



August 2007



NIEHS Spotlight

- [Blackshear Lecture Kicks Off Scientific Director Selection](#)
- [NTP Introduces Revised Nomination Review](#)
- [Co-op Program Continues to Pay off for NIEHS](#)
- [Panel Offers Tips for Talking to the Public about Science](#)
- [NTP Board Calls for Expediting Alternative Testing Methods](#)
- [Summers of Discovery Celebrates Class of 2007](#)



Science Notebook

- [EPA Biologist Reviews Endocrine Disruptor Research](#)
- [Genetic Epidemiologist Speaks on DNA Adducts in Prostate Cancer](#)
- [Extramural Update](#)
- [Extramural Papers of the Month](#)
 - [Semen Quality Lower when Mother's Beef Consumption High during Pregnancy](#)
 - [Iron and Paraquat — Synergistic Risk Factors for Parkinson's Disease](#)
 - [Cancer Deaths Still High Decades after Exposure to Arsenic Reduced](#)
 - [Men with Higher Bone and Blood Lead Levels at Greater Risk for Heart Disease](#)
- [Intramural Papers of the Month](#)
 - [Inhibiting Enzyme Reduces Fluid in the Lung Caused by Viral Infection](#)
 - [COX-2 Inhibits UVB-Induced Epidermal Apoptosis after Acute Exposure](#)
 - [Dairy Products and Parkinson's Disease](#)
 - [Genetic Polymorphisms and Childhood Asthma and Atopy](#)



Inside the Institute

- [Lab Media and Glassware Employees Recognized](#)
- [Annual Fish Fry Serves up Good Food and Old-time Fellowship](#)
- [STEM Scholars Visit NIEHS](#)
- [Penta Retires to a Life of California Dreaming](#)
- [Summer Ventures Scholars Tour Laboratory of Structural Biology](#)
- [Calendar of Upcoming Events](#)



NIEHS Spotlight

Blackshear Lecture Kicks Off Scientific Director Selection

By Lillian Gu and Eddy Ball

The Scientific Director Candidate Seminar Series commenced on July 2 in Rodbell Auditorium with a talk by Perry Blackshear, M.D., D.Phil., titled “The TTP Family of Tandem Zinc Finger Proteins and their Roles in mRNA Turnover.” Blackshear, the first candidate under consideration, reviewed his lab’s recent research on a group of proteins in the Tristetrapolin (TTP) family and potential novel clinical applications of the lab’s findings.

The lecture series marks the beginning of the selection process for the next NIEHS scientific director. Blackshear is currently the acting scientific director, as well as the director of the Clinical Research Program and a principal investigator in the Laboratory of Signal Transduction [Polypeptide Hormone Action Group](#). His lecture was hosted by NIEHS Deputy Director Sam Wilson, M.D.

Blackshear began with a brief overview of his lab’s research on the tandem zinc finger protein TTP and TTP-like proteins over the past ten years. Much of the current understanding has resulted from his lab’s development of TTP knockout (KO) mice, which were typically normal at birth, but rapidly developed severe arthritis, extreme emaciation and myeloid hyperplasia, a proliferation of blood cells in the bone marrow.

Experiments involving interbreeding and the injection of animals with Tumor Necrosis Factor- α (TNF- α) antibodies helped the researchers pinpoint the mechanisms linking TTP and symptoms in the KO mice. Blackshear and his colleagues postulated that the syndrome was due to an excess of TNF- α , a signaling compound that is implicated in autoimmune disorders such as rheumatoid arthritis and known to induce emaciation.

Following this line of thought, Blackshear’s lab then experimented with stimulating KO mice macrophages, a main TNF production site, with lipopolysaccharide (LPS), a compound derived from bacterial cell walls. The result was production of more TNF- α protein as



Throughout the talk and the question-and-answer session which followed, Blackshear punctuated his detailed discussion of TTP and his vision of the role of intramural research at NIEHS with his infectious self-effacing humor and distinctive wit. He began by noting that “I will spend the next few days talking to almost every conceivable interest group here at NIEHS.” (Photo courtesy of Steve McCaw)



During his introduction, Wilson praised Blackshear’s many scientific accomplishments. However, the host, who is usually quite composed, couldn’t avoid chuckling about his time as a reviewer of Blackshear’s grant applications. (Photo courtesy of Steve McCaw)

well as TNF- α messenger RNA (mRNA) than in wild type (WT) counterparts — reinforcing the hypothesis that TTP plays a role in either the transcription of TNF from DNA to mRNA or the stability of the mRNA.

In order to study the role of TTP in TNF expression, Blackshear exposed LPS-stimulated macrophages to the transcriptional inhibitor Actinomycin-D and tracked message decay. He found that the KO macrophages had a lower TNF-mRNA turnover rate than the WT macrophages, suggesting that the lack of TTP increased the stability of the message, increasing TNF production and producing the TTP-deficiency syndrome.

The investigator and colleagues suspected that TTP binds to the TNF- α transcript in an AU-rich region long known to be involved in mRNA destabilization. This AU-rich element (ARE) is highly conserved among mammals, and the lab found that single base mutations here are enough to block TTP and ARE binding.

According to Blackshear, greater understanding of the TTP pathway may lead to development of novel anti-inflammatory therapies with fewer side effects. Currently, the drugs that directly inhibit TNF are effective in only a handful of inflammatory and autoimmune diseases. In addition, these protein drugs are expensive and require injections. They also can result in the development of anti-drug antibodies.

By sequencing the TTP gene from a large number of subjects, Blackshear has associated variations in certain gene regions with rheumatoid arthritis and myositis. However, he points out that “while all of these [associations] are highly statistically significant, they need to be validated by secondary studies as well as by peer reviews.”

One Candidate's Vision for the Division of Intramural Research (DIR)

During a question-and-answer session following his lecture, Blackshear was asked first about the role of the intramural research program at NIEHS. “I think our role should be that we undertake more high risk, potentially high yield research, that which may not be quite as predictable as what the extramural investigators are forced to do,” he responded. “And I wish I could convince our BSC [Board of Scientific Counselors] that they should not rely quite so much on what I heard one reviewer refer to as ‘sheer industriousness,’ that is, large numbers of papers.”

Blackshear also expressed the need for the scientific director to address the significant percentage of tenure-track investigators at NIEHS who have failed to get tenure, which he hopes to influence with increased “mentoring of these individuals at all levels - from their colleagues in their branches, their branch chief, to the scientific director, to everyone in the Institute.” He pointed to the emergence of an activist tenure-track assembly as a promising development. “I think... we could also do more to mentor our postdoctoral fellows.”

Recalling how important his undergraduate experiences were in his choice of a career, the candidate expressed his interest in finding ways to revitalize graduate and undergraduate programs. “I would like very much to revitalize the trainees’ assembly by increasing the numbers of graduate students, medical students and undergraduates here, which have been traditionally low because of the obvious difficulties in connections with neighboring universities.”

When asked about promoting clinical research among the rest of DIR, Blackshear expressed his high hopes for the bi-directional stimulus provided by communication between lab scientists and clinical researchers at the new NIEHS Clinical Research Unit. “I think we will have a very unusual opportunity for investigators to walk across the parking lot and extrapolate from their basic science into hands-on clinical research.”

The candidate responded to a question about the need for more “informal, ad hoc discussions” between scientists in such venues as the cafeteria, where investigators have an opportunity to talk with people working in different areas. “I’d be open to suggestions as to other things,” he concluded, “other than this very distant future of a campus [as envisioned in the Institute’s master plan].”

Later that afternoon, Blackshear attended a question-and-answer session with the staff of the National Toxicology Program (NTP). Looking forward to a process of re-alignment with DIR, NTP scientists were naturally curious about how candidates envision the new role of NTP research at the Institute. The session was one of the first of several he would hold with interest groups throughout the Institute.



NIEHS Director David A. Schwartz, M.D., enjoyed Blackshear's asides, but he was also interested in ways to improve the success rate of tenure track investigators. (Photo courtesy of Steve McCaw)



Many in the audience were intramural bench scientists. Shown here are Biologist Rachel Patterson, left center, Chemist Cynthia Smith, Ph.D., center right, and Toxicologist Kristine Witt, right. (Photo courtesy of Steve McCaw)

Recent efforts in Blackshear's lab have involved finding new TTP targets with the help of RNA microarray analysis and studying other TTP family proteins such as ZFP36L1, ZFP36L2 and ZFP36L3. In addition, Blackshear has looked towards invertebrate species as an alternative to mammalian testing and found that their related proteins display similar RNA binding.

The series continued on July 24 and August 6 with lectures by the other two candidates for the position, whose talks will be reported in the September 1 issue of the *eFactor*. Evan Simpson, Ph.D., gave a talk titled "Sex, Fat and Cancer" on July 24 at 9:30 a.m. in Rodbell Auditorium. He is currently a professor of Biochemistry at Monash University, lab director of the Victorian Breast Cancer Consortium and head, Sex Hormone Biology, Prince Henry's Institute of Medical Research in Melbourne, Australia.

On August 6, Rudy Juliano, Ph.D., will give a talk on "Integrin-Mediated Control of Cell Signaling Events" at 9:30 a.m. in Rodbell Auditorium. Juliano is currently the Cary C. Boshamer Distinguished Professor in the Department of Pharmacology at the University of North Carolina at Chapel Hill.

[Return to Table of Contents](#)



Not surprisingly, several scientists working with NTP, such as Staff Scientist Barbara Shane, Ph.D., center, were eager to hear about where Blackshear saw the division heading in years to come. (Photo courtesy of Steve McCaw)

NTP Introduces Revised Nomination Review

By Eddy Ball

During the June 22 meeting of its Board of Scientific Counselors (BSC) in Rodbell Auditorium, the National Toxicology Program (NTP) introduced an important revision to its study nomination review process. This process governs the protocol for moving chemicals from initial nomination for toxicology studies to the point at which NTP has approval to design and initiate those studies.

The new process adds a step following public comment and prior to review by the BSC during a public meeting (see text box). NTP project leaders are now responsible for developing draft research concepts for consideration by the board. A research concept contains in abbreviated form the nomination rationale, a proposed study approach and the significance and expected outcome of a proposed research program tailored for each nomination. Previously, research concept development did not take place until after BSC and NTP Executive Committee review.

NIEHS/NTP Staff Scientist Scott Masten, Ph.D., explained the rationale behind the change during his presentation on the new process. “What we decided to do was to move this step to earlier in the process,” he explained, “to have the



Environmental Toxicology Program Staff Scientist Scott Masten, Ph.D., gave the board a presentation explaining how the revised nomination process would work. Masten was also project leader for the asbestos nomination. (Photo courtesy of Steve McCaw)

Revised NTP Study Nomination Review Process

- **OPEN NOMINATION** — Any interested party, including government agencies, academic or interest groups, members of the general public or NIEHS/NTP staff, can submit a [nomination](#).
- **NTP SCREENING** — The NTP Office of Chemical Nomination and Selection reviews nominations to determine whether they have been adequately tested or have been previously considered by the NTP. At this point, the NTP may initiate an exhaustive literature review.
- **INTERAGENCY REVIEW** — Nominations that merit further consideration are then reviewed by the Interagency Committee for Chemical Evaluation and Coordination (ICCEC), which is composed of representatives from ten federal agencies with research or regulatory interests in toxicology.
- **PUBLIC INPUT** — NTP solicits public comments on the nominations and study recommendations by means of notices in the *Federal Register* and NTP news outlets.
- **(NEW STEP)** — NTP assigns a project leader, who is an NIEHS, FDA, or NIOSH staff scientist, to develop draft research concepts.
- **BSC REVIEW** — In open meeting, the NTP Board of Scientific Counselors reviews each research concept and provides recommendations on its merit and priority.
- **NTP EXECUTIVE COMMITTEE REVIEW** — The NTP Executive Committee considers input received from all prior review steps and makes a final recommendation to the NTP Director.
- **IMPLEMENTATION** — The NTP Project leader assembles a project team to design the studies outlined in the research concepts.

opportunity for public review and comment as well as to gain the insight from the Board of Scientific Counselors on some of our thoughts about how we should address the nomination.”

At the June 22 meeting, NTP scientists tested the new process by presenting research concepts for four of the nine study nominations that underwent federal interagency review in December 2006:

- Artificial butter flavorings containing acetoin and diacetyl, nominated by the United Food and Commercial Workers International Union (UFCW), may cause lung disease in exposed flavor manufacturing workers.
- Naturally occurring and atypical forms of asbestos, nominated by the Environmental Protection Agency and National Center for Environmental Health/ Agency for Toxic Substances and Disease Registry, is of concern for people exposed to the substance near abandoned mines or natural outcroppings.
- Nanoscale silver, nominated by the Food and Drug Administration (FDA), is used widely and increasingly in drug, food and cosmetic products and may have similar or more pronounced toxic effects relative to other forms of silver.
- *o*-Phthalaldehyde, nominated by the National Institute for Occupational Safety and Health (NIOSH), is widely used as a disinfectant in health care settings and is suspected of causing skin and respiratory irritation and toxicity.

The board endorsed draft research concepts for all four of the nominations. The board’s response to the additional information provided by the revised process was overwhelmingly positive.

During the board’s consideration of nanoscale silver, Director of the NTP Center for Phototoxicology Paul Howard, Ph.D., of FDA, praised the revised process. “We [at the FDA] enthusiastically endorse this enhanced review,” he said. “The board is [now] interacting more on the scientific merits and doing a more enhanced review.”

Not only does the new process benefit the board, Howard continued, “I think this only makes for better [long-term] studies coming out of the NTP.... I think it [also] will be very beneficial to the regulatory agencies.”

The board will consider the remaining five nominations during its December 6, 2007 meeting. In the meantime, NTP scientists will be working to develop draft research concepts for studying aminopyridines, diethyl phthalate, 2’,2’ dithiobisbenzanilide, 2-methoxy-4-nitroaniline, and nanoscale gold.

[Return to Table of Contents](#)



Counselor Katharine Hammond, Ph.D., a professor of public health at the University of California-Berkeley, was one of several board members who took advantage of the new process to comment on research concepts for the nominated compounds. (Photo courtesy of Steve McCaw)



Toxicologist Dan Morgan, Ph.D., presented the nomination and draft research concept for studying artificial butter flavorings containing acetoin and diacetyl. (Photo courtesy of Steve McCaw)

Co-op Program Continues to Pay off for NIEHS

By Eddy Ball

When Vanessa Knight began work as a budget analyst at NIEHS in May, she became a member of a select cadre of NIEHS employees who have transitioned into full-time employment through NIEHS administrative co-op programs at local colleges and universities. Knight's new circle of peers includes what Office of Director (OD) and Office of Management (OM) Lead Administrative Officer (AO) Charletta Fowler recently described as "a unique group of AOs" — some of the leading administrators in their respective divisions.

In addition to Fowler this group of AOs includes Administrative Officers Mitsue Parrish, Kimberly Peterson and Kathryn Woods. Like Knight, who was a budget intern, each of these four administrators is a graduate of co-op programs and worked part-time in administrative positions while attending college. Each also accepted full-time employment at the Institute upon graduation. Fowler is the senior member of the group with 20 years of full-time experience, followed by Parrish and Peterson with 18 years each and Woods with 13 years of service.

With the exception of Woods, an alumna of St. Augustine's College in Raleigh, the AOs are all graduates of North Carolina Central University (NCCU) in Durham, where Knight received her bachelor's degree in May. Knight moved from student employee during her senior year to full-time budget analyst through the current NIEHS Administrative Co-op Program.

The NIEHS Administrative Co-op Program provides administrative and management training opportunities that target students recommended by local educational institutions. As part of its strong commitment to workforce planning, the NIEHS Administrative Co-op Program strives to give training and experience to future college graduates to prepare them with the necessary skills and background to be highly competitive for a career in the Federal government.

These administrators are now pursuing careers at the Institute and justifying many times over the organization's investment in nurturing their administrative talents. They are also encouraging their younger colleagues to follow their lead and Knight's, by striving for excellence and taking advantage of what NIEHS has to offer.

Administration – Supporting Science at NIEHS

As lead administrative officer for the Office of Director and Office of Management, Charletta Fowler provides senior leadership, direction, planning and management of the administrative activities and supervises the administrative officers, each of whom is assigned specific areas of responsibility:

- Kathryn Woods was instrumental in setting up the NIEHS Document System and continues to serve as one of the three points of contact for updating the system. In addition, she provides administrative support for the Office of Communication and Public Liaison, Office of Science Policy, Library and Information Services, Computer Technology Branch, Administrative Services and Analysis Branch, and Facilities Engineering Branch.
- Mitsue Parrish, who developed the Institute's Traveler's Reference Guide and Travel Pages, is widely regarded as one of the travel experts at NIEHS. In addition to providing the last word in travel recommendations, she also supports activities in the NIEHS journal Environmental Health Perspectives, Acquisitions Management Branch, Health and Safety Branch, Human Resources and Office of Equal Opportunity and Diversity Management.
- Kimberly Peterson works with some of the ranking executive officers of the Institute from her office in B-Module in the Rall Building. She provides administrative support to the Immediate Office of the Director, Office of the Deputy Director, Associate Director for Management, Financial Management Branch, Office of Translational Research and Office of Risk Assessment.

“My student co-op position was a great investment on my behalf and the Institute’s,” Fowler commented. “I am very proud of my career, my staff, Vanessa and NIEHS leadership for supporting this program, and I would like to see others have that experience because I’m all for developing the Institute’s future.” Fowler has put her sentiments into action by serving on the NIEHS Co-op Program Committee to ensure that in the years to come more young students like Knight also enjoy the opportunities she has.



Budget Analyst Vanessa Knight now works full time at the job she did part time during her senior year at NCCU. (Photo by Eddy Ball)



Knight is just starting her career at NIEHS, but she has four strong role models in this “unusual group of AOs.” Pictured from left are Kimberly Peterson, Mitsue Parrish, Charletta Fowler and Kathryn Woods. (Photo courtesy of Steve McCaw)

[Return to Table of Contents](#)

Panel Offers Tips for Talking to the Public about Science

By Eddy Ball

The auditorium at Duke University’s Bryan Center quickly filled with scientists and science reporters on June 22 for a brown-bag panel discussion titled “Talking to the Public: How Can Media Coverage of Science Be Improved.” The event was co-sponsored by Sigma Xi, the Duke Institute for Genome Sciences and Policy, and the Council for Advancement of Science Writing. The Science Communicators of North Carolina helped to publicize the event in the Triangle scientific community.

In the course of presentations, panel discussions, and question-and-answer sessions, panel members outlined specific ways scientists, public information officers and journalists can improve scientific communication. The panel included four specialists with expertise in science communication:



Veteran scientific spokesman Hunt Willard related several anecdotes of his interviews with print and broadcast journalists — the positive outcomes, with such professionals as NPR’s Ira Flatow of “Talk of the Nation: Science Friday,” along with the lessons he learned from some of his not so good experiences. This photograph shows him delivering a lecture on epigenetics at the meeting of the NIEHS National Advisory Environmental Health Sciences Council in February 2007. (Photo courtesy of Steve McCaw)

- Richard Harris, science correspondent for National Public Radio, who reports on science for “Morning Edition,” “All Things Considered” and “Weekend Edition”
- Joanne Rodgers, executive director, Media Relations and Public Affairs at Johns Hopkins University School of Medicine, who fields media inquiries and helps scientists prepare for interviews
- Christine Russell, president of the Council for Advancement of Science, who reported on science for the Washington Post before joining Harvard University’s Kennedy School of Government as journalism fellow
- Huntington Willard, Ph.D., director of the Duke Institute for Genome Sciences and Policy, who has been featured in several national media stories about science

Although coming from different backgrounds, the panel members developed several core themes about how scientists can frame their messages to get more accurate and supportive coverage of science out to the public. They all agreed with Harris, for example, when he underscored the importance of speaking to the audience in terms they can understand.

“Don’t worry about being too simple,” Harris said and recommended that scientists ask journalists to paraphrase what they think the scientist said. In her presentation, Rodgers suggested that scientists envision talking to their equivalent of “Aunt Sophie,” the well-meaning relative with little or no training in science. Rodgers also outlined the many ways that public information officers can help scientists with their insight into individual reporters, their experience seeing science reporting from both sides and their understanding of common pitfalls in interviewing.

In her presentation, Russell referred to her list of [“Ten Tips for Medical Coverage of Science and Public Policy.”](#) These tips caution scientists and reporters about the pitfalls of sensationalizing breakthroughs and disasters and inadvertently misusing risk statistics. Russell’s tips also encouraged writers to put new research into context with earlier studies, avoid “dueling” experts and keep in mind that there is no single “public.”

[Return to Table of Contents](#)

The Scientist’s Perspective

As the discussant and sole scientist on the panel, Willard described his sense of an “obligation to try to explain what I do” and offered suggestions that are in many respects similar to the ones listed by the journalists on the panel — but in his case framed by the scientist’s perspective.

- Before meeting with reporters, understand the “agenda,” which may change at different points in one’s career. Scientists almost always have an objective in mind when they talk to journalists — promoting themselves, their institutions or their field.
- Prior to the interview, prepare two or three points to get across and make these points, no matter what questions the reporter may ask.
- Think ahead about ways to explain what people can’t see, such as DNA. Try to make metaphors visual and commonly understood.
- During the interview, use relatively short sentences, which are easier to understand and lend themselves more readily to sound bites in recorded stories.
- Be careful about statistics. “For example,” Willard noted, “you can say that we’re all 99.9% identical at the DNA level, suggesting... that we’re all one happy family of human beings. Or you can state the same information in another way -- there are massive differences between us, as many as 3 million differences between my DNA and your DNA. Same information, but very different message.”
- Don’t assume that the “public” understands basic scientific terms.

NTP Board Calls for Expediting Alternative Testing Methods

By Eddy Ball

As the final item on its June 22 meeting agenda, the National Toxicology Program (NTP) Board of Scientific Counselors (BSC) reviewed a draft five-year plan to encourage research, development and validation efforts that will lead to alternative approaches to regulatory testing using animals. William Stokes, D.V.M., director of the NTP Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM) and executive director of the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) presented the BSC with an overview of the history and progress of the plan's development.

The draft NICEATM /ICCVAM five-year plan, which has undergone a period of public comment that included a Town Meeting in early June attended by more than 90 stakeholders, is currently in revision for expected public release in late 2007. "We're looking forward to considering all of the public input we've received and assessing how we can make a more effective plan for the future," Stokes explained.

Several members echoed the points articulated in Stokes' report and expressed in public comments calling for ICCVAM to work to try to help increase the pace of developing and introducing alternative methods. ICCVAM depends on government and industry labs to develop, validate and submit alternative test methods for ICCVAM consideration. ICCVAM then carries out a careful review of their scientific validity and forwards recommendations on their usefulness and limitations to federal agencies. Federal regulatory agencies have the final say as to whether they accept the test methods.

Operating under a statutory mandate to promote alternative methods that protect human and animal health and the environment, NICEATM and ICCVAM programs have for the past ten years reviewed alternatives to animal testing for regulatory toxicology studies. The Animal Welfare Act and Public Health Service Policy require scientists to consider alternatives prior to the use of animals for research and testing. The legislation established goals referred to as the "3 Rs" — *reduce* the number of animals, *refine* procedures to lessen or eliminate pain and distress, and *replace* animals with non-animal systems or with phylogenetically lower animal species, such as the worm *C. elegans* and the zebra fish.

The desire to ramp those efforts was underscored by two alternative testing advocates who spoke following Stokes' report. Catherine Willett, Ph.D., science policy advisor for People for the Ethical Treatment of Animals,



Stokes, center, sat behind counselors Jon Mirsalis, left, and Katharine Hammond, right, as he waited for his turn to speak. (Photo courtesy of Steve McCaw).



John Bucher, Ph.D., foreground, attended the BSC meeting for the first time in his new role as associate director of NTP. (Photo courtesy of Steve McCaw).

and Sue Leary of the Alternatives Research and Development Foundation both voiced concerns that the ICCVAM plan would not quickly implement alternative methods.

Leary balanced her criticism with an appreciation for Stokes' "very fair job representing the rather strong comments that ICCVAM received at the Town Meeting." She also characterized recent reorganization efforts at NTP as offering "a wonderful opportunity for the new leadership at NTP to have this very exciting, very vital field of alternatives take a stronger role in the research portfolio."

Several BSC members echoed the sentiments of colleague Kenny S. Crump, Ph.D., who said, "Let's don't keep the bar too high for accepting new testing approaches." Fellow counselor Jon Mirsalis, Ph.D., added, "Some of these tests are never going to replace animal testing... but go ahead and adopt them for what they can be used for — for early screening, for moving forward."

Stokes summed up the common ground shared by all the stakeholders as the meeting came to a close. "The ultimate goal is to develop predictive systems that very rarely would need to involve animals or perhaps not at all," he said.

[Return to Table of Contents](#)

Summers of Discovery Celebrates Class of 2007

By Eddy Ball

On July 25, the 2007 Summers of Discovery program held its annual poster session in Building 101. Of this year's 75 interns, 58 participants displayed results of their two- to three-months' work with NIEHS scientists. Thirteen of the posters were presented by high school students. Winners of the competition were announced during the July 27 Awards Ceremony in Rodbell Auditorium, which for many interns marked the completion of their summer at the Institute.

The interns completed research projects under the mentorship of one or more senior scientists in their assigned laboratory groups. Each year, several of the interns go on to present their work at professional conferences or use it as the basis for publications in peer-reviewed journals.

According to Summers of Discovery Coordinator Charle League, "Every intern is strongly encouraged to submit a poster [as part of training about making a scientific presentation]." This year's participation rate, she said, is "a fairly good percentage [compared to] past years."

Although the program continues into August, a number of the interns have left the Institute to take a break before their fall semesters begin. Those who remain will be able to attend the two final lectures in the Summers of Discovery Seminar Series, both scheduled for 11:00 a.m. in Rodbell Auditorium:



NIEHS Director David A. Schwartz, M.D., toured the display area, surveying the outcome of this year's program. He stopped to ask N.C. State student Amy Anderson, right, about her work in the Laboratory of Reproductive and Developmental Biology on expression of reproductive homeobox genes. (Photo courtesy of Steve McCaw)

- August 1 — Farhad Imani, Ph.D., will present a talk titled “Respiratory Virus Infections and Immune Responses.” Imani is head of the Immunology Group in the Laboratory of Respiratory Biology.
- August 8 — Jack Taylor, M.D., Ph.D., will speak on “A Random Walk through Biomedical Careers and Gene Polymorphisms.” Taylor is a senior investigator in the Epidemiology Branch.



Laboratory of Molecular Genetics Fellow Stephanie Nick McElhinny, Ph.D., talked with University of Virginia student Doan-Thu “Katrina” Nguyen, right, about her research in the Laboratory of Structural Biology involving nuclear magnetic resonance analysis of allergens. (Photo courtesy of Steve McCaw)

A little over half of the participants in the poster session attend high schools and universities in North Carolina. The others are affiliated with institutions throughout the United States, and one intern, Karla Hernandez-Cruz, returns to Caracas, Venezuela, to attend classes at the Universidad Metropolitana.

During the Awards Ceremony, winners were announced for research excellence in three areas — high school, undergraduate and graduate and professional (see text box). Following the awards, members of the Class of 2007 attended a reception.

The Summers of Discovery program was launched in 1989 as a way to give talented high school, undergraduate and graduate students, as well as high school and college faculty, a more in-depth exposure to the world of scientific research. Selected by scientific mentors from the NIEHS Division of Intramural Research according to the applicants’ areas of interest and experience, interns work with mentors to design and construct a research project to be carried out over a period of eight to twelve weeks. Participants are paid a salary based on their level of education and experience.

This Year’s Poster Session Winners

High School

- **Wayneho Kam**, a rising freshman at Duke University and a graduate and valedictorian of Southeast Raleigh Magnet High School in Raleigh, N.C., researched the advantages and risks of nanomaterials with scientists in the Laboratory of Pharmacology and Chemistry Photochemistry/Photobiology Group. Abstract: Kam W, Chignell CG, He Y-Y, Sik B, Feng L. Synthesis of quantum dots to assess subcellular distribution of nanoparticles in keratinocytes.

Undergraduate

- **Leisha Collins**, who will complete her course work in the Department of Microbiology at North Carolina State University in December, studied alterations in the mitochondrial genome with investigators in the Laboratory of Molecular Genetics DNA Repair and Mitochondrial Damage Group. Abstract: Collins L, Hunter S, Van Houten B. Insight into mitochondrial double-strand break repair.

Graduate and Professional

- **Joan Roberts, Ph.D.**, a professor of Chemistry and chair of the Department of Natural Sciences at Fordham University, performed her research on the nanoparticle fullerol with the Laboratory of Pharmacology and Chemistry Photochemistry/Photobiology Group. Abstract: Roberts JE, Wielgus A, Andley U, Chignell CF. Phototoxicity and cytotoxicity of fullerol in human lens epithelial cells.

“The work these students do most definitely furthers research at the NIEHS,” League explained. “It’s a way to excite up-and-coming students about science and to grow the future research pool.” For faculty participants, such as award winner Joan Roberts, Ph.D., the program allows established faculty and teachers to work with advanced equipment that their schools and colleges may not have in their laboratories and to collaborate with scientists working on the cutting edge of their fields.

[Return to Table of Contents](#)



UNC Chapel Hill student Matthew Lau, right, talked with co-author Mike Resnick, Ph.D., about their work with clustered DNA damage in budding yeast. Resnick is the supervisory research geneticist in the Laboratory of Molecular Genetics, where he and Lau collaborated on the project with Visiting Fellow Wenjian Ma, Ph.D., and Staff Scientist Dimitry Gordenin, Ph.D. (Photo courtesy of Steve McCaw)



Cary Academy rising senior Anirudh Kota, left, outlined his research methodology for Laboratory of Neurobiology Acting Chief David Armstrong, Ph.D. Kota completed his second summer of research with the Neurotoxicology Group and his mentors, Graduate Student/Technician Chris McPherson and Group Director Jean Harry, Ph.D. (Photo courtesy of Steve McCaw)



The Class of 2007 gathered for a final group photo. Coordinator Charle League, seated center in black, can look back on this summer, hectic as it was, with a feeling of accomplishment. (Photo courtesy of Steve McCaw)



Science Notebook

EPA Biologist Reviews Endocrine Disruptor Research

By Lillian Gu

On June 29 in Rodbell Auditorium, the Frontiers of Environmental Science Lecture Series featured a talk by biologist Suzanne E. Fenton, Ph.D., on “The Mammary Gland as a Sensitive Tissue for Detecting Effects of Environmental Components.” The talk was hosted by Laboratory of Molecular Carcinogenesis Fellow Rosemarie Ramos, Ph.D. Fenton attracted a near-capacity crowd of NIEHS scientists who share her research interests in the effects of endocrine disrupting compounds (EDCs) on the reproductive health of mammals and their offspring.

The lecturer is a research biologist with the Environmental Protection Agency, where she and her group study prenatal and lactational EDC exposures and their effects on the development of the mammary gland. “The mammary is unique because it has periods of rapid growth,” she explained, “and it also has periods of extensive differentiation, and it can switch back and forth between these throughout the life of the woman. That provides many opportunities for initiation of lesions and promotion of altered cells.”

Fenton uses the rodent as a model in her studies because the mammary structure and development process are very similar to its human counterpart. The end points in her studies are significant alterations in mammary gland development and lactation — specifically, delays in vaginal opening, decreased ductal branching and delays in the differentiation of terminal end buds in mammary glands. She also looks at gene expression effects, increased mortality, decreased milk ingestion and developmental abnormalities in rodent dams and pups.

During her talk, Fenton focused on effects on the mammary gland of exposure to three EDCs, dioxin, atrazine and perfluorooctanoic acid (PFOA). She reported that while the dioxin exposure levels she used were quite high, the atrazine exposure levels that produced mammary effects in rodents were lower than the current NOEL, the no-observed-effect level. The PFOA levels used were only ten-fold that of the known human serum concentration, making the results of her studies (see text box) more relevant to human exposure levels.



Research Biologist Suzanne Fenton said she is eager to see whether large prospective human studies now underway will shed light on the endocrine disruptor controversy. (Photo courtesy of Steve McCaw)



Not surprisingly, NIEHS Director David Schwartz, M.D., was on hand to question the lecturer. Among the Institute’s scientists, the subject of endocrine disrupting compounds remains controversial. (Photo courtesy of Steve McCaw).



Laboratory of Molecular Toxicology Supervisory Biologist Retha Newbold was especially interested in study design. Some of her recent research has explored the link between obesity and EDC exposure. (Photo courtesy of Steve McCaw)



Extramural Program Administrator Jerry Heindel, Ph.D., center, and Program Analysis Branch Chief Ben Van Houten, Ph.D., also listened carefully. Heindel administers several of the Institute's current EDC-related grants. (Photo courtesy of Steve McCaw)

According to Fenton, in addition to dioxin, atrazine and PFOA, which have demonstrated effects as endocrine disruptors, several other compounds are also suspected of altering mammary gland development, including bisphenol A, polychlorinated biphenyls

Highlights of Fenton's Rodent Studies

Dioxin

Dioxins are a persistent group of chemicals that are common byproducts of industrial processes. Fenton studies the specific dioxin known as TCDD, which she described as “a model compound, where we have substantial human information and rodent information.”

Fenton found that exposure to TCDD on gestation day 15 delays vaginal opening, decreases ductal branching and delays the differentiation of terminal end buds in mammary glands. Effects also included a 100-fold increase in the expression of CYP1B1 and a ten-fold increase in CYP1A1, key detoxification enzymes in the cytochrome P450 family.

Atrazine

In her cross-fostering study of atrazine, a once widely used and still persistent herbicide, Fenton found that while either *in utero* or lactational exposure to atrazine were enough to alter mammary development, the most severe effects were seen in pups with both exposures. She found that a mixture of atrazine metabolites, which are not as well regulated as the compound itself, affected mammary gland development at significantly lower doses than previously seen — counter to the findings of large epidemiological studies that have failed thus far to find an association between atrazine exposure and breast cancer risk.

Perfluorooctanoic acid (PFOA)

PFOA is a very stable, high-use compound found in grease- and stain-proof materials such as mattresses, clothing and carpets. In the mouse model, Fenton found that both mammary gland development and gene expression in dams were delayed by PFOA exposure.

These developmental delays affected the epithelium and adipose content of breast tissue at normal lactation and weaning times. Altered spiking patterns for expression of lactoferrin, a protein with antimicrobial activity, left pups unprotected at a point in their development when they were most susceptible to infection.

and organochlorine. Because of the controversy surrounding these compounds, Fenton stressed the importance of including the study of mammary glands in puberty research. “By not collecting mammary tissue in the assays addressing pubertal endpoints following early EDC exposure,” she argued, “we are slowing the process of determining which EDCs alter developing breast tissue.”

Researchers should be aware of pitfalls in researching EDCs, Fenton noted. “Many studies are exposing the animals at the wrong time. Exposure in adult animals for all of the compounds that I talked about today has no effect on the mammary glands. Trying to correlate current exposures in women with their health effects is not getting us closer to the answers of what the environmental risks are for breast cancer.”

As examples of better study design, Fenton pointed to two human studies that will track children’s environmental exposures to various compounds and their development over many years, the NIEHS-funded multi-center breast cancer research studies and the National Children’s Study. With this kind of design, she concluded, investigators may be more likely to determine whether the trans-generational effects demonstrated in rodent populations also are applicable to humans.

[Return to Table of Contents](#)

Genetic Epidemiologist Speaks on DNA Adducts in Prostate Cancer

By Lillian Gu

During a July 10 visit to NIEHS for an extramural grant review, genetic epidemiologist Benjamin A. Rybicki, Ph.D., gave a presentation titled “DNA Adducts as a Marker of Biologically Effective Dose in Prostate Cancer.” Among those attending were his grant administrator, Kimberly McAllister, Ph.D., and DERT Acting Director Dennis Lang, Ph.D.

An investigator at the Henry Ford Health Sciences Center, Rybicki has focused on the clinical potential of DNA adduct formation as a biomarker in assessment of cancer risk, recurrence and prognosis, particularly in prostate cancer. “DNA adducts are one of the few biomarkers for exposures directly related to cancer that can be quantified in human cells,” Rybicki explained. “Formation is considered to be a necessary, but not sufficient, step to induce carcinogenesis.” DNA adducts are especially promising as biomarkers because they occur early in the disease process and may serve as a measurement of how much of a carcinogen is biologically effective in the body.

Rybicki and his colleagues have completed a series of studies on the role of environmental polycyclic aromatic hydrocarbons (PAHs) in carcinogenesis, building upon previous epidemiological evidence of PAH-DNA adduct formation in lymphocytes, especially in occupational studies. “It occurred to me during a review of the literature,” he said at the beginning of his talk, “that PAH in DNA adducts could be a very useful marker of exposure.”



*Genetic epidemiologist Benjamin A. Rybicki
(Photo by Eddy Ball)*

According to Rybicki, PAHs are large aromatic planar compounds that comprise a class of over 200 chemicals. Their potential role in cancer was first observed in 1775 when British surgeon Sir Percival Pott demonstrated a correlation between exposure to soot and the incidence of scrotal cancer among chimney sweeps. With access to a large number of biopsy samples from men with prostate cancer treated at the Henry Ford Health Sciences Center, Rybicki's team has been able to use immunohistochemistry to perform large volume studies on tumor and non-tumor prostatic tissue, exploring what role, if any, polymorphisms in genes, such as ones controlling expression of the repair enzymes, may play in tumorigenesis.

While Rybicki's findings are still tentative, intriguing patterns have emerged. He has found, for example, that tumor cells showed significantly lower adduct levels compared with adjacent non-tumor cells. He also determined that PAH-DNA adduct levels in tumor cells were inversely correlated with higher grade primary tumors, large tumor volumes and high prostate-specific antigen (PSA) levels.

Rybicki speculated that tumor cells may have reduced PAH-DNA adduct levels due to their lower levels of cellular differentiation and increased tumor proliferation. He discovered that while repair enzyme gene polymorphisms or PAH exposure alone produced no associations with prostate cancer, looking at the two together uncovered a strong correlation with prostate cancer risk.

With his most recent NIEHS grant, the researcher hopes to expand understanding of the temporal relationship between DNA adducts and prostate cancer development by studying benign prostate specimens. At Henry Ford, Rybicki has access to benign prostate specimens of a racially diverse cohort of 5,197 men. He hopes to determine whether biomarkers of environmental exposure and PAH-DNA adducts are predictive of later prostate cancer development, as well as whether DNA adducts in the benign prostate are associated with the level of expression of the p53 and p21waf/cip1 tumor suppressor genes in prostate tumors of men who develop prostate cancer.

[Return to Table of Contents](#)

A Tentative, but Sobering Caveat for Minority Males and Grilled Meat Lovers

In [a recent study](#), Rybicki experimented with another adduct-forming compound called 2-amino-1-methyl-6-phenylimidazo[4, 5-b]pyridine (PhIP), a carcinogen formed when boiling, frying and barbecuing that also has been implicated in human prostate cancer. PhIP is a heterocyclic amine in cooked meats that has been demonstrated to be carcinogenic in rat prostate through the formation of DNA adducts. High consumption of grilled red meat has been associated with a higher incidence of prostate cancer in men, and there is a growing body of evidence that prostate carcinogenesis is biologically different in Caucasian and African American men, who may have a higher exposure to meats cooked at high temperatures.

While higher-temperature cooking, such as grilling and barbecuing, increases PhIP formation in both races, differences in metabolism of PhIP by the enzyme SULT1A1 may account for a two-fold greater risk for prostate cancer among African American males compared with Caucasians at comparable enzyme levels. In addition, these biological differences may result in more robust tumor development in African Americans.

Racial differences aside, according to Rybicki, the backyard barbecue, like smoking and occupational exposure, is a preventable risk factor. There is a certain level of PAHs and PhIPs in all food, but cooking, especially at high temperatures, increases levels dramatically.

Extramural Update

Short Term Career Development Award (K18) Applications Being Accepted

Applications are now being accepted for the NIEHS Short Term Career Development Award in the Environmental Health Sciences for Established Investigators (K18). The program offers established, well-funded mid-career level investigators support for the development of research capability in the environmental health sciences or in translational research. The awards provide candidates with protected time to achieve a shift in the focus of their research direction, or to learn exposure biology relevant to their ongoing research projects. These short-term mentored career development awards range from three months to one year in duration.

A primary goal of the NIEHS Strategic Plan 2006 is to expand and enhance the role of clinical and translational research in the environmental health sciences and to enhance the role of clinical investigators in environmental health sciences research. The Strategic Plan also addresses the need for increased training and career development opportunities in clinical and translational research and recognizes the advantages of the increased integration of environmental health sciences research with the overall NIH research enterprise.

The Short Term Career Development Award program is designed for two groups of investigators:

- Physician Scientists and others with clinical training who have research funding from other Institutes and essentially no experience in research applicable to the environmental health sciences, who wish to spend time in the laboratory or research program of a well funded and NIEHS-supported investigator in order to explore the introduction of research involving environmental stressors of importance to the mission of the NIEHS into their experimental systems and disease oriented research programs; and
- Investigators in the basic sciences with active research funding from NIEHS who wish to gain experience in a relevant, disease oriented translational program in order to extend their basic knowledge to a more translational problem.

NIEHS expects that this award will stimulate innovative, new projects in clinical and translational research in the environmental health sciences. Investigators who receive support through this program will be invited to the NIEHS campus in Research Triangle Park, NC, to present an open seminar on their research results.

The due date for the next cycle of applications for K-series grants is October 12, 2007.

For more information on this program see: <http://grants.nih.gov/grants/guide/pa-files/PAR-07-402.html>

CONTACT: Carol Shreffler, Ph.D. at shreffl1@niehs.nih.gov

[Return to Table of Contents](#)



Extramural Papers of the Month

By Jerry Phelps

Semen Quality Lower when Mother's Beef Consumption High during Pregnancy

Men whose mothers consumed beef more than seven times per week during pregnancy had lower sperm counts as adults, according to new research results from a team of investigators led by an NIEHS-grantee. The researchers conducted an epidemiologic study of 387 men. They found that lower semen quality was associated with more frequent beef consumption by mothers. However, the researchers cautioned that more research is necessary before any substantial conclusions about causation can be reached.

The study points out that all the men were able to father a child without medical assistance. However, the 51 men whose mothers ate the most beef had sperm counts classified as sub-fertile according to standards established by the World Health Organization. In contrast, the men whose mothers ate the least amount of beef had average sperm concentrations 24 percent higher. The men's own consumption of beef was not associated with decreased semen quality nor was the mothers' consumption of other meats.

The authors suspect that *in utero* exposure to growth hormones and other chemicals present in beef may have altered testicular development. This is but one explanation for these findings; there are several other possibilities, including pesticides in cattle feed and other lifestyle factors during pregnancy.

Citation: [Swan SH, Liu F, Overstreet JW, Brazil C, Skakkebaek NE](#). 2007. Semen quality of fertile US males in relation to their mothers' beef consumption during pregnancy. *Hum Reprod* 22(6):1497-1502.

[Return to Table of Contents](#)

Iron and Paraquat – Synergistic Risk Factors for Parkinson's Disease

Mice exposed to iron and the pesticide paraquat showed accelerated age-related damage in neurons associated with Parkinson's disease, according to an NIEHS-funded study. However, mice pretreated with an antioxidant had less severe effects, suggesting iron and paraquat damage the neurons through oxidative stress mechanisms.

Both high doses of iron given at infancy and paraquat have been shown to cause Parkinson-like symptoms in mice. In the current study, genetically identical mice were divided into four groups. One group was given excess iron during infancy; one group was given paraquat; a third group was given both agents; and the fourth group didn't receive either agent. Half the animals in each group were given an antioxidant. Results show that exposing the mice to both agents accelerated the Parkinson-like neurodegeneration with the symptoms starting at the human equivalent of middle-age. Mice co-treated with the antioxidant showed significantly less nerve cell death in the area of the brain associated with Parkinson's disease.

This study points to the need for an early diagnostic test for Parkinson's disease to identify people in need of antioxidant interventions prior to the development of symptoms. It also shows that seemingly harmless early life exposures can work in concert with subsequent exposures to exacerbate neurodegeneration.

Citation: [Peng J, Peng L, Stevenson FF, Doctrow SR, Andersen JK.](#) 2007. Iron and paraquat as synergistic environmental risk factors in sporadic Parkinson's disease accelerate age-related neurodegeneration. *J Neurosci* 27(26):6914-6922.

[Return to Table of Contents](#)

Cancer Deaths Still High Decades after Exposure to Arsenic Reduced

Death rates from lung and bladder cancer remained high decades after residents of northern Chile were exposed to high levels of arsenic in their drinking water, according to an NIEHS-funded report published in the *Journal of the National Cancer Institute*.

The northern region of Chile draws much of its water supply from arsenic-contaminated rivers originating in the Andes. From 1958-1970, the municipal water supply for this region averaged 870 micrograms arsenic per liter, nearly 90 times the current U.S. EPA standard. The world's first large-scale arsenic removal plant opened there in 1971, but by then, residents had been exposed to high levels of arsenic for 13 years.

The researchers analyzed cancer death rates in the high-exposure area and compared them to another region in Chile with similar demographic characteristics, but with low arsenic exposure. They found that lung and bladder cancer mortality rates started to increase in 1968 and peaked between 1986 and 1997 with rates reaching 153 per 100,000 men and 50 per 100,000 women — over 2.5 times higher than in the area of lower arsenic exposure.

This study points out the need for more testing of the world's water resources. The results show that the health risks of consuming arsenic-contaminated drinking water are very high and long lasting.

Citation: [Marshall G, Ferreccio C, Yuan Y, Bates MN, Steinmaus C, Selvin S, Ljawi J, Smith AH.](#) 2007. Fifty-year study of lung and bladder cancer mortality in Chile related to arsenic in drinking water. *J Natl Cancer Inst* 99(12):920-928.

[Return to Table of Contents](#)

Men with Higher Bone and Blood Lead Levels at Greater Risk for Heart Disease

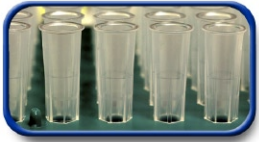
A recent NIEHS-sponsored report using data from the Normative Aging Study initiated in 1961 by the Department of Veterans Affairs shows links between exposure to lead and the risk of heart disease in aging men. The study participants consisted of 2,280 middle-aged and elderly men living in Massachusetts. Men with the highest blood or bone lead levels had more heart attacks or angina than men with lower overall lead exposure.

An ischemic heart disease event, defined as myocardial infarction or angina pectoris confirmed by a cardiologist, occurred in 83 cases (70 non-fatal and 13 fatal). The average blood, tibia, and patellar lead concentrations were higher in the ischemic heart disease cases than in controls. The lead levels correlated with about a 25 percent increase in risk for ischemic heart disease.

Lead exposure is known to cause neurological damage in children and also to be a risk factor for hypertension and kidney disease. The current findings further the understanding of the long-term consequences of lead exposure and strongly suggest that the health effects of lead can persist long after the initial exposure occurs.

Citation: [Jain NB, Potula V, Schwartz J, Vokonas PS, Sparrow D, Wright RO, Nie H, Hu H](#). 2007. Lead levels and ischemic heart disease in a prospective study of middle-aged and elderly men: the VA Normative Aging Study. *Environ Health Perspect* 115(6):871-875.

[Return to Table of Contents](#)



Intramural Papers of the Month

By Eddy Ball and Lillian Gu

Inhibiting Enzyme Reduces Fluid in the Lung Caused by Viral Infection

A team of researchers in the NIEHS Laboratory of Respiratory Biology has demonstrated that pharmacological inhibition of key enzymes in lung membrane can significantly reduce the accumulation of fluid in lung tissue infected by respiratory syncytial virus (RSV). Their study, published online in June, elicits for the first time the mechanisms by which this most common cause of respiratory tract viral infection increases lung membrane permeability, leading to the accumulation of fluid in infected lungs — a characteristic feature of viral hemorrhagic diseases.

The investigators performed *in vitro* experiments on lung membrane epithelial cells and demonstrated how RSV infection caused a decrease in the membrane's ability to resist the transfer of fluid into the lung. They also showed that inhibition of the kinase p38 MAPK (and, to a lesser extent, of JNK and ERK) can effectively reduce RSV-induced gap formation.

The findings are significant because they represent an important breakthrough in understanding the mechanism by which RSV activates enzyme pathways and a heat shock protein, Hsp27, and causes other physiological changes that lead to membrane permeability. By triggering fluid accumulation in the lung, RSV can set the stage for secondary bacterial infections and even life-threatening pneumonia among infants, immune-compromised patients and the elderly.

Citation: [Singh D, McCann KL, Imani F](#). 2007. MAPK and Hsp27 Activation Are Associated With RSV Induction of Human Bronchial Epithelial Monolayer Disruption. *Am J Physiol Lung Cell Mol Physiol*. Doi:10.1152/ajplung.00097.2007

[Return to Table of Contents](#)

COX-2 Inhibits UVB-Induced Epidermal Apoptosis after Acute Exposure

In collaboration with a scientist from the University of Texas, researchers in the NIEHS Laboratory of Molecular Carcinogenesis reported the effects of ultraviolet light B (UVB) on mice deficient in cyclooxygenases 1 and 2 (COX-1 and COX-2) in a study published in the May issue of the journal *Molecular Carcinogenesis*. Chronic UVB exposure has been implicated as a major cause of skin cancer, which is in part attributed to an increase in prostaglandin (PG) production due to the induction of COX-2.

While previous studies have used non-steroidal anti-inflammatory drugs (NSAIDs) to inhibit COX activity, the present study used COX-deficient mice to reduce PG production and avoid any COX-independent effects that NSAIDs may have.

The investigators found that COX-2, but not COX-1, deficient mice displayed increased UVB-induced epidermal apoptosis, or programmed cell death, and impaired epidermal recovery. Thus, COX-2 induction appeared to offer immediate benefits by protecting against the acute effects of UVB exposure in the mouse epidermis. However, the researchers concluded that while COX-2 protects against the early effects of UVB exposure, it can contribute to tumor formation during chronic UVB exposure.

Citation: [Akunda JK, Chun KS, Sessoms AR, Lao HC, Fischer SM, Langenbach R.](#) 2007. Cyclooxygenase-2 deficiency increases epidermal apoptosis and impairs recovery following acute UVB exposure. *Mol Carcinog* 46(5):354-362.

[Return to Table of Contents](#)

Dairy Products and Parkinson's Disease

A team of researchers led by an investigator in the NIEHS Epidemiology Branch reported findings of an association between high intake of dairy products and increased risk for developing Parkinson's Disease (PD), particularly among men. The study, which appeared in the May issue of the *American Journal of Epidemiology*, was funded by grants from NIH, NIEHS, the Kinetics Foundation and the Michael J. Fox Foundation for Parkinson's Research.

The team prospectively investigated 57,689 men and 73,175 women who were enrolled in the American Cancer Society's Cancer Prevention Study II nutritional cohort in 1992-1993 and completed follow-up surveys in 1997, 1999 and 2001. Of that cohort, the investigators had diagnostic confirmation for 388 cases of incident PD. Relative risk of PD was calculated by statistical analysis of baseline intakes of nutrients from dairy products or other sources.

The team found that men who were in the highest 20% of milk consumption had approximately 80% higher risk of PD as compared with men in the lowest 20%. The association was weaker in women. As demonstrated in a meta-analysis of pooled data, the study confirmed the findings of earlier large-scale prospective studies, the Health Professionals Follow-up Study, Nurses' Health Study and the Honolulu-Asia Aging Study.

Citation: [Chen H, O'Reilly E, McCullough ML, Rodriguez C, Schwarzschild MA, Calle EE, Thun MJ, Ascherio A.](#) 2007. Consumption of dairy products and risk of Parkinson's disease. *Am J Epidemiol* 165(9):998-1006.

[Return to Table of Contents](#)

Genetic Polymorphisms and Childhood Asthma and Atopy

In an NIEHS-funded study, an international team of researchers reported a link between genetic polymorphism in the transforming growth factor beta-1 gene (*TGFB1*) and childhood asthma and atopy. After genotyping 546 asthmatic children and their parents in Mexico, the investigators pinpointed three out of the five single nucleotide polymorphisms (SNPs) in *TGFB1* they tested to be important — the T allele of C-509T, the C allele of T869C and the C allele of rs7258445.

Expressed in many inflammatory cells including airway epithelial cells, *TGFB1* is a cytokine, a protein signaling compound. *TGFB1* is found in higher levels in the lung fluid of asthma patients and has been hypothesized to be involved in allergic inflammation and airway constriction.

The five *TGFB1* SNPs, selected based on functional and linkage disequilibrium data, were genotyped from blood samples. Atopy, or the genetic tendency to develop allergic reactions, was measured via a skin prick test with a battery of 24 aeroallergens. Statistical analysis correlated atopy data, asthma data and the SNP data to identify three relevant SNPs.

This study is the largest of its kind and the first to report a connection between SNP rs7258445 and asthma or atopy, adding significantly to evidence for a role of *TGFB1* variations in asthma and atopy.

Citation: [Li H, Romieu I, Wu H, Sienra-Monge JJ, Ramirez-Aguilar M, Del Rio-Navarro BE, Del Lara-Sanchez IC, Kistner EO, Gjessing HK, London SJ.](#) 2007. Genetic polymorphisms in transforming growth factor beta-1 (*TGFB1*) and childhood asthma and atopy. *Hum Genet* 121(5):529-538.

[Return to Table of Contents](#)



Inside the Institute

Lab Media and Glassware Employees Recognized

By Lillian Gu

When the Media and Glassware Unit staff showed up in D250 for a mysterious “mandatory meeting” on June 22, they were greeted with a scrumptious meal of Southern style BBQ beef, grilled chicken and coleslaw. Evergreen Consulting, the company NIEHS has contracted to manage media and glassware, provided the catered meal to thank its employees for their hard work and dedication.

During the luncheon, the unit’s employees received certificates for their years of service. While Evergreen has had the contract only since 2005, some of the Media and Glassware staff have been around for much longer, including Media Technician Sara Holmes with 25 years as a contractor with NIEHS and NIEHS Project Officer Jennie Foushee now in her 35th year of federal service.

Evergreen President Heath Carroll had approached the Media and Glassware Units Project Officer Jennie Foushee and Assistant Project Officer Essie Jones earlier with the idea for the surprise luncheon. As NIEHS employees, Foushee and Jones could not offer any government funding for the luncheon, but they were glad to help plan the event and keep it a well-guarded secret for two weeks prior to the luncheon.

“We were truly surprised,” said Project Manager Yvette Nurse-Parrish, who had no idea of what was about to take place. “I said, ‘Maybe he’s going to do a safety meeting.’”

According to Foushee, the Media and Glassware Unit, located on the first floor of D-module in Building 101, is crucial to research at the Institute. “Without Glassware and Media it’s impossible for research to be completed,” she explained. “The unit is responsible for making sure the glassware is thoroughly cleaned, processed, sterilized and ready for use, as well as that all media protocols are followed and completed as required.”

Investigators can request media 24 hours ahead of time through the online Media Ordering and Tracking System, known as MOATS. Foushee approves work requests for the department, where the media is prepared, and samples are incubated overnight and delivered the next morning. Evergreen staff also collect glassware twice a day from the labs and bring it back to the department to be cleaned.



Media and Glassware employees showed off their certificates at the June 22 appreciation luncheon. (Photo courtesy of Steve McCaw)



Evergreen President Heath Carroll, center, posed with Project Assistant Essie Jones, left, and Project Officer Jennie Foushee. (Photo courtesy of Steve McCaw)

The glassware is machine washed, inspected for residues and breakage, covered with foil and re-shelved in the D-module mall area, where lab technicians can pick up the type of glassware needed. Glassware for use with tissue cultures is also autoclaved, a sterilization process using super-heated steam to kill bacteria and other organisms, and sealed.

The department's employees take a lot of pride in their work. "Our thing is to ensure quality — that the glassware is ready when they need it, how they need it, where they need it to be," commented Nurse-Parrish. "My responsibility is that the quality of Media and Glassware is maintained."

The Media and Glassware Unit processes more than 20,000 pieces of glassware and prepares approximately 25,000 media and buffer solutions each month.

Behind the Scenes in Media and Glassware



Washroom Technician Lawrence Barbee prepares a batch of glassware for washing. (Photo courtesy of Steve McCaw)



After washing, Glassware Inspection Technician Bunny Johnson checks for thorough cleanliness as she removes the glassware from the wash racks. (Photo courtesy of Steve McCaw)



Media Technician Jenny Boyd mixes media components. (Photo courtesy of Steve McCaw)



Technician Tom Gillespie prepares to break down the boxes received with new glassware. (Photo courtesy of Steve McCaw)



Washroom Technician Tony Jackson removes sterilized media after autoclaving. (Photo courtesy of Steve McCaw)



Media Technician Mike Watkins dispenses media broth to fill a lab request. (Photo courtesy of Steve McCaw)



Glassware Technician Dennis Malone inspects glassware once more to ensure quality of cleaning. (Photo courtesy of Steve McCaw)



Only when everything passes muster is the glassware ready for shelving. Glassware Technician Janie Shaw performs the final quality check and creates the only part of the Media and Glassware Unit most people at NIEHS will ever see — row after gleaming row of immaculate flasks, cylinders, bottles, beakers and pitchers ready for use in the lab. (Photo courtesy of Steve McCaw)

Annual Fish Fry Serves up Good Food and Old-time Fellowship

By Eddy Ball

More than 120 federal employees and contractors flocked to the covered picnic area at the NIEHS ball field for the annual Blacks In Government (BIG) Annual Fish Fry on June 28. Ostensibly, they came for the golden brown trout, whiting, fries, hushpuppies and sides, but the real reasons most people return year after year are the intangibles.

The fish fry is a time to gather with friends from across the Institute and across the pond and enjoy a chance to talk, laugh, meet new people and catch up on new developments. This year, the event only sold tickets in advance. A smaller crowd and the summer heat failed to dampen the spirit of traditional Southern fellowship — which is what this modest fundraiser is really all about.

According to Chapter President Veronica Godfrey, a biologist in the NIEHS Environmental Toxicology Program, the fish fry actually raises very little money for the service organization. “The Chapter pays for the fish, oil and hush puppies, but the paper products, deserts, drinks and vegetables are in-kind donations from members,” Godfrey explained.

Members also do the cooking and the clean-up, a substantial investment of sweat equity for the cook staff, such as NIEHS Stem Cell Biologist Annette Rice who braved both the heat of the day and the heat of boiling oil to prepare the fish and fries to perfection. As hard as the work is, however, the crew remains largely the same from year to year, which speaks volumes about what this event means on a personal level.

As a nonprofit service organization, BIG promotes equity in all aspects of American life, excellence in public service, and personal development opportunities for all Americans. The RTP Chapter of BIG is dedicated to preparing area young people for the future by mentoring and tutoring in the schools, developing oratory skills and providing cutting-edge training in such areas as web page design.

The local chapter, which was started at NIEHS, also sponsors Black History Month events each year and promotes education, professional development, support and networking. Its 22 members are government employees at NIEHS, the Environmental Protection Agency, the National Center for Health Statistics and the Army Research Office. Dues are \$15 per year, and membership is open to government employees and contract employees of government agencies.



Lindia Ingram, Keith Holloway, Veronica Godfrey and Elena Braithwaite enjoyed their lunches under the cover of the picnic shelter. (Photo courtesy of Steve McCaw)



The Georges, Margaret of NIEHS, left, and Michael of EPA usually spend their days across the pond from each other. At the fish fry, they worked together on the food preparation crew. (Photo courtesy of Steve McCaw)

Funds raised by the organization at this year's fish fry and other events will be used to support activities for young people and chapter members to attend the regional training conferences. Several members have helped to plan this year's Annual Training Conference August 13-17 at the Gaylord Opryland Hotel and Convention Center in Nashville, Tenn.

[Return to Table of Contents](#)



Marcia Sutton joined her mom, NIEHS Biologist Deloris Sutton, for lunch. (Photo courtesy of Steve McCaw)



Extramural Division colleagues Elizabeth McMillan and Sharon Beard prepare to line up for lunch. (Photo courtesy of Steve McCaw).



Contract Specialist Colette Malone, left, paused before enjoying one of the many deserts available at the fish fry. Her friend, NCCU student Sherell Smith, right, works in Extramural Division Activities Support. (Photo courtesy of Steve McCaw)

STEM Scholars Visit NIEHS

By Eddy Ball

On July 2 in Rodbell Auditorium, NIEHS hosted 30 aspiring scholars from North Carolina Central University (NCCU), who were participating in a six-week National Science Foundation (NSF) residential bridge program, the Initiative for Transforming and Sustaining Science, Technology, Engineering and Mathematics (ITSSTEM). The visit was another example of the myriad of outreach and partnership type activities (see related article on the Summer Ventures Program visit) that NIEHS has fostered over a 14-year period and that have been coordinated by Director of Education and Biomedical Research Development Marian Johnson-Thompson, Ph.D.

The young people are promising pre-freshmen from minority or underserved groups who plan to major in science, technology, engineering and mathematics (STEM) fields at NCCU. During their visit, they attended three lectures by NIEHS scientists and broke up into four groups for individual sessions with scientists. The talks and small group sessions combined science education, career exploration and mentoring to facilitate the ITSSTEM goal of increasing the number of students successfully completing degrees in STEM fields.

Following a welcome by Johnson-Thompson, the students viewed a “North Carolina Now” television feature on the Sister Study and heard a report on project update activities from Summers of Discovery faculty intern Faye Cobb Payton, Ph.D. Payton, an associate professor of Information Systems/Technology at North Carolina State University, is spending her summer at NIEHS analyzing participant profile data for the Sisters Study to improve ongoing recruitment and interview protocols.

A talk on “Oxidative Stress and Inflammation” by Dario Ramirez, Ph.D., provided a transition for the students from epidemiology and biostatistics to the world of basic research. Ramirez is a Principal Investigator-in-Training in the Free Radical Metabolites Branch of the Laboratory of Pharmacology and Chemistry. He and other scientists in the Free Radical Branch have used a novel approach, known as immuno-spin trapping, as a sensitive, cost effective method for evaluating free radical activity at physiologically relevant levels.



Faye Cobb Payton talked about career exploration as well as her work at NIEHS. The Atlanta native initially planned to become a physician, but the actual experience of patient care changed her mind and led her into the field of information technology and biostatistics. (Photo courtesy of Steve McCaw)



Staff Scientist John Roberts explained use of confocal microscopy in his work with the Metastasis Group in the Laboratory of Molecular Carcinogenesis. (Photo courtesy of Steve McCaw)

The students then broke into groups to visit three labs. These included the Laboratory of Molecular Carcinogenesis, with investigators John Roberts, Ph.D., and Margaret George, the Laboratory of Signal Transduction, with investigator Jerry Yakel, Ph.D., and the Laboratory of Reproductive and Developmental Toxicology, with investigators Bill Schrader, Ph.D., and Annette Rice. A fourth group remained in Rodbell Auditorium for a small group discussion led by Biologist Veronica Godfrey of the Laboratory of Pharmacology and Chemistry.

The formal part of the program ended with a presentation by Health Science Administrator Joan Pakenham, Ph.D., an NCCU alumna and former biomedical research scholar who participated in a similar NIH-funded program, designed to increase the number of minority biomedical research scientists. In her talk, "One Model of a Successful STEM Career," Pakenham discussed her experience as a Minority Access to Research Careers (MARC) Fellow at NCCU and her experiences as a bench scientist in cancer research and current work in policy and administration at NIEHS.

According to Johnson-Thompson, NIEHS educational outreach activities, such as this one, are made possible through the volunteer efforts of NIEHS staff, who are committed to helping young scholars and always willing to give of their time. One volunteer who has volunteered as a lecturer and host laboratory scientist, Jerry Yakel, recently described his motivation for giving his time to these programs: "If I can help just one [of the students] to decide either to study what I do or to study something that is of passionate interest for them, then I feel lucky and honored to be in such a position."

[Return to Table of Contents](#)



When the students returned from small-group lab visits, Johnson-Thompson, background, asked one student from each group to report on the group's experiences. NCCU ITSSTEM Coordinator Crystal Gathers, center, listened as this young woman described her discussion session with Godfrey. (Photo courtesy of Steve McCaw)



Pakenham encouraged the students to strive for the high grade point averages that can open doors to advanced opportunities in STEM careers. Pakenham offered the students insights into the many career paths open to them. (Photo courtesy of Steve McCaw)

Penta Retires to a Life of California Dreaming

By Eddy Ball

Friends and colleagues of California-bound John Penta, Ph.D., gathered in the Executive Conference Room on July 2 to wish the 25-year NIH employee well on his retirement from NIEHS. Penta, whose background is in oncology clinical trials, has headed the NIEHS Technology Transfer Program for the past 10 years.

The Boston native spent his early years in a diverse neighborhood of immigrants and learned to speak French, German and Yiddish, in addition to his parents' native language, Italian. Attending a parochial boys' school, he experienced a rigorous traditional education that sparked his passion for science. However, the young Penta also developed interests in other subjects, such as history, classical literature and music.

Before Penta even began his post-secondary education at Purdue University, where he received his doctorate, he was already a classically trained pianist and a working musician. Accepted at age 15 into the New England Conservatory of Music, Penta earned spending money during college by playing in clubs in nearby Chicago on weekends. Over the years, he has played the piano at several NIEHS events and entertained residents of nursing homes in Chapel Hill, Durham and Raleigh.

After leaving the military, where he served as a captain in Army Intelligence Research in the 1960s, Penta pursued studies of pathology, physiology, anatomy and laboratory test interpretation as part of a 24-month training program at the National Cancer Institute (NCI). His training and research at NCI took place at the bedsides of cancer patients involved in clinical trials. Penta also worked and studied at Johns Hopkins Oncology Center in Baltimore.

During his tenure at NCI, Penta was part of a national effort which led to a chemotherapy regimen for treating children and teenagers with metastatic osteogenic sarcoma. Later, he and a group of scientists raised venture capital and founded a biotechnology company devoted to finding new therapies for cancer and for the new disease that came to be named AIDS. He came south in 1996 to engage in clinical research at NIEHS and teach as adjunct professor of oncology at Duke University.



Host William Martin, M.D., center, joined applause for the retiring scientist, right. (Photo courtesy of Steve McCaw)



Charle League and Penta shared a laugh over refreshments. League was one of nearly fifty colleagues who packed the Executive Conference Room to bid Penta farewell. (Photo courtesy of Steve McCaw)

In 1997, Penta accepted his position in technology transfer, helping researchers negotiate the legal labyrinth of protecting intellectual property and licensing inventions for use by business and non-governmental organizations outside of NIH to benefit public health. Looking forward to leisure, Penta said he plans to fill his time with reading, playing piano in clubs and senior citizen homes, and enjoying a less hectic life in California, where he has many friends and former classmates.

[Return to Table of Contents](#)



The new retiree posed with David A. Schwartz, M.D., left, Marian Johnson-Thompson, Ph.D., and Sam Wilson, M.D. (Photo courtesy of Steve McCaw)

Summer Ventures Scholars Tour Laboratory of Structural Biology

By Eddy Ball

Twelve young scholars participating in the [Summer Ventures in Science and Mathematics Program \(SVSM\)](#) at North Carolina Central University visited NIEHS on July 10. The students, academically talented rising juniors and seniors in state high schools, attended a two-hour program of lectures and lab visits as part of their four-week residential curriculum.

The visit began with an overview of NIEHS research by Public Affairs Specialist John Peterson, who used high-profile NIEHS research findings to illustrate the interplay of genes, environment and time in the pathogenesis of disease. Peterson's remarks were followed by more detailed talks from Laboratory of Structural Biology (LSB) Research Physicist Bob London, Ph.D., and LSB Scientific Computing Support Specialist Eugene DeRose, Ph.D., on nuclear magnetic resonance imaging. LSB Supervisory Research Chemist Ken Tomer provided an overview on high-sensitivity assessment of epoxygenase gene variability related to inflammation and hypertension and identification of markers for treatment-resistant prostate cancer.

Accompanying the students to NIEHS was John Myers, Ph.D., professor of Organic Chemistry at NCCU. His institution is the Triangle sponsor for Summer Ventures, which is coordinated by the North Carolina School of Science and Mathematics. In the classroom component of the program, Myers is focusing on



John Peterson gave the students a half-hour overview of research at NIEHS. He used notable research accomplishments, such as investigations into lead toxicity and validation of the BRCA genes, to underscore the importance of basic research in advancing public health. (Photo courtesy of Steve McCaw)

isolation of molecules, and the two field trips the students experienced, at NIEHS and RTI International, developed that theme by exposing participants to real-world applications of what they are learning.

Summer Ventures is a free, state-funded program of intensive study with room, board and tuition provided without charge to participants. Since the program's inception in 1984, NCCU has been one of six sites across the state where the program is conducted. Other sites include Appalachian State University, East Carolina University, UNC at Charlotte, UNC at Wilmington and Western Carolina University.

In addition to their classroom and institution-based experiences, students interact with professionals from other institutions, government and industry, who guide students through an academic program specially designed to provide experience in scientific inquiry and mathematical problem solving. NIEHS has been a popular field trip option ever since the program's beginning.



Bob London, foreground, showed the students output from the Nuclear Magnetic Resonance (NMR) unit prior to their visit to the equipment room itself. (Photo courtesy of Steve McCaw)



In the NMR lab, Eugene DeRose, seated, explained the liquid nitrogen cooling that reduces resistance in the NMR machinery to almost zero. He also eased students' concerns about the effects of the powerful magnetic fields produced by the equipment. (Photo courtesy of Steve McCaw)



Ken Tomer, right, conducted his part of the program in a hallway. Abstracts of recent studies served as the visuals for his presentation. (Photo courtesy of Steve McCaw)

[Return to Table of Contents](#)

Calendar of Upcoming Events

- **August 1** in Rodbell, 11:00–12:30 — Summers of Discovery Seminar Series featuring Farhad Imani, Ph.D., speaking on “Respiratory Virus Infections and Immune Responses”
- **August 3** in Rodbell, 9:00–10:00 — Frontiers in Environmental Sciences Lecture Series, Speaker and Topic TBA
- **August 6** in Rodbell, 10:00–11:30 — DIR Scientific Director Candidate Seminar featuring Rudy Juliano, Ph.D., speaking on “Integrin-Mediated Control of Cell Signaling Events”
- **August 6 (Off Campus Event)** in Alexandria, Va., 8:30-5:00 NTP CERHR Bisphenol A Expert Panel Meeting II
- **August 6 (Off Campus Event)** in the UNC Lineberger Comprehensive Cancer Center Plaza Conference Room, 5:00 —Norman Sharpless, M.D., speaking on Murine Models of Lung Cancer
- **August 7** in the Executive Conference Room, 12:00–1:00 — Receptor Mechanisms Discussion Group featuring Karen Adelman, Ph.D., speaking on “Poised Polymerases: Sitting in the Starting Gates and Ready to Respond”
- **August 7** in Rodbell, 4:00–5:00 — NTP Q&A Session with DIR Scientific Director Candidate Rudy Juliano, Ph.D.
- **August 8** in Rodbell, 11:00–12:30 — Summers of Discovery Seminar Series featuring Jack Taylor, M.D., Ph.D., speaking on “A Random Walk Through Biomedical Careers and Gene Polymorphisms”
- **August 10** in Rodbell, 9:00–10:00 — Frontiers in Environmental Sciences Lecture Series featuring Redford Williams, M.D., addressing the topic of “Stressful Social Environments and Genes: Effects on Mental and Physical Well-Being”
- **August 10** in Rodbell, 1:00–2:30 — Seminar: “DNA Processing in Auto-Immune Disease” by Fred Perrino, Ph.D.
- **August 15** in Rodbell and environs, 8:00-5:00 — Friends and Family Day
- **August 16** in Rodbell, 8:00–6:00 — Conference: Network Approaches to Investigating Environmental Influences on Human Disease
- **August 17** in Rodbell, 9:00–10:00 — Frontiers in Environmental Sciences Lecture Series featuring Ken Olden, Ph.D.
- **August 22** in D-350, 12:00–1:00 — LMG Seminar Series with Stephanie Nick McElhinny, Ph.D., speaking on “Leading- and Lagging-Strand Polymerases”
- **August 27-29 (Off Campus Event)** at Durham Marriott — Conference: “Endocrine Disruptor Research: Basic Biology, Mechanisms, and Translation to Human Health Risk”
- **August 31** in Rodbell, 9:00–10:00 — Frontiers in Environmental Sciences Lecture Series with Donald M. Anderson, Ph.D., cautioning his audience, “Don’t Eat the Clams: Managing the Threat from the New England Red Tide”

[Return to Table of Contents](#)

eFactor

Your On-Line Source for NIEHS News



The e-Factor, which is produced by the Office of Communications and Public Liaison, is the staff newsletter at the National Institute of Environmental Health Sciences. It is published as a communication service to NIEHS employees. We welcome your comments and suggestions. The content is not copyrighted. It can be downloaded and reprinted without permission. If you are an editor who wishes to use our material in your publication, we ask that you send us a copy for our records.

- Director of Communications: [Christine Bruske](#)
- Writer-Editor: [Eddy Ball](#)
- Science Editor: [Robin Arnette](#)