National Institute for Occupational Safety and Health
Extramural Research Awards in Fiscal Year 2003
New and Continuing Grants and Cooperative Agreements

This report contains information about extramural research projects (including centers and conferences) that received funding in FY2003. The projects are listed in a table, followed by descriptions of the projects (there are no descriptions for the conferences). Training grants are not included in this document. Descriptions were prepared by the principal investigators

The projects are grouped by Program Area. Projects that were determined by the Quality Assurance Committee of NIOSH to address NORA are marked by having "(NORA)" at the end of the Program Area name. Although each project is assigned to one primary Program Area, there are many projects that relate to more than one area. The "Find" feature may be used to locate words or phrases of interest (Ctrl F).

Inquiries about this report may be directed to the NIOSH Office of Extramural Programs in Atlanta, GA at 404-498-2530.

National Institute for Occupational Safety and Health
Office of Extramural Program — Project List

	Program Area	Title	Investigator	Grant Number	Project Start and End Dates:
1	Allergic and Irritant Dermatitis	Dermal Absorption of Cutting Fluid Mixtures	Baynes, Ronald	R01 OH003669	8/1/2000-7/31/2004
1	Asthma & Chronic Obstructive Pulmonary Disease	Occupational COPD in Kaiser Permanente Northwest – PERT	Buist, Sonia	U36 C319276D	9/30/2002-9/29/2005
2	Asthma & Chronic Obstructive Pulmonary Disease	Lung Disease in Chinese Textile Workers	Christiani, David	R01 OH002421	9/30/2001-9/29/2005
3	Asthma & Chronic Obstructive Pulmonary Disease	Longitudinal Study of Isocyanate Asthma in Body Shops	Cullen, Mark	R01 OH003457	9/30/2002-9/29/2007
4	Asthma & Chronic Obstructive Pulmonary Disease	A Validated Asthma Questionnaire for Healthcare Workers	Delclos, George	R01 OH003945	9/30/2001-9/29/2004
5	Asthma & Chronic Obstructive Pulmonary Disease	Evaluation of Digital Chest Radiographs for Pneumoconioses – PERT	Franzblau, Alfred	U36 300430AM	9/30/2002-9/29/2005
6	Asthma & Chronic Obstructive Pulmonary Disease	PNOR/PNOC Exposures & the Development of COPD – PERT	Glindmeyer, Henry	U36 C319276A	9/30/2001-9/29/2004
7	Asthma & Chronic Obstructive Pulmonary Disease	Pulmonary Effects of Machining Fluid Aerosols	Gordon, Terry	R01 OH003044	9/30/2001-9/29/2004
8	Asthma & Chronic Obstructive Pulmonary Disease	COPD: Occupational, Airway Responsiveness & Smoking Effect – PERT	Harber, Phillip	U36 C319276B	9/30/2001-9/29/2004
9	Asthma & Chronic Obstructive Pulmonary Disease	Isocyanate Exposure Intervention Study in Body Shops	Liu, Youcheng	R01 OH004246	9/30/2002-9/29/2005
10	Asthma & Chronic Obstructive Pulmonary Disease	Physiologic Characterization of Occupational Asthma	Sama, Susan	K01 OH007608	9/1/2002-8/31/2005
11	Asthma & Chronic Obstructive Pulmonary Disease	COPD Risks in Carpenters	Wegman, David	R21 OH007718	9/30/2002-9/29/2004
12	Asthma & COPD	Addressing Asthma from a PH Perspective (multi state)	Currier, Mary	U59 CC323194	9/1/2003-8/31/2006
1	Cancer Research Methods	P53 Biomarker and Intervention in Occupational Cancer	Brandt-Rauf, Paul	R01 OH007590	6/1/2002-5/31/2005
2	Cancer Research Methods	Susceptibility and Occupational Radiation Risks	Richardson, David	R01 OH007871	9/30/2002-9/29/2005
3	Cancer Research Methods	Time-Factors in Exposure Effects Among Uranium Workers	Richardson, David	R03 OH007521	5/1/2002-4/30/2004
1	Control Technology	Decay of Acclimation and Time for Re-acclimation	Ashley, Candi	R03 OH007836	9/30/2003-9/29/2005
2	Control Technology	Field Studies with Innovative Safe Excavation Technologies	Bernold, Leonhard	R01 OH004201	9/30/2001-9/29/2004
3	Control Technology	Midwest Nursery Grower Intervention	Chapman, Larry	U01 OH008100	9/30/2003-9/29/2007
4	Control Technology	On-Board Diagnostic Sensor for Respirator Breakthrough	Deininger, Debra	R44 OH004174	9/30/2002-9/29/2004
5	Control Technology	Downed Firefighter Location System	Fobare, Mark	R43 OH007960	9/15/2003-3/14/2004
6	Control Technology	Integrated Stability Mapping System for Mines	Heasley, Keith	R01 OH007751	9/1/2002-8/31/2005
7	Control Technology	Control Measures for Silica Exposures for Tuckpointing	Heitbrink, William	R21 OH007761	9/30/2002-9/29/2004
8	Control Technology	Improved Health and Safety in Mining through Helical Drilling and Rock Bolt Anchoring	Hill, John	R01 OH007727	9/30/2002-9/29/2006
9	Control Technology	Use of Digital Imagery to Characterize Rock Masses	Kemeny, John	R01 OH007739	9/1/2002-8/31/2005
10	Control Technology	Measurements and Control of Diesel Emissions in Underground Mines	Lu, Mingming	R01 OH007679	9/1/2002-8/31/2005
11	Control Technology	Engineering Control of Longwall Machine Noises	Luo, Yi	R01 OH007732	9/1/2002-8/31/2005
12	Control Technology	Respiratory Protection Against Bioaerosols in Agriculture	Reponen, Tiina	R01 OH004085	6/1/2001-5/31/2004
1	Exposure Assessment Methods	A Simple Device for Measuring Omnidirectional Germicidal UV Radiation	Echols, Stanley	R44 OH003881	9/30/2002-9/29/2004
2	Exposure Assessment Methods	Predicting Relative Workload During Physically Demanding Work	Abdelhamid, Tariq	R03 OH007604	9/1/2002-8/31/2004
3	Exposure Assessment Methods	Real-time In Situ Aerosol Monitoring in Mine Atmospheres	Baum, Marc	R01 OH007680	9/1/2002-8/31/2006
4	Exposure Assessment Methods	Inhalation Dosimetry/Exposure Index of Fiber Aerosol in Human Respiratory Tract	Cheng, Yung-Sung	R01 OH003900	9/1/2002-8/31/2007
5	Exposure Assessment Methods	Investigating Principles of Workroom Exposure	Feigley, Charles	R01 OH007626	9/1/2001-8/31/2004
6	Exposure Assessment Methods	Numerical Modeling of Size-Specific Aerosol Concentration	Flynn, Michael	R01 OH007363	9/30/2001-9/29/2004
7	Exposure Assessment Methods	Real-Time, In-Use PM Measurement from Diesel Engines	Gautam, Mridul	R01 OH007729	9/1/2002-8/31/2005
8	Exposure Assessment Methods	Comparison of Concentrations at Personal Exposure Sampling Locations	Guffey, Steven	R01 OH007587	7/1/2001-6/30/2004
9	Exposure Assessment Methods	Pesticide Dose Monitoring in Turf Appplicators	Harris, Shelley	R01 OH004084	8/1/2002-7/31/2005
10	Exposure Assessment Methods	Novel Hydrogen Sulfide Sensors for Portable Monitors	Hooker, Matthew	R44 OH007471	9/15/2003-9/14/2005
11	Exposure Assessment Methods	Improved Methods for Dermal Exposure Estimation	Kasting, Gerald	R01 OH007529	9/1/2002-8/31/2006
12	Exposure Assessment Methods	Measuring Human Fatigue with the BLT Prototype	Langley, Theodore	R43 OH007664	9/15/2003-3/14/2004
13	Exposure Assessment Methods	Chrysotile: New Exposure Indices and Cancer Epidemiology	Loomis, Dana	R01 OH007803	9/30/2003-9/29/2007
14	Exposure Assessment Methods	A Novel and Non-Invasive Method of Dermal Sampling for Exposure Assessment	Mitragotri, Samir	R03 OH007524	9/30/2002-9/29/2004
15	Exposure Assessment Methods	Dermal Exposure to 1,6-Hexamethylene Disocyanate	Nylander-French, Leena	R01 OH007598	8/1/2003-7/31/2006
16	Exposure Assessment Methods	B2-Microglobulin: Renal Biomarker of Workplace U Exposure	Pinney, Susan	R01 OH007976	9/30/2003-9/29/2005

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	Program Area	Title	Investigator	Grant Number	Project Start and End Dates:
17	Exposure Assessment Methods	Validation of Biomarkers in Humans Exposed to PAHs	Qu, Qingshan	R21 OH007632	1/1/2002-12/31/2004
18	Exposure Assessment Methods	New Methods for Evaluation of Organic Dust Aerosols-Colorado	Reynolds, Stephen	R01 OH007841	8/1/2002-7/31/2007
19	Exposure Assessment Methods	Genetic/Exposure Interaction in Beryllium Disease	Rosenman, Kenneth	R01 OH007495	8/1/2003-7/31/2006
20	Exposure Assessment Methods	Biological Monitoring of Woodsmoke Exposure	Simpson, Christopher	R03 OH007656	9/1/2002-8/31/2004
21	Exposure Assessment Methods	Evaluation of Exposure Measurement Error	Symanski, Elaine	R03 OH007834	9/30/2003-9/29/2005
22	Exposure Assessment Methods	Dermatopharmacokinetics: In Vivo Analysis of Solvents	Thrall, Karla	R01 OH003658	9/30/2003-9/29/2006
23	Exposure Assessment Methods	Health Effects of Occupational Exposures in PGDP Workers	Tollerud, David	R01 OH007650	7/15/2002-7/14/2005
24	Exposure Assessment Methods	Molecular Analysis of Mycobacteria in Cutting Fluids	Yadav, Jagjit	R01 OH007364	9/30/2001-9/29/2004
1	Fertility & Pregnancy Abnormalities	Developmental Immunotoxicity of Atrazine	Barnett, John	R21 OH007686	9/29/2002-9/29/2004
2	Fertility & Pregnancy Abnormalities	Reproductive Outcomes in Workers with Past Exposure to Dioxins in Ufa (Russian Federation)	Dardynskaia, Irina	K01 OH007609	8/11/2003-8/10/2006
3	Fertility & Pregnancy Abnormalities	Endocrine Disruptors and Neurodevelopmental Outcome	Eskenazi, Brenda	R01 OH007400	9/29/2001-9/29/2005
4	Fertility & Pregnancy Abnormalities	Exposure to Bisphenol A and Its Reproductive Effect in Humans	Li, De-Kun	R01 OH007580	9/30/2003-9/29/2008
5	Fertility & Pregnancy Abnormalities	Male Reproductive Effects from Occupational Exposure to Boron	Robbins, Wendie	R01 OH007575	9/30/2001-9/29/2006
1	Health Services Research	Sharp Instrument Injuries and Use of Clinical Services	Maupome, Gerardo	R03 OH007512	9/30/2003-9/29/2005
2	Health Services Research	Geographic Variation in Spine Care Among Injured Workers	Rischitelli, D.	K01 OH007922	9/30/2003-9/29/2006
1	Hearing Loss	A Model Hearing Conservation Program for Coal Miners	Bise, Christopher J.	U60 CC315855	12/1/1998-5/31/2004
2	Hearing Loss	Adverse Effects of Noise on Hearing: Basic Mechanisms	Bohne, Barbara	R01 OH003973	5/1/2001-4/30/2006
3	Hearing Loss	Models for Assessing Risk of Occupational Hearing Loss	Fechter, Laurence	R01 OH003481	9/30/2002-9/29/2006
4	Hearing Loss	Development of A School-Based Hearing Conversation Program for Use in Rural Areas	Flamme, Gregory	R21 OH007707	9/30/2002-9/29/2004
5	Hearing Loss	Noise, Solvents, and Hearing Loss	Rabinowitz, Peter	R01 OH007724	9/30/2002-9/29/2005
6	Hearing Loss	Prospective Study of Hearing Damage Among Newly-Hired Construction Workers	Seixas, Noah	R01 OH003912	9/30/1999-9/29/2004
1	Indoor Environment	Floor-Supply Displacement Ventilation System	Chen, Qingyan	R01 OH004076	9/30/2001-9/29/2004
2	Indoor Environment	Health and Socioeconomic Consequences of NSBRI	Redlich, Carrie	R01 OH004182	4/1/2001-3/31/2004
3	Indoor Environment	An Indoor Environment Design Tool for Entire Buildings	Srebric, Jelena	K01 OH007445	8/1/2001-7/31/2004
4	Indoor Environment	Microanalytical System for Indoor VOC Monitoring	Zellers, Edward	R01 OH003692	9/30/1998-5/31/2005
1	Infectious Diseases	Body Substance Exposures: Risk Factors and Psychological Impact	Babcock, Hilary	K01 OH007614	9/1/2002-8/31/2005
2	Infectious Diseases	A Case-crossover Study of Sharps-related Injuries	Mittleman, Murray	R01 OH007489	9/1/2002-8/31/2006
1	Intervention Effectiveness Research	Small Business Safety Officer	Fraser, Mark	R44 OH004183	9/30/2002-9/29/2004
2	Intervention Effectiveness Research	WHO Global Occupational Health Programme	Goldstein, Gregory	U60 CC008636	9/30/1992-9/29/2004
3	Intervention Effectiveness Research	IMHOTEP	Haynes, John	U50 CC411492	9/9/1994-1/28/2005
4	Intervention Effectiveness Research	Hazardous Substance Training for Emergency Responders	Lamar, Eric	U01 OH007869	9/30/2002-9/29/2007
5	Intervention Effectiveness Research Methods	Effectiveness of Computer-Based Training: cTRAIN	Anger, Kent	R01 OH004193	4/1/2001-3/31/2004
6	Intervention Effectiveness Research Methods	Intervention Research on Work Organization Factors and Health	Brisson, Chantal	R01 OH007647	9/30/2002-9/29/2005
7	Intervention Effectiveness Research Methods	Promoting Prevention in Managed Care	Findlay, Steve	USC CC387112	9/30/1999-9/29/2004
8	Intervention Effectiveness Research Methods	Effectiveness of Intervention on Health	Brosseau, Lisa	R21 OH007741	9/30/2002-9/29/2004
9	Intervention Effectiveness Research Methods	Designing Ergonomic Interventions for the Fire Service	Conrad, Karen	R01 OH007490	9/30/2002-9/29/2005
10	Intervention Effectiveness Research Methods	Certified Safe Farm: Evaluating Health Insurance Claims	Donham, Kelley	U01 OH008110	9/1/2003-8/31/2007
11	Intervention Effectiveness Research Methods	Sun Protection and Skin Cancer Awareness in Watermen	Ehrlich, Alison	R03 OH007843	8/1/2003-7/31/2005
12	Intervention Effectiveness Research Methods	Evaluation of the NAGCAT Tractor Guidelines	Fathallah, Fadi	R01 OH007850	8/1/2003-7/31/2006
13	Intervention Effectiveness Research Methods	Effects of Physical Conditioning on Lifting Biomechanics	Granata, Kevin	R01 OH007352	9/30/2001-9/29/2004
14	Intervention Effectiveness Research Methods	Occupational Safety and Health Training for Teleworkers	Harrington, Susan	R44 OH007461	9/15/2003-9/14/2005
15	Intervention Effectiveness Research Methods	Effectiveness of Farm Safety Day Camps for Children	McCallum, Debra	R01 OH007536	9/30/2001-9/29/2004
16	Intervention Effectiveness Research Methods	Causes and Effects of Compliance with OSHA Standards	Mendeloff, John	R01 OH007817	6/1/2003-5/31/2006
17	Intervention Effectiveness Research Methods	Ergonomic Partnership to Address Treefruit Worker Injury	Miles, John	U01 OH008091	9/30/2003-9/29/2007

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	Program Area	Title	Investigator	Grant Number	Project Start and End Dates:
18	Intervention Effectiveness Research Methods	Evaluation of Farm Safety 4Just Kids Day Camps	Reed, Deborah	R01 OH007534	9/30/2001-9/29/2004
1	Mixed Exposures	Experimental and Computational Methods for Quantitating the Absorption of Complex Chemical Mixtures Through Skin	Riviere, Jim	R01 OH007555	6/1/2001-5/31/2004
2	Mixed Exposures	Complex Mixture Modeling of Organophosphate Pesticides	Timchalk, Charles	R01 OH003629	9/30/2001-9/29/2004
1	Musculoskeletal Disorders: Low Back	Lift Aid Use in Reducing Injuries in Nursing Personnel	Bohr, Paula	R21 OH007708	9/30/2002-9/29/2004
2	Musculoskeletal Disorders: Low Back	Low Back Pain: Quantifying Risk Factors	Garg, Arun	U01 OH008083	9/30/2003-9/29/2006
3	Musculoskeletal Disorders: Low Back	Reducing Low-Back Disorders Using a New Sitting Design	Makhsous, Mohsen	R21 OH007737	9/30/2002-9/29/2004
4	Musculoskeletal Disorders: Low Back	Neuro-Fuzzy Prediction of Spine Loads in Response to Risk Factors	Marras, William	R01 OH007787	9/30/2002-9/29/2006
5	Musculoskeletal Disorders: Low Back	Spine Loading and Muscle Overexertion During Repetitive Lifting	Marras, William	R01 OH003913	9/30/2000-9/29/2004
6	Musculoskeletal Disorders: Low Back	Identifying Safe Load Moment Exposures for the Back	Marras, William	U01 OH007313	9/30/2000-9/29/2005
7	Musculoskeletal Disorders: Low Back	Biomechanical and Psychosocial Risks for Low Back Disorders	Marras, William	R01 OH003914	9/1/2001-8/31/2004
8	Musculoskeletal Disorders: Low Back	Back Pain & Work Disability in Health Care Workers	Pompeii, Lisa	K01 OH007996	9/30/2003-9/29/2006
9	Musculoskeletal Disorders: Low Back	Biomechanics and Physiology of Cumulative Low Back Disorders	Solomonow, Moshe	R01 OH007622	8/1/2003-7/31/2008
10	Musculoskeletal Disorders: Low Back	Low Back Pain: A Multicenter Randomized Trial	Weinstein, James	R01 AR045444	9/30/1999-9/29/2004
11	Musculoskeletal Disorders: Low Back	Vibration, Proprioception, and Low Back Stability	Wilson, Sara	R03 OH007995	9/30/2003-9/29/2005
1	Musculoskeletal Disorders: Upper Extremities	Force- Repetition Interaction in a Rat Injury Model of C.T.D.	Barbe, Mary	R01 OH003970	6/1/2000-5/31/2005
2	Musculoskeletal Disorders: Upper Extremities	Exposure Response Relationship in Hand Arm Vibration	Cherniack, Martin	U01 OH007312	9/30/2000-9/29/2005
3	Musculoskeletal Disorders: Upper Extremities	Estimating Joint Impedance from the Surface EMG	Clancy, Edward	R03 OH007829	9/15/2003-9/14/2005
4	Musculoskeletal Disorders: Upper Extremities	Upper Limb Musculoskeletal Disorders: Quantifying Risk	Garg, Arun	U01 OH007917	9/30/2002-9/29/2006
5	Musculoskeletal Disorders: Upper Extremities	Prospective Study of UEMSD and Physical Job Stressors	Gerr, Fredric	R01 OH007945	9/30/2003-9/29/2007
6	Musculoskeletal Disorders: Upper Extremities	In Vivo Rabbit Model of Finger Musculoskeletal Disorders	King, Karen	R01 OH007786	9/30/2003-9/29/2007
7	Musculoskeletal Disorders: Upper Extremities	Effects of Repetitive Work on Fatigue of Long Duration	Lehman, Steven	R01 OH007441	9/30/2001-9/29/2005
8	Musculoskeletal Disorders: Upper Extremities	Prevention of MSDs in Plant Nursery Work	Miles, John	R21 OH007738	9/30/2002-9/29/2004
9	Musculoskeletal Disorders: Upper Extremities	Computer Use and Musculoskeletal Disorders	Monteilh, Carolyn	R03 OH007612	9/1/2002-8/31/2004
10	Musculoskeletal Disorders: Upper Extremities	Musculoskeletal Stress in Repetitive Precision Tasks	Paquet, Victor	R03 OH007532	5/1/2002-4/30/2004
11	Musculoskeletal Disorders: Upper Extremities	Biomechanical Effects of Industrial Eccentric Exertions	Radwin, Robert	R01 OH007793	9/30/2002-9/29/2005
12	Musculoskeletal Disorders: Upper Extremities	A Model for Wrist and Elbow Musculoskeletal Disorders	Rempel, David	R01 OH007359	7/1/2001-6/30/2005
13	Musculoskeletal Disorders: Upper Extremities	Collaborative Study of Workplace Musculoskeletal Disorders	Rempel, David	R01 OH007914	9/30/2003-9/29/2007
14	Musculoskeletal Disorders: Upper Extremities	Ergonomic Interventions for Garment Work	Ritz, Beate	R01 OH007779	9/30/2002-9/29/2005
15	Musculoskeletal Disorders: Upper Extremities	Prospective Study of Upper Extremity Musculoskeletal Disorders	Silverstein, Barbara	U01 OH007316	9/30/2000-9/29/2005
16	Musculoskeletal Disorders: Upper Extremities	Cumulative Trauma Disorder: Skeletal Muscle Dysfunction	Stauber, William	R01 OH002918	6/1/2001-5/31/2004
17	Musculoskeletal Disorders: Upper Extremities	Shoulder, Low Back, or Knee Strength Degradation	Zhang, Xudong	K01 OH007838	9/1/2003-8/31/2006
1	Neurological Disorders	Solvent-Related Functional Brain Abnormalities	Morrow, Lisa	R01 OH003646	9/30/2001-9/29/2004
1	Organization of Work	Physical & Social Hazards: Jobs, Race, Gender & Health	Barbeau, Elizabeth	R01 OH007366	9/30/2001-9/29/2004
2	Organization of Work	Effects of Extended Work Hours on Intern Health and Safety	Czeisler, Charles	R01 OH007567	9/30/2001-9/30/2005
3	Organization of Work	Practical Circadian Interventions for Night Shift Work	Eastman, Charmane	R01 OH003954	8/1/2003-4/30/2008
4	Organization of Work	Occupational Physical Activity and Circulatory Diseases	Krause, Niklas	R01 OH007820	8/1/2003-7/31/2006
5	Organization of Work	Work Hours, Musculoskeletal Disorders and CVD Risk	Landsbergis, Paul	R01 OH007577	9/30/2001-9/30/2005
6	Organization of Work	The Impact of Total Workload on Maternal Postpartum Health and Quality of Life	McGovern, Patricia	R18 OH003605	9/30/1999-9/29/2004
7	Organization of Work	Work Organization and Health Among Home Care Workers	Muntaner, Carles	R01 OH007440	9/30/2001-9/29/2004
8	Organization of Work	Work Organizational Factors and Psychological Distress	Osinubi, Omowunmi	R21 OH007713	9/30/2002-9/29/2004
9	Organization of Work	Extended Work Schedules and Workplace Injury in Nurses	Trinkoff, Alison	R01 OH007554	9/30/2001-9/30/2005
1	Risk Assessment Methods	Risk Assessment for Airborne Bioterrorism Agents – PERT	Nicas, Mark	U36 300430AQ	3/1/2003-2/28/2005
2	Risk Assessment Methods	Stochastic Models for Radiation Carcinogenesis: Temporal Factors and Dose-Rate Effects	Moolgavkar, Suresh	R01 OH007864	9/30/2002-9/29/2005

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3	Risk Assessment Methods	Physiologically-Based Pharmacolinetic/Clonal Growth Modeling: Predicting Cancer Potential of Chemical Mixtures	Yang, Raymond	R01 OH007556	6/1/2001-5/31/2004
1	Social and Economic Consequences of Occupational Injury & Disease	Disability Risk in Work-Related Musculoskeletal Injuries	Franklin, Gary	R01 OH004069	9/30/2001-9/29/2006
2	Social and Economic Consequences of Occupational Injury & Disease	On-the-Job Injury: Employment History and Hidden Losses	Galizzi, Monica	K01 OH007999	9/1/2003-8/31/2006
3	Social and Economic Consequences of Occupational Injury & Disease	Unclaimed Injuries and Workers' Compensation Adequacy	Lakdawalla, Darius	R03 OH007619	9/1/2002-8/31/2004
4	Social and Economic Consequences of Occupational Injury & Disease	Use of Health and Social Services Following Work Injury	Shannon, Harry	R01 OH007811	9/15/2003-9/14/2005
5	Social and Economic Consequences of Occupational Injury & Disease	Social/Economic Impact of Injury/Illness in Career Roofers	Welch, Laura	R01 OH003699	9/30/2001-9/29/2005
1	Special Populations	Effectiveness of Computer-based Safety Training in Vineyard Workers	Anger, W.	U01 OH008104	9/30/2003-9/29/2007
2	Special Populations	Casa A Campo: Pesticide Safety for Farmworkers' Families	Arcury, Thomas	R25 OH007611	9/30/2001-9/29/2005
3	Special Populations	Jornaleros Unidos con el Pueblo (Day Laborers United with the Community)	Bhatia, Rajiv	R25 OH008146	9/30/2003-9/29/2007
4	Special Populations	Worker Genetic Susceptibility to Mutagenic Risk	Brandt-Rauf, Paul	R01 OH004192	7/1/2001-6/30/2004
5	Special Populations	Biomechanics of Human Reactions to Slip Events	Cham Dit Tham, Rakie	R03 OH007533	5/1/2002-4/30/2004
6	Special Populations	Biomechanics of Slips in Older Adults	Cham Dit Tham, Rakie	R01 OH007592	8/1/2002-7/31/2005
7	Special Populations	Pilot Study of Ag-related Injuries Impacting Amish Community	Field, William	R21 OH007711	9/30/2002-9/29/2004
8	Special Populations	Effects of Aging on the Biomechanics of Slips and Falls	Lockhart, Thurmon	K01 OH007450	7/1/2001-6/30/2004
9	Special Populations	Removing the HOOA Family Farm Exemption: Impact on Injury	Marlenga, Barbara	R01 OH008046	9/30/2003-9/29/2006
10	Special Populations	Community Collaboration for Farmworker Health and Safety	May, John	R25 OH008144	9/1/2003-8/31/2007
11	Special Populations	Biomarkers of Pesticide Toxicity Among Teen Farmworkers	McCauley, Linda	R01 OH008057	9/30/2003-9/29/2006
12	Special Populations	Sustained Work Indicators of Older Farmers	Reed, Deborah	R01 OH004157	9/30/2001-9/29/2006
13	Special Populations	Nail Salon Hazards and Health Effects	Roelofs, Cora	K01 OH007956	9/1/2003-8/31/2006
14	Special Populations	Evaluation of Occupational Carrying Tasks for Farm Youth	Schwab, Charles	R01 OH008058	9/1/2003-8/31/2006
15	Special Populations	Health Disparities Among Health Workers	Slatin, Craig	R01 OH007381	9/30/2000-9/29/2005
16	Special Populations	Occupational Health of Immigrants Working in Restaurants	Tsai, Jenny	R03 OH007840	9/1/2003-8/31/2005
17	Special Populations	Adherence to the NAGCAT and Injury Risk Reduction	Wilkins III, John	R01 OH008070	9/30/2003-9/29/2006
18	Special Populations	Childhood Agricultural Trauma Evaluation System	Williams, Allan	R01 OH004265	9/30/2000-9/29/2004
19	Special Populations	Community Health Intervention with Yakima Agricultural Workers	Keifer, Matthew	R25 OH008143	9/1/2003-8/31/2007
1	Surveillance Research	Building Environmental Epidemiology Capacity at the State Level (CSTE)	Knutson, Donna	U01 CC007277	9/30/1991-9/30/2005
2	Surveillance Research	Core: Maine; Occupational Safety Core Surveillance Indicator Program	Lim, Kim	U53 CC122293	9/30/2002-9/29/2005
3	Surveillance Research	Core: Occupational Health Surveillance in Michigan	Cameron, Lorraine	U01 OH007306	9/30/2000-9/29/2004
4	Surveillance Research	Core: Surveillance Model Program in California	Harrison, Robert	U01 OH007307	9/30/2000-9/29/2004
5	Surveillance Research	Core: Surveillance of Occupational Health in New York	Gelberg, Kitty	U01 OH007308	7/1/2001-6/30/2005
6	Surveillance Research	Enhanced Surveillance of Occupational Injuries to Youth < 18	Davis, Letitia	U01 OH007301	9/30/2000-9/30/2004
7	Surveillance Research	Enhancement of NC State-based Occupational Surveillance	Buckheit, Kathleen	U53 CC422294	9/30/2002-9/29/2005
8	Surveillance Research	FACE: Alaska	Middaugh, John	U60 CC007089	9/1/2001-8/31/2006
9	Surveillance Research	FACE: California	Harrison, Robert	U60 CC907284	9/1/2001-8/31/2006
10	Surveillance Research	FACE: Iowa	Quinlisk, Patricia	U60 CC708674	9/1/2001-8/31/2006
11	Surveillance Research	FACE: Kentucky	Williams, Patricia	U60 CC409879	9/1/2002-8/31/2006
12	Surveillance Research	FACE: Massachusetts	Davis, Letitia	U60 CC108704	9/1/2001-8/31/2006
13	Surveillance Research	FACE: Michigan	Grether, Deborah	U60 CC521205	9/30/2002-9/29/2006
14	Surveillance Research	FACE: Minnesota	Bender, Alan	U60 CC507283	9/1/2001-8/31/2006
15	Surveillance Research	FACE: Nebraska	Hetzler, William	U60 CC709864	9/1/2002-8/31/2006
16	Surveillance Research	FACE: New Jersey	Bresnitz, Eddy	U60 CC207088	9/1/2001-8/31/2006
17	Surveillance Research	FACE: New York	Gelberg, Kitty	U60 CC220784	9/1/2001-8/31/2006
18	Surveillance Research	FACE: Oklahoma	Mallonee, Sue	U60 CC613938	9/30/2002-9/29/2006
19	Surveillance Research	FACE: Oregon	Heumann, Michael	U60 CC021204	9/1/2002-8/31/2006
20	Surveillance Research	FACE: Washington	Cohen, Martin	U60 CC013928	9/1/2002-8/31/2006

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21	Surveillance Research	FACE: West Virginia	King, Mark	U60 CC312914	9/1/2001-8/31/2006
22	Surveillance Research	FACE: Wisconsin	Hanrahan, Lawrence	U60 CC507081	9/1/2001-8/31/2006
23	Surveillance Research	New Mexico; Worker Health Surveillance	Voorhees, Ronald	U53 CC622291	9/30/2002-9/29/2005
24	Surveillance Research	SENSOR: California	Harrison, Robert	U60 CC902990	9/30/2002-9/29/2005
25	Surveillance Research	SENSOR: Massachusetts; Surveillance of Work-Related Asthma	Davis, Letita	U60 CC103010	9/30/2002-9/29/2005
26	Surveillance Research	SENSOR: Michigan	Kalinowski, Douglas	U60 CC515856	9/30/2002-9/29/2005
27	Surveillance Research	SENSOR: New Jersey; Surv of Occup Asthma and Silicosis	Valiante, David	U60 CC208160	9/30/2002-9/29/2005
28	Surveillance Research	SENSOR: New York; Sentinel Event Notification of Occupational Risks	Mauer, Matthew	U60 CC215858	9/30/2002-9/29/2005
29	Surveillance Research	SENSOR: Oregon	Heumann, Michael	U60 CC008161	9/30/2002-9/29/2005
30	Surveillance Research	SENSOR: Texas; Occupational Pesticide Poisoning	Rosales, Rachel	U60 CC602983	9/30/2002-9/29/2005
31	Surveillance Research	SENSOR: Utah; State-Based Surveillance of Work-Related Burns	Ball, R.	U60 CC814698	9/30/2002-9/29/2005
32	Surveillance Research	Surveillance of Mortality and Morbidity in U.S. Workers	Fleming, Lora	R01 OH003915	9/1/2002-8/31/2005
33	Surveillance Research	Surveillance of Work-Related Carpal Tunnel Syndrome	Harrison, Robert	U01 OH007297	9/30/2000-4/29/2004
34	Surveillance Research Methods	The Youth Employment Training Pilot Program	Anderson, Henry	U01 OH007298	9/30/2000-4/30/2004
35	Surveillance Research Methods	Capture-Recapture Estimates of Workplace Injury Rates	Boden, Leslie	R01 OH007596	9/1/2002-8/31/2005
36	Surveillance Research Methods	Core: Occupational Surveillance Modules for Prevention	Bonauto, David	U01 OH007292	7/1/2001-6/30/2005
37	Surveillance Research Methods	Core: Occupational Health Surveillance in Massachusetts	Davis, Letitia	U01 OH007302	7/1/2001-6/30/2005
38	Surveillance Research Methods	Surveillance Methods for Health Care and Related Workers	Dement, John	R01 OH003979	9/30/2001-9/29/2005
39	Surveillance Research Methods	A Comprehensive Surveillance of Occupational Injury in Maryland	Dischinger, Patricia	R01 OH007830	7/10/2003-7/9/2006
40	Surveillance Research Methods	Connecticut; Occup Dis Surv Enhancement Project	Fleissner, Mary Lou	U53 CC122295	9/30/2002-9/29/2005
41	Surveillance Research Methods	Improving Data Quality in Pesticide Illness Surveillance	VanDerslice, Jim	U01 OH007296	9/30/2000-9/29/2004
1	Traumatic Injuries	Risks for Workplace Violence in Long-Haul Truckers	Anderson, Debra	R01 OH007931	9/30/2002-9/29/2005
2	Traumatic Injuries	Spokane Workplace Domestic Violence Initiative	Blodgett, Christopher	R01 OH007947	9/30/2002-9/29/2005
3	Traumatic Injuries	Wisconsin Dairy Traumatic Occupational Injury Intervention	Chapman, Larry	R01 OH007578	9/30/2001-9/29/2005
4	Traumatic Injuries	Organizational Factors Affecting Police Victimization	Fridell, Lorie	R01 OH007946	9/30/2002-9/29/2004
5	Traumatic Injuries	Surveillance Research Methods in Construction Injury	Glazner, Judith	R01 OH007633	9/30/2002-9/29/2005
6	Traumatic Injuries	Evaluation of Traumatic Injuries in HCW During Surgery	Korniewicz, Denise	R01 OH007558	9/30/2001-9/29/2005
7	Traumatic Injuries	Evaluation of Workplace Violence Prevention Intervention	Lipscomb, Jane	R01 OH007948	9/30/2002-9/29/2007
8	Traumatic Injuries	Workplace Violence Risk in the Home Health Work Place	Lipscomb, Jane	R21 OH007754	9/30/2002-9/29/2004
9	Traumatic Injuries	Homicide During Robbery: A Case-Control Study	Loomis, Dana	R01 OH003897	8/1/2003-7/31/2005
10	Traumatic Injuries	Occupational Injuries Among Commercial Fishers	Loomis, Dana	R01 OH004073	6/1/2000-5/31/2004
11	Traumatic Injuries	Risk Factors and Controls for Falls From Heights	Nussbaum, Maury	R01 OH007882	9/1/2003-8/31/2007
12	Traumatic Injuries	Trucking Firm Characteristics, Driver Injury and Outcome	Oleinick, Arthur	R01 OH003804	7/1/2001-6/30/2004
13	Traumatic Injuries	Evaluation of California Initiatives to Reduce Violence in Health Care Settings	Peek-Asa, Corrine	R01 OH007934	9/30/2002-9/29/2005
14	Traumatic Injuries	Work-Related Motor Vehicle Crashes: Reducing the Burden	Peele, Pamela	R01 OH003419	9/30/2001-9/29/2004
15	Traumatic Injuries	A Strong Construction Injury Prevention Intervention at the Subcontractor Level	Stafford, Pete	R01 OH007565	9/30/2001-9/29/2004
16	Traumatic Injuries	Adolescent Farm Work, Fatigue and Injuries in Colorado	Stallones, Lorann	R21 OH007744	9/30/2002-9/29/2004
1	Center Grant	Ohio Regional Center for Agricultural Disease and Injury Research, Education and Prevention	Bean, Thomas	U50 OH008108	9/30/2003-9/29/2006
2	Center Grant	Washington Ag Center	Fenske, Richard	U50 OH007544	9/30/2001-9/29/2006
3	Center Grant	North Carolina Ag Center	Gustke, Susan	U50 OH007551	9/30/2001-9/29/2006
4	Center Grant	National Children's Center for Rural & Ag Health & Safety	Lee, Barbara	U50 OH008107	9/30/2003-9/29/2008
5	Center Grant	Texas Ag Center	Levin, Jeffrey	U50 OH007541	9/30/2001-9/29/2006
6	Center Grant	New York Ag Center	May, John	U50 OH007542	9/30/2001-9/29/2006
7	Center Grant	Kentucky Ag Center	McKnight, Robert	U50 OH007547	9/30/2001-9/29/2006
8	Center Grant	High Plains Intermountain Center for Ag Health & Safety	Reynolds, Stephen	U50 OH008085	9/15/2003-9/14/2006

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9	Center Grant	Colorado Ag Center	Reynolds, Steve	U50 OH007545	9/30/2001-9/29/2003
10	Center Grant	Iowa Ag Center	Sanderson, Wayne	U50 OH007548	9/30/2001-9/29/2006
11	Center Grant	California Ag Center of UC Davis	Schenker, Marc	U50 OH007550	9/30/2001-9/29/2006
12	Center Grant	Establishment of the Western Mining Resource Center at Colorado School of Mines	Rozgonyi, Tibor	U60 CC816929	9/1/1999-8/31/2004
13	Center Grant	Safety and Health Interventions in the Construction Industry	Stafford, Pete	U60 CC317202	9/30/1999-6/30/2004
1	ASPH/ATPM	Efficacy Study on Skin Protection in Body Shops	Liu, Youcheng	U36 C319276E	Project has not been assigned a working period
2	ASPH/ATPM	Prevention of Exposure to Creosote in Dockbuilders	Moline, Jacqueline	U50 CC300860	Project has not been assigned a working period
3	ASPH/ATPM	Operation of a Post Doctoral Research Associateship Program	Nyquist, Judy	U60 CC300478	5/1/1983-7/31/2004
4	ASPH/ATPM	Research, Prevention Education, and Clinical Services in Occupational Safety and Health Clinics	Parazino, Grace	U60 CC317613	9/30/1999-9/29/2004
5	ASPH/ATPM	Evaluation of Needlestick Prevention Information Dissemination Project	Richter, Donna	U36 C300430K	9/30/2003-9/30/2004
6	ASPH/ATPM	ASPH for the Improvement of Interaction Between Phase and PHPS	Riedel, Sara	U36 CC300430	9/28/1981-9/27/2004
1	Conference Grants	Mediating Conflict in the Workplace Conference, February 27, 2004	Baker, Robin	R13 CC923060	9/1/2003-3/31/2004
2	Conference Grants	Intervention Effectiveness Research: An Agenda Setting Conference for Agricultural Safety and Health	Bean, Thomas	R13 CC522991	1/15/2004-1/14/2005
3	Conference Grants	5th International Symposium Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities	Dosman, James	U13 CC023037	9/30/2003-9/29/2004
4	Conference Grants	West Virginia Ag Safety Days Workshop	Echols, Lee	C13 CC322994	7/1/2003-2/27/2004
5	Conference Grants	Agroterrorism Workshop: Engaging Community Preparedness, February 12, 2004	Levin, Jeffrey	R13 CC622989	9/1/2003-8/31/2004
6	Conference Grants	Science @ Work: Help for Safety Professionals	Lin, Mei-Li	C13 CC522987	9/8/2003-9/9/2003
7	Conference Grants	National Forum for National Strategies for Health Care Providers: Pesticides Initiative	MCCurdy, Leyla	R13 CC322766	6/1/2003-5/31/2004
8	Conference Grants	Challenges in Ag Health and Safety	Schenker, Marc	C13 CC922985	9/7/2003-9/9/2003
9	Conference Grants	Western Ag Health and Safety Conference: Cultivating a Sustainable Ag Workplace, Sept 12-14, 2004	Senske, Richard	R13 CC022993	1/1/2004-12/31/2004
10	Conference Grants	Collaboration in Agricultural Safety and Health, June 20-24, 2004	Skjolaas, Cheryl	R13 CC522992	1/1/2004-12/31/2004
11	Conference Grants	National Chapter Conference Score 4 Farm Safety…Everyone Wins, March 12-13, 2004	Slusher, Debbie	R13 CC722988	1/5/2003-4/30/2004

Program Area: Allergic and Irritant Dermatitis (NORA)
Title: Dermal Absorption of Cutting Fluid Mixtures
Investigator: Ronald Baynes
Grant Number: R01 OH003669
Start & End: 8/1/2000-7/31/2004
Affiliation: North Carolina State University
City & State: Raleigh, NC
Phone: (919) 513-6398

Description:
The primary objective of this research project is to investigate the influence of chemical mixtures on the dermal disposition and cutaneous toxicity of several cutting fluid additives and contaminants using a experimental paradigm that takes into account the difficulty of experimentally testing all commercial cutting fluids or oils. The long-term goal is to understand chemical and biological interactions in a chemical mixture that modulates dermal disposition of irritants or chemicals and to be able to predict chemical and biological interactions in a chemically-defined mixture in the workplace. The central hypothesis is that many chemical additives or components in cutting fluid formulations behave as solvents, co-solvents, or surfactants. These additives can modulate percutaneous absorption by altering the normal anatomy and physiology of the skin by discrete mechanisms eventually determine the fate of the irritant(s) and thus its potential to cause irritant dermatitis.

The research has three specific aims: (1) Determine statistically significant chemical-chemical and chemical-biological interactions for five component mixtures using three skin model systems possessing increasing levels of biological complexity. Silastic membranes, porcine skin sections, and isolated perfused porcine skin flaps will be used to probe for various levels of interactions. (2) Determine interactions with common cutting fluid contaminants, nickel and N-nitrosodiethanolamine, and a cleansing solvent, trichloroethylene. IPPSFs will be used in these reduced factorial experiments. (3) Using biomarkers of irritation, determine significant changes in epidermal barrier structure and function in skin flaps exposed to mixtures that significantly alter component(s) disposition within skin. These latter experiments will primarily focus on subclinical effects, such as prostaglandin and cytokine release.

At the completion of this project investigators expect to identify significant interactions between functional components of the mixture that will contribute to a better understanding of additive deposition and irritancy of related cutting fluid products.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Occupational COPD in Kaiser Permanente Northwest - PERT
Investigator: Sonia Buist
Grant Number: U36 C319276D
Start & End: 9/30/2002-9/29/2005
Affiliation: Oregon Health Sciences University
City & State: Portland, OR
Phone: (503) 494-7680

Description:
Chronic Obstructive Pulmonary Disease (COPD} is a major public health problem, affecting over 16 million people in the United States and more generally 5-15% of adults in industrialized countries. In the U.S. it is the fourth leading cause of mortality and the only major disease for which both prevalence and mortality are increasing. The direct and indirect costs of COPD to the U.S. .in 2000 were estimated to be nearly.$30.4 billion, of which as much as $7 billion may be due to occupational COPD. We propose a population-based survey and case-control study to evaluate the work-relatedness of COPD among individuals aged 35 years and older who are members of a large health maintenance organization. The study will use computerized medical records to identify all individuals treated for COPD during a four-year period (1999-2002) to compute prevalence estimates, and will use these individuals, and a control group without COPD, to conduct a case-control study of occupational factors associated with COPD. Exposure data for the case-control study will be obtained from telephone interviews, and will include a detailed occupational history which will subsequently be reviewed and rated by an industrial hygienist for exposure to known or suspected risk factors. Recognizing the limitations of using chart-based diagnoses to define COPD, we also propose to conduct spirometric evaluations on a subset of cases and controls to better characterize their COPD status (i.e., validate the diagnosis and severity of their disease. Additional existing spirometric evaluations are expected to be available on a subset of those with the COPD diagnosis, and these data will also be used to further characterize their COPD status.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Lung Disease in Chinese Textile Workers
Investigator: David Christiani
Grant Number: R01 OH002421
Start & End: 9/30/2001-9/29/2005
Affiliation: Harvard School of Public Health
City & State: Boston, MA
Phone: (617) 432-1260

Description:
The proposed study is a competing continuation of R01-OH-02421. This proposal is designed to address unanswered questions regarding the respiratory health of workers chronically exposed to organic dust (specifically cotton dust) and endotoxin. Exposure to gram-negative bacterial endotoxin has been described in laboratory studies as producing acute respiratory symptoms and lung function change. Similar study has addressed the relative contributions of cotton dust and endotoxin in producing both acute and chronic respiratory effects. In addition, we will examine the long-term effects of removal by retirement from exposure on respiratory health status. This is possible because of documented accessibility to workers who have left the workforce. The importance of endotoxin in causing pulmonary effects is important not only in the cotton textile industry, but also in a number of other environments where significant levels of airborne endotoxin are encountered. The study population (closed cohort) that has been followed since 1981 and is unusually well-suited for epidemiologic study due to: low turnover, very low smoking prevalence among women workers, reliable baseline data, a suitable comparison group studied in identical fashion, excellent cooperation among industry officials, union and the collaborative research team, access to subjects who have retired or left the industry in disability, and cost-efficiency. The population included 447 cotton textile and 465 silk textile workers first surveyed in 1981. Follow-up surveys were conducted in 1986, 1992, and 1996 with excellent participation. The proposed study is unique because exposure estimates for both dust and endotoxin over a 20 year period allow assessment of exposure-response relationships for both dust and endotoxin for the full study interval.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Longitudinal Study of Isocyanate Asthma in Body Shops
Investigator: Mark Cullen
Grant Number: R01 OH003457
Start & End: 9/30/2002-9/29/2007
Affiliation: Yale University
City & State: New Haven, CT
Phone: (203) 785-6434

Description:
Diisocyanates remain the most frequent cause of occupational asthma (OA) in developed economies. Four years ago the Yale Occupational and Environmental Medicine Program, in conjunction with investigators from UMass, initiated a multi-disciplinary, large scale cross-sectional study of autobody shops in Ne"" Haven (the SPRAY study) to address outstanding questions for primary and secondary control of this highly prevalent condition. Ancillary studies were initiated simultaneously in humans and animals to elucidate mechanism. To date we have demonstrated several key associations between patterns of exposure and clinical, physiologic and immunologic parameters, and begun to elucidate the immunology of the disease. However, success has been hampered by inherent limitations of cross-sectional design and evident healthy worker selection pressures in this industry. We propose now to take further scientific advantage of this extraordinary cohort and our relationship with the subjects and shops to:

1. characterize the natural history of isocyanate exposure by following SPRAY subjects over the next five years with repeated exposure assessment and measurements of respiratory and immunologic function.

2. address healthy worker effect by supplementing the existing cohort with an inception cohort of new workers hired during the follow-up period

3. confirm all cases developing new onset asthma by specific inhalation challenge to establish the
exposure patterns, pre-clinical physiologic and immunologic features and host factors which confer risk for isocyanate asthma.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: A Validated Asthma Questionnaire for Healthcare Workers
Investigator: George Delclos
Grant Number: R01 OH003945
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Texas
City & State: Houston, TX
Phone: (713) 500-9459

Description:
Occupational asthma (OA) is currently the most frequently reported diagnosis of work-related respiratory disease in developed nations. Healthcare workers (HCWs), a sector representing approximately seven percent of the U.S. workforce, are among some of the occupational groups at risk of development of OA, with reports of increased occurrence of asthma in nurses, animal handlers, respiratory therapists, physicians, and manufacturers of pharmaceuticals, among others. Relatively few studies have been published with information on formal validation of asthma questionnaires, and validation to date has largely focused on the ability of questionnaire items to predict asthma in populations. In order to use questionnaires to study associations between asthma and occupational and non-occupational exposures, it is also essential that the information obtained on these exposures be reliable and valid. Although several questionnaires exist for the evaluation of asthma in the workplace, very few have undergone formal, in-depth validation. Given the increasing importance of asthma as an occupational disease, there is a clear need for better and more reliable, standardized survey instruments that allow the detection of asthma in different working populations, and its characterization in relation to potential etiologic agents and triggers. We propose to develop, validate and field test a new survey instrument for work-related asthma among HCWs, which permits the assessment of occupational and non-occupational exposures that may result in the development of work-related asthma. This three-year study will be conducted in two phases. The specific aim of Phase I will be to develop and validate a new survey instrument of work- related asthma, for use in healthcare settings. The questionnaire will be validated by administering it to a convenience sample of 100 HCWs (both with and without asthma), and comparing results to "gold standards" for asthma (methacholine bronchial challenge test) and non-occupational exposures risk factors (RAST IgE-specific antibody panel against common environmental aeroallergens and latex). Occupational exposures will be determined by two separate methods: (a) a job-exposure matrix (JEM) previously developed by NIOSH for use in healthcare settings, and modified to focus specifically on asthmagens, and (b) self-reported exposures, compared to and supplemented by expert industrial hygienist review. The apriori developed JEM will be validated and updated through a series of workplace visits to area hospitals. The specific aims of Phase 2 will be to: (1) cross-validate and field test the new survey instrument in a population-based sample of four occupational groups (n=l400 per group) of HCWs (nurses, physicians, respiratory therapists, and occupational therapists), identified through their respective licensing boards in Texas; (2) estimate and compare the prevalence of work-related asthma among these four occupational groups, (3) analyze associations between occupational and non-occupational exposures among HCWs with and without asthma in this population and (4) estimate the occupational burden of asthma in these four occupational groups.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Evaluation of Digital Chest Radiographs for Pneumoconioses - PERT
Investigator: Alfred Franzblau
Grant Number: U36 300430AM
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Michigan
City & State: Ann Arbor, MI
Phone: (734) 936-0758

Description:
The fundamental goal of this investigation is to assess the equivalency of digital radiography (DR) in comparison to traditional film-screen radiography (FSR) for diagnosis and quantification of parenchymal and pleural abnormalities due to pneumoconiosis and other forms of fibrotic lung disease. Currently, the most widely used approach for scoring chest radiographs for interstitial fibrosis and pleural abnormalities related to pneumoconiosis is the system promulgated by the International Labour Office (ILO, 1980). This system is predicated on use of posterior-anterior (PA) FSR chest radiographs, and comparison to standard films. At present, there are few or no empirical data to indicate whether DR is equivalent to FSR in identification and quantification of radiographic findings due to interstitial fibrosis, and also pleural abnormalities (e.g., thickening, plaques, and/or calcification). DRs are not used for the NIOSH-sponsored coal-workers pneumoconiosis surveillance program. Furthermore, DR images can be laser printed on film like traditional FSR images, so-called "hard copy" DR, or DR images can be read on a monitor at a computer workstation, so-called "soft copy" DR. Little is known about the impact of reading "hard copy" versus "soft copy" DR images. Results from the present study will provide an empirical foundation for the utilization of DR in application of the ILO system for screening, diagnosis, medical surveillance, and epidemiological study of pneumoconiosis and other forms of interstitial fibrosis. This study will achieve this goal by having 5 b-readers interpret images in each format (FSR, hard copy DR, and soft copy DR) from subjects with a range of radiographic abnormalities due to pneumoconiosis. Based on these radiographic interpretations, we will be able to assess and compare FSR interpretations to readings of hard and soft copy DR for: (1) image quality; (2) overall agreement for presence of parenchymal and pleural abnormalities; (3) over-reading and under-reading of DR relative to FSR; (4) inter-rater and intra-rater reliability of DR relative to FSR; and (5), the impact of image quality, reader characteristics, and patient characteristics on DR readings relative to FSR readings. Furthermore, for those subjects on whom high resolution chest CTs are available, we will use HRCT as a "gold standard" to assess the accuracy of FSR, and hard and soft copy DR for presence of parenchyma abnormalities, pleural abnormalities, over reading, and under reading.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: PNOR/PNOC Exposures & the Development of COPD - PERT
Investigator: Henry Glindmeyer
Grant Number: U36 C319276A
Start & End: 9/30/2001-9/29/2004
Affiliation: Tulane University
City & State: New Orleans, LA
Phone: (504) 588-5613

Description:
Chronic Obstructive Pulmonary Disease (COPD) has multiple causes. Smoking is the most important, but occupational dust exposures can cause bronchial and bronchiolar disease in nonsmokers and can contribute to the adverse symptomatic and functional effects in exposed smokers. The magnitude of the contributions to COPD from the spectrum of unregulated industrial inhalants (particles, fibers, and or gases), has not received adequate study. The goal of this project is to determine the prevalence and incidence of COPD in populations with various exposures falling into the rubric of exposures not otherwise regulated or classified (ENOR/ENOC). The populations consist of a large (n> 25,000) , diverse (approximately 25% women and 20% African American) population of workers at 44 manufacturing facilities representing 8 different industry segments. These include 11 paper conversion plants, 6 kraft paper plants, medium density fiberboard plants, 2 nylon 6 manufacturing plants, 3 synthetic textile plants, 7 man-made-mineral fiber plants, 3 detergent manufacturing plants, and 5 aircraft spray-painting facilities. Strictly standardized spirometry and questionnaire data have been longitudinally collected on these populations. The workers will be placed into homogeneous exposure groups based upon a job exposure matrix factoring in the nature of the exposure, the type of exposure agent, and the exposure levels. The prevalence and severity of COPD (GOLD definition based on symptoms and level of lung function) will be determined and compared to expected prevalence rates. The propensity for the development of COPD will e investigated by using accelerated annual decline in lung function. Potential factors/ confounders that will be considered in both these analyses will include age, cigarette smoking habit, pack-years of smoking, differences across industries, type and level of NOR/NOC exposure, and absence or presence of historical toxic dust exposure.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Pulmonary Effects of Machining Fluid Aerosols
Investigator: Terry Gordon
Grant Number: R01 OH003044
Start & End: 9/30/2001-9/29/2004
Affiliation: New York University
City & State: Tuxedo, NY
Phone: (845) 731-3536

Description:
Whereas the previous proposal determined that several components contribute to adverse pulmonary effects produced by inhaled machining fluid aerosols, this research proposal will test the hypothesis that mycobacteria contamination of machining fluids produces hypersensitivity pneumonitis in exposed workers. Two case reports in the literature have documented that occupational exposure to machining fluid aerosols is associated with hypersensitivity pneumonitis. Recently, eight additional outbreaks (i.e., eight different machining plants) of hypersensitivity pneumonitis have been identified. In 7 of these 8 outbreaks, Mycobacteria chelonae was identified as a major contaminant of each machining fluid. Also, antibodies to M. chelonae were more common in workers exposed to machining fluid aerosols and serum from each of 6 patients diagnosed with hypersensitivity pneumonitis was positive in an ELISA for antibodies to M. chelonae. In addition, pilot work in our laboratory has recently demonstrated that repeated tracheal instillation of M. chelonae can produce hypersensitivity pneumonitis-like histological changes in the mouse lung. Taken together, these results are suggestive but not proof of a link between hypersensitivity pneumonitis and exposure to M. chelonae-contaminated machining fluid aerosols. Thus, a new occupational problem has surfaced in which a targeted microbe, M. chelonae, has not been: (1) routinely assayed in machining fluids or (2) previously considered in the pathogenesis of hypersensitivity pneumonitis. Since epidemiologic studies can typically provide only relational information, we propose to use an animal model of hypersensitivity pneumonitis to determine whether M. chelonae is responsible for the induction of hypersensitivity pneumonitis in machining fluid workers. Although indirect evidence suggests that M. chelonae is involved in the recent outbreaks of hypersensitivity pneumonitis, the findings from our proposed controlled laboratory studies are needed in proving causality prior to instituting control strategies such as the appropriate biocide for eradicating the critical microbial contaminant of machining fluids.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: COPD: Occupational, Airway Responsiveness & Smoking Effect - PERT
Investigator: Phillip Harber
Grant Number: U36 C319276B
Start & End: 9/30/2001-9/29/2004
Affiliation: University of California
City & State: Los Angeles, CA
Phone: (310) 794-0201

Description:
The study will examine the role of occupational exposures in producing Chronic Obstructive Pulmonary Disease (COPD) and in affecting the rate of progression of COPD. This study will be based upon the nearly 6,000 participants in the Lung Health Study, a longitudinal study of respiratory function among individuals with early COPD. The study will examine the interrelationships among occupational exposures, airway hyper responsiveness, tobacco smoking and COPD. Occupational exposure data from the baseline questionnaire and the extensive lung function testing, at baseline and longitudinally over twelve years, will be employed.. It will address the following specific questions: (I) To what extent do occupational exposures to dust, airway irritants and sensitizers contribute to the development of COPD? (2) Is airway hyper responsiveness a significant effect modifier for the impact of occupational exposures? (i.e., are persons with hyper responsive airways more likely to be affected? (3) What is the relative role of cumulative versus recent exposures in producing accelerated lung function decline? (4) Methodologically, what are the optimal exposures indices and temporal modeling for assessing COPD from occupational exposures? (5) What is the relative contribution of tobacco smoking versus occupational exposure in causing chronic airflow obstruction and accelerated rate of decline of lung function? (6) To what extent does airway hyper responsiveness lead to self-selection/health migration from jobs with irritant or other exposure?

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Isocyanate Exposure Intervention Study in Body Shops
Investigator: Youcheng Liu
Grant Number: R01 OH004246
Start & End: 9/30/2002-9/29/2005
Affiliation: Yale University
City & State: New Haven, CT
Phone: (203) 785-5969

Description:
Diisocyanates, a group of highly reactive compounds extensively used in the collision repair industry, are the most commonly reported cause of occupational asthma. Our preliminary data revealed a high inhalation exposure to isocyanate oligomers and extensive skin exposure in auto body shop workers. Control technologies and strategies to reduce these exposures are urgently needed in order for shops to comply with EPA and OSHA regulations and to achieve the overall goal of asthma prevention. However, little research has been done in this industry to evaluate the effectiveness of exposure control measures.

We propose an intervention study to test the hypothesis that an integrated intervention program will significantly reduce the inhalation and skin exposure of auto body workers, particularly painters, to aliphatic diisocyanates. Our specific aims are to: (1) Implement an educational training program and assess the effectiveness of training; (2) Implement a product (process) change and engineering control program and evaluate their effectiveness in exposure reduction; (3) Implement an administrative program to supply more protective equipment and evaluate its effectiveness in exposure reduction; (4) Implement a behavioral intervention program and evaluate its effect on work practices; (5) Evaluate the overall effectiveness of this intervention program with feedback from shop management and workers and using urinary biological monitoring tools.

The overall study design will be a prospective field experimental study with ten shops each in the intervention group and control group and 120 workers. Our experience in an ongoing epidemiological study (SPRAY) affords us ready access to the collision industry. We will evaluate the intervention at baseline, six months and one year. Effects of intervention will be assessed at six months between the two groups, and sustainability of intervention effectiveness evaluated among intervention phases. This should allow us to identify effective exposure intervention strategies, recommend them for wide application in this industry and other similar industries, and contribute significantly to a better prevention of asthma in auto body shop workers.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: Physiologic Characterization of Occupational Asthma
Investigator: Susan Sama
Grant Number: K01 OH007608
Start & End: 9/1/2002-8/31/2005
Affiliation: Harvard University
City & State: Boston, MA
Phone: (617) 432-1260

Description:
This Special Emphasis Research Award will provide an opportunity for a young occupational epidemiologist to be released from routine field study responsibilities to develop her own cutting edge research on molecular biomarkers in exhaled breath and to gain training and experience in the application of modem longitudinal biostatistical methods in occupational respiratory epidemiology. This project will take maximum advantage of large and well-funded ongoing community-based studies of occupational asthma and of the depth and breadth of Harvard's academic environment.

Occupational asthma (OA) accounts for 5% to 36% of asthma in adults and occupational exposure are major contributors to morbidity among adult asthmatics. Early detection and intervention are essential for primary as well as secondary prevention of OA. Unfortunately, the physiologic manifestations of OA are poorly understood and easily measured noninvasive biomarkers of OA are sorely needed. Current methods based on peak expiratory flow (PEF) diaries are effort dependent and the quality of the efforts and records cannot be controlled. This project will address these pressing needs by illuminating the relationship between the four work-related asthmatic airflow patterns (WRAAP) described by Sherwood Burge for PEF diaries and WRAAP observed using portable electronic spirometers, and a more sophisticated physiologic and noninvasive biomarker of airway inflammation. This study will lay the foundation for application of these new methods not only in future occupational epidemiologic studies, but also in industrial screening and outpatient clinics. Thus, this study will light a path toward improved detection and prevention of OA.

Program Area: Asthma & Chronic Obstructive Pulmonary Disease (NORA)
Title: COPD Risks in Carpenters
Investigator: David Wegman
Grant Number: R21 OH007718
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Massachusetts
City & State: Lowell, MA
Phone: (978) 934-3265

Description:
Evidence of a relationship between occupational dust exposures and chronic airways disease including chronic obstructive pulmonary disease has been demonstrated in a number of studies in occupational and community settings. Apart from studies focused on the classical dusty trades, however, very little is known about the possibility of risk from more moderate exposures to a diverse mixture of different types of particulates, Evidence is mounting for mechanisms that might underlie a relatively non-specific toxic effect from particulate exposures. In addition to respiratory tract irritation, high particulate exposures can overload the clearance mechanisms of the lung, producing a cascade of responses that may culminate in chronic lung injury. To contribute to the study of risk associated with exposure to a mixture of particulates, we propose to target a working population of union carpenters. Carpenters have a diversity of aerosol (wood dust being only one) and chemical exposures and excess risk for pulmonary disease. Apart from studies of occupational asthma there have been few investigations of respiratory disease associated with this trade, despite the fact that carpentry is one of the largest specialty trade among construction workers. The proposed study is therefore designed as a pilot investigation of the risk among carpenters of chronic airway obstruction other than asthma. The specific objectives of this pilot study are to develop and evaluate methods to: (1) identify incident cases of COPD in the Carpenters Combined Benefits Fund of Massachusetts medical insurance records data base; and (2) assess a diverse range of different aerosol and gas exposures occurring in carpenters' jobs. The outcome of the pilot study will be methods that can be applied in a subsequent case control investigation designed to provide quantitative data on the associations between COPD and different aerosol exposures experienced by carpenters. The case control study will be the subject of a separate proposal, contingent upon successful development of the necessary methods.

Program Area: Asthma & COPD
Title: Addressing Asthma from a PH Perspective (multi state)
Investigator: Mary Currier
Grant Number: U59 CC323194
Start & End: 9/1/2003-8/31/2006
Affiliation: Mississippi State Department of Health
City & State: Jackson, MS
Phone: (601) 576-7634

Description:
The National Center for Environmental Health State Asthma Surveillance plan includes Occupational Asthma Surveillance. NIOSH contributes $100,000 per year to participate in this program. For FY2003, NCEH invested the $100,000 in one award (vice portioning it out to each of the states.) For this reason, you will find this description for one of the awards.

The Mississippi's Asthma Program is a new award with the following goals: (1) By November 30, 2004, the MSDH Asthma Program will establish an ongoing statewide asthma surveillance system to track morbidity, mortality, and burden of cost, (2) By November 30, 2004, the Asthma Program will establish and evaluate the processes of an asthma coalition that will assist in the program efforts statewide, (3) By August 31, 2006, the MSDH Asthma Program will develop and promote a comprehensive state asthma plan, and (4) By August 31, 2006, the Surveillance Branch will coordinate with the Office of Health P{romotion (OHP) to effectively manage the Asthma Program.

Program Area: Cancer Research Methods (NORA)
Title: P53 Biomarker and Intervention in Occupational Cancer
Investigator: Paul Brandt-Rauf
Grant Number: R01 OH007590
Start & End: 6/1/2002-5/31/2005
Affiliation: Columbia University
City & State: New York, NY
Phone: (212) 305-3959

Description:
Research Methods for Occupational Cancer are needed to develop early markers of adverse health effects from workplace exposures and to devise ways for interrupting the pathways between workplace exposures and resultant cancers. The p53 tumor suppressor gene product is a potential target for both of these approaches. Certain occupational exposures can produce mutations in p53 which cause the generation of an immune response with circulating p53 auto-antibodies, even before the occurrence of clinically detectable cancers, so that these antibodies may serve as useful early markers of adverse effects. In addition, certain short peptide sequences from p53 have been demonstrated in cell culture to be able to cause mutant p53 to revert to normal function, resulting in the death of cancer cells containing mutant p53 but with no effect on normal cells with wild-type p53, suggesting that this may be a useful approach for interrupting the pathway between workplace exposures that produce p53 mutations and resultant cancers. The purpose of the proposed research is to examine both of these approaches for occupational cancers caused by asbestos exposure in two related projects. For the first project, banked serum samples from a cohort of workers with asbestosis will be examined for the presence of p53 auto-antibodies by enzyme-linked immunosorbent assay and immunoblotting to determine if the presence of the antibodies correlates with the subsequent development of cancer, as well as with the presence of p53 mutations in the resultant tumors. For the second project, the effects in cell culture of a p53 peptide sequence (delivered as the peptide or as a plasmid-based mini-gene) on asbestos-associated lung cancer and mesothelioma cell lines with and without p53 mutations and corresponding non-cancer cell lines with wild-type p53 will be investigated, as well as determining the mechanism of action of the peptide for inducing death in these cells.

Program Area: Cancer Research Methods (NORA)
Title: Susceptibility and Occupational Radiation Risks
Investigator: David Richardson
Grant Number: R01 OH007871
Start & End: 9/30/2002-9/29/2005
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 966-2675

Description:
Epidemiological studies of U.S. nuclear weapons workers allow evaluation of the effects of low dose, low dose rate radiation exposures accrued in an environment of mixed radiological and non-radiological exposures associated with the USDOE weapons complex. In the proposed study, we will examine a cohort of nearly 22,000 badge-monitored workers at the Savannah River Site (SRS) who will be followed over a fifty-year period. Past research on this epidemiologically important population has focused on analyses of standardized mortality ratios. The proposed study, in contrast, will focus on radiation-mortality associations in this cohort while investigating potential sources of bias and effect modification. We will examine radiation-mortality associations under varying lag assumptions, and investigate potential changes with age-at-exposure in susceptibility to the carcinogenic effects of radiation. Next, we will investigate differences between workers in the carcinogenic effects of radiation exposure due to non-radiological exposures accrued at SRS. Mechanistic models of carcinogenesis suggest that initiating exposure to some non-radiological carcinogens may modify the effects of subsequent ionizing radiation exposures. We will use a job-exposure matrix to identify workers with routine potential for exposure to several non-radiological agents, and apply innovative methods to examine the joint effects of radiological and non-radiological exposures. Finally, we will examine the role of tritium and neutron exposures in these analyses of radiation-mortality associations. We will investigate whether variation in radiation risk estimates between subgroups of workers reflects heterogeneity in radiological exposures. Study results for this large USDOE cohort will be evaluated in relation to observations from studies of other DOE facilities; and, study data will be compiled in a manner that will facilitate future pooled analyses. In this way, the proposed work will substantially strengthen the available epidemiological information about low level radiation effects in USDOE cohorts.

Program Area: Cancer Research Methods (NORA)
Title: Time-Factors in Exposure Effects Among Uranium Workers
Investigator: David Richardson
Grant Number: R03 OH007521
Start & End: 5/1/2002-4/30/2004
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 843-3193

Description:
The proposed study investigates radiation-mortality associations in a cohort of workers employed at the US Department of Energy's Y-12 uranium processing facility. The Y-12 cohort was recently expanded, and vital status information was updated through 1990. Radiation lung dose estimates for workers at Y-12, based on bioassay and in vivo monitoring records, are available in computerized form. However, no analyses of dose-response associations have been conducted using this updated information. The proposed research will take advantage of this previously collected data in order to conduct investigations of occupational exposure-disease associations. Detailed analysis will be conducted of variation in radiation-mortality associations with latency, time-since-exposure, and agent-exposure. The results of this study will help to address analytical questions about radiation-lung cancer associations in this cohort, while reducing exposure misclassification by better identifying the etiologically-relevant time period of exposure.

Program Area: Control Technology (NORA)
Title: Decay of Acclimation and Time for Re-acclimation
Investigator: Candi Ashley
Grant Number: R03 OH007836
Start & End: 9/30/2003-9/29/2005
Affiliation: University of South Florida
City & State: Tampa, FL
Phone: (813) 974-4980

Description:
Work in a warm or hot environment coupled with high metabolic loads and/or work in protective clothing can bring about considerable heat strain (e.g. increased heart rate and core body temperature). Acclimation via increasing exposure to work in a hot environment is one potent control used to reduce the level of heat stress and decrease the signs of heat strain. Documented physiological responses of acclimation include improved circulatory efficiency and thermoregulation. Once workers are acclimated to work in the heat, physiological adaptations will persist as long as workers remain in the hot environment. However, workers may be absent from the hot environment due to training, vacation, illness or normal shift change, and some adaptations may be lost requiring some degree of re-acclimation. However, the rate of decay of acclimation is uncertain. In addition, re-acclimation will be dependent on the degree of decay. The basic philosophy of the experimental design is to determine the rate of decay of physiological adaptations of acclimation and the time to re-establish the physiological changes of acclimation. The first goal is to determine loss pattern of acclimation in 7 -day increments over a period of approximately 6 weeks. The second goal of the study is to identify the decay pattern from the previous data collected. Based on this information, the loss pattern for 1/3 and 2/3 of total loss of acclimation will be determined. These time periods will be used for the planned decay periods and the time to full re-acclimation will be determined for each. These goals can be accomplished with an experimental design that systematically determines loss of acclimation and time to re-establish acclimation.

Program Area: Control Technology (NORA)
Title: Field Studies with Innovative Safe Excavation Technologies
Investigator: Leonhard Bernold
Grant Number: R01 OH004201
Start & End: 9/30/2001-9/29/2004
Affiliation: North Carolina State University
City & State: Raleigh, NC
Phone: (919) 515-3677

Description:
The objective of this proposal is to evaluate new excavation technologies that promise to radically reduce several hazards related to backhoe excavation in construction. The research performed under grant 5 R01 CCR413051-02 from NIOSH successfully demonstrated the feasibility and applicability of safe excavation and pipe-laying. The research "ruggedized" the prototype technologies and demonstrated each as full-scale field experiments on actual construction sites using construction crews. From the lessons learned, new questions and further research topics have arisen. The overall goals of the research still remain but with an extension of the previous work. In order to further achieve the goals, the following specific aims will be pursued:

1. Extend the capabilities of the excavator-Mounted Buried Utility Detection System (EM-BUDS) presently capable of locating metallic pipes and power lines to have the ability to locate plastic and concrete pipe.

2. Address the questions raised with the pipe manipulator (PIPEMAN) about remotely setting the bedding.

3. Design and fabricate a smaller version of PIPEMAN (PIPEMAN, jr.) That can lay smaller pipes such as pvc and steel pipes and investigate the issues of jointing the pipes which have very different requirements than the concrete pipes.

4. Integrate the expanded EM-BUDS and PIPEMAN, Jr.

5. Improve the human-machine interfaces of the EM-BUDS, PIPEMAN and PIPEMAN, Jr.

6. Demonstration of the technologies at field sites.

7. Disseminate information via journal articles, conference papers and on a website.

Program Area: Control Technology (NORA)
Title: Midwest Nursery Grower Intervention
Investigator: Larry Chapman
Grant Number: U01 OH008100
Start & End: 9/30/2003-9/29/2007
Affiliation: University of Wisconsin
City & State: Madison, WI
Phone: (608) 262-7408

Description:
This application will accomplish three specific aims:
1. Develop or identify existing control technologies for work performed on nursery operations engaged in bedding and garden plants and nursery crops production in the US Midwest. We will reduce hazards (and thereby injuries) by developing or identifying controls that reduce exposures to physical work hazards for musculoskeletal and traumatic injuries. The types of controls we will consider will include work practices, tools, labor aids, and administrative controls. We will seek out reports from nursery managers, commercial suppliers, {University Extension, and others about emerging production practices that could improve both safety and profits We will also collaborate with university instructors and their students in design and other engineering courses to accomplish this aim.
2. Conduct field research to evaluate the control technologies from Specific Aim #1 with the most promise to determine their impact on production and to verify that musculoskeletal risk factor reductions actually take place when the practices are adopted. We will undertake small scale, field studies to quantitatively evaluate the hazard-reducing and profit-enhancing aspects of two to four of the best production practices each year. Comparisons will be made in the field or in laboratory simulations between accomplishing work by the conventional methods and with the improved control technology. Less than a half dozen subjects in each condition for less than a half day of work are anticipated. Small scale field studies will also be undertaken on operations that have adopted practices to verify that musculoskeletal risk factor reductions actually take place.
3. Conduct and evaluate a large, region-wide intervention to promote the best control technologies from Specific Aim #2 to the 7,888 nursery operations in seven North Central states (WI,MN,MI,IA,IL,IN,OH) that produce bedding and garden
plants and nursery crops. Disseminate information about the improved work practices through the sources that growers are already known to rely on for information about new production methods (i.e. other growers, trade publication, public events, university Extension and other private and public sector resource people, the Internet, etc.). Evaluate the interventions with annual mail questionnaires to separate, population-based, rolling probability samples of the study group (n=650 nursery growers/yr) and the control group (320 New Zealand nursery growers/yr).

Program Area: Control Technology (NORA)
Title: On-Board Diagnostic Sensor for Respirator Breakthrough
Investigator: Debra Deininger
Grant Number: R44 OH004174
Start & End: 9/30/2002-9/29/2004
Affiliation: Nanomaterials Research Corporation
City & State: Longmont, CO
Phone: (720) 494-8401

Description:
Nanomaterials Research proposes to develop an extremely sensitive, low temperature, low cost, and miniaturized chemiresistive detector that can be mounted inside a respirator to warn users when toxic organic vapors are present inside the respirator. The sensor will alert the wearer when the respirator's filter cartridge has been consumed, when the respirator doesn't fit properly, or when the respirator has been compromised for any reason. Current methods of predicting filter breakthrough are inexact and inefficient, and an active end of service life: indicator would provide a significant advance in worker safety.

Nanomaterials Research demonstrated during the Phase I that it is feasible to use novel materials selection (including polymers and nano-scale ceramic powders) to overcome present limitations of solid state sensor technology including: high operating temperature (300-400C), significant power consumption (a result of the high operating temperature), poor reproducibility from one sensor to the next, and a lack of stability over time. The development of new and unique polymer and ceramic composite sensors has resulted in a stable, reproducible sensor that is responsive to a wide range of toxic VOCs (volatile organic compounds) at temperatures well below current state of the art.

During the Phase II, these results will be extended to many more classes of organic compounds, and low cost packaging and electronic circuitry to power the sensor will be developed. The resulting sensor will be marketed to respirator manufacturers for integration into their products. Our preliminary work has already attracted the attention of a major respirator manufacturer who will provide expertise on regulatory and packaging issues associated with integrating this technology into a respirator.

Program Area: Control Technology (NORA)
Title: Downed Firefighter Location System
Investigator: Mark Fobare
Grant Number: R43 OH007960
Start & End: 9/15/2003-3/14/2004
Affiliation: Tiercent Corporation
City & State: Niskayuna, NY
Phone: (518) 986-4119

Description:
Fire Fighting is a very hazardous occupation. On average, there are 600,000 structure fires annually and 3.0 deaths per 100,000 structure fire. Alarmingly, this death toll has doubled since 1977. Most of the fatalities are a result of heart attack and asphyxiation, complicated by the fact that rescuers cannot locate a downed victim in time to provide aid. Unfortunately, there is no equipment available today that will provide a rescuer with the location of a downed or lost firefighter and directions on how to best reach the victim. Tiercent is working to develop a solution: a system that will track the path and location of firefighters inside burning structures and alert the accountability officer when an individual is in need of assistance. The system will graphically display the 3D path and location of the downed firefighter such that a rescue team can quickly lend assistance.

Tirecent aims to reduce firefighter fatalities 50% by reducing the average time it takes to search for a downed or lost firefighter. The firm's commercialization plans aim to penetrate 30% of the emergency services market by 2006, delivering 2,500 systems to the marketplace. Upon completion of this Phase 1 Research Project, Tiercent will demonstrate the feasibility of a system that uses a unique combination of radio frequency and inertial based technologies to locate a person within a 50'x50'x50' dwelling. More specifically, the system will provide information on the floor that a person is on, as well as their location on this floor, within five feet of accuracy.

There are three sets of experiments in the Phase I research plan; floor level determination, X- Y accuracy improvement, and algorithm validation. The results of these experiments will be signal processing algorithms to determine firefighter location using a single three-axis body-mounted accelerometer and a radio frequency location system. Algorithm validations will be performed by collecting accelerometer and radio frequency tracking data during routine firefighter training exercises. The research plan calls for the use of: 1) ten paid firefighters from Troy. NY, 2) a fire training facility in Rensselaer County, NY, 3) Wearable Accelerometric Motion Analysis Systems, developed by Stanford University, and 4) the Where net real-time location system.

Program Area: Control Technology (NORA)
Title: Integrated Stability Mapping System for Mines
Investigator: Keith Heasley
Grant Number: R01 OH007751
Start & End: 9/1/2002-8/31/2005
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-7680

Description:
The overall objective of this project is to reduce the injuries and fatalities associated with ground falls in underground mines by developing a state-of-the-art stability mapping system which tightly integrates geo-mechanical stress analysis, geological mapping and roof support design. The primary output of this project will be a user-friendly software program which takes the site-specific mining plan, geology, and stability criteria as input and produces a map of the mine showing the relative stability index of the different mining areas and the recommended support requirements for those areas. The calculated stability index in this program will include the appropriate geologic influences at the mine along with the geo-mechanical stress effects from overburden depth, pillar design, adjacent seams, stream valleys and other user-defined influences. The roof support recommendations in the program will be derived from present NIOSH research (Mark et al., 2001). The proposed software development will incorporate/modify/enhance present software (AutoCad - drafting/mine mapping, SurvCADD - geologic modeling, and LaModel - mine stress analysis) as much as possible in order to speed the development and provide software which is already familiar to the mine design engineer.

Once the software is created, the program will be field tested and validated with field studies at a couple of mines. Through this field-testing process, practical weighting factors for the various inputs to the stability index and practical support requirements can be developed and validated. Also, by working with producing mines, the practical application of the developed software can be evaluated and enhanced with input from practicing mine design professionals. Ultimately, the final stability mapping system will be transferred to the mining industry through publication, workshops, and other presentations as appropriate.

Program Area: Control Technology (NORA)
Title: Control Measures for Silica Exposures for Tuckpointing
Investigator: William Heitbrink
Grant Number: R21 OH007761
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-4213

Description:
During exterior building renovation, deteriorated mortar is removed with a grinder to a depth of 1-2 cm and replaced with new mortar in a process termed "tuckpointing." Typically, the grinders used in tuckpointing are 10 cm in diameter with a rotational speed of 10,000-12,000 rpm. During mortar removal, worker exposures to reparable crystalline silica are as much as 5 mg/m3, a level 100 times the NIOSH REL and approximately 50 times the OSHA PEL. Because of these excessive exposures to respirable crystalline silica, workers are at risk for developing silicosis. Dust control is achieved by partially enclosing the grinding wheel with a ventilated shroud. To exhaust air from the shroud, a vacuum cleaner can be used, functioning as an air mover and particulate collection device. Recently, vacuum cleaner bags and fmal filters have become commercially available for wet-dry vacuum cleaners. If these bags and filters are shown to efficiently collect respirable dust, wet-dry vacuum cleaners may be a useful control option for dust control during mortar removal. They could also meet the size and weight requirements for equipment to be used on scaffolding that may be only 0.8 meters wide, as well as providing a cost-effective option in a competitive, cost-conscious industry. Using laboratory and field evaluations, the proposed work will test the capability of wet-dry vacuum cleaners to provide the needed exhaust ventilation and dust collection. In the laboratory phase of the study, the particulate collection efficiency of wet-dry vacuum cleaner filter bags will be studied. For the vacuum cleaners to maintain exhaust flow rates necessary to capture the dust, the filter bags must efficiently collect enough dust to keep the final filters from becoming clogged. The relationship between pressure loss and exhaust flow rate will also be studied to characterize the ability of the vacuum cleaners to move air. Laboratory studies have shown that an exhaust rate of 2.2 m3/min (80 cubic feet per minute [cfm]) is needed for optimal control of the dust. The field phase of this project will focus on the overall dust exposure implications of using four wet-dry vacuum cleaners and one vacuum cleaner with reverse-pulsing filters that discharge the dust into a collection bag.

Program Area: Control Technology (NORA)
Title: Improved Health and Safety in Mining through Helical Drilling and Rock Bolt Anchoring
Investigator: John Hill
Grant Number: R01 OH007727
Start & End: 9/30/2002-9/29/2006
Affiliation: UTD Incorporated
City & State: Manassas, VA
Phone: (703) 393-0800

Description:
UTD proposes developing an innovative rockbolt hole drilling system based on new Helical Drag Bit technology and new rock bolts that address Rock Mass Stabilization (reducing risk of catastrophic rock mass failure) by improving grouted rock bolt anchoring through improved hole geometry, improving mechanical rock bolt anchoring capacity through new rock bolt designs that take advantage of new hole geometry, and utilizing a directly measured drilling parameter (torque) to reliably interpret rock properties and conditions (function of new proven bit design). The new drilling and rock bolt system will significantly reduce the risk of ground slope failure due to the increased load capacity and higher pullout strength, while reducing total installation and operations costs due to savings in power consumption and speed of drilling. The new system will significantly reduce respirabable dust produced during the drilling process and reduce noise emanating from drilling hydraulics machinery through utilization of anew bit design that requires significantly less power than commercially available bits to excavate the same volume (beneficial to human health), and incorporate a portion or all of the drilling process directly into the rockbolt for reduction in installation handling requirements (potential for reduction in handling injuries and rock fragment injuries).

Program Area: Control Technology (NORA)
Title: Use of Digital Imagery to Characterize Rock Masses
Investigator: John Kemeny
Grant Number: R01 OH007739
Start & End: 9/1/2002-8/31/2005
Affiliation: University of Arizona
City & State: Tucson, AZ
Phone: (520) 621-4448

Description:
Ground failures are a serious problem for the U.S. mining industry. Mine Safety and Health Administration statistics for 1994-98 show that 47% of mine fatalities and 16% of the mine injuries in underground mines were attributable to ground failures. In open-pit mines, statistics from 1995 through 2000 revealed that 33 workers were killed in slope-failure related accidents. This proposal addresses three types of ground failures associated with mining in the United States, (1) catch-bench failure in open-pit mines, (2) large scale slope failure in open-pit mines, and (3) pillar failure in underground mines.

The behavior of rock masses is dominated by rock discontinuities. Rock discontinuities reduce the overall rock mass strength and also provide specific pathways for rock failure. Rock discontinuities are presently being characterized with traditional methods, including scanline surveying, cell mapping, and geologic mapping. These methods are time-consuming, hazardous on unstable slopes, and even under the best circumstances only a small dataset of discontinuity properties can be obtained.

It is proposed to utilize state-of-the-art imaging technologies to characterize the discontinuities associated with open-pit slopes and underground pillars. There are two primary imaging technologies that will be investigated. The first is the use of still digital cameras along with image processing software. The second is the use of high-resolution laser-scanning devices. Each of these two technologies has advantages and disadvantages in different circumstances. It is proposed to investigate these two technologies, to determine how they can be used together to provide superior information over a wide range of surface and underground conditions. A three-year project is proposed. The first year will focus on open-pit gold and copper operations in Nevada and Arizona. The second year will focus on underground gold and stone operations in Nevada and other western states. Studies in the first two years will include field studies, the processing of field data, and the automated input of this data into geomechanical models. In the third year, techniques will be investigated to automate the process of acquiring image information in the field, in both underground and open-pit applications.

Program Area: Control Technology (NORA)
Title: Measurements and Control of Diesel Emissions in Underground Mines
Investigator: Mingming Lu
Grant Number: R01 OH007679
Start & End: 9/1/2002-8/31/2005
Affiliation: University of Cincinnati
City & State: Cincinnati, OH
Phone: (513) 556-0996

Description:
The diesel particulate matter (DPM) emissions in underground mines are much higher than other occupational exposures, which pose potential health threats to mine workers. This project is aimed at developing a novel control technology to substantially reduce DPM and other diesel exhaust emissions and to determine the impact of this control method by performing a thorough characterization of DPM emissions in target underground mines. DPM emission measurements, such as area-of-interest sampling, personal exposure and emission source sampling, will be performed and the technology will be implemented in a selected mine/mines for demonstration purposes.

Program Area: Control Technology (NORA)
Title: Engineering Control of Longwall Machine Noises
Investigator: Yi Luo
Grant Number: R01 OH007732
Start & End: 9/1/2002-8/31/2005
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-7680

Description:
Longwall mining is the safest and the most productive mining methods in underground coal mines. Due to the high degree of mechanization and confined environments, noise levels at the longwall mining faces are normally high. Constant exposure to such noisy environment for an extended period could lead to permanent hearing loss. The two major sources of the noises in a longwall face are: (1) the machine noises produced by the mining machines (i.e., shearer, face conveyor, stage loader and crusher, etc.), and (2) the background noises produced by the breakage and movement of surrounding rock strata in the process for them to reach a new equilibrium after being disturbed by the mining activities. The machine noises contribute to the major portion of the noise exposures to the workers. The background noise is a piece of very useful information for the workers to detect and predict harmful ground movement events. Therefore, it is desirable to leave the background noise intact.

The objective of this proposed research is to develop and test a technology for the reduction of the overall levels of machine noises in the underground longwall faces while keeping the background noise basically unaltered. We propose to do this using a combination of the traditional passive methods and the active noise control (ANC) technology. Because of the maturity and successful applications of the ANC technology in many other industrial environments, we expect the active method to produce the most dramatic reductions in noise exposures to the longwall miners. By reducing the overall noise levels in the longwall panels, the miners hearing loss can be reduced greatly over their working lives.

Program Area: Control Technology (NORA)
Title: Respiratory Protection Against Bioaerosols in Agriculture
Investigator: Tiina Reponen
Grant Number: R01 OH004085
Start & End: 6/1/2001-5/31/2004
Affiliation: University of Cincinnati
City & State: Cincinnati, OH
Phone: (513) 558-0571

Description:
Agricultural workers are exposed to high concentrations of airborne microorganisms, and thus have an increased risk for developing respiratory diseases. Respirators, when properly selected and used, can decrease the exposures in agricultural environments. In this study, a new field-compatible method will be developed to dynamically measure the protection provided by respirators against dust in agricultural environments. Another method will be developed to determine the protection provided by respirators against fungal and actinomycete spores. The new methods will be evaluated first in the laboratory under controlled conditions using four test aerosols: NaCl, PSL and fungal and actinomycete spores. The laboratory tests will be conducted using three different respiratory flow rates, three different concentrations for test particles and three different sampling probe locations. After that, the new methods will be tested in the field during different agricultural operations while farmers are using the new N95 filtering facepiece respirators. The field evaluation will be performed during different tasks: feeding animals, seeding, harvesting. Tests related to animal feeding will be performed during two season, in the fall and in the winter, when the concentrations in the animal confinements are expected to be most significantly different. The field testing will include both small-scale and large scale farming operations. The design of the proposed laboratory and field experiments will include a combination of traditional time-consuming microbiological methods and of advanced dynamic and compact aerosol measurement techniques. This dual approach combined with our extensive experience on respirator and bioaerosol studies will allow us to collect a representative data bank in the shortest possible time. The results will include dynamic measurements of respiratory protection as a function of time and particle size. The field testing will be conducted for different agricultural activities in different seasons. The data will provide the basis for recommendations and, if desired, regulations for the respiratory protection of agricultural workers against organic dust. The methods developed and tested in this study are critically needed for further epidemiological and intervention studies in agricultural and other occupational environments.

Program Area: Exposure Assessment Methods
Title: A Simple Device for Measuring Omnidirectional Germicidal UV Radiation
Investigator: Stanley Echols
Grant Number: R44 OH003881
Start & End: 9/30/2002-9/29/2004
Affiliation: Riverbend Instruments, Inc.
City & State: Birmingham, AL
Phone: (205) 320-1722

Description:
The overall objective of the proposed research is to design a relatively inexpensive kit suitable for sale which will enable the user to easily and accurately measure fluence of UV-C, particularly at 254nm, the most widely used wavelength for germicidal action. Though UV is widely used for sterilization of room air in hospitals and larger buildings, for sterilization of drinking water and waste water, there is currently no method for measuring fluence (iradiation from all directions, which determines the sterilization efficacy of UV), suitable for routine commercial use. Radiation from a single source may be adequately measured with currently available radiometers, but no method has been found to measure fluence by this means. Lack of a workable fluence measurement renders unfeasible the measurement of fluence for design verification or quality control of large air sterilization systems. The use of UV air disinfection is very likely to increase due to the threat of bioterrorism via airborne pathogens. The proposed kit will be of sufficient sensitivity to permit its use for personal dosimetry .Intense UV, some of which is in the "C" band, is widely used in industry for polymerization of coatings, This technology is recognized by the EPA as favored over solvent-based coatings because of the elimination of solvent fume air pollution.

Program Area: Exposure Assessment Methods (NORA)
Title: Predicting Relative Workload During Physically Demanding Work
Investigator: Tariq Abdelhamid
Grant Number: R03 OH007604
Start & End: 9/1/2002-8/31/2004
Affiliation: Michigan State University
City & State: East Lansing, MI
Phone: (517) 432-6188

Description:
Many work physiologists recommend expressing measured oxygen uptake as a percentage of maximum oxygen uptake (V02max), commonly known as relative workload, since it provides a subject-specific workload (Astrand and Rodahl 1986, Bonjer 1971, Rohmert 1973, Kamon 1979, Tomlinson and Manenica 1977). In addition to accounting for individual differences in physiological capacities among workers, relative workload also enables more accurate assessment of potentials of physical fatigue.

Once a subject's V02max is known, the determination of relative workload is arithmetically simple. Determining V02max is accomplished through the use of direct (exact) measurement or prediction techniques. Exact measurement of V02max is impractical for applied research due to its intensive and intricate laboratory procedures as well as the risks it poses for unfit subjects. Prediction techniques offer an attractive alternative with numerous linear and non-linear regression techniques available.

The specific aim of this research is to develop a practical and direct method to predict relative workload from in-situ collected sub-maximal oxygen uptake data without the need to determine maximum oxygen uptake. The method is developed by modeling the human cellular utilization system as a stochastic system and on the hypothesis that oxygen uptake data are serially dependent, and that by exploiting this dependence using time series analysis techniques, a regression model between relative workload and a statistical characteristic of collected oxygen uptake data can be developed.

If successful, the technique proposed in this project will be vital in achieving one of the goals of Healthy People 2001 (U.S. Department of Health and Human Services 2000) to "promote the health and safety of people at work through prevention and early intervention." In addition, this new technique will help in better understanding the physical demands for today's workforce doing today's work and will have widespread application in identifying excessively demanding tasks so can be better matched to the abilities of subjects.

Program Area: Exposure Assessment Methods (NORA)
Title: Real-time In Situ Aerosol Monitoring in Mine Atmospheres
Investigator: Marc Baum
Grant Number: R01 OH007680
Start & End: 9/1/2002-8/31/2006
Affiliation: Oak Crest Institute of Science
City & State: Pasadena, CA
Phone: (626) 817-0883

Description:
Exposure to aerosol, and certain chemicals, can constitute an occupational health hazard in the mining and mineral processing industries. The pneumoconioses, also known as the mineral dust diseases, have been found to be associated with a miner's cumulative exposure to mine aerosol in the respirable range. They comprise a wide spectrum of conditions ranging from diseases characterized by diffuse collagenous pulmonary reactions to relatively small lung burdens of bioactive dusts (e.g., silicosis,asbestosis) to diseases characterized by largely non-collagenous reactions to heavy lung dust burdens (e.g., coal workers' pneumoconiosis). The primary goal of the proposed research is to develop and field-test an in situ, real-time, continuous monitor of particulate matter (PM) and key gaseous chemicals present in mine atmospheres. This novel instrument will employ an array of complimentary spectroscopic techniques to non-invasively probe an adjacent air column for aerosols and gases that represent an occupational hazard to miners. Optical signals from the sensor will be interpreted automatically to yield bulk chemical, size (for aerosols), and concentration information on these toxic materials. Specifically, the sensor will be designed to characterize mineral (silica and asbestos) and diesel exhaust(soot) PM, as well as measure gas-phase pollutants such as methane, hydrogen, and polycyclic aromatic hydrocarbons. Long-term objectives include the development of new compliance measurement techniques that also can be used to study the fundamental properties of mine aerosol. The proposed field studies are expected to contribute to the understanding of the dynamics of hazardous materials in mine atmospheres. The instrument will be developed, evaluated, refined, and tested in the laboratory, followed by extensive field evaluations and measurements, including: (1) comparison studies with traditional methods using the University of Minnesota variable residence time micro-dilution system, for measurements of diesel exhaust under controlled conditions, (2) measurements in a mine environment alongside traditional sampling technology.

Program Area: Exposure Assessment Methods (NORA)
Title: Inhalation Dosimetry/Exposure Index of Fiber Aerosol in Human Respiratory Tract
Investigator: Yung-Sung Cheng
Grant Number: R01 OH003900
Start & End: 9/1/2002-8/31/2007
Affiliation: Lovelace Biomedical & Environmental Research Institute
City & State: Albuquerque, NM
Phone: (505) 845-1034

Description:
Exposures to airborne asbestos and man-made vitreous fibers (MMVFS) increase the incidence of lung cancer, asbestosis, and mesothelioma. Fibers that deposit in the bronchial and alveolar regions, subsequently translocating to the parenchyma, are thought to be responsible for the development of these diseases. Physico-chemical properties of fibers, including length, diameter, and durability in the lung, are major factors in the etiology of these lung diseases. Because inhalation is the main route of exposure, the deposition pattern in the respiratory tract as a function of fiber dimensions is new information critical to understanding respiratory dosimetry and defining the index of exposure for health protection purposes. Controlled studies of fiber deposition in human volunteers are not available because of ethical concerns. However, total and regional depositions of inhaled fibers have been estimated from postmortem measurement, mathematical modeling, and animal toxicity studies. Increasingly, mathematical deposition models have been used to assess the dosimetry of inhaled MMVFS. However, current lung dosimetric models for fibers in the human respiratory tract are based on theoretical equations, which have not been verified with experimental data. This proposal has three objectives: (1) to develop experimental information on the deposition of fibrous aerosols as a function of fiber diameter and length in realistic human respiratory tract replicas, (2) to verify and improve the prediction of fiber dose estimate in human lungs using both empirical data as well as a computational fluid dynamic technique, and (3) to define,.a size-selective exposure index based on fiber penetration data. Because lung diseases caused by inhaled fibers occur in the bronchial, alveolar, and parachymal regions, a thoracic fraction defined as the fraction of particles penetrating the larynx and reaching the lung must be established and will be defined from experimental data obtained in this study. This research will generate essential information on the dosimetry of inhaled fibers in the human lung, data for an improved mathematical lung deposition model, and a definition of the thoracic fraction of fibers for exposure assessment. Sampling devices based on this size-selection definition can be developed in the future for improved assessment of worker exposure.

Program Area: Exposure Assessment Methods (NORA)
Title: Investigating Principles of Workroom Exposure
Investigator: Charles Feigley
Grant Number: R01 OH007626
Start & End: 9/1/2001-8/31/2004
Affiliation: University of South Carolina Foundation
City & State: Columbia, SC
Phone: (803) 777-6360

Description:
Assessing exposures of workers to chemical hazards is an essential element of occupational epidemiology and industrial hygiene. However, exposure assessment is often the weakest link in research on the relationship between chemical exposure and occupational disease. Thus, development of a more reliable basis for worker exposure assessment methods is a critical need. The long-term goal of the research proposed here is develop more reliable exposure assessment methods by investigating how physical factors in a workroom govern worker exposure and its variation. These factors include work area airflow characteristics, work area physical configuration, source characteristics and worker activities.

The specific aims are to: (1) determine the effect of worker presence on the workroom concentration fields and velocities; (2) determine the effects of worker presence and activities on worker personal exposure; (3) develop a deterministic model for exposure assessment that accounts for the fundamental physical determinants of workroom exposure; and (4) evaluate the use of this model in several workrooms.

An experimental workroom will be built, allowing control of dilution air flowrate and tracer gas emission, and simulation of realistic workroom thermal characteristics. Experiments will be performed to characterized workroom concentration and velocity for different air inlets, thermal conditions, and air flowrates. Then, experiments under the same environmental conditions will be performed with a person present to represent a worker. The "worker's" impact on the room velocity and tracer concentration will be determined. To provide additional insight into the phenomena observed, some experimental conditions will be simulated using computational fluid dynamics. A deterministic model relating exposure to room configuration, airflow and thermal boundary conditions, and contaminant source characteristics will be developed and implemented as an interactive computer program. Then the model will be tested and refined by application in several industrial workrooms.

Program Area: Exposure Assessment Methods (NORA)
Title: Numerical Modeling of Size-Specific Aerosol Concentration
Investigator: Michael Flynn
Grant Number: R01 OH007363
Start & End: 9/30/2001-9/29/2004
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 966-3473

Description:
The long-term goal of this research is to develop a numerical algorithm for predicting the concentration and size distribution of aerosols, and to evaluate the major uncertainties in applying such a tool to occupational health problems. Solutions to current challenges such as modeling human exposure to inhalable and respirable particles, estimating the performance of size-selective aerosol samplers, and optimizing the design of ventilation systems for particulate control, are hindered by the lack of a comprehensive mathematical modeling methodology. Health effects such as chronic obstructive pulmonary disease are related to both the toxicity of the material and particle size as indicated in the size-selective sampling methodology for particles outlined in the ACGIH-Threshold Limit Value for Chemical Substances.

Computational fluid dynamics (CFD) is a promising approach for these and other problems, but at present, there is not a viable method for predicting aerosol concentration fields and size distributions. There are also many sources of uncertainty in the use of CFD simulations, including the turbulence model selected, the boundary conditions imposed, and the conceptual model of reality input to the computer code. This research will: (1) provide a complimentary tool for use with CFD codes to predict aerosol concentration fields and size distributions, and (2) develop and apply a methodology to evaluate uncertainties inherent in the use of this tool for occupational an environmental exposure problems. This proposal has relevance to the NORA research priorities of: Control Technology and Personal Protective Equipment, Exposure Assessment Methods, Intervention Effectiveness, and Indoor Air. In addition it is particularly pertinent to current CDC concerns regarding the spread of infectious agents in urban (e.g., bio-terrorism), or enclosed environments (e.g., airplanes). The specific aims are to: 1) Improve our existing computer algorithm to take output from computational fluid dynamics software and make predictions of size-specific aerosol concentration fields. 2) Develop parallel implementations on large-scale machines to investigate convergence of the algorithm. Assess important sources of uncertainty in the prediction of aerosol concentrations relevant to occupational health problems. These issues include, (a) time-dependent effects and turbulence in the near-wake region, (b) numerical convergence and accuracy, and (c) comparability of numerical predictions and experimental data. 4) Employ computational visualization tools to enhance interpretation of the results and to improve worker education.

Program Area: Exposure Assessment Methods (NORA)
Title: Real-Time, In-Use PM Measurement from Diesel Engines
Investigator: Mridul Gautam
Grant Number: R01 OH007729
Start & End: 9/1/2002-8/31/2005
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-3111

Description:
The global objective of the proposed study is to accurately measure and control the genotoxic respirable particulate matter (PM) produced by diesel engine powered mining equipment. This study is aimed at highlighting differences between the engine out PM emissions measured in a laboratory in accordance with the new Mine Safety and Health Administration (MSHA) regulations, and the actual "real-world" PM exhaust emissions emitted by mining engines operating over normal duty cycles in mine atmospheres. This study proposes to employ a portable real-time particulate matter mass monitor to quantify the genotoxic exposures by measuring diesel particulate matter (DPM) emissions from tailpipes of mining engines. It is proposed that an integrated approach be adopted that will involve a critical assessment of DPM exhaust emissions measured in the laboratory as well as direct on-board DPM emissions measured from engines operating in the mines. The inability of the adequate on-board PM measurement technology that could consistently and accurately measure DPM in underground mines resulted in MSHA requiring only in-laboratory engine tests. However, very recent developments in PM mass measurement systems may now enable in-field PM exhaust emissions measurements from diesel engines. This would provide researchers with the ability to evaluate the real-world contribution of particulate matter from diesel engines operating in the close confines common to mining environments. Moreover, this technology would provide a means of verifying in-use performance of proposed emissions curtailing devices and identifying emissions control system failures in the field. The proposing team's experience has highlighted the imperative need to measure in-mine diesel PM exposures, since prior work for the West Virginia Diesel Commission had shown that engines and exhaust aftertreatment systems that have passed certification tests in the laboratory may not only malfunction in the field, but the emission levels may be significantly greater than the certification standards. Such technology is imperative in order to accurately assess in-mine diesel PM exposures so that the mining industry can effectively safeguard the health and safety of miners while enhancing the productivity and efficiency of mining operations.

Program Area: Exposure Assessment Methods (NORA)
Title: Comparison of Concentrations at Personal Exposure Sampling Locations
Investigator: Steven Guffey
Grant Number: R01 OH007587
Start & End: 7/1/2001-6/30/2004
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-4607

Description:
Industrial hygienists estimate inhaled concentrations of airborne contaminants using " personal" samples, which are almost always taken at the lapel of the sampled subject (i.e., a worker). Despite the importance of the assumption that lapel samples are representative of inhaled concentrations, it has not been convincingly demonstrated by published research, and significant doubts remain that concentrations at the lapel are always representative of inhaled exposures. It is quite plausible that lapel samples are unrepresentative of inhaled concentrations for some exposure conditions and that lapel samples bias results differently for different work environments. Given the complexity of the fluid flows near the body and the high variability of conditions in the workplace, modeling the relationship between lapel and inhaled concentrations for all exposure conditions is practicable only with computational fluid dynamics (CFD). However, with CFD and verification with experimental data, it should be possible to find the effects of important variables on: (1) the levels of inhaled concentrations, and (2) the errors associated with use of a surrogate sampling site instead of inhaled concentrations. It is reasonable to suspect that one or more adequate surrogate sites for inhaled concentrations can be found among the following locations: lapel, neck, sternoclavicular region, cheek, or forehead. The proposed study will compare tracer gas and vapor concentrations taken at these sites during highly challenging conditions. Humans and mannequins in a wind tunnel will be sampled under various conditions of cross-draft velocity, cross-draft orientation, and source location to find the conditions that produce the greatest deviations between inhaled samples and its surrogates. The experiments will also explore the effects of breathing on sampling error at the sampling sites. In addition, the scope of the findings will be extended by use of computational fluid dynamic (CFD) modeling This issue is important to IH practice, particularly in enforcement of OSHA standards for allowed airborne contaminant exposures, but also in epidemiological research, allocation of funds for engineering controls, and in relating exposures to biological sample concentrations. Finally, the study will allow evaluation of the efficacy of modeling human exposures using mannequins and CFD.

Program Area: Exposure Assessment Methods (NORA)
Title: Pesticide Dose Monitoring in Turf Appplicators
Investigator: Shelley Harris
Grant Number: R01 OH004084
Start & End: 8/1/2002-7/31/2005
Affiliation: Virginia Commonwealth University
City & State: Richmond, VA
Phone: (804) 828-1582

Description:
One of the greatest barriers to obtaining useful results in epidemiologic studies is the lack of adequate exposure data. The broad, long term objective of the proposed project is to improve the assessment of pesticide exposures in epidemiologic studies which will allow for the identification of health risks such as cancer, which would otherwise not be found using traditional methods of exposure assessment.

This study has been designed to evaluate total body dose of the commonly used pesticides MCPA, mecoprop, dicamba, cyfluthrin and imidacloprid (using biological urine monitoring) in professional turf applicators. Previously developed dose prediction models will be validated (mecoprop, dicamba) and adjusted, if necessary to improve dose prediction. The important exposure variables or predictor variables which will be effective in predicting total body dose in applicators without the use of biological samples, will be evaluated and this information will be used to determine exposure reduction strategies.

Prior to the initiation of a full-scale field study, a comprehensive evaluation of the urinary excretion of MCPA, cyfluthrin and imidacloprid will be conducted on a group of 10 workers. In the second year of the study, a sample of 100 workers employed by TruGreen Chemlawn will be selected from approximately 5 different franchises and information concerning the use patterns of pesticides for each individual employee will be obtained. The total amount of each pesticide excreted in the urine will be measured for two consecutive 24 hour periods following a minimum of three work days. This process will be repeated three times: a spring evaluation of herbicide exposures; a summer evaluation of insecticide exposure; and a fall evaluation of herbicide exposure. During each sampling period, information will be obtained from each applicator on spraying practices, hygiene practices, and other variables which may affect their daily exposure to herbicides. Current pesticide use reported by the applicators will be compared with actual use data obtained from employer records. A previously developed quantitative exposure prediction model that is based on use records and other predictor variables will be validated, and, based on the newly collected data, new models will be developed in order to better predict pesticide exposures if deemed necessary.

Recommendations, based on questionnaire and modeling data, to reduce exposure to these pesticides, will be developed and provided to the participating company and subjects. In the short term, this type of research can be used to reduce pesticide exposures by identifying cost-effective controls in both occupational and environmental settings and this, in the long term, may help to reduce both acute and chronic health risks.

Program Area: Exposure Assessment Methods (NORA)
Title: Novel Hydrogen Sulfide Sensors for Portable Monitors
Investigator: Matthew Hooker
Grant Number: R44 OH007471
Start & End: 9/15/2003-9/14/2005
Affiliation: Nanomaterials Research Corporation
City & State: Longmont, CO
Phone: (720) 494-8401

Description:
Nanomaterials Research's primary objective for this SBIR project is the design, development, and demonstration of a better sensor technology for the detection of hydrogen sulfide Hydrogen sulfide is a colorless, flammable gas that is highly toxic It reacts with the enzymes in the blood that inhibit cell respiration At high concentrations, it can literally shut off the lungs, while lower levels can burn the respiratory tract and cause eye irritation This gas is encountered in a wide range of industries, and a number of standards have been established for occupational exposure The OSHA Permissible Exposure Limit (PEL) is 10 ppm, the Short Term Exposure Limit (STEL) is 15 ppm, and exposures of 300 ppm or greater are considered immediately dangerous to life and health (IDLH) Because of the potential for adverse health effects at low concentrations, the industrial hygiene community is continually seeking improved performance from hydrogen sulfide sensors Specific requirements include reliable and accurate detection in real time, quantitative measurement capabilities, low purchase and life cycle costs, and low power consumption (for portability) Sensors meeting these requirements will find numerous applications within the health and safety field In addition, there are several potential spin-off opportunities in leak detection, emission monitoring, and process control.

Nanomaterials' approach is to utilize alternative ceramic oxide materials, and a unique multilayer fabrication process to accomplish the objectives of this project The work plan includes optimization of the sensor materials, sensor element fabrication, sensor element packaging, in-house and external evaluation of the sensors, and establishing the foundation for new instrument development The ultimate aim is a low-cost, low-power sensor that can be used in a new type of personal monitor The envisioned monitor is a low profile, credit card sized "smart-card" that can not only alert the wearer when unsafe concentrations have been encountered but also to track cumulative individual worker exposure to a particular toxic gas species.

Program Area: Exposure Assessment Methods (NORA)
Title: Improved Methods for Dermal Exposure Estimation
Investigator: Gerald Kasting
Grant Number: R01 OH007529
Start & End: 9/1/2002-8/31/2006
Affiliation: University of Cincinnati
City & State: Cincinnati, OH
Phone: (513) 558-1817

Description:
The investigators propose to develop a sophisticated, yet accessible mathematical model that closely mimics percutaneous penetration, tissue concentrations and clearance in human skin in vivo. This development will significantly advance the mechanistic understanding of allergic and irritant dermatitis and the mechanics of dermal exposure assessment. This objective will be accomplished through the construction and experimental verification of physiological and physical properties-based models for percutaneous absorption incorporating features not found in the mathematical models presently used to estimate dermal exposure. Successful completion of the specific aims of the proposal will lead to the following: (1) an experimentally verified, microscopic model of transport in human stratum corneum and skin appendages (hair follicles, sweat glands); (2) a dermal vascular model that allows accurate predictions of permeant concentrations and clearance in the viable skin layers; (3) a transient diffusion model for calculating dermal absorption subsequent to low-to-moderate exposures to potentially volatile compounds; (4) a skin hydration model for linking the above with steady-state permeability models presently in use; and (5) an easy-to-use spreadsheet for dermal exposure calculations incorporating the most important features from the investigation.

The research methods include: Sophisticated numerical techniques for modeling transport in heterogeneous structures and advanced graphical representation of these results. Detailed examination of stratum corneum ultra structure and microtransport properties using laser scanning confocal microscopy, fluorescence photobleaching, and other light microscopic techniques. Determination of diffusivities and partition coefficients of selected permeants in stratum corneum, epidermis, dermis, and hypodermis and the role of protein binding on these values.

Program Area: Exposure Assessment Methods (NORA)
Title: Measuring Human Fatigue with the BLT Prototype
Investigator: Theodore Langley
Grant Number: R43 OH007664
Start & End: 9/15/2003-3/14/2004
Affiliation: Bowles-Langley Technology, Inc.
City & State: Alameda, CA
Phone: (510) 864-3111

Description:
Bowles-Langley Technology, Inc., "BL T", a privately held California corporation, proposes to develop an electronic device capable of quickly assessing an individual's level of fatigue and alertness. The device will be used to screen individual workers, on a daily or periodic basis. The initial market will include truck drivers, bus drivers, airline pilots, rail workers, air baggage inspectors, maritime workers and other workers who are engaged in activities where accidents from lack of alertness can have a magnified impact on human life and the environment.

In operation, the device first establishes an individual's baseline by testing over a period of weeks. Once a stable baseline is established, each individual is then measured in comparison to his or her own baseline. A performance score below baseline is an indication of potential impairment.
The device uses patented technology, proprietary software and algorythms to compute results and also to insure individual privacy.

The immediate task is to conduct a clinical trial of the system to determine its effectiveness in detecting fatigue. The test protocol involves keeping 10 individuals awake for 24 hours. During this time the individuals will be tested repeatedly with a variety of testing equipment and simulators as well as with the BL T test device. If the BL T test results show a positive correlation with the other measurements, then a more extensive clinical trial will be conducted followed by large scale workplace trials.

Use of this device has the potential to substantially reduce accidents in many industries.

Program Area: Exposure Assessment Methods (NORA)
Title: Chrysotile: New Exposure Indices and Cancer Epidemiology
Investigator: Dana Loomis
Grant Number: R01 OH007803
Start & End: 9/30/2003-9/29/2007
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 966-7433

Description:
Asbestos is classified as a definite human carcinogen, with all forms treated as equally hazardous under current US regulations. Chrysotile is the most commonly used form of asbestos and, while use of chrysotile is restricted in the Us., maintenance personnel and building occupants continue to be exposed due to the vast quantities of in-place fiber and use in developing countries is increasing. Despite the accumulated scientific evidence, a number of questions remain unresolved concerning the carcinogenicity of asbestos in general and chrysotile in particular. Some researchers argue that the cancer risk associated with exposure to chrysotile is much lower than that for amphibole forms of asbestos. Among workers exposed to chrysotile, an unexplained contrast also exists between the extremely high risk of lung cancer among textile workers and the much lower risk among miners and millers. These controversies are difficult to resolve because only a handful of independent studies have adequate exposure-response information. To address open questions about chrysotile, we propose a historical cohort study of 5818 workers at four North Carolina asbestos textile plants that have extensive data on asbestos exposures but where cancer occurrence has never been studied. The principal goals of this epidemiological study are: 1) To estimate textile workers' exposures to chrysotile asbestos using both established indicators based on fiber concentration and new indicators, which use transmission electron microscopy to account for fiber size distribution, dimensions, and surface area; 2) To characterize the quantitative relationship between cumulative exposure to chrysotile and lung cancer mortality while controlling for potentially confounding occupational exposures, and 3) To also evaluate the risk of lung cancer with respect to new indicators of asbestos exposure, including measures of fiber size distribution, fiber dimensions, and fiber surface area. A well-conducted epidemiologic investigation of this new population would provide information badly needed to help answer questions concerning the generalizabilty of previous studies, and about the relative hazardousness of chrysotile. Furthermore, research on lung cancer mortality using exposure indices that account more fully for the bivariate distribution of asbestos fiber length and width would provide new data relevant to risk assessments for all forms of asbestos as well as for man-made mineral fibers.

Program Area: Exposure Assessment Methods (NORA)
Title: A Novel and Non-Invasive Method of Dermal Sampling for Exposure Assessment
Investigator: Samir Mitragotri
Grant Number: R03 OH007524
Start & End: 9/30/2002-9/29/2004
Affiliation: University of California
City & State: Santa Barbara, CA
Phone: (805) 893-7532

Description:
The general objective of the proposed studies is to develop a "novel method of collecting contaminants from the skin to assess cutaneous exposure to hazardous materials." This method utilizes low-frequency ultrasound in combination with surfactants to extract contaminants from the superficial as well as deeper layers of skin in a controlled manner. Contaminants extracted in this manner will be assessed using analytical methods to assess the exposure of the individual to hazardous substances.

Due to its large size, skin offers one of the most vulnerable organs for exposure to contaminants. One of the major issues in assessing skin exposure is the lack of methods to collect samples in a controlled way. Accordingly, better methods of meaningful sample collection are desired. In the proposed studies, we plan to address this challenge.

We hypothesize that a short application of low-frequency ultrasound along with surfactants can be used to extract contaminants from a fixed area of skin painlessly and non-invasively. The extracted sample can then be analyzed to assess dermal exposure to contaminants. The specific objectives of the proposed studies are as follows: (i) Assess the Composition of Ultrasonically Collected Sample, (ii) Assess Mechanisms of Ultrasonic Sample Collection, and (iii) Assess Safety Issues of Ultrasound Application.

Program Area: Exposure Assessment Methods (NORA)
Title: Dermal Exposure to 1,6-Hexamethylene Disocyanate
Investigator: Leena Nylander-French
Grant Number: R01 OH007598
Start & End: 8/1/2003-7/31/2006
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 966-3826

Description:
We propose to develop and apply methods for measurement of 1,6-hexamethylene diisocyanate (HDI) exposure of spray painters who are at risk for sensitization and development of occupational asthma. The importance of the problem and the availability of a well-defined "at-risk" study population warrant the comprehensive nature of this proposed research. To achieve this goal, we will recruit 50 spray painters from one U.S. Marine/Navy base. Personal breathing-zone exposure will be measured with the Iso-Check TM sampler. Blood and urine samples will be analyzed for the metabolite 1,6-hexamethylene diamine (HDA) as a marker for whole body exposure and systemic absorption. Dermal deposition and penetration into the stratum corneum will be measured using a non-invasive tape-stripping method. An enzyme-linked immunosorbent assay (ELISA) method for detection of HDI-adducted keratin will be developed in order to measure HDI absorption and the potential systemic bioavailability via the skin. Development of the capacity to measure adducts of HDI in the skin will allow us to define the kinetics and dosimetry of exposure(s). We will correlate the measured dermal concentration by the developed methods (ELISA and/or HDI extracted from the keratinized skin) with concentrations in other sentinel media (HDA in urine or plasma). Together, these data will allow us to correlate dermal exposure to systemic exposure and to determine the significance of exposure through the skin. Correlation between the biologically available dose and the dose measured in the biological specimens is critical to developing an understanding of the role of HDI exposure through the skin. Finally, we will be able to determine how factors related to job classification and work tasks affect recent dermal exposure to HDI in occupationally exposed workers using mixed-effects linear-regression models and to develop a model for spray painting exposure to predict dermal deposition rates and to evaluate these predictions in laboratory and field settings. By combining a industrial hygiene survey with measurements of exposure through all potential routes, with measurements of biologically available dose and sophisticated exposure modeling, the methods developed and results obtained by this study will be valuable for understanding of the role of dermal exposure as a vehicle for systemic exposure and for developing strategies to measure and minimize dermal exposure.

Program Area: Exposure Assessment Methods (NORA)
Title: B2-Microglobulin: Renal Biomarker of Workplace U Exposure
Investigator: Susan Pinney
Grant Number: R01 OH007976
Start & End: 9/30/2003-9/29/2005
Affiliation: University of Cincinnati
City & State: Cincinnati, OH
Phone: (513) 558-0684

Description:
Beta-2-microglobulin (B2 M) is a low molecular weight protein biomarker in urine, used in detection of early impairment of proximal tubular function, often for biological assessment of exposure to uranium. Previous studies ofbeta-2~microglobulin have been hampered by small sample size, limiting ability to determine if amount, duration or chemical form of uranium effects the level ofbeta~2-microglobulin or other measures of urinary function. This study will explore uses ofbeta-2-microglobulin as a biomarker using laboratory data and occupational history information previously collected from a population of 2213 workers who formerly worked at a uranium processing plant. Specific Aims are: 1) Characterize the beta-2-microglobulin levels in this population, and to compare their beta-2-microglobulin levels to reference intervals established for a population of unexposed community residents from the same region; Evaluate the trend over time in workers with repeated measures, and the ability of beta-2-microglobulin to predict diminished renal function; 2) Describe the relationship between beta-2-microglobulin and other parameters of renal function (serum creatinine, blood urea nitrogen, urinary protein, blood and glucose in urine) and compare those relationships in workers to the unexposed population; 3) Characterize the historical uranium exposure to each worker by amount and duration of exposure, age at exposure, and chemical form of uranium; 4) Determine the exposure-effect relationship between parameters of uranium exposure and level of urinary beta-2-microglobulin, and levels of other measures of renal function; 5) Relate current urine uranium levels of 100 workers to historical exposure and beta-2-microglobu1in level. Our access to this large population of workers with beta-2-microglobulin measures and detailed occupational history data, coupled with our knowledge of industrial processes at this site, provides a unique opportunity to study this biomarker. Understanding risk of renal disease and usefulness ofbeta-2-microglobulin as a biomarker will improve medical screening and intervention in aging US population workers with previous occupational uranium exposure.

Program Area: Exposure Assessment Methods (NORA)
Title: Validation of Biomarkers in Humans Exposed to PAHs
Investigator: Qingshan Qu
Grant Number: R21 OH007632
Start & End: 1/1/2002-12/31/2004
Affiliation: New York University
City & State: Tuxedo, NY
Phone: (845) 731-3567

Description:
Polycyclic aromatic hydrocarbons (PAHs) are widespread environmental contaminants due to significant contributions from incomplete combustion of fossil fuels and other organic materials. Exposure to PAHs has been associated with lung and skin cancer in occupational setting and a potential increased risk of cancer in humans exposed to PAHs at low ambient levels is now becoming a major public concern. In order to address this problem, a variety of biomarkers have been developed to index the exposure levels or biological effects of PAHs. However, the validity of their applications in risk assessment of PAHs at low levels is uncertain. This proposed study will mainly focus on polycyclic aromatic hydrocarbons (PAHs). In order to address this problem, a variety of biomarkers have been developed to index the exposure levels or biological effects of PAHs. However, the validity of their applications in risk assessment of PAHs at low levels is uncertain. This proposed study will mainly focus on validating these biomarkers in a Chinese population with broad ranges of exposures to PAHs. The biomarkers to be validated include urinary 1-hydroxypyrene, DNA and protein (hemoglobin and albumin) adducts as well as p53 protein. In addition, the polymorphisms of genes, including CYP1A1, microsomal epoxide hydrolase (mEH), GSTM1, and p53 genes, will be identified to assess gene-environment interactions. For this purpose, we will conduct a study with 5 projects included. The specific aims of this study are: (1) to determine if these candidate markers can at least reliably detect differences between workers with relatively high levels of exposure and unexposed subjects; (2) to examine the reproducibility of these biomarkers and to assess their inter-and intra-individual variabilities; (3) to estimate the effective half-lives of the exposure markers and to evaluate whether they relate to the most current exposure or to integrated exposures over a period of time; (4) to determine whether these markers can be reliably used to differentiate between unexposed subjects and exposed subjects at low ambient levels and to characterize their exposure-response relationships; (5) to investigate the specificity of these biomarkers and to identify possible effects of general confounding factors, such as smoking, diet, age, and gender on the levels of these markers; (6) To evaluate how gene polymorphisms of CYP1A1, GSTM1, mEH, and p53 interact with PAHs exposure in relation to the levels of all candidate biomarkers. The ultimate goal of this study is to determine whether or not these biomarkers can be useful as markers for risk assessment in humans exposed to PAHs at low ambient levels in future large scale epidemiological studies.

Program Area: Exposure Assessment Methods (NORA)
Title: New Methods for Evaluation of Organic Dust Aerosols-Colorado
Investigator: Stephen Reynolds
Grant Number: R01 OH007841
Start & End: 8/1/2002-7/31/2007
Affiliation: Colorado State University
City & State: Fort Collins, CO
Phone: (970) 491-3141

Description:
More than 700,000 men, women, and children working in livestock production are at risk for occupational lung disease from organic dust exposures. The goals of this project are (1) evaluate a novel Recombinant Factor C endotoxin assay using organic dusts from livestock environments, (2) evaluate new methods for measuring inhalable particulates, endotoxins, and glucans/ergosterols that can be used to help establish occupational exposure guidelines for complex organic dusts in swine, poultry, dairy, equine and sheep environments, (3) evaluate and develop correction factors for direct-reading aerosol instruments that can be used by practitioners for interventions. This project involves close collaboration with NIOSH, and with the University of Iowa's Great Plains Center for Agricultural Health, and will complement and enhance the related project conducted at that Center. The performance of inhalable samplers including the IOM, IOM with Multifoam discs, and Button Sampler will be compared to traditional gravimetric methods in a laboratory wind tunnel and in the field. The utility and performance of these devices for measuring endotoxins and glucans/ergosterols will also be determined. Analysis using both assay (LAL and monoclonal antibody) and chemical (mass spectrometry) methods will help elucidate relationships between specific chemical components and potency of these microbial products in the various organic dust matrices, ultimately providing better tools for epidemioliogic studies and standard setting. In the same laboratory and field experiments two direct-reading devices, the DataRAM and HAM, will be compared to the gravimetric methods, and their performance characterized in response to particle size distributions determined using a Grimm. Suitability for practical applications in these environments will also be determined. A unique aspect of this study is the evaluation of sampler performance when influenced by wind, validating the work performed at Iowa under quiescent conditions. This project addresses the need for more research related to organic dusts in agriculture identified by the NIOSH Board of Scientific Counselors, as well as developing practical cost-effective tools for application in engineering and other interventions, also identified as a priority. This study will address several priority areas of the National Occupational Research Agenda (NORA): Asthma,Chronic Obstructive Pulmonary Disease, Mixed Exposures, Exposure Assessment.

Program Area: Exposure Assessment Methods (NORA)
Title: Genetic/Exposure Interaction in Beryllium Disease
Investigator: Kenneth Rosenman
Grant Number: R01 OH007495
Start & End: 8/1/2003-7/31/2006
Affiliation: Michigan State University
City & State: East Lansing, MI
Phone: (517) 353-1846

Description:
A cohort of 1,517 former beryllium workers from two facilities in Eastern Pennsylvania has had medical testing and characterization of their exposure. Medical testing has consisted of blood lymphocyte proliferative transformation (LPT), spirometry and a chest x-ray interpreted by a panel of three "B" readers. Beryllium sensitization has been confirmed by a second positive LPT and chronic beryllium disease by lung biopsy and LPT testing of lavage fluid. As part of the medical testing, which has already been performed, whole blood was collected and frozen and a separate consent form to allow for future genetic testing was obtained from participants. Coincidental with the medical testing a detailed exposure assessment for each participant was constructed using all previous air sampling data, review of process and engineering changes over time and interviews with long term workers. Using a 3 to 1 case-control match this proposal will fund genetic testing of individuals with either beryllium sensitization or chronic beryllium disease. This proposal will allow study of the genetic/exposure interaction of a large well characterized group of individuals who all had beryllium exposure and who have a high rate of beryllium sensitization or chronic disease yet only 11.0% of the cohort has developed these changes. The results of this study will help to elucidate the underlying mechanism of beryllium sensitization and chronic disease.

Program Area: Exposure Assessment Methods (NORA)
Title: Biological Monitoring of Woodsmoke Exposure
Investigator: Christopher Simpson
Grant Number: R03 OH007656
Start & End: 9/1/2002-8/31/2004
Affiliation: University of Washington
City & State: Seattle, WA
Phone: (206) 543-3222

Description:
Exposure of humans to high levels of woodsmoke is associated with adverse health effects including asthma, respiratory disease and cardiovascular disease. In the US alone, more than 100,000 people annually are exposed to elevated woodsmoke levels from wildfires, prescribed burns and agricultural field burning. 70,000 - 80,000 people involved in wildland fire fighting also receive substantial occupational exposure to woodsmoke. Investigating the relationship between woodsmoke exposure and adverse health effects is hindered by inadequate methods of exposure assessment, which lead to exposure misclassification, and the setting of community-impact-driven guidelines for managed fires suffers from a lack of exposure-response data.

The primary objective of this proposal is to develop biological markers of human exposure to woodsmoke. Preliminary work has shown that levels of a number of substituted methoxylated phenolic compounds are increased in urine following woodsmoke exposure. It is our hypothesis that the dose-dependent increase in urinary methoxphenols observed following ingestion or inhalation of woodsmoke combustion products can be related in a quantitative manner to environmental woodsmoke, and thereby provide a biomarker basis for assessment of woodsmoke exposure in occupationally and environmentally exposed populations.

To test this hypothesis, we plan to conduct human exposures to woodsmoke from an open fire. Exposures will be characterized using time-integrated personal sampling and area monitors. The following parameters will be measured: particle mass, particle-associated methoxyphenols and vapor-phase methoxyphenols. In addition, time resolved exposures will be assessed using data logging nephelometers at fixed locations and personal nephelometers. Urinary methoxyphenols will be determined before and after woodsmoke exposure, by using gas chromatography/mass spectrometry .In addition, we plan to measure methoxyphenol levels in urine samples collected from wildfire fighters who have elevated occupational exposure to woodsmoke. A validated biomarker of woodsmoke exposure will facilitate exposure assessment for studies investigating adverse effects of woodsmoke exposure in humans, and could be used to evaluate the effectiveness of interventions to reduce woodsmoke exposure in domestic and occupational settings. This proposed study addresses NORA research priorities related to asthma and COPD, exposure assessment methods and control technology/personal protective equipment.

Program Area: Exposure Assessment Methods (NORA)
Title: Evaluation of Exposure Measurement Error
Investigator: Elaine Symanski
Grant Number: R03 OH007834
Start & End: 9/30/2003-9/29/2005
Affiliation: University of Texas
City & State: Houston, TX
Phone: (713) 500-9238

Description:
Variability in exposure over time can induce error in exposure assessment and thereby diminish measures of effect in epidemiologic studies. In a univariate regression model, under expectation, evaluating an effect of exposure yields an 'observed' slope coefficient that is smaller than it should be when exposure is imperfectly measured. The ratio of the 'observed' to the true slope coefficient reflects the attenuation bias and it is well known that it equals the ratio of the variance of the true exposure to the variance of the error-prone exposure measure. Given the different expressions for attenuation bias, different forms of the estimators can be constructed as either a ratio of estimated slope coefficients or as a ratio of estimated variances. In the former case, the estimator is a ratio of normally distributed variates, and in the latter case, a ratio of approximately chi-squared distributed variates. This implies that the two estimators are not equal in distribution and we expect that the degree to which they differ may depend upon sample size, the magnitude of the regression effect, and the degree of variability in the true and measured exposures. Therefore, a primary objective of the proposed investigation will be to examine the distributional, behavior of the two estimators of attenuation bias using empirical and analytical methods. Simulation studies will be carried out for distinct combinations of sample size and of the parameters in the regression and measurement error models, and comparisons made. Using analytical methods, the conditional distribution of the ratio of the 'observed' to the true slope coefficient given the en-or-prone exposure measure and the outcome will be derived and compared to the distribution of attenuation bias expressed as a ratio of variances, which is available in closed form in the literature. A final objective of the proposed investigation will be to quantify the degree of measurement error in measures of exposure, assess the consequences of exposure measurement error in attenuating regression results, and make comparisons on the basis of attenuation bias between multiple exposure measures to the same contaminant. Overall, the fmdings of the proposed investigation should provide a basis for determining when relevant data can be used to make reliable estimates of measurement error and for comparing the degree of exposure measurement error in multiple measures of exposure collected on groups of workers exposed to a variety of workplace contaminants.

Program Area: Exposure Assessment Methods (NORA)
Title: Dermatopharmacokinetics: In Vivo Analysis of Solvents
Investigator: Karla Thrall
Grant Number: R01 OH003658
Start & End: 9/30/2003-9/29/2006
Affiliation: Battelle Memorial Institute
City & State: Richland, WA
Phone: (509) 376-6115

Description:
This project is a continuation of NIOSH 5-RO1-OH03658-02, "Dermatopharmacokinetics of paint solvents." The overall research objective for this continuation project is to expand prior studies to evaluate the percutaneous absorption of compounds commonly encountered within similar industries (styrene and ethylbenzene) along with focused studies to evaluate the dermal bioavailability of compounds with both lipophilic and hydrophilic properties. The first part of this study demonstrated that the dermal absorption of toluene in an aqueous matrix was substantially less than previous estimates, and that aqueous methylethyl ketone was absorbed to a much greater degree than previously determined. Additionally, studies conducted to evaluate the dermal absorption of methyl ethyl ketone have revealed a biphasic absorption pattern, with an initial rapid appearance of compound in the exhaled breath, indicative of high permeability, followed by a more sustained moderate permeability. Furthermore, our studies with complex paint matrices indicate that
the matrix impacts toluene dermal absorption to a lesser degree than concentration within the matrix. The next phase of study, as proposed here, will explore the biphasic absorption in more detail by evaluating additional compounds with both lipophilic and hydrophilic properties, will evaluate the dermal bioavailability of additional compounds commonly encountered in the occupational setting, and will evaluate the dermal bioavailability of solvents as vapors. This continuation proposal has the following Specific Aims:

1. To compare the dermal absorption of compounds with both lipophilic and hydrophilic properties with prior studies using methyl ethyl ketone in F344 rats.
2.To evaluate the kinetics and dermal bioavailability of ethylbenzene and styrene in an aqueous matrix using F344 rats.
3.To evaluate the kinetics and dermal bioavailability of ethylbenzene, styrene, and toluene vapor using F344 rats.

Program Area: Exposure Assessment Methods (NORA)
Title: Health Effects of Occupational Exposures in PGDP Workers
Investigator: David Tollerud
Grant Number: R01 OH007650
Start & End: 7/15/2002-7/14/2005
Affiliation: University of Louisville
City & State: Louisville, KY
Phone: (502) 852-2305

Description:
The Paducah Gaseous Diffusion Plant (PGDP) is located in Western Kentucky, about 10 miles west of the City of Paducah. It currently employs approximately 1,700 workers; some 8,000 individuals have worked at the plant since it was opened in 1952. The plant is in a rural area and some areas adjacent to the site are protected conservation, wildlife and recreation areas. The primary function of the PGDP has been to produce enriched uranium for use by commercial reactors or as feed material for other plants that further enrich the uranium. Workers, government officials and the, surrounding community have raised concerns about potential health effects from current and past exposures at the plant. The proposed studies will develop new information to help address these concerns. These investigations will take a two-pronged approach, evaluating the impact of historical exposures on worker mortality, and characterizing the effects of more recent exposures on current and future risk of disease. The specific aims of this feasibility study are:

AIM 1: Carry out site visits to the PGDP facility in Paducah and to Oak Ridge, in order to initiate direct communications with these two important sources of records and other information.

AIM 2: Develop and refine a panel of biomarkers to assess exposure and tissue response to radiation at PGDP, including: Chromosome Aberrations; Somatic Mutations; and Protein Adducts.

AIM 3: Develop and validate systems and procedures to procure, transport and test biological samples from PGDP workers.

AIM 4: Identify current PGDP workers with higher and lower levels of exposure. The overall purpose of this study is to assess the feasibility of undertaking a comprehensive investigation of both historical exposures that may have affected the health of PGDP workers and more recent exposures that may affect current and future disease risk.

Program Area: Exposure Assessment Methods (NORA)
Title: Molecular Analysis of Mycobacteria in Cutting Fluids
Investigator: Jagjit Yadav
Grant Number: R01 OH007364
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Cincinnati
City & State: Cincinnati, OH
Phone: (513) 558-4806

Description:
Microbial contaminants including nontuberculous mycobacteria (NTM) in metalworking fluids (MWF) have been implicated in occupational respiratory illnesses. Our broader goals are to develop and apply practical DNA-based approaches for real-time detection, quantitation, and identification of mycobacteria in MWF for understanding the prevalent strains and their sources, growth, and survivability in commercial MWFs including those associated with hypersensitivity pneumonitis (HP). The specific aims are (1) to develop polymerase chain reaction (PCR)-based protocols for real-time detection and quantitation of NTM in water-based MWF; (2) to PCR screen field samples of different commercial formulations of water-based MWFs for NTM followed by strain-specific identification of the NTM isolates using molecular typing methods (3) to investigate the sources and dynamics of growth and survival of the selected NTM strains in MWF in use in the identified industrial operations, and (4) to characterize strains of NTM in MWF samples associated with physician-diagnosed HP cases. A mycobacterium genus-specific PCR based method will be optimized for real-time detection of NTM in water-based MWF. The method will be used as a basis for developing a quantitative PCR protocol for quantitation of NTM in field MWFsamples in use across the industries. NTM isolates from MWF samples, obtained using specific media, will be identified at the strain level based on genome fingerprinting by pulsed field gel electrophoresis (PFGE) or rapid amplification of polymorphic DNA-PCR (RAPD)PCR) technique. Selected plants will be investigated for sources of the isolated growth and survival of the selected fields strains by analyzing different environmental sources including water, air, and soil, using PCR. Dynamics of field conditions using quantitative PCR. In parallel studies, MWFs obtained from plants employing physician-diagnosed HP cases will be analyzed for NTM strains using PCR and DNA fingerprinting, and the identified case strains will be compared with the field strains for understanding their industry-wide occurrence and distribution. The resulting information will help NORA's objectives by providing practical methods for microbial exposure assessment and database for developing intervention strategies related to MWF exposures. the associated MWF will be investigated in simulated

Program Area: Fertility & Pregnancy Abnormalities (NORA)
Title: Developmental Immunotoxicity of Atrazine
Investigator: John Barnett
Grant Number: R21 OH007686
Start & End: 9/29/2002-9/29/2004
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-2649

Description:
Atrazine is the most heavily used single herbicide in the USA with estimates of approximately 82 million pounds applied to crops each year, It has been detected with very high frequency in the water in the USA as well in many major aquifiers. Thus, farm families are likely exposed to some concentration of atrazine per os during a growing season and perhaps throughout the year.

There is a relative paucity of published reports on the toxicity of atrazine despite its very high usage. Also, we were only able to find one published report on the immunotoxicity of atrazine. This report showed a persistent decrease in primary antibody response up to 40 days after the administration of a single dose of atrazine. Other immune parameters showed more transient effects. Thus, atrazine is immunotoxic in an adult exposed animal.

Many substances have been shown to have greater or different immunotoxicity when administered during the gestation of the animal. The very high use levels of atrazine and the potential for women to ingest atrazine during the gestational development of their child create a case to determine whether atrazine can affect the normal development of the immune system. Therefore, this application seeks to test the hypothesis that prenatal exposure to atrazine will adversely affect the normal development of the immune system. This hypothesis will be tested by exposing gravid mice to atrazine throughout the gestational period. The offspring of these dams will be allowed to nurse their natural mother, weaned at d21 of life and a variety of immune parameters will be assessed beginning at 6 weeks of age. This duplicates the paradigm of a human ingesting atrazine during the gestation of her child, nursing the child and then assessing the immune response of the young adult offspring.

This R21 application will be used to test the above stated hypothesis and provide data to justify mechanistics studies on the effect of prenatal atrazine exposure on the developmental immune response.

Program Area: Fertility & Pregnancy Abnormalities (NORA)
Title: Reproductive Outcomes in Workers with Past Exposure to Dioxins in Ufa (Russian Federation)
Investigator: Irina Dardynskaia
Affiliation: University of Illinois
City & State: Chicago, IL
Phone: (312) 355-0138
Grant Number: K01 OH007609
Start & End: 8/11/2003-8/10/2006

Description:
The applicant will supplement the mentorship experience with coursework in occupational health and epidemiology. Portions of the research will be supported by our Fogarty grant for "International Research and Training in Environmental and Occupational Health." The goal of Dr. Dardynskaia's research study is to assess whether a cohort of chemical workers exposed to chlorinated phenols, chlorphenoxy acids, and their chlorinated dioxin and dibenzofuran contaminants at the Khimprom chemical plant in Ufa, Bashkortostan experienced adverse reproductive outcomes as a result of these exposures. Despite a large body of experimental data on the adverse reproductive effects of CDDs and CDFs in animals, the human data are still sparse. While lowered sex ratio appears to be a reproductive outcome among groups with heavy occupational or environmental exposure to these compounds, this association is far from proven. The Ufa cohort gives us a rare opportunity to study this association in one of the most heavily dioxin-exposed occupational cohorts in the world. Given the ubiquity of environmental exposure to these compounds and their ability to disrupt endocrine systems at low doses, the question of whether they can affect reproductive outcomes in humans is indeed significant. The Ufa cohort consists of approximately 500 individuals employed in the production of chlorphenoxy herbicides at this plant between 1961 and 1987. The reproductive experience of this cohort will be compared to that of an unexposed cohort of nearest neighbor controls, matched to the exposed on gender and age. Exposure will be ascertained through plant employee records, the plant chloracne registry, and an occupational and environmental history questionnaire. Reproductive outcomes will be assessed through administration of a reproductive history questionnaire to female workers and controls and to male workers and their spouses/partners, through medical abstraction of delivery records of offspring, and through review of birth certificate data.

Program Area: Fertility & Pregnancy Abnormalities (NORA)
Title: Endocrine Disruptors and Neurodevelopmental Outcome
Investigator: Brenda Eskenazi
Grant Number: R01 OH007400
Start & End: 9/29/2001-9/29/2005
Affiliation: University of California, Berkeley
City & State: Berkeley, CA
Phone: (510) 642-3496

Description:
Agricultural pesticide use may be the most significant source of environmental endocrine disruptor exposure in the United States. California, the leading agricultural state in the nation, is the only state that requires reporting of all agricultural pesticide use. The Pesticide Use Reporting (PUR) data indicates that over 600, 000 pounds of ED pesticides are used annually in the Salinas Valley alone. Based on animal and human evidence, prenatal exposure to other endocrine disruptors such as PCBs may result in neurodevelopmental effects and these outcomes may be one of the most sensitive indicators of toxicity. Although animal studies suggest that endocrine disrupting pesticides potentially could affect neurodevelopment, no studies to date have examined these effects in humans.

The objectives of this study are: (1) to determine whether in utero exposure to endocrine disrupting (ED) pesticides, such as non-persistent ED pesticides and organochlorine pesticides, is associated with adverse effects on the neurobehavioral development of children; and (2) to identify population correlates of exposure, (e.g., occupation, season, PUR data) so that appropriate interventions can be developed in the future to reduce exposure. We propose to examine this relationship in approximately 550 children from predominantly low-income Latino farmworker families living in the Salinas Valley of Monterey County, California. These children, whose mothers were enrolled during pregnancy, are participants of CHAMACOS, a study of the NIH- and EPA-funded Center for Children=s Environmental Health Research, which aims to investigate exposure to organophosphate pesticides and potential health effects in children.

We will measure biomarkers of exposure to 14 organochlorine pesticides in archived CHAMACOS serum samples collected at 26 weeks gestational age, and 16 non-persistent ED pesticides or their metabolites in archived maternal urine samples collected at 13 and 26 weeks gestational age. We will investigate the association of these biomarkers with neurodevelopment of newborns (Brazelton) and, 6, 12, and 24 month olds. Mothers are interviewed prenatally and postnatally about their sociodemographic characteristics, habits, housing, exposure, work and medical history. Geographic coordinates of residences are determined in home visits and will be linked to the PUR data.

This study will provide the first data on exposure and health effects of ED pesticides in a highly exposed population, complete the exposure profile of CHAMACOS children, and target interventions to reduce child exposures.

Program Area: Fertility & Pregnancy Abnormalities (NORA)
Title: Exposure to Bisphenol A and Its Reproductive Effect in Humans
Investigator: De-Kun Li
Grant Number: R01 OH007580
Start & End: 9/30/2003-9/29/2008
Affiliation: Kaiser Foundation Research Institute
City & State: Oakland, CA
Phone: (510) 450-2255

Description:
Bisphenol A (BPA) is strongly suspected as a human endocrine disrupter. We propose to follow up our earlier published preliminary report on the human reproductive toxicity of BPA among workers in four Chinese chemical plants. We expect to recruit (a) 300 current and former BPA-exposed workers (200 men and 100 women), (b) 300 spouses, for examining intermediate exposure levels, and (c) 300 offspring, for examining multigenerational effects. For each male worker, two controls with no history of exposure to BPA will be selected from local textile factories. Because of the smaller number of exposed female workers, four controls will be selected per exposed female worker, thus 800 controls with their spouses and offspring will be recruited. Our specific aims are as follows: (1) Among women (both exposed workers and spouses of male exposed workers), is there a relationship of exposure with sex hormone profile, menstrual disorders, frequency of sexual intercourse, time-to pregnancy, and spontaneous abortion? (2) Among men (both exposed workers and spouses of female exposed workers), is there a relationship of exposure with sex hormone profile, inhibin B levels, semen quality, and frequency of sexual intercourse? (3) Among the children of exposed workers, is there a relationship of parental exposure with sex ratio, birth weight, age at development of secondary sex features, menstrual characteristics, and sex hormone profile? Current BPA exposure will be obtained from air sampling through personal monitoring. Cumulative exposure will be estimated through a semi-quantitative job/exposure matrix. An in-person interview will be conducted to obtain detailed information on work history, reproductive and sexual history, and the age at puberty of offspring. Blood and semen samples will be evaluated for hormone levels and semen quality. The work will be conducted by the Shanghai Institute of Planned Parenthood Research and Fudan University (formerly Shanghai Medical University), Department of Occupational Health in collaboration with University of Washington. They have extensive experience in the data collection and lab analysis methods that will be used in the study. The proposed study will evaluate the reproductive effects of BPA in settings where there have been high levels of exposure. The study will also investigate effects in multiple human generations.

Program Area: Fertility & Pregnancy Abnormalities (NORA)
Title: Male Reproductive Effects from Occupational Exposure to Boron
Investigator: Wendie Robbins
Grant Number: R01 OH007575
Start & End: 9/30/2001-9/29/2006
Affiliation: University of California
City & State: Los Angeles, CA
Phone: (310) 825-8999

Description:
This is an epidemiologic study that will investigate the relationship between workplace exposure to boron containing compounds (including boric acid, borax) and adverse male reproductive effects. Boric acid has been identified as one of the highest priority chemicals for human field study by Moorman et al. (2000) in their review of 43 National Toxicology Program reproductive toxicants. Prioritization was based on the strength of animal data, estimated numbers of humans exposed in the workplace, and lack of adequate reproductive health effects data for the human. Animal studies show boric acid has effects on male reproduction at comparatively lower doses than other known reproductive toxicants, reproductive system sensitivity over other toxicities, and a probable threshold for adverse effects. Three human studies have published results on reproductive effects of occupational boron exposure. Two found no effect on fertility or development and one found testicular atrophy and sterility. All three have been criticized for study design issues or lack of adequate exposure assessment. A need still exists for a definitive human reproductive study. Therefore, the specific aims of this research are to:

1. Describe the relationship between boron exposure and direct measures of toxicity on male reproduction:

(a) total sperm count, sperm density, viability, motility, morphology, and sperm MY chromosome ratios
(b) sperm chromatin integrity measured by sperm chromatin structure assay (SCSA), COMET, TUNEL, protamine I (P 1), protamines 2-4 (HP2-4), and protamine 2 precursor proteins (HPI 1 - 2, HPS 1-2) in ejaculated sperm cells
(c) blood and urine steroid hormone markers including testosterone, free testosterone, serum hormone binding globulin, dihydrotestosterone, LH, FSH, estrone, estradiol, estriol.

2. Describe the relationship between boron exposure and indirect measures of toxicity on male reproduction: fertility history and physical exam data.

3. Describe the relationship between workplace, environmental, and dietary sources of boron with biomarkers of exposure and reproductive effect.

The goal is to contribute critical information on the exposure level at which boron causes adverse effects on human male reproduction. The information could then be used to inform workplace practices and policies to protect the reproductive health of the hundreds of thousands of men estimated to be exposed to boric acid and other boron containing compounds in the workplace.

Program Area: Health Services Research (NORA)
Title: Sharp Instrument Injuries and Use of Clinical Services
Investigator: Gerardo Maupome
Grant Number: R03 OH007512
Start & End: 9/30/2003-9/29/2005
Affiliation: Kaiser Foundation Research Institute
City & State: Portland, OR
Phone: (503) 335-6625

Description:
The present study proposes to use detailed health records to explore links between sharp-instrument injuries (SII) and exposure to blood and body fluids (BBFE) among health-care workers (HCWs), and HCWs personal use of clinical services. Such research will result in a more accurate assessment of the economic and health impacts of SII/BBFE incidents. as well as an estimation of the current systems in place to address the sequels of such incidents. By means of sophisticated electronic health information technology, detailed data will be obtained to explore the selection, design, and implementation of engineering systems, clinical protocols, and subsequent research efforts in the future. We will be using records from the Kaiser Permanente Northwest (KPNW) health-maintenance organization clinical services, so barriers to access to care, lack of standardization of clinical/laboratory data and data entry procedures, and other confounders will be controlled for in the research design. More stringent measures than the already high standards currently in place will be employed to maintain the anonymity and confidentiality of these records during the investigation.

In the present study, (Specific Aim 1) we will undertake both a case-referent study and a pre-post study using electronic records of HCWs with a clinical position at KPNW to establish and characterize whether or not an association exists between SII/BBFE incidents reported, and the increased use of clinical services in the short and in the long term. We will also (Specific Aim 2) establish a classification of risk in terms of circumstances of SII/BBFE incidents by evaluating the relative contribution of the factors making up an employee profile (job description; mechanism of injury; purpose of offending device; and so on).

The results from this exploratory investigation will identify research opportunities to fill some of the gaps outlined in the National Occupational Research Agenda (www.cdc.gov/niosh/nora). These opportunities will hopefully lead in the future to a more accurate body of knowledge for policy makers, clinicians, and health plan administrators to ensure that timely interventions to ameliorate the effect of health hazards may be planned and implemented for at-risk employees. This study will provide important information to establish the current impact of SII/BBFE incidents in HCWs, in terms of their utilization of clinical services and associated costs.

Program Area: Health Services Research (NORA)
Title: Geographic Variation in Spine Care Among Injured Workers
Investigator: D. Rischitelli
Grant Number: K01 OH007922
Start & End: 9/30/2003-9/29/2006
Affiliation: Oregon Health & Science University
City & State: Portland, OR
Phone: (503) 494-4398

Description:
This proposal addresses two National Occupational Research Agenda priority areas: occupational health services research and low back pain. Back pain among workers is an enormous medical, social, and economic burden in the United States. Back disorders account for 27% of all disabling occupational injuries in the United States and the average direct cost of a low back injury claim is more than twice that of other occupational injury claims combined. The primary goal of the study is to examine community differences in the rate and types of spinal surgery performed on injured workers using small area analysis. Small area analysis is a commonly employed method in health services research but there have been limited applications of this technique in occupational health research. Oregon, as well as a number of neighboring Western states, has been identified as having elevated rates of spine surgery compared to the rest of the nation and significant local variation exists among communities based on prior analyses of Medicare claims data. We plan to evaluate whether a similar pattern of local variation exists for workers' compensation claims and to evaluate factors contributing to observed variations including physician specialty, physician supply, source of payment, and the effect of managed care. This project will pilot the use of an existing comprehensive state database of workers' compensation medical payments that provides rich opportunities for health services and outcomes research in occupational health. The methods described in this application can be applied to other geographic units or other diagnoses and thereby serves as a model for analyzing the individual, community and provider variables that influence the treatment of work-related injuries and illnesses.

Program Area: Hearing Loss
Title: A Model Hearing Conservation Program for Coal Miners
Investigator: Christopher J. Bise
Grant Number: U60 CC315855
Start & End: 12/1/1998-5/31/2004
Affiliation: Pennsylvania State University
City & State: University Park, PA
Phone: (814) 863-1644

Description:
Penn State has proposed to conduct a well thought out research study to design, implement, and evaluate the efficacy of a model hearing conservation program (HCP) for coal miners. The research team identified in the proposal possesses all the requisite knowledge and skills essential to executing a successful program. In addition, their approach to establishing an effective HCP is enhanced by the proposed use of new techniques and methods.

Funding of this proposal will ensure the availability of proven and effective intervention strategies for the prevention of noise-induced hearing loss among miners in this country. The plan of research will identify current best practices in well-run HCPs in other industries, adapt them, as appropriate, to the mining population, and introduce new techniques and methods to further improve state-of-the-art HCPs. Results of the study will be shared with the scientific and mining communities on a regular basis throughout the study period. The cooperative program will conclude by providing a workshop designed to facilitate the adoption of HCPs by other mine operators.

Program Area: Hearing Loss (NORA)
Title: Adverse Effects of Noise on Hearing: Basic Mechanisms
Investigator: Barbara Bohne
Grant Number: R01 OH003973
Start & End: 5/1/2001-4/30/2006
Affiliation: Washington University
City & State: St. Louis, MO
Phone: (314) 362-7497

Description:
Exposure to noise injures the cochlea, often irreversibly. Depending on the intensity and duration of the exposure, the ear may sustain a temporary (i.e., TTS) or permanent (i.e., PTS) threshold shift. Moderate hearing losses may have devastating effects on all aspects of a person's life, including oral communication, employment opportunities and the enjoyment of some of life's greatest pleasures - the human voice, music and the sounds of nature. Several hypotheses exist on the pathogenesis of TTS and PTS, but none have been proven No hypothesis has attempted to explain how workplace noise damages then destroys sensory cells, supporting cells and nerve fibers in the cochlea. The studies proposed here will: (1) determine how TTS and PTS are related; (2) determine which existing noise-damage hypotheses are most likely to be correct; and (3) identify factors that are associated with increased noise susceptibility. Chinchillas will be exposed binaurally for 24 hrs to a 4-kHz or a 0.5 kHz octave band of noise. The exposure level will be either 95 dB or 85 dB sound pressure level (SPL). These levels will produce a moderate TTS and sometimes a PTS. Auditory brainstem response (ABR) thresholds and distortion product otoacoustic emission (DPOAE) levels will be monitored before, and several times after exposure. The survival-fixation technique will be used to preserve an animal's two cochleae at two different times. Thus, each animal will provide two 'snapshots' of the dynamic structural changes which occur post-exposure. This technique is effective because there is excellent left-right correlation with respect to damage when both cochleae are preserved simultaneously. Problems with data interpretation resulting from interanimal variations in noise susceptibility will be minimized. Because survival-fixation preserves the presumed in-vivo relation between the stereocilia and the rectorial membrane (TM), this project will examine alterations in the TM-stereocilia relationship at different intervals post-exposure. Hypotheses to be tested include: TTS results from pillar buckling and sagging of the reticular lamina which uncouples the stereocilia from the TM; TTS disappears when the pillars are repaired, the height of the organ of Corti is restored and the stereocilia are recoupled to the TM. Quantitative data on hair-cell and pillar losses and damage will be collected, compared between each animal's left and right cochleae and correlated with ABR threshold shifts and DPOAE changes. Our goal is to provide information on possible mechanisms of noise damage in the cochlea as a basis for developing scientifically sound strategies for reducing noise-induced hearing loss in humans.

Program Area: Hearing Loss (NORA)
Title: Models for Assessing Risk of Occupational Hearing Loss
Investigator: Laurence Fechter
Grant Number: R01 OH003481
Start & End: 9/30/2002-9/29/2006
Affiliation: Loma Linda Veterans Association for Research & Education (LLVARE)
City & State: Loma Linda, CA
Phone: (909) 825-7084

Description:
Hearing loss is the most common occupational injury in the United States. More than 30 million workers are exposed to potentially hazardous noise and nine million workers have exposure to ototoxic chemicals. The focus of this grant is identifying the mechanisms and conditions under which chemical asphyxiants potentiate noise induced hearing loss (NIHL). Chemical asphyxiants serve as useful model compounds because hydrogen cyanide and carbon monoxide potentiate NIHL in rats at exposure levels relevant to the workplace. Fire fighters, operators of heavy equipment, tunnel and toll workers, and truck drivers are exposed to noise and chemical asphyxiants simultaneously. A two-stage hypothesis will be tested whereby noise and asphyxiant "initiate" (:active oxygen species (ROS) generation and asphyxiants "promote" this stress by impairing intrinsic ROS buffering mechanisms. Cochlear function will be compared among treatment groups using electrophysiological and acoustic methods. Corresponding histopathological injury will be detected by staining for succinate dehydrogenase activity. Potentiation of NIHL by asphyxiant exposure will be assessed following pharmacological treatments that enhance and depress intrinsic ROS buffering systems. If ROS promotion is critical to potentiation of NIHL, then treatments that enhance ROS scavenging will reduce susceptibility. Also, treatments that decrease ROS scavenging will increase susceptibility. Biochemical studies will confirm the effectiveness of drug treatment on intrinsic ROS buffering. Direct measurement of ROS will be performed in the cochlea using electron paramagnetic spin resonance spectrometry (EPR). Finally, immunohistochemical methods will be used to define the consequences of mixed exposures on selected stress pathways in the cochlea.

Program Area: Hearing Loss (NORA)
Title: Development of A School-Based Hearing Conversation Program for Use in Rural Areas
Investigator: Gregory Flamme
Grant Number: R21 OH007707
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-6951

Description:
There is a high prevalence of hearing impairment in rural areas, with substantial impairments appearing in adolescence and early adulthood. Adolescents who work on farms or in agribusiness are at a much greater risk of hearing impairment than their peers. Training hearing protection habits is needed before the onset of hearing impairment, and school systems represent a logical place to address this need. This project will develop and evaluate two hearing conservation programs, one for fourth graders and one for seventh graders. The fourth grade program will include hearing tests and an educational program designed to provide knowledge about auditory anatomy and physiology, knowledge about risk factors for hearing damage, instruction in avoiding hearing damage, and signs of hearing damage. The seventh grade program will consist of hearing tests, education programs, hearing protection device use, display of the sound levels produced by various sound producers (farm equipment, shop equipment, etc.) and a simple procedure to monitor their daily exposure to hearing damage. The seventh grade program incorporates components of the Health Belief Model and the Theory of Self Efficacy.

Program Area: Hearing Loss (NORA)
Title: Noise, Solvents, and Hearing Loss
Investigator: Peter Rabinowitz
Grant Number: R01 OH007724
Start & End: 9/30/2002-9/29/2005
Affiliation: Yale University
City & State: New Haven, CT
Phone: (203) 785-7267

Description:
While noise, one of the most prevalent occupational hazards, is well recognized as a cause of high frequency hearing loss, a growing body of evidence suggests that organic solvents, also widespread in industry, may also increase the risk of hearing loss. There is a need for longitudinal studies of exposed workers to further investigate this possibility. Determining a dose-response relationship for solvents and hearing loss could affect further efforts to control exposures and prevent hearing loss.

This study will make use of the Alcoa database, a unique longitudinal data set of a large working population which includes a significant number of women and African Americans. This data set contains both detailed exposure information regarding noise and solvents as well as hearing tests on employees in U.S. Alcoa and that a significant number of workers are exposed to solvents. The long term goal of the study is to examine effects of chronic solvent exposure on hearing, as well as the impact of noise-solvent interactions on the auditory system.

The study will investigate these effects through a longitudinal cohort study of 8800 workers hired at Alcoa between 1983 and 1997. This would be the largest study to date of noise, solvents, and hearing, and will allow for calculation of relative risks of developing hearing loss for solvent and noise exposed workers. Modeling of industrial hygiene sampling data will allow for cumulative estimates of noise and solvent exposures. A nested case control study will match cases of hearing loss identified in the cohort with controls by age at hire, year of hire, sex, and gender, to further explore these relationships.

Program Area: Hearing Loss (NORA)
Title: Prospective Study of Hearing Damage Among Newly-Hired Construction Workers
Investigator: Noah Seixas
Grant Number: R01 OH003912
Start & End: 9/30/1999-9/29/2004
Affiliation: University of Washington
City & State: Seattle, WA
Phone: (206) 685-7189

Description:
Noise-induced hearing loss (NIHL) is among the most common occupational afflictions, especially to construction workers. Hearing loss usually progresses unnoticed until it begins to interfere with communication, decreasing in quality of life and posing a serious safety hazard. Precise exposure-response relationships for noise-induced hearing loss, especially for highly variable noise exposures, as found in construction, are lacking. In recent years, the potential for distortion product otoacoustic emissions (DPOAEs) as a screening tool for early hearing damage, and possibly as a marker of susceptibility for hearing loss has been recognized. However, no prospective studies of DPOAEs in relation to well-characterized noise exposure and standard audiometry have been conducted. We propose to monitor noise exposure in a cohort of newly-hired construction apprentices and controls and characterize the effects of this exposure on hearing acuity (via standard audiometry) and DPOAEs over a four year period.

Four hundred construction apprentices and 100 medical students will be recruited into the study. Each subject will be given an audiometric exam and DPOAE measurements every six months for four years. Baseline and follow-up questionnaires will be used to characterize other risk factors for hearing loss, non-occupational exposure to noise, characteristics of work and use of hearing protective devices (HPDs). Noise exposure will be monitored twice yearly on each subject using data-logging noise dosimeters in conjunction with time/activity cards. The dosimeters will collect noise levels using 3 and 5 dB exchange rates as recommended by NIOSH and OSHA, respectively, as well as peak exposure information. An activity-exposure matrix will be developed from these data to provide estimates of average, peak and variability of exposure during work and home activities. These data will be used to estimate individual exposures (using several metrics) over time.

Analyses will be conducted to evaluate the relationships between noise exposure (using both average levels and variable exposure metrics) and both audiometric changes and DPOAEs while controlling for covariates. The relationship between audiometric changes and DPOAEs will also be assessed, while controlling for noise exposure metrics and covariates. The study will exploit the repeated measures design on a 'naive' cohort, and individual measures of exposure to avoid and control problems of bias and exposure measurement error.

Program Area: Indoor Environment (NORA)
Title: Floor-Supply Displacement Ventilation System
Investigator: Qingyan Chen
Grant Number: R01 OH004076
Start & End: 9/30/2001-9/29/2004
Affiliation: Massachusetts Institute of Technology
City & State: Cambridge, MA
Phone: (617) 253-7714

Description:
Indoor environment is important to a worker's health and welfare because more than half of the U.S. workforce is employed indoors. Also up to 90% of a typical worker's time is spent indoors. A worker's productivity is related to the indoor environment, such as the indoor air quality and thermal comfort. Displacement ventilation seems to be a good ventilation system to improve the indoor air quality with an acceptable thermal comfort level. However, the widely used side-wall-supply displacement ventilation generates recirculations in the occupied zone of a large office or a workshop. These recirculations present the risk of cross infection between the workers. The floor-supply displacement ventilation could be a solution to avoid the recirculations. On the other hand, the floor-supply system could not remove a high cooling load often found in most U.S. offices and workshops, because the cold air is directly supplied to the occupied zone.

This proposed research will optimize the floor-supply ventilation system to minimize the risk of cross infection among the workers in large offices and workshops with suitable air supply and exhaust locations. The investigation will also improve the design of the floor-supply displacement ventilation system for the removal of a high cooling load without a draft risk. The research will use numerical simulations through computational-fluid-dynamics (CFD) to reduce the costs. Nonetheless, detailed and high quality experimental data will be obtained in a full-scale environmental chamber, and the data will be used to validate the CFD results.

The study will assess the performance of the floor-supply displacement ventilation system in terms of indoor air quality, thermal comfort, energy consumption, and first costs. The parameters to be studied include perforated degree, ventilation rate, supply air temperature, exhaust location, floor insulation, space size, furniture arrangement, etc. for five different climate regions in the U.S. The results can be used to design the ventilation systems in large offices and workshops that provide a healthy and comfortable indoor environment.

Program Area: Indoor Environment (NORA)
Title: Health and Socioeconomic Consequences of NSBRI
Investigator: Carrie Redlich
Grant Number: R01 OH004182
Start & End: 4/1/2001-3/31/2004
Affiliation: Yale University
City & State: New Haven, CT
Phone: (203) 737-2817

Description:
The primary goal of this revised R01 application is to determine the health and socioeconomic consequences of nonspecific building-related illness (NSBRI) (or sick building syndrome) in workers diagnosed with this prevalent disorder. More than half of the U. S. workforce is now employed in indoor nonindustrial environments. Various symptoms and illnesses have increasingly been reported in such nonindustrial indoor environments. NSBRI refers to a common nonspecific disorder which is usually associated with a particular building. Although objective physiologic abnormalities are generally not noted, NSBRI can be extremely unpleasant and an important cause of disability and lost work time. Despite this, NSBRI has received scant scientific attention from a clinical and economic perspective. Little progress has been made in establishing: (1) diagnostic criteria, (2) the natural history or clinical course of NSBRI, (3) the social and economic consequences of this common and important occupational health problem, or (4) the predictors of adverse outcomes. Our Specific Aims are: Aim 1 (A) Identify and classify NSBRI cases using several different case definitions of NSBRI. Aim 1 (B) Determine associations between the different case definitions and the various outcome variables. Aim 2 (A) Characterize the natural history of NSBRI following diagnosis. Aim 2 (B) Determine which host factors (i.e. age, marital status, initial symptoms) and workplace factors (i.e. job stress, work environment) are associated with disease progression and severity. Aim 3 (A) Determine the effect of NSBRI on socioeconomic outcomes (i.e. work-disability, employment status, financial status). Aim 3 (B) Determine which host factors and workplace factors are associated with more adverse socioeconomic outcomes. The overall study design will be a retrospective longitudinal follow-up study of 75 patients diagnosed with NSBRI at the YOEMP Clinic from 1994 to 1999. A similar group of 75 musculoskeletal patients matched on age, gender and year of diagnosis will be used as controls for the socioeconomic analysis. Phone interviews will assess symptoms, general health, functional status, disability, stress, and socioeconomic status since diagnosis of NSBRI. This study should identify diagnostic criteria, increase our understanding of the natural history and socioeconomic consequences of NSBRI, as well as identify risk factors associated with worse outcomes. This information is critical for the development of interventions to prevent and/or ameliorate the adverse consequences of NSBRI.

Program Area: Indoor Environment (NORA)
Title: An Indoor Environment Design Tool for Entire Buildings
Investigator: Jelena Srebric
Grant Number: K01 OH007445
Start & End: 8/1/2001-7/31/2004
Affiliation: Pennsylvania State University
City & State: University Park, PA
Phone: (814) 863-2041

Description:
The applicant's long-term career plans are to conduct research and teaching on indoor environment, such as indoor air quality and thermal comfort in buildings. In particular, the applicant will emphasize the research on energy-efficient ventilation system for applications to occupational safety and health.

Indoor environment is important to a worker's health and welfare, because more than half of the U.S. workforce is employed indoors, and up to 90% of a typical worker's time is spent indoors. Also, worker's productivity is related to the indoor environment, such as the indoor air quality and thermal comfort. Poor indoor environment design has cost billions dollars due to productivity loss of the working American.

The aims of the proposed investigation are to develop an integrated design tool to analyze combined problems of indoor air quality (IAQ) and thermal comfort for an entire building. The integrated tool will consist of three major components: building models, a heating, ventilating, and air-conditioning (HVAC) model, and mass and heat source/sink models. The building models will use a simplified computational-fluid-dynamics model to calculate IAQ and thermal comfort in a single zone and a multi-zone model to link the heat and mass transfer between zones for an entire building. The HVAC model will use modules that can be easily used to form different HVAC systems. The mass and heat source/sink models will use the coupled program of the simplified computational-fluid-dynamics and an energy analysis program as well as various dispersion models. The integrated design tool will be validated by experimental data of IAQ and thermal comfort obtained in a building.

The integrated design tool can be used to evaluate IAQ and thermal comfort in terms of contaminant concentrations, the mean age of air, ventilation effectiveness, airflow pattern, air velocity, air velocity fluctuation, air temperature, relative humidity, percentage dissatisfied people due to draft, and percentage predicted dissatisfied people in an entire building.

Program Area: Indoor Environment (NORA)
Title: Microanalytical System for Indoor VOC Monitoring
Investigator: Edward Zellers
Grant Number: R01 OH003692
Start & End: 9/30/1998-5/31/2005
Affiliation: University of Michigan
City & State: Ann Arbor, MI
Phone: (734) 936-0766

Description:
Continued research on the development and implementation of a high-performance microanalytical system capable of on-site speciated analysis of volatile and semi-volatile organic compounds (VOCs and SVOCs) encountered as complex mixtures at low-/sub-part-per-billion concentrations in non-industrial indoor working environments is proposed. Application to other occupational health monitoring needs will also be addressed. During the first funding cycle of this project, we succeeded in producing and characterizing the performance of a notebook-computer-sized fieldable instrument that employs preconcentration, thermal desorption, high-speed tunable separation, and microsensor-array detection. Detection limits ranging from 0.06 - 17 ppb have been achieved for the components of mixtures of >30 VOCs/SVOCs spanning a 104_fold range of vapor pressures captured from 1-L air samples. Response patterns combined with chromatographic retention times have been used for vapor identification. Analytical cycle times of < 10 min are possible. Meeting these goals has also led to advances in adsorbent-preconcentrator design, dual-column pressure/temperature-modulated separations using air as carrier gas, and vapor detection, recognition, and quantification with ultra-miniature arrays of polymer-coated surface-acoustic-wave (SAW) microsensors. Here, we propose to field test this first-generation instrument in office buildings and to explore its application for breath analysis and for industrial air monitoring where vapor concentrations tend to be higher. Development of a second-generation microanalytical system with the following refinements/additions is also proposed: a wireless interface to permit unattended operation; an onboard vapor generator for automatic field calibration and system diagnostics; use of an alternative sensor technology with greater sensitivity to reduce sample volumes and/or detection limits; addition of a focusing element to reduce inlet bandwidths and use of alternative separation strategies to improve chromatographic resolution/versatility and reduce analysis time; and implementation of Si-micromachined components to reduce size and power. Laboratory and field testing of this second-generation instrument will then be performed. This system represents a significant advancement over the current state-of-the-art in monitoring instrumentation for complex vapor mixtures, obviating the need for conventional sorbent-tube/GC-MS methods for routine indoor air (and other) monitoring. The versatility of this instrument will facilitate the assessment of exposure distributions and the implementation of rational intervention strategies related to indoor air quality and other occupational health problems.

Program Area: Infectious Diseases (NORA)
Title: Body Substance Exposures: Risk Factors and Psychological Impact
Investigator: Hilary Babcock
Grant Number: K01 OH007614
Start & End: 9/1/2002-8/31/2005
Affiliation: Washington University
City & State: St. Louis, MO
Phone: (314) 454-7947

Description:
Body substance exposures pose a significant risk to healthcare workers of blood-borne pathogen transmission. Prevention efforts have focused on barrier precautions and more recently on safety devices, whose efficacy may vary and whose cost-effectiveness is unclear. Other risks such as organizational factors at work are still being explored. The psychological impact on healthcare workers of sustaining an exposure is poorly documented. Specific Aim 1 will determine the effect of three safety devices on needlestick injury rates, and their cost-effectiveness, in a large multi-hospital system. This healthcare system has a large, computerized occupational health database to which large and small, urban and rural, teaching and community hospitals report exposures using a common reporting form. Specific Aim 2 will address organizational factors that can affect risk of body substance exposures. A large survey of work schedules and practices of exposed workers at nine hospitals will be performed as well as a nested case-control study at the largest hospital. Specific Aim 3 will use validated psychiatric assessment tools to assess the psychological impact of sustaining an exposure both immediately after the event and at one and six month intervals. To accomplish these aims, the candidate will work with two sponsors: Dr. Victoria Fraser, a nationally recognized leader in the fields of hospital epidemiology and healthcare worker safety, and Dr. Bradley Evanoff, an occupational health specialist with a Master of Public Health (MPH) degree and extensive research experience in occupational injuries. In addition, the candidate will attend research seminars in the divisions of Infectious Diseases and General Medical Sciences and continue to pursue a MPH degree. The proposed research, classes, and mentorship will allow the candidate to become a well-trained independent investigator studying infectious risks to healthcare workers and designing and implementing interventions to improve the occupational health and safety of healthcare workers.

Program Area: Infectious Diseases (NORA)
Title: A Case-crossover Study of Sharps-related Injuries
Investigator: Murray Mittleman
Grant Number: R01 OH007489
Start & End: 9/1/2002-8/31/2006
Affiliation: Beth Israel Deaconess Medical Center
City & State: Boston, MA
Phone: (617) 632-7653

Description:
Injuries caused by sharp medical devices are common with an estimated 400,000 to 800,000 American healthcare workers injured each year. Injured healthcare workers are at risk for blood-borne viral illnesses, including hepatitis Band C, HIV infection and other less common diseases. The direct medical costs of evaluating and treating sharps-related injuries is approximately $500 million annually. Despite the recent adoption of safer medical devices, the risk of sharps-related injury remains unacceptably high. Relatively little is known about potentially preventable transient etiologic factors that immediately precede these injuries.

In this revised application we propose to conduct a case-crossover study of 1,000 healthcare workers who sustain a sharps-related injury recruited from six hospitals in Boston and Baltimore. We will evaluate risk factors in the following domains: (1) worker-related factors such as rushing, fatigue, distraction and feelings of anger; (2) procedure-related factors such as uncommon, unusual or emergency procedures; (3) workplace-related factors such as working short-staffed, overtime or while on-call; and (4) device-related factors such as use of an unusual or malfunctioning device. We will also evaluate differences in the risks between workers with differing characteristics such as age, gender, profession, and history of prior sharps-related injuries. The effect of risk factors in continuous exposure settings such as operating rooms and intermittent exposure settings such as inpatient units and outpatient clinics will be evaluated.

In a pilot study 90 healthcare workers were interviewed by telephone. Forty were nurses and 28 were trainees. Twenty were injured while scrubbed in an operating room or procedure suite and 15 had known exposures to HIV or hepatitis C. Among our preliminary findings, an increased risk of sharps-related injury was associated with rushing (RR 5.1, 95% CI 3.0-8.7), anger (RR 4.7, 95% CI 1.9-12.2), distraction (RR 8.6, 95% CI 4.3-17.2), and multiple passes (RR 3.1, 95% CI 1.6-3.5). There were trends toward higher risk while working short staffed and among surgeons working in a bloody operative field. Trends toward lower risk were seen with emergency procedures and while being taught. Successful completion of this study may identify modifiable risk factors for hospital-acquired sharps- related injuries. This knowledge may lead to individual and systems level risk-reduction interventions.

Program Area: Intervention Effectiveness Research
Title: Promoting Prevention in Managed Care
Investigator: Steve Findlay
Grant Number: USC CC387112
Start & End: 9/30/1999-9/29/2004
Affiliation: NIHCM Foundation
City & State: Washington, DC
Phone: (202) 296-4192

Description:
The purpose of the study is to gain a more accurate understanding of the industry rates of diseases that may be occupationally related, identify those industries with inflated rates, and identify opportunities for interventions within those industries. It will demonstrate how medical claims data can be used to understand the relationship between place of work and disease. A knowledge base would be created that could motivate and point the way to primary and secondary prevention of occupational disease. The project seeks to identify specific industries and employers with high rates of occupationally related diseases. It also seeks to develop plans and recommendations for targeted intervention activities for employers. A health insurer in Western Pennsylvania, with a large department dedicated to the critical analysis of health insurance claims, would work closely with employers to aid in their understanding of occupationally-related disease and its ramifications in their workplaces as well as the necessity for interventions to promote prevention.

Program Area: Intervention Effectiveness Research
Title: Small Business Safety Officer
Investigator: Mark Fraser
Grant Number: R44 OH004183
Start & End: 9/30/2002-9/29/2004
Affiliation: Mission Research Corporation
City & State: Nashua, NH
Phone: (603) 886-8860

Description:
The vision of "Small Business Safety Officer" is to provide a Web-based cost-savings portal for small businesses to integrate worker safety and health compliance, pollution prevention, and cheaper and safer process alternatives into their business process. The architecture of the Phase I prototype is similar to commercial tax preparation software. Compliance and information needs are determined through an interview process and software wizards then launch Employee and Administrative Websites containing tools and content tailored to the company S&H issues.

From our preliminary testing with two firms and review of the Phase I prototype with 30 businesses, we have determined there to be significant need for a product that provides easy-to-use, centralized, understandable, tailored, and cost-conscious solutions. The Phase I innovations we developed, with input from the Summary Reviews, that will be completed in Phase II are: The user-friendly interview process for initial implementation with full help capability; Incorporation of process alternative and cost savings advisors; and, Provision for custom design of the Website(s) content to address individualized needs. The additional innovations planned for Phase II are: Design of site content along a new communication model to facilitate understanding; Development of tools and advisors for chemical toxicity and ergonomics; Design of a training program by the University of Massachusetts Lowell (UML) to support the product; and, Integrate established databases with automated searching to allow S&H information to find the users.

The Phase II alpha prototype on a CDROM will be installed and site tested at two small businesses. We will also perform product demonstrations and outreach to businesses through ES&H organizations to refine features, capabilities and content. The program is a partnership between MRC, the University of Massachusetts Lowell, COES, LLC and our commercial partner, the Bureau of National Affairs. The completed product will address the needs of 60,000 businesses and 1.5M workers subject to the Laboratory Standard. Incorporation of ergonomics will enable extension to other business sectors and millions of additional U.S. workers in Phase III.

Program Area: Intervention Effectiveness Research
Title: WHO Global Occupational Health Programme
Investigator: Gregory Goldstein
Grant Number: U60 CC008636
Start & End: 9/30/1992-9/29/2004
Affiliation: World Health Organization (WHO)
City & State: Geneva 27, SW
Phone: (417) 913-559

Description:
Safe and healthful work should be a fundamental right, yet every year, millions of people worldwide are denied that right. It is estimated that occupational injuries affect over 250 million workers, while occupational diseases impact 160 million people annually. Over one million workers lose their lives from work-related causes every year. The human and economic costs are larger in developing countries, where many workers are concentrated in the informal sector and/or small scale enterprises, or in traditionally dangerous industries such as agriculture, logging, fishing and mining.

In 1996 the World Health Assembly approved and endorsed the "Global Strategy on Occupational Health for All." This Strategy has become the mandate of the Occupational Health Programme in the WHO Headquarters, the WHO Regional Offices, and the global Network of the WHO Collaborating Centres in Occupational Health. In 1999, following consultations with several partners, including NIOSH, it was agreed that WHO's programme on occupational health would focus its activities mostly on issues of increasing global concern, under three main areas: (a) Evidence for policy, legislation and support to decision-makers, (b) Capacity building, and (c) Protection and promotion of workers' health.

Under (a), sound information on the global burden of work-related diseases and accidents is developed. The proposal then develops a methodology for assessing economic impact, and uses that methodology along with the information on the global burden to estimate the economic impact of occupational illness and injuries. In three countries national plans of action based on these analyses are prepared. Another proposal studies the impact of globalization and trade on occupational health, and develops recommendations for action. Under (b) are proposals to increase the national capacity of developing countries to strengthen occupational health by providing relevant and timely information in a usable format, and to enable members to build collaborative partnerships. Under (c) are proposals for the Regional Initiatives in Occupational Health, especially the "Africa Initiative" for occupational health in small-scale industries and in the informal sector, and related components of "Practical Solutions," and workplace health promotion.

Program Area: Intervention Effectiveness Research
Title: IMHOTEP
Investigator: John Haynes
Grant Number: U50 CC411492
Start & End: 9/9/1994-1/28/2005
Affiliation: Morehouse College
City & State: Atlanta, GA
Phone: (404) 215-2610

Description:
The purpose of Project: IMHOTEP is to increase knowledge, skills and research training of under-represented minority students in the areas of biostatistics, epidemiology and occupational safety and health. For the purposes of this program, under-represented minority students are African American/Black American, Hispanic/Latino, or American Indian/Alaska Native students. Students who are selected for the program participate in 11 weeks of intense research and data analysis with experts at the Centers of Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR). At the outset of the program, students participate in two weeks of classroom training that includes introductory courses in epidemiology, biostatistics, and occupational safety and health, as well as an epidemiology home study course, computer based training, and hands on field experiences with CDC professionals. In the remainder of the program, students gain valuable work experience in processing, analysis, and presentation of data through the study of existing data sets from divisions of CDC, including the National Institute for Occupational Safety and Health (NIOSH). In 2000, OMH and Morehouse have a new cooperative agreement which the cost/intern increased from $7,500 to $10,050.

Program Area: Intervention Effectiveness Research
Title: Hazardous Substance Training for Emergency Responders
Investigator: Eric Lamar
Grant Number: U01 OH007869
Start & End: 9/30/2002-9/29/2007
Affiliation: International Association of Fire Fighters
City & State: Washington, DC
Phone: (202) 824-1555

Description:
The IAFF proposes to implement a nationwide Hazardous Substance Training Program for fire fighters, paramedics and other first responders employed in 26,354 fire departments across the United States. (National Fire Protection Association (NFPA), U.S. Fire Department Profile Through 2000, December 2001)

In the year 2000, 84,500 fire fighters were injured while on duty, 12,006 from exposure to toxic fire products and another 2,113 from exposure to chemicals or radiation (NFPA, U.S. Firefighter Injuries of 20Q0, 2001). It is important to note these data only encompass injuries reported to the NFPA in 2000. In the course of their work, thousands more first responders are exposed to toxic materials that potentially increase their long-term risk for certain types of cancer, heart-lung damage, leukemia, and other diseases.

The IAFF's proven training program strongly and forcefully emphasizes occupational safety and health as part of a comprehensive hazardous materials first responder training plan. Besides meeting the salient demand for federally-mandated hazardous materials first responder training, the IAFF program seeks to fundamentally change fire fighters''knowledge, attitudes and behaviors, causing them to adopt a safer approach to responses throughout their careers. The IAFF Recruit Training Initiative exemplifies this philosophy and is currently used in numerous fire-rescue departments nationwide.

In summary, the IAFF proposes to immediately implement a comprehensive project for both career and volunteer fire fighters with a proven staff of grant management professionals and nationally-acclaimed fire service instructors. The IAFF proposal provides for at least 165 first responder courses every year the project is funded. This training activity is supported by curricula development, continuing education for field instructors, ongoing development of digital and web-based learning methodologies and a comprehensive evaluation plan to track student, course, and institutional changes.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Effectiveness of Computer-Based Training: cTRAIN
Investigator: Kent Anger
Grant Number: R01 OH004193
Start & End: 4/1/2001-3/31/2004
Affiliation: Oregon Health Sciences University
City & State: Portland, OR
Phone: (503) 494-2514

Description:
US corporations spend between $55 and $60 billion per year to provide almost 2 billion hours of training to an estimated 60 million employees. Over 100 OSHA workplace standards have been identified that require training to minimize the risk of disease or injury. However, health and safety specialists have few tools to inexpensively produce effective and customized training that ensures competency at completion, and can be readily revised. We have developed, as a tool to fill this gap, cTRAIN, a computer-based training program that is founded on proven behavioral training principles. STRAW consists of both the computer-based training program to teach the information and a "screenbuilder" development environment for entering content to create new programs. It features intuitive navigation and operation, automatic (computer-generated) spoken English or Spanish as continuously available on/off options for all text (entered in the appropriate language) plus a voice recording option (allowing other languages), self-pacing, immediate feedback on quiz items and a post-test with a simple report on performance. Complementing the training program is a durable "9BUTTON" response input unit that does not put off the poorly educated (as do computer keyboards), as well as a keyboard option. A systematic evaluation of cTRAIN's effectiveness as an intervention technique (NORA priority) will assess, in majority and minority (Latino) workers, the basic training principles which are built into the training program (eg, specific vs. generic feedback, computer-generated vs. recorded natural speech). Coincident with these experiments, new cTRAIN programs (hazard communication, sharps disposal, lab safety, eye and tractor safety) will be developed by content experts and reviewed for both educational effectiveness (consistency with established behavioral training principles) and appropriate content. The new programs will then be presented to volunteer Caucasian and Latino employees in education, construction, hospitals, and nurseries (agriculture) (NORA priority: special populations). Learned knowledge (competency) after training and 3 months later will be assessed with the post-test (to assess retention) as compared to the pre-test (same test). The effectiveness of the training will also be evaluated by measuring behavioral change after training as compared to the same behaviors measured prior to training. In addition, feedback will be elicited from content experts to evaluate the potential for adoption of the computer-based training program and the "screenbuilder" environment.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Intervention Research on Work Organization Factors and Health
Investigator: Chantal Brisson
Grant Number: R01 OH007647
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Quebec
City & State: Quebec, Canada
Phone: (418) 682-7382

Description:
Intervention effectiveness research (IER) and the organization of work are two priorities of the US National Occupational Research Agenda (NORA). In addition, the organization of work is considered a strong contributor to the development of musculoskeletal disorders, a third NORA priority. Few studies have been conducted to date to evaluate the impact of interventions aimed at concretely reducing adverse work organization factors and the comprehensive range of their health impact The objective of the study is to evaluate the benefits of interventions aimed at reducing adverse work organization factors (high psychological demands, low I control, poor social support, and effort-reward imbalance) and their health impact, measured by ambulatory blood pressure, musculoskeletal disorders, mental health problems and certified sick leave.

The study has the following specific aims:
1. To produce knowledge that will foster the development of well-adapted interventions designed to concretely reduce adverse work organization factors. This will be achieved through the combined use of quantitative evaluation of the importance of adverse work organization factors and health problems (prior risk evaluation) and qualitative methods aimed at using worker's and manager's knowledge of real work situations, namely focus groups with workers and follow-up with managers.

2. To systematically document how the intervention is carried out. Intervention refers to organizational changes implemented to concretely reduce the four targeted adverse work organization factors. The nature and intensity of these organizational changes will be assessed and information on those contextual elements that hinder or facilitate the desired changes will be collected through interviews with top management, a work organization changes log, and follow-up of focus groups with employees.

3. To measure the extent to which the intervention reduced the prevalence of adverse work organization factors and the level of health outcomes. Effectiveness of the intervention will be evaluated with aquasi-experimental design including a control group and pre and post-measures. Certified sick leave will be collected for two years preceding the intervention and for the following three years. All of these measures will be monitored in all workers belonging to the intervention group (N=1700) and in all workers belonging to a suitable comparable workplace (N= 1000) before, at 18 months and at 36 months after the intervention.

This study will provide solid new findings that could be used to prevent cardiovascular disease, musculoskeletal disorders and mental health problems, the most frequent, costly and debilitating health problems in the working age population.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Effectiveness of Intervention on Health
Investigator: Lisa Brosseau
Grant Number: R21 OH007741
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Minnesota
City & State: Minneapolis, MN
Phone: (612) 624-3143

Description:
The purpose of this research is to develop tailored written materials and test whether they enhance small business owners' beliefs about outcomes that result from efforts to improve workplace health and safety. Enhanced beliefs will, in turn, raise their attitudes and intentions toward trying to make improvements. Written materials will be designed to emphasize those belief outcomes most highly associated with high-intentioned owners, using written formats and styles shown to be most attractive to small business owners. This research is responsive to the need for more and better information on the effectiveness of interventions identified by NIOSH's National Occupational Research Agenda. The research will take place in two phases over two years. In the first phase, a wide variety of written materials in various formats (newsletters, magazines, newspapers, brochures, etc.) and styles (case studies, personal stories from owners and workers, cartoons, etc.) will be developed and tested using a series of focus groups with small business owners. Results will be used to determine which styles and formats are ranked most highly by owners in attractiveness, readability and effectiveness in delivering specific health and safety messages. Six to twelve separate written pieces will be developed, incorporating the focus group results. In the second phase, the effectiveness of written materials will be tested in a randomized, controlled trial with 120 owners of small businesses. Owners in control and intervention groups (60 owners in each group) will complete a baseline survey of intentions, attitudes and outcome beliefs toward improving health and safety. Owners in the control group will receive monthly or bi-monthly mailings of a trade newsletter or journal. Owners in the intervention group will receive the same materials along with tailored written materials aimed at specific health and safety outcome beliefs. At the end of the year, owners in both groups will be asked to complete a follow-up survey measuring their intentions, attitudes and outcome beliefs. Owners in the intervention group will also be asked for their opinions on the specific materials received. It is expected that the difference in mean pre- and post-study outcome beliefs (and perhaps intentions and attitudes) will be greater in the intervention than the control group.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Designing Ergonomic Interventions for the Fire Service
Investigator: Karen Conrad
Grant Number: R01 OH007490
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Illinois
City & State: Chicago, IL
Phone: (312) 413-0739

Description:
Problem: The fire service remains one of the most hazardous industries in this country with its work-related injury rates and total annual costs exceeding those for most other occupations. Consistently over the years, musculoskeletal injuries are the major type of firefighter injury particularly in emergency medical service (EMS) operations, which are much more frequent than fire suppression. The tasks performed during EMS runs contain many of the same risk factors associated with musculoskeletal injury , and specifically back injury , in other occupations including: lifting, bending, pulling, twisting, awkward postures, and heavy workloads. Unfortunately, few studies have analyzed the biomechanical issues during emergency rescue operations. In a previous study funded by NIOSH, we identified and quantified the biomechanical and postural risk factors associated with emergency rescue tasks in the fire service. We are now in a position to design, develop, and evaluate targeted ergonomic interventions for this population of workers.

Purpose: The purpose of this proposal is to develop and evaluate up to 10 ergonomic interventions that reduce biomechanical loads and are considered worthy of adoption for use by the workers who perform emergency medical/rescue (EMS) operations. We will be using a participatory ergonomic process, much like what has been advocated by NIOSH and others. ~

Aims: The specific aims of the proposed research are: (1) In conjunction with fire service personnel, design specific equipment and work method interventions that address ergonomic concerns during EMS operations; (2) Develop and build equipment and refine work methods based on the design process; (3) Test equipment and refined work method interventions in a laboratory setting using simulated EMS tasks; refine and re-test equipment and methods as necessary based on participant feedback and biomechanical results; and (4) Implement and evaluate the interventions in the field to obtain usability and acceptability feedback from end users performing EMS operations.

Methods: The intervention development and implementation process is comprised of four phases. In Phase 1, the design phase, we will conduct focus groups with firefighter/paramedics (the end users) to discuss ideas for equipment modifications and work method refinement based upon the intervention opportunities identified in our previous research. It is during this phase that the specific interventions will be identified. In Phase 2, the interventions that require the fabrication of equipment will be built and modifications to work methods refined. Phase 3 will test the modified equipment and work methods in a laboratory environment to quantify the effects on tissue loading. We will use a repeated measures experimental design to examine the relative effectiveness of the new interventions compared to the existing approaches in reducing

biomechanical loads on the musculoskeletal system, and in particular the spine. In Phase 4, we will implement and evaluate the interventions in six field tests with firefighter/paramedics by collecting usage data after each emergency run and usability and acceptability data via written survey and group interview at the completion of each field test period.

Product: The final product will be a set of up to 10 successful interventions that are biomechanically validated and superior to their existing counterparts and are judged to be worthy of adoption for use in the field by the end-user firefighter/paramedics.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Certified Safe Farm: Evaluating Health Insurance Claims
Investigator: Kelley Donham
Grant Number: U01 OH008110
Start & End: 9/1/2003-8/31/2007
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-4190

Description:
Agriculture is one of the most hazardous industries in the US. A recent systematic review of farm safety interventions found little evidence of the interventions being effective. The Certified Safe Farm (CSF) program has shown exceptional potential to become a widely used effective intervention model. Our pilot results show a 17% reduction in total farm related injury and illness costs and 35% reduction in the costs covered by insurance. These results are very promising, but they are self-reported, and may be subject to bias. We propose to validate these results in this new proposed study, which has large sample sizes and measures success with actual health insurance claims data. Iowa Farm Bureau Federation, Wellmark Blue Cross Blue Shield of Iowa, and AgriSafe Network are our active partners. The specific aims of this project are to:
1. Enroll 600 Iowa farmers into the CSF program who are members of the Iowa Farm Bureau Federation and have Wellmark health insurance coverage through Iowa Farm Bureau Federation.
2. Provide CSF services (agricultural occupational health screenings, education, and on-farm safety reviews) to each of the enrolled farmers twice during the four-year project.
3. Provide safety and health education to CSF farm families on a continual basis.
4. Conduct retrospective and prospective analyses of health insurance claims data for the 600 CSF farmers and at least 2400 control farmers who are also Iowa Farm Bureau-Wellmark insurees.
5. Analyze the association of health outcomes and demographic, farm production, health, insurance, and farm hazard characteristics.
6. Utilize project findings to build an ongoing CSF program in collaboration with insurance and agribusiness partners. The CSF program has shown to be well received among farmers, feasible to implement, and transportable to different farming situations. It has shown to reduce farm hazards, increase the use of personal protective equipment, reduce respiratory symptoms, and decrease farm-related injury and illness costs. This proposal aims to take this program to the next level -a sustainable ongoing program linked with farm organizations, insurance companies, and agribusinesses. Positive results from this study will provide justification for the private sector to invest in the CSF program. With insurance and agribusiness participation, this program has the potential to achieve high participation rates among farmers and make a significant difference in reducing the burden of injuries and illnesses in US agriculture.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Sun Protection and Skin Cancer Awareness in Watermen
Investigator: Alison Ehrlich
Grant Number: R03 OH007843
Start & End: 8/1/2003-7/31/2005
Affiliation: George Washington University
City & State: Washington, DC
Phone: (202) 741-2627

Description:
Many attempts have been made to change sun protection and skin cancer awareness in both patients and the general population. However, these efforts have had varied success. Few studies have implemented behavioral theories of individual risk assessment as a component of behavioral intervention. We have developed a behavior intervention questionnaire study in which the intervention will be a composite of skin cancer screening and education. A component of the education will focus on using the "risk as precautions" model to enhance the subject's personal awareness of skin cancer risk. Populations with increased risk of skin cancer will benefit most from this type of intervention. The Maryland Watermen's Association (MWA) represents a population with a known increased risk of occupational induced skin cancer. We will conduct a behavior intervention questionnaire study of licensed Maryland watermen. The study will address the following issues: 1) whether education alone or education and skin cancer screening is an effective tool for changing sun protection behavior in an adult population with occupational exposure; 2) whether skin cancer risk awareness can predict a change in sun protection. This study will provide critical data for subsequent use of the risk as precautions model and skin cancer screening as methods to increase skin cancer awareness and change sun protection behavior in outdoor workers.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Evaluation of the NAGCAT Tractor Guidelines
Investigator: Fadi Fathallah
Grant Number: R01 OH007850
Start & End: 8/1/2003-7/31/2006
Affiliation: University of California, Davis
City & State: Davis, CA
Phone: (530) 752-1612

Description:
Work-related injuries may occur because children are assigned hazardous farm jobs that are beyond their physical and mental capabilities. The North American Guidelines for Children's Agricultural Tasks (NAGCAT) were developed to assist parents in assigning appropriate and safe jobs to their children 7-16 years. Farm tractors account for the majority of deaths and major portions of non-fatal trauma among children on North American farms. Because of this high frequency of tractor involvement in childhood fatalities and other traumatic farm injuries, NAGCAT have a heavy emphasis on safe operation of farm tractors in different work situations. The proposed study aims to build upon the NAGCAT project by providing a field test of the NAGCAT tractor guidelines. The objective of this study is to systematically assess the most common tractors operated by children with respect to dimensional and operational characteristics in order to identify any potential strength and anthropometrics mismatches between the physical characteristics of children and adolescents of ages 12 to 16 years (ages recommended for tractor operation by NAGCAT) and the tractors they are operating. To achieve this objective, the following specific aims will be addressed:

1. Evaluate 250 tractors that are representative of those operated by children with respect to (a) seat dimensions and characteristics, (b) control reach and clearance requirements, (c) control force activation requirements, (d) monocular, binocular, and ambinocular fields of view (e) entry/exit characteristics.

2. Identify potential strength and anthropometrics mismatches between the requirements of operating a given tractor and the physical characteristics of children and adolescents of ages 12 to 16 years.

3. Recommend revisions to the NAGCAT tractor guidelines based on these findings.

The results of this study will provide scientific evidence of the extent to which the NAGCAT tractor guidelines (developed by consensus) actually reflect a match between the physical abilities of children and adolescents 12 to 16 years and the tractors they commonly operate. It is anticipated that once the recommended revisions are incorporated into the NAGCAT, the risks of traumatic and fatal injuries to children due to tractor operation will be reduced.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Effects of Physical Conditioning on Lifting Biomechanics
Investigator: Kevin Granata
Grant Number: R01 OH007352
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Virginia
City & State: Charlottesville, VA
Phone: (804) 982-0513

Description:
Occupationally-related low back disorders (LBDs) are the leading cause of lost work days and the most costly occupational safety and health problem facing industry today. Epidemiologic surveys demonstrate that exercise and physical conditioning may act as a prophylaxis to reduce the incidence of occupational LBDs. How and why exercise and physical conditioning influence LBD risk remains unknown. To improve the intervention methods for control of occupational low-back pain, to improve rehabilitation of LBDs, and to identify individuals at increased risk of LBD, it is necessary to quantify how physical conditioning acts to limit low-back injury risk in occupational lifting tasks. Low-back injuries have been attributed to spinal load and spinal stability during lifting and manual materials handling tasks. Factors that contribute to spinal load and stability include lifting technique, spinal kinematic coordination, trunk muscle recruitment and co-contraction, and the design of the lifting task (weight, distance, etc.). It is proposed that exercise can modify lifting and spinal kinematics and muscle recruitment patterns, thereby influencing biomechanical risk associated with spinal load and stability. The goal of this research is to quantify how exercise and physical conditioning modify the biomechanics of lifting in manual materials handling and lifting tasks. Specifically, we intend to investigate factors that might contribute to improved spinal stability and reduced spinal load during simulated manual materials handling tasks. Subjects will participate in an eight-week exercise program in one of four protocols including either, aerobic exercise, strengthening, dynamic spine stabilization, or control (no exercise). Spinal load and spinal stability during simulated manual materials handling lifting tasks will be quantified before beginning the exercise program, midway through, immediately upon completion of the eight week exercise program and four weeks after termination of the exercise protocols. It is hypothesizes that the exercise programs will change the muscle recruitment patterns and spinal kinematics of lifting, thereby modifying spinal load and stability. Spinal load and stability will be quantified using published techniques, including efforts by the principle investigator, and based upon measurements of dynamic lifting kinetics, dynamic spinal kinematics I curvature and trunk muscle recruitment patterns (electromyography) recorded during the lifting tasks. This effort represents the first randomized-control study of exercise and physical conditioning on lifting biomechanics and associated risk factors for LBD.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Occupational Safety and Health Training for Teleworkers
Investigator: Susan Harrington
Grant Number: R44 OH007461
Start & End: 9/15/2003-9/14/2005
Affiliation: Harrington Software Associates, Inc.
City & State: Warrenton, VA
Phone: (540) 349-8074

Description:
The purpose of this research is to reduce the risk of occupational injury and illness to employees who telecommute from their homes (telework). The rapid growth of teleworking has raised several social and legal issues regarding an employer's responsibility for an employee's home office. OSHA
policy states that employers are not responsible for home offices; yet, teleworkers may be more at risk from occupational safety and health hazards than their co-workers who commute. In a traditional workplace, risk factors are controlled or eliminated by the employer, building owner, or fire marshal. In the home workplace, employees must control or eliminate risk factors on their own.

The Phase I pilot study on ergonomics demonstrated the need for teleworker safety training. Over 85% of participants indicated that they had never received teleworker training before and 48% indicated that they had experienced discomfort while teleworking. In the pilot test of the prototype ergonomics module, the training significantly improved participants' knowledge, attitudes, and practices.

Phase II will expand the research to include the development of modules on fire safety, electrical safety, radon, and falls/tripping. HSA will conduct a national field test and follow-up study. The program will be delivered in CD-ROM and web-based formats.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Effectiveness of Farm Safety Day Camps for Children
Investigator: Debra McCallum
Grant Number: R01 OH007536
Start & End: 9/30/2001-9/29/2004
Affiliation: Institute for Social Science Research
City & State: Tuscaloosa, AL
Phone: (205) 348-3820

Description:
Farm safety day camps are offered in hundreds of communities across the country as a format for teaching children safe methods of play and age-appropriate work on farms and ranches. There has been little research, however, to evaluate the effectiveness of these one-day community-initiated events. The proposed project involves an evaluation of the "Progressive Farmer" Farm Safety Day Camp Program, a national program, with approximately 250 camps offered in 37 states this year. With the changes in agriculture toward the end of the 20th century, many groups lost the statewide safety specialists and/or programming efforts that had previously supported farm safety day camp organizers. However, this shift at the state level did not reduce the desire by local communities to conduct day camps to educate both farm and non-farm children about the dangers involved in living on and visiting farms. To help meet this need, the "Progressive Farmer" Farm Safety Day Camp program was begun in 1995 to provide nationwide support for interested individuals and groups. The program was designed to meet the needs of local community members who want to help children in their area stay safe. It provides training, resources, support, and networking opportunities needed to conduct a camp that provides age-appropriate, effective lessons in topics related to farm safety. While providing such support on a nationwide scale, the program is specifically designed to be community-based, as each camp is planned and conducted at the local level, pairing the support and materials provided by "Progressive Farmer" with support provided by local individuals and organizations. Camp process evaluation will consist of surveys completed by the camp coordinators and volunteers, reporting data for their camp, including attendance, curriculum components used, assessments of success, and suggestions for improvements. The process evaluation will involve all camps offered from March 2002 through October 2002. From the camp coordinators, an Evaluation Advisory Group will be formed to assist with plans for conducting the evaluation and with plans for dissemination of the results back to the communities that participate. Outcomes will be evaluated using a sample of 30 camps and their surrounding communities. Pre-test, post-test, three-month follow-up, and one-year follow-up surveys will be administered to assess knowledge, beliefs, attitudes, and behaviors of children, ages 8-13 who attend "Progressive Farmer" day camps and a comparison group of children in the same communities who do not attend camp. Impact of the camps will also be evaluated by asking about farm-related injuries in the pre-test, three-month, and one-year follow-up surveys. In addition to testing for changes among campers across time, and testing for differences between campers and non-campers, a comparison will be made between two types of camps: (a) community-wide day camps and (b) school-based day camps or programs.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Causes and Effects of Complicance with OSHA Standards
Investigator: John Mendeloff
Grant Number: R01 OH007817
Start & End: 6/1/2003-5/31/2006
Affiliation: University of Pittsburgh
City & State: Pittsburgh, PA
Phone: (412) 648-2651

Description:
This project will provide new insights into the determinants of compliance with OSHA standards and into the effects of compliance on the total factor productivity and capital investment at inspected establishments. This information can, in turn, be used to estimate the costs of compliance. All of these contribute to our understanding of the OSHA enforcement process, which is arguably the central public policy intervention addressing occupational injuries and illnesses. The knowledge gained can also help OSHA target its enforcement efforts.

This project will create a dataset linking information on OSHA inspections from 1972 to the present with confidential establishment-level Census data, the Longitudinal Research Database, which combines economic data from the Census of Manufacturers, conducted every 5 years, and the Annual Survey of Manufacturers.

Although a similar dataset has been extensively used to study EPA enforcement over the last decade, this will be the first time it has been used to study OSHA. Until now, studies of the determinants of compliance have used only the information available in OSHA's own inspection data system. No prior studies of the determinants of compliance have used only the information avalable in OSHA compliance on plants' productivity.

In addition to examining overall patterns of compliance, this research will focus on compliance with health standards, compliance with new standards, and compliance with standards which have been found to be clearly related to the prevention of injuries.

Regression analyses will examine a number of different measures of compliance, adding explanatory variables on establishment characteristics (plant age, wage levels, capital investment, and productivity) and firm characteristics (size and profitability) to the variables already in the OSHA file. Regressions will also be used to examine the effects of compliance on capital spending, productivity, and other measures of the establishment's economic performance. Adjustments to address the potential endogenity of these variables will be carried out.

The information on productivity and investment will be used to make estimates of the compliance costs entailed by the lead and cotton dust standards adopted in the late 1970s, and compare them to prospective estimates of those compliance costs derived during the standard-setting process.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Ergonomic Partnership to Address Treefruit Worker Injury
Investigator: John Miles
Grant Number: U01 OH008091
Start & End: 9/30/2003-9/29/2007
Affiliation: University of California, Davis
City & State: Davis, CA
Phone: (530) 752-6210

Description:
This ergonomics field study will involve multiple agricultural community interests as partners in planning, conducting and evaluating field research and in disseminating results. The project's goals are to significantly reduce or eliminate identified ergonomic risk factors, reduce associated negative health outcomes, and improve community partners capacity to understand and use ergonomics methods to address hazards in hand harvest of treefruit crops and ergonomics risk factors. These risk factors are: ladder use and safety, manual handling of awkward and heavy loads, and highly repetitive hand removal of fruit. Target beneficiaries are farm workers, an underserved population cited as a Special Target Population in the National Health Promotion and Disease Prevention Objectives and in the NORA guidelines.
Project Specific Aims are to:
1) To scientifically document and describe ergonomics risk factors involved in hand harvest of treefruit, we will:
a) develop detailed ergonomics job descriptions of hand harvest in 12 commodities;
b) utilize biomechanical, metabolic, and postural stress measures to describe ladder use, manual load handling, and repetitive picking in detail;
c) assess the incidence and types of injuries associated with hand harvest risk factors.
2) To develop and evaluate field practical applications of known controls that eliminate or significantly reduce targeted hand harvest risk factors, we will:
a) share proven concepts with cooperating workers, growers, contractors, safety practitioners, and interest groups making up the treefruit community;
b) modify effective intervention applications to ensure field practicability;
c) conduct cooperative controlled field trials of cooperatively selected intervention applications;
d) statistically compare individual intervention and control conditions.
3) Because interventions are often combined in the workplace, we will scientifically test the impact of selected interventions combined together on targeted hand harvest risk factors by:
a) conducting cooperative hand harvest intervention trials with treefruit production partners;
b) statistically comparing combined intervention conditions and control conditions in terms of ergonomics, injury symptoms, and productivity measures.
4) To improve community-based understanding of ergonomics methods and improve intervention practices in hand harvest of treefruit, we will:
a) provide training and workplace experience with ergonomics methods to cooperating partners;
b) provide community ergonomics information and training;
c) assess perceived adoptability of interventions;
d) communicate project findings to treefruit and other agricultural industry groups, to workers and community interest groups, and other sat and injury researchers.

Program Area: Intervention Effectiveness Research Methods (NORA)
Title: Evaluation of Farm Safety 4Just Kids Day Camps
Investigator: Deborah Reed
Grant Number: R01 OH007534
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Kentucky
City & State: Lexington, KY
Phone: (859) 275-9636

Description:
The purpose of this 3-year, multi-site evaluation research is to examine the effectiveness of farm safety day camps organized and executed through five Farm Safety 4 Just Kids (FS4JK) Chapters in different regions of the nation. The locations of the chapters encompass a variety of agricultural commodities and farm compositions.

The specific aim is to evaluate whether the camps positively influence: (1) children's knowledge about farm safety and health, their safety attitudes, and subsequent safety behaviors; and (2) parents' attitudes and behavior toward children's farm safety behavior. In addition, the effect of the camps on the local community will be assessed. This research is grounded in the social-ecological framework of McLeroy and colleagues (1988) and in the National Institute of Occupational Safety and Health Training Intervention Effectiveness Research (TIER) Model.

A multi-level, mixed-method evaluation strategy that combines both quantitative and qualitative data collection methods will be used to examine the long-term effects of the day camps on children, their families, and their communities. The design of the study is a quasi-experimental, no control group pretest-posttest design with repeated measures that will be collected over 18 months following children's camp experience.

The partnership of local FS4JK Chapters, the North American Farm Safety 4 Just Kids organization, and the University of Kentucky provides a unique approach to examining the effectiveness of FS4JK day camps. The evaluation results can be used to assist FS4JK with refinements of future programs and will assist camp leaders in articulating their theoretical framework, goals, and objectives of the day camps. The findings also will contribute to the national research agenda in farm child safety knowledge, attitudes, behavior, and injury rates.

Program Area: Mixed Exposures (NORA)
Title: Experimental and Computational Methods for Quantitating the Absorption of Complex Chemical Mixtures Through Skin
Investigator: Jim Riviere
Grant Number: R01 OH007555
Start & End: 6/1/2001-5/31/2004
Affiliation: North Carolina State University
City & State: Raleigh, NC
Phone: (919) 513-6305

Description:
Chemical exposure in most environmental and occupational settings is to complex chemical mixtures rather than to individual chemicals. Estimating exposure for risk assessment purposes under this scenario is difficult, as most research studies only assess single chemical exposure. Our group has previously studied the nature of chemical interactions within a mixture that could modulate absorption across the skin. The components of a chemical mixture may alter absorption of a toxin either through chemical-chemical interactions within the dosing solution, through modulation of skin lipids which alter permeability, or to physiological changes in perfusion or skin metabolism which may change the fraction of drug absorbed into the circulation. Interactions detected in simple in vitro models will also occur in more complex biological systems. However, the overall response of the system will be dependent upon the magnitude and direction of these interactions relative to the higher level biological interactions only present in ex vivo and in viva settings. The objective of this present grant proposal is to extend the analysis of chemical mixture interactions that affect percutaneous absorption to define the physical chemical characteristics of the penetrant which make it susceptible to significant mixture interactions. The ability of mixture components to modulate a chemical's rate and extent of percutaneous absorption and/or cutaneous deposition is dependent upon the physical chemical properties of the chemical that make it susceptible to specific chemical interactions; as well as the mechanism of percutaneous absorption that determines whether changes in skin permeability or vascular perfusion could further alter disposition. These studies will evaluate interactions of 12 chemicals selected on the basis of their physical chemical properties in three model systems of increasing biological complexity: inert silastic and in vitro porcine skin diffusion cells, and ex viva isolated perfused porcine skin flaps (IPPSF). Mathematical models of dermal absorption will then be developed which can provide efficient parameters to serve as experimental endpoints, yet are sensitive to the presence of interactions. Statistical approaches to using partial factorial and response-surface experimental designs to analyze these data will be investigated.

Program Area: Mixed Exposures (NORA)
Title: Complex Mixture Modeling of Organophosphate Pesticides
Investigator: Charles Timchalk
Grant Number: R01 OH003629
Start & End: 9/30/2001-9/29/2004
Affiliation: Battelle Memorial Institute
City & State: Richland, WA
Phone: (509) 376-0434

Description:
This research project will establish a strategy to evaluate potential health implications resulting from exposure to complex mixtures of organophosphate (OP) insecticides. OP insecticides are widely utilized in a variety of applications and potential exists for significant occupational exposure. The health implications of mixed chemical exposures are currently poorly understood, since the toxicological characterization of such complex mixtures is not practical due to the numerous potential combinations.

To address this chemical mixture issue, an integrated approach is proposed involving the application of physiologically-based pharmacokinetic/pharmacodynamic (PBPK/PD) modeling in conjunction with focused in vivo/in vitro studies. The goal of this project is to provide a quantitative understanding of complex chemical interactions within biological systems, estimate tissue dosimetry, and quantitate pharmacodynamic response (i.e. esterase inhibition). This approach represents a reasonable application of limited resources (i.e. time and funding) to generate data which can be used to evaluate human health risk from occupational exposure to important agricultural chemicals.

Specific research aims include:
1. To develop a PBPK/PD model for diazinon (DZN) in the rat.
2. To conduct focused in vitro experiments in rats to quantify critical metabolic interactions for mixtures of chlorpyrifos (CPF) and DZN that can readily be incorporated into a binary mixture PBPK/PD model.
3. To conduct in vivo evaluations of the PBPK/PD model interactions for mixtures of CPF and DZN in the rat.
4. To conduct focused in vitro experiments with human tissues to quantify critical metabolic interactions and to develop a human DZN and binary OP mixture PBPK/PD model.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Lift Aid Use in Reducing Injuries in Nursing Personnel
Investigator: Paula Bohr
Grant Number: R21 OH007708
Start & End: 9/30/2002-9/29/2004
Affiliation: Maryville University
City & State: St. Louis, MO
Phone: (314) 529-9515

Description:
The most prominent risks for injuries among health care workers are associated with the physically demanding tasks of lifting and transferring patients. The use of mechanical lifts can lower the physical demands but nursing personnel do no regularly use the devices even when they are available. This pre-post intervention study will focus on training acute care nursing personnel to recognize the need for using the devices and their correct use. Following six months on baseline data collection, the intervention will be implemented. The intervention will consist of provision of training sessions, periodic educational reminders and management encouragement to use the lift devices. The study will evaluate the effectiveness of the intervention using primary outcomes of symptom prevalence and severity, job satisfaction, reported psychosocial stressors, and reported and actual lift usage. Additionally, administrative records (workers' compensation records and OSHA logs) will be evaluated as a secondary outcome measures. The study will also prospectively identify personal and work organization factors that predict musculoskeletal injury and that limit the use of lift devices by nursing personnel. Pre-intervention data collection will include baseline musculoskeletal symptom and job satisfaction survey, interviews to determine lift usage, and actual lift usage from counting devices on the lifts. Follow-up surveys will be used to collect symptom and job satisfaction information approximately 12 months following completion of the training. Collection of data for reported and actual lift usage will be ongoing throughout the study period.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Low Back Pain: Quantifying Risk Factors
Investigator: Arun Garg
Grant Number: U01 OH008083
Start & End: 9/30/2003-9/29/2006
Affiliation: University of Wisconsin
City & State: Milwaukee, WI
Phone: (414) 229-6240

Description:
This multi-center prospective cohort study will: (i) Determine baseline prevalence rates and subsequent incidence rates over a 2 year period for low back pain (LBP), LBP with neurological signs (sciatica), LBP-related impairments, lost time and modified duty-related LBP for 3 levels of job physical exposures (low, medium, high), (ii) Quantify job and individual risk factors (e.g., weights, frequency, horizontal and vertical locations, low back moments, etc.), (iii) Validate existing job analysis methods (especially Revised NIOSH Lifting Equation, Maximum Acceptable Weights and Forces, 3-D Static Strength Biomechanical Model, the Proposed TLV for Lifting, and the Washington State Checklist), and (iv) Develop a final model for determining MSD risks. A cohort of 678 workers (study drop-outs replaced) from 10 very different industries with a total worker population of over 10,000 in three diverse states will participate in the study to help ensure generalizability of the study results.

To maximize objectivity and accuracy, job physical exposures will rely primarily on measurements to quantify exposures. To maximize clinical and epidemiological validity and reliability, all participants will have health outcomes assessments by Physical Therapists and qualified physicians. These will include: baseline questionnaires, structured interviews and standardized physical examinations. Changes in job physical exposures will be monitored monthly. LBP symptoms, sciatica, LBP impairments and LBP severity measures will be assessed monthly using a symptom questionnaire on all, and structured interviews/physical examinations on those with symptoms. Job physical exposure and health outcomes assessment teams will be blinded to each other throughout the field observation phase.

Multivariate logistic regression models and survival analyses will be utilized to explore relationships between job physical risk factors and low back pain (LBP), sciatica, LBP impairments and LBP severity measures. In addition to quantifying ergonomic risk factors, interactions between various job, psychosocial and individual risk factors will be explored. This project is expected to result in the ability to improve the existing ergonomic job evaluation models that have robust predictive capabilities for a broad range of industries.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Reducing Low-Back Disorders Using a New Sitting Design
Investigator: Mohsen Makhsous
Grant Number: R21 OH007737
Start & End: 9/30/2002-9/29/2004
Affiliation: Rehabilitation Institute of Chicago
City & State: Chicago, IL
Phone: (312) 908-7953

Description:
Work-related low back musculoskeletal disorders are common and affect a large portion of the workforce. Occupational risk factors for LBP include sustained static muscle load, and inappropriate curvature of the spine and pelvis. Sitting may cause backward rotation of the pelvis, reduction in lumbar lordosis, changes in muscle activities and disc pressure, excessive pressure over the ischium and coccyx, and certainly the associated LBP .

A new seat design, of which the back part of seat (BPS) can be dynamically tilted downward and upward with respect to the front part of the seat (FPS) providing adjustment of thigh and ischial support and equipped with back support adjustable in height and volume, will be investigated. It was found in the pilot study that sitting with lowered BPS and adjustment of low back support resulted in more evenly distributed contact pressure, reduced peak pressure under the ischia, increased total and segmental lumbar lordosis, forwardly rotated the pelvis, and increased lumbar intervertebral heights. We believe that the functional relations of the seat and backrest need to be further investigated in order to not only prevent flattening of the lumbar spine but also reduce the ischial load in long term sitting, which are related to LBP. We propose to study the biomechanical and neuromuscular effects of the new sitting concept, and evaluate quantitatively the benefits in the LBP patients for using appropriate lumbar support that increases lordosis and decreases the sitting pressure and load carried by the ischial tuberosities.

Hypothesis 1: When the BPS is tilted downward, load on the ischial tubercles and lumbar spine will be reduced and shifted to the thighs and the thoracic spine, respectively. Low back muscle activities will also be reduced. Specific aim 1: Contact pressure distributions between the buttock-thighs and seat, and between the back and backrest, load carried at the seat and back will be evaluated with and without ischial support, combined with flat or adjusted back support. The muscular activities involved in stabilizing the trunk under these conditions will be investigated.

Hypothesis 2: Increase in lumbar lordosis, forward rotation of the pelvis, and larger intervertebral heights will be observed when the BPS is tilted down to reduce ischial support. Specific aim 2: The total and segmental lumbar lordosis, pelvis inclination, and intervertebral spaces of lumbar spine, will be measured and compared under the different sitting conditions.

Hypothesis 3: Sitting alternately between the postures with the BPS at level and tilted down positions will reduce the discomfort/pain associated with sitting. As a result, patients with LBP will better tolerate prolonged sitting. Specific aim 3: The subjective evaluation and impressions gained from the use of such a sitting design for a period of four months will be evaluated using questionnaire in two groups of chronic LBP patients with pain history and symptoms.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Neuro-Fuzzy Prediction of Spine Loads in Response to Risk Factors
Investigator: William Marras
Grant Number: R01 OH007787
Start & End: 9/30/2002-9/29/2006
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-6670

Description:
Occupationally-related low back disorders (LBDs) continue to be the leading cause of lost work days and the most costly occupational safety and health problem facing industry today. It has been well established that most occupationally-related LBD risk is associated with manual materials handling activities as well as psychosocial influences in the workplace (National Academy of Sciences, 2001). In addition, individual factors can influence risk. However, our ability to characterize risk associated with these various dimensions of LBD risk has been rather poorly understood. Recent literature indicates that a common link within each of these risk dimensions involves increases in trunk muscle coactivation that can lead to increased spine loading and subsequent LBD. Electromyographic (EMG)-assisted models provide the only means to accurately assess and quantify the effect of changes in trunk muscle coactivation upon spinal loading. However, the collection of EMG under most industrial conditions is impractical. The objective of this work is to develop a Spine Loading Assessment System (SLAS) that has the capacity to assess trunk muscle coactivation patterns and subsequent spine loading in response to multiple risk dimensions. This system would permit one to accurately estimate spine loading as a result of physical workplace factors, psychosocial factors, and individual factors but would not require the use of EMG. This objective will be achieved through the development of a Hybrid Neuro-Fuzzy Engine (HNFE). This engine would act as a system artificial "brain" able to synthesize information about the workplace and assess how the trunk musculature would behave. The engine will interface with a well-developed biologically-driven dynamic biomechanical model of the trunk. In this manner, we will be able to accurately predict spine loading in the workplace in response to various risk factor dimensions without the need to collect EMG data in the workplace. Collectively, the SLAS will have several benefits. First, it can be used to assess the risk of spine structure damage believed to contribute to low back pain as a function of work dimensions commonly associated with the workplace. Hence, this model will have immediate applications to workplace designs. Second, the system will provide insights as to how the various dimensions of risk synergistically impact the musculoskeletal system. Finally, it will facilitate further investigations regarding stability and coactivity.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Spine Loading and Muscle Overexertion During Repetitive Lifting
Investigator: William Marras
Grant Number: R01 OH003913
Start & End: 9/30/2000-9/29/2004
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-6670

Description:
Occupationally-related low back disorders (LBDs) are the leading cause of lost workdays and the most costly occupational safety and health problem facing industry today. LBDs are particularly prevalent in manufacturing, distribution center, and warehousing environments where repetitive lifting is common. Although assessments have successfully evaluated LBD risk during a single exertion, none have been able to effectively assess how risk changes during repetitive lifting at various lifting frequencies throughout a workday. This study will assess how exposure to different frequencies of lift over time can result in unacceptable biomechanical risk of LBD. Our preliminary studies point to two mechanisms of risk. First, different lift frequencies affect lifting kinematics and the subsequent muscle recruitment patterns. These changes alter the nature (direction) and magnitude of spinal loading, thereby exceeding spine tolerance limits. Second, exposure to a repetitive lift throughout the workday can also result in muscle recruitment pattern changes over the work period, thereby, increasing the spinal loading throughout the day. Hence a lift frequency that is acceptable early in the workday may exceed biomechanical tolerance limits as the workday progresses. This study will explore the changes in muscle recruitment and spinal loading when workers lift one of three weights (corresponding to the range of industrial exposures) at six different lift rates over extended workdays. The frequency and duration of lift will be judged risky and unacceptable when the spinal loads exceed documented spine tolerance limits. These findings will result in an understanding of the portion of the population at risk for spine structure (disc) injury as a function of load magnitude, lifting frequency, and lift period duration. These results will provide quantitative guidance for the mediation of work-related LBDs for the millions of workers performing materials handling tasks in manufacturing and distribution center environments.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Identifying Safe Load Moment Exposures for the Back
Investigator: William Marras
Grant Number: U01 OH007313
Start & End: 9/30/2000-9/29/2005
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-6670

Description:
Low back pain (LBP) continues to represent the leading occupationally-related musculoskeletal disorder experienced by workers. Previous surveillance studies (Marras et al., 1992, 1995) have indicated that the most robust individual marker of risk for occupationally-related LBP is a load moment (load magnitude x distance from the spine). Even this crude measure is capable of outperforming more computationally complex assessment tools such as the NIOSH lifting guide and revised equation (Marras et al, 1999). In addition, many biomechanical studies suggest that the load moment exposure represents a biologically plausible pathway for a low back injury mechanism. However, no studies have attempted to specifically define the association between the various components of load moment exposure and LBP risk. Thus, the objective of this study is to explore how exposure to various components of load moment (I.e. components of the duty cycle) relate to LBP risk. This goal will be accomplished by developing and analyzing a rich and diverse database where the magnitude of the moments as well as the temporal exposure vary. Two phases will be necessary to complete this goal. Phase I will use an existing database of 515 manufacturing jobs to help understand the relationship between load moment and exposure frequency. Statistical models will be constructed and tested to help understand which features of the temporal exposure to moment might provide sensitive measures. In addition, instrumentation will be developed to precisely monitor load moment exposure. The final component of Phase I will involve the recruitment of various distribution centers needed to create a prospective database (phase II). Phase II will employ the moment measurement instrumentation in an industrial study of materials handling. In this prospective study 1200 participants will be monitored for clinically relevant indicators of LBP status at the beginning and the end of an 18-month period. During the exposure period, components of the workplace will be monitored including precise load moment exposure, temporal aspects of exposure (e.g. duty cycle, cumulative exposure, etc.), load position, etc. Workers will be monitored over an 9-hour shift. Upon completion of the prospective observation period, injury reporting, changes in clinical back status, etc. will be evaluated as a function of the load moment and temporal exposure characteristics using statistical models. In addition, easily measured surrogate indicators of the most predictive model measures will be developed so that these findings can be used to assess risk with minimal equipment. Collectively this study will not only enhance our knowledge of how exposure to various aspects of load moment affects LBP risk but will also lead to applicable measures with both high sensitivity and specificity for control of risk in the workplace.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Biomechanical and Psychosocial Risks for Low Back Disorders
Investigator: William Marras
Grant Number: R01 OH003914
Start & End: 9/1/2001-8/31/2004
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-6670

Description:
Occupationally-related low back disorders (LBDs) represent a major occupational health concern. The etiology of this health problem is complex and poorly understood. The proposed study investigates the role of biomechanical job demands and psychosocial work characteristics in increasing LBD risk among employees in manual materials handling jobs. Although there is a wealth of knowledge associated with each of these categories of risk factors, there is a dearth of studies that have rigorously investigated both categories of risk factors in the same work environment. Therefore, it is difficult to estimate the contribution of each of these risk categories to the overall risk for occupationally-related LBDs.

We hypothesize that both types of risk factors make independent contributions to the risk of LBDs, and that psychosocial work characteristics are more likely to increase risk for LBD when biomechanical job demands are moderate to low than when they are high.

The proposed study uses a prospective cohort design. It significantly increases the standard of scientific rigor of investigations in this area through: (1) reliable, valid state-of-the art measures of both psychosocial work characteristics and biomechanical job demands; (2) assessments of exposure variables at multiple points in time; (3) the use of an array of outcome measures for LBD including a validated, highly quantifiable clinical assessment of low back functional status; and (4) adequate power to formally assess both additive and potential interactive effects of the two categories of risk factors. With adequate quantification of exposures, we will be able to accurately estimate the extent to which exposures (both psychosocial and biomechanical) need to be decreased to reduce LBD risk. We will also be able to discern when and under what conditions an intervention to improve the psychosocial work environment will be likely to reduce the incidence of LBD and its associated morbidity among manual materials handling employees.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Back Pain & Work Disability in Health Care Workers
Investigator: Lisa Pompeii
Grant Number: K01 OH007996
Start & End: 9/30/2003-9/29/2006
Affiliation: Duke University
City & State: Durham, NC
Phone: (919) 286-1722

Description:
The purpose of the proposed study is to examine risk factors for occupational back pain (OBP), and to examine the impact of work disability on workers and their co-workers in a large population population (n = 12,500) of health care workers at Duke University Medical Center (DUMC). This study aims to examine organizational factors, such as downsizing efforts while considering other known and suspected risk factors of OBP, as possible predictors for back injury and disability in health care workers that have not been adequately addressed in prior studies. In addition, risk factors for back injury specific to nursing personnel whose jobs involve patient handling will be examined. Detailed analyses will be conducted to explore differences in back injuries that result in restricted and lost workdays across variable demographic, psychosocial, and occupational characteristics for the entire cohort of health care workers. Factors influencing the feasibility and effectiveness of modified work assignments specific to nursing units will also be addressed. The number of lost and restricted workdays, physical impairment, psychosocial demands, and the injured worker's perception of workplace accommodations will be considered in determining the overall effectiveness of modified work assignments. The feasibility of modified work assignments in nursing units will be examined by considering feedback from nurse managers, nursing personnel, occupational physicians, occupational health nurses, and workers' compensation administrators and case-managers who are integrally involved with implementing these workplace strategies. Data previously collected at DUMC will be used, as well as additional prospective surveillance data, and focus group information. This mix of quantitative and qualitative techniques will be utilized to address the National Occupational Research Agenda's Priority Research Area of low back disorders, in addition to addressing issues related to special populations at risk, surveillance efforts, and occupational health services research.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Biomechanics and Physiology of Cumulative Low Back Disorders
Investigator: Moshe Solomonow
Grant Number: R01 OH007622
Start & End: 8/1/2003-7/31/2008
Affiliation: Louisiana State University
City & State: New Orleans, LA
Phone: (504) 568-2251

Description:
The biomechanical and physiological processes associated with the development of cumulative spinal disorders due to long term application of static and repetitive occupational loads to the spine will be investigated. It is hypothesized that spinal tissues, when exposed to creep/elongation due to repetitive or static loads, cause desensitization of sensory receptors within and consequent loss of reflexive muscular activity, rendering the spine exposed to instability and potential injury. Full recovery of the creep/elongation and muscle activity while resting between sequential work periods may not be possible, allowing the cumulative increase of residual creep/elongation over time to develop long lasting neuromuscular disorders.

A five year experimental research program consisting of the in-vivo feline model will systematically explore the relationship between cumulative loads applied to spinal ligaments, discs, etc., in sequential static and cyclic work/rest periods as well as the following recovery in eight hours of rest to the activity level of paraspinal muscles and the disorders in their functions.

The results of this research will provide strong insights into biomechanics and the neurophysiology of low back disorders in common occupational activities; provide an insight to the effect of sequential cumulative loads and daily rest on development of spinal disorder in the short and long term; and delineate optimal work/rest periods that may minimize or prevent the development of low back disorders in the most common occupational activities.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Low Back Pain: A Multicenter Randomized Trial
Investigator: James Weinstein
Grant Number: R01 AR045444
Start & End: 9/30/1999-9/29/2004
Affiliation: Dartmouth College
City & State: Hanover, NH
Phone: (603) 650-1149

Description:
Low back pain is considered one of the most widely experienced health problems in the U.S. and the world. This condition is second only to the common cold as the condition for which patients most frequently see a physician or suffer days lost from work. Estimated costs to those who are severely disabled from low back pain range from $30-70 billion annually. Rates of spinal surgery in the U.S. have increased sharply over time, and 15-fold geographic variation in rates of these surgeries has been documented. In many cases, the rates of surgery appear to be determined by where one lives and who one sees. Despite these trends, there is little evidence proving the effectiveness/efficacy of these therapies over non-operative management. This study will use the unique resource of the National Spine Network to conduct multicentered, randomized, controlled trials for the three most common diagnostic groups for which spine surgery is performed: lumbar intervertebral disc herniation (IDH), spinal stenosis (SpS) and spinal stenosis secondary to degenerative spondylolithesis (DS). The trials will compare the most commonly used standard surgical treatments to the most commonly used standard non-operative treatments. The study will be conducted at 16 sites throughout the United States. The primary endpoints of the study will be changes in general health-related quality of life as measured by the SF-36 health status questionnaire and spine-related disability as measured by the Oswestry Low Back Pain questionnaire. Secondary endpoints will include patient satisfaction with treatment, resource utilization for estimation of cost, and utility for current health for estimation of quality adjusted life years (QALYs). The latter two endpoints will be used to complete a formal cost-effectiveness evaluation. Patients will be followed a minimum of 24 months with visits scheduled at 3, 6, 12, and 24 months. Data on all endpoints will be collected at each study visit. If possible, extended follow-up visits will be scheduled at 36 and 48 months. It is anticipated that a total of 1450 subjects will be enrolled and randomly allocated. An additional observational cohort will be tracked to assess health and resource outcomes. Data from the RCT and observational cohorts will be integrated to formally estimate the cost-effectiveness of operative versus non-operative interventions for IDH, SpS, and DS. Based on this trial, there will be scientific evidence as to the relative effectiveness/efficacy of surgical versus non-surgical treatment for these three common lumbar spine conditions.

Program Area: Musculoskeletal Disorders: Low Back (NORA)
Title: Vibration, Proprioception, and Low Back Stability
Investigator: Sara Wilson
Grant Number: R03 OH007995
Start & End: 9/30/2003-9/29/2005
Affiliation: University of Kansas
City & State: Lawrence, KS
Phone: (785) 864-2103

Description:
Occupational vibration exposure is a known risk factor for low back disorders. While past research has investigated issues such as transmission of vibration, the means by which vibration might result in low back pain is still not well understood. A possible mechanism by which vibration might result in low back injury is by a disruption of the proprioceptive system leading to decreased spinal stability and increased susceptibility to injury. Vibration has been shown in the past to alter several measures of proprioception in the joints of the extremities. These alterations change with the frequency of the vibration and last after the vibration has been withdrawn. However, these changes in proprioception have yet to be thoroughly investigated in the low back. The aims of this research are to begin to investigate the effects of vibration on proprioception in the low back and spinal stability. It is hypothesized that reposition sense error (one measure of proprioception) will increase with exposure to vibration. Further, it is expected that this increase will be different with different frequencies of vibration exposure. The temporal properties of these changes will be investigated. It is hypothesize that after removal of the vibration, the increased error will persist for some time before eventually returning to baseline. Finally, these changes in proprioception will be compared to changes in sudden load dynamics using a model of spinal dynamics in order to assess the effect of proprioception on spinal stability. This research is important to better understand what types of vibrations put a worker at risk, how these vibrations increase risk, and what may be done to reduce risk. For example, if it is found that proprioceptive changes last for 10 minutes after exposure, it may be prudent to recommend truck drivers and heavy equipment operators rest for 10 minutes before participating in heavy lifting activities. This work will provide the ground work for future research examining how proprioception is altered by occupational vibration. exposure and how it affects the overall spinal stabilization.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Force- Repetition Interaction in a Rat Injury Model of C.T.D.
Investigator: Mary Barbe
Grant Number: R01 OH003970
Start & End: 6/1/2000-5/31/2005
Affiliation: Temple University
City & State: Philadelphia, PA
Phone: (215) 707-3628

Description:
The long term goals of this research are to use a rat injury model of cumulative trauma disorder (CTD) to examine the interaction between multiple risk factors that contribute to the development of CTD and to investigate interventions to prevent and reverse work-related musculoskeletal disorders. In this five year study, the protocol includes three specific aims: (1) to determine the effects of a voluntary low force task performed at low, medium and high repetition rates on motor behavior and pathophysiological outcomes of forelimb and central nervous system tissues; (2) to determine the effects of a voluntary low repetition task performed at low, medium and high force levels of exertion on motor behavior and pathophysiological outcomes of forelimb and central nervous system tissues; and (3) to determine the effects of voluntary task regimes performed at a range of repetition rate and force level combinations on motor behavior and pathophysiological outcomes of forelimb and central nervous system tissues. The objectives for each specific aim are: (A) to determine the effects of voluntary task regimens causes direct mechanical injury to musculoskeletal, peripheral nerve and surrounding connective tissues; (B) to determine the extent to which the task regimens stimulate inflammatory cells and inflammatory processes locally and systemically; (C) to determine the extent to which the task regimens result in neuroplasticity in the spinal cord and nucleus cuneatus of the brainstem; and (D) to determine the extent to which the task regimes cause motor performance and movement pattern changes and their chronological relationship to the peripheral and central tissue changes.

Adult rats (360 experimental and 54 controls) will be trained to grasp and pull a small handle at a pre-defined repetition rate-force level combination including 9 permutations ranging from low (1reach/45 s), to medium (1 reach/30 s), to high (1 reach/15 s) repetition rates and from low (0.2 N), to medium (0.7 N), to high (1.2 N) force levels for 2 hours/day, three days/week for up to 8 weeks. At biweekly endpoints, they will undergo testing for video motion analysis of the forepaw, grip strength, forehead sticker removal, and median nerve conduction velocity. They will then be euthanized for examination of muscular, tendinosynovial, skeletal, and neural tissues both local and proximal to the trained forepaw using hematoxylin and immunohistochemical staining and ELISA techniques. Tract tracing will be used to examine reorganization of sensory afferents from the forelimb to the spinal cord and the dorsal column nuclei. Comparisons will be made between the trained and untrained controls. Changes will be monitored across weeks of task performance as well as with increasing repetition rate-force level exposure.

Many questions remain about the interaction of task repetition rate and force level in the development of CTD. A more precise understanding of these effects will help to guide therapeutic strategies for preventive and early care of affected individuals, rehabilitation approaches for subacute and chronic cases, and prevention of chronic disability.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Exposure Response Relationship in Hand Arm Vibration
Investigator: Martin Cherniack
Grant Number: U01 OH007312
Start & End: 9/30/2000-9/29/2005
Affiliation: University of Connecticut
City & State: Farmington, CT
Phone: (860) 679-4916

Description:
Exposure to vibrating tools produces several characteristic disorders affecting tissues of the upper extremity, which collectively are termed the Hand-Arm Vibration Syndrome (HAVS). The National Institute of Occupational Safety and Health has recognized the importance of exposure and response relationships in hand-arm vibration by identification as one of three foci of the Musculoskeletal Disease Consortium (MSDC). This proposal represents the combined plan of investigators from Canada, Finland, Sweden and the United States to study four vibration exposed cohorts in Europe and North America. They are the Suomossalmi forest worker cohort in Finland, the Volvo truck cab assembly workforce in Umea, the Electric Boat shipyard workforce in Connecticut, and Connecticut dental hygienists exposed to high frequency vibration. Dental hygienists appear to experience rapid onset injuries to mechanoreceptors in the fingers. The three industrial cohorts have been studied; their restudy reflects the intent to utilize existing exposure data, and to assure cohort participation where health effects have been quantified and where there are usable prior studies. The latter point is important because the proposed study period may be too brief to appreciate intra-subject change. Worksite selection reflects exposure variation and inclusion of impact (Volvo) and high frequency vibration (dental hygienists). Medical tests -- laser Doppler, cold challenge plethysmograpy, multi-frequency vibrometry, and fractionated digital nerve conduction -- are sophisticated and reflect physiologic understanding.

Exposure assessment is the most complex component of this study. It includes vibratory and biomechanical assessment of cohort representatives and individual monitoring of daily work routines using individualized data loggers and sensor gloves. This level of detail, which has not been previously applied, reflects the necessity of assessing daily real time exposure corrected for biomechanical variables.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Estimating Joint Impedance from the Surface EMG
Investigator: Edward Clancy
Grant Number: R03 OH007829
Start & End: 9/15/2003-9/14/2005
Affiliation: Worcester Polytechnic Institute
City & State: Worcester, MA
Phone: (508) 831-5778

Description:
For a number of years, researchers have been studying the relationship between the surface electromyogram (EMG) and torque produced about a joint, as a means of non-invasively estimating musculoskeletal load in particular, and the dynamics of joint/musculoskeletal dynamics in general. Measurement and understanding of these dynamics is important in the prevention of musculoskeletal injuries in the workplace (e.g., injuries associated with heavy lifting jobs or repetitive tasks) and in rehabilitation engineering, neuromuscular disease, basic motor control research and other areas. A distinct aspect of load is the "rigidity" that we produce in order to achieve a task. For example, a worker using a power tool (e.g., a hand drill) will purposely co-contract his/her muscles to increase rigidity and stabilize the tool--often without producing any externally measurable torques/forces. However, excessive rigidity (concomitantly producing heavy internal musculoskeletal loads) may be associated with musculoskeletal injury. Currently, no robust methods exist for estimating the degree of rigidity while performing useful tasks. Formally, the mechanical engineering profession more properly defines "rigidity" as the static component of mechanical impedance. For constant-posture tasks (and other limited tasks), mechanical impedance has been measured, but the measurement requires imparting forces on the body, and thus disturbs the task under study. In this grant, we will propose relating mechanical impedance to EMG in a calibration task (in which the body is perturbed), so that after calibration, impedance might be estimated (from EMG) without perturbing the task. This paradigm is identical to EMG-torque modeling. Note that in performing EMG-torque modeling, one usually estimates EMG amplitude (EMGamp) from the EMG waveform, and then develops an EMGamp-torque model. Advanced methods for estimating EMGamp, now available in the literature, have been shown to provide better EMG-torque estimates. Our long-term objectives in this work are to use EMG-based estimates of mechanical impedance to study mechanisms of musculoskeletal injury in occupation tasks, as well as in other applications. Our specific aims are to (a) demonstrate that mechanical impedance about the elbow can be estimated from the EMG in a constant-posture, slowly force-varying task, and (b) demonstrate that advanced methods for estimating EMGamp lead to better EMG-impedance estimates.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Upper Limb Musculoskeletal Disorders: Quantifying Risk
Investigator: Arun Garg
Grant Number: U01 OH007917
Start & End: 9/30/2002-9/29/2006
Affiliation: University of Wisconsin-Milwaukee
City & State: Milwaukee, WI
Phone: (414) 229-6240

Description:
This multi-center prospective cohort study will: (i) Determine baseline prevalence rates and subsequent incidence rates over a three-year period for specific distal upper extremity disorders and symptoms for three levels of job physical exposures (low, medium, high), (ii) Quantify job and individual risk factors (e.g., force, posture, repetition, etc.), (iii) Validate existing job analysis methods (especially American Conference of Governmental Hygienists (ACGIH) Threshold Limit Value (TLV) for Hand Activity (HAL), Strain Index (SI) and Washington State Checklist), and (iv) develop a final model for determining MSD risks. A cohort of 600 workers (study drop-outs replaced) from five very different industries with a total worker population of over 10,000 in two diverse states will participate in the study to help ensure generalizability of the study results.

To maximize objectivity and accuracy, job physical exposures will rely primarily on measurements to quantify exposures. To maximize clinical and epidemiological validity and reliability, all participants will have health outcomes assessments by Certified Hand Therapists and qualified physicians. These will include: baseline questionnaires, structured interviews and standardized physical examinations. Changes in job physical exposures will be monitored monthly. Specific disorders and symptoms will be assessed monthly using a symptom questionnaire on all, and structured interviews/physical examinations on those with symptoms. Senior physicians experienced in evaluating worker populations will provide electrodiagnostic testing (at baseline, and during monthly follow-up if new symptoms develop) to those workers with CTS-like symptoms. Job physical exposure and health outcomes assessment teams will be blinded to each other throughout the field observation phase.

Multivariate logistic regression (MLR) models and survival analyses will be utilized to explore relationships between job physical risk factors and specific disorders, aggregate disorders and symptoms. In addition to quantifying ergonomic risk factors, interactions between various job, psychosocial and individual risk factors will be explored. This project is expected to result in the ability to improve the existing ergonomic job evaluation models that have robust predictive capabilities for a broad range of industries.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Prospective Study of UEMSD and Physical Job Stressors
Investigator: Fredric Gerr
Grant Number: R01 OH007945
Start & End: 9/30/2003-9/29/2007
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-4212

Description:
Musculoskeletal disorders of the extremities (UEMSDs) affect tendons, tendons sheaths, muscles, nerves, bursae, and blood vessels of the hands arms, shoulders, and neck. In 2000, disorders associated with repeated trauma "accounted for 67% of all work-related illness in the United States. Inconsistent associations between physical job stressors and UEMSDs are commonly reported. These inconsistencies are related to imprecise measures of exposure, incomplete control of confounding, poor ascertainment of health outcome, and near exclusive reliance on studies of cross-sectional design. To better estimate effects of work on musculoskeletal health, a prospective epidemiologic study of manufacturing workers is proposed. Approximately 600 study participants will be enrolled over 1.5 years and followed for up to 3 years. At the time of enrolment, musculoskeletal symptoms will be documented and demographic, personal health, work history, and occupational psychosocial stress information will be collected. Information about exposure to physical job stressors will be obtained from a combination of two sources. First, for each study participant, forceful exertions, upper extremity repetition, and upper extremity postures associated with all tasks performed at his/her job will be quantified by observations and direct methods. Second, all study participants will be asked to record in a task log, on a daily basis, the number of hours he/she spent performing each of the specific tasks that are required by his/her job. The physical job stressors for each task will be combined with information from each participant's log of specific tasks performed over time to create a unique time series of exposure information. Any changes to the employee's tasks will be recorded in the task log and will trigger and exposure reassessment. Study participants will also record occurrences and severity of upper extremity symptoms. Those participants with new onset of symptoms that meet a priori criteria will undergo standard clinical examination. Two primary aims will be addressed: 1) the incidence of specific UEMSDs will be estimated among manufacturing workers and 2) multivariate analyses that incorporate time-varying independent variables will be performed to test the hypothesis that incident UEMSDs are associated with physical job stressors after controlling for potential confounding variables.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: In Vivo Rabbit Model of Finger Musculoskeletal Disorders
Investigator: Karen King
Grant Number: R01 OH007786
Start & End: 9/30/2003-9/29/2007
Affiliation: University of California
City & State: San Francisco, CA
Phone: (510) 231-9448

Description:
The ongoing rise in costs and morbidity associated with occupational musculoskeletal disorders (MSDs) demands the investigation of known risk factors for injury. Repetition of movement, forceful loading and their combination (repetitive loading) are risk factors for MSDs. These happen to be some of the few modifiable risk factors for MSDs of the hand and other joints. This project proposes to use an in vivo animal model of repetitive finger joint loading to elucidate the relative risks of these factors (repetition and combined force and repetition). Finger joint loading is used to simulate hand intensive tasks found
in the workplace to test the following hypothesis: The combination of force and repetition is an occupational risk factor for MSD. This project will quantify the structural and molecular changes in joint tissues due to repetitive loading. And finally, this project will determine the threshold of repetitive loading in a dose-response study. The long term goals of this study are to 1) determine the relative contributions of individual biomechanical characteristics of finger joint loading, namely repetition, force level. and duration of exposure; and 2) demonstrate causality between these biomechanical risk factors. cellular response, tissue damage, and injury. The results of this mechanobiology project will lead to guidelines for effective interventions of MSDs of the hand joints such as osteoarthritis (OA) or degenerative joint disease (DJD). This project addresses the RFA in I) developing a quantitative dose-response model identifying dose-response relationships, 2) determining whether the injury response of the tissue has more to do with repetition of loading or level of peak load. and 3) identifying the ultrastructural injury and biochemical alterations associated with physical loading.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Effects of Repetitive Work on Fatigue of Long Duration
Investigator: Steven Lehman
Grant Number: R01 OH007441
Start & End: 9/30/2001-9/29/2005
Affiliation: University of California
City & State: Berkeley, CA
Phone: (510) 642-5893

Description:
Since musculoskeletal disorders of the upper extremity associated with repetitive work may be caused by cumulative exposure-, a physiologic marker that indicates a level of collective change in the muscle due to exposure is needed. Muscle fatigue of long duration, also known as low frequency fatigue, increases with exposure and can persist for more than 24 hours, into the next workday. We therefore propose to test the hypothesis that fatigue of long duration may be used as a measure of cumulative exposure to repetitive work. Our approach for this four-year study is to conduct a series of hypothesis-driven laboratory-based experiments, which will simulate repetitive wrist flexion work tasks for eight-hour workdays. These experiments will determine a relationship between parameters describing exposure to repetitive work with changes in a physiological response, the level of muscle fatigue. Traditional isometric muscle stimulation techniques will provide objective measurements of fatigue of long duration created by the wrist flexion task throughout the workday and into the next morning. Since fatigue of long duration can persist into the next morning, the first set of experiments will test whether muscle fatigue accumulates over consecutive workdays, and whether accumulated fatigue is equivalent to fatigue from a single bout of work. The second set of experiments will test which quantitative measure of exposure to repetitive work dominates the physiological response: is it cumulative activation, force or work? The third set of experiments will determine the effects of several proposed job task interventions, including training, mini-breaks and different repetition rates, on the level of fatigue. Ultimately, this study will link aspects of exposure to repetitive work with changes in muscle physiology, an important step in the etiology of work-related musculoskeletal disorders, and will aid in the redesign of repetitive. working tasks.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Prevention of MSDs in Plant Nursery Work
Investigator: John Miles
Grant Number: R21 OH007738
Start & End: 9/30/2002-9/29/2004
Affiliation: University of California
City & State: Davis, CA
Phone: (530) 752-6210

Description:
We propose to work cooperatively with owner/operators and workers to evaluate the efficacy of specific engineering interventions in the plant cuttings job, including adaptation of Airshirz and ergonomics workstation improvements, in significantly improving prevention of upper extremity MSDs. This is a sub population of farmworkers who have documented history of diagnosed MSDs (specifically Carpal Tunnel Syndrome). In addition, information on MSDs, MSD risk factors, and controls will be disseminated to workers and to grower groups. Project Specific Aims are to:

1. Develop detailed ergonomic descriptions (biomechanical, metobolic, and postural) of targeted risk factors for MSDs involved in making plant cuttings for propagation;

2. Estimate the incidence of MSDs and related symptoms among participating plant propagation workers;

3. Adapt the proved Airshirz cutting tool to the requirements of the plant cuttings job;

4. Assemble and train worker/supervisor ergonomics teams who will interact with researchers to identify and prioritize potential work station and task improvements;

5. Implement the adapted Airshirz cutting tool and other work station and work processes;

6. Evaluate the efficacy of interventions (a) to reduce targeted ergonomics risk factors, (b) to reduce UE MSDs and related symptomatology among participating plant propagation workers, and (c) for potential technology transfer across the nursery industry;

7. Communicate project findings to nursery and other agricultural industry groups, to workers, and to community interests; and

8. Report project findings in appropriate research and professional publications.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Computer Use and Musculoskeletal Disorders
Investigator: Carolyn Monteilh
Grant Number: R03 OH007612
Start & End: 9/1/2002-8/31/2004
Affiliation: Emory University
City & State: Atlanta, GA
Phone: (404) 727-3370

Description:
The NORA area to be addressed in this proposal is Work Disease and Injury Priority Research, specifically Musculoskeletal Disorders of the Upper Extremities. The overall goal of the proposal is to add to knowledge of the factors affecting survival time to upper extremity musculoskeletal symptoms and disorders (UEMSDs) among computer users keying at least 15 hours per week. To achieve this goal, additional statistical analyses of existing data previously collected in a major prospective study of factors affecting the onset of UEMSDs among computer users are proposed.
The specific aims are to:

(1) Develop an index of postures and workspace dimensions among computer users and determine its ability to predict UEMSDs by (a) using the methods of factor analysis to identify and describe combinations of body postures and workstation dimensions potentially predictive of UEMSDs among computer users and (b) using the methods of survival analysis to quantify the associations (i.e., hazard ratios) between those combinations of posture variables and time to onset of UEMSDs among computer users;

(2) examine the assumption of linear relationships between keying hours and UEMSDs by comparing the ability of linear models, threshold models and other statistical models to describe these associations; and

(3) describe gender-specific postural and workspace risk factors for UEMSDs among computer users.

Successful completion of the first aim will result in the quantification of the ways that separate postural measurements and/or office workspace dimensions work in combination to increase or decrease risk of UEMSDs. Successful completion of the second aim will advance knowledge of the nature of the association between hours keying and onset ofUEMSDs. Successful completion of the third aim will advance knowledge of the causes of observed gender differences in the reporting of UEMSDs among computer users.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Musculoskeletal Stress in Repetitive Precision Tasks
Investigator: Victor Paquet
Grant Number: R03 OH007532
Start & End: 5/1/2002-4/30/2004
Affiliation: University of Buffalo
City & State: Buffalo, NY
Phone: (716) 645-2357

Description:
There is evidence that precision work is associated with musculoskeletal disorders of the upper extremities, particularly the shoulders. A logical series of factorial experiments will show whether precision acts alone or interactively with other task factors to elicit musculoskeletal stress. It may not be possible to modify the precision demands of industrial work. However, understanding how more controllable factors, such as task layout or organizational factors interact with precision, will provide pointers as to which ergonomic interventions would best mitigate the impact of precision. The study will also provide simultaneous information about movement time and musculoskeletal stress. Several indices of musculoskeletal stress will be used including; muscle activation patterns, discomfort ratings, postural measures, and counts of the number of non-task related postural shifts. Indices of movement time will be determined from the coefficients found from fitting data on the time it takes to make movements to an equation; that breaks movement time into the time required to move particular distances, and the time required to close in on precision targets. Such information will show whether musculoskeletal stress and movement time are correlated, and whether they coexist or whether one precedes the other in time. Information about the - association of movement time with stress would give agronomists another tool to assess somatic fatigue or stress. The repeated measures experiments will last one to two hours and will provide information about whether the deleterious effects of precision accumulate with task duration, and whether those effects are different for different combinations of precision and task layout. In the early experiments, this would give predictors for when work should stop and when should begin. In the later experiments, that info-nation would provide a means to evaluate the effectiveness of work/rest cycles.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Biomechanical Effects of Industrial Eccentric Exertions
Investigator: Robert Radwin
Grant Number: R01 OH007793
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Wisconsin
City & State: Madison, WI
Phone: (608) 263-6596

Description:
This research studies the effects of repetitive eccentric exertions in industrial power hand tool operation on biomechanical properties of muscle and tendon in order to better understand the etiology and prevention of work related musculoskeletal disorders. It is hypothesized that increased power tool reaction force and build-up time corresponds with greater changes in the dymanic characteristics of the upper limb. A laboratory-based experiment will define the short-term relationship between repetitive eccentric exertions (i.e. reaction force magnitude and build-up time) and upper limb properties (i.e. stiffness, viscous damping and inertial mass). Subjects will repetitively resist forearm supination against a motor for simulating eccentric exertion levels representative of pistol grip power hand tool operation. Peak torque levels and build-up time will be experimentally controlled. Forearm mechanical properties will be measured before and following a period of work. Mechanical parameters will be ascertained using a unique apparatus that models the forearm as a single degree-of-freedom dynamic mechanical system by measuring the angular displacement of a disturbance to a known mechanical system in free oscillation when the subject uses maximal effort to oppose its motion. Our preliminary data reveals that significant stiffness and inertial mass changes are observed when exercising eccentrically at similar intensity levels. Biochemical measures of blood creatine kinase (CK), and anatomical measures using T2 changes in an MRI of the forearms will be compared with biomechanical parameters prior to, and following repetitive eccentric exertions for a random subset of the subjects. Subjective discomfort will be assessed using a visual analog scale, and forearm edema and strength will also be measured. The second experiment will assess similar upper limb biomechanical properties for industrial workers who regularly perform repetitive eccentric exertions of varying intensity, build-up time and repetition rate in selected industrial jobs. Subjects will be recruited from tool operation jobs on a local automobile assembly line. This research can ultimately lead to better ergonomic interventions through quantitative power hand tool design guidelines and work practices based on understanding the damaging effects of exposure to specific levels of reaction force, build-up time and repetition, as well as providing new outcome measures for epidemiological studies.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: A Model for Wrist and Elbow Musculoskeletal Disorders
Investigator: David Rempel
Grant Number: R01 OH007359
Start & End: 7/1/2001-6/30/2005
Affiliation: University of California
City & State: Richmond, CA
Phone: (510) 231-5720

Description:
Debate exists regarding the relative role of various biomechanical factors (e.g., force, repetition, acceleration, etc.) during repetitive work in the causation of upper extremity musculoskeletal disorders. Most of these factors can be altered in the design of work. We will use our recently developed rabbit finger flexor model to investigate the role of these factors in causing entrapment neuropathy of the median nerve at the wrist and tendonitis at the epicondyle. In addition, the study will identify early cellular and biochemical changes in matrix proteins and cytokines. For 2 hours per day, 3 days per week for 10 weeks, the large finger flexor is repetitively stimulated while the fingertip load is controlled. The loading is performed under general anesthesia The system allows for the precise control of repetition rate, peak fingertip force, load duration, and rate of loading. Three experiments will separately investigate the role of repetition rate, peak force, and loading rate on tissue function and structure. Work (integral of force over time) will be held constant across the loading conditions. Median nerve function is evaluated by measuring distal motor latency across the wrist, and morphologic differences in nerve fiber count, fiber density and myelination are quantified. Morphologic differences in the tendon attachment site at the epicondyle are evaluated with semi-quantitative and quantitative methods assessing cellularity, cell shape, collagen fiber linearity, neovascularization, edema, and apoptosis. The antigentic location and density of structural proteins (collagen I, II, III, decorin, tenascin, fibronectin), and various cytokines (IL-1b, TNF-a, TGF-p, bFGF, substance P) will be assessed using immunohistochemical methods. A fourth experiment will assess these biochemical endpoints at earlier times of exposure. This study has the potential to identify the characteristics of biomechanical loading which are injurious; information valuable to occupational health practitioners in adding specificity to ergonomic guidelines for repetitive work. The study also has the potential to identify the biochemical pathways and time-frames of disease progression; information which may lead to new strategies for treating and preventing entrapment neuropathies and tendon disorders related to work.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Collaborative Study of Workplace Musculsoskeletal Disorders
Investigator: David Rempel
Grant Number: R01 OH007914
Start & End: 9/30/2003-9/29/2007
Affiliation: University of California
City & State: San Francisco, CA
Phone: (510) 231-5720

Description:
This is a 3-year prospective study of 800 employees across a variety of industries, occupations and locations to determine the dose-response relationships between exposure to biomechanical factors and the development of hand, wrist, and elbow musculoskeletal disorders (MSDs), such as epicondylitis, wrist tendonitis and carpal tunnel syndrome. Although there is a substantial body of epidemiologic data linking various workplace factors to the development of upper extremity MSDs, the dose-response relationships between biomechanical factors and specific disorders are not well characterized. This data is critical for employers, employees and government agencies in order to establish the most effective prevention strategies. Companies and jobs will be targeted to achieve a distribution of exposure levels to biomechanical risk factors. Generally, stable, monotask jobs will be selected for study. At initial recruitment and then annually the following will be completed for all participants: baseline questionnaire, physical examination focused on the upper extremity, and a job analysis. On a quarterly basis, employees will complete a brief questionnaire and if their reported pain level is above a threshold, the physical exam will be repeated. If the job tasks change the job analysis will be repeated. It is anticipated that approximately 650 employees will be recruited on first site visit with an additional 150 new hires recruited at follow-up visits. The relationships between exposures and the development of specific and pooled musculoskeletal disorders will be examined using a Cox proportional hazards model controlling for historical and significant covariates (e.g., gender, age, psychosocial factors). The data will be evaluated for dose-response and threshold relationships. Participating employees will be notified of physical exam findings and employers and employees will be notified of the final study findings. Study methods, instruments, and data format will be coordinated with the NIOSH Work-related Musculoskeletal Disorders Consortium.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Ergonomic Interventions for Garment Work
Investigator: Beate Ritz
Grant Number: R01 OH007779
Start & End: 9/30/2002-9/29/2005
Affiliation: University of California
City & State: Los Angeles, CA
Phone: (310) 206-5487

Description:
The center of apparel manufacturing in the United States is California with approximately 7,500 apparel firms and the Los Angeles basin accounting for 80% (115,000 jobs) of California's apparel and textile industry. Nearly 40% of the industries with the highest reported incidence rates of injuries and illnesses from repetitive motion in the United States are in apparel manufacturing. Thus, we are proposing to conduct a randomized trial of a newly developed ergonomic intervention applied to sewing machine operators working in LA garment shops; we tested these interventions previously for acceptance by workers in Northern California. The proposed ergonomic intervention package includes changes in work station design such as (1) tilting the sewing machine table to decrease neck and trunk flexion; (2) seating improvements such as adding sitting wedges to existing chairs and/or providing highly adjustable chairs appropriate selected for work at a sewing machine; (3) installing table extension on the left side of the sewing machine table to decrease awkward arm postures and pinch forces; and (4) providing support for the left foot with a simple block of wood or extending the foot pedals so that both feet are well supported, or activate, the control. In addition to equipment changes, we will train all employees in how to perform work tasks more safely, and/or suggest improvements in the work procedures (e.g., redesign of the work flow, rest breaks, enhanced variety in tasks to reduce repetitive strain). We will examine whether interventions implemented at 150 sewing work station and expected to have benefits can reduce rates of upper extremity, neck (and lower back) musculoskeletal disorders, severity of pain and impairment, and lost-time compared to 150 'placebo' (control) interventions. Secondary purposes include (1) determining the effect of the intervention on body postures and work practices, (2) identifying the characteristics of employees, who benefit from the intervention, (3) estimating the effects of the intervention on productivity, and (4) estimating the cost of the intervention. The long-term objectives of this line of research are to determine to what extent ergonomic and some work organizational changes (for sewing machine operators in garment shops can prevent upper extremity, neck and low back musculoskeletal impairment, disorders, and disability. This study will provide employers, employees and public agencies with evidence of the effectiveness of ergonomic interventions in order to guide health and safety policy.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Prospective Study of Upper Extremity Musculoskeletal Disorders
Investigator: Barbara Silverstein
Grant Number: U01 OH007316
Start & End: 9/30/2000-9/29/2005
Affiliation: Washington State Department of Labor & Industries
City & State: Olympia, WA
Phone: (360) 902-5668

Description:
The goal of this study is to follow a prospective cohort of 1000 workers in two industries to evaluate the relationship between work-related risk factors and the development of non-traumatic soft tissue musculoskeletal disorders of the upper extremities (WMSDs). Musculoskeletal injuries and illnesses account for a tremendous amount of lost workdays and cost to industry in the United States. In this study, two hypotheses will be tested: The presence of the workload factors of hand force, awkward postures of the neck, shoulder, forearm, hands and wrists, and the repetitiveness of the work performed will cause an increase in the incidence of upper extremity work-related musculoskeletal disorders while controlling for individual and psychological factors. The interaction between the workload factors of hand force, awkward postures of the neck, shoulder, forearm, hands and wrists, and repetitiveness of the work performed will increase the risk of developing an upper extremity work-related musculoskeletal disorder. Nationally in 1998, there were 253,300 disorders associated with repetitive motion resulting in lost time including 26,000 cases of carpal tunnel syndrome and 22,000 tendon-related disorders (BLS, 1999) reported by private industry. The National Institute for Occupational Safety and Health (NIOSH) reported that about 700,000 (32 percent) of the cases involving lost workdays annually were attributed to repetitive motion disorders or overexertion (NIOSH, 1997). These reported injuries and illnesses result in a tremendous amount of lost productivity and a detrimental impact on the working and non-working lives of many people. Reducing workplace illnesses and hazards is the first priority of the Washington State Department of Labor and Industries. This research will be conducted in one manufacturing industry and one service industry, with multiple sites of each possible. SHARP surveillance activities using workers compensation data have identified manufacturing and service sector industries with high incidence of WMSD claims. The literature on causality has been extensively reviewed (Bernard, 1997). However, more information is needed to more precisely quantify exposure-response relationships between physical load factors and WMSDs, while controlling for relevant individual, psychological and social factors. Prospective studies using quantitative estimates of exposure and standardized outcome assessments will help to focus primary prevention efforts more precisely. Workers will be followed prospectively for 3 years to determine the effect of work-related risk factors on both incidence and persistence of musculoskeletal disorder symptoms, clinical findings, and compensated injury claims. An initial cohort of approximately 600-700 workers will be recruited for participation in the study. Three groups of workers will be followed: new workers, previously exposed symptomatic workers, and current healthy workers at baseline. As participants become diagnosed as a having a clinical outcome or leave the workplace, they will be removed from the cohort. These subjects will be replaced with newly hired workers monthly (resulting in 1000 total participants) for determination of disease incidence in the workplace. All participants will be briefly questioned quarterly to determine health status, with symptomatic

workers examined for clinical morbidity outcomes. All participants either leaving or entering the cohort will be given a clinical exam and complete all study questionnaires. All workers will be classified by job into one of six different exposure levels based on hand force and repetition rate. Detailed task analysis and task-based video analysis will be conducted on all participants in the two work environments, with hand force measured by direct estimation. Data will be analyzed to determine disease development relationships between measured risk factors and diagnosed outcomes. Information gathered will be used to develop a model describing the relationship between risk factor levels and rate of disorder development or symptom severity. These results will be very important in determining the impact of exposures as well as other factors on the development of musculoskeletal disorders. Ultimately this will lead to better targeting of resources towards the reduction of work-related musculoskeletal disorders.

Program Area: Musculoskeletal Disorders: Upper Extremities (NORA)
Title: Cumulative Trauma Disorder: Skeletal Muscle Dysfunction
Investigator: William Stauber
Grant Number: R01 OH002918
Start & End: 6/1/2001-5/31/2004
Affiliation: West Virginia University
City & State: Morgantown, WV
Phone: (304) 293-1491

Description:
Chronic pain originating from the musculoskeletal system is a dominant cause of sick-leave in modern industry and can be a very disabling and troublesome condition for the individual. Although the cause of this problem in skeletal muscle is unknown, one of the most frequent situations in which muscle pain is experienced is in industrial workers who have to move repeatedly and/or forcibly. The cumulative trauma disorder (CTD) which results from repetitive movements is of special interest because these repeat-motion injuries are one of the most difficult to anticipate and prevent.

Our studies in humans have shown that exposure to a single bout of repeated strains can lead to myofiber and fascial rupture without bleeding but accompanied by muscle pain, restricted motion, and loss of strength and power. Little is known about the effect of repeated strains on muscles or the dynamic components of repeated use such as velocity and acceleration which produce injury resulting in CTD or CTD risk. Since variations in human exposure and response together with the necessity for repeated tissue sampling makes man unsuitable as a research subject, we have developed a rat model of repeated strain injury (CTD).

Using this model, the present study is designed: (1) to produce muscle strain injury in rats with and without fatigue using a custom-built dynamometer which can result in pathologic fibers, (2) to measure TGF-beta and bradykinin in response to muscle injury with and without pathology, (3) to assess the role of TGF-beta in collagen production and 4) to assay for TGF-beta in the blood of strain injured rats. Pathologic muscle fibers associated with TGF-beta will be identified using immunohistochemical techniques. Collagen content will be measured by HPLC. Active and latent forms of TGF-beta1 and TGF-beta2 and type I and III collagens will be quantified by Western blots.

Insight into the factors and conditions producing muscle injury with pathology should provide a better understanding of the healing (adaptive) or failed-healing (pathologic) processes of muscle and aid in the design of preventative regimens for individuals in specific industrial settings.

Program Area: Musculoskeletal Disorders: Upper Extremities
Title: Shoulder, Low Back, or Knee Strength Degradation
Investigator: Xudong Zhang
Grant Number: K01 OH007838
Start & End: 9/1/2003-8/31/2006
Affiliation: University of Illinois
City & State: Urbana, IL
Phone: (217) 265-8031

Description:
The general objective of this research is to systematically investigate whether and how strength degradation in three major body joints--the shoulder, low back, and knee--affects the movement strategies and injury risk associated with the performance of manual materials handling. Our long-term goal is to develop quantitative tools and guidelines that integrate movement and strength information for the recognition, prediction, and prevention of occupational musculoskeletal injuries. This proposed research project seeks to accomplish the following specific aims:

(1) To evaluate the strengths of human subjects, and through analysis of acquired strength profiles, to establish four subject groups one a symptomatic control group and three groups of individuals with selectively degraded shoulder, low back, or knee strength.
(2) To measure three-dimensional movements during simulated manual materials handling tasks performed by the four groups of subjects under various task conditions (created by systematically varying task parameters such as load handled, angle of asymmetry, destination location).
(3) To model the measured movements using a high-fidelity whole-body biomechanical linkage representation, and through determination of the active degrees of freedom in various measured movements, to examine the hypothesized whole-body joint motion activation pattern change.
(4) To model the measured movements using an optimized-based differential inverse kinematics (ODIK) approach, and thus to visualize the hypothesized whole-body inter-joint motion apportionment strategy aberration.
(5) To model the measured movements using an inverse-dynamics-driven direct dynamics (ID 4) approach, and thus to gain insight into the kinetic cause for hypothesized kinematics aberration and examine hypothesized changes in moment allowance (i.e., "strength reserve") and risk of injury.

A successful completion of this project will lead to: (1) Motion-based evaluation of muscle strength degradation for proactive ergonomics intervention, return-to-work assessment, and rehabilitative ergonomics implementation; (2) Guidelines and computerized simulation models for designing consumer products or workplaces to better accommodate special population with degraded strength capability; and (3) A better understanding of how muscle strength influences the motion control strategies and consequently the injury risk during manual materials handling tasks in specific and human movements in general

Program Area: Neurological Disorders
Title: Solvent-Related Functional Brain Abnormalities
Investigator: Lisa Morrow
Grant Number: R01 OH003646
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Pittsburgh
City & State: Pittsburgh, PA
Phone: (412) 624-0762

Description:
In November, 1996 a workshop sponsored by NIOSH and the Association of Occupational and Environmental Clinics was convened to discuss solvent exposure in Railroad (RR) workers. Explicit questions were posed regarding the health effects of solvents, as well as recommended actions. The conference specifically suggested research utilizing functional imaging to determine the presence and severity of neuropathology following solvent exposure. Another area of interest was how to estimate the levels of past solvent exposure using a range of methods, such as interviews and modeling. This proposal incorporates both of these suggestions. We propose to assess central nervous system activation with Positron Emission Tomography (PET) in a sample of workers employed in the RR industry. Solvent exposure will be evaluated with a structured interview to ascertain an estimate of cumulative exposure. A battery of neuropsychological tests will be administered, as well as indices to assess psychiatric function. Exposed workers will be selected from a sample of over 180 workers who have been seen in the Occupational and Environmental Health Clinic at the West Virginia University School of Medicine. Workers have been exposed to solvents for at least 10 years and have been categorized by degree of exposure - mild, moderate, severe. A random sample of 16 workers from each category will be selected for inclusion in the protocol (N = 48). An equal number of nonexposed blue-collar control workers will be assessed with the same battery of tests and compared to the exposed subjects. We predict that exposed workers will show a pattern of brain activation that is significantly different from controls and specifically, involving a relatively diminished activation in the frontal cortex such that other cortical areas are recruited when subjects perform a memory task. In addition, there will be a dose-response relationship between exposure and neural activation.

Program Area: Organization of Work
Title: Physical & Social Hazards: Jobs, Race, Gender & Health
Investigator: Elizabeth Barbeau
Grant Number: R01 OH007366
Start & End: 9/30/2001-9/29/2004
Affiliation: Dana-Farber Cancer Institute
City & State: Boston, MA
Phone: (617) 632-5390

Description:
Background: The workplace is a key site where individuals confront two types of health hazards. One is physical hazards, referring to such phenomena as dusts/fumes, static load, and noise. The other is social hazards, referring to such phenomena as job strain, racial discrimination, sexual harassment, and violence. Yet, to date, as acknowledged by leading researchers in the fields of occupational health and social epidemiology, remarkably little research explores the extent to which physical and social hazards are: (1) inter-related, (2) distributed among workers with respect to job type, race/ethnicity, and gender, and (3) synergistic in their adverse effects on health, broadly understood as both health behaviors (such as cigarette smoking) and health status (e.g., blood pressure).

Specific Aims: The specific aims are to examine: (1) associations between hazardous physical exposures (dust/fumes, noise, ergonomic strain), hazardous social exposures (racial and gender discrimination, sexual harassment, violence, job strain), and socio-demographic characteristics (race/ethnicity, gender, and wage level); and (2) associations between hazardous physical exposures, hazardous social exposures, and health outcomes (health status, blood pressure, and health behaviors).

Study design and methods: Cross-sectional survey on a racially and ethnically diverse population of male and female unionized workers engaged in a wide range occupations in the greater Boston area (n= 2,000).

Outcomes: Our study addresses significant gaps in knowledge about social and physical hazards at work and their contributions to social inequalities in health. By selecting a well-justified set of determinants and outcomes, in combination with an appropriate study population, our study has the potential to expand public health knowledge about and efforts to reduce social inequalities in health.

Program Area: Organization of Work (NORA)
Title: Effects of Extended Work Hours on Intern Health and Safety
Investigator: Charles Czeisler
Grant Number: R01 OH007567
Start & End: 9/30/2001-9/30/2005
Affiliation: Brigham and Women's Hospital
City & State: Boston, MA
Phone: (617) 732-4013

Description:
Advances in medical technology and economic pressure to reduce health care costs have converged to intensify the hourly workload of hospital interns. Yet the hospital intern's traditional 36-hour on-call shift has remained largely unaltered, recurring every 3-4 nights for months at a time, with work hours ranging from 80-110 hours/week. Laboratory and field data indicated that such extended duty shifts and long work weeks are associated with acute total sleep deprivation, chronic partial sleep deprivation, misalignment of circadian phase and sleep inertia, resulting in a deterioration of alertness and neurobehavioral performance. We plan to test the hypotheses that: 1) extended workdays/long workweeks in interns are associated with increased risk of actual and near miss motor vehicle crashes, falling asleep at the wheel, falling asleep while working, and a reduction in quality of life measures; 2) provision of 10 hours of protected time for sleep will substantially increase sleep obtained during ICU on-call nights; and 3) physicians provided with 10 hours of protected time for sleep while on-call will exhibit improved performance, enhanced alertness, and fewer microsleep episodes while on duty. A prospective questionnaire study of all U.S. physicians and dentists in their first post-graduate year is proposed to compare the occurrence of adverse events in physicians who are required to work extended work days (>30 consecutive hours) and long work weeks (>80 hours per week) versus dentists who are not required to work such extended work days or long work weeks in their first postgraduate year. A second intervention study is proposed to evaluate the efficacy of providing 10 hours of protected time for sleep in improving alertness and performance and reducing the safety hazards associated with 36-hour on-call shifts. The proposed study could have important public policy implications related to graduate medical education and training in the United States, and for the health and safety of the 100,000 medical and surgical residents who are the principal providers of medical care in academic medical centers across America.

Program Area: Organization of Work (NORA)
Title: Practical Circadian Interventions for Night Shift Work
Investigator: Charmane Eastman
Grant Number: R01 OH003954
Start & End: 8/1/2003-4/30/2008
Affiliation: Rush-Presbyterian-St. Luke's Medical Center
City & State: Chicago, IL
Phone: (312) 850-7787

Description:
Millions of U.S. workers have to work night shifts, resulting in serious consequences such as sleep deprivation, fatigue, reduced alertness, impaired performance, gastrointestinal disorders, and reduced job and public safety. These problems occur because the circadian clocks of the workers do not usually phase shift (reset) to adjust to night work and day sleep schedules. Thus, there is a misalignment between the physiological circadian rhythms and the work and sleep schedule. Night workers are forced to work and sleep when their bodies are not prepared for either. We have shown, in simulated night shift studies, that appropriately timed bright light during the night shift combined with specific dark periods for daytime sleep can produce complete re-alignment of circadian rhythms with the night work, day sleep schedule. However, with complete adjustment night workers would not be adapted to the night time sleep schedule that they subsequently follow on their days off. This will limit the practical application of these types of schedules.

We plan to test a schedule for permanent night work that would produce sufficient re-alignment both during night shifts and during days off. Subjects will "work" in the lab and sleep at home. Treatment groups will be exposed to bright intermittent light during the night shifts and will adhere to prescribed dark/sleep episodes (for daytime sleep after night work and sleep on days off). This treatment should phase delay the circadian clock (set it later) to a compromise position, in between complete adaptation to night work and complete adaptation to days off. Control groups will remain in ordinary room light during the night shifts and will be free to sleep whenever they choose while off work. A series of experiments are proposed in which circadian phase will be assessed on different days of the schedule by measuring the circadian rhythm of melatonin. We will determine whether the compromise phase position can be achieved and maintained in the treatment groups despite alternations between series of night shifts and days off. We will determine whether more subjects in the treatment groups than in the control groups obtain a favorable compromise phase position. We will determine whether the treatment groups perform better and feel more alert on the night shift than the control groups, and whether they obtain more sleep. This work will have important implications for the health, safety ,and well being of the night shift worker.

Program Area: Organization of Work (NORA)
Title: Occupational Physical Activity and Circulatory Diseases
Investigator: Niklas Krause
Grant Number: R01 OH007820
Start & End: 8/1/2003-7/31/2006
Affiliation: University of California
City & State: Richmond, CA
Phone: (510) 231-9551

Description:
Low levels of physical activity have been identified as a major risk factor for cardiovascular disease. However, the evidence for this observation is primarily based on leisure time physical activity. The literature regarding occupational physical activity is controversial. The long-term health effects of different levels of energy expenditure and of different types of activity at work are unknown for most circulatory diseases. However, recent epidemiological research has shown a strong association between prolonged standing at work and hospitalization due to varicose veins, 4-year progression of carotid atherosclerosis, all-cause mortality, and a trend for cardiovascular mortality. The aim of the proposed research is to determine the long-term health effects of different types and levels of occupational physical activity on chronic circulatory diseases. This will be accomplished by an 11-year follow-up of 2682 middle-aged men enrolled in the population-based Kuopio Ischemic Heart Disease Risk Factor Study (KIHD). The KIHD study has the most comprehensive set of biological, behavioral, social, and psychological risk factors of any study, allowing for the control of virtually all known possible confounders. For the first time, the impact of occupational physical activity will be evaluated prospectively on 11-year progression of carotid atherosclerosis and a wide range of specific circulatory diseases, including myocardial infarction, stroke, intermittent claudicating, hypertension, thrombophlebitis, and pulmonary embolism. Specifically, the following questions will be addressed: 1) Is the level of daily energy expenditure during work activities associated with circulatory disease and death? 2) Is the ratio of static/dynamic work predictive of morbidity and mortality? 3) Is a predominantly standing working position a risk factor for arteriovascular and venous diseases? 4) Is the impact of occupational physical activity on persons with existing is chemic heart disease or peripheral vascular disease different from the impact on healthy individuals? The long-term goals of this project are to yield useful information for (1) the primary prevention of chronic diseases of the circulatory system, associated disability, and premature death in the aging working population, and (2) the development of evidence-based recommendations for the optimal balance between static and dynamic work, working postures, and overall levels of occupational and leisure time physical activity, for both healthy people and those diagnosed with cardiovascular disease.

Program Area: Organization of Work (NORA)
Title: Work Hours, Musculoskeletal Disorders and CVD Risk
Investigator: Paul Landsbergis
Grant Number: R01 OH007577
Start & End: 9/30/2001-9/30/2005
Affiliation: Mount Sinai University
City & State: New York, NY
Phone: (212) 241-4571

Description:
Stressful features of work organization, including long work hours, have recently been identified as risk factors for blood pressure elevation and cardiovascular disease (CVD) and have been suggested as risk factors for work-related musculoskeletal disorders (WMSDs). The proposed study has two primary specific aims, to determine: (1) associations between extended work hours, ergonomic risk factors, other psychosocial job stressors, and WMSDs; and (2) associations between extended work hours, other psychosocial job stressors (including job strain, effort-reward imbalance and shift work), blood pressure elevation and CVD risk. The study population includes white-collar and blue-collar men and women from the health care, transportation, and manufacturing industries, many of whom currently use overtime extensively. The study is also designed to examine the effect of characteristics of overtime, to assess how overtime may interact with other stressful features of work organization, ergonomic stressors or demographic measures, and to investigate the impact of recent changes in the organization of work on work hours, psychosocial job stressors, ergonomic risk factors, and work climate. Initial efforts will include analyses of available employer records on work hours and WMSDs in the transportation and manufacturing industries, and secondary analysis of existing medical data bases in the health care industry. A population-based case-control study of incident cases of WMSDs will be conducted among health care workers. 200 cases and 200 healthy incidence-density-matched controls will be interviewed in person. Ergonomic observation of an individual representing each job title held by study participants will be conducted. 40 job-matched controls will also be selected from workers in the same job titles as cases to assess information bias in the cases, and to allow substitution of job-matched controls' biomechanical job exposures for cases in whom such data cannot be collected. A cross-sectional study of a random sample of 400 employees, stratified by overtime use, from participating employers in various industries, will be conducted to investigate risk factors for blood pressure elevation and CVD. Participants will have their blood pressure measured while working using an innovative method (work site point estimates) to obtain a valid estimate of mean workday blood pressure. A sub-sample of 100 employees will be followed over 2 years and have their blood pressure measured during periods of high vs. low overtime.

Program Area: Organization of Work (NORA)
Title: The Impact of Total Workload on Maternal Postpartum Health and Quality of Life
Investigator: Patricia McGovern
Grant Number: R18 OH003605
Start & End: 9/30/1999-9/29/2004
Affiliation: University of Minnesota
City & State: Minneapolis, MN
Phone: (612) 625-7135

Description:
The trajectory of health and quality of life for employed women upon return to work after childbirth is unknown. The effects of stress and role conflict from total workload on women's postpartum health are not well established. Yet, mothers of infants represent one of the fastest growing segments in the US labor market.

The purpose of this project is to estimate a function relating total workload (i.e., hours of paid and unpaid work), use of family medical leave, job stress, work-family conflict to maternal health at critical points in time after childbirth. The research model is adapted from economic models of health and household production function theory, and integrates elements of the biopsychosocial approach to stress and health. The study employs a prospective design with panel data collection at 6 weeks, 3 months, 6 months, 12 months and 18 months after childbirth. Selected intervals reflect critical times in women's postpartum recovery and employment patterns that have implications for maternal workload and well-being. Potential subjects will be recruited from selected hospitals and screened for eligibility. Upon hospital discharge following childbirth, 782 women will be surveyed at intervals described above using both telephone and mailed administration of survey instruments depending on the timing of data collection. A system of equations will be estimated for women's total workload, use of family medical leave, job stress, work-family conflict, health status and quality of life at each time period.

Consistent with this theoretical approach an analytic procedure called two-stage least squares will be employed. This approach permits cross-sectional analyses that estimate the impact of explanatory variables (e.g., job stress) on the dependent variables of interest (e.g., maternal health) at one specific point in time (e.g., six months after childbirth). In addition, the use of panel data permits longitudinal analyses that will allow us to estimate alternative models such as distributed lag models. This latter approach will enable us to estimate current values of the dependent variable (e.g., maternal health at 18 months after childbirth) as a function of both current and past values of the explanatory variables (e.g., total workload at 12 months and 18 months after childbirth). Results from the study will provide important information on maternal health and quality of life at a vulnerable time in the life cycle of women and their families. The study findings will identify workplace and job characteristics and family and personal choices that support women's health and quality of life. Knowledge of these factors will facilitate the design and testing of policy and programmatic interventions relevant to employers, policy makers and occupational health providers.

Program Area: Organization of Work (NORA)
Title: Work Organization and Health Among Home Care Workers
Investigator: Carles Muntaner
Grant Number: R01 OH007440
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 706-0889

Description:
Work organization is an important determinant of employee psychological and physical well-being. Depression and musculoskeletal disorders are outcomes of adverse work organization that inflict major social and economic burden on workers, firms, and communities, including chronic disability and suicide. Home care work has been found to be one of the most physically, and possibly psychologically hazardous work environments in the US, a disturbing finding as home care is currently the fastest growing occupation in the country.

The proposed study will assess the relationship between the organization of work and the prevalence of major depression and musculoskeletal disorders among home care workers. A cross-sectional study will be conducted of 1520 home care workers drawn from a large and diverse population in Los Angeles County, California. The overarching hypothesis of this three year study is that work organization (i.e. the amount of work to be performed and the capacity to decide how to do it) will have a direct association with the prevalence of major depression and musculoskeletal disorders among home care workers. This will be the first study in the US to examine work organization factors in the home care industry in relation to the prevalence of depression an musculoskeletal disorders among home care workers. This study will also make important methodological contributions to the field of occupational health. Home care workers are a "hard-to-reach" special population at risk (with a high proportion of poor, minorities, immigrants, and women) and as such we will use computer assisted telephone interviewing to minimize respondent effort in participating. In addition, work organization will be measured among home care workers under standard and non-standard (part-time, on-call work arrangements. We will employ a newly developed screening instrument for depression with improved content validity and domain representativeness compared to other non-clinical instruments for this outcome. The results of this study will have implications for work place policies in home care agencies across the US that have the potential to reduce depression and musculoskeletal disorders as well as the associated loss of productivity from these disorders among home care workers.

Program Area: Organization of Work (NORA)
Title: Work Organizational Factors and Psychological Distress
Investigator: Omowunmi Osinubi
Grant Number: R21 OH007713
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Medicine and Dentistry of New Jersey
City & State: Piscataway, NJ
Phone: (732) 445-0123

Description:
The project goal is to determine the impact of organizational culture on workers' psychological distress, job-related stress and work productivity as well as to explore the relationship between organizational culture and provision of workplace crisis intervention programs to employees in the aftermath of the World Trade Center (WTC) disaster. A sample of 10 organizations and a total of 500 employees will be recruited from within a 10-mile radius of WTC. Human resource managers (or equivalent) will complete surveys to characterize disaster-related workplace programs offered to employees. Employees will complete questionnaires that assess psychological distress (Profile of Mood States), job-related stress (Job Content Questionnaire), other life stressors (PERI Life Event Scale), self-rated work productivity (Endicott Work Productivity Scale) and the perceived cultures of their respective organizations (Organizational Culture Inventory - OCI) at 12 and 24 months after the disaster. Organizations will be classified as having positive (constructive) or negative (aggressive/defensive and passive defensive) based on the OCI, Study Hypotheses: Organizations with positive (constructive) cultures are more likely provide disaster-related crisis intervention programs and have lower employee psychological distress and job-related stress compared to organizations with negative cultures. Employees of organizations with positive cultures are more likely to have higher self-reported work productivity and show a reduction in psychological distress between 12 and 24 months after the WTC disaster compared to their counterparts in organizations with negative cultures. It is recognized that the sample size for this study may not be large enough to find statistical significance. However, one of the purposes of this exploratory study is to ensure that there is enough variability in the measures of interest to warrant further investigation. Also this study is intended to obtain preliminary estimates of the effect of organizational culture on (a) whether organizations implement crisis intervention programs, (b) employee's psychological distress and job-related stress, and (c) self-reported work productivity. The preliminary data obtained will enable investigators to plan a larger, more comprehensive study.

Program Area: Organization of Work (NORA)
Title: Extended Work Schedules and Workplace Injury in Nurses
Investigator: Alison Trinkoff
Grant Number: R01 OH007554
Start & End: 9/30/2001-9/30/2005
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 706-0452

Description:
Few industries in the United States have undergone more sweeping changes over the past decade than the health care industry. These changes have primarily come from a desire to reduce or control costs. One of the major cost-cutting strategies has been to reduce the size of the nursing workforce. To compensate, nurses are often required to work extended schedules, including > 8 hour days, >40 hour workweeks, mandatory overtime, double shifts, and other inflexible scheduling demands. Little is known about the health impact of these extended work schedules on nurses, though one study found that when registered nurse (RN) positions decreased by 9.2 percent, work-related injuries and illnesses among RNs increased by 65.2 percent. (Shogren & Calkins, 1997). Nurses face many occupational hazards; among the most common are musculoskeletal disorders (MSDs) and the transmission of bloodborne pathogens such as HIV and Hepatitis C through needlestick injuries. Extended work schedules increase the length of workplace exposure to hazards that lead to such injuries. To address the problem of extended work and its health impact on nurses, we will accomplish the following specific aims: 1) examine the nature and prevalence of extended work schedules (hours/day, hours/week, mandatory and voluntary overtime, breaks) among nurses in a variety of settings; 2) determine the relationship of extended work schedules to musculoskeletal pain/disorders (MSDs), measured longitudinally; 3) determine the relationship between extended work schedules and needlestick injuries, measured longitudinally. Survey data will be collected from a probability sample of 3500 actively licensed RNs in two states. Data on extended work schedules, exposures and injuries will be collected in Wave 1 and Wave 3, 12 months apart. To assess the stability of extended work schedules, we will measure this construct one additional time, after 6 months, at Wave 2. Wave 1 and 2 exposure data will be regressed on Wave 3 outcome data to examine potentially causal associations. This study of nurses, who are experiencing a multitude of extended work hour arrangements, will provide a comprehensive examination of the impact of such work arrangements on the health of nurses. Identifying organizational variables related to nurse's health that, if modified, could reduce the likelihood of worker injury is key to maximizing the quality of health care while maintaining a healthy workforce.

Program Area: Risk Assessment Methods
Title: Risk Assessment for Airborne Bioterrorism Agents (PERT)
Investigator: Mark Nicas
Grant Number: U36 300430AQ
Start & End: 3/1/2003-2/28/2005
Affiliation: University of California
City & State: Berkeley, CA
Phone: (510) 643-6914

Description:
Project will promote domestic preparedness for terrorism by proposing to develop quantitative risk analysis methods for selecting respiratory protection against airborne pathogens used for bioterrorism

Program Area: Risk Assessment Methods (NORA)
Title: Stochastic Models for Radiation Carcinogenesis: Temporal Factors and Dose-Rate Effects
Investigator: Suresh Moolgavkar
Grant Number: R01 OH007864
Start & End: 9/30/2002-9/29/2005
Affiliation: Fred Hutchinson Cancer Research Center
City & State: Seattle, WA
Phone: (206) 667-4145

Description:
Current radiation protection standards are based largely on the experience of the cohort of A-bomb survivors. An important question, however, is whether the risks estimated in a Japanese war-time population exposed to instantaneous radiation can be transported to contemporary western populations exposed typically to protracted radiation in the workplace or elsewhere. Additional complications arise when age- and time-related factors in radiation exposure must be considered. A recent analysis of a large Canadian cohort of workers occupationally exposed to low-LET radiation using conventional epidemiological methods yielded estimates of excess relative risk that were an order of magnitude higher than those estimated from the A-bomb survivors' data. Can such inconsistencies be resolved? This research proposes to continue the development of methods based on the biological principles of multistage carcinogenesis for analyses of epidemiological data on radiation carcinogenesis. These methods, which complement the traditional epidemiological approaches to data analyses, can incorporate age- and time-dependent factors, including protraction of exposure, in a transparent way. These methods have been used by us and others for analyses of occupational cohort data and have yielded insights that would have been difficult to obtain using traditional methods alone. As an example an analysis of lung cancer incidence in the Canadian cohort referred to above using these methods showed that the inconsistency referred to above disappears when protraction is properly accounted for. The developed methods will be applied to substantial available data sets. Specifically, we propose to analyze the association between low-LET radiation and incidence of lung and colorectal cancer in Canadian National Dose Registry (CNDR) cohort with extended follow-up through 1999. We also propose to explore the association between low-LET radiation and mortality from lung cancer in the CNDR cohort and the cohort of nuclear workers in the Comprehensive Epidemiological Data Resource (CEDR) set up by the Department of Energy. The main goals of these analyses are to explore the effects of various age- and time-related factors and of protraction of exposure on the risk of radiation carcinogenesis.

Program Area: Risk Assessment Methods (NORA)
Title: Physiologically-Based Pharmacolinetic/Clonal Growth Modeling: Predicting Cancer Potential of Chemical Mixtures
Investigator: Raymond Yang
Grant Number: R01 OH007556
Start & End: 6/1/2001-5/31/2004
Affiliation: Colorado University
City & State: Fort Collins, CO
Phone: (970) 491-5652

Description:
Objectives: We propose to develop a biologically-based modeling approach for predicting the cancer potential of chemical mixtures. This will be accomplished by integrating a time-course hepatocarcinogenesis assay at the tissue, cellular, and molecular levels with physiologically-based pharmacokinetic (PBPK) and clonal growth modeling. We hypothesize that the carcinogenic potential of chemical mixtures can be predicted based on an integrated approach involving PBPK/clonal growth modeling of time-course glutathione-S-transferase π positive (GST-P) foci development and its temporal cellular and molecular indicators. The intended research is important because, without such a predictive approach, it is impossible to assess the almost infinite number of chemical mixtures in the environment by conventional experimentation. Our approach, as discussed below, will integrate computer modeling, bioengineering concepts, a whole animal bioassay system, and state-of-the-science cellular and molecular biology for the prediction of carcinogenic potential. Our research team is confident in developing such an approach successfully because we have already implemented the PBPK/clonal growth model to describe the time-course development of GST-P foci in a series of chlorobenzene isomers. Further, we have studied hexachlorobenzene (HCB), 3,3',4,4',5 pentachlorobiphenyls (PCB126) and arsenic (AS), the three chemicals proposed for this project, using the Ito medium-term liver foci bioassay and have accumulated extensive background data.

Approach: We will validate the proposed predictive model using a combination of simulation modeling and experimentation in a stepwise fashion. First, we will build the PBPK/clonal growth models, based on experimental data, for three distinctively different single chemicals-HCB, PCB126 and AS. Experimental data collection include time-course GST-P foci number and volume, liver cell division and death rates, and gene expression profiling using the DNA microarray in initiated and normal hepatocytes. We will then incorporate potential toxicologic interactions into the model based on the knowledge obtained from single chemical studies, and predict carcinogenic potential of the three binary mixtures. Third, we will validate the model by conducting the above-mentioned experiments on binary mixtures. Fourth, we will go up one tier to predict the foci growth kinetics of the ternary mixture based on the information from single chemicals and binary mixtures and validate the model by conducting experiments on the ternary mixtures.

Expected Results: Overall, we anticipate that PBPK/clonal growth modeling will effectively integrate data from molecular levels (gene expression profiles) to cell kinetics (division/death rates) to organ/tissues levels (GST-P foci development and liver physiology). Further, we anticipate that this model will successfully predict carcinogenic potential of the binary and ternary chemical mixtures of HCB, PCB 126 and AS.

Program Area: Social and Economic Consequences of Occupational Injury & Disease (NORA)
Title: Disability Risk in Work-Related Musculoskeletal Injuries
Investigator: Gary Franklin
Grant Number: R01 OH004069
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Washington
City & State: Seattle, WA
Phone: (206) 685-7080

Description:
The vast majority of cost and lost productivity in workers' compensation is due to work related musculoskeletal injuries. Among injured workers with these conditions, a small proportion (5-10%) develop long-term disability and account for most (80-85%) of the cost and lost work. In the absence of an accurate method to identify workers at risk for long-term disability, secondary prevention efforts cannot be well targeted. This is a 5-year, population-based, prospective study among Washington State workers with back injuries and carpal tunnel syndrome (CTS). The principal aim is to develop an accurate predictive model of risk for long-term disability among 5 key risk dimensions: employment related factors; biomedical/healthcare related factors; sociodemographic factors; administrative/legal factors; and psychosocial factors. To accomplish this aim, a baseline interview among approximately 3,000 eligible workers will be conducted within 2-6 weeks of (workers-~compensation) claim allowance. A continuous measure of disability outcome (lost time compensation) will be determined from a computerized database at one year. Additional important outcomes will be determined by a follow-up interview at one year (functional status, work status) and from computerized records (work status, wage status). Multivariate survival analysis within and across risk dimensions will be used to develop the principal risk models, including adjustment for injury severity. The reliability of determining severity from medical records will be determined as well (Specific Aim 2). A third aim of this study is to develop a brief risk assessment instrument for both low back and CTS injuries which would be useful to physicians when first treating injured workers. The main focus of these instruments would be on those risk factors which may be modifiable and which may be amenable to early intervention to prevent disability. Statistical analysis for this aim will focus on sensitivity and specificity of specific combinations of risk factors. These risk assessment instruments will be pilot tested among physicians participating in an occupational health care quality improvement project. The fourth aim of this project is to determine reinjury rate and predictors of reinjury among the original low back injury cohort 2 years after the initial injury The unique study environment in Washington state, including the ability to conduct population-based sampling, timely access to survey injured workers, linkage of medical, claims and work status databases, and support from the business and labor communities, will substantially contribute to the success of this study.

Program Area:	Social and Economic Consequences of Occupational Injury & Disease (NORA)
Title:	On-the-Job Injury: Employment History and Hidden Losses
Investigator:	Monica Galizzi
Grant Number:	K01 OH007999
Start & End:	9/1/2003-8/31/2006
Affiliation:	University of Massachusetts
City & State:	Lowell, MA
Phone:	(978) 934-2790

Description:
This research project will test the hypothesis that individual's personal characteristics and preinjury labor market experience, together with employers' characteristics, behaviors and working conditions, will determine the long lasting social and economic consequences of workplace injuries. The study aims: (1) to estimate the effect of a job related injury or illness on individuals' future employment given information on workers' preinjury labor force participation, employment relations, and working conditions; (2) to determine the factors that may explain recurrent episodes of work related injury and illness; (3) to estimate the effect of a job related injury/illness on future earnings and on other hidden economic consequences (such as loss of fringe benefits, and need to rely on government assistance programs); (4) to evalaute the effect of an injury on the families of injured workers (in terms of changes in spouses' employment and children well-being); (5) to measure variation in outcomes among workers who receive or do not receive workers' compensation benefits. To study these topics the research will use several probability models and models describing the variation of continuous dependent variables over time.
The candidate is an economist whose previous research has looked at themes of labor mobility through the use of administrative data. She has experience in using workers' compensation data. The richness of the data she will use (the NLSY), will permit her to broaden and develop her individual research agenda and to establish herself as an economist interested in topics of occupational safety and health. She will work under the mentorship of two economists with large familiarity with the NORA priority areas. She will also draw on the expertise of several university colleagues who are active in research areas such as occupational epidemiology. ergonomics, and work environment policy. Through the participation to courses and seminars she will further develop her econometric skills and learn how to enrich the economic analysis of individual behaviors with a public health perspective and a broader understanding of injured workers' employment experiences. This grant would secure her sufficient research time to build such solid base for better defining her future research agenda and strenghthening her research skills.

Program Area: Social and Economic Consequences of Occupational Injury & Disease (NORA)
Title: Unclaimed Injuries and Workers' Compensation Adequacy
Investigator: Darius Lakdawalla
Grant Number: R03 OH007619
Start & End: 9/1/2002-8/31/2004
Affiliation: RAND
City & State: Santa Monica, CA
Phone: (310) 393-0411

Description:
The workers' compensation system is designed to provide health care and compensation to all American workers who suffer injuries or illnesses in the workplace without regard to fault. However, preliminary analysis suggests that only half of injured workers file claims. In light of this fact, we propose research with two key goals: (1) To understand the economic, demographic, and policy factors that cause workers with occupational injuries and illnesses not to file claims; (2) To reassess the adequacy of workers' compensation wage replacement rates, in light of the fact that many workers do not file claims or receive benefits of any kind. Consideration of the first goal reveals the surprising finding that the most vulnerable workers-those with the least alternative insurance against workplace injuries and illnesses-may be the ones least likely to file for workers' compensation. They may face higher costs of filing workers' compensation claims. To pursue the second goal, we calculate the total wages lost over several years as a result of a workplace injury, which we will compare to the benefits paid by workers' compensation. These calculations will include the zero benefits paid to workers who do not file claims.

We will use the National Longitudinal Survey of Youth (NLSY), a public-use database sponsored by the United States Department of Labor. Use of the NLSY breaks new empirical ground in two important ways. First, the NLSY is a nationally representative database, containing extensive information on over 4,000 workplace injuries, while previous analyses of workers' compensation filing have been limited to the use of site-, firm-, or region-specific data. Second, the NLSY has longitudinal data on earnings as well as unclaimed injuries, while previous analyses of the adequacy of workers' compensation have been limited to workers who file claims.

This research is within NIOSH's NORA priority area of the Social and Economic Consequences of Workplace Injuries and Illnesses.

Program Area: Social and Economic Consequences of Occupational Injury & Disease (NORA)
Title: Use of Health and Social Services Following Work Injury
Investigator: Harry Shannon
Grant Number: R01 OH007811
Start & End: 9/15/2003-9/14/2005
Affiliation: McMaster University
City & State: Hamilton, OT
Phone: (905) 525-9140

Description:
The main aim of this study is to investigate the health, economic and social consequences of workplace injury for workers and their families, with particular emphasis on mental health and social service utilization. We propose using a linked database of administrative records developed in British Columbia (BC), which includes Workers' Compensation Board (WCB), public insured health services, income assistance and vital statistics records, to investigate the use of health and social services for five years before and after an injury for both workers and their families. These patterns will be compared to selected control groups. The major focus of the study will involve examining: (1) changes and patterns over time in health and social service utilization, and suicide rates for injured workers and their controls, (2) changes and patterns over time in health and social service utilization, and suicide rates for families of injured workers and families of controls, (3) risk factors associated with increased utilization of specific health and social services for injured workers, 4) risk factors associated with increased utilization of specific health and social services for families of injured workers. Outcomes to be examined include changes in, and specific types of uses of (a) physician services,(b) hospital services, (c) income assistance, (d) prescription drugs, (e) continuing care services and (f) mental health care episodes will be explored for workers, their families, and controls. Mortality data, specifically suicide as cause of death, for 1994 to 2000 will also be examined for all groups. A number of potential confounders, such as age, sex and income will be examined for all groups. Worker characteristics such as, age, sex, income, industry or job type, time on job before injury, type of injury (acute or chronic), and WCB costs, length of claim, and occurrence of other claims will also be examined. The substantial economic and social consequences of workplace injury underscore the need to document such consequences and how injuries affect the overall quality of life of workers and their families. By identifying characteristics of workers and their families who are most at risk (increased mental health and social assistance utilization) of being severely affected by a workplace injury, specific interventions can be targeted to provide services to help vulnerable families to better cope with workplace injuries and illnesses.

Program Area: Social and Economic Consequences of Occupational Injury & Disease (NORA)
Title: Social/Economic Impact of Injury/Illness in Career Roofers
Investigator: Laura Welch
Grant Number: R01 OH003699
Start & End: 9/30/2001-9/29/2005
Affiliation: MedStar Research Institute
City & State: Washington, DC
Phone: (202) 877-5466

Description:
We aim to provide a credible measure of the amount of disability, disability retirement, early retirement, and job change caused by injury, illness, and musculoskeletal disease among roofers. We will use standard well-developed survey instruments and techniques to survey union construction workers as they leave their trade and one year later. We will determine the reason for leaving, the nature of injury or illness if present, functional limitations at the time of leaving the trade and again after one year, and the social and economic consequences of that decision. This study will focus on three groups of roofers: (1) those who leave the trade before retiring, at any time in their careers; (2) and those who take early retirement; and (3) those who apply for disability retirement. We will also interview a comparable group of roofers who continue to work for each of these three groups. Specifically we will: (1) Determine what proportion of roofers leave the union before retirement age or retire early, or apply for disability retirement because of work-related injury, work-related disease, or a chronic medical condition; (2) Determine what proportion of roofers who continue to work in the trade have chronic symptoms from a work-related injury, have a work-related disease, or have a chronic medical condition; (3) Describe the social and economic impact of work-related injury and illness or premature retirement due to a medical condition for each of these groups; (4) Evaluate change in measures of social and economic impact over time in the roofers who drop out of the union and those who retire early or on disability; and (5) Assess and describe the impact of work-related conditions and aging on the ability of roofers to remain employed in their trade.

Program Area: Special Populations (NORA)
Title: Effectiveness of Computer-based Safety Training in Vineyard Workers
Investigator: W. Anger
Grant Number: U01 OH008104
Start & End: 9/30/2003-9/29/2007
Affiliation: Oregon Health & Sciences University
City & State: Portland, OR
Phone: (503) 494-2514

Description:
Every year, 6 million Americans suffer an injury or illness on the job, and 1/3 of them lose work time because of it. Worker's Compensation benefits cost companies $41.7 billion per year, and agriculture is one of the most dangerous industry sectors. To prevent such injuries, US corporations spend between $55 and $60 billion per year to provide almost 2 billion hours of training to an estimated 60 million employees, a significant portion of which is directed to employee safety and health. Training is the essential base for teaching workers to work safely and adopt safe work practices, and supervisor training to provide positive feedback reinforces the appropriate work practices (behaviors). This application is proposed by a University based research team and a community-based health clinic (jSalud! of Tuality HealthCare Foundation) serving the Hispanic population working in agriculture, especially vineyards. Building on work in a nursery that produced computer-based training for a Hispanic population with 0-16 years of education, this project will test the hypothesis that: effective and cost-efficient computer-based training coupled with supervisor feedback and contingent reinforcement can produce safe and healthful work practices in Hispanic workers with limited education and no computer experience, and maintain those work practices for a year. The intervention will be introduced in three vineyards but lagged in time to provide an experimental design that controls for history, maturation and sequence effects. Success will be measured by changes in (1) knowledge of appropriate (safe) work practices, (2) directly observed workplace behaviors (checklist), (3) objective strain and physiologic effort (heart rate) measures, (4) workers' compensation claims, and (5) by questionnaires and structured interviews (thus measuring all of Kirkpatrick's 4 levels of training evaluation-- reactions, learning, behavior, and results). In addition, we will develop a program to teach Hispanic farmworkers with a range of education to learn from internet-based training, to evaluate the background education and experience needed to support the skills to complete and learn from internet-delivered training. Finally, the community-based organization (jSalud!) will be taught the skills to develop and evaluate the effectiveness of a training program, and then develop, implement and assess the results using science-based principles and publish the findings.

Program Area: Special Populations (NORA)
Title: Casa A Campo: Pesticide Safety for Farmworkers' Families
Investigator: Thomas Arcury
Grant Number: R25 OH007611
Start & End: 9/30/2001-9/29/2005
Affiliation: Wake Forest University
City & State: Winston-Salem, NC
Phone: (336) 716-9438

Description:
An estimated 4.2 million seasonal and migrant farmworkers and their dependents work across most of the United States. This population is largely minority (90% Hispanic), medically-underserved, and at risk for a variety of environmental health problems. Casa a Campo builds on a community-university partnership that has worked to reduce one environmental health risk, pesticide exposure, among farmworkers in North Carolina (NC). The activities proposed here will expand the scope of work to include members of farmworker families, and enlarge the partnership to include providers of health care to farmworker families, and farmworker advocacy and educational organizations. The Casa a Campo partnership will address 5 specific aims: (1) to conduct research to document knowledge and beliefs about pesticide exposure, document exposure of young children, and document other environmental health concerns of farmworker families; (2) to develop culturally appropriate materials and programs to reduce pesticide exposure among these families; (3) to develop materials and programs to better prepare health care providers to recognize, treat, and prevent pesticide exposure of farmworker families; (4) to increase the capacity of community-based organization to involve the community in the identification, assessment, and reduction of environmental health risks in their own communities. These efforts will be structured by a multi-mode, multi-domain model of community participation developed previously by this group. The model is proactive, designed to encourage and develop community participation in different domains (consultation, strategic planning, implementation) through different modes (partnership Junta Directiva, advisory committee, community forums, research, training of community members, and educating college students from farmworker families).

Program Area: Special Populations (NORA)
Title: Jornaleros Unidos con el Pueblo (Day Laborers United with the Community)
Investigator: Rajiv Bhatia
Grant Number: R25 OH008146
Start & End: 9/30/2003-9/29/2007
Affiliation: San Francisco Department of Public Health
City & State: San Francisco, CA
Phone: (412) 252-3931

Description:
Day laborers represent a socially marginalized community that endures a disproportionate burden of avoidable workplace hazards. The informal, temporary nature of their work and their limited social and economic resources increase the laborers' exposure to hazards and their sensitivity to the consequences of injury and illness. The field of environmental justice recognizes such affected populations have limited opportunities to name problems and inform decisions that affect their lives. This project aims to improve the day laborers' working conditions by increasing their social and economic resources and by influencing changes in the social and structural contexts that contribute to hazardous working conditions. The project builds upon an existing partnership involving San Francisco immigrant day laborers, community organizations and governmental institutions responsible for immigrant worker welfare and utilized assessments conducted and strategies identified by this partnership. More specifically, through adapting a model process of communication/or social change the project will (1) will convene a Community Council as a space for dialogue among day laborers, their employers, community organizations and participating research and governmental institutions based on mutual interests, equitable participation, and the goal for collective action; (2) prioritize, plan, and implement integrated and culturally relevant interventions to reduce workplace hazards; and (3) evaluate the change the collective capacity of day laborers, employers and participating institutions resulting from the process. The proposed Community Council broadens the stakeholders represented in the existing partnership to employers and laborers. The project applies resources and structure to a participatory process of assessment, planning, intervention, dissemination, and evaluation conducted by the Council. Interventions will be implemented that aim to address both hazards faced by day laborers as well as the social factors and institutional structures that influence those hazards. The participatory evaluation will be in place from the beginning of the project implementation and recognizes a distinction between the capacity for achieving change and the actual achievement of change. Outcome indictors will be formulated to reflect changes in hazardous work conditions and their social and structural context and changes in the collective capacity of the community.

Program Area: Special Populations (NORA)
Title: Worker Genetic Susceptibility to Mutagenic Risk
Investigator: Paul Brandt-Rauf
Grant Number: R01 OH004192
Start & End: 7/1/2001-6/30/2004
Affiliation: Columbia University
City & State: New York, NY
Phone: (212) 305-3959

Description:
Special populations at risk for workplace-related health effects include workers with genetic susceptibility to the mutagenic effects of occupational exposures due to inherited variants of metabolizing enzymes. We have previously demonstrated that workers exposed to vinyl chloride (VC) experience an increased frequency of biomarkers of mutagenic damage (mutant ras-p21 and/or mutant p53) in a dose-dependent fashion. At any given dose, however, workers can experience none, one or both of these biomarkers of mutagenic damage, suggesting that there may be inherited differences in VC-metabolizing enzymes that could account for these differences in effect from presumed similar exposures. In fact, genetic polymorphisms in VC-metabolizing enzymes have recently been related to an increased sister chromatic exchange frequency, a non-specific indicator of DNA damage, in VC-exposed workers. The purpose of the current study is to see if genetic polymorphisms in VC-metabolizing enzymes are also related to the more specific biomarkers of mutagenic damage (mutant ras-p21 and/or mutant p53) in VC-exposed workers. Restriction fragment length polymorphism techniques will be used to analyze DNA from sub-groups of VC-exposed workers with none, one or both biomarkers of mutagenic damage but with similar demographic and exposure characteristics for genetic polymorphisms in VC-metabolizing enzymes, and prevalences of the polymorphisms will be compared among the sub-groups. It is anticipated that workers with the polymorphisms will be more likely to have the biomarkers of mutagenic damage than similarly exposed workers without the polymorphisms and thus will be more likely to suffer from the subsequent carcinogenic and other health effects of VC exposure. If this proves to be correct, then such special populations at risk could be targeted for more stringent interventions to help prevent the occurrence of VC-related occupational diseases.

Program Area: Special Populations (NORA)
Title: Biomechanics of Human Reactions to Slip Events
Investigator: Rakie Cham Dit Tham
Grant Number: R03 OH007533
Start & End: 5/1/2002-4/30/2004
Affiliation: University of Pittsburgh
City & State: Pittsburgh, PA
Phone: (412) 647-8050

Description:
Slips and falls accidents have been recognized to be of major importance in occupational health. Epidemiological studies have reported this problem being even more serious among older workers, especially female workers. In light of the aging dynamics of the labor force, the long term goal of this proposed study is directed at reducing slip-precipitated falls among older adults. Specific aims are 1) investigate the differences in gait biomechanics relevant to recovery responses following a slipping perturbation between young/older and male/female adults and 2) examine the effect of slippery surfaces warnings on slip-fall potential and biomechanics of recovery responses. Sixty subjects equally divided by gender and into two age groups will be recruited in this study: "young" between the ages of 20 and 35 years and "older" aged 55 to 70 years old. Each subject will be asked to walk on dry and soapy vinyl tile floors, while varying the extent of the a-proiri knowledge of the floor's contaminant condition (unexpected slippery surfaces, warning of possible slippery conditions, the subject is aware of the slippery condition). Various kinetic and kinematic gait variables will be derived from the ground reaction forces and 3D body motion data recorded at 150 Hz. Those kinetic and kinematic variables will be evaluated at specific times during gait and used as dependent variables in ANOVAs investigating gender, age and warning safety conditions. In summary, this proposed study will provide a better understanding of the reasons for epidemiological findings suggesting increasing incidence of slip-initiated falls among older adults. By understanding the biomechanical reasons for such reports, the results of this study will have direct implications in 1) the development of more effective fall prevention and training programs aimed at improving chances of recovery from slips among older adults and 2) the possible implementation of safety warning guidelines.

Program Area: Special Populations (NORA)
Title: Biomechanics of Slips in Older Adults
Investigator: Rakie Cham Dit Tham
Grant Number: R01 OH007592
Start & End: 8/1/2002-7/31/2005
Affiliation: University of Pittsburgh
City & State: Pittsburgh, PA
Phone: (412) 647-8050

Description:
Slips/falls accidents are among the leading generators of injuries in the workplace, especially among older adults and even more seriously in the female labor force. The aging dynamics of the work force and increasing participation rate of female workers have motivated the long-term goal of this proposed study, that is to reduce slip-precipitated falls among older adults, including older female workers. The specif aims are 1) compare the differences in the biomechanics of human reactions between slip-recovery and slip-fall trials, 2) investigate the impact of age/gender on recovery biomechanics following a slip, 3) examine the effect of slippery surfaces warnings on slip potential and biomechanics of recovery responses and 4) investigate the effect of postural stability and lower extremity physical strength capabilities on recovery biomechanics. Sixty subjects equally divided by gender and into two age groups will be recruited in this study: "young" between the ages of 20 and 35 years and "older" aged 50 to 65 years old. Subjects will walk on dry and soapy vinyl tile floors, while varying the extent of the a-priori knowledge of the floor's contaminant condition unexpected slippery surfaces, warning of possible slippery conditions, the subject is aware of the slippery condition). Various kinetic and kinematic gait variables will be derived from the ground reaction forces and 3D body motion data recorded at 150 Hz. Those kinetic and kinematic variables will be evaluated at specific times during gait and used as dependent variables in ANOVAs investigating gender, age, warning safety conditions, postural stability and lower extremity physical strength capabilities. In summary, this proposed study will provide a better understanding of the reasons for epidemiological findings suggesting increasing incidence of slip-initiated falls among older adults. By understanding the biomechanical reasons for such reports, the results of this study will have direct implications in 1) the development of more effective fall prevention and training programs aimed at reducing slip-precipitated falls among older adults and 2) the possible implementation of safety warning guidelines.

Program Area: Special Populations (NORA)
Title: Pilot Study of Ag-related Injuries Impacting Amish Community
Investigator: William Field
Grant Number: R21 OH007711
Start & End: 9/30/2002-9/29/2004
Affiliation: Purdue University
City & State: West Lafayette, IN
Phone: (765) 494-1191

Description:
Old Order Anabaptist groups, such as the Amish and Old Order Mennonites, are a rapidly expanding agricultural minority with a long-standing presence in the U.S. farming community. However, few consolidated efforts have been identified which document the nature and extent of farm work-related injuries among these groups or address the best injury prevention strategies to impact these communities. This absence of information is particularly problematic because the unique farming practices and socio-religious customs of Old Order groups render many conventional farm safety efforts ineffective. An additional concern that is raised by preliminary studies by the principal investigator indicates a much-higher-than-average percentage of Old Order Anabaptist farm fatalities involving children. The purpose of this exploratory project is to expand the knowledge base regarding the nature of farm injuries and best-practice interventions among Old Order Anabaptist groups. To achieve this, the project team will enlarge Purdue's existing database of farm fatalities among the target population through the use of conventional surveillance methods and a nationwide surveillance of Old Order weekly publications. Purdue will subcontract with Messiah College (Grantham, PA), a leading institution for Anabaptist studies, to review weekly Anabaptist publications that frequently contain farm-related injury reports and to profile the types of agricultural technologies being used in Amish communities. Once sufficient data have been gathered, the project team will construct statistical models and conduct a comparative analysis between farm injuries among the target population and those among the overall farming population. The project team will utilize the database, comparative analysis, and input from the project's consultant committee, comprised of individuals with extensive experience working with Old Order Anabaptist groups, to identify technological and socio-religious factors that contribute to farm injuries, especially to children. As a means of identifying best-practice intervention strategies, the project will again utilize the consultant committee and will facilitate a national symposium on injuries in Old Order communities. Outcomes, in addition to baseline injury data and potential intervention strategies, will include injury prevention information with application to the growing cottage industry within these communities.

Program Area: Special Populations (NORA)
Title: Effects of Aging on the Biomechanics of Slips and Falls
Investigator: Thurmon Lockhart
Grant Number: K01 OH007450
Start & End: 7/1/2001-6/30/2004
Affiliation: Virginia Polytechnic Institute and State University
City & State: Blacksbury, VA
Phone: (540) 231-9088

Description:
Injuries associated with slip and fall accidents pose a significant problem to industry, both in terms of human suffering and economic losses. Existing evidence has identified several aging effects related to slip and fall accidents, yet has not explained determining causes of older individuals' higher likelihood of slip and fall accidents. In this proposal, intrinsic changes associated with aging such as gait adaptation, musculoskeletal and sensory degradation and its effect on the initiation, detection, and recovery processes of slips and falls will be evaluated to answer the question of why older adults are exposed to a higher likelihood of slip-induced falls. The aim of the proposed research is to investigate changes in walking and the ability to recover from slips associated with increasing age. An experiment is proposed to measure how deterioration of lower extremity muscular strength/ activation rate, and sensory functions among older individuals affect several biomechanical parameters under normal and abnormal conditions. Independent variables for the experiment will include; age groups (3 levels - 18-35 years, 40-60 years, and 65 years or over), and floor surfaces (2 levels - oily vinyl tiles and outdoor carpet). Biomechanical parameters measured will include: hamstrings muscle activation rate, horizontal heel contact velocity, friction demands, slip distances, and the joint reactive moments (ankle, knee, and hip). Prior to the experiment, a sensory organization test (SOT) and muscle control test (MCT) will be performed on all subjects to obtain information concerning the proprioceptive, visual, and vestibular functions as well as muscle control (reaction) times. Isometric and isokinetic tests will be performed to evaluate leg strength. It is hypothesized that older adults' musculoskeletal and sensory degradation will constrain the counterbalancing joint reactive moments to reduce segmental motion during recovery from slips and falls, and expose older individuals to a higher likelihood of slip and fall accidents. This information will allow engineers to design better work environments and jobs to reduce the incidence of slips and falls for an aging workforce. Additionally, it will provide information on possible intervention strategies (muscle strengthening and balance exercises) for improving dynamic equilibrium in older workers.

Program Area: Special Populations (NORA)
Title: Removing the HOOA Family Farm Exemption: Impact on Injury
Investigator: Barbara Marlenga
Grant Number: R01 OH008046
Start & End: 9/30/2003-9/29/2006
Affiliation: Marshfield Clinic Research Foundation
City & State: Marshfield, WI
Phone: (715) 389-3021

Description:
This proposal addresses the first priority listed in the RFA: Develop and evaluate new or existing enhanced control technologies and is specifically focused on administrative controls in the form of public policy.

Despite increased national efforts, the problem of childhood agricultural fatalities, injuries, and disability persists. Agricultural safety professionals and child safety advocates are beginning to consider public policy approaches. In the United States, one of the policy considerations is removing the family farm exemption from the Hazardous Occupations Order for Agriculture (HOOA). Before investing resources to initiate such a policy change, it would be helpful to assess its potential impact on the prevention of childhood agricultural injuries.

The purpose of this proposed study, "Removing the HOOA Family Farm Exemption: Impact on Injury," is to systematically apply the HOOA to case descriptions of fatal and non-fatal injuries experienced by farm children in order to determine if the HOOA (if implemented and enforced) might have prevented the occurrence of these injuries. This proposed study will build upon our previous NIOSH grant in which we assembled a large case series (-1000 cases) of traumatic childhood farm fatalities and injuries using existing surveillance data, coroner/medical examiner records, case investigation reports, and national survey data. The case series will be enhanced by additional injury cases from a national minority farmer's survey. The use of "real life" childhood farm injury cases will provide some evidence of the extent to which removal of the HOOA family farm exemption might have reduced the occurrence of these injuries. It will also highlight ages, jobs, and situations that would not be covered by removing the exemption.

Program Area: Special Populations (NORA)
Title: Community Collaboration for Farmworker Health and Safety
Investigator: John May
Grant Number: R25 OH008144
Start & End: 9/1/2003-8/31/2007
Affiliation: Northeast Center for Agricultural Health
City & State: Copperstown, NY
Phone: (607) 547-6023

Description:
The Community Collaboration for Farmworker Health and Safety project will utilize the PRECEDE PROCEED model of health education I intervention to create locally-designed occupational interventions at each of two independent migrant farm worker community sites. The aim is a directly measurable decline in
previously quantitated rates of occupational injury and illness in migrant communities in eastern New York and Maine. The fundamental goals here are: 1) to build an effective coalition of community migrant health programs -Maine Migrant Health Program (MMHP) and Hudson Valley Migrant Health Program (HVMHP); primary care practitioners (PCPs) at each site; and a research team -the Northeast Center for Agricultural Health (NEC). 2) develop and test a process for effective occupational interventions through coalitions. This process would be of great utility to the NEC in stimulating similar interventions at a number of other collaborating sites throughout the Northeast. Central to this project are the efforts of a NEC-based Project Coordinator and of Site Coordinators at each of the community sites. Through their work the project would: 1) dialogue with the migrant community, soliciting community input and identifying leaders to join a project team of workers, employers, PCPs and other stakeholders at each site. 2) following PRECEDE-PROCEED, assist these teams in selecting the most significant occupational health problems challenging the community and devising appropriate interventions for these problems. The teams would draw upon existing local injury data from ongoing NEC epidemiologic studies, upon the injury prevention expertise of the PCP committee members and upon community input to make these determinations. 3) solicit project team and community review and assessment of the process and intervention outcome evaluation data collected by NEC researchers to determine those interventions that proved to be effective. 4) utilize community and coalition resources to both disseminate effective interventions to the migrant and farm community as well as the occupational health community and to permanently embed all or portions of the interventions in local organizations. The proposed project addresses a number of NIOSH's NORA priorities and would lead to ongoing coalition-based intervention efforts with the other ten migrant health programs who are currently collaborating with ongoing NEC migrant farmworker injury epidemiology research.

Program Area: Special Populations (NORA)
Title: Biomarkers of Pesticide Toxicity Among Teen Farmworkers
Investigator: Linda McCauley
Grant Number: R01 OH008057
Start & End: 9/30/2003-9/29/2006
Affiliation: Oregon Health & Sciences University
City & State: Portland, OR
Phone: (503) 494-2501

Description:
Each year, thousands of migrant farmworkers migrate to the Pacific Northwest to harvest berry crops. A great number of these laborers are adolescents-some traveling alone and others working alongside their families in the agricultural fields. These adolescents are exposed to pesticide spray (drift) and residues in the soil and on foliage. However, little scientific evidence is available to determine acceptable levels of pesticide exposure in this vulnerable population. Pesticides are thought to pose a considerably higher biological risk to children than to adults, but little is known about the extent or magnitude of this vulnerability. The potential of neurotoxicity related to chronic low-dose pesticide exposure in children is a major public health concern. Also, there may be risk factors that influence the occupational exposures of youth agricultural workers, and the period of rapid development during adolescence may introduce added risk in areas such as DNA damage related to pesticide exposure. Our interdisciplinary research team will use a cross-sectional, repeated measures design to compare adolescent farmworkers to their adult counterparts and to non-agricultural referent groups in order to: 1) determine differences in exposure to agricultural chemicals with urinary biomarkers of pesticide metabolites, 2) examine the relationship between urinary pesticide metabolites and neurobehavioral performance, and 3) determine age-related differences in pesticide-induced markers of DNA damage and oxidative stress.

Program Area: Special Populations (NORA)
Title: Sustained Work Indicators of Older Farmers
Investigator: Deborah Reed
Grant Number: R01 OH004157
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Kentucky
City & State: Lexington, KY
Phone: (859) 257-9636

Description:
This prospective panel study will focus on the most rapidly aging workforce in the U.S.: the family farmer. This special population is known to suffer one of the highest rates of occupational injury and mortality. Farmers rarely retire from their vocation and work long past usual retirement age. A longitudinal design to track the sustained work patterns of aging farmers and to identify factors that influence their decision to remain in farm work will be used. The specific aims of this study are to:

1. Identify factors that influence the sustained work of older farmers.
2. Develop health profiles (including physical and mental indicators) of older male and female farmers.
3. Develop exposure profiles for tasks related to agricultural work of older farmers.
4. Explore the sociocultural, family and economic factors that influence the work practices and health of older farmers.

The aims are congruent with the "Healthy People 2010" objectives 20.1 and 20.2 to reduce farm worker fatalities and injuries. This study will enroll a partial sample from the Kentucky Farm Family Health and Hazard Surveillance Study (data collected 1994-1996) and their spouses (n=914) and an oversample of African American farmers and spouses (n=914), for a total of 1828 persons enrolled from Kentucky and South Carolina. Measures on sociocultural, health and behavioral, and work environment factors will be collected through six waves of mailed surveys over 50 months. Hierarchical regression analysis will provide a quantitative model of the sustained work of older farmers. Descriptive and predictive analyses will be conducted by gender and race. Focus groups of male farmers, farm women, and farm couples will address items not conducive to survey research. Attachment to farm life and the land, farm enterprise transfer, and the meaning of work will be explored in 18 focus group sessions. Findings from the study will be used to design occupational counseling appropriate to age, gender, and race, as well as health and safety programs for aging farmers.

Program Area: Special Populations (NORA)
Title: Nail Salon Hazards and Health Effects
Investigator: Cora Roelofs
Grant Number: K01 OH007956
Start & End: 9/1/2003-8/31/2006
Affiliation: University of Massachusetts Lowell
City & State: Lowell, MA
Phone: (978) 934-2591

Description:
Nail salon employees are potentially exposed to dozens of recognized chemical hazards including acrylates, solvents, and biocides in dust and vapor form, yet little is known of salon workers' total exposure or work environment conditions. Even less is known about prevalence of health effects in this population of mostly Asian immigrant women workers. We do know that exposure to the chemicals with which they work have been linked to asthma, dermatitis, cognitive dysfunction and reproductive health hazards. Special barriers confront investigators in studying the nail work environment, including the smallness of nail salons businesses and potential language and cultural differences between investigators and salon owners and workers.

The proposed study, by a new investigator, aims to develop methods for a community-based, comprehensive investigation of both the technical and social issues related to the nail salon work environment and health hazard prevalence in salon workers. Through consultation with a Research Advisory Group, site visits to salons, and in-depth and relationship-building interviews with stakeholders, the investigator will) design an exposure assessment strategy appropriate to the evaluation of nail salon work environments; 2) design a survey to assess occupationally-related health effects in nail salon workers; 3) pilot the exposure assessment strategy and health effects survey to evaluate feasibility and validity; 4) assess the social context of occupational health issues as they relate to nail salon work; 5) determine access strategies and build relationships to facilitate this project and a larger-scale study.

Program Area: Special Populations (NORA)
Title: Evaluation of Occupational Carrying Tasks for Farm Youth
Investigator: Charles Schwab
Grant Number: R01 OH008058
Start & End: 9/1/2003-8/31/2006
Affiliation: Iowa State University
City & State: Ames, IA
Phone: (515) 294-4131

Description:
This project addresses priority areas 7 and 13 of the National Occupational Research Agenda. Injuries to farm children are unique because of the types of tasks involved, the developmental issues regarding the etiology of the injury, and the potentially severe consequences of the injury. Parents often begin to involve their children in agriculture by assigning them farm maintenance and livestock feeding activities because they are deemed safer than the more complex and hazardous operation of tractors and field equipment or having direct contact with livestock. These tasks may require children to carry loads that are proportionally large and/or heavy and are often unilaterally loaded. There are currently no data available to help parents gage the risks associated with these tasks or to identify appropriate carrying procedures or limits based on the developmental level of their children. This project addresses the following research questions: (1) Does a five-gallon bucket (the container most commonly used in agricultural work settings) inappropriately force children to alter posture to accommodate the dimensions of the bucket? (2) Does this postural adjustment adversely affect the loading on upper extremity joints and the spine? (3) Will joint loading be lower using a smaller container (one-gallon) that minimizes postural adjustments? and (4) Will joint loading and postural adjustment be decreased when a load is distributed bilaterally in smaller dimension containers (i.e., carrying a bucket in each hand)? The goal of this project is to investigate potential risk factors for farm children performing occupational carrying tasks to make recommendations regarding the loading (unilateral vs. bilateral) and the container size used for performing these tasks. In support of this goal, the following objectives have been established: (1) recruit subjects (both male and female) representative of rural Midwest farm youth; (2) collect anthropometric, kinematic, and kinetic data from the subjects following established experimental protocols; (3) reduce data for further analysis by calculating 3-dimensional segment orientations and joint angles, differentiating the angles to obtain angular velocities and accelerations; (4) combine the kinetic, anthropometric and kinematic information to calculate joint moments, reaction forces and joint powers using a computer model developed previously in the Iowa State Biomechanics Laboratory; (5) analyze joint moments and powers for carrying tasks using a large and small container with unilateral loading, and using small containers with bilateral loading; (6) develop recommendations addressing the loading condition and the container size for occupational carrying tasks performed by youth; (7) develop educational materials and curriculum based on the recommendations targeting farm parents, farm youth, and safety educators; and (8) disseminate the results of the project.

Program Area: Special Populations (NORA)
Title: Health Disparities Among Health Workers
Investigator: Craig Slatin
Grant Number: R01 OH007381
Start & End: 9/30/2000-9/29/2005
Affiliation: University of Massachusetts
City & State: Lowell, MA
Phone: (978) 934-3291

Description:
Socioeconomic position (class, gender and ethnicity), is inversely associated with risk of morbidity and mortality due to various conditions. Some of these are not immediately life-threatening but have a major impact on health quality of life, affecting the physical and social functional capacity of a substantial proportion of the population. These include musculoskeletal disorders, various types of acute injury (both intentional and unintentional), and mental health conditions. All three of these have been associated with environmental conditions in the workplace, which themselves show a marked socioeconomic gradient because of widespread occupational segregation. We propose to examine the work environment as a primary mediator of the effect of socio-economic position on population health. The study will involve a combination of quantitative and qualitative data and will support a contextual analysis, set within a broader ecological and political theoretical framework. Multiple data sources will be used to evaluate job features such as physical load (e.g., heavy lifting), shift work, high psychological job demands coupled with low decision autonomy, and threat of interpersonal violence; and facility-wide characteristics such as adequacy of staffing, management commitment to occupational health and safety programs, and policies concerning gender and racial discrimination and sexual harassment. Morbidity will be assessed by survey instrument as well as from facility records of absenteeism, work-related injury and illness, and compensation claims. In a series of three panel surveys, we will seek to maximize the number of subjects responding more than once, to permit longitudinal analysis. An outcomes sub-study will sample employees reporting health problems at baseline, additional information about their health and employment status will be sought about two years later. By conducting the study in multiple facilities and job groups, it will be possible to compare the effects of job-and individual-specific exposures as well as the effect of different management policies and workplace climates that have the potential to determine the magnitude and impact of hazardous exposures. The study will be conducted within the health care industry, which employs a large proportion of the working population in Massachusetts (and nationally) and is an increasingly important employer of minority workers. This workforce has substantial variability in socioeconomic status, gender, and ethnicity and is exposed to a variety of known health and safety hazards at work. This setting should provide an adequate multidimensional range of facts to permit a meaningful examination of physical and social/behavioral risks and the complex pathways that produce disparities in population health status.

Program Area: Special Populations (NORA)
Title: Occupational Health of Immigrants Working in Restaurants
Investigator: Jenny Tsai
Grant Number: R03 OH007840
Start & End: 9/1/2003-8/31/2005
Affiliation: Seattle University
City & State: Seattle, WA
Phone: (206) 296-5679

Description:
The eating and drinking (E&D) industry is the third largest employment sector in the United States; and restaurant workers make up the largest proportion of E&D workers. It is estimated that E&D workers sustain more than 5 percent of reported nonfatal injuries nationwide. Washington State reports even higher rates with a 7.6% injury rate in 1999. The E&D industry, and in particular the restaurant industry, is one of the most common workplaces for Chinese immigrants. The primary purpose of this feasibility study is to explore and analyze the occupational experiences of Chinese immigrants who work in restaurants, with specific emphasis on work-related injuries and illnesses. The specific aims are to: (1) identify and describe the types of occupational injuries and illnesses that occur among Chinese immigrant workers; (2) describe Chinese immigrant restaurant workers' perceptions about work-related hazards and risks; (3) examine these workers' occupational health and safety knowledge related to such things as regulatory requirements, worker protection, and safe work practices; (4) identify individual and contextual factors influencing the occupational experiences of these workers; and (5) determine the optimal way to collect valid and reliable data about occupational hazards and risks among Chinese immigrant workers. The participants for this study will consist of a purposive sample of 20 Chinese immigrants whose primary employment is in the restaurant industry. Inclusion criteria include: (1) born in China, Taiwan, or Hong Kong; (2) over 18 years of age; (3) speak Chinese, Taiwanese, or English; and (4) have been working in restaurants for at least 6 months. An ethnographic approach that includes semi-structured interviews and participant observation will be used. The interviews will be used to learn about the participants' work-related experiences and to explore their knowledge and perceptions about occupational hazards and risks. The participant observation will be used to generate new questions and to supplement the information collected during the interviews. Additional, a Demographic and Immigration Questionnaire will be used to collect demographic and immigration data, and a Demands of Immigration Scale will assess distress associated with the demands of immigration. A qualitative software program (HyperRESEARCH) will be used for data management. An ecological framework will be used to guide interview questions and analysis for this study; this framework provides a means to identify the full range of factors that affect the participants' occupational experiences.

Program Area: Special Populations (NORA)
Title: Adherence to the NAGCAT and Injury Risk Reduction
Investigator: John Wilkins III
Grant Number: R01 OH008070
Start & End: 9/30/2003-9/29/2006
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 293-3923

Description:
In 1999, the North American Guidelines for Children's Agricultural Tasks (NAGCAT) were published. Based on expert opinion and child development theories (but not empirical evidence), the Guidelines are intended to help parents (and other adult caregivers) in assigning developmentally-appropriate jobs to youth 7-18 years of age who work in agriculture. The effectiveness of these guidelines has yet to be fully evaluated -especially in regards to their work-related injury risk reduction potential.

The overarching goal of the proposed research is to evaluate the effectiveness of the NAGCAT as an approach to the primary prevention of childhood agricultural injury. We are therefore proposing to conduct a randomized controlled trial having an experimental time series design, permitting a rigorous test of NAGCAT's effectiveness. We expect our findings to provide informative evidence-based answers to the following questions. First, to what extent can compliance with the NAGCAT be maximized through a theory-based dissemination strategy? Second, to what extent can compliance with the NAGCA Tactually reduce the risk of work-related injury among youth exposed to agricultural hazards? Third, to inform future NAGCAT dissemination efforts, what parental characteristics are most strongly associated with maximal compliance?

Our hypothesis is that hazard-exposed youth in households who receive messages about the NAGCA T based on Protection Motivation Theory will exhibit greater compliance/conformity to the NAGCAT and lower injury rates than youth in control households. Specific Aims are:
1. Quantitatively assess the extent to which youth working conditions and safety behaviors are in compliance/conformity with the NAGCAT.
2. Evaluate the effectiveness of a dissemination strategy based on Protection Motivation Theory in terms of changes in youth working conditions and safety behaviors.
3. Quantify risk of work-related Injury among a sample of youth exposed to agricultural hazards.
4. Taking into account the experimental time series design of the proposed study, conduct statistical analyses to evaluate the functional relationship between adherence to the Guidelines and work-related injury risk.
5. Identify parental characteristics and attitudes that most strongly predict high compliance/conformity with the NAGCAT.

Program Area: Special Populations (NORA)
Title: Childhood Agricultural Trauma Evaluation System
Investigator: Allan Williams
Grant Number: R01 OH004265
Start & End: 9/30/2000-9/29/2004
Affiliation: Minnesota Department of Health
City & State: Minneapolis, MN
Phone: (612) 676-5105

Description:
Agriculture is one of the most hazardous occupations in the United States, and rural adolescents are at significant risk of agricultural- and work-related injury and asthma. Based on U.S. Census Bureau estimates, approximately 100,000 adolescents between 14 and 18 years old reside in rural Minnesota, and may be at risk for agricultural injuries and asthma. This study will use new surveillance methods to address the issues relevant to these adolescent injuries and asthma. The specific aims are to: (1) determine the magnitude and scope of agricultural injuries and asthma among 9th to 12th grade students in four different agricultural regions in Minnesota; (2) describe the change in rural work exposures in these adolescents in terms of total work hours, and hours worked between agribusiness, traditional family farming and non-farm work; (3) evaluate the reliability of adolescent self-reported information about agricultural and work exposures, and injury experiences; and (4) use a cohort analysis to calculate risk factors for injuries and to facilitate planning for future prevention activities. An advisory group consisting of professionals in public health, agricultural education, school administration and others will assist in meeting these aims. Using a stratified cluster design with agricultural region as strata and schools as the cluster, a sample of 32 rural schools will be selected and recruited to participate in this study. Data on demographics, work hours and hazards, and injury risk factors will be collected from the entire student body through a self-completed questionnaire administered to each student a total of four times over a two-year period. Injury incidence and asthma prevalence rates will be calculated to determine the degree of variability on both a seasonal and yearly basis. Information will also be collected to determine the number and type of agricultural and work-related injuries that occur to rural adolescents across a spectrum of farming activities. Data also will be used to analyze this open (dynamic) cohort for potential risk factors.

Program Area: Special Populations
Title: Community Health Intervention with Yakima Agricultural Workers
Investigator: Matthew Keifer
Grant Number: R25 OH008143
Start & End: 9/1/2003-8/31/2007
Affiliation: University of Washington
City & State: Seattle, WA
Phone: (206) 616-1452

Description:
The primary purpose of this project is to develop a permanent partnership that will empower the Hispanic agricultural worker community in the Yakima Valley, Washington State, to effectively identify, characterize and respond to the many occupational and environmental risks they face. The target population is the seasonal and migrant agricultural workers in the middle Yakima Valley. The Northwest Community Education Center/Radio KDNA, Heritage College, the Yakima Valley Farm Workers Clinic, and the University of Washington will partner in this multi-disciplinary project. This project will organize and sustain a community advisory board (CAB) comprised of unions, church groups, community members and other representative community groups. Through the guidance of the CAB a community process will develop a prioritized research and action agenda. The activities of the project will use a participatory action research (PAR) approach as a means to obtain new perspectives and an ecological framework to identify and prioritize occupational and environmental health stressors. The plan will include frequent community communication and education, an interactive evaluation process, curriculum development for Heritage College students and ConneX summer trainees and further data collection by students and community members. Technical expertise will be tapped from the University of Washington Schools of Nursing and Public Health and Heritage College. Preliminary data collection will support the development of new research proposals. The products of this process will be a sustainable community-academic-clinical partnership, an empowered cadre of young people from the community and improved occupational and environmental health for Hispanic agricultural workers.

Program Area: Surveillance Research
Title: Building Environmental Epidemiology Capacity at the State Level (CSTE)
Investigator: Donna Knutson
Grant Number: U01 CC007277
Start & End: 9/30/1991-9/30/2005
Affiliation: Council of State and Territorial Epidemiologists
City & State: Atlanta, GA
Phone: (770) 458-3811

Description:
This project responds to a CSTE position statement that was adopted in 1995. This CSTE position statement recognized the need for, "the facilitation of state health department activities in the prevention of occupational disease by coordinating multi-state preventive programs, by facilitating communication among state/territorial health departments, and facilitating information sharing between the academic community and state/territorial health departments."

CSTE and its member-leaders, in partnership with CDC and other public and private health agencies, will accomplish the following:

1. CSTE will co-lead the facilitation to develop and publish of a model set of indicators with which to define and quantify indicators for occupational health surveillance for use by and with state departments of public health.
2. CSTE will continue to provide education regarding occupational health surveillance and the indicators development, proper use of indicators and the progress of the project to decision makers at the state and federal level when asked.
3. CSTE will provide information about the indicator development process and progress through regular with members.
4. CSTE will hold two, two-day, hands-on session for states and partners to participate in the indicators development process.
5. CSTE will link with CDC's National Institute for Occupational Safety and Health and state's websites to provide members with easily accessible documents outlining information, the indicators process and other projects in development for their use.
6. CSTE will guarantee access to member-leaders or staff to attend developmental meetings, update sessions, and stakeholders meetings. With this structure, CSTE will be able to provide "experts on call" to CDC and other agencies for critical state input.
7. CSTE will continue to provide training for the ABLES and SENSOR states through planning and coordinating the ABLES/SENSOR conference in conjunction with the annual CSTE conference.
8. CSTE will collaborate with the National Center for Environmental Health and NIOSH to formulate plans for training and capacity development for environmental health and occupational health.

Program Area: Surveillance Research
Title: Maine; Occupational Safety Core Surveillance Indicator Program
Investigator: Kim Lim
Grant Number: U53 CC122293
Start & End: 9/30/2002-9/29/2005
Affiliation: Maine Department of Labor
City & State: Augusta, ME
Phone: (207) 624-6443

Description:
The Maine Department of Labor (MDOL) intends to enter into a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH) to develop and implement a state based surveillance program. The proposed surveillance program will compile data on 13 core surveillance indicators. These core indicators have been established by federal and state representatives to reflect a minimum set of conditions for a state-based surveillance initiative. The 13 core surveillance indicators were identified and developed by the State/CSTE/NIOSH Occupational WorkGroup.

The following are the objectives of the program:

1. Identify and establish contact with relevant advisory groups.
1b. Compile data on the 13 core indicators.
1c. Evaluate and assess data needs.

2. Data analysis on the 13 core indicators.
2b. Identify three core indicators for in-depth epidemiological study.

3. Develop an epidemiological report on the three core indictaors.
3b. Identify data gaps.
3c. Produce final report.

Program Area: Surveillance Research
Title: Core: Occupational Health Surveillance in Michigan
Investigator: Lorraine Cameron
Grant Number: U01 OH007306
Start & End: 9/30/2000-9/29/2004
Affiliation: Michigan Department of Community Health
City & State: Lansing, MI
Phone: (517) 335-8350

Description:
This application to NIOSH would secure funding necessary to establish occupational health surveillance as an integral part of the public health disease and injury prevention system in Michigan. This is achieved by strengthening the core public functions in occupational health: surveillance, policy development, intervention and infrastructure within established and developing occupational health systems in the state. The specific aims of this project are: 1) Ensure that occupational health data are regularly and systemically collected, assembled, analyzed and made available. 2) Institutionalize an infrastructure for occupational health across Michigan's public health and occupational health regulatory system, in partnership with stakeholders and the concerned public. 3) Increase the level of occupational disease and injury prevention activities in the state. 4) Develop a model occupational health surveillance core program that can be used or adapted in other states, especially, in the 23 states that have a state-based OSHA program. A strategic planning process will identify priority areas for surveillance and resources to address these areas. Pesticide poisoning surveillance will be piloted first as a known priority area for several state agencies and for the public.

Program Area: Surveillance Research
Title: Core: Surveillance Model Program in California
Investigator: Robert Harrison
Grant Number: U01 OH007307
Start & End: 9/30/2000-9/29/2004
Affiliation: California Department of Health Services
City & State: Oakland, CA
Phone: (510) 622-4404

Description:
The Occupational Health Branch (OHB) of the California Department of Health Services (CDHS) proposes to develop and implement a core state-based surveillance model program for the prevention of targeted workplace diseases, injuries and hazards. A multi disciplinary staff at the OHB currently conducts surveillance and investigation of multiple work-related diseases and injuries, including asthma, pesticide illness, carpal tunnel syndrome, selected fatal injuries and lead poisoning. In addition, we propose to add silicosis and selected nonfatal injuries as core surveillance activities. We propose several innovative approaches that will enhance our previous surveillance activities: (1) all conditions that are recommended as "core" public health activities by the State-NIOSH Surveillance Work Group will be placed under surveillance; (2) our surveillance model will use multiple data sources - including electronic reporting through a new Workers Compensation Information System - that can be replicated in other States; (3) our condition-specific surveillance systems will be integrated through a core surveillance database that can serve as a useful tool for targeting industries for in-depth intervention activities; and (4) we will conduct a broad-based intervention in the construction industry based on multiple endpoint surveillance data. Our approach relies on the linking of surveillance data with intervention and prevention efforts to integrate occupational health into mainstream public health. The successes and lessons learned from these activities will be distilled to assist NIOSH in recommending a model for core occupational health surveillance that can be undertaken in other States. For each core condition under surveillance, we will conduct efficient case finding using existing NIOSH and/or CSTE case definitions, and employ standardized databases and coding systems to collect, analyze and report aggregate data to NIOSH. Using established guidelines for prioritizing cases for follow-up, we will perform hazard surveys and workplace investigations for purposes of targeted prevention activities. We will use a variety of means to disseminate our scientific findings and prevention recommendations, including the preparation of a surveillance annual report and articles for scientific publication. The project will develop and implement broad-based, industry-wide intervention activities that address simultaneously multiple health and safety hazards identified through the core surveillance system. Construction will be targeted as the focus of the intervention component, which will be identified, developed and implemented in a collaborative process with key stakeholders. We will evaluate aspects of this model core surveillance system including the function of endpoint-specific surveillance systems, utility of the aggregate database for targeting industries and occupations, feasibility of replicating the model in other States, and process of working with stakeholders to develop and implement interventions.

Program Area: Surveillance Research
Title: Core: Surveillance of Occupational Health in New York
Investigator: Kitty Gelberg
Grant Number: U01 OH007308
Start & End: 7/1/2001-6/30/2005
Affiliation: New York State Department of Health
City & State: Troy, NY
Phone: (518) 402-7900

Description:
New York, with the assistance of the SENSOR and ABLES programs, has established a structure for occupational disease surveillance and follow-up in New York State. Provisions of the New York State (NYS) Public Health Law mandate the reporting of a number of occupational conditions in NYS. Since 1981, the New York State Department of Health, Bureau of Occupational Health (BOH) has operated a Heavy Metals Registry for the reporting of cases of lead, mercury, arsenic, and cadmium poisoning, and an Occupational Lung Disease Registry for the reporting of cases of work related lung disease. Since 1991, BOH has operated a Pesticide Poisoning Registry and receives reports from healthcare providers of suspected pesticide poisonings. While all of these registries are operational, the extent to which there is active surveillance, with aggressive case finding, ascertainment and follow-up, varies. There are a number of reasons for this variability, including differences in how the diseases are diagnosed and the different reporting sources for the various registries. Additional federal resources will permit us to build upon existing reporting laws and infrastructure and expand current surveillance efforts to help us achieve the NIOSH standards for a model core surveillance system for a range of significant occupational conditions. We propose to conduct general surveillance of existing databases available to the Department of Health such as death certificates and hospital discharge data to assist with documenting the magnitude of occupational injuries and illnesses in New York, and to identify trends and industries occupations at elevated risk. Focus will be primarily upon upgrading our Occupational Lung Disease Registry; however, we will also focus more attention on conducting educational outreach for all of our registries.

Program Area: Surveillance Research
Title: Enhanced Surveillance of Occupational Injuries to Youth < 18
Investigator: Letitia Davis
Grant Number: U01 OH007301
Start & End: 9/30/2000-9/30/2004
Affiliation: Massachusetts Department of Public Health
City & State: Boston, MA
Phone: (617) 624-5621

Description:
Each year in the U.S. more than 200,000 youths are injured on the job and at least 70 are killed. In 1996, young workers were recognized as a Special Population and a national occupational research priority. The Massachusetts Department of Public Health (MDPH) has likewise identified the prevention of occupational injuries to youth as a public health priority. In 1992, MDPH passed regulations requiring physicians and hospitals to report occupational injuries to youth less than 18-years-old. Since that time, MDPH has worked, with support from NIOSH, to establish a model, comprehensive surveillance and intervention system for occupational injuries to youth. Multiple data sources including workers' compensation records, emergency department (ED) reports, and hospital discharge data are used for case ascertainment, follow-up interviews with injured teens are conducted, and surveillance findings are used to target work site interventions and broad-based prevention activities.

MDPH proposes to continue and enhance the Massachusetts Surveillance System for Occupational Injuries to Youth and as a new initiative, to provide guidance to other states in implementing the model. Specific aims of this proposal are to: (1) Maintain and enhance case ascertainment using multiple data sources to identify sentinel cases and generate meaningful summary data; (2) Conduct timely follow-up interviews with injured youth in order to fully characterize the cases and target work site interventions; (3) Plan, conduct and foster intervention and prevention activities to reduce the risk of occupational injuries to youths in targeted workplaces, industries, and communities; (4) Analyze and disseminate surveillance data to promote prevention activities and to continue ongoing evaluation of the surveillance system; (5) Maintain and enhance collaboration between relevant government agencies and among public health practitioners in Massachusetts; and (6) Provide guidance to other states in implementing the model. Proposed enhancements of the model include: (a) expanding the number of EDs reporting cases to obtain a statewide representative sample of EDs; (b) evaluating use of alternative sources of state employment data in calculating occupational injury rates; (c) piloting the use of self-administered follow-up questionnaires to increase follow-up capacity; and (d) refining and documenting protocols for conducting research oriented workplace investigations of non-fatal incidents and disseminating incident reports. MDPH will also obtain input from states in the northeast and produce a "how-to" guide for surveillance of work-related injuries to youth that may be used by other states across the country.

Program Area: Surveillance Research
Title: Enhancement of NC State-Based Occupational Surveillance
Investigator: Kathleen Buckheit
Grant Number: U53 CC422294
Start & End: 9/30/2002-9/29/2005
Affiliation: North Carolina Department of Health and Human Services
City & State: Raleigh, NC
Phone: (919) 715-6422

Description:
This project proposes to develop integrated, comprehensive surveillance activities that can accurately identify occupational illnesses and injuries, enable North Carolina (NC) to prioritize the health issues, develop appropriate interventions, and provide accurate data to the national databases.

The objectives include:
1. Enhancing the current, limited occupational safety and health surveillance program within the Occupational and Environmental Epidemiology Branch, Epidemiology Section, NC DHHS.
2. Establishing an advisory committee from interdisciplinary agencies and professional associations;
3. Surveying and evaluating the various existing injury and illness databases in North Carolina;
4. Identifying gaps in the information currently collected;
5. Developing of a comprehensive state-based surveillance infrastructure that will be compatible with the National Electronic Disease Surveillance System (NEDSS); and
6. Identifying and developing appropriate interventions needed to reduce occupational injuries and illnesses based on the new data collected and recommendations of the advisory committee.

Various types of illness and injury data are compiled by various organizations and agencies. The majority is collected by the NC Department of Labor (DOL), Bureau of Labor Statistics (BLS) and the NC Industrial Commission. The nature of the reporting criteria may result in significant under-reporting. The NC DOL does not capture data from every industry or facility, only those chosen by SIC Code or high incidence rates in the past. The Industrial Commission only captures those injuries and illnesses that are reported as a Workers' Compensation claims.

As part of the state's bioterrorism preparedness efforts, NC is in the process of developing databases that will capture data from health care facilities across the state. While these databases will increase the sensitivity of public health epidemiologic surveillance, these same databases will also capture data on the subset of individuals treated for occupational injuries and illnesses. We can then develop this new comprehensive database to be compatible with NEDSS.

Program Area: Surveillance Research
Title: FACE: Alaska
Investigator: John Middaugh
Grant Number: U60 CC007089
Start & End: 9/1/2001-8/31/2006
Affiliation: Alaska Department of Health and Social Services
City & State: Anchorage, AK
Phone: (907) 269-8054

Description:
The State of Alaska, Department of Health & Social Services, Division of Public Health, Section of Epidemiology provides direction and leadership in occupational injury control and prevention strategies in Alaska. This proposal, titled Alaska Fatality Assessment and Control Evaluation (FACE) will assist the State to continue to build the State's capacity for conducting traumatic occupational injury surveillance. The goal of this proposal is to reduce traumatic occupational injury and death in Alaska and throughout the nation by conducting occupational fatality surveillance on-site investigations, and developing and disseminating hazard prevention strategies. This work will - (1) identify work environments that place workers at high risk for fatal injury using a "real-time" reporting, multi-agency surveillance system; (2) identify potential risk factors by conducting on-site investigations on specific traumatic occupational fatalities; (3) develop and evaluate prevention strategies for reducing the incidence of traumatic occupational injuries and fatalities in Alaska; (4) contribute to the collaborative efforts of Federal, State, and private agencies/organizations for the development of effective regional and state-based occupational injury prevention and intervention activities. A project manager/field investigator will be employed to facilitate development of the multiple source state-level surveillance database and conduct epidemiologic analysis. Detailed recommendations for the prevention of workplace injuries, safety training, and engineering solutions and to facilitate a collaborative multi-agency, multi-organization approach to develop prevention priorities and efficient use of State and Federal resources. Data from surveillance will be maintained in a computerized database that will be used for descriptive epidemiologic studies, prioritizing prevention efforts, monitoring trends, and report generation.

Program Area: Surveillance Research
Title: FACE: California
Investigator: Robert Harrison
Grant Number: U60 CC907284
Start & End: 9/1/2001-8/31/2006
Affiliation: California Department of Health Services
City & State: Oakland, CA
Phone: (510) 622-4404

Description:
The Occupational Health Branch (OHB) of the California Department of Health Services (CDHS) proposes to continue to build on our existing capacity in California for conducting traumatic occupational fatality surveillance, investigation and intervention activities using the fatality assessment and control evaluation (FACE) model. The objectives of the proposed California FACE (CA/FACE) program are to identify work environments that place workers at high risk for fatal injury; identify the risk factors for these fatal injuries; and develop, disseminate and evaluate prevention strategies. Through an in depth analysis of data on interactions of the worker, the work environment, and work processes, the ultimate goal of the CA/FACE program is to reduce the burden in California of traumatic occupational fatalities through the development of effective prevention measures. We seek to build upon our past experience in state-based fatality surveillance to increase the base of knowledge to prevent work-related injury deaths in California in the currently identified priority areas, as well as other occupations that we may identify as a result of data analysis or new prevention opportunities. Our long range goals are to develop prevention/intervention strategies aimed at reducing fatal injuries in the workplace. We propose a balanced program that includes occupational fatality surveillance, field investigation of priority category fatalities, and development and dissemination of preventive strategies. Specifically, we propose to continue to 1) implement a multisource surveillance system to identify all traumatic occupational fatalities occurring within a specific region (Los Angeles County) in a timely fashion to allow investigation of targeted fatalities. We will continue to utilize established data management and quality control systems to ensure timely reporting of required data elements to the NIOSH Data Center in a uniform and compatible format. 2) conduct on-site investigations of specific traumatic occupational fatalities using the NIOSH FACE investigative model. Our protocol with specific criteria and rationale for the selection of on-site investigations will continue to be employed. 3) develop and evaluate prevention strategies for reducing the incidence of traumatic occupational injuries and fatalities at the State level. Prevention strategies will include dissemination of our findings and prevention recommendations through hazard alerts (FACE Facts), publication of reports on the CA/FACE Web site, and publication of a scientific publication summarizing our data and selected investigations to date.

This application for funding is for a continuation of the Fatality Assessment & Control Evaluation (FACE) program run by the Occupational Health Branch of the Los Angeles County State Department of Health Services, which has been in existence since 1992.

Program Area: Surveillance Research
Title: FACE: Iowa
Investigator: Patricia Quinlisk
Grant Number: U60 CC708674
Start & End: 9/1/2001-8/31/2006
Affiliation: Iowa Department of Public Health
City & State: Des Moines, IA
Phone: (515) 281-4941

Description:
The Iowa Fatality Assessment and Control Evaluation Program (FACE) is a program carried out by the University of Iowa Department of Occupational and Environmental Health under a subcontract with the Iowa Department of Public Health using funds provided by the National Institute for Occupational Safety and Health (NIOSH). Dr. Patricia Quinlisk of the Iowa Department of Public Health is the FACE Program principal investigator. Dr. Craig Zwerling and Mr. John Lundell, both with the University of Iowa, are co-principal investigators working in conjunction with the Iowa Department of Public Health. The FACE program collects basic information on all occupational fatalities in the state of Iowa and performs in-depth studies of specific types of fatal injuries, currently focusing on highway workzone and machinery-related fatalities. The goals of these investigations are to identify workplace fatalities and to alert employers, employees, and farmers about these risks.

Program Area: Surveillance Research
Title: FACE: Kentucky
Investigator: Patricia Williams
Grant Number: U60 CC409879
Start & End: 9/1/2002-8/31/2006
Affiliation: Kentucky Cabinet for Health Services
City & State: Frankfort, KY
Phone: (502) 564-9592

Description:
Nine-hundred forty-eight occupational fatalities were identified and recorded by the Kentucky Fatality Assessment and Control Evaluation (FACE) project between 1994 and 2000, an average of 135 per year. Kentucky's fatality rate is 7/100,000 compared to a national rate of 5/100,000. The FACE project has been contracted to the Kentucky Injury Prevention and Research Center at the University of Kentucky to develop and maintain an active and timely surveillance system, conduct on-site investigations and disseminate key findings to public health audiences, employers, workers, agricultural groups and the academic community.

The proposed project will build upon past successes and maintain a balance between surveillance, field investigations and the development and dissemination of interventions to reduce the occupational fatality rate in the Commonwealth. Specifically, this will allow us to identify work environments at high risk for fatal injury, identify risk factors for fatal injuries, and quickly respond to emerging issues. Collaborations and agreements with reporting agencies and organizations will continue to result in quick notification of cases and allow for rapid analysis of the data to uncover new issues in traumatic occupational fatalities. The multi-source case identification system and periodic reconciliation with the Census of Fatal Occupational Injuries assures a comprehensive system sensitive enough to identify cases missed through other data sources. The proposed project will build on this and attempt to further improve the timeliness of case identification. Twelve on-site investigations of machine related cases, roadway construction incidents and cases involving persons less than 18 years will be conducted during the year. Reports will be written in the NIOSH FACE format and disseminated to those in a position to effect change. An extensive analysis of the FARS and FACE linked data set to understand risk factors associated with motor vehicle occupational fatalities will be completed. We will also conduct a qualitative data analysis of case report narratives to create coded data for analysis of factors contributing to fatalities. A comprehensive evaluation of the surveillance, investigations and dissemination is planned.

Program Area: Surveillance Research
Title: FACE: Massachusetts
Investigator: Letitia Davis
Grant Number: U60 CC108704
Start & End: 9/1/2001-8/31/2006
Affiliation: Massachusetts Department of Public Health
City & State: Boston, MA
Phone: (617) 624-5621

Description:
Traumatic occupational fatalities continue to be a significant public health problem in Massachusetts as they are throughout the United States. Each year in Massachusetts approximately 70 workers are fatally injured at work. Information about the work settings and the specific circumstances in which these deaths occur is essential to develop effective prevention measures at the national and state levels. Since April 1990, the Massachusetts Department of Public Health (MDPH) has participated in the NIOSH Fatality Assessment and Control Evaluation (FACE) project. This project enabled MDPH to build the Massachusetts surveillance system for fatal occupational injuries, to increase understanding of risk factors leading to fatal events through investigations of targeted fatalities, and to undertake activities to prevent fatal occupational injuries in the Commonwealth.

MDPH proposes to continue and enhance the Massachusetts FACE project. The overall goal of the project is to reduce the incidence and accompanying human and economic burden of work-related fatalities in the state. Specific aims of the project are: (1) To maintain the current case ascertainment system for timely identification and collection of data to identify work environments that place workers at risk of fatal occupational injuries in Massachusetts; (2) To conduct in-depth, on-site investigations of targeted fatalities using FACE investigative methods to identify risk factors for fatal occupational injuries; (3) To disseminate information on high risk work environments, workplace risk factors and preventive measures to stakeholders who could intervene in workplaces throughout the state; and (4) To develop, implement, and evaluate targeted prevention strategies focusing on specific industries, groups of workers or hazards.

Program Area: Surveillance Research
Title: FACE: Michigan
Investigator: Deborah Grether
Grant Number: U60 CC521205
Start & End: 9/30/2002-9/29/2006
Affiliation: Michigan Department of Consumer and Industry Services
City & State: Lansing, MI
Phone: (517) 322-1817

Description:
Every other day, on the average, a Michigan worker dies from a work-related fatality. We propose to expand an epidemiologic surveillance system for workplace fatalities, conduct selected onsite investigations and develop prevention strategies to minimize the risk of future occurrences. We will follow the guidelines of the National Institute for Occupational Safety and Health (NIOSH) Fatality Assessment and Control Evaluation (FACE) program. Since 1983 NIOSH staff, and since 1989, state personnel have conducted FACE investigations for selected fatalities. The methodology for conducting surveillance, approaching employers to maximize cooperation for the investigations, minimizing duplication with OSHA fatality investigations, collecting information during the fatality investigations and sharing information among states and NIOSH has already been developed. In three of the states with FACE programs, the program is located at a state university. We plan to contract out the proposed activity in Michigan to two state universities. We will ensure that information useful for preventing additional fatalities is widely disseminated. Names of employers, victims and/or witnesses will be kept confidential. Dissemination of the information will include: (1) Sharing the data with NIOSH for inclusion in a national data base and national publications (ie. NIOSH Alert-Preventing Worker Deaths from Uncontrolled Release of Electrical, Mechanical, and other types of Hazardous Energy DHHS (NIOSH) Publication No. 99-110, August 1999). (2) Increasing knowledge among Michigan employers, labor and professional groups on how to obtain NIOSH alerts. (3) Developing and publishing an annual report on Michigan Fatalities which will be disseminated via mail and a website. (4) Developing and publishing Michigan specific targeted alerts which will be disseminated via mail and a website. (5) Developing Public Service announcements. We have assembled a team that includes expertise in epidemiology, engineering, industrial hygiene, farm safety, health and safety education and occupational medicine. This proposed project will build on the current efforts of an experienced group.

Program Area: Surveillance Research
Title: FACE: Minnesota
Investigator: Alan Bender
Grant Number: U60 CC507283
Start & End: 9/1/2001-8/31/2006
Affiliation: Minnesota Department of Health
City & State: Minneapolis, MN
Phone: (612) 676-5229

Description:
The Minnesota Department of Health (MDH) proposes to enter into a cooperative agreement with the National Institute for Occupational Safety and Health (NIOSH) to conduct occupational fatality surveillance and investigations according to NIOSH guidelines. The Minnesota Fatality Assessment and Control Evaluation (MN FACE) program also will establish a community-based intervention program for the prevention of fatal and non-fatal injuries in rural communities.

The specific aims of this proposal are to: (1) use the existing MN FACE surveillance system to identify all traumatic occupational fatalities that occur within Minnesota; (2) use the NIOSH/FACE model to investigate targeted fatalities to identify factors that place workers at increased risk of death; (3) use sentinel data from the Minnesota and national FACE programs to target, formulate, and disseminate work-related fatality prevention and intervention programs; (4) conduct analysis of interactions between the worker, the work environment, and work processes to understand the nature of work-related fatalities and evaluate targeted prevention/intervention programs; and (5) participate in the NIOSH-sponsored FACE Consortium and Coordination Committee.

The MN FACE program will accomplish these aims by maintaining its existing comprehensive multi-source surveillance system for the identification of occupational fatalities. The MN FACE program will conduct investigations of targeted occupational fatalities to identify risk factors that place workers at increased risk of death. The MN FACE program will write all occupational fatality reports in accordance with the recommended NIOSH format. MN FACE will develop and evaluate a community nurse-based intervention. MN FACE will provide community health nurses continuing education concerning farm hazards. MN FACE will also provide community health nurses with hazard identification materials for distribution to farmers and their families. The purpose of this program will be to use the existing community-based public health system to: (1) inform farmers of serious farm hazards; (2) empower farmers and their families through the belief that they can make their farms safer; and (3) provide farmers and their families with safety materials to assist in this process.

MN FACE surveillance and intervention data will be analyzed using descriptive statistics, measures of risk, and process evaluation. MN FACE data and fatality prevention recommendations will be distributed through a network of safety and health professionals throughout Minnesota. Finally, MN FACE staff will become active members in the proposed FACE Consortium and Coordination Committee.

Program Area: Surveillance Research
Title: FACE: Nebraska
Investigator: William Hetzler
Grant Number: U60 CC709864
Start & End: 9/1/2002-8/31/2006
Affiliation: Nebraska Workforce Development
City & State: Omaha, NE
Phone: (402) 595-2960

Description:
Nebraska Workforce Development, Department of Labor, Office of Safety and Labor Standards, provides direction and leadership in occupational injury control and prevention strategies in Nebraska. This proposal, titled Nebraska Fatality Assessment and Control Evaluation (FACE) will allow the State to continue its existing program for the surveillance, investigation and intervention of traumatic occupational fatalities in order to meet its goal of reducing traumatic occupational injury and death in Nebraska and throughout the nation. This will be accomplished by (1) identifying work environments that place workers at high risk for fatal injury using a multi-agency surveillance and reporting system; (2) identifying potential risk factors by conducting on-site investigations on targeted traumatic occupational fatalities; (3) developing and evaluating prevention strategies, such as safety training and practical engineering solutions, for reducing traumatic occupational injuries and fatalities in Nebraska; and (4) working collaboratively with federal, state, and private organizations/agencies in the development and dissemination of injury prevention intervention products/activities. A Principal Investigator (PI) and a Field Investigator (FI) will be employed to receive and review fatality notifications and reports and prioritize them for investigations. The PI and FI will also continue to enhance the state's surveillance capability, conduct epidemiologic analysis, and produce appropriate intervention products. Nebraska FACE has a well-established working relationship with the Federal Occupational Safety and Health Administration (OSHA), the Nebraska Department of Roads, County Attorneys/Coroners, the Bureau of Vital Statistics and Police, Sheriffs and Public Safety Departments. In addition, excellent collaborative relations have been established with labor unions, professional safety organizations, business and trade organizations through which our intervention products will be disseminated. Data from surveillance and investigations will be maintained in a computerized database that will be used for case management, descriptive epidemiologic studies, monitoring trends, prioritizing intervention efforts and report generation.

Program Area: Surveillance Research
Title: FACE: New Jersey
Investigator: Eddy Bresnitz
Grant Number: U60 CC207088
Start & End: 9/1/2001-8/31/2006
Affiliation: New Jersey Department of Health & Senior Services
City & State: Hamilton, NJ
Phone: (609) 588-7463

Description:
This proposal is to continue the New Jersey Fatality Assessment and Control Evaluation (NJ FACE) Program with new incorporated enhancements. NJ FACE was initiated in 1990 to pursue the NIOSH goal of reducing work-related fatal injuries through surveillance, performance of on-site investigations for specific types of fatal injuries, and prevention through information dissemination. During this time, the NJ FACE surveillance system has identified 1,066 fatalities using multiple sources of notification, leading to field investigations of 150 incidents. Numerous investigation reports, Hazard Alerts, and other injury prevention publications have been disseminated to thousands of New Jersey employers.

NJ FACE will enhance these efforts to make the program more effective. Surveillance will be improved by adding new notification sources and more actively pursuing existing sources to achieve more timely notifications. Investigations will be increased, and older workers will be investigated as a NJ FACE priority area. New variables will be collected and analyzed. An Occupational Fatalities Prevention Advisory Group of interested stakeholders will be formed to advise and assist FACE staff. Injury prevention efforts will be enhanced with a major educational intervention for falls and electrocutions. New methods of evaluating the program will be explored to ensure effectiveness. NJ FACE will propose the most successful enhancements to other states through its membership in the FACE Consortium and Coordinating Committee.

Program Area: Surveillance Research
Title: FACE: New York
Investigator: Kitty Gelberg
Grant Number: U60 CC220784
Start & End: 9/1/2001-8/31/2006
Affiliation: New York Sate Department of Health
City & State: Troy, NY
Phone: (518) 402-7900

Description:
The New York State Department of Health, Bureau of Occupational Health (BOH), in collaboration with Cornell University, proposes to conduct investigations of traumatic fatal occupational injuries in upstate New York in order to identify causes and detect common patterns of selected fatal injuries. Specifically, the aims of this project are:

1. to build on the existing occupational fatal injury surveillance system by increasing timeliness of reports and expanding the network of reporters;
2. to conduct in-depth on-site investigations of traumatic work-related deaths among identified high-risk populations in New York State. Currently, these populations include those younger than 18 years of age or those 60 years of age or older with special priority for any fatality involving machinery or within the agricultural industry; and
3. to develop and evaluate recommendations designed to control or eliminate the identified risks and disseminate these hazard prevention strategies to those who can influence safety in the workplace including workers, employers, and safety and health professionals.

BOH has substantial experience conducting surveillance, interventions, research and outreach of occupational injuries, illnesses and fatalities in NYS. The bureau will expand upon their existing programs, and utilize the existing FACE investigation protocol, data structure and report formats to identify and investigate traumatic fatal occupational injuries among the targeted conditions.

A close working relationship with the Cornell University School of Agriculture will enhance our ability to target agricultural fatalities, which include a high occurrence of child, elderly and machinery-related fatalities. An agricultural engineer from Cornell University will conduct site investigations for fatalities that occur in agriculture. FACE investigations will be conducted only in upstate New York (all of NYS, excluding NYC) because NYC collects their own fatality data. This will allow for increased focus on the target conditions, and better opportunity for case ascertainment.

Program Area: Surveillance Research
Title: FACE: Oklahoma
Investigator: Sue Mallonee
Grant Number: U60 CC613938
Start & End: 9/30/2002-9/29/2006
Affiliation: Oklahoma State Department of Health
City & State: Oklahoma City, OK
Phone: (405) 271-3430

Description:
Occupational injuries are a significant public health problem in the U.S. and in Oklahoma. Each year, approximately 6,000 persons die from occupational fatalities in the U.S. and more than 100 die in Oklahoma. The Oklahoma State Department of Health, Injury Prevention Service is requesting funding from the National Institute for Occupational Safety and Health (NIOSH) to continue the Oklahoma Fatality Assessment and Control Evaluation (OKFACE) project. The primary goal of the OKFACE project is to reduce traumatic occupational fatalities within Oklahoma by: (1) identifying high-risk work environments; (2) determining risk factors for fatal injuries, and (3) developing, implementing, and evaluating prevention strategies. The objectives for Year 01 are to: (1) maintain the comprehensive, multi-source, statewide occupational fatality surveillance system and contribute to the national occupational fatality surveillance system; (2) conduct in-depth site investigations of targeted occupational fatalities and distribute reports to at-risk groups and organizations; (3) analyze occupational fatality surveillance data and provide reports to NIOSH and local/state entities; (4) analyze Oklahoma reportable injury surveillance data and prepare a report on non-fatal work-related injuries; (5) prepare a strategic plan for the prevention of occupational injuries and fatalities; and (6) participate in the FACE Consortium and Coordination Committee. The completeness of the surveillance system will be evaluated by cross checking OKFACE cases with multiple other sources. The utility and acceptability of the OKFACE reports of investigation will be evaluated by surveying recipients and the reports will be adjusted accordingly within the NIOSH guidelines. All OKFACE activities will be monitored on an ongoing basis using the timeline to ensure that reports and other activities are completed. In future years, prevention programs will be developed, implemented, and evaluated as recommended by the work group on the prevention of occupational injuries and fatalities in the state strategic plan. These programs will likely focus on agricultural injuries since farming accounts for the highest number of work-related deaths in Oklahoma.

Program Area: Surveillance Research
Title: FACE: Oregon
Investigator: Michael Heumann
Grant Number: U60 CC021204
Start & End: 9/1/2002-8/31/2006
Affiliation: Oregon State University
City & State: Portland, OR
Phone: (503) 731-4573

Description:
Traumatic occupational fatalities exact a huge emotional and financial toll in U.S. workplaces. This project represents a partnership of the Oregon Department of Human Services, Health Services, the Oregon Health & Science University, Center for Research on Occupational and Environmental Toxicology and Oregon State University in establishing an Oregon Fatality Assessment and Control Evaluation Program (OR-FACE) that will be designed to identify, evaluate and report all fatal workplace injuries in Oregon, and to develop and disseminate interventions to prevent traumatic occupational fatalities. These three partnering organizations represent a multidisciplinary team with substantial surveillance, research and outreach expertise.

The specific aims of the Program are:
1. To identify traumatic occupational fatalities through the development of a statewide surveillance network that includes government, private industry, labor organizations, community organizations and insurers.

2. To investigate selected traumatic occupational fatalities using an etiologic model that focuses on process and energy transfer (root causes), and is in some cases supplemented by a management model that explores contributing organizational factors.

3. To have a multidisciplinary team analyze the surveillance and investigation data to identify work environments that place workers at a high risk for fatal injury and to identify risk factors for these injuries.

4. To develop and disseminate prevention strategies for these injuries using popular media, trade and industry journals, meetings, websites, and a network that includes government, private industry, labor organizations, community organizations and insurers.

5. To collaborate with other states and NIOSH to develop intervention prevention strategies to decrease the rate of occupational injuries and fatalities in the United States.

Program Area: Surveillance Research
Title: FACE: Washington
Investigator: Martin Cohen
Grant Number: U60 CC013928
Start & End: 9/1/2002-8/31/2006
Affiliation: Washington Department of Labor and Industries
City & State: Olympia, WA
Phone: (360) 902-4957

Description:
The Safety and Health Assessment and Research for Prevention (SHARP) Program will continue to develop, maintain, and enhance it's Fatality Assessment and Control Evaluation (FACE) Program with the goal of preventing work-related traumatic injuries and deaths. The program will have four components, surveillance, investigation, prevention activities/information dissemination, and evaluation. Basic data will be collected on all work-related fatalities in Washington State. The data will be used to help focus incident investigations as well as describe the incidents and associated risk factors. In addition to the fatality investigations and the corresponding reports, we will work with at least one construction employer and use fatality narratives in their tailgate safety meetings as discussion topics. We will also develop similar narratives based on near-hit incidents. The specific aims of this program are to:

1. Maintain and enhance the current program's timely multi-source surveillance system to identify and track all traumatic occupational fatalities that occur in Washington State. Washington (WA) FACE will continue to provide first report data to the NIOSH FACE Program.
2. Identify situations and factors using epidemiological, safety engineering, and human factors/ergonomics methods to focus prevention strategies.
3. Investigate select fatal incidents. Fatal incidents will be investigated in the NIOSH defined priority areas (current priority incident types involve the death of youths, those associated with machinery, and street/highway construction work zone fatalities), as well as a Washington state priority area, incidents in the heavy construction industry.
4. Develop and disseminate materials that can be used to reduce the risk of fatal occupational injuries in Washington State.
5. Develop a series of case narratives that highlight near-hit and fatal incidents, detailing risk factors for the incidents and recommendations for the prevention of future incidents. Use these and other materials to focus discussion at construction companies' tailgate safety meetings.
6. Evaluate the materials that are developed and disseminated.
7. Serve as a member of the Coordination Committee (CC) in Washington State.

Program Area: Surveillance Research
Title: FACE: West Virginia
Investigator: Mark King
Grant Number: U60 CC312914
Start & End: 9/1/2001-8/31/2006
Affiliation: West Virginia Department of Health & Human Services
City & State: Charleston, WV
Phone: (304) 558-3956

Description:
The primary goal of the West Virginia FACE program is for the continued expansion and improvement of the state's capacity for conducting traumatic occupational fatality surveillance, investigation, and intervention activities. In doing so, the occupational public health infrastructure within the state will be strengthened by integrating resources for occupational safety and health research and public health prevention programs at the state and local levels. The specific aims of the West Virginia FACE program include: (1) the development of a timely, comprehensive, multiple-source surveillance system to identify and record basic epidemiologic data on all traumatic occupational fatalities within the state; (2) continued electronic interface with NIOSH; (3) conducting comprehensive on-site field investigations of occupational fatalities; (4) the development of state prevention strategies through the identification of potential risk factors for certain types of traumatic occupational fatalities; (5) the rapid dissemination of prevention recommendations in order to reduce the risk for similar incidents; (6) the development and implementation of innovative primary and secondary prevention strategies to reduce the incidence of traumatic occupational injuries and fatalities; and (7) the application of methodology to objectively evaluate the implementation, accomplishments, and progress of the West Virginia FACE program.

Program Area: Surveillance Research
Title: FACE: Wisconsin
Investigator: Lawrence Hanrahan
Grant Number: U60 CC507081
Start & End: 9/1/2001-8/31/2006
Affiliation: Wisconsin Department of Health & Family Services
City & State: Madison, WI
Phone: (608) 267-7173

Description:
Occupational fatality is a serious but preventable health problem in Wisconsin. Annually, the work force averaged 118 traumatic fatalities from 1991-1999. The average annual rate of fatal occupational injuries in Wisconsin from 1980-1995 was 4.5 per 100,000 workers, which is lower than the national average of 5.3. On average, the most frequent causes include motor vehicle crashes (24%), machine-related (24%), struck by falling objects (9.9%) and falls (8.2%). Since October 1991, the Wisconsin FACE Program has worked to reduce the incidence of fatal and serious injuries in the workplace. WI FACE has developed internal resources to continue this important work over the next five years, and has the commitment of other state and federal agencies and organizations to support objectives of the project.

The objectives include:
1. Continue to improve the timely, comprehensive, multiple source (e.g. death certificate, coroner, police, OSHA, worker's compensation reports) state level surveillance system for identifying and recording basic epidemiologic data on all work- related fatalities occurring in Wisconsin.
2. Continue conducting on-site investigations of specific traumatic occupational fatalities (e.g., machine-related injury, deaths of youths under 18 years of age, and street/highway construction work zone fatalities) using the NIOSH FACE model.
3. Through case investigations, continue to identify factors common to selected types of traumatic occupational fatalities, leading to development and evaluation of prevention strategies.

Priority populations that have been identified through Wisconsin's previous years' experience, and strategies to address the issues of these populations include:
1. Youth - Collaborate with Youth Worker Injury Prevention Center to identify and dismantle barriers to safer youth workplaces.
2. Highway-related - Draw on working relationships with highway safety agencies to address highway workzone, seatbelt use.
3. Farmers with Disabilities - Continue work with AgrAbility; expand efforts to Dept. of Vocational Rehab and Medical Society.
4. Language and Literacy Issues - Circulate FACE findings on workplace language language and literacy issues.
5. Cultural and Faith-Based Communities - Provide focused prevention strategies to minority communities of cultural bases.

Program Area: Surveillance Research
Title: Enhancement of NC State-based Occupational Surveillance

Program Area: Surveillance Research
Title: New Mexico; Worker Health Surveillance
Investigator: Ronald Voorhees
Grant Number: U53 CC622291
Start & End: 9/30/2002-9/29/2005
Affiliation: New Mexico Department of Health
City & State: Sante Fe, NM
Phone: (505) 476-3573

Description:
The proposed plan seeks to establish an occupational health surveillance program in the State of New Mexico. The specific objectives during the three-year period of this award will be to:

1. Establish an occupational illness, toxic exposure and injury surveillance program in the State of New Mexico utilizing existing data sources in state and federal public health and labor agencies, public and private healthcare provider data, academic institutions, and creating a single repository for combining these data into valid, reliable and useful surveillance information.

2. Establish a scientific and governmental advisory board to facilitate data collection, analysis of findings, and to implement policy changes in the state of New Mexico for primary prevention of occupation injury and illness.

3. Conduct a review and analysis of existing available surveillance data within the state, including preliminary analysis of existing data for patterns and problematic areas in occupational illness and injury.

4. Report information on analyzed data to the federal partners at NIOSH and state partners at the New Mexico Department of Health.

5. Develop and implement comprehensive surveillance activities and associated activities in New Mexico, including:

a. Assuring that data systems include NIOSH- recommended core variables;
b. Increasing the reporting by medical providers and laboratories of heavy metal poisoning and other occupational injuries and diseases which are currently notifiable;
c. Establishing ongoing, periodic analysis of occupational health datasets;
d. Producing a report of the prevalence of occupational injuries and illnesses, based initially on analysis of existing data.

6. Expand occupational health surveillance activities to include Native American populations in New Mexico through partnerships with the Indian Health Service and tribal governments.

7. Extend the existing occupational health datasets to incorporate:
a. primary care provider reporting in the rural areas of New Mexico
b. Summary data from private occupational health practices in New Mexico

Program Area: Surveillance Research
Title: SENSOR: California
Investigator: Robert Harrison
Grant Number: U60 CC902990
Start & End: 9/30/2002-9/29/2005
Affiliation: California Department of Health Services
City & State: Oakland, CA
Phone: (510) 622-4404

Description:
The Occupational Health Branch (OHB) of the California Department of Health Services (CDHS) proposes to maintain and enhance our integrated surveillance programs for work-related asthma and pesticide illness. Over the next three years, we propose to maintain our existing SENSOR model for the surveillance of WRA and pesticide illness, and to implement several innovative approaches that will enhance our previous surveillance activities for these conditions: (1) We will continue to conduct multi-source surveillance for WRA and pesticide illness, relying on our existing state-wide provider-based reporting systems. In addition, we will implement state-wide case ascertainment using electronic reporting of workers' compensation data; initiate routine use of hospital discharge data for WRA; evaluate the utility of agricultural commissioners' and laboratory reports to enhance the completeness of pesticide illness reporting; and improve our data management capabilities. (2) We will continue to perform selected case-based investigations based on our review of surveillance data. In addition, we will identify and recommend sustainable alternatives to the use of fumigants in agriculture, and perform targeted investigations to prevent WRA exposures among health care workers, custodians, and nail salon workers. (3) We will continue to collaborate with local and state agencies (both regulatory and public health) involved in prevention of workplace injuries and illnesses, as well as continue outreach to employers, labor organizations, health care providers, and community-based organizations. In addition, we will prepare a statewide planning document for the assessment of environmental and occupational health indicators (including WRA and occupational pesticide illness), and conduct a comparative analysis of California pesticide illness surveillance data sets. (4) We will continue to disseminate surveillance and case investigative findings to our target audience through a variety of methods including fact sheets, newsletters, field investigation reports, web site content, and peer-reviewed scientific publications. In addition, we will incorporate the results of our findings and recommendations into an innovative report of occupational health surveillance and workplace interventions (Occupational Health Watch). (5) We will continue to perform routine evaluation of the WRA and pesticide illness surveillance systems for case ascertainment (temporal reporting trends, timeliness or reports, sensitivity), case follow-up and field investigations (medical records retrieval, work site employer and employee participation rates), and information dissemination (timeliness of reports, number distributed). In addition, we will conduct a formal evaluation of our surveillance systems using recently published CDC guidelines; evaluate the impact of our work site recommendations; and develop a standard evaluation tool to routinely assess the quality and effectiveness of our written materials.

Program Area: Surveillance Research
Title: SENSOR: Massachusetts; Surveillance of Work-Related Asthma
Investigator: Letita Davis
Grant Number: U60 CC103010
Start & End: 9/30/2002-9/29/2005
Affiliation: Massachusetts Department of Public Health
City & State: Boston, MA
Phone: (617) 624-5621

Description:
Estimates of the proportion of adult onset asthma that can be attributed to work range from 5% to 29%. An untold fraction of adults have pre-existing asthma aggravated by work. In Massachusetts, an estimated 9.7% of adults with current asthma - over 45,000 people -report that their asthma is related to work. In 1992, the Massachusetts Department of Public Health (MDPH) passed regulations requiring physicians to report work-related asthma. Since that time, MDPH, with support from NIOSH, has worked to field-test the SENSOR model for work-related asthma (WLA) surveillance. Physician reports and hospital discharge data are used for case ascertainment, follow-up interviews with reported cases are conducted, and surveillance findings are used to target work site interventions and broad-based prevention activities. Since 1993, MDPH has identified over 400 cases of WRA, and multiple work site investigations have been carried out. Aggregate data have been identified industries and occupations where intervention is needed and highlighted asthma causing agents that need to be addressed.

Program Area: Surveillance Research
Title: SENSOR: Michigan
Investigator: Douglas Kalinowski
Grant Number: U60 CC515856
Start & End: 9/30/2002-9/29/2005
Affiliation: Michigan of Consumer & Industry Services
City & State: Lansing, MI
Phone: (517) 322-1817

Description:
This proposal will fund surveillance programs for three conditions: (1) work-related asthma; (2) work-related noise induced hearing loss (NIHL); and (3) silicosis. The state has had SENSOR funded projects in work-related asthma since 1987, silicosis from 1987-1992 and work-related NIHL from 1992-2000. With this funding, occupational disease reporting has increased from less than 100 reports a year prior to 1988 to over 20,000 reports a year. The state has continued silicosis surveillance without SENSOR funds from 1993 to date and work-related NIHL from 2000 to date. Since initiation of surveillance we have confirmed 1,782 cases of work-related asthma, 857 cases of silicosis, and 18,336 cases of work-related NIHL. We have conducted 714 follow back industrial hygiene inspections, and interviewed 7,662 fellow workers during these inspections. We have written and mailed out two quarterly newsletters (total 63 different newsletters) and four annual reports per year (total 45 different reports) to approximately 4,000 targeted physicians and health care professionals. We have received 100% reporting from the 156 acute care hospitals in the state. We have spoken and had display booths at medical meetings, published 24 papers, four books chapters, and 13 abstracts in the medical literature and worked with other state organizations such as the medical licensing board to publicize Michigan's occupational disease reporting law. We have also evaluated our effort to improve working conditions. We will continue all the above activity over the next three years. We currently have 8 additional papers that have been submitted or a final manuscript is being reviewed. In addition, we will be expanding our outreach, follow back and evaluation activity. New activity planned includes: use of poison control data, expanding our use of workers' compensation data, integrating with the National Electronic Disease Surveillance System (NEDSS), pilot testing the new occupational health indicators, conducting follow back interviews of previously confirmed asthma cases and fellow workers and a project on special populations.

Program Area: Surveillance Research
Title: SENSOR: New Jersey; Surv of Occup Asthma and Silicosis
Investigator: David Valiante
Grant Number: U60 CC208160
Start & End: 9/30/2002-9/29/2005
Affiliation: New Jersey Department of Health & Senior Services
City & State: Trenton, NJ
Phone: (609) 984-1863

Description:
The overall goal of this proposal is to continue and enhance implementation of the Sentinel Event Notification System for Occupational Risks (SENSOR) model of occupational disease surveillance for occupational asthma and silicosis in New Jersey. The SENSOR model is an occupational disease surveillance system having four principle components: a set of selected target conditions, health data sources for case identification and case ascertainment, a surveillance center to collect and evaluate case data, and intervention activity targeted by case data. Since 1985, the NJDHSS Occupational Health Surveillance Program (OHS) has conducted varying levels of surveillance for injuries and illnesses reportable under New Jersey=s occupational disease reporting regulations. The OHS Program maintains both an occupational asthma registry and silicosis registry for cases occurring in New Jersey. During the grant period, we propose the following three broad objectives to enhance existing surveillance activities for occupational asthma and silicosis in New Jersey:
a. Utilize the occupational health medical expertise in New Jersey to improve recognition, reporting, and medical surveillance by physicians and case ascertainment by NJDHSS;

b. Take advantage of new and timelier data sources to improve case identification; and

c. Expand our community of partners and key stakeholders to enhance NJDHSS intervention and dissemination efforts.

This proposal will include a collaboration with New Jersey's medical school-based Environmental and Occupational Health Sciences Institute (EOHSI) to conduct outreach and education to increase occupational asthma and silicosis recognition, reporting, and medical surveillance by physicians and improve case ascertainment for occupational asthma and silicosis. The proposal will also use hospital discharge, emergency department, death data, and Workers' Compensation data to identify case reports of occupational asthma and silicosis. Intervention will include on-site industrial hygiene evaluation of workplaces identified by new cases of occupational asthma and silicosis. Other intervention components include industry-wide outreach, education, and intervention in common industries and occupations in New Jersey with identified occupational exposures to asthmagens and silica dust.

Program Area: Surveillance Research
Title: SENSOR: New York; Sentinel Event Notification of Occupational Risks
Investigator: Matthew Mauer
Grant Number: U60 CC215858
Start & End: 9/30/2002-9/29/2005
Affiliation: New York State Department of Health
City & State: Troy, NY
Phone: (518) 402-7900

Description:
The New York State Department of Health, Bureau of Occupational Health, proposes to continue surveillance of pesticide poisonings in New York State through the New York State Pesticide Poisoning Registry (NYSPPR), with the goal of continuing and improving case ascertainment and public health intervention and prevention activities. The continuation of this program will allow further elucidation of the burden of pesticide-related health effects in New York State and ongoing public health interventions for affected individuals, their health care providers, employers, and others potentially exposed.

Program objectives include the improvement of reporting and case ascertainment, provision of outreach and intervention services, provision of information and education to cases, employers, health care providers, and others affected, identification of new pesticide-related hazards or health effects, monitoring of data to identify sentinel events or trends, identification of new applications for the NYSPPR as new health threats emerge, and maintenance and improvement of the SENSOR Pesticide Incident Data Entry and Reporting (SPIDER) software program. SPIDER is used by seven state SENSOR pesticide programs for data collection, case classification, and data sharing with the National Institute for Occupational Safety and Health (NIOSH) for data aggregation at the national level.

The NYSPPR has been and will continue to be an instrumental part of surveillance activities developed to identify and characterize possible health effects related to West Nile Virus mosquito control programs in New York State. In addition, the events of September 11, 2001 have resulted in biological and chemical terrorism preparedness planning. Through this planning process, the NYSPPR has been identified as a potential resource in screening for chemical events involving pesticides - for both sentinel event identification and post-event surveillance. The NYSPPR will continue to notify NIOSH and the United States Environmental Protection Agency (US EPA) of any high priority pesticide toxicity events, following established criteria. Reporting to NIOSH and US EPA will assist in surveillance at a national level, which may be critical in the event of chemical terrorist attacks.

Program Area: Surveillance Research
Title: SENSOR: Oregon
Investigator: Michael Heumann
Grant Number: U60 CC008161
Start & End: 9/30/2002-9/29/2005
Affiliation: Department of Human Services
City & State: Portland, OR
Phone: (503) 731-4025

Description:
The Oregon Department of Human Services' Environmental and Occupational Epidemiology section will collaborate with a wide range of state and private partners to track workers' compensation claims data on and direct reports of occupational dermatitis, burns, and pesticide-related illness and injury. The sentinel and population-based data for each condition will be analyzed to characterize demographic patterns and casual factors within specific industries and occupations. Economic costs and case rates will be calculated. Particular attention will be paid to specific populations, including youth, temporary and migrant and seasonal workers. Data for target conditions will be reviewed, and selected case investigations conducted to identify underlying causes and potential new hazards. Results of these analyses and intervention recommendations will be shared with those of stakeholders who have demonstrated interest in preventing target work-related illness and injury. EOE will work with partners to prioritize and pursue strategies to prevent the target conditions in high-risk populations. The project will be evaluated for efficiency and usefulness of the model and its components. This evaluation will serve to improve Oregon's surveillance system and demonstrate its reproducibility for other states. EOE's surveillance methods, data findings, and intervention experiences will be disseminated through local publications, peer-reviewed journals, and share with NIOSH and other states.

Program Area: Surveillance Research
Title: SENSOR: Texas; Occupational Pesticide Poisoning
Investigator: Rachel Rosales
Grant Number: U60 CC602983
Start & End: 9/30/2002-9/29/2005
Affiliation: Texas Department of Health
City & State: Austin, TX
Phone: (512) 458-7269

Description:
The potential for significant work-related pesticide illness in Texas is great. The Environmental Protection estimates that 10,000 - 20,000 physician diagnosed poisoning occur each year among the three million agricultural workers in the United States. An estimated 300,000 suffer acute illness as a results of pesticide exposure each year. In 1997 Texas farm and ranch operators spent more than $1 billion in pesticide and fertilizer costs. With farm and ranch work estimated to be 197,393 works and an additional 362,724 migrant and seasonal farm workers and their dependents in Texas in 2000, Texas agricultural workers are a significant risk factor for occupational pesticide exposure.

A well designed and maintained pesticide surveillance system is imperative not only for determining the incidence and prevalence of occupational pesticide-related illness, but also for guiding timely field investigations and appropriate risk-reduction interventions. Acute occupational pesticide poisoning is a required reportable condition in Texas. Under this law (Texas Health @ Safety Code, Chp 84) the Pesticide Exposure Surveillance in Texas (PEST) program at the Texas Department of Health conducts case ascertainment through agreements with other state agencies, physician reports, and at-risk community groups. During the next three years, the PEST program will utilize NIOSH funding to maintain and expand current surveillance activities, conduct rapid follow-up interviews with exposed individuals, and administer time-sensitive field investigations. We will place an increased emphasis on workplace evaluations, interventions and, recommendations for industries in high-risk sectors. We will develop new collaborative ties and enhance reporting relationships with key partners in underserved populations and at-risk communities. Surveillance data containing integral information will be analyzed and disseminated regularly to local, state, and national agencies in the health and safety community to help guide the development of future prevention programs and regulations. Most importantly, PEST staff will utilize surveillance data and experience from the past 15 years to develop appropriate bilingual and culturally sensitive intervention and prevention materials, provide training to workers and at-risk population, and subsequently reduce incidents of occupational pesticide exposure through Texas.

Program Area: Surveillance Research
Title: SENSOR: Utah; State-Based Surveillance of Work-Related Burns
Investigator: R. Ball
Grant Number: U60 CC814698
Start & End: 9/30/2002-9/29/2005
Affiliation: Utah Department of Health
City & State: Salt Lake City, UT
Phone: (801) 538-6191

Description:
The goal of this project is to continue development of a registry of work-related burn cases in the state of Utah, develop and implement additional intervention activities, help ensure that affected workers are identified and receive the appropriate medical and environmental follow-up, and appropriate prevention activities are directed toward targeted industries. We propose to increase the number of sources currently used to obtain reports of workers burns to assure the accuracy of analysis of burn case data, and the focus of intervention and outreach activities toward targeted industries. Additional intervention activities implemented will be focused to reduce the incidence of work-related burns in Utah by assisting industries identified as high risk to implement more effective prevention activities directed toward their workforce.

In Utah, 10,961 burns were reported to the Utah Industrial Commission during calendar years 1997-2001, an average of 2,192/year. According to the Centers for Disease Control, work-related burns are a leading cause of occupational injury in the United States. Work-related burns account for 20-25% of all serious burns. Burn injuries can leave in their wake serious injuries and permanent scars on individuals. The proposed plan will provide a means to identify high risk industries and age groups through surveillance of work-related burn injury data. Continued data collection on a statewide basis is essential to continue to identify high risk areas and activities associated with burn injuries in Utah workers, and to ensure that direct intervention activities reduce injuries associated with work-related burns. The information obtained through surveillance activities will be disseminated to government agencies, researchers, medical providers, and other interested groups. This information is key to the continued development of effective intervention and prevention activities to reduce the incidence of work-related burns in Utah. The proposed plan includes working jointly with other agencies in Utah such as the Intermountain Burn Center, and Utah Occupational Safety and Health, and the Rocky Mountain Center for Occupational and Environmental Health to assist in prevention of work-related burn injuries. The successful application of this grant will provide funds to strengthen the infrastructure of current surveillance projects and continue the occupational disease and injury surveillance program in Utah.

Program Area: Surveillance Research
Title: Surveillance of Mortality and Morbidity in U.S. Workers
Investigator: Lora Fleming
Grant Number: R01 OH003915
Start & End: 9/1/2002-8/31/2005
Affiliation: University of Miami
City & State: Miami, FL
Phone: (305) 243-5912

Description:
The databases available to examine national patterns and trends of US worker health and safety are out dated, and in general, incomplete. The National health Interview Survey (NHIS), a multipurpose household survey of the US civilian non-institutionalized population conducted annually since 1957 by the National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention (CDC), has collected demographic, health, and employment data on over 450,000 US workers aged 18 years and older in probability sampling of the entire US population, with a Mortality Follow Up with cause of death from 1986 through 1995. Therefore, the NHIS database allows for longitudinal analysis of mortality data as a retrospective cohort study, as well as cross-sectional and trend analysis of the aggregate morbidity data collected annually representative sample of all US workers for the past 2 decades.
Using this uniquely representative an large database of the NHIS 1986-94 surveys with Mortality Follow-Up, the objectives of this proposed study are to evaluate the time trends for morbidity, and the longitudinal mortality associated with industry and occupation for the US worker. After assembling the cohort of employed persons aged 18 and older, the investigators will examine the cause specific mortality, and reported health and disability as summarized date for all annual NHIS interviews from 1986-1994, as well as the morbidity time trends, by industry and occupation. Hypotheses have been generated based on the historical literature; these hypotheses can be tested not only in terms of specific industry/occupational subgroups, but also in subgroups determined by important confounding variables such as age, gender, race/ethnic, socio-economic status, and geographic region (depending on the subgroup sample size). The costs of injury and disease in terms of lost work time and use of medical services can be evaluated by specific industry/occupational subgroups; cause-specific mortality by industry/occupation subgroups, as well as by the same confounding variable, will also be determined.The investigators propose to create 2 Study Monographs, one on Morbidity and one on Mortality, to be made publicly available in a linked Study Website so that researchers and general occupational health community can use these data to compare to prior studies, to develop new research hypotheses, and to use the data as a surveillance tool to evaluate time trends and occupational disease in the US for the past 2 decades in both genders and in a variety of race-ethnic subpopulations. This study proposal satisfies at least 3 NIOSH research priority areas (NORA): (1) surveillance research methods providing unique mortality and morbidity data on the entire US workforce; (2) unique mortality and morbidity data on older, race-ethnic, lower socio-economic and gender-specific worker subpopulations in the US; (3) unique data on social and economic costs of workplace disease and injury. In addition this application is responsive to Program Announcement "Occupational Safety and Health Research (PA-99-143).

Program Area: Surveillance Research
Title: Surveillance of Work-Related Carpal Tunnel Syndrome
Investigator: Robert Harrison
Grant Number: U01 OH007297
Start & End: 9/30/2000-4/29/2004
Affiliation: California Department of Health Services
City & State: Oakland, CA
Phone: (510) 622-4404

Description:
The Occupational Health Branch (OHB) of the California Department of Health Services (DHS) proposes to further develop and enhance its surveillance system for the detection and prevention of occupational carpal tunnel syndrome (CTS). For the past two years, we have been conducting CTS case ascertainment and performing selected work site investigations. We propose to enhance the current CTS surveillance system by expanding and evaluating case ascertainment tools; conducting telephone interviews of workers in high risk industries and occupations; increasing case-based field investigations, hazard identification, and prevention activities; and using the results of these efforts to foster prevention activities. This comprehensive system will use the existing SENSOR case definition and will employ protocols and methodologies easily adopted as a model by other states. The program will expand data collection to include electronically transmitted workers' compensation data, which will update our system to be consistent with national trends in information transfer and create a model more easily adopted by other states. Workers with CTS in high-risk industries and occupations will be interviewed by telephone using a standardized questionnaire to identify risk factors that can lead to prevention strategies. Work site investigations will be expanded in order to identify prevention methods and hazard reduction. Findings from all activities will be widely disseminated in the form of reports, educational materials, and scientific publications. The proposed enhanced surveillance program will be evaluated using established criteria such as timeliness, sensitivity, simplicity, flexibility, representativeness and acceptability. By building on the solid foundation of current surveillance activities, we believe we can achieve the goal of building a model work-related carpal tunnel surveillance program that can be used to prevent this important occupational disease in California and in other states.

Program Area: Surveillance Research Methods (NORA)
Title: The Youth Employment Training Pilot Program
Investigator: Henry Anderson
Grant Number: U01 OH007298
Start & End: 9/30/2000-4/30/2004
Affiliation: State of Wisconsin
City & State: Madison, WI
Phone: (608) 266-1253

Description:
This project will develop and implement a new model for youth occupational injury surveillance in Wisconsin. This model will link injury surveillance with the Wisconsin youth work permit system. Within the next two to three years, the Wisconsin Department of Workforce Development (DWD) plans to computerize the current child work permit system. Now, during the initial computerization planning process, is an opportune time to develop a surveillance component that can be incorporated into the work permit application system. Upon successful completion, the proposed pilot study could affect the statewide implementation of the DWD program and expand the linked injury surveillance and the work permit application system to all of the public high schools in Wisconsin.

There have been no youth surveys to determine the incidence of occupational injuries in Wisconsin. Existing data comes from Workers' Compensation Claims. Currently there is no comprehensive occupational safety training program for working Wisconsin youth nor is there easy youth access to safety information or a mechanism for getting questions answered.

The project will: Develop a computerized youth work permit application; Develop and maintain a computerized work permit database in order to make sure that jobs applied for are not prohibited by State or Federal rules, or individuals whose permits have been revoked do not receive another; Develop a computerized safety training program for working minors; Develop a computerized survey for minors who are working that can be administered during school; Create a website/hotline to address any student work safety concerns.

Data from the anonymous school based surveys will be used to determine whether youth who have obtained a work permit are less likely to experience a work related injury.

Program Area: Surveillance Research Methods (NORA)
Title: Capture-Recapture Estimates of Workplace Injury Rates
Investigator: Leslie Boden
Grant Number: R01 OH007596
Start & End: 9/1/2002-8/31/2005
Affiliation: Boston University
City & State: Boston, MA
Phone: (617) 638-4620

Description:
This study will use the two most widespread and comprehensive sources of occupational injury and illness reporting to evaluate the completeness of reporting in each and factors that affect differential reporting. These two sources are state workers' compensation data and the Survey of Occupational Injuries and Illnesses (SOII) conducted annually by the Bureau of Labor Statistics. It will also provide improved estimates of the overall annual incidence of occupational injuries and illnesses for eight states.

For the period from 1998 through 2000, we will compare reported injuries from these two sources matching individual injuries and illnesses in eight states: Oregon, Washington, Wisconsin, New Mexico, Florida, Texas, Minnesota, and West Virginia. We will use capture-recapture analysis for each of these states to develop improved measures of nonfatal injury incidence. The study will account for differential capture by employer, injury, and worker characteristics by using logistic regression. This also will enable us to identify factors associated with underreporting. Based on the findings of the capture-recapture analysis, we will suggest changes in reporting programs that would improve data collection. Finally, we will compare the degree to which the two data systems appear to capture occupational injuries and illnesses in the states studied. If capture is relatively uniform across states, capture rates estimated from the studied states will be applied to states outside the study population to provide improved national estimates of the incidence of injuries and illnesses.

Program Area: Surveillance Research Methods (NORA)
Title: Core: Occupational Surveillance Modules for Prevention
Investigator: David Bonauto
Grant Number: U01 OH007292
Start & End: 7/1/2001-6/30/2005
Affiliation: Washington Department of Labor and Industries
City & State: Olympia, WA
Phone: (360) 902-5664

Description:
Through surveillance of several National Occupational Research Agenda (NORA), Healthy People, and Washington State Department of Labor and Industries priority conditions including occupational asthma (OA), adult lead poisoning, musculoskeletal disorders of the upper extremity, low back disorders, dermatitis, hospitalized burns, traumatic head and brain injuries (THBI) as well as assaults, the Safety and Health Assessment and Research for Prevention (SHARP) program will demonstrate the application of a comprehensive, occupational surveillance program. Through demonstration of the proposed surveillance program, SHARP will create a systematic model for adoption by other states. To allow for adaptability, SHARP proposes development of a modular approach which demonstrates several approaches to outcome based surveillance, hazard based surveillance, and subsequent prevention activities. The proposed project will address the following aims: (1) Conduct a survey of state based occupational surveillance programs to determine currently employed approaches to surveillance and prevention, program capabilities, and program opinion leaders. (2) Demonstrate a modular approach to occupational surveillance. This modular approach should encompass the use of different data sources for priority conditions selected by an individual program. (3) Develop modules for the creation, dissemination, and evaluation of prevention efforts. (4) Conduct an employer/employee survey to further identify etiologic agents or practices in one identified industry. (5) Develop an Internet based library of surveillance modules and prevention materials. (6) Produce and disseminate three surveillance reports for WA State priority conditions per year. (7) Produce and disseminate two prevention reports to employers or employees per year. Through the proposed project, SHARP will demonstrate the utilization of several data sources for the surveillance of occupational diseases and hazards. Further, SHARP will demonstrate the analysis of such data, the creation of simple public health interventions using surveillance data, the implementation of interventions, and the evaluation of interventions using surveillance data. Finally, SHARP will produce a web accessible library of materials detailing the methodology of the various components of the surveillance program including prevention materials that may be modified and disseminated in other states.

Program Area: Surveillance Research Methods (NORA)
Title: Core: Occupational Health Surveillance in Massachusetts
Investigator: Letitia Davis
Grant Number: U01 OH007302
Start & End: 7/1/2001-6/30/2005
Affiliation: Massachusetts Department of Public Health
City & State: Boston, MA
Phone: (617) 624-5621

Description:
Work-related injuries and illnesses are a significant public health problem in the United States, imposing substantial human and economic costs. Surveillance of work-related illnesses, injuries and hazards is essential to establish research priorities and to target, design and evaluate prevention efforts. Surveillance is needed at the state and local as well as national levels. The Massachusetts Department of Public Health (MDPH) proposes to develop, implement, and evaluate a core occupational health surveillance program to promote prevention at the state and local levels that can serve as a model for other states. This core program will include surveillance of multiple occupational health/hazard endpoints. The specific aims of the proposed project are as follows, falling into four major categories: Sentinel Event Surveillance: (1) refine the list of high priority occupational health conditions that should be placed under sentinel case surveillance in all states; (2) develop surveillance protocols for high priority conditions and implement surveillance in Massachusetts; (3) evaluate prevention impact of sentinel event surveillance activities, and revise model core program; Population-based Surveillance: (4) describe existing population-based sources of data on health conditions, hazards and the worker populations-at-risk that may be used for occupational health surveillance at the state and local levels; (5) conduct analyses of priority data sets; prepare and disseminate surveillance reports; (6) assess the relative utility of these different population-based approaches to surveillance, and propose schedule of core population-based surveillance activities; Intervention and Prevention: (7) continue and expand working relationships with prevention partners to promote use of surveillance findings for public health action at the state and local levels; (8) develop mechanisms to improve dissemination and use of surveillance findings; Regional Collaboration: (9) work with other states in the Northeast to obtain their input in defining core occupational health surveillance functions and to promote the development of state occupational health surveillance capacity; (10) produce a set of written “surveillance tools” that can be used/adapted by other states working to build core programs. MDPH will work with NIOSH State Occupational Surveillance Consortium in developing a final report and set of consensus recommendations regarding core occupational health surveillance activities in the states.

Program Area: Surveillance Research Methods (NORA)
Title: Surveillance Methods for Health Care and Related Workers
Investigator: John Dement
Grant Number: R01 OH003979
Start & End: 9/30/2001-9/29/2005
Affiliation: Duke University
City & State: Durham, NC
Phone: (919) 286-3232

Description:
NIOSH has identified health care workers (HCW) as a special population at high risk of occupational disease and injury. The Bureau of Labor Statistics estimates that there are over eight million workers employed in US health care industries. Health care workers are involved in very diverse functions and duties that may expose them to many hazards such as toxic chemicals, infectious agents (e.g., blood borne and body substance exposures to bacteria, viruses, fungi, and parasites), latex, ergonomic hazards, workplace violence, work related stress, and physical agents. Relatively little injury and disease surveillance data exists for health care workers. The major objective of this research is to develop a comprehensive system for health, injury, and hazard surveillance of health care workers. This will be accomplished through the combination of population-based and case-based data. A job-exposure matrix will be developed for hazard surveillance and for estimation of individual exposures through linkage with each worker's job history. The surveillance system will use analytical tools for cohort data to study the incidence and causes of work related injuries and health conditions, the identification of high risk populations, and appropriate prevention measures. These data will be supplemented by the use of case-based data, allowing more detailed follow-up of a group of 'sentinel health events' of concern for health care workers. Specific conditions to be addressed by case-based surveillance will include patient lifting and handling injuries, other noninfectious occupational injuries, latex allergy, occupational asthma, and work-related stress. The system will be implemented for five years of surveillance of a cohort of over 10,000 health care workers employed by Duke University Health systems (DUHS), which includes Duke University Medical Center, a large teaching hospital, and Durham Regional Hospital, a community based hospital. Other components of DUHS include 20 clinics located in eight N.C. counties, triangle Hospice, and the Duke Infusion Center. While we will evaluate the utility of the system in this setting, the goal of the project is to define elements and performance characteristics of a model surveillance system which could be used in other health care institutions. Results of the case-based surveillance effort also will have broad application to health care workers.

Program Area: Surveillance Research Methods (NORA)
Title: A Comprehensive Surveillance of Occupational Injury in Maryland
Investigator: Patricia Dischinger
Grant Number: R01 OH007830
Start & End: 7/10/2003-7/9/2006
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 328-4246

Description:
The long-term objective of this research is to provide the information necessary to reduce death and disability from occupational injury. While much is known about work-related fatalities, little is known about the epidemiology of non-fatal injuries requiring treatment in an emergency department (ED) or admission to a hospital. This study seeks to develop a model for comprehensive statewide surveillance of occupational injuries. Available sources of data in Maryland will be linked to create an incident-specific database, which allows estimation of the incidence of occupational injury by population, by industry, and by occupation. In addition, validation studies of the reliability of reporting will be conducted. The study has the following six specific aims: (1) To develop a model system for statewide surveillance of occupational injuries, based on the linkage of available sources of data, including ED records, hospital discharge records, medical examiners records, death certificates, ambulance run sheets, police crash reports, trauma registry records, and emergency medical services communication logs. This will be a passive, retrospective surveillance based on data from 2001, 2002, and 2003. (2) To conduct a validation study of the reporting of work relatedness by available data sources based on sampled chart reviews of ED patients, inpatients, and deceased workers, in order to determine the nature and occupation of the patient and circumstances of the injury. In addition, false- positive and false- negative rates for work relatedness will be computed. (3) To collect in-depth information to identify injury circumstances through an active, prospective investigation of trauma patients, including in-depth interviews and screening by trauma nurses during 2003, 2004, and 2005. Data obtained from these sources will be corroborated with information from external sources. (4) To determine the strengths and weaknesses of available sources for identifying work-related injuries for 2003, the only year for which both passive and active surveillance data will be available. (5) To use knowledge resulting from this surveillance to make recommendations for a long-term, sustainable surveillance system for occupational injuries. (6) To identify priority areas for injury prevention within the state of Maryland, based on groups of workers at high risk of injury.

Program Area: Surveillance Research Methods (NORA)
Title: Connecticut; Occup Dis Surv Enhancement Project
Investigator: Mary Lou Fleissner
Grant Number: U53 CC122295
Start & End: 9/30/2002-9/29/2005
Affiliation: State of Connecticut Department of Public Health
City & State: Hartford, CT
Phone: (860) 509-7740

Description:
The primary objective of the Connecticut Occupational Disease Surveillance Enhancement Project is to improve the overall completeness, timeliness, and continuity of occupational disease event reporting in the State. This enhancement in surveillance capacity will allow for the development of improved interventions targeted at the primary prevention of occupational diseases in Connecticut's workplaces. This primary objective will be achieved through activities focused on addressing the specific aims of the proposed research, which are:

1. To assess the completeness of reporting for occupational asthma, burns, and skin disease within the State, through comparison with existing data sources.

2. To assess the knowledge, attitudes, and practices (KAPs) of primary care physicians and selected specialists, as they relate to occupational diseases and reporting requirements, and to target interventions to stimulate more complete reporting of occupational diseases from primary care physicians to the Connecticut Department of Public Health (CT DPH).

3. To assess internal and external capacity for future development and implementation of a NEDSS-compliant electronic reporting system for occupational diseases.

4. To identify factors that influence the continuity of disease reporting from occupational health clinics to CT DPH and develop interventions aimed at ensuring continuity of reporting from individual clinics.

5. To enhance processes for dissemination of occupational disease information to appropriate clinicians and public/private-sector decision-makers, and to identify and address ongoing and emerging occupational health issues affecting the State, through formation of an inter-agency communications committee and the Connecticut Occupational Health Advisory Board.

In general, activities to address these specific aims will involve comparison of existing CT DPH occupational health data with existing data from other sources (i.e. hospital discharge, Worker's Compensation, CT Department of Labor) to identify barriers to complete and timely reporting of occupational disease events. The proposed activities will also involve collection of new data in the form of surveys to assess physicians' KAPs related to occupational diseases and their willingness to report complete and timely data. Subsequently, interventions incorporating outreach and training will be developed and tested to target factors identified as adversely affecting timely, complete and continuous reporting. Qualitative and quantitative methods of evaluation will be utilized to identify significant factors affecting reporting and to assess the

effectiveness of individual interventions. Specific intervention activities will focus initially on smaller areas, with the goal of expanding targeted conditions and effective interventions to larger areas throughout the State toward the end of the study period. In addition, the Connecticut Occupational Health Advisory Board and an inter-agency communications work-group will be assembled to identify specific targets for current and future occupational health surveillance and intervention activities, and to implement processes for disseminating occupational disease surveillance data and other information originating from CT DPH.

Program Area: Surveillance Research Methods (NORA)
Title: Improving Data Quality in Pesticide Illness Surveillance
Investigator: Jim VanDerslice
Grant Number: U01 OH007296
Start & End: 9/30/2000-9/29/2004
Affiliation: Washington State Department of Health
City & State: Olympia, WA
Phone: (360) 236-3361

Description:
Washington State has required investigation of all reported suspected pesticide related illnesses since 1970. While Washington has successfully initiated several effective interventions based on this data, the usefulness of the data for developing such interventions has been limited due to weaknesses of the data and of the data management system. Increasing the value of the information produced by Washington's occupational pesticide illness surveillance system must be based on a systematic evaluation and enhancement of data quality, data collection procedures, and data analysis and interpretation. The specific aim of this project is to increase the value of the information generated by the pesticide illness surveillance system as a means of formulating and evaluating more effective intervention efforts to protect workers from pesticide exposures and illnesses. Specifically this project will: 1) Evaluate and improve the quality of data collected by the surveillance system by assessing the quality of data produced by each of its components data sources, investigating the degree and determinants of underreporting through focus groups and a review of outpatient records, and development of a system for incorporating incident data into a Geographic Information System; 2) Improve the functionality and compatibility of the database management system by incorporating functions to analyze and export data using NIOSH variable definitions, coding and format; and 3) Enhance the analysis of the surveillance data and expand the dissemination of program and policy relevant information derived from surveillance data by gathering input from stakeholder on questions that need to be addressed, developing short focused reports on these topics, evaluating the usefulness of these reports, and institutionalizing those analyses and reports which generate information which directly helps to develop and evaluate intervention policies and programs.

Program Area: Traumatic Injuries (NORA)
Title: Risks for Workplace Violence in Long-Haul Truckers
Investigator: Debra Anderson
Grant Number: R01 OH007931
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Kentucky
City & State: Lexington, KY
Phone: (859) 257-3410

Description:
The purpose of this study is to investigate the incidence and distribution of workplace violence among female and male long-haul truck drivers and the effects of violence on their mental health. An average of 20 workers are murdered each week in the U.S. and an estimated 18,000 workers per week are victims of non-fatal assault (NIOSH, 2001). Homicide is the leading cause of death among U.S. women in the workplace and depending on the geographic area, the first, second or third leading cause of death among all workers (Simonowitz et al., 1997). Sixteen percent of workplace homicides are perpetrated by an intimate partner (NIOSH, 2001).

The specific aims are to: (1) identify the types of violence that women and men experience while working as a long-haul truck driver; (2) identify risk factors that contribute to violence against truckers and between truckers.; (3) differentiate the risks of work-related stress among distinct sociodemographic groups of truckers as they relate to specific exposures experiences by long-haul truck drivers; (4) determine the prevalence of domestic violence experienced by long-haul truck drivers when their driving partner is their intimate partner; and (5) identify work environment factors that place truck drivers' safety at risk. The aims of this project are consistent with the Healthy People 2010 objectives that address the reduction for work-related homicides (Objective 20-5) and work-related assaults (Objective 20-6), and with National Institute for Occupational Safety and Health National Occupational Research Agenda (NORA) Objectives. They also address types of violence identified by the Iowa Report to the Nation on Workplace Violence (2001). The project specifically focuses on risk factors related to workplace violence in the long-haul trucking profession. A cross-sectional, non-intervention design using both quantitative and qualitative methods will be used to collect data. A quantitative survey will be conducted with a non-collected on violence-related variables (e.g., harassment, weapons, assault, rape, robbery, worksite security, fatigue, psychological strain, and substance abuse). Qualitative data on violence at the worksite will be collected via 60 phone questions about workplace violence. The findings will assist in the development of interventions to decrease the risk of exposure to violence in the long haul trucking industry. A sequential and staged approach to the analysis of the data will be used. Dependent on the specific aim, bivariate relationships, logistic regression, discriminant analysis. Cronbach's alpha, and ANCOVA will be used. Content analysis will be used to describe, analyze, and interpret the qualitative data for core consistencies and meanings described by truckers.

Program Area: Traumatic Injuries (NORA)
Title: Spokane Workplace Domestic Violence Initiative
Investigator: Christopher Blodgett
Grant Number: R01 OH007947
Start & End: 9/30/2002-9/29/2005
Affiliation: Washington State University
City & State: Spokane, WA
Phone: (509) 358-7679

Description:
Domestic violence is a leading cause of preventable injury and death. Workplace domestic violence is under identified and programs in the workplace are needed to identify and intervene in domestic violence. This proposal will: increase the identification of domestic violence in the workplace (DVWP); increase the capacity of organizations to prevent workplace violence incidents through preventive policies and early intervention practices; and increase the effectiveness of responses to workplace domestic violence through a coordinated community response to improve the quality of business response, victim supports, and law enforcement intervention. The proposed initiative uses employee and management education, business policy development, the creation of incident reporting strategies to increase the identification of DVWP incidents, and a continuing relationship with the intervention team to improve programs over time. A second principal objective of this initiative is to develop the organizational development strategies, management and employee skills, and follow-up strategies to assure that policies result in effective practices in the workplace. In this initiative, we propose a coordinated community response to assess and reduce the emerging threat, protect the individuals at risk, reduce the risk of re-victimization, and reduce the disruption to the mission of the affected business. Key to this coordinated response is the melding of victim support and safety and law enforcement response with businesses' obligations to aid their employees and pursue their mission as organizations. We will conduct a longitudinal, randomized outcomes study of the effectiveness of a DVWP intervention that integrates these educational, organizational development, and crisis response components.

Program Area: Traumatic Injuries (NORA)
Title: Wisconsin Dairy Traumatic Occupational Injury Intervention
Investigator: Larry Chapman
Grant Number: R01 OH007578
Start & End: 9/30/2001-9/29/2005
Affiliation: University of Wisconsin
City & State: Madison, WI
Phone: (608) 262-7408

Description:
This project will implement and evaluate the effectiveness of an intervention in the workplace intended to prevent and reduce traumatic agricultural injuries. We plan to build on our on-going intervention among the 21,000 dairy operations in Wisconsin that constitute 20% of the nation's operations and employ over 73,500 workers. Since there is no effective workplace safety regulation for most of this industry, our intervention strategy focuses on encouraging the adoption of production practices that are more profitable as well as safer. Our principal outcome measures are those which monitor our intervention's success at the population level (i.e. what percent has adopted for each innovation, what percent is aware). In this application, we plan to accomplish three specific aims:

1. Continue, for three additional years, a community-based, information-dissemination intervention among Wisconsin dairy producers that will reduce traumatic injuries by persuading operation managers to adopt safer and more efficient work methods. We will reduce hazards (and thereby injuries) by improving information flow to dairy operation managers to persuade them to adopt production methods that are both safer and more profitable. We will begin continuing the intervention in the first year of this application when other funding ends (Mar02).

2. Conduct annual, large sample, mail questionnaire-based scientific evaluation of the information dissemination intervention that includes both process and outcome measures. We intend to: 1) determine if our materials are reaching the target audience and which intervention aspects are most effective, 2) determine whether dairy producer adoption and awareness of each production method have increased, and 3) determine whether dairy farmer perceptions of each hazard-reducing production method's relative safety or profit advantages are improving (mail questionnaires administered Feb03, Feb04, Feb05).

3. Add one or two traumatic injury-reducing production methods to the intervention in each of the three additional intervention years. We will seek out reports from farmers and others about emerging production methods that could improve both safety and profits and add one or more of the new production methods to the intervention to promote statewide at the start of year 6 (Mar02), year 7 (Mar03), and year 8 (Mar 04). This work will begin at the start of this project (Sept01).

Program Area: Traumatic Injuries (NORA)
Title: Organizational Factors Affecting Police Victimization
Investigator: Lorie Fridell
Grant Number: R01 OH007946
Start & End: 9/30/2002-9/29/2004
Affiliation: Police Executive Research Forum
City & State: Washington, DC
Phone: (202) 454-8318

Description:
Law enforcement officers are second only to taxi cab drivers in terms of the rates at which they are murdered on the job. Their rate of non-fatal violent victimizations exceeds that of taxi drivers and, indeed, exceeds the rates of all other occupational groups. Despite the seriousness and importance of the problem of violence against the police and despite considerable changes within agencies over recent years geared toward improving officer safety, we know surprisingly little about the impact of various law enforcement agency initiatives on the level of violence against their personnel. The Police Executive Research Forum (PERF) proposes a project the aim of which is to identify law enforcement agency policies, practices, and training that reduce the incidence of assaults and murders of on-duty police officers. The project will produce policy relevant information for law enforcement agencies that can be used to safeguard police on the streets. To achieve our aim, we will use multivariate statistical analyses to identify the factors both internal and external to law enforcement agencies that impact on the rate at which police are assaulted/murdered. The dependent variable will be the rates at which officers are assaulted/murdered. The two sets of independent variables will represent (1) factors internal to the agency that might impact on officer safety (e.g., training, policies, practices, equipment), and (2) factors external to the agency that might impact on the rate at which officers are assaulted/killed (e.g., violent crime rate, poverty level). The second set of variables (external variables), selected based on prior research, are necessary control variables that will enable us to effectively identify the impact of the organizational variables. In addition to a technical report for the funding agency, we will produce a practical guide for law enforcement officers and executives summarizing our findings and outlining recommendations based on our results that can promote the safety of officers on our streets.

Program Area: Traumatic Injuries (NORA)
Title: Surveillance Research Methods in Construction Injury
Investigator: Judith Glazner
Grant Number: R01 OH007633
Start & End: 9/30/2002-9/29/2005
Affiliation: University of Colorado
City & State: Denver, CO
Phone: (303) 315-7939

Description:
Construction workers have among the highest rates of occupational injury, yet there are significant challenges in understanding their work exposures and the injuries associated with them for a number of reasons that are closely associated with the way they work. Construction workers are mobile, working for multiple contractors, which makes them difficult to enumerate. Their job sites are constantly changing as are the associated hazards. The work is often done by multiple trade groups on site with different responsibilities, different immediate supervisors, potentially different safety priorities and training requirements, and usually different compensation carriers. Yet the work of one group of workers has great potential to affect the health and safety of other workers. In recent years, the U.S. economy has supported much construction; consequently the construction trades have attracted Latino workers, presenting new challenges associated with language and cultural differences to the safety and health of workers.

We propose to assess occupational injuries and hazards on a long-term commercial construction site in the Denver area with a diverse workforce. The study will take place through collaboration with the University of Colorado's "rolling owner-controlled insurance plan." This arrangement provides a unique opportunity to enumerate time at risk among a variety of trade groups and to document their work injuries and the circumstances surrounding those events as well as the changing hazards associated with different stages of construction. Data will be collected through a combination of quantitative and qualitative methods which will allow both case-based and rate-based analyses. The result should be improved understanding of the injury experience of workers as well as the context in which injuries occur on complex construction projects, which will be useful for guiding prevention efforts.

The proposed work will address a number of NIOSH's priorities, including surveillance methods, traumatic injury, construction workers, and special populations, specifically Latino construction workers.

Program Area: Traumatic Injuries (NORA)
Title: Evaluation of Traumatic Injuries in HCW During Surgery
Investigator: Denise Korniewicz
Grant Number: R01 OH007558
Start & End: 9/30/2001-9/29/2005
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 706-7250

Description:
There are over 8 million health care workers (HCW in the U.S. and approximately 600,000-1 million needlesticks occur resulting in 1000 new cases of HIV, HBV, HCV among HCW. Recent increases in the rate of needlestick/sharp injuries and exposure to bloodborne pathogens has been reported to be greater than 50% in HCW who work in the operating room (OR) as compared to other HCW in other settings. Most important, 22% of all needlestick injuries have been reported by surgical personnel with 33% of the injuries occurring in the surgical field, 25% occurring at the surgical site, 59% occurring with the non-dominant hand.

An alternating block design (four six month blocks) is proposed to: (1) investigate the factors associated with needlestick/sharp injury during a surgical episode and (2) to evaluate specific surgical factors (length of surgery, surgical instrumentation, handedness, use of indicator gloves for needlestick/sharp injury, sequence of surgical cases) that impact on the rate of traumatic (needlestick/sharp) injury among HCW during surgery. During a 24-month data collection period all operating room personnel involved in the study will be trained to use an indicator glove and medical devices (blunt suture needles and retractable scalpels) engineered to reduce the rate of needlestick/sharp injuries. Data will be collected by circulating room nurses for type of surgery, HCW identification, role of HCW, surgical instruments used during a surgical episode, and numbers of glove changes during the episode. Following the surgical event, all gloves will be collected, visually inspected for defects, cuts, and holes and tested for barrier integrity via the standardized FDA waterleak test method (1000cc/2 min.).

Multivariate analysis will be conducted and logistic regression to determine the factors predictive of needlestick/sharp injuries to OR personnel.

Program Area: Traumatic Injuries (NORA)
Title: Evaluation of Workplace Violence Prevention Intervention
Investigator: Jane Lipscomb
Grant Number: R01 OH007948
Start & End: 9/30/2002-9/29/2007
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 706-7647

Description:
Workplace violence is pervasive in the social service and health care setting. Washington State workers' compensation assault injury data for 1995-2000 ranks Social Services as the highest risk major industry (142.0 per 10,000 workers) followed by Health Services (74.6 per 10,000 workers). Within Social Services, Residential Care ranked 2nd among specific industries with a rate of 301 per 10,000 workers, To address these data, we will conduct a comprehensive assessment of risk factors for violence and occurrences of violence in a sample of social service workplaces. Upon completion of the initial risk assessment we will develop and implement a comprehensive violence prevention program in these workplaces. The program will be developed in concert with federal OSHA Guidelines for violence prevention. Management Commitment and Employee Involvement are inherent in the design of the proposed study and include the formation and work of joint labor-management advisory groups. A Worksite Analysis will include focus groups, a pre-intervention survey, and walk-through evaluations. Hazard Prevention and Control will be accomplished by implementing recommendations from the walkl-through survey and focus groups. The advisory groups in consultation with project staff will review and make recommendations for necessary changes to policies and procedures. Training and Education will take place in year three of the study. Formative evaluation of the project will be ongoing. The impact of the intervention on staff assault experience will be evaluated one year following implementation of the program. The specific aims of the proposed five-year project are as follows. (1) Describe environmental, organizational, and behavior/interpersonal risk factors for workplace violence present in the social service workplace. (2) Assess the assault experience of staff in these workplaces. (3) Examine the relationship between organizational factors and staff assaults in this sample of workplaces. (4) Design and implement a violence prevention intervention within these workplaces. (5) Conduct a process and outcome evaluation of the intervention in sample workplaces one year following program implementation.

Program Area: Traumatic Injuries (NORA)
Title: Workplace Violence Risk in the Home Health Work Place
Investigator: Jane Lipscomb
Grant Number: R21 OH007754
Start & End: 9/30/2002-9/29/2004
Affiliation: University of Maryland
City & State: Baltimore, MD
Phone: (410) 706-7647

Description:
Workplace violence is recognized as a significant occupational hazard in the healthcare sector, however little is known about the magnitude of the problem and effective prevention strategies in the home health care workplace. Home health care workers are exposed to many of the same hazards associated with workplace violence as their counterparts in the hospital environment, but they face additional risk related to the nature of the way their work is organized. Their work is often highly unpredictable and they have little or no control of the physical work environment Also, the differing social role of caregiver and client (family or domestic partners) when in the client's home may place these workers at increased risk of assault related injury. The overall objective of this exploratory research project is to collect pilot data to inform study design, sampling strategy, and measurement of workplace violence in the home health work place. The pilot project will develop measures for risk factors, threats and assaults and current violence prevention strategies. This project will also develop measures to assess current violence prevention strategies in home health and their coherence with OSHA's violence prevention guidance for home healthcare. This pilot project will provide a conceptual and methodological blueprint for a large-scale investigation of workplace violence in home health care via the following specific aims: (1) Develop valid and reliable measures of potential risk factors for workplace violence in the home health workplaces, with a focus on organization of work factors. (2) Ascertain empirical sampling parameters of the relevant dependent variables, threats and assaults, in order to calculate sample size and power estimates for future study examining the association of identified risk factors and assault in home health. (3) Describe the frequency and severity of threats and assault in a sample of Maryland home health work places . (4) Develop measures to assess current violence prevention strategies in home health and their coherence OSHA guidelines for a comprehensive violence prevention program. Valid and reliable measures of workplace violence in home health care work places will be developed through the use of focus groups and a self -administered survey of direct care providers and administrators from two Maryland home health agencies. Focus group notes and transcripts will be analyzed for the purpose of developing survey questions. Content validity of the instrument will be established by convening a panel of violence experts to rate items for adequacy and relevancy. The survey will then be piloted with a sample of direct care providers from the two agencies. Survey results will be analyzed to measure the validity and reliability of measures of risk factors for assault, threats and assaults. In addition, the validity of these measures in the home health worker population will be ascertained to develop an empirical sampling strategy for future work. Focus groups will assess the type of preventive strategies in use in home health care. Measurement items based on the framework for OSHA' s 1996 violence prevention guidance for community health workers employers will be developed. Strategies for contacting and conducting future research among a larger population of home health care workers will be explored.

Program Area: Traumatic Injuries (NORA)
Title: Homicide During Robbery: A Case-Control Study
Investigator: Dana Loomis
Grant Number: R01 OH003897
Start & End: 8/1/2003-7/31/2005
Affiliation: University of North Carolina at Chapel Hill
City & State: Chapel Hill, NC
Phone: (919) 966-7433

Description:
Violence in the workplace is widely recognized as a major public health issue. Occupational homicide rates have continued to rise throughout the 1990s, despite declining rates of occupational death from all major unintentional causes. The majority of occupational homicides are the result of robbery, or attempted robbery, of the workplace. The case-control study will focus on workplace and event-phase risk factors for workplace robbery-homicide. The study will compare workplace robberies which result in homicide (cases) to robberies which do not result in homicide (controls). Cases will be defined as all occupational homicide, as a result of robbery or attempted robbery, in the state of North Carolina for the period 1994-99 and will be identified through the state medical examiner system. For every case, two controls will be selected from investigations of workplace robberies, not resulting in homicide, conducted by the same law enforcement agency that investigated the case. Controls will be identified using the Uniform Crime Reporting System maintained by the North Carolina State Bureau of Investigation. Approximately 90 cases and 180 controls will be enrolled in this 2.5 year study. This study will utilize and extend the successful methodologies, collaborations, and databases developed in connection with recent studies of occupational injury and homicide. The study will make a significant contribution to our knowledge about how best to reduce the incidence of occupational robbery-homicide.

Program Area: Traumatic Injuries (NORA)
Title: Occupational Injuries Among Commercial Fishers
Investigator: Dana Loomis
Grant Number: R01 OH004073
Start & End: 6/1/2000-5/31/2004
Affiliation: University of North Carolina
City & State: Chapel Hill, NC
Phone: (919) 966-2251

Description:
This is a prospective cohort study of occupational injuries among commercial fishers that seeks to:
(1) measure the incidence of nonfatal occupational traumatic injuries and musculoskeletal disorders;
(2) to characterize the types and severity of occupational traumatic injuries and musculoskeletal disorders; (3) to describe and characterize the work processes, equipment, and environmental conditions; and
(4) to identify risk factors that could be modified to reduce the risk or severity of injury.
The study will be carried out via an intensive, two-year prospective follow-up of a cohort of commercial fishers in Eastern North Carolina. The cohort will be characterized in detail by clinical evaluations conducted at the beginning and every six months thereafter, and incident injuries will be ascertained prospectively by telephone interviews conducted weekly during the fishing season. This follow-up strategy will ascertain injury occurrence in a population that is ordinarily hard to study because of their geographic dispersal and irregular work schedules. The statistical analysis will use methods for repeated measures data.

Program Area: Traumatic Injuries (NORA)
Title: Risk Factors and Controls for Falls From Heights
Investigator: Maury Nussbaum
Grant Number: R01 OH007882
Start & End: 9/1/2003-8/31/2007
Affiliation: Virginia Polytechnic Institute and State University
City & State: Blacksburg, VA
Phone: (540) 231-6053

Description:
Falls from heights are a major problem in both industry and general society when measured in terms of economic losses and human suffering. Given that most of these falls are believed to result from a loss of balance, appropriate strategies to address the problem of falls should focus on improving balance control. Existing research has identified a number of major extrinsic and intrinsic factors involved in the control of balance. Only recently has another intrinsic factor, localized muscle fatigue, been shown to influence balance control. Additional research is needed to further our understanding of how fatigue contributes to loss of balance and falls.

To address this need, three projects are proposed that will use laboratory experiments and biomechanical modeling to investigate and mitigate the effects of localized muscle fatigue on balance control. First, experiments will be conducted to examine and quantify the effects of localized muscle fatigue on balance control and the ability to recover from a balance perturbation. Second, a biomechanical model will be developed to quantify balance control strategies in terms of joint torques and to predict the effects of localized fatigue on these parameters. Third, the effectiveness of two interventions aimed at reducing the adverse effects of fatigue on balance control will be determined.

Completion of these projects will provide new information concerning factors that can adversely affect balance control and contribute to the development of intervention strategies for fall prevention. Emphasis is also placed on understanding age-related changes in the effect of fatigue on balance control, in light of epidemiological evidence of high fall risks among older workers and demographic trends toward an aging population and workforce.

Program Area: Traumatic Injuries (NORA)
Title: Trucking Firm Characteristics, Driver Injury and Outcome
Investigator: Arthur Oleinick
Grant Number: R01 OH003804
Start & End: 7/1/2001-6/30/2004
Affiliation: University of Michigan
City & State: Ann Arbor, MI
Phone: (734) 764-3238

Description:
Truck drivers had the highest number of occupational injuries and illnesses causing time away from work during 1992-97 and the third highest rates. Except for back injuries, almost no information is available on risk factors for such injuries. Neither the role of personal factors nor that of motor carrier (trucking firm) operating characteristics and vehicle features is understood. This study brings together experts from truck transportation, industrial relations, occupational medicine/epidemiology and biostatistics to link and analyze data sets that have not been combined previously to investigate factors associated with truck driver injury and outcome.

The study will: (1) calculate incidence rates by motor carrier operating characteristics, fleet size and truck configuration; (2) estimate medical care use in different medical care settings by social-demographic, truck firm and specific medical diagnosis and model such use with logistic or Poisson regression; (3) model outcome measured by lost work-time using logistic, Poisson and Cox models; and (4) calculate the predictive value of the resulting models by appropriate methodology.

The compensation information will be obtained from a major industrialized State's workers' compensation bureau. The data covers about 60-65% of the state workers, including all workers in firms with 2-500 workers, with the balance of the workforce covered by self-insured employers. Data from the workers' compensation agency include social-demographic, accident characteristics, medical care use and compensation for lost work-time. The study population consists of about 12,000 workers who had work-related injuries or illnesses occurring in 1996-98. Follow-up will be available through mid-2001. Motor carrier operating characteristics and vehicle features will be obtained from federal or state regulatory agencies. Truck crash information will also be obtained from federal or state sources.

Incidence rates are calculated by linking compensation and truck firm data. Logistic, Poisson and Cox models are used to test hypotheses and identify significant factors in incidence, medical care use and outcome. Predictive value is evaluated by ROC curves, the Bayes Information Criteria or other recommended approaches.

Program Area: Traumatic Injuries (NORA)
Title: Evaluation of California Initiatives to Reduce Violence in Health Care Settings
Investigator: Corrine Peek-Asa
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-4895
Grant Number: R01 OH007934
Start & End: 9/30/2002-9/29/2005

Description:
In response to a growing awareness of violence against health care workers, the State of California implemented two initiatives to reduce workplace violence in health care facilities. The first initiative was Cal/OSHA's 1993 release of "Guidelines for Security and Safety of Health Care and Community Service Workers." These Guidelines describe elements of a comprehensive security program for the health care setting. The second initiative was the California Hospital Safety and Security Act (Assembly Bill 508), which required licensed acute care and psychiatric facilities to implement a comprehensive security program by July, 1995. The combination of these two initiatives is unique among states, and no formal evaluation of either of these initiatives has been conducted.

The overall goal of this proposed research is to apply a quasi-experimental study design to evaluate the simultaneous effects of these two initiatives. The first objective is to conduct an impact evaluation to determine if the initiatives led to improve security programs in California hospitals. The second objective is to conduct an outcome evaluation to determine the effects of the two initiatives on incidence rates of violent events in hospitals.

Psychiatric and Acute Care Hospitals in California will comprise the intervention population and those in New Jersey will comprise the comparison population. New Jersey was chosen as the comparison state because they follow Federal OSHA Guidelines and have no specific state-based initiatives regarding hospital security programs. At least 150 intervention and 50 comparison hospitals will be sampled using a stratified random sampling method to represent urban safety program material and interviews with the Nurse Mangers, Risk Mangers and an average of three staff members within each unit. The security assessment will evaluate environmental modifications, work practice changes, policies and practices implemented, training, security services, management commitment, use of risk assessment, and violent event surveillance. Incident rates of violent events in participating facilities will b e the main outcome measure. An interrupted time-series analysis will be used to determine if the initiatives led to decreases in rats when compared to the comparison hospitals. The relationship between different components of the security programs and violent event rates will also be examine. This proposal is a unique opportunity to examine the impact of state-based prevention initiatives and to identify the most effective components of hospital security programs. Such evaluations have been identified as a priority in research agendas including NORA and Workplace Violence: A Report to the Nation.

Program Area: Traumatic Injuries (NORA)
Title: Work-Related Motor Vehicle Crashes: Reducing the Burden
Investigator: Pamela Peele
Grant Number: R01 OH003419
Start & End: 9/30/2001-9/29/2004
Affiliation: University of Pittsburgh
City & State: Pittsburgh, PA
Phone: (412) 624-2743

Description:
Motor vehicle crashes are the single major occupational cause death for American workers. A great deal has been learned about prevention of motor vehicle crashes for the general public; much less is known about the underlying causes and effective preventive strategies for work-related motor vehicle crashes. Few studies have focused on non-fatal motor vehicle injuries in the workplace, and there is no comprehensive information on morbidity and costs of work-related motor vehicle crashes. This competing continuation represents a natural extension of our currently funded project "Analysis of Capitated Payments in Workers' Compensation," (5 RO 1 OH03419-03) through which we have developed a database and prospective record linking system to capture comprehensive data on the number, magnitude, and economic impact of work-related injuries for the 29,000 employees of the City of Philadelphia.

We now propose to expand that database through additional record linking of existing databases, in order to comprehensively analyze the nature and causes of occupational motor vehicle crashes involving City vehicles and to develop a risk factor model which accounts for morbidity and economic burden of these events. This proposal addresses the National Occupational Research Agenda (NORA) priority research areas of. Traumatic Injuries; Health Services Research; Intervention Effectiveness Research; Social and Economic Consequences of Worker Illness and Injury; and Surveillance Research Methods. To achieve these goals, we will pursue three highly focused Specific Aims:

1. Create a comprehensive database of municipal employees and their work-related motor vehicle crashes suitable for risk factor analysis using existing data on municipal workers in the City of Philadelphia, including a broad range of information on all City drivers and vehicles which focuses on the morbidity and economic impacts of crashes and provides the foundation for an ongoing crash surveillance system.

2. Develop predictive models to define the determinants of work-related motor vehicle crashes, by examining risk factors related to driver characteristics, vehicle factors, and crash factors, using retrospectively collected data on the City's workforce and vehicles. Test and validate predictive models of work-related motor vehicle crashes, by using prospectively collected data on the City's workforce and vehicles.

3. Test and validate predictive models of work-related motor vehicle crashes, by using prospectively collected data on the City's workforce and vehicles.

Program Area: Traumatic Injuries (NORA)
Title: A Strong Construction Injury Prevention Intervention at the Subcontractor Level
Investigator: Pete Stafford
Grant Number: R01 OH007565
Start & End: 9/30/2001-9/29/2004
Affiliation: Centers to Protect Workers' Rights
City & State: Silver Spring, MD
Phone: (301) 578-8500

Description:
The goal of this proposal is to lower injuries in construction, using methods that are easily replicable to the entire construction industry. The proposal aims to show that introducing strong injury prevention methods similar to those in use at industry-leading companies, at the level of the subcontractor, can be proven to improve safety practice and lower injuries. The methods to be used to achieve this goal are:

1. Spend the first four months gathering best practice strong safety programs and crafting the intervention safety program, which will include but not be limited to: 100% hard hat use, 100% use of proper eye protection, 100% fall protection use, and weekly pro-active safety visits by company personnel to each worksite of the company. Other points will arise from the best practices specific to each trade.

2. Simultaneously, enlisting forty (40) medium to large contractors - greater than 50 full-time equivalent construction workers, who are willing to institute a strong safety program but do not currently have one. The contractors will be drawn from every trade and craft in the AFL-CIO Building and Construction Trades Department, and will be drawn from four geographic areas.

3. Developing and implementing the program at each of the 40 contractors.

4. Perform a safety visit to a worksite for each company every two months, to ensure that the company is following its safety policy.

5. Perform control safety visits to matched sites - similar in size, trade and craft, worktype and location, to contractors not in the study, to determine the present state of safety practice throughout the length of the study period.

6. Gather injury data - OSHA 200 logs and construction work hours, and calculate injury rate and lost-time injury rate for the study group. Experience leads to a belief that control group injury data cannot be collected, but an effort to collect the OSHA logs and worker hours of the companies seen at control sites will be made.

The expectation is that the 40 companies will significantly improve their safety practice over the background safety practice, and will lower their injury rates.

Program Area: Traumatic Injuries (NORA)
Title: Adolescent Farm Work, Fatigue and Injuries in Colorado
Investigator: Lorann Stallones
Grant Number: R21 OH007744
Start & End: 9/30/2002-9/29/2004
Affiliation: Colorado State University
City & State: Fort Collins, CO
Phone: (970) 491-6156

Description:
Fatal and nonfatal injuries among adolescents have been reported to be higher on farms than in other environments. Reasons for higher injury rates among adolescents residing on farms are multifaceted and often unclear. Recent research has focused on identification of parental attitudes and behaviors, which place children and adolescents on farms at high risk of injury .Parents directly influence farm work practices among children and adolescents, and studies to understand parental motivation are important in designing effective educational programs to reduce injuries among adolescents on farms. Further work is needed to address the issue of adolescent behaviors and attitudes, which influence the risk of farm injuries. Other factors contributing to increased risk of injuries on farms must also be considered in the design of a comprehensive educational program to reduce injuries. One such area is the relationship between fatigue in adolescents and the risk of injuries. It has been documented that fatigue due to sleep deprivation leads to a diminished capacity to function effectively in adults. One study focusing on sleep loss in adolescents showed that sleep deprivation in adolescents was also related to the decline in performance. Despite obvious implications such observations may have on farm related injuries in adolescents, very little work has been done to assess level of fatigue in adolescents residing on farms. The purpose of this study are to: (1) describe attitudes and behaviors among adolescents aged 13-18 years related to work practices on Colorado farms; (2) describe sleep patterns among adolescents on Colorado farms; (3) describe the injury patterns of 600 adolescents residing on Colorado farms; and (4) describe the relationship between injuries and adolescent attitude, behaviors, work practices, and fatigue on Colorado farms.

Program Area: Center Grant
Title: Ohio Regional Center for Agricultural Disease and Injury Research, Education and Prevention
Investigator: Thomas Bean
Grant Number: U50 OH008108
Start & End: 9/30/2003-9/29/2006
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-9455

Description:
Dr. Tom Bean who is responsible for overall coordination of the Center will direct the Administrative and Planning Core. Dr. Bean will work closely with the Deputy Director, Dr. Wilkins. He will aggressively promote active exchange/interaction among investigators and others involved in GLCASH activities, including scheduling regular meetings of the External and Internal Advisory Committee. Dr. Bean will also encourage new investigators to develop feasibility projects and pilot programs related to agricultural safety and health and he would monitor the overall budgetary status of the Center, ensuring that monies are spent appropriately. Further, he will track progress on funded projects falling under the auspices of the Center. Dr. Wilkins, also the Research Core Director will monitor the activities of associated researchers within the Research Core and others having interests in agricultural safety and health. Dr. Wilkins will assist Dr. Heaney (Prevention/Intervention Core Director) and Dr. Bruns (Education/Outreach Core Director) in conducting ongoing evaluation of the activities of the Prevention/Intervention and Education/Outreach activities of the Center. Dr's Wilkins, Heaney and Bruns will comprise the Internal Advisory Committee and an External Advisory Committee has been established which is composed of four experts who can provide guidance, direction, and consultation to the GLCASH, and who, in addition, can offer a local, state, and/or national perspective from their experience and expertise in agricultural safety and health.

Program Area: Center Grant
Title: Washington Agriculture Center
Investigator: Richard Fenske
Grant Number: U50 OH007544
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Washington
City & State: Seattle, WA
Phone: (206) 543-0916

Description:
The Pacific Northwest Agricultural Safety and Health Center will continue to serve Alaska, Idaho, Oregon, and Washington and encompass natural resource production activities in the areas of farming, forestry and fishing. This broad definition of agriculture is in keeping with the unique climate, geography and resource base of the region. The Center will have a strong emphasis on injury and illness prevention, health promotion, and on integration of health and safety activities across the region. The Center's overall aims include:

Conduct research related to the prevention of occupational disease and injury among agricultural workers and their families;

Develop, implement and evaluate education and outreach programs for promoting health and safety for agricultural workers and their families;

Develop, implement and evaluate model programs for the prevention of illness and injury among agricultural workers and their families; and

Develop linkages and communication with other governmental and non-governmental bodies involved in agricultural health and safety with special emphasis on communications with other agricultural health and safety programs.

These objectives will be achieved through: 1) development of an infrastructure for research, education, and prevention in agricultural safety and health at the University of Washington, in conjunction with other academic institutions and organizations in Region X; 2) creation of a regional network linking governmental and non-governmental organizations active in the promotion of health and safety and the prevention of illness and injury in agricultural workers and their families; and 3) participation in a network of agricultural safety and health centers. These efforts will be undertaken with a special emphasis on populations such as hired farm laborers, other ethnic minority workers, women, and children.

Program Area: Center Grant
Title: North Carolina Agriculture Center
Investigator: Susan Gustke
Grant Number: U50 OH007551
Start & End: 9/30/2001-9/29/2006
Affiliation: East Carolina University
City & State: Greenville, NC
Phone: (252) 744-1000

Description:
This application proposes the establishment of a Southern Regional Agromedicine Center based at the North Carolina Institute for Health and Safety in Agriculture, Forestry and Fisheries. The Center would address agricultural, forestry and fishing health and safety issues common to the southeastern coastal plains and southern Appalachian of the US and Puerto Rico and the Virgin Islands. The model will be highly interdisciplinary and collaborative with strong administrative input from the member states and territories. This model is pattern after the formation of the NC Institute, which began as a grassroots initiative of investigators from several NC universities and agencies and organizations concerned about Agromedicine issues. The Centers program includes research, education and prevention/intervention projects that are designed to address common regional problems of environment and climate related illness, traumatic injury, pesticide health risks, ergonomic injuries, and reactive airway disease. There is a strong emphasis on broad dissemination of research outcomes and duplication of successful education and prevention/intervention projects throughout the region.

This proposal contains eleven projects, five research, three education, and three prevention/intervention projects. The scope of these projects span seven states and two territories and involve issues in forestry and fisheries as well as agriculture. These projects address important issues affecting minority seasonal and migrant workers who travel and work throughout the Southeast as well as women and children.

Program Area: Center Grant
Title: National Children's Center for Rural & Agriculture Health & Safety
Investigator: Barbara Lee
Grant Number: U50 OH008107
Start & End: 9/30/2003-9/29/2008
Affiliation: Marshfield Clinic Research Foundatin
City & State: Marshfield, WI
Phone: (715) 387-9182

Description:
With the updated action plan from the 2001 Summit on Childhood Agricultural Injury Prevention as the guiding framework, our Center's theme is Building Partnerships to Protect Children at Work and Children at Play on our Nation's Farms and Ranches. Through public-private sector partners, we will conduct outreach, prevention, education, and research projects that reflect geographic, ethnic, and cultural diversity of American agriculture. Special attention is given to Spanish-speaking migrant and immigrant farmworker children.

Barbara Lee, PhD serves as the Center's Director and leader of the Administrative Core. A 10-member External Advisory group and seven Internal Advisors will guide strategies, apply feasibility funds, convene stakeholder meetings, and track progress. In addition to our external advisors and our core team, another 18 individuals have agreed to work on various projects and this number may grow. The Outreach Core, led by Christian Hanna, MPH, consists of three projects that use communication strategies, formal networking among national organizations, and consensus teams to generate "best practices" recommendations on eight different topics. The Intervention Core, directed by Mark Purschwitz, PhD, includes a demonstration project with employers of adolescent farmworkers; and an evaluation of "Generations of Safe Farmers" intervention. Steven Kirkhorn, MD, leads the Education Core, consisting of four formal projects and several "joint sponsored" professional training activities --two projects address Spanish-speaking farmworkers, one offers upgrades to the NASD, and the fourth uses an immersion process with journalists to increase and improve media coverage on children and agriculture. The Research Core, led by Barbara Marlenga, PhD, will pilot test an evaluation of a state law restricting youth tractor operations on public roads.

Our proposed activities will yield measurable and tangible outcomes. We have a strong track record and unwavering commitment to successfully address national objectives for childhood agricultural injury prevention.

Program Area: Center Grant
Title: Texas Agriculture Center
Investigator: Jeffrey Levin
Grant Number: U50 OH007541
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Texas Health Center at Tyler
City & State: Tyler, TX
Phone: (903) 877-7250

Description:
This is a competing renewal for the Southwest Center for Agricultural Health, Injury Prevention, and Education (SW Center). Having developed a regional presence as part of the NIOSH Agricultural Initiative, the SW Center wishes to continue to meet the needs of the agricultural community in five Southwestern states and the nation. There is to be an administrative core with participation by all project directors, and three cores, each with a designated leader, to oversee research, education/outreach, and intervention/prevention activities. The research core specifically addresses migrant children's health issues, agricultural related intimate partner violence, and agricultural exposures with hormonal effects. A pilot project will address the use of poison control centers as sites of improved exposure surveillance. The education core will look to disseminate information to professional and lay audiences, and to continue outreach activities throughout the Southwest, and beyond. A major focus will be continued work with the National Migrant Farmworker community. Intervention core activities will look at traditionally under-served populations including the Navajo, African-American farmers in the Mississippi Delta, and the fishing population of the Gulf Coast. The goal of the SW Center is to both create new knowledge, as well as using existing information to prevent injury and illness among agriculturally-related populations.

Program Area: Center Grant
Title: New York Agriculture Center
Investigator: John May
Grant Number: U50 OH007542
Start & End: 9/30/2001-9/29/2006
Affiliation: Mary Imogene Bassett Hospital
City & State: Cooperstown, NY
Phone: (607) 547-6023

Description:
The New York Center for Agricultural Medicine and Health, in collaboration with investigators from the Pennsylvania State University, Cornell University, University of Rochester, State University of New York, Stony Brook and the New York State Department of Health proposes another five-year cycle of activities. The Northeast Center will continue to be directed by John May, MD, assisted by several external advisory committees and an Internal Advisory Committee of the core directors.

The Research Core proposes five-year projects focusing upon tractor overturns, toxic gases associated with manure pits and the implications of increasing Hispanic labor on Northeastern dairy farms. Pilot projects will study the impact of Lyme disease upon agricultural workers and the effect of ergonomic intervention in orchard work. A three year child injury surveillance project will interdigitate with and expand an existing NIOSH study of child injury on New York farms. The NEW Education Core proposes Agricultural Hazard Abatement Training programs to assist farmers in developing safety planning and training for their business in a number of the region's states. A second project will build a Network of Safety and Health Trainers to address underserved areas in the region. The NEC's Youth Initiative will combine three child injury pilot projects that have proven to be successful. The Prevention Core has three projects. A Migrant Intervention project will utilize specific migrant injury data developed by the NEC under a related NIOSH-National Cancer Institute project with Northeastern migrant health clinics. This and other significant health and safety information will be translated into Spanish and brought to Northeastern farm worker communities and migrant clinics The NEC will then partner with these clinics and help to support community-based solutions to the problems defined. A NEC pilot project in southern Pennsylvania that has focused upon community-based training and coalition building will be continued through the Penn State Cooperative Extension. Evaluations have repeatedly shown NCYAMH's Health Screening/Prevention strategy to be effective in enhancing use of various protective measures. This screening/prevention program will be expanded to serve populations throughout the Northeast. The Evaluation Core will be responsible for coordinating and overseeing the evaluation of all education and prevention projects. This core will also assist with the ongoing Agricultural Centers Evaluation (ACE) project.
The Center will continue with its External Advisory Board and its Executive Panel of leading regional experts. A new Farm Worker Advisory Committee will have five to ten permanent members from migrant health clinics and advocacy groups throughout the region.

Program Area: Center Grant
Title: Kentucky Agriculture Center
Investigator: Robert McKnight
Grant Number: U50 OH007547
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Kentucky
City & State: Lexington, KY
Phone: (859) 323-6836

Description:
The Southeast Center for Agricultural Health and Injury Prevention was established at the University of Kentucky in September 1992. Its location on a land grant campus permits extraordinary collaboration between its home basis of Medicine, Public Health, and other campus disciplines, including Nursing, Agriculture, Engineering, and the Cooperative Extension Service. The Center has three foci: 1) applied research, 2) education and training, and 3) the design of prevention/intervention programs. Twelve projects are contained in this renewal application; five in research, four in education/outreach, and three in prevention/intervention. All six states in our service area will be served (GA, KY, NC, SC, TN, VA). Throughout the past nine years, the Center has attracted substantial extramural funding, in addition to the NIOSH Agricultural Center grant, including awards from the W.K. Kellogg Foundation, Bureau of Primary Health Care, as well as other NIOSH/CDC R01 awards and cooperative agreements. For the current year, these non-Center dollars approach 1.4 million, and the Center has recently doubled its office and lab space to accommodate our growing research enterprise. The Center will continue to be administratively placed in the College of Medicine's Department of Preventive Medicine, which now has strong ties to the new Kentucky School of Public Health. In the last year, 17 peer-reviewed articles or abstracts were submitted or published from Center personnel across five colleges on campus. Core section leaders in research, education, and prevention have been drawn from faculty in the College of Education, Nursing, and Medicine, and all are nationally recognized experts in agricultural health and safety issues. The 12 projects submitted represent persistent and emerging occupational health and safety issues in the Southeast, including farm tractor overturns, migrant worker issues, pesticides and minority populations, and farmer suicides. Education and prevention proposals are built strongly from the experience and work of the Southeast Center staff over the past nine years and represent a refocusing of the Center's efforts to a more research-intensive environment, while still directly serving the population at risk.

Program Area: Center Grant
Title: Colorado Agriculture Center
Investigator: Steve Reynolds
Grant Number: U50 OH007545
Start & End: 9/30/2001-9/29/2003
Affiliation: Colorado State University
City & State: Fort Collins, CO
Phone: (970) 491-3141

Description:
HI-CAHS has been in existence since 1991, but activity in agricultural health and safety began at Colorado State University in 1968 with a grant from the W.K. Kellogg Foundation. The mission of HI-CAHS has and continues to be primary prevention; to save human lives, prevent suffering, and lower cost to society arising from avoidable occupational insults that occur in agriculture through state of the art research, outreach intervention, and agricultural health and safety education. To meet this mission, HI-CHAS is divided into an Administrative Core, which is made up of an Internal Advisory Committee (Center Executive Committee), External Advisory Committee (representation from all States in PHS Region VIII). The administrative core oversees the Multi-Disciplinary Research Core, Education and Outreach Core, and the Prevention/Intervention Core.

The Center is multi-disciplinary, utilizing expertise and resources from the Colleges of Veterinary Medicine and Biomedical Sciences, College of Engineering, College of Applied Human Sciences, and the College of Agriculture. Within each college there are multiple academic departments, which are incorporated into and active in the Center. Also included are: the Colorado State University Cooperative Extension Service, the Agricultural Engineering Research Center and the Center for Environmental Toxicology and Technology (CETT). The Center has also enjoyed long standing support of the NIOSH Western Regional Office in Denver, the OSHA Regional Office in Denver, and numerous trade associations, farmers, ranchers, and agricultural cooperatives throughout the region.

The Center's main strength is its human resources, but the physical resources are considerable as well. These include: over $1.0 million in industrial hygiene equipment, 3 major industrial hygiene laboratories, 6 fully equipped offices in the Environmental Health building, offices and laboratories in agricultural engineering, social work, and Agricultural Sciences and the Agricultural Research Engineering complex, and the offices, equipment and laboratories of the CETT. We also have an analytical laboratory with sophisticated equipment ranging from atomic absorption to a mass spectrometer.

Program Area: Center Grant
Title: High Plains Intermountain Center for Agriculture Health & Safety
Investigator: Stephen Reynolds
Grant Number: U50 OH008085
Start & End: 9/15/2003-9/14/2006
Affiliation: Colorado State University
City & State: Fort Collins, CO
Phone: (970) 491-3141

Description:
Colorado State University's High Plains Intermountain Center for Agricultural Health and Safety (HI-CAHS) has been a vital resource serving the agricultural population of federal Region VIII for more than 12 years. HI-CAHS has an outstanding record of productivity, evidenced by more than 70 peer-reviewed publications, 25 graduate students trained, hundreds of presentations and thousands of outreach contacts in 1996 to 2003. The mission of HICAHS is to reduce injury and illness among the agricultural population in Region VIII. Housed in a land grant institution, HICAHS is well positioned to translate research knowledge into community action. This application describes a reorganization of HICAHS to better meet the goals of the National Program for Occupational Safety and Health in Agriculture through research, intervention/prevention, education and outreach. Our External Regional Advisory Committee (representing: agricultural producers, farm bureau, health and veterinary care providers, church, agricultural business,
migrant advocates, Cooperative Extension, and the University of Utah NIOSH ERC) provided critical consultation and will be key partners in implementing the proposed activities.
The goals of the High Plains Intermountain Center for Agricultural Health and Safety will be:
1) To conduct multidisciplinary research related to the prevention of occupational disease and injury among agricultural workers and their families in Federal Region VIII.
2) To develop, implement, and evaluate education and outreach programs for promoting health and safety for agricultural workers and their families in Federal Region VIII.
3) To develop, implement, and evaluate models programs and tools for intervention and prevention of illness and injury among agricultural workers and their families in Federal Region VIII.
4) To develop linkages and communication with other governmental and non-governmental bodies involved in agricultural health and safety, and especially with other agricultural health and safety programs.

Program Area: Center Grant
Title: Iowa Agriculture Center
Investigator: Wayne Sanderson
Grant Number: U50 OH007548
Start & End: 9/30/2001-9/29/2006
Affiliation: University of Iowa
City & State: Iowa City, IA
Phone: (319) 335-4207

Description:
The University of Iowa's Great Plains Center for Agricultural Health has been a vital resource in agricultural health and safety in the Federal Region VII since 1990. The Center has an outstanding track record of productivity as evidenced by 218 publications, 367 presentations, 32 training courses, support for 26 graduate students, 50 meetings sponsored and 38 other products during 1996-01. This renewal application describes a reorganization of the GPCAH to meet the goals of the NIOSH Agricultural Health and Safety Center Program: research, outreach/training, and prevention of agricultural illnesses and injuries. The goals of The University of Iowa Great Plains Center for Agricultural Health (GPCAH) for 2001-06 will be:
1) To conduct a multidisciplinary agricultural health and safety research program in Federal Region VII in line with national research priorities for agricultural health and safety;
2) To develop and evaluate novel disease and injury prevention models that assesses educational, outreach and intervention programs targeting farmers and farm family members in Iowa and Federal Region VII:
3) To develop and implement professional training related to agricultural health and safety for health professionals including industrial hygienists, veterinarians, and physicians;
4) To provide agricultural health and safety technical assistance and consultation in research methods, training, and education to health professionals and community-based organizations in Federal Region VII; and
5) To maintain and strengthen links with health professionals in academic institutions, state and federal agencies, and international organizations engaged in agricultural health and safety research, training and prevention programs.

Program Area: Center Grant
Title: California Agriculture Center of UC Davis
Investigator: Marc Schenker
Grant Number: U50 OH007550
Start & End: 9/30/2001-9/29/2006
Affiliation: University of California
City & State: Davis, CA
Phone: (530) 752-5676

Description:
The major goal of the UC Agricultural Health and Safety Center at Davis is to improve the health and safety of farmers, farm family members and farmworkers in western agriculture. To achieve this goal a team of 13 scientists plus co-investigators and numerous support staff has been assembled. Center collaborations exist in Arizona and Hawaii, and an annual conference will be rotated between Davis and the Northwest Ag Center in Washington. Western agriculture represents practices and a workforce population different from the rest of the country. UC Davis is uniquely situated to address these issues because of the co-location of its Schools of Medicine and Veterinary medicine, and the College of Agriculture and Environmental Sciences. The diverse expertise of the Center faculty permits achievements of the Center goals by varied, largely field-oriented research projects and interventions. Areas of specific interest include respiratory disease in dry climate farming, ergonomic hazards of farm labor work, acute and cumulative trauma injuries, biomarkers and neurotoxicity of pesticide exposure, health status of hired farmworkers, and economic and policy issues pertinent to agricultural health and safety.

The Center is organized into research, intervention/prevention, education and administrative cores. Communication and synergism between investigators in the different cores is a key function of the Center, and is facilitated by monthly seminars, an annual conference, quarterly newsletter (print and electronic), an international listserver, media interactions and WWW homepages at http://agcenter.ucdavis.edu/agcenter/.
An Internal Advisory Committee under the direct leadership of the Center Director administratively guides the Center. They are responsible for planning seminars, conferences, public events, and special projects. Committee members are selected to represent a spectrum of UC Colleges such as Medicine, Agriculture and Environmental Science, and scientific disciplines. Feedback on Center programs and operations and communication on Center activities occurs with regional stakeholders on an External Advisory Panel.

Program Area: Center Grant
Title: Establishment of the Western Mining Resource Center at Colorado School of Mines
Investigator: Tibor Rozgonyi
Grant Number: U60 CC816929
Start & End: 9/1/1999-8/31/2004
Affiliation: Colorado School of Mines
City & State: Golden, CO
Phone: (303) 273-3700

Description:
The objective of this proposal is to create the Western Resource Mining Center (WMRC) at the Colorado School of Mines to address the research and training needs of Western mining constituencies. The program will initiate and/or complement the research and outreach activities of the Office for Mine Safety and Health Research of NIOSH, supporting the priorities of the National Occupation Research Agenda. In order to increase the WRMC's efficiency in its research and training, and to build strong support across the Western mining community, the WMRC will foster partnership and cooperation with the other schools, industry, manufacturers and consultants.

The research component of the program will focus on the important mining research areas identified by the Risk Matrix and Gap Areas Matrix developed by NIOSH and produce results that will improve the health and safety of Western Miners. The specific objectives of the research program are: (1) reduce human exposure to machinery and potential accident prone environment by developing algorithms for LHD operation automation (E3, G3, J3), (2) develop hanging wall/roof characterization, and incidental and catastrophic failure predication and prevention techniques through geomedia characterization using seismic tomography (A3, D3); rationally based design of yield pillars (A3); automated water jet scaling in conjunction with shotcreting (D3, G4), (3) reduce dust by developing better cutter bit design, (4) reduce off-highway truck related accidents by using on board GPS systems (H3, E3, K3).

Early in 1996, Colorado School of Mines began to react to the concerns of the mining industry and considered the need for a centrally located safety and health training center to service the Western mining community. Surveys of existing training opportunities and discussions with Western mining operators labor organizations and mining associations strongly supported the establishment of a safety and health training entity on the CSM campus. As a result through the auspices of the CSM office of Special Programs and Continuing Education, an initial series of courses were fought at CSM during 1998, and CSM's Mine Safety and Health program became a reality. With federal funds provided by the NIOSH grant, CSM expects to expand its stable of safety and health related technical courses, convert selected courses to distance delivery format, and prepare curricula for manager training in human behavior, leadership, and safety and health program management. Program managers expect to collaborate with other safety organizations, educational institutions, and mining associations to augment their efforts, not replicate them. Agreements will also be sought to prepare joint educational, materials (videos, workbooks, handouts, etc.). An advisory committee has been appointed and represents the metal, non-metal, coal, gravel and stone, and State segments of the industry. The committee meets semi-annually.

Program Area: Center Grant
Title: Safety and Health Interventions in the Construction Industry
Investigator: Pete Stafford
Grant Number: U60 CC317202
Start & End: 9/30/1999-6/30/2004
Affiliation: Center to Protect Workers' Rights
City & State: Washington, DC
Phone: (202) 962-8490

Description:
Over the past ten years the Center to Protect Workers' Rights (CPWR) has planned, developed, and operated a national center dedicated to improving safety and health performance in the construction industry. The overall objective of this application is to build on the current base of knowledge; intensify and accelerate the identification and adoption of best practices throughout the industry; and evaluate changes in safety and health outcomes. To accomplish this, they will focus on the following specific aims:
a. Implement interventions with proven effectiveness in industry-wide settings.
b. Identify needs and prevention systems gaps and develop/define new interventions.
c. Create a stronger base of technical support in engineering, economics, labor relations and law as they relate to the development and adoption of best practices to the industry
d.Create new forums for more effective communication and dissemination of best practices to the industry..
e.Coordinate research projects and other activities proposed in the application within the private sector and between the private sector and NIOSH and other federal and state agencies.
F.Evaluate the impact of safety and health performance through ongoing surveillance of national trends.

Program Area: ASPH/ATPM
Title: Efficacy Study on Skin Protection in Body Shops
Investigator: Youcheng Liu
Grant Number: U36 C319276E
Start & End: Project has not been assigned a working period
Affiliation: Yale University
City & State: New Haven, CT
Phone: (203) 785-5969

Description:
Workers in auto body shops have extensive skin contact with organic solvents (OS). OS can induce both acute neurotoxic effects and chronic central nervous system disorders, and facilitate the breakthrough of chemical protective clothing (CPC) by isocyanates which in turn can cause asthma. CPC use may provide last line of defense, but little has been researched in this industry on the effectiveness of currently used CPCs against OS and identification of more protective CPCs.

We propose a one-year pilot study to test the hypothesis that a more protective type of CPC can be found from field performance testing. Our specific aims are to: 1) Evaluate the efficacy of currently used (latex) gloves and protective clothing (Nylon and Tyvek); 2) Evaluate the efficacy of recommended gloves (nitrile and butyl) and protective clothing (Saranex TM coated suits); 3) Evaluate acceptance of currently used and recommended gloves and protective clothing by shop management and workers.

The overall design will be a cross-sectional study in 10 shops and 60 workers with 5 shops each as the study shops and control shops. Current CPC will be assessed in all 10 shops qualitatively and quantitatively using charcoal indicator pads and chemical analysis or biologically using urine sample analysis. Recommended CPCs will be similarly assessed in 5 shops. Our current SMASH (Safe Methods for Autobody Shop Health) study affords us ready access to the industry and conduct this pilot testing. This should allow us to identify more protective CPCs and recommend them for wide application in this industry and other similar industries, and contribute significantly to a better prevention of asthma, neurotoxicity and dermatitis in auto body shop workers.

Program Area: ASPH/ATPM
Title: Prevention of Exposure to Creosote in Dockbuilders
Investigator: Jacqueline Moline
Grant Number: U50 CC300860
Start & End: Project has not been assigned a working period
Affiliation: Mount Siani School of Medicine
City & State: New York, NY
Phone: (212) 241-4792

Description:
Coal tar creosote is a complex mixture of polycyclic aromatic hydrocarbons, phenols, heterocyclic oxygen, sulphur and nitrogen compounds derived from coal. Workers in the construction trades, principally during dockbuilding and foundation work through the use of creosote treated wood pilings have significant potential exposure. There have been few previous human studies of the health effects of creosote. In a case series, creosote caused skin irritation, desquamation, photosensitivity and hyperpigmentation following exposure. Creosote is carcinogenic to animals. To date, there have been no human studies specifically to assess whether creosote is carcinogenic to humans.

Creosote is absorbed through the skin and by inhalation. Recent studies show that demal exposure to creosote accounts for most of the absorbed dose. Therefore, it is essential to prevent dermal exposure to creosote not only to minimize dermal effects, but also to lessen systemic absorption. The purpose of this pilot study is to assess whether we can decrease dermal and thus systemic absorption of creosote through the use of protective gloves and rigorous shin washing using an effective cleanser. We hypothesize that the use of proper personal protective equipment and prompt removal of creosote from the skin can decrease the systemic absorption of creosote. 30 dockbuilders from Local 1456 of the United Brotherhood of Carpenters will be asked to participate in this pilot intervention study. Participants will receive gloves and cleanser. Air monitoring of creosote and particulates, and skin examinations will be performed at the end of shift and the following morning to assess relative pulmonary and dermal absorption at baseline and two weeks later. Questionnaire data will be collected on medical and work histories. The union membership have expressed great interest in expanding the partnership with investigators from the Mount Sinai School of Medicine with the hope of decreasing health effect related to creosote. This pilot study will provide us with important information regarding the proper way to assess exposures, promulgate regulatory standards using the appropriate exposure assessment measurement, as well as whether a simple, cost-effective intervention can diminish system absorption and lessen health effects related to creosote.

Program Area: ASPH/ATPM
Title: Operation of a Post Doctoral Research Associateship Program
Investigator: Judy Nyquist
Grant Number: U60 CC300478
Start & End: 5/1/1983-7/31/2004
Affiliation: National Academy of Sciences, National Research
City & State: Washington, DC
Phone: (202) 334-2202

Description:
The National Research Council (NRC)--as the operating arm of the National Academy of Sciences (NAS) and the National Academy of Engineering (NAE)--will provide the overall scientific and technological policy supervision and such other required administrative functions as detailed in this proposal for the successful conduct of a National Research Council-the National Institute of Occupational Safety and Health (NIOSH) Resident Research Associateship Program. NRC Research Associateship awards are made annually to carefully selected scientists and engineers at the doctoral level in a national competition. These awards provide opportunities to enable Associates to increase their proficiency in research, to advance the research programs of the sponsoring laboratories, and to make governmental laboratory facilities, often including unique equipment, available to the scientific community. An NRC Research Associate, as a guest investigator, is neither an employee of the National Research Council nor of the sponsoring laboratory and does not perform personal services for either organization. An award implies no obligation on the part of the NIOSH, the Associate, nor of the NRC after tenure. As part of the award, an Associate receives a stipend for self-support while pursuing research activities, largely of a personal choice, that are also of interest to the NIOSH.

In the NRC Associateship programs, there are two important objectives that must be kept in proper balance in the conduct of the program. These objectives are:

1. to provide postdoctoral scientists and engineers of unusual promise and ability opportunities for research on problems, largely of their own choice, that are compatible with the research interests of the sponsoring laboratories and

2. to contribute to the general research effort of the participating federal laboratories.

The purpose of the cooperative agreement with the National Institute of Occupational Safety and Health is to operate a postdoctoral research Associateship program in the areas of occupational safety and health, such as bioengineering, biological monitoring, cell physiology and biochemistry, epidemiology, immunology, microbiology and mutagenesis, noise, pathology, pharmacology, physiology and biophysics, radio-frequency radiation, stress and human factors, toxicology and vibration. Support will be provided to doctoral scientists and engineers of unusual ability and promise or proven achievement who will be given an opportunity to conduct research on problems, largely of their own choice, which are compatible with the research interests of the National Institute of Occupational Safety and Health. The areas of interest include occupational lung disease (including lung cancer), musculoskeletal injuries, occupational cancer, traumatic injuries, cardiovascular disease, reproductive problems, neurologic illness,

noise-induced hearing loss, dermatological problems, and psychological disorders. This agreement will benefit the Institute of Occupational Safety and Health and the award recipient, as well as The National Academy of Sciences/National Research Council. This agreement will help keep the NAS/NRC informed of developments within the research community and strengthen the link between the NAS, distinguished academicians, and the academic and federal research communities.

Program Area: ASPH/ATPM
Title: Research, Prevention Education, and Clinical Services in Occupational Safety and Health Clinics
Investigator: Grace Parazino
Grant Number: U60 CC317613
Start & End: 9/30/1999-9/29/2004
Affiliation: Association of Occupational and Environmental Clinics
City & State: Washington, DC
Phone: (202) 347-4976

Description:
AOEC has a long track record of cooperation with NIOSH (they are currently in year six of the fourth cooperative agreement). AOEC now comprises 63 clinics in 28 states, the D.C., and Canada. They represent a multi-disciplinary consortium of clinics dedicated to providing clinical and educational expertise in occupational medicine. The current proposal has the following objectives:

•Develop and maintain a national clinical database, consisting of exposure and outcome information, for both surveillance purposes and or case identification.

•Conduct periodic reviews of the database.

•Provide occupational health educational outreach in the health professions and primary care practitioners, with emphasis on those providing care for medially under-served populations.

•Develop, maintain, and distribute to members a referral listing of full-service occupational clinics at which individual patient or small employers may seek high quality, multi-disciplinary, patient-centered occupational health services practiced by clinicians who are additionally committed to a public health model for prevention.

•Work to expand into geographically and medically under-served area. Identify potential sources of occupational health care in these areas and establish mentoring relationships with the nearest "full-service" clinic, to include educational and referral ties, and capacity-building.

•Develop and enhance an Internet list-serve that facilitates sharing clinical information without breaching medical confidentiality.

•Develop and disseminate information regarding clinical practices on occupational safety and health.

•Develop information (such as documents) that provides needed information for clinicians engaged in the practice of occupational medicine.

Program Area: ASPH/ATPM
Title: Evaluation of Needlestick Prevention Information Dissemination Project
Investigator: Donna Richter
Grant Number: U36 C300430K
Start & End: 9/30/2003-9/30/2004
Affiliation: University of South Carolina
City & State: Columbia, SC
Phone:

Description:
The Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH) have collaborated on a needlestick prevention information dissemination project in several US cities. Columbia, South Carolina, was chosen as an intervention site for this project based on its high number of AIDS cases for a metropolitan area with population between 500,000 and 2,000,000, the city's size, and because it is the state capital. The goal of the project is to increase awareness and adoption of bloodborne pathogen exposure prevention methods among healthcare workers in Columbia, South Carolina. The project has two objectives towards reaching this goal: 1) to raise the awareness of healthcare workers about the hazards of bloodborne pathogen exposures and related exposure prevention methods, safer sharps devices in particular, and 2) to increase prevention activities among healthcare workers, including managers. The proposed evaluation will assess the effectiveness of this initiative in Columbia, South Carolina. The focus of the evaluation is on learning lessons about delivering prevention information via different modalities. It will incorporate a significant amount of process evaluation to capture program activities to accurately describe the initiative. It will also incorporate impact evaluation measures to document changes in knowledge, attitudes, and motivations of those receiving the intervention. CDC's "Framework for the Program Evaluation in Public Health" will be used to guide the preparation of this evaluation plan. The framework calls for attention to six steps; 1) engaging stakeholders, 2) describing the program 3) focusing the evaluation design 4) gathering credible evidence 5) justifying conclusions, and 6) ensuring use and sharing lessons learned. It is anticipated that the evaluation of this project will have a significant impact in designing, implementing, and evaluating other bloodborne pathogen exposure prevention programs.

Program Area: ASPH/ATPM
Title: ASPH for the Improvement of Interaction Between Phase and PHPS
Investigator: Sara Riedel
Grant Number: U36 CC300430
Start & End: 9/28/1981-9/27/2004
Affiliation: ASPH Fellowship
City & State: Washington, DC
Phone: (202) 296-1099

Description:
The workplace dermal hazard in this country is largely unrecognized and unevaluated even though there are indications of significant threat to worker health. We propose a one-year project to gain access to industries where dermal hazards are present and to assess the potential for exposure and the current practice for control of the hazard including the use of personal protective equipment. Access will be gained through established relationships with industries participating in our industrial hygiene internship and occupational medicine residency programs as well as the industrial hygiene undergraduate program at Millersville University. Industries will be classified by size, type, and the potential for dermal exposure and selected to capture a range of sizes and types. We will approach selected industries to : 1) ascertain interest in participating in a research study of dermal exposure and protection; 2) characterize the industry; 3) qualitatively evaluate the dermal hazard potential; and 4) characterize current practice of personal protective equipment. The potential for workplace dermal exposure will be assessed through a three stage process including an interview with the plant industria hygienist, a plant walk-through, and administration of a survey to workers to assess their potential for dermal exposure and current control practice. This project will result in industry access, development of a dermal exposure survey instrument, a preliminary qualitative assessment of exposure and personal protective equipment use, and a process to assure confidentiality of workers and employers. This research is intended to lay the ground work for subsequent studies providing a more detailed quantitative assessment of dermal exposure, effectiveness of current PPE practices and studies to test new PPE strategies.

Program Area: Conference Grants
Title: Mediating Conflict in the Workplace Conference, February 27, 2004
Investigator: Robin Baker
Grant Number: R13 CC923060
Start & End: 9/1/2003-3/31/2004
Affiliation: UCB - Labor Occupational Health Program
City & State: Berkeley, CA
Phone: (510) 643-8900

Program Area: Conference Grants
Title: Intervention Effectiveness Research: An Agenda Setting Conference for Agricultural Safety and Health
Investigator: Thomas Bean
Grant Number: R13 CC522991
Start & End: 1/15/2004-1/14/2005
Affiliation: Ohio State University
City & State: Columbus, OH
Phone: (614) 292-3721

Program Area: Conference Grants
Title: 5th International Symposium Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities
Investigator: James Dosman
Grant Number: U13 CC023037
Start & End: 9/30/2003-9/29/2004
Affiliation: Institute of Ag Rural and Environmental Health
City & State: Saskatoon, SK, CAN
Phone: (306) 966-8286

Program Area: Conference Grants
Title: West Virginia Ag Safety Days Workshop
Investigator: Lee Echols
Grant Number: C13 CC322994
Start & End: 7/1/2003-2/27/2004
Affiliation: West Virginia Department of Agricult, Plant Industries Division
City & State: Charleston, WV
Phone: (304) 558-2209

Program Area: Conference Grants
Title: Agroterrorism Workshop: Engaging Community Preparedness February 12, 2004
Investigator: Jeffrey Levin
Grant Number: R13 CC622989
Start & End: 9/1/2003-8/31/2004
Affiliation: University of Texas Health Center at Tyler
City & State: Tyler, TX
Phone: (903) 877-7270

Program Area: Conference Grants
Title: Science @ Work: Help for Safety Professionals
Investigator: Mei-Li Lin
Grant Number: C13 CC522987
Start & End: 9/8/2003-9/9/2003
Affiliation: National Safety Council
City & State: Itasca, Dupage, Illinois
Phone: (630) 775-2283

Program Area: Conference Grants
Title: National Forum for National Strategies for Health Care Providers: Pesticides Initiative
Investigator: Leyla MCCurdy
Grant Number: R13 CC322766
Start & End: 6/1/2003-5/31/2004
Affiliation: National Environmental Education & Training Foundation
City & State: Washington, DC
Phone: (202) 833-2933

Program Area: Conference Grants
Title: Challenges in Ag Health and Safety
Investigator: Marc Schenker
Grant Number: C13 CC922985
Start & End: 9/7/2003-9/9/2003
Affiliation: University of California
City & State: Davis, CA
Phone: (530) 752-5676

Program Area: Conference Grants
Title: Western Ag Health and Safety Conference: Cultivating a Sustainable Ag Workplace, Sept 12-14, 2004
Investigator: Richard Senske
Grant Number: R13 CC022993
Start & End: 1/1/2004-12/31/2004
Affiliation: University of Washington
City & State: WA
Phone:

Program Area: Conference Grants
Title: Collaboration in Agricultural Safety and Health, June 20-24, 2004
Investigator: Cheryl Skjolaas
Grant Number: R13 CC522992
Start & End: 1/1/2004-12/31/2004
Affiliation: National Institute for Farm Safety
City & State: Madison, WI
Phone: (608) 265-0568

Program Area:	Conference Grants
Title:	National Chapter Conference Score 4 Farm Safety…Everyone Wins, March 12-13, 2004
Investigator:	Debbie Slusher
Grant Number:	R13 CC722988
Start & End:	1/5/2003-4/30/2004
Affiliation:	FS4JK Chapter Relations Director
City & State:	Earlham, IA
Phone:	(515) 758-2827