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

PHOTO COURTESY OF REGENERATIVE MEDICINE PARTNERSHIP IN EDUCATION

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

NCRR RESOURCES: NCRR'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 NCRR 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

NCRR 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, NCRR 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.ncrr.nih.gov/ri.

PHOTO COURTESY OF UNIVERSITY OF PUERTO RICO SCHOOL OF MEDICINE

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.

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 NCRR 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 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 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.

PHOTO COURTESY OF MAYO CLINIC