

Conduct of **RESEARCH**

Allegheny-Singer Research Institute — the research arm of Allegheny General Hospital — is a non-profit institution dedicated to promoting the understanding, treatment and prevention of human diseases. Principal areas of investigation include cardiothoracic and cardiovascular disease, human genetics, human performance and infectious disease, musculoskeletal healing, neuroscience, oncology and psychiatry.

Allegheny-Singer Research Institute (*ASRI*) was founded in 1913, when the family of William Singer — an Allegheny General Hospital board member — endowed a laboratory in his name. Subsequent endowments helped establish the William H. Singer Memorial Laboratory, later incorporated into the Allegheny-Singer Research Institute.

Today — as biomedical research has moved from the periphery of medicine to occupy center stage — ASRI is tackling vital questions about how the human body works at the cellular and molecular level. The Institute's unique emphasis is on translational research — applying the principles of biological science to the solution of clinical problems — as well as clinical research to evaluate specific medicines and devices.

RESEARCH PROGRAMS

Each research department or center is comprised of a team of clinicians and scientists, providing a link between the daily work of Allegheny General Hospital and the research conducted by ASRI. The relationship between the two institutions is synergistic: Clinical experience generates questions for research, while research informs and improves the quality of patient care. The Institute's research also frequently crosses specialties and disciplines, generating novel approaches and answers to long-standing medical problems.

Examples of promising research programs underway at ASRI include:

Biofilms

A new confocal imaging facility at the Center for Genomic Sciences (*CGS*) — the most advanced of its kind in the United States — is dedicated to the study of bacterial biofilms (*complex organizations of bacteria that adhere to a surface*) in human disease. Under the direction of Dr. Paul Stoodley, the facility combines ultrahigh-resolution confocal scanning laser microscopy and real-time (*time-lapse*) imaging of bacterial biofilms growing in situ. Given that some 80 percent of bacterial diseases in the developed world are biofilm related, the Center's efforts to understand and control these highly-resistant microbial environments offers enormous promise for both medicine and public health.

Cardiothoracic and Cardiovascular

The Magovern group is developing a musclepowered cardiac assist device. The device is biocompatible and will serve as an endogenous energy source to aid the failing heart. Dr. Richard Shannon's group is investigating the effect of cocaine on the heart muscle as part of his effort to develop a new treatment for cardiac failure.

Education

Dr. Eva Toth, CGS's vice director for education, directs a program to teach high school teachers about genetics. Teachers from area schools will receive hands-on experience and lectures to expand their knowledge in the fields of genetic testing, DNA isolation and sequence analysis, biotechnology and other areas. This program is funded by over \$2 million from the National Science Foundation and the U.S. Department of Education.

Human Genetics

Under the direction of Garth Ehrlich, Ph.D., CGS scientists are working to uncover human disease genes through state-of-the-art technologies. Discovering genes that predispose the patient to the development of diseases and conditions is fundamental to achieving a basic understanding of the pathophysiology involved. Examples of diseases under investigation include: brain tumors (*Dr. Matthew Quigley, Neurosurgery*), pediatric gastro-esophageal reflux, Dupuytren's contractures, craniofacial abnormalities and disorders of external ear formation (*the LaMancha goat project*).

Dr. Farrell Buchinsky, meanwhile, is spearheading a national effort to determine the genetic susceptibility of a viral airway infection in children called recurrent respiratory papilloma.

Allegheny Human Performance Center

Scientists examine the molecular basis of human performance, beginning with a project to understand resistance to sleep deprivation and fatigue. This promising avenue of research is seeking funding through the Department of Defense, the United States Air Force and the U.S. Department of Transportation.

Musculoskeletal

Dr. Sandeep Kathju is leading an effort to create a modality for scarless wound healing. His discoveries have the potential to revolutionize all areas of surgery. This work has been underwritten in part by the Pittsburgh Tissue Engineering Institute (*PTEI*). At the same time, a major collaboration among ASRI, PTEI and Carnegie-Mellon University is underway, called the Virtual Face. The initiative — currently under discussion with the Defense Advanced Research Projects Agency (*DARPA*) — seeks to develop new ways to restore facial structures damaged by trauma.

Center for Neuroscience Research (CNR)

Led by Kevin Kelly, M.D., Ph.D. — a neurologist and NIH-funded investigator — the CNR is conducting research into post-stroke epilepsy. Dr. Thomas Scott is investigating the effects of various treatments of multiple sclerosis. Dr. Donald M. Whiting is expanding his groundbreaking research into deep-brain stimulation technology — which has been so successful in the control of Parkinson's disease and dystonia — into the management of epilepsy. The Center's research includes the use of brain-stimulating implants to control conditions such as obesity and anorexia. Dr. Peter Jannetta is internationally known for his groundbreaking research into the pathology and treatment of cranial nerve compression. His current research includes investigating the efficacy of vascular decompression surgery in the treatment of vertigo, chronic dizziness and tinnitus.

Oncology

Dr. Stan Shackney's research into breast cancer has developed novel ways to predict survival after treatment, using patterns of genetic changes. Dr. Soonmyung Paik of the National Surgical Adjuvant Breast and Bowel Project (*NSABP*) is also using genetic tools to predict posttreatment survival for breast cancer patients.

Psychiatry

Tony Mannarino, Ph.D. and Dr. Judith Cohen are world leaders in the study of post-traumatic stress disorders in children. Their National Institutes of Health (*NIH*) funded research has revealed new methods for treating this disorder. Their techniques have been used to help children traumatized by Hurricane Katrina & the tsunami in Southeast Asia.

OUR VITAL MISSION

Medical research — at ASRI and elsewhere — has given physicians powerful means of preventing, diagnosing and curing disease. Unfortunately, national funding for this research has not kept pace with discovery. Over the past 15 years, the chance that a proposal will be funded by the National Institutes of Health (*NIH*) has declined from about 50 percent to about 10 percent today. With this decline in government funding, the Institute must increasingly turn to the support of the private sector — to corporations, foundations and individuals.

Our private sector partners are helping ASRI make an incalculable difference in the lives of patients and their families.