

NATIONAL INSTITUTES OF HEALTH • NATIONAL CENTER FOR RESEARCH RESOURCES

NCR Reporter

WINTER/SPRING 2008

CRITICAL RESOURCES FOR RESEARCH



U.S. Department of Health and Human Services

www.ncrr.nih.gov



Engaging Communities



Bringing Research Advances More Quickly to Patients

Community engagement is a critical element in the translational research process and one that NCCR has supported for many years. The advent of the Clinical and Translational Science Awards (CTSA) consortium has led to the development of new and far-reaching opportunities that encourage community involvement and, thus, will bring research advances more quickly and efficiently to patients.

For instance, programs at the University of Pittsburgh, the University of California, Davis (two CTSA recipients), and Meharry Medical College (a participant in NCCR's Research Centers in Minority Institutions program as well as a partner in a CTSA to Vanderbilt University) illustrate the importance of involving the community as full partners in the research process. These programs, described in this issue's cover story, successfully demonstrate the critical need to ensure the diversity of the research team, involve members of *all* communities in the research process, and address cultural differences for each population included in a study.

The importance of community-based physicians and nurses cannot be overstated. A new initiative, highlighted on the CTSA in Focus page, supports networks of community-based medical providers who are qualified, trained, and eager to participate in research studies. Through this initiative, NIH has awarded funding to four members of the CTSA consortium to determine the feasibility and value of establishing such networks.

The principal investigators of the CTSA consortium gathered recently—as part of an NCCR Advisory Council meeting—to describe their successes and challenges since joining the consortium in 2006. Many of the grantees' accomplishments have focused on reaching out to their communities and developing resources to facilitate and encourage patient involvement. The highlights from the presentations are covered in the News section.

Community engagement also continues to be the focus of NCCR activities this spring. I encourage you to attend the CTSA-sponsored workshop entitled "Accelerating the Dissemination and Translation of Clinical Research into Practice" on May 9. Information on the workshop is provided on page 3 and on the NCCR Web site at www.nih.ncrr.gov.

NCCR grantees have made great strides in fully engaging their communities in the research process. I hope you will share our excitement in learning about their current and future efforts.

Barbara Alving, M.D.

Barbara Alving, M.D.
Director, NCCR

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Translational research, often referred to as “bench to bedside,” translates knowledge gleaned from laboratory findings to potential treatments for diseases. But there is a second aspect to this research—assessing the usefulness of these advances to patients.

Often, studies that engage patients require the involvement of community-based physicians and nurses. Through its Roadmap initiative “Re-engineering the Clinical Research Enterprise,” NIH has awarded supplemental funds to four members of the Clinical and Translational Science Awards (CTSA) consortium—Columbia University Health Sciences, Duke University, Mayo Clinic College of Medicine, and University of Rochester—to determine the necessary components for creating and maintaining networks of community-based medical providers who are qualified, trained, and eager to participate in research studies.

These networks—referred to as clinical research associates networks or organizations—have several important functions, according to Lloyd Michener of the CTSA-funded Duke Translational Medicine Institute and co-chair of the Community Engagement Steering Committee for the CTSA consortium. “They help connect CTSA institutions to diverse patients who represent a wide variety of conditions,” he explains. “They help provide support to medical practices to conduct clinical research. And they help researchers understand disease at the population level.”

Duke already has established a network of primary care physicians, the Duke Primary Care Research Consortium, who work together to enroll patients in clinical research studies. The consortium involves 25 practices with 29 sites in eight counties of North Carolina’s Piedmont area. Since its inception in 1997, the consortium has enrolled more than 3,000 subjects in more than 50 trials.

With the supplemental support from NIH, the Duke Translational Medicine Institute is assessing the feasibility of expanding this network to include physicians at more practices and specialty physicians. “We will be sending a survey to 1,000 physicians to gauge their level of interest in clinical research,” says Rowena Dolor, director of the Duke Primary Care Research Consortium. Based on the survey results, Dolor and colleagues will develop different education modules for supporting research at these sites. They will also survey the clinical studies currently approved by Duke’s Institutional Review Board to select ones that would be good candidates for involving community providers.

“The CTSA would function as a clearinghouse for multicenter clinical studies that require provider identification, training and certification, and study-specific support,” explains Dolor. “Some practices have dedicated research staff, and all we would need to do is offer a study to them—provided that they have the necessary certification; others would need us to send a study coordinator for subject enrollment and follow-up.”

Dolor is currently gathering data on the feasibility and cost of running this type

of organization. The other three CTSA-funded centers that received comparable NIH supplements are asking similar questions using different approaches. “Some are conducting focus groups; others are setting up practice-based research networks,” says Dolor.

Although networks of primary care physicians and researchers have existed for many years, explains Michener, “what is new is the degree of formalization and connection to the community we are trying to achieve. The research organizations we are implementing span all diseases and conditions. It is really exciting.” ■

UPCOMING MEETING

The CTSA Community Engagement Steering Committee will hold a workshop entitled “Accelerating the Dissemination and Translation of Clinical Research into Practice” on May 9, 2008, on the NIH campus in Bethesda. For information about the workshop and to register to attend, visit www.aptrweb.org/workshops.

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 The Clinical and Translational Science Awards (CTSA) program is a national consortium designed to transform how biomedical research is conducted across the country. Its goals are to speed the translation of laboratory discoveries into treatments for patients, as well as to train the next generation of clinical researchers. The CTSA program is led by NCR. For more information, visit CTSAweb.org.

Engaging Communities

Partnerships among researchers, health care providers, and patient communities are helping to bring research advances to the people who need them. **BY LAURA BONETTA**

During the 1970s, Pittsburgh football fans watched L. C. Greenwood bring home four Super Bowl victories for the Pittsburgh Steelers. Today, he can be spotted in a short video bringing home to viewers a message about the benefits of participating in clinical research studies.

Greenwood stars in the 30-minute documentary “Clinical Research: Advancing Science & Changing Lives,” produced by WQED, the Pittsburgh public television affiliate, in collaboration with the University of Pittsburgh Clinical and Translational Science Institute (CTSI), a recipient of a 2006 Clinical and Translational Science Award (CTSA) from NCRR. The film, a version of which is streamed on the University of Pittsburgh CTSI Web site (www.ctsi.pitt.edu/video/index.html), is one of the institute’s many activities aimed at engaging its community.

NCRR-funded programs like the CTSI in Pittsburgh increasingly involve communities in translational research—the process of taking basic laboratory findings and translating them into strategies to prevent or treat diseases. To achieve its purpose, translational research must engage members of racial and ethnic minority groups and people living in rural and inner-city areas, who face much higher rates of disease, premature death, and disability than other populations (see sidebar “[Health Disparities](#)” on page 8). The key to this engagement, regardless of the type of program or population served, is two-way communication that establishes partnerships among researchers, health practitioners, and their community members.

LONG-LASTING RELATIONSHIPS

In Pittsburgh, a successful partnership between the University of Pittsburgh and the community grew out of the joint efforts of two people. In 2002, Steven Reis, a professor of medicine in the Division of Cardiology at the University of Pittsburgh School of Medicine, began recruiting subjects for his Heart Strategies Concentrating on Risk Evaluation (Heart SCORE) study, a community-based protocol to identify risk factors associated with heart disease.

Because the prevalence and severity of heart disease are much higher among African Americans than other U.S. populations, Reis wanted half of the 2,000 study participants to be African American. In the Pittsburgh region, however, only 12 percent of the population is of this racial group. “We wanted to recruit a study population that had 4 times the representation in the general population,” says Reis. “That seemed like a huge challenge.”

Lee Higgs, Jr., former executive vice president and chief operations officer of the Urban League of Greater Pittsburgh, an organization that provides programs and services to about 35,000 people annually, offered to assist Reis in his recruitment efforts. Within two years, they achieved an astounding 100 percent of their recruitment goal among African Americans.

“Key to our success was the willingness of Steve and the University of Pittsburgh to listen to the community’s needs,” says Higgs. “Rather than saying, ‘We want something from you,’ we went to the community asking, ‘What can we do for

Rather than saying, “We want something from you,” we went to the community asking, “What can we do for you?” —LEE HIPPS



■ Sherry Brooks, community outreach coordinator for the University of Pittsburgh Clinical and Translational Science Institute (CTSI), prepares to analyze cholesterol levels in one of the participants at a health fair held in the employees’ cafeteria of Pepsi Bottling Group, Inc., in McKees Rocks, Pa. Another member of the CTSI, Mary Fisher, provides health and wellness educational information and literature on clinical research participation. The screening is one of many outreach activities by the CTSI designed to give members of the community health information and to listen to their concerns.

you?” Hipps received resounding requests from the public for health screenings, such as for cholesterol and blood pressure. In response, Hipps says, “We started doing free screening at churches and community centers and then referred people to physicians for follow-up care.”

The university-community partnership, which has since been brought under the umbrella of the CTSI, developed into the Community PARTners (Partnering to Assist Research and Translation) Program, co-directed by Hipps and Jacqueline Dunbar-Jacob, dean of the University of Pittsburgh School of Nursing. “With the CTSI, we now have an institutional presence in the community,” says Reis, the institute’s director. “We provide a central resource for the community and for investigators.” And in light of the fact that community engagement programs require a long time to establish and sustain, Reis assures, “We expect the CTSI to be a long-term program at the University

of Pittsburgh. Therefore, we can commit to a sustainable partnership with our community.”

The CTSI has three main goals, according to Reis, that affect three communities. “We want to have a research-informed general community, research-informed practicing physicians and nurses, and community-informed researchers,” he explains.

Through Community PARTners, the CTSI continues to provide free health screenings and information in various settings and has instituted a community-oriented speakers bureau through which researchers are available to speak to churches or other groups on key health topics. Consequently, educating speakers has also become a critical component of the program. “We do not assume that just because a researcher is an expert on a topic, he or she could talk to community members,” says Hipps. “It is not about impressing people with your knowledge but rather giving people the information they need.”

FOCUSING ON WOMEN'S HEALTH

Listening to and becoming familiar with the needs of the Nashville area community has been a focus for the research at Meharry Medical College for years. "We do a lot of focus groups to assess the concerns of people in our community," says Valerie Montgomery Rice, senior vice president for health affairs and dean of the School of Medicine.

At a recent focus group, Meharry researchers asked parents how they felt about sharing information with their children about a vaccine to protect against the most common types of human papillomavirus—a virus transmitted by sexual contact that can, in some cases, cause cervical cancer in women and other kinds of cancers in both men and women. "We learned that parents were not concerned that talking about the vaccine would make their children more likely to engage in risky behavior," says Montgomery Rice. "Their main concern was a misapprehension that the vaccine would cause them to get the disease." She added that it is important for clinical researchers to know their communities and not make assumptions about their needs or concerns.

To better address the community's needs, particularly those of women, Montgomery Rice spearheaded the creation of the Center for Women's Health Research—the nation's first research center devoted exclusively to understanding why African American women are at greater risk for certain diseases, such as type 2 diabetes and HIV/AIDS, and how biology, race, and economics contribute to health disparities in women.



■ Valerie Montgomery Rice (right), dean of the School of Medicine at Meharry Medical College and a professor of obstetrics and gynecology, spearheaded the creation of the Center for Women's Health Research to bring together investigators conducting research on health disparities in women. She is shown here with one of her colleagues, Dineo Khabele, director of the center's Gynecologic Oncology & Women's Cancer Research Laboratory.



■ Obesity plays an important role in many conditions affecting African American women, such as type 2 diabetes. Women who participate in studies at the Center for Women's Health Research at Meharry Medical College have access to fitness and nutrition counseling as well as the center's exercise facilities, which include cardiovascular and strength training equipment and a group exercise studio.

"The center was conceived out of the idea that lots of people at Meharry were doing research in women's health disparities, but they were not connected," says Montgomery Rice, the center's executive director. "If you really want to focus on a bench-to-bedside effort, you need to have a physical structure to allow for basic and clinical researchers to come together."

Funded with grants from NCRR and NIH's National Center on Minority Health and Health Disparities, the Center for Women's Health Research is a 10,000-square-foot facility, of which about one-third is dedicated to laboratory space for researchers in the areas of reproductive biology; cell, molecular, and developmental biology; and HIV. The center also includes several cores, including radiology, exercise and nutrition, hormones, and behavior.

"The behavior core is unique," explains Montgomery Rice. "This is where we answer the hard questions, such as 'Why do women make the choices they do that put them at increased risk for diseases?'" And because obesity is an important factor in many diseases affecting African American women, the center emphasizes nutrition and exercise. All women who participate in a study at the center have access to the center's exercise facility and to fitness and nutrition counseling.

There is an incredible disconnect between what researchers are doing and what is being provided to the community. —SERGIO AGUILAR-GAXIOLA

The Center for Women’s Health Research—one of many programs at Meharry with a strong community component—will now have access to additional resources provided by the Vanderbilt Institute for Clinical and Translational Research, which was established through an NCCR CTSA in 2007 awarded to Vanderbilt University in partnership with Meharry Medical College. The CTSA builds on a decade-old alliance between the two institutions.

One of the CTSA’s roles will be to educate more researchers about what community engagement entails. “Many researchers still think community engagement is only community-based participatory research,” says Marino Bruce, an associate professor in the department of family and community medicine at Meharry, who co-directs the community engagement core of the CTSA. “It is not just about recruiting people to a clinical trial. Translation is about people having a conversation. And just like language translation, it is not just the words that matter but also the context.”

SPEAKING THE SAME LANGUAGE

Sergio Aguilar-Gaxiola, a professor of internal medicine and director of the Center for Reducing Health Disparities at the University of California, Davis, also knows the importance of effective communication.

A growing amount of research has found that differences in language and culture, even small ones, could be one of the reasons for the nation’s persistent health care disparities. As a result, Aguilar-Gaxiola is implementing a new training effort at UC Davis’ Sacramento campus that will incorporate the Culturally and Linguistically Appropriate Services (CLAS) standards, a set of guidelines published in 2000 by the U.S. Department of Health and Human Services’ Office of Minority Health. (For more information, visit www.omhrc.gov/templates/browse.aspx?lvl=2&lvlID=15.)

In addition, Aguilar-Gaxiola is leading a national program to improve the way in which hospital staff communicate with non-English-speaking patients. The program, called Speaking Together: National Language Services Network, was

launched in fall 2006 with funding from the Robert Wood Johnson Foundation and involves the UC Davis Health System and nine other collaborating institutions. “We are addressing the importance of language services,” says Aguilar-Gaxiola. “For a system whose patients sometimes have limited resources, communication plays a critical role in health care.”

The UC Davis Health System serves a diverse population in Sacramento and from counties throughout the Northern California region. “The more I work with our community, I realize there is an incredible disconnect between what researchers are doing and what is being provided to the community,” says Aguilar-Gaxiola, whose research interests are in the area of mental health. “For example, in the last decade we have learned a lot about the risks and protective factors for mental disorders, but the rates of these disorders are still significantly high.” Many people are simply not aware of what mental disorders are or how to seek treatment.



■ Sergio Aguilar-Gaxiola, a professor of internal medicine and director of the Center for Reducing Health Disparities at the University of California, Davis, is working with medical interpreters for the UC Davis Health System on a national initiative to help improve communication between health practitioners and patients from different ethnic backgrounds. Aguilar-Gaxiola co-chairs the CTSA consortium’s Community Engagement Steering Committee along with Lloyd Michener, director of the Duke Center for Community Research at Duke University Medical Center.

As a first step in increasing participation of underserved communities in health care, Aguilar-Gaxiola and colleagues are partnering with community-based organizations, providers,

People go into medicine to make a difference. But you cannot change the face of medicine unless you impact your community. —VALERIE MONTGOMERY RICE

and public agencies to understand needs and concerns of diverse groups and populations. He recently completed a nine-month project funded by the California Department of Mental Health to gather information about the kinds of problems residents see in their communities and the types of services that might help prevent these problems. The report resulting from this effort will help both the agency and the counties around the state to plan programs and improve their mental health services.

These examples are just a few of the projects working toward one ultimate goal: “to develop evidence that it is possible to reduce certain disparities in health care and improve the quality of care to all populations,” says Aguilar-Gaxiola. “I believe that it is possible to do that. We need to recognize and act upon the idea and common understanding that the ultimate beneficiaries of our health research are the very communities that need it the most.”

CHANGING THE FACE OF MEDICINE

Aguilar-Gaxiola also co-chairs the CTSA consortium’s Community Engagement Steering Committee along with Lloyd Michener, director of the Duke Center for Community Research at Duke University Medical Center (see [related story](#) on page 3). “The goal of the committee is, first of all, to bring attention to the importance of reaching out to communities, to have meaningful input from community organizations, and to use them as partners,” explains Aguilar-Gaxiola. “We are finding ways to facilitate bidirectional communication by sharing knowledge, expertise, and resources.”

The committee is developing a series of workshops over the next year to share best practices among CTSA-funded institutions. The ultimate goal is to promote co-learning and collaboration across sites. The first workshop, entitled “Accelerating the Dissemination and Translation of Clinical Research into Practice,” is scheduled for May 9, 2008, on the NIH campus in Bethesda. It is jointly sponsored by NCRP and the Association for Prevention Teaching and Research. (For more information, visit www.aptrweb.org/workshops.)

The knowledge that will emerge from these workshops will benefit not only CTSA institutions but also all researchers involved in community-based programs. In addition to NCRP, several NIH institutes and other organizations, including the Agency for Healthcare Research and Quality, the Centers for Disease Control and Prevention, the Association for Prevention Teaching and Research, the Health Resources and Services Administration, and the Association of American Medical Colleges, will strive to engage all communities in biomedical research and health delivery.

“People go into medicine to make a difference,” says Montgomery Rice. “But you cannot change the face of medicine unless you impact your community. You can be the top institution in terms of research and NIH grants, but if you don’t impact the community, what is the benefit of being number one?” ■

HEALTH DISPARITIES

Health disparities refer to gaps in the quality of health and health care across racial, ethnic, and socioeconomic groups. In 2003, the Institute of Medicine published *Unequal Treatment: Confronting Racial and Ethnic Disparities in Health Care*, a landmark report that reviewed health disparities and helped raise further awareness of this issue at the national policy level. According to the report, “racial and ethnic minorities tend to receive lower quality of healthcare than non-minorities, even when access-related factors, such as patients’ insurance status and income, are controlled. The sources of these disparities are complex, are rooted in history and contemporary inequities, and involve many participants at several levels” (www.nap.edu/openbook.php?isbn=030908265X).

More recently, the Agency for Healthcare Research and Quality published the *2006 National Healthcare Disparities Report* on behalf of the U.S. Department of Health and Human Services to provide a national overview of disparities data in both quality of care and access. The report documents that racial and ethnic minorities continue to receive poorer quality of care than whites according to 22 essential quality-of-care measures. Specifically, Hispanics receive poorer quality of care compared to non-Hispanic whites in 77% of these measures, African Americans in 73%, American Indians and Alaska Natives in 41%, and Asians or Pacific Islanders in 32%.

Research Unit Goes to Extremes



■ Researchers from Mayo Clinic have been studying the effects of altitude illness by examining workers who travel from McMurdo Station in Antarctica (sea level) to the South Pole (high altitude). Bruce Johnson, who heads the research study, is holding the bottom right corner of the flag.

from the National Science Foundation. The study has broad implications for human health, because the biological processes at work in severe altitude illness also underlie other serious health conditions, such as congestive heart failure and chronic lung disease. The study may also advance understanding of how people adapt to low

Each year when summer comes to the southern hemisphere, hundreds of researchers and support staff descend on the South Pole. And every year, despite careful health screening, a few researchers may need to be evacuated because of severe altitude illness, and scores more may experience milder symptoms, such as headache, nausea, dizziness, shortness of breath, and fatigue.

For the past two years, Bruce Johnson has journeyed here from Rochester, Minn., where he is a professor of medicine at Mayo Clinic's College of Medicine, to study altitude illness and to find genetic markers that may predict predisposition to this ailment. On Johnson's latest expedition to the South Pole in fall 2007, phlebotomist Josh Mueller accompanied the team. Mueller was on loan from Mayo's innovative "mobile" clinical research unit, established in 2007 with funding from an NCR Clinical and Translational Science Award (CTSA) to the Mayo Clinic College of Medicine.

The Antarctic Study of Altitude Physiology, headed by Johnson, is a three-year project funded by a research grant

pressure, such as in space flight, and thus has prompted interest from NASA.

Unquestionably, the Antarctic Study poses unusual logistical challenges. To reach their study subjects, Johnson's team must fly for 24 hours to Christchurch, New Zealand, then six more hours to McMurdo Station in Antarctica, and then another three hours, when weather permits, to reach the South Pole. (On two occasions, bad weather grounded the team at McMurdo for two weeks.) After examining South Pole workers at the main station, Johnson and colleagues must then hike a half-mile in bone-piercing cold and wind to tents housing seasonal residents.

Although the South Pole sits at 9,300 feet above sea level, the Earth's spin and the cold create atypically low pressure that approximates up to 11,000 feet or higher. This pressure causes hypoxemia, or reduced levels of oxygen in the bloodstream, which is the root cause of the symptoms of altitude illness. Thus, Johnson's team collects blood samples from study participants and, with the aid of monitoring devices, gathers data about numerous physiological functions over time, hoping that the numbers will provide a picture of the mechanisms of illness.

Back at the lab at Mayo Clinic, Johnson, who also co-directs the CTSA-funded Energy Balance Core of Mayo's Center for Translational Science Activities, processes the blood samples, totaling about 16 per subject, for biochemical assays and gene expression. "Without CTSA support, we'd be looking for ways to cut corners a little bit in recruiting subjects and processing samples," says Johnson.

So far, Johnson has collected and analyzed samples from approximately 240 subjects at sea level (McMurdo Station) and from about 200 people at high altitude (the South Pole). His ultimate goal is to test 300 subjects at each site by the end of the study.

The mobile clinical research unit that facilitated Johnson's most recent polar expedition is one of three CTSA-supported clinical research units at Mayo. The other two are stationary units located in Mayo's two Rochester hospitals, supporting both inpatient and outpatient studies. Typically, hospital medical staff are too busy caring for patients to assist researchers with their studies. However, the more than 100 specially trained staff dedicated exclusively to the clinical research unit provide Mayo investigators with valuable help in collecting blood and other samples from patients, administering study drugs, monitoring physiological responses, and recording study data.

The mobile unit, which averages a staff of seven registered nurses and technicians, extends the reach of Mayo's clinical studies. "The mobile clinical research unit opens up whole new avenues of research, because it allows people of all ages and states of health to participate in clinical studies regardless of where they are," says Andrew Badley, its director and a professor of medicine at Mayo.

The South Pole is the farthest afield the mobile unit has ventured thus far. Closer to home, current studies have taken the unit to Mayo's operating rooms for research on heart valve surgery, to Winona State University for a genetics study in healthy student volunteers, and to Minneapolis for a "real-world" obesity study involving exercise interventions in the workplace. Badley reports that his unit is currently conducting "a significant number of studies off campus, and we expect its use to increase."

—BARBARA SHAPIRO

NCRR RESOURCES: The Mayo Clinic College of Medicine is a member of a national consortium, funded through the Clinical and Translational Science Awards program, that is transforming how clinical and translational research is conducted, ultimately enabling researchers to provide new treatments more efficiently and quickly to patients. For more information, visit CTSAweb.org.

A Planetarium Show on Diabetes

"Not all children who play baseball become professional ball players, but they do learn to appreciate the sport," says John A. Pollock, biology professor at Duquesne University in Pittsburgh, Pa. Through innovative methods, including movies, video and board games, and Internet sites, Pollock has been finding ways to get children and their families to appreciate not baseball but science. "We don't intend all children to become scientists; rather, we hope to foster an appreciation and understanding of science and its influence on their lives."

His latest endeavor is the world's first high-definition video planetarium show on biomedicine, which opened at the Henry Buhl, Jr. Planetarium and Observatory at the Carnegie Science Center in Pittsburgh last November. Sponsored by the Regenerative Medicine Partnership in Education, a program supported through an NCRR Science Education Partnership Award (SEPA) to Duquesne University, the show "Our Cells, Our Selves" explores type 1 diabetes, an autoimmune disease that results in the permanent destruction of the insulin-producing islet cells of the pancreas.



■ The planetarium show "Our Cells, Our Selves" takes viewers on a journey to explore the immune system and understand diabetes—a disease that starts in islet cells (shown in the photo) in the pancreas.

The movie is presented as a bedtime story told to 7-year-old Sylvie, recently diagnosed with diabetes. Through colorful and engaging animations, the story explains how the immune system works, what goes wrong in diabetes, and how stem cells may provide a cure.

Reactions to the 16-minute show have been overwhelmingly positive. "Even very young children remain attentive," says

Pollock. He has been particularly gratified by comments from children diagnosed with diabetes who appreciated being able to “see” the disease and asked him when stem cell therapies would be available.

Pollock hopes to distribute “Our Cells, Our Selves” to other museums this spring. He also is considering developing a DVD version of the movie that could be distributed to rural communities that may not have access to a museum.

The show builds on an earlier project, the Tissue Engineering Show and Education Partnership, also funded by a SEPA grant. Similar to that project, “Our Cells, Our Selves” includes a movie and accompanying educational resources, such as classroom workbooks as well as online and outdoor activities.

Pollock credits many individuals who contributed to the success of the current project, including Creative Director Laura Lynn Gonzalez, who worked with Pollock to develop the topic and approach to the show. Students from both Duquesne and Carnegie Mellon universities contributed to the digital animation.

—AMBER BOEHM

NCCR RESOURCES: NCCR’s Science Education Partnership Awards are designed to improve life science literacy throughout the nation. Educators can receive free copies of the movies and workbooks developed by the Regenerative Medicine Partnership in Education at www.sepa.duq.edu/education/index.html.

Connectivity Enables Collaborations

In November 2007, physician-scientist Priscilla Magno practiced new procedures at the Experimental Surgery Laboratory of the University of Puerto Rico (UPR) School of Medicine. One thousand five hundred miles away, her former mentor, Anthony N. Kalloo, chief of the Division of Gastroenterology and Hepatology at the Johns Hopkins Hospital in Baltimore, Md., followed her progress.

Kalloo watched as Magno performed a procedure on an animal model using an endoscope, an instrument used to view organs inside the body. Kalloo was able to observe the same images Magno was seeing in real time and in perfect detail.

The successful long-distance collaboration was made possible by high-resolution video streaming using Internet2, a nonprofit consortium that develops and deploys advanced network applications and technologies for education and high-speed data transfer.

The equipment for Internet2 connectivity and staff positions to operate it were made possible by Research Centers in Minority Institutions (RCMI) funding to the Center for Information Architecture in Research at the UPR Medical Sciences Campus. Additional funding through an NCCR Institutional Development Award provides for an Internet2 network engineer, a key player in the transmission process both before and during the endoscopy procedure.



■ Anthony N. Kalloo watched researchers at the University of Puerto Rico perform an experimental surgical procedure from his office at the Johns Hopkins Hospital in Maryland. The long-distance collaboration was made possible by high-resolution video streaming using Internet2 connectivity.

The high-resolution, real-time video allowed Magno, who recently returned to UPR from Johns Hopkins, to continue her collaboration with Kalloo in a very tangible way. “We were able to communicate during crucial moments in the procedure,” says Magno. “It was as if he were in the room.”

José G. Conde, director of the Center for Information Architecture in Research, and Aníbal Vega, systems programmer at the center, coordinated the project that made this collaboration possible. Conde hopes that more UPR researchers will utilize the wired surgical suite for collaborative operations and that the use of Internet2 connectivity will expand beyond surgery and be used to promote collaborations for a myriad of research projects.

The establishment of Internet2 connectivity is an ideal example of the mission of the RCMI-funded center: to foster collaborative research and minimize the effect of Puerto Rico’s geographical isolation from major research centers. Conde hopes that this connectivity will bridge the geographical gap and facilitate more training and research to increase and enhance global collaborations at the UPR Medical Sciences Campus.

—AMBER BOEHM

NCCR RESOURCES: The Research Centers in Minority Institutions program provides grants to institutions that award doctoral degrees in health-related fields and that have a 50 percent or greater enrollment of students from minority communities underrepresented in the biomedical sciences. Through the Institutional Development Award program, NCCR fosters health-related research and improves the competitiveness of investigators in states that historically have not received significant levels of competitive research funding from NIH. For more information, visit www.nccr.nih.gov/ri.

More Than Skin Deep

Scientists discover ways to generate embryonic stem cells from skin tissue. **BY LAMONT WILLIAMS**

Take skin cells, tweak them a bit, and they can become heart cells for a patient with chronic heart disease or insulin-producing cells for a patient with diabetes. Such cell-based therapies in which stem cells give rise to specific types of cells to repair damaged cells or tissues, also referred to as regenerative medicine, are still in the future. But two recent studies conducted by groups based at NCCR-funded National Primate Research Centers (NPRCs) are helping to pave the way toward custom-made cells and tissues for patients.

“The field of regenerative medicine is an extremely important one,” says John Harding, NCCR’s director of primate resources. “It is potentially the way we are going to cure some diseases that are not curable by any other means at present. The advances at the Oregon and Wisconsin NPRCs will significantly accelerate this area of research.”

The two recent breakthroughs rely on the fact that nearly every cell in the human body contains the full set of genes required for making every type of cell. During development, a fertilized egg develops into an embryo, which contains embryonic stem cells. These cells turn different sets of genes off while leaving others on, giving rise to heart, brain, skin, or other specialized cells in the body. In most cases, the specialized cells retain the full complement of genes even though not all of these genes are functional.

Researchers at the Oregon NPRC essentially persuaded one type of specialized cell—a skin cell—to revert back to its embryonic stem cell status. The method used, called somatic

cell nuclear transfer, involved obtaining an egg cell of a female rhesus macaque (*Macaca mulatta*) and removing its nucleus. The researchers then transferred the nucleus of a skin cell from another adult macaque into the enucleated egg cell. The transfer



■ Shoukhrat Mitalipov and his colleagues at the Oregon National Primate Research Center (NPRC) have generated embryonic stem cells from rhesus macaque skin cells using somatic cell nuclear transfer. Research at NCCR-funded NPRCs has played an important role in the field of regenerative medicine.

allowed the egg cell to mature into an embryo containing embryonic stem cells, mimicking normal development. By providing or removing certain chemical signals, the researchers prompted the stem cells to develop into nerve, heart, liver, pancreatic, and other cells.

This process could potentially be used to take skin cells from a patient suffering from disease and, using the process of somatic cell nuclear transfer, produce cells that will replace those damaged by disease. Because the replacement cells would originate from the patient,

Moving forward, the primate centers will be extremely valuable for regenerative medicine. —JAMES THOMSON

there would not be the risk of the cells being rejected by the patient's immune system. "Consider a patient with Parkinson's disease," says Shoukhrat Mitalipov, co-director of the Assisted Reproductive Technologies and Embryonic Stem Cell Core Laboratory at the Oregon NPRC in Beaverton, who leads the research. "In this person, there is a certain type of neuron that has been damaged, producing the patient's symptoms. This new technique may one day be used to create new neurons that can be placed into the patient to cure the condition."

Although federally funded researchers can only use this technique in animal models because it involves living eggs, such studies could provide important insights into the eventual success of cell-based therapies in humans. "Moving forward, the primate centers will be extremely valuable for regenerative medicine," says James Thomson, a professor at the University of Wisconsin School of Medicine and Public Health. "In this field, you need a model that is long lived like the primate to follow these diseases, which tend to be diseases of old age."

Thomson, a pioneer in stem cell research, directed the group at the Wisconsin NPRC that reported the first isolation of embryonic stem cell lines from a rhesus macaque in 1995. He then led his group to the first successful isolation of human embryonic stem cell lines in 1998. Last year, one week after the announcement of the Oregon team's success, Thomson's team, along with a team of Japanese scientists working independently, reported that human skin cells could be transformed into stem cells without the use of living egg cells or embryos.

Thomson and colleagues used viruses as laboratory tools to introduce four genes into the genome of human skin cells, causing the skin cells to become pluripotent stem cells. Although stem cells generated through this technique, called induced pluripotent stem (iPS) cells, appear to behave like ordinary embryonic stem cells, more tests are needed to precisely determine the properties of iPS cells. Thomson's team and other researchers are also working on finding ways to remove the "extra" genes once they are no longer needed.

If iPS cells prove to be like embryonic stem cells and are able to produce any type of cell in the body, they could be used to replace damaged cells and tissues using a patient's own cells. Because no human eggs or embryos would be used, the technique would circumvent the ethical and legal issues that

surround the use of embryonic stem cells in therapy. But before any therapies can be used with patients, "more work in the primate centers needs to be performed showing that therapies based on iPS cells can be done and are safe," says Thomson.

These advances, which have generated much excitement among stem cell researchers, build on many years of work developing the necessary tools and expertise at all NPRCs. "The base grants to the centers allowed the buildup of

the intellectual and physical infrastructure needed to accomplish breakthroughs such as these," says Harding. And primate centers will undoubtedly continue to play an important role in regenerative medicine as more discoveries are made. ■



■ Stem cell research pioneer James Thomson and colleagues at the University of Wisconsin have generated cells that appear to function like embryonic stem cells by "reprogramming" human skin cells. These cells could potentially be used to create different types of cells that can replace damaged cells in patients with diseases like diabetes or Parkinson's.

The research described in this article is supported in part by base grants to the Oregon National Primate Research Center and the Wisconsin National Primate Research Center, two of eight NCRR-funded primate research centers nationwide. Thomson also was the recipient of an NCRR grant that funded improvements in viral vectors that were ultimately used in the induced pluripotent stem cell studies, as well as grants from the Charlotte Geyer Foundation and the National Institute of General Medical Sciences. Mitalipov's work also was supported by a grant from the National Institute of Neurological Disorders and Stroke.

ADDITIONAL READING:

Yu, J., Vodyanik, M. A., Smuga-Otto, K., et al., Induced pluripotent stem cell lines derived from human somatic cells. *Science* 318:1917–1920, 2007.

Takahashi, K., Tanabe, K., Ohnuki, M., et al., Induction of pluripotent stem cells from human fibroblasts by defined factors. *Cell* 131:861–872, 2007.

Byrne, J. A., Pedersen, D. A., Clepper, L. L., et al., Producing primate embryonic stem cells by somatic cell nuclear transfer. *Nature* 450:497–502, 2007.

NCRR's Council Members Hear Presentations from Grantees

Principal investigators from the Clinical and Translational Science Awards (CTSA) and National Primate Research Center (NPRC) programs discussed their accomplishments at the National Advisory Research Resources Council meeting held on January 30, 2008, on the NIH campus in Bethesda.

The Advisory Council, whose members are experts from such diverse fields as science, policy, law, economics, and management, provides the second level of grant reviews and advises NCRR on funding activities, policies, and programs. The January meeting was the first time that Council members heard directly from representatives of the 24 CTSA recipients since that program began in 2006.

Presenters from the CTSA program provided several vivid examples of innovations that will facilitate collaborations among researchers from many disciplines. For example, Columbia University has developed Work Web, a database tool that connects researchers who have complementary skills and specialties. In addition, a multidisciplinary pilot awards program encourages researchers who haven't worked together before to form new teams. The University of Rochester has used its CTSA, together with funds from New York State, toward a new clinical science building designed with open spaces that encourage scientists and staff to interact. Mayo Clinic has promoted multidisciplinary science for years, but it

is now providing a central administrative "home" for such disciplines as genomics, proteomics, metabolomics, and informatics and is facilitating the application of these cutting-edge disciplines to personalized medicine.

But CTSA sites have not only enhanced collaboration at their own institutions, they have also strengthened multi-institutional networks. For example, the CTSA to Vanderbilt University has enhanced the university's long-standing alliance with Meharry Medical College by making additional shared resources available to the two institutions.

CTSA member institutions have been making strides toward engaging communities in the research process. Columbia University has used CTSA support to establish the Community Engagement Resource, which helps people in the community understand how their participation contributes to research. Columbia also received an NIH Roadmap National Clinical Research Associates award to build models for conducting clinical research in community medical practices. The University of Iowa has established a community roundtable, primarily composed of local health centers that serve minority groups. It is also working with health care organizations across the state to develop best practice guidelines for community engagement.

Much progress also has been made toward sharing and leveraging resources across all 24 CTSA recipients, which are organized as a consortium. Through various committees, the consortium is finding ways for different CTSA recipients to collaborate more efficiently. In this way, the

consortium is providing a national identity and unified voice for clinical and translational science.

At the January meeting, Council members also heard from directors of several NPRCs—centers that provide the specialized resources and intellectual infrastructure necessary for performing translational research on nonhuman primates. For the past 50 years, the NPRC program has developed primate models for atherosclerosis; energized HIV/AIDS research with the discovery of the simian form of the virus; discovered areas in the brain that are important for memory; established foundations for work on stem cells; and contributed to assisted reproductive technologies, gene therapy, and regenerative medicine.

Like the CTSA program, the eight NCRR-funded NPRCs are focusing on collaborations that will further enhance the impact of their work. For example, they have established working groups to integrate their efforts and strengthen their collaborations, and they have begun to work with the Biomedical Informatics Research Network to meet information technology needs.

Many NPRCs have also linked to other NIH-supported collaborations. For example, the New England NPRC works with Regional Centers of Excellence for Biodefense and Emerging Infectious Diseases Research and the global Center for HIV-AIDS Vaccine Immunology, two groups supported by the National Institute of Allergy and Infectious Diseases. The California NPRC participates in the Centers of Excellence in Translational Human Stem Cell Research, which is

supported by the National Heart, Lung, and Blood Institute; the National Institute of Neurological Disorders and Stroke; and the National Institute of Diabetes and Digestive and Kidney Diseases.

NPRCs also are connecting with CTSA. Five of the eight NPRCs are at institutions that also have CTSA, and at some institutions, such as the University of California, Davis, CTSA and NPRC investigators serve on each other's leadership and advisory committees.

The CTSA and NPRC programs are among many NCRF initiatives that encourage collaboration among researchers and health care providers across disciplines and institutions. These efforts, along with those by other NIH institutes and centers, will further the NCRF and NIH goal of transforming how translational and clinical science are conducted. For more information about the CTSA and NPRC programs, please visit www.ncrr.nih.gov.

NCRF Grantee Receives Wolf Prize

The Wolf Foundation of Israel has announced it will award the 2008 Wolf Prize in Chemistry to William E. Moerner, an NCRF grantee at Stanford University in California. Moerner will share the \$100,000 award with Allen J. Bard of the University of Texas at Austin for their pioneering work developing single-molecule optical imaging and electrochemistry, respectively. These technologies enable researchers to study the properties

of individual molecules. Moerner, who is a chemistry professor at Stanford and also a member of the National Academies of Science, will receive the Wolf Prize from Israeli President Shimon Peres in Jerusalem on May 25, 2008.

SciAm 50 Honors NCRF Grantee

Richard D. Smith, a Battelle Fellow at the Department of Energy's Pacific Northwest National Laboratory, has been named one of 50 outstanding leaders in the 2007 Scientific American 50 (SciAm 50)—an annual list of 50 key contributors in science and technology—for creating a new approach to help detect the earliest stages of Alzheimer's, Parkinson's, and other neurological diseases. He shares the honor with collaborator Desmond Smith of the David Geffen School of Medicine at the University of California, Los Angeles. Richard Smith is the director of the NCRF-funded Proteomics Research Resource for Integrative Biology. The complete list of this year's winners for the SciAm 50 appears in the January 2008 issue of *Scientific American*. It can also be viewed on the magazine's Web site at www.sciam.com/article.cfm?id=sci-am-50-2007.

New Video About NCRF

A new NCRF multimedia presentation entitled "Harnessing Innovation to

Advance Human Health" is available on the NCRF Web site (http://videocast.nih.gov/podcast/ncrr/NCRRNovPromo_web.mov). Through compelling images and narration, the video presents what NCRF does and, in particular, how it helps bring together diverse research teams to realize the full potential of shared biomedical resources. The project was made possible by NCRF grantees who provided photographs and video footage of NCRF-funded laboratories, technologies, resource centers, and animal models. ■



■ These images are from a new video on NCRF's Web site that explains the Center's role in supporting biomedical research.

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