The Penn State Milton S. Hershey Medical Center and Penn State College of Medicine Research and Graduate Studies Mission is to promote, foster, and sustain the highest quality research, training, and career development within the Medical Center.
We are making critically important contributions to the health of the nation and world. Our discoveries bring relief to the faces of parents and loved ones, increase greatly the odds of survival for patients fighting disease, and, through new concepts in prevention, help to ensure long, happy lives for people everywhere.

Just this year, we witnessed an amazing step forward in our artificial heart assist device technology. For the first time, a U.S. patient implanted with an Arrow LionHeart™, a young man with congestive heart failure who could barely walk around a room, was able to go home from the hospital and begin enjoying life again.

From life-saving devices to help premature babies breathe easier, to discoveries that unlock the secrets of our genes and show promise to inspire new drug therapies, to technologies that help surgeons develop and enhance their operating techniques, we are helping to bring life-enhancing products to the market.

Discovery is not possible without funding for biomedical research. We’ve worked tirelessly to increase sponsored research funding, and have watched our funding grow 56 percent, from $54.5 million in 2000 to more than $85.1 million in 2003. It’s a testament to our commitment to making important biomedical discoveries.

We joined with community partners, the Life Sciences Greenhouse of Central Pennsylvania, Harrisburg Regional Chamber of Commerce and Capital Region Economic Development Corporation, Technology Council of Central Pennsylvania, and Ben Franklin Technology Partners, to present Innoventure2003™. This research and technology expo brought innovation in science, medicine and technology together to promote better health and lower healthcare costs, and to facilitate economic growth. We’re already seeing the results of collaborations forged at that inaugural event. Planning for Innoventure 2005™ is underway.

New discoveries and development of therapies bring new commerce, new companies, and new jobs. As evidenced by an economic impact study, the Medical Center attracts more than $40 million to the state just from federal resources for its research activities. This only punctuates the tremendous economic potential created by our biomedical research mission.

We must push on. We must continue to search for new partnership opportunities both within and outside the institution, explore alternative sources of funding and, most importantly, make the discoveries that improve health.

Jay Moskowitz, Ph.D.
associate vice president for health sciences research, Penn State University
vice dean for research and graduate studies, Penn State College of Medicine
For nearly fifteen years, James Connor, Ph.D., professor of neural and behavioral sciences, and John L. Beard, Ph.D., professor of nutritional sciences, have been looking for answers to the nutritional disorder the World Health Organization has ranked number-one in the world—iron deficiency.

Their partnership started shortly after Connor arrived at Penn State College of Medicine in 1987.

“John called me because of our common interest in iron,” Connor recalls. “At the time, he was investigating dietary modification of iron and he wanted to understand more about what was happening neurologically.”

What started as a simple phone call developed over nearly fifteen years into two National Institutes of Health R01 grants, joint participation in two program project grants, and co-training of three doctoral students and two master’s students. One doctoral student from Beard’s laboratory even went on to serve a post-doctoral fellowship in Connor’s lab.

Most of their studies seek to uncover the biologic understanding of the relationship between brain development, brain iron status, and neurological function. Ultimately, iron deficiency, particularly during critical stages of development, can lead to behavioral and mental deficits that can last a lifetime.

“Our partnership works because we come from very different backgrounds and meet at the interface of our interests in brain biology and brain metabolism,” said Beard who is based in the Department of Nutritional Sciences, Penn State-University Park. “Because of our backgrounds, we often interpret data differently. What is so exciting is that we have so much respect for one another’s opinions that we want to understand the perspective of the other person. I feel that’s what really pushes science forward these days. You get better science done when two, three, or more people are involved and challenging each other.”

Their collaboration also has allowed each investigator to expand the scope of his individual research.

“I have gained a real appreciation of the dietary requirement of iron, which has allowed me to expand into studies of iron transport mechanisms and how iron passes through the blood-brain barrier,” Connor said. “I may not have been comfortable manipulating the dietary iron status in my investigations without the knowledge I’ve gained from John.”

Beard acknowledges that, due to their locations on different campuses, both he and Connor have had to commit to the partnership, be willing to travel, and get creative with technology. But it hasn’t slowed them down.

Connor and Beard are also in the third year of a multi-species program project grant based at University of Michigan investigating how iron deficiency during early development changes brain metabolism.

This year, the two even published a review of their work titled “Iron Status and Neural Functioning,” in the Annual Review of Nutrition. The article is a tribute to their years of collaboration and to the contributions they’ve made to the field of iron metabolism.

Next steps: They hope soon to announce yet another program project grant success.

“Get better science done when two, three, or more people are involved and challenging each other.”

– John L. Beard, Ph.D.
Our Mission: Promote the Medical Center regionally, nationally, and internationally.

Continuing projects in the Department of Health Evaluation Sciences include:
- Acting as Data Coordinating Center for PROPHET, a national study to determine whether treatment with low-dose steroids will decrease the number of babies who develop chronic lung disease (CLD). The PROPHET study will recruit 712 premature infants from nine hospitals to determine whether this therapy is beneficial.
- Offering the Penn State Clinical Research Training Program designed to prepare health care clinicians and other researchers for clinical investigation and health services research. Between 1999 and 2003, twenty Penn State College of Medicine physicians operated the Data Coordinating Center of the Asthma Clinical Research Network (ACRN). The ACRN—a partnership of NHLBI, eight clinical centers across the United States, and the Data Coordinating Center at Penn State College of Medicine—conducts clinical trials for rapid evaluation of new and existing treatments for asthma.

Innovations developed while collaborating on programs like the ACRN have caused the Department of Health Evaluation Sciences to become a nationally-recognized model for multi-center clinical study design.

In addition to its biostatistical expertise, the Department has a team of epidemiologists who perform population-based research studies on cancer, women’s health, and the effects of air pollution on cardiovascular health.

“We will continue to expand in the next year with plans to grow our New Health Services Research group, which will focus on health economics and outcomes-based research,” Chinchilli said.

The Department of Health Evaluation Sciences at Penn State College of Medicine this year launched a new Bioinformatics Consulting Center in collaboration with Penn State-University Park. The cross-campus center, initiated under a grant from the Tobacco Settlement Funds, is a resource for researchers who use gene chips and other bioinformatics tools in their investigations.

“The subtle changes that make good research projects great ones can often be attributed to careful study design, expert data management, and rigorous statistical analyses,” said Vernon M. Chinchilli, Ph.D., interim chair and professor of health evaluation sciences, Penn State College of Medicine. “Our services through the Bioinformatics Consulting Center can provide investigators expertise in those areas to ensure their studies result in information that will generate valid conclusions.”

The establishment of the center is just one of a number of successes the Department has enjoyed in recent years. In September, the Department was awarded a five-year, $7 million grant from the National Heart, Lung, and Blood Institute (NHLBI)—National Institutes of Health to continue to operate the Data Coordinating Center of the Asthma Clinical Research Network (ACRN). The ACRN—a partnership of NHLBI, eight clinical centers across the United States, and the Data Coordinating Center at Penn State College of Medicine—conducts clinical trials for rapid evaluation of new and existing treatments for asthma.

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When asked about the Pediatric Innovation Program, neonatologist Charles Palmer, M.B., Ch.B., might pull out a container of what looks like thirty pairs of butterfly wings.

The “wings” are actually the prototypes for Palmer’s patented plastic device, called the Naso Oral Respiratory Interface (NORI) System. The NORI is attached to a baby’s face with hydrogel and used to stabilize the various tubes that enter the baby’s mouth, eliminating the need for tape, which is not only irritating, but also can be unsanitary.

For Palmer and the other founding members of the Pediatric Innovation Program, projects like the NORI are only the beginning—and the sky’s the limit.

The Pediatric Innovation Program is a unique collaboration of Penn State Children’s Hospital, Penn State University, and industrial partners that focuses on improving the development of technology for infants and children. The program provides a forum for clinicians, engineers, and industry to exchange ideas with the goal of innovating clinically-relevant technology for rapid translation into clinical solutions.

“Often a new initiative starts with a nurse or doctor who notices a challenge in caring for a child,” Palmer said. “That develops into a pencil drawing on a piece of paper, or simply a concept. Our goal is to bring together the people who can move that rapidly from ‘idea’ to ‘practice.’” Liz Kisenwether of the College of Engineering and Tony Warren of the Smeal College of Business are developing this concept of market-pull technology into an entrepreneurship class bringing engineering and business concepts to answer the needs of our pediatric patients.

A number of Pediatric Innovation Program projects are already underway. James Kendig, M.D., professor of pediatrics, is spearheading a project with Robert McGrath, Ph.D., Russell Messier Ph.D., and Mark Horn, Ph.D., from Penn State’s College of Engineering to modify hydrogen sensors for the early detection of neonatal necrotizing enterocolitis, a disease in newborns which results in the death of portions of the small intestine and colon.

Engineers from University Park are bringing state-of-the-art biosensor technology to infants’ bedside. Mike Pishko, Ph.D., from chemical engineering, Craig Grimes, Ph.D., from electrical engineering, and Stephen Fonash, Ph.D., director of the Penn State Nanofabrication Facility, are actively engaged with neonatal physicians at the Medical Center in seeking better ways to assess and deliver care to the smallest patients at Penn State Children’s Hospital.

Although an emerging program, members have their sights set on making the Pediatric Innovation Program a national resource for enhancing technological innovation, encouraging industrial partnerships and associations to facilitate the transfer of intellectual property and marketing of new knowledge, setting standards for the best neonatal and pediatric health care delivery possible.

“We believe that resources spent on improving health at the start of life are truly resources well spent in the prevention of lifelong handicap.”

– Charles Palmer, M.B., Ch.B.
Anna Barrett, M.D., assistant professor of neurology, was selected by the members of The Hinkle Society at Penn State College of Medicine to receive the 2003 Hinkle Society Junior Investigator Award. The award is bestowed on one young investigator each year who is considered a “rising star” and who has great potential for continued success in research. It is the most prestigious award given to a junior faculty member at the College of Medicine. Barrett, a behavioral neurologist, is interested in learning about brain-behavior relationships to better understand the healthy brain, and to improve treatment and rehabilitation of brain disorders.

Brian Reese, a doctoral student from Plattsburgh, N.Y., was awarded first place in the graduate division of the firstever Central PA College Venture Challenge, a business plan competition designed to showcase students in the region who are on their way to becoming entrepreneurs. Reese, who earned an M.B.A. from Penn State Harrisburg, submitted a plan for a consulting firm to provide guidance to scientists seeking to commercialize the results of their original research. Reese is pursuing a Ph.D. in Integrative Biosciences at Penn State College of Medicine with a concentration in neuroscience.

Penn State General Clinical Research Center recently held the grand reopening for its newly remodeled $1.4 million facility. The renovation and expansion was made possible by a $700,000 Construction Grant awarded by the National Institutes of Health (NIH) and the required 700,000 match from the College of Medicine. The $2 million Animal Research Facility construction and renovation that added fifteen animal rooms and space for new research faculty was also completed in 2003. This project was necessary to keep up with the boom in genetic research at the College of Medicine.

The College of Medicine graduated six students from the MD/PhD program, the largest graduating class since the College’s formal, NIH-supported, dual-degree program began in 1995. The graduates were Akash Patnaik, Joseph Rasimas, Richard Conn, Carolyn Pizoli, Bethanee Schlosser, Ridwan Lin. The MD/PhD program at the College is one of only forty-one such programs in the country.

The Department of Neural and Behavioral Sciences was officially formed July 1, 2003. The creation of this department, and consequently the dissolution of the Department of Neuroscience and Anatomy and the Department of Behavioral Science, ensures a continuum of interdisciplinary science and better aligns the College of Medicine with the structures of the National Science Foundation (NSF) and the NIH. This alignment enables the College to be better positioned for the types of funding that are now available.

Robert E. Harbaugh, M.D., a 1978 graduate of Penn State College of Medicine, returned to the Medical Center and assumed leadership of the Division of Neurosurgery in the Department of Surgery, which became an independent department July 1, 2003. Establishment of the new Department of Neurosurgery will permit easier collaboration and integration among clinical and basic neuroscientists, neurologists, neurosurgeons, and others within the Medical Center and at Penn State-University Park.

Leaders from Penn State Hershey Medical Center (PShMC) and the Lebanon VA Medical Center (VAMC) announced the official grand opening of a state-of-the-art research facility on the grounds of the Lebanon VAMC. The new laboratory will allow Lebanon VAMC to expand its research program and support VA-funded studies in areas that are important to the health of veterans including cardiology and renal failure. The new lab will enable the Lebanon VAMC and researchers with dual appointments to the Lebanon VAMC and PShMC to draw down more federal research dollars.

The Penn State Clinical Research Training Program under the leadership of Tom Lloyd, Ph.D. and Diane Thiboutot, M.D., graduated its third class of physician-researchers. The NIH-sponsored K30 program is designed to increase the number of physicians pursuing careers in clinical research. Six physicians—Sharon Banks, D.O., Kevin Cockroft, M.D., William Flood, M.D., Jimmy Ibinkle, M.D., Ian Paul, M.D., and Ellen Perricci, M.D.—earned their Master of Science degrees in Health Evaluation Sciences.
Provide a program of humane animal care and use that meets or exceeds the highest national standards.

Our Missions:

- Educate the public about the value of the research enterprise.
- Assure employees, students, patients, and visitors, as well as the community around us, of a safe environment through compliance with government regulations and good safety practices.
- Initiate and sustain training and career development of students, staff, and faculty.
- Support the people and ideas that lead to better health.

Research Team (l-r): Deborah Freverttter, M.S., Robert A. Gibbey, M.D., Ph.D., Barbara L. Suchanec, M.P.A., Charles Palmer, M.B., Ch.B., Vernon M. Chinchilli, Ph.D., Thomas P. Loughran, Jr., M.D., David Hufford, Ph.D., Henry J. Donahue, Ph.D., James Connor, Ph.D., Ian Gilchrist, M.D., John T. Repke, M.D., Leslie Parent, M.D., Kristin Eckert, Ph.D.
Hui-Lin Pan, M.D., Ph.D., professor of anesthesiology, discovered that the secret to heart attack chest pain may be on the tip of the tongue. He found evidence that the same type of nerve receptors that register the burning sensation from hot peppers in the mouth are located on the surface of the heart, which may cause the sensation of chest pain from a heart attack. His data suggests that the ‘hot pepper’ receptors could become a new target for treatment of chronic chest pain, also referred to as angina pectoris, that is resistant to conventional treatments.

A drug developed by Waldemar Debinski, M.D., Ph.D., associate professor of neurosurgery, received Fast Track designation from the Food and Drug Administration for the promise shown in the treatment of brain tumors in early clinical studies and was expected to enter Phase III trials in 2003. The drug, an anti-cancer cytotoxin based on interleukin 13 (IL13), a cytokine that regulates immune response, Debinski discovered that cytotoxin, IL13-PE38QQR, has exceptionally potent killing activity in brain tumors.

Wild black bears may hold some secrets to recovering bone in humans. Seth Donahue, Ph.D., found that, like humans, bears suffer bone loss from disuse or immobilization. But unlike humans who can’t recover lost bone, bears have a unique ability to rebound from significant bone loss suffered each year during hibernation. The black bear’s mechanism of bone recovery may provide insight to human bone loss and recovery.

A longstanding collaboration between principal investigator, Michael B. Smith, Ph.D., and his team, Timothy J. Master, M.D., Qing X. Yang, Ph.D., and Christopher M. Collins, Ph.D., yielded a $6.9 million grant from the National Institute of Biomedical Imaging and Bioengineering—National Institutes of Health to study ultra high field magnetic resonance imaging (MRI). Ultimately, this research will lead to improved MR scanners that will produce clearer, more precise images of the brain, tumors, organs, or other structures in the body. Improving the quality of MR images will allow physicians to more accurately diagnose and determine courses of treatment for their patients.

Gavin Robertson, Ph.D., assistant professor of pharmacology, pathology, and dermatology, discovered that a dysfunction in a gene called PTEN is a critical mechanism by which 30 percent to 60 percent of cases of melanoma, the most deadly form of skin cancer, grow and spread. Published in the June 1 issue of Cancer Research and supported by The Foreman Foundation for Melanoma Research, this research offers the first hope for a new melanoma treatment target in decades.

In FY 2003, the College of Medicine received $6,498,171 in Tobacco Settlement Funds from the Commonwealth of Pennsylvania including $3,788,425 for competitive research grants. In addition, $2 million was allocated to support collaborative projects between investigators at Penn State—University Park and the College of Medicine. These funds are being used to support biomedical research, clinical research, and health services research in a number of priority areas including cancer, cardiovascular health, diabetes, neuroscience, and bioengineering, among others.

A team of researchers led by Charles D. Smith, Ph.D., professor of pharmacology, identified compounds that could wipe out an enzyme responsible for tumor growth. These compounds are the first ‘drug-like’ agents shown to inhibit an enzyme called sphingosine kinase. Since sphingosine kinase is involved in growth regulation and certain other biological processes that are important in tumor growth, these compounds have potential use for the treatment of many types of cancer.

An international panel of thirty experts convened by Cheston Berlin Jr., M.D., University professor of pediatrics and professor of pharmacology, met at the College of Medicine to develop a plan for a nationwide effort to discover what, if any, environmental chemicals transfer from mothers to their babies through human milk. The information from the workshop, subsequently published, was designed to gather data to support the safety of breastfeeding for women in the United States and Canada. The symposium focused on methods for obtaining human milk, detecting the presence of environmental chemicals in those samples and interpreting and communicating the information found.

Thomas P. Loughran, Jr., M.D., was named the first director of Penn State Cancer Institute. An internationally-recognized figure in cancer research and treatment, Loughran came to Penn State Hershey Medical Center from the Moffitt Cancer Center and Research Institute in Tampa, FL, where he had served as program leader of hematologic malignancies since 1996. Loughran investigates large granular lymphocyte (LGL) leukemia, a rare blood disease often
On the leading edge continued

Linda Hatfield, M.S., R.N.C., C.R.N.P., nursing research specialist and doctoral candidate, was awarded an American Nurses Foundation grant to study the efficacy of oral sucrose as a pre-procedure intervention for mild to moderate procedural pain during routine immunizations. Hatfield will hold the title of 2003 Aventis Pasteur/American Nurses Foundation Scholar.

George J. Olt, M.D., professor of obstetrics and gynecology, is a principal investigator for the national Gynecologic Oncology Group, a consortium of forty-six parent institutions and 200 affiliates that conduct clinical cancer studies. With approximately thirty studies currently underway at the Medical Center, there are protocols available for women with ovarian, uterine, cervical, and vulvar cancers.

Richard S. Legro, M.D., professor of obstetrics and gynecology, is leading a nationwide research study for women with polycystic ovary syndrome (PCOS) who want to become pregnant. A total of thirteen medical centers across the country are participating in this National Institute of Child and Human Development (NICHD)—National Institutes of Health (NIH) study. The goal is to test a combination of medications to bring about pregnancy in women with infertility due to polycystic ovary syndrome.

Scientists came from around the country and beyond to join the diabetic retinopathy research team May 8-10, 2003, for the Juvenile Diabetes Research Foundation Center for Mechanisms and Intervention of Diabetic Retinopathy at Penn State Milton S. Hershey Medical Center “Workshop on Mechanisms of Vision Impairment in Diabetic Retinopathy.” Their goal was to brainstorm how to save the eyesight of those with diabetic retinopathy, a devastating complication of diabetes that affects millions and may cause blindness. The group’s recommendations for the future direction of research in diabetic retinopathy were taken to the National Institutes of Health (NIH).

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Joanna Floros, Ph.D., professor of cellular and molecular physiology, pediatrics, and obstetrics and gynecology, Anthony E. Pegg, Ph.D., Evan Fugh professor of cellular and molecular physiology, and pharmacology, and John W. Wills, Ph.D., professor of microbiology and immunology, benefited from active NIH MERIT Awards in 2003. Judith Bond, Ph.D., professor and chair biochemistry and molecular biology, Jim Jefferson, Ph.D., Evan Pugh professor and chair of cellular and molecular biology, and Satvir S. Tevetitha, Ph.D., distinguished professor of microbiology and immunology, are past recipients of the MERIT Award, which is highly selective and “recognizes researchers who have demonstrated superior competence and outstanding productivity in research endeavors.”
People are still talking about Innoventure2003™—talking about the wealth of health sciences research in central Pennsylvania and the opportunities to strengthen and diversify the region’s economic base by establishing new partnerships.

Spearheaded by Jay Moskowitz, Ph.D., associate vice president for health sciences research, Penn State University, and vice dean for research, Penn State College of Medicine, and in partnership with the Technology Council of Central PA, the Life Sciences Greenhouse of Central PA, the Harrisburg Regional Chamber, and Ben Franklin Technology Partners, the first ever Innoventure science and technology expo took place May 2, 2003.

The community-wide effort highlighted the recent discoveries and intellectual capital of public and private universities, hospitals, and businesses. More than 100 researchers from the Medical Center and surrounding hospitals, businesses, and colleges displayed their work for hundreds of attendees. Industry participants included venture capitalists, construction firms, attorneys, and other members of the business community. Because of the event’s success, planning for Innoventure2005™ is already underway.

“Research and technology are the keys to an economy that will lead to better health, lower healthcare costs, and substantial economic growth,” Moskowitz said. “The central Pennsylvania region is poised to be a leader in this arena. Innoventure2003 allowed us to celebrate that fact and to energize the people of our region and let them know about the tremendous resources that exist in their own backyards.”

Surgeon Walter E. Poe, Jr., M.D., implanted an Arrow LionHeart™ left ventricular assist device in a 35-year-old man from York, PA, May 14, 2003. Six weeks later, Gayle Snider became the first U.S. recipient of the device to go home.

“I am feeling great—better than I ever expected,” Snider said at a news conference June 24, 2003. “It’s just phenomenal. I can’t believe after forty days I’m going home. I’m looking forward to getting back to a daily routine, most of all, sleeping in my own bed. I hope that my decision to go with the Arrow LionHeart will help others in the future.”

Since then, Snider has been to the beach with his family and even visited Dover Downs to enjoy his favorite pastime—watching NASCAR. Snider has continued regular visits to the Medical Center for periodic checkups.

The Arrow LionHeart, a totally implantable heart assist device conceived of and developed at Penn State College of Medicine in conjunction with Arrow International, Reading, PA, does not replace the natural heart but helps the heart’s left ventricle. The LionHeart is intended as a long-term therapy for patients with end-stage heart failure who are not candidates for heart transplantation. Such patients have a poor quality of life and low probability of surviving six months.

The Arrow LionHeart, which took place in Europe from October 1999 to December 2003, were presented Nov. 9, 2003, at the American Heart Association’s 76th Annual Scientific Sessions conference. They showed low incidence of infection and few device failures. “This study suggests that fully-implantable mechanical heart support is possible and reliable,” said John P. Boehmer, M.D., associate professor of cardiology, Penn State Hershey Medical Center. “Only three device failures were recorded in 17.3 years of support time. We’ll continue to improve upon that already impressive record with device refinements and experience.”

Arrow International announced Nov. 7, 2003, that it received authorization from its European Notified Body, TUV Product Services of Munich, Germany, to CE-mark the Arrow LionHeart, based on the results of the European trial. The CE-mark provides authorization to market the device within the European Economic Area for permanent implantation or “destination therapy,” and is the first left ventricular assist system to receive such authorization.

The Arrow LionHeart is the first totally implantable left ventricular assist device capable of taking over the entire workload of the left ventricle. Energy from an external battery pack is transmitted across the intact skin to power the system and charge the implanted battery.

“I hope that my decision to go with the Arrow LionHeart will help others in the future.”

—— Gayle Snider
Research is the foundation of medicine. At our Penn State Hershey Medical Center and College of Medicine, we place such importance on research and its extraordinary potential to improve people’s lives that it shares equal footing with education and patient care as our institution’s primary missions. We are committed to world class research with a worldwide impact.

In just the last three years, our research faculty has made great strides, finding ways to explain disease and make patients healthier and more comfortable. We forged strategic partnerships with industry, government, our colleagues at Penn State University, and those at other academic institutions, because we know that our collective efforts may ultimately bring new discoveries to patients even faster.

This has been a period of exemplary progress that will pave the way for major achievements in the Medical Center’s research programs in future years, and we are still gaining momentum. Under the leadership of Jay Moskowitz, Ph.D., we are taking steps to further maximize research capacity by enriching our personnel, improving research infrastructure, ensuring compliance with the highest standards of research conduct, and strengthening ties to the community through improved communications. One vital component of these efforts is a new research building, because we recognize our faculty’s need for facilities and technology to accommodate their growing research endeavors.

Without yesterday’s discoveries, we would not have drugs to fight infection, devices to open clogged arteries, knowledge of the human body to assure proper treatment, and countless other technologies that keep us healthy today. Those examples lead to the one, most compelling reason to grow our research program: Research is life-saving!

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