THE JOHNS HOPKINS HEART AND VASCULAR INSTITUTE (HVI)

Cardiovascular disease affects people of all ages and backgrounds; it is the number one cause of death in the world. From prevention, to basic science research, to complete replacement of the damaged heart, The Johns Hopkins Heart and Vascular Institute is in a unique position to translate innovation into improved and longer lives.
RISING TO THE CHALLENGE

A CALL TO ACTION

Rising to the Challenge: The Campaign for Johns Hopkins—our students, faculty, and researchers—who through their work improve the lives of millions around the world. Together with our philanthropic partners we will:

ADVANCE DISCOVERY AND CREATIVITY

through support of our exceptional faculty and researchers. Their innovative work drives the development of new knowledge, new forms of expression, and new ways to save lives and improve health, and furthers progress across our core disciplines in science and technology, the humanities and arts, and public health and medicine.

ENRICH THE STUDENT EXPERIENCE

by investing in scholarships and fellowships, inspirational spaces for collaborative learning and social opportunities, and new programs that will enhance student-faculty interactions, ensure diversity on campus, link learning in the classroom to life after graduation, and strengthen connections between our students and our surrounding communities.

SOLVE GLOBAL PROBLEMS AS ONE UNIVERSITY

by creating new cross-disciplinary solutions in crucial areas such as sustaining global water resources, revitalizing America’s cities, advancing individualized health, understanding how we learn and teach, and attacking the root causes of global health problems.

At the Johns Hopkins Heart and Vascular Institute, faculty work daily to achieve the best possible outcomes for heart disease patients in our local community, across the country, and around the world. Affecting people of all ages and backgrounds, heart disease is the leading cause of death in the United States.

- More than 2,200 Americans die of cardiovascular disease each day, an average of one death every 39 seconds.
- Each minute, someone in our country dies from a coronary event such as a heart attack.
- Sudden cardiac death is the most common cause of natural death in the US, accounting for half of all heart disease deaths (325,000 per year); in over half of cases sudden cardiac arrest occurs without prior symptoms.
- Heart failure affects over five million Americans and kills more than 250,000 each year.
- One third of adults in the US (approximately 76.4 million) have hypertension and fewer than half are aware and receiving treatment.
- Cardiovascular diseases are the #1 cause of death in American women; they kill more women than the next three causes of death combined, including all forms of cancer.

ATTACKING CARDIOVASCULAR DISEASE FROM ALL ANGLES

The Heart and Vascular Institute (HVI) provides the highest quality, comprehensive care for patients with heart-related conditions, while performing the cutting-edge research that continuously improves patient care, and while educating new researchers and clinicians. Over 100 specialists working within eight HVI Centers of Excellence examine heart health from all angles: prevention, such as through diet, lifestyle, and medication; comprehensive risk prediction using genomic profiles, imaging, blood tests, and other early warning methods; support for the heart at the cellular level, such as by protecting the heart’s energy supply (mitochondria); surgical repair ranging from minimally invasive procedures to transplant; and replacement with a surrogate that combines biological (stem cells) and mechanical methods. No case is routine at Hopkins. Every patient receives the full attention of the skilled HVI team.

IMAGING AND PREVENTION

The best way to reduce the number of deaths due to heart disease is to prevent them.

THE CICCARONE CENTER FOR THE PREVENTION OF HEART DISEASE

provides individualized, comprehensive patient care that conjoints expertise with compassion. A clinical team studies each patient’s lifestyle, medical history, and family background to assess risk and creates a plan for minimizing that risk. Clinical activities and education go hand in hand. Ciccarone Center faculty teach continuing medical education for practicing cardiologists, train junior cardiologists, and coach patients in heart-healthy lifestyles. Research in the Ciccarone Center focuses on developing new risk-prediction methods, such as genetic markers, and new ways to prevent cardiac events or diminish their impact.

THE CENTER OF EXCELLENCE FOR CARDIOVASCULAR IMAGING

allows physicians to identify physiological changes in the heart and blood vessels, and to more precisely—and earlier—predict a patient’s risk, diagnose cardiovascular disease, and assess the treatment effectiveness. In the last 30 years, cardiovascular imaging focused on anatomy and function of the heart and blood vessels. Molecular imaging, the next frontier, will allow viewing of specific molecules that play a role in cardiac disease.

THE SUDDEN CARDIAC DEATH (SCD) RESEARCH CENTER

focusing on sudden cardiac death, works to understand the underlying risk factors and to develop new preventive strategies. Researchers study the latest and most innovative treatments, patients can participate in clinical trials or be the first to benefit from new diagnostic and predictive methods. An example is the use of magnetic resonance imaging (MRI) to detect regions of electrical instability from clogged arteries, which might trigger the heart to beat irregularly. Various methods of risk prediction—genetic, proteomic, metabolomic, electrocardiographic, imaging—are in use or under development. As part of the care team, residents and fellows learn these and other state-of-the-art methods, while gaining clinical and research expertise.
The human genome consists of about three billion DNA nucleotide base pairs, organized into 20–25,000 blocks that form genes. Genes are sometimes altered without noticeable effect; at other times, a small change of a single DNA nucleotide causes cardiovascular disease. Today scientists recognize a few DNA changes, but most remain poorly understood.

The Johns Hopkins Heart and Vascular Institute (HVI)

PERSONALIZED MEDICINE

“Personalized Medicine” is healthcare that, using a full array of individual health information, customizes care to each patient. Central to Personalized Medicine is an understanding of the individual’s genetic profile, which helps identify the person’s unique risks and predict his or her likely response to treatments. Other methods include describing the individual’s “proteome” (set of proteins which implement gene-describing the individual’s “proteome” (set of proteins which implement gene-expression) and “metabolome” (unique chemical fingerprint).

Because almost every cardiovascular disease has a genetic contribution, one HVI research focus is hereditary conditions: cardiomyopathies (hypertrophic, dilated), Arrhythmogenic Right Ventricular Dysplasia, arrhythmias including Long QT Syndrome, and Marfan Syndrome. These conditions are all caused by a single change in one or both copies of the DNA encoding a single gene. Knowledge of these genes in the individual patient allows cardiologists to diagnose, take preventive action, and treat appropriately, in other words, to personalize medical care for each patient.

THE JOHNS HOPKINS CENTER FOR INHERITED HEART DISEASE (CHID)

The Johns Hopkins Center for Inherited Heart Disease (CHID) is a world leader in diagnosing, genetic testing and counseling, and treatment for inherited heart diseases. For many of these diseases, we are the only destination. Our comprehensive genetic counseling distinguishes care at the CHID from that of other programs, nationally and globally. Specialized training genetic counselors meet with patients and their families to assess family patterns of genetic inheritance, discuss screening and test results, and coordinate genetic testing. We are currently working to create efficient methods of collecting families’ genomic data, build databases that organize large amounts of genomic data, and study more genetically complex conditions, such as high blood pressure, coronary artery disease, and diabetes.

BASIC AND TRANSLATIONAL RESEARCH

In Medicine, new knowledge begins with breakthroughs in basic (laboratory) sciences, but only impacts patients after it has been translated into new clinical methods. Through two new centers, we plan to harness Hopkins’ longstanding strength in basic science to directly benefit cardiovascular patients.

THE TRANSLATIONAL RESEARCH CENTER

The Translational Research Center will provide support for innovative clinical research designed to ensure that discoveries in the basic sciences are translated into new treatments for heart disease. Our plans entail renovating existing space, recruiting and retaining research staff, upgrading our imaging technology, and launching high-risk, high-potential projects. Participation in a clinical trial is often a patient’s best, or only, way to access the newest and most powerful treatments for heart disease; this state-of-the-art outpatient center will increase the number of clinical trials we can offer our patients.

THE MITOCHONDRIAL CELL SIGNALING CENTER will develop new methods of supporting the mitochondria and preserving heart health. Imagine having to design a pump, with an uninterrupted power supply, that works flawlessly for 80 years or more. These design parameters describe the human heart, which pumps five to six liters of blood per minute for a lifetime. By transforming food into chemical energy (ATP), mitochondria serve as tiny powerhouses that provide the heart with continuous energy. Impairment of mitochondrial function is associated with cardiac pathologies including chronic angina, heart attack, heart failure, and diabetic cardiomyopathy. We will study the mitochondrial role in cardiovascular health, and use this knowledge to develop new treatments for patients with, or at risk of, heart disease.

CLINICAL SCHOLARSHIP

Clinical assessment and wisdom have always been the essence of Johns Hopkins Medicine. Good “bedside manner,” perceptiveness, sound judgment, perspective gained through experience, a curiosity that fuels voracious learning, and depth of understanding are invaluable qualities that require nurturance. They are grounded in study of the literature and evidence, and by original scholarly work such as publishing one’s own research. A good doctor is thus wise and intelligent, compassionate and educated. We believe that young clinicians at Johns Hopkins should begin their careers with time allotted for both true scholarship and the development of clinical wisdom.

“When hose of us now in our sixties began clinical careers, we had the luxury of time for a thoughtful, considered approach to our patients and their care… we lent all our effort to a passion for bedside medicine, unhampered by competing requirements for our time, and confident that our department could afford to keep us on staff…”

—Thomas A. Traill, MD

READERSHIP IN CARDIOVASCULAR MEDICINE:

To develop skills and competence in our junior faculty, to support them in becoming both well-informed and deeply thoughtful doctors, we plan to create a Readership in Cardiovascular Medicine. A Readership is an academic rank, like a visiting professorship, which may be granted for a period, in this case two years, and which carries a stipend. For junior clinical faculty, the Readership will provide the equivalent of the “seed” funding often available for young researchers early in their careers. We would expect to find the Reader teaching residents on the wards, immersed in study, or writing a manuscript. Steadily building a reputation for clinical wisdom and scholarship, each Reader will attract readership in Cardiovascular Medicine: A Translational Research Center.

The Hopkins Heart

In the Hopkins Heart, we have committed to creating a miracle. Seeking a long-term solution to heart failure, we intend to develop a combined biological/mechanical option that improves the function of, promotes regeneration of, and if necessary completely replaces, a diseased heart. For heart failure patients, it will make the difference between death and life.

“We are learning how the device therapy called cardiac resynchronization effects the heart at a basic level, and some of these changes may someday turn into therapies in their own right and provided as new drugs.”

—Dr. David A. Kass

THE JOHNS HOPKINS HEART AND VASCULAR INSTITUTE (HVI)
RISING TO THE CHALLENGE

THE ARTIFICIAL HEART: NO LONGER AN ELUSIVE DREAM
• 1935: Charles Lindbergh partners with Nobel Prize winner Alexis Carrel to design a prototypical heart to support organ function.
• 1953: The advent of open heart surgery demonstrates the feasibility of temporary support of circulation.
• 1970’s: Crude attempts at a total artificial heart are piloted as a rescue effort after unsuccessful surgical repair.
• 1982: A total artificial heart is implanted in Barney Clark, who survived 112 days. Clark’s surgeon, Dr. William DeVries, admits that survival in artificial heart patients has not improved substantially since 1982.
• 2012: Johns Hopkins takes on the challenge.

The need for the Hopkins Heart is urgent. Outcomes of current approaches—mechanical support devices (ventricular assist devices), cardiac resynchronization pacemaker therapy, stem cells, and cardiac transplantation—are not solutions. Independently, these approaches are fraught with challenges and complications, such as incompatibility with the body’s own tissues, poor survival rate of stem cells, and limited availability of donor hearts for transplantation.

The Hopkins Heart will be: totally implantable, without tethering lines or external power sources; able to contact blood without causing thrombosis or inflammation; capable of a wide range of pump flows, to meet the demands of each individual body; available in a wide range of sizes, including ones of each individual body; available in pump flows, to meet the demands of each individual body; available in external power sources; able to contact one’s own tissues, poor survival rate of donor hearts for transplantation.

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THE HEART AND VASCULAR INSTITUTE IS THE BEST PLACE FOR CARDIOVASCULAR CARE, RESEARCH, AND EDUCATION
We are optimally positioned for excellence. Consistently, U.S. News & World Report has ranked Johns Hopkins Hospital in the top two in the country, and our Cardiovascular Program #3. We have a unique Institute, one that is recognized for significantly advancing care for patients with cardiovascular disease. Our world-class faculty boasts a track record of important “firsts.” We were, for example, first to perform closed-chest cardiopulmonary resuscitation (CPR), first to develop a rechargeable cardiac pacemaker and an implantable defibrillator, first to “tag” magnetic resonance images to quantify cardiac function. The proximity of other Hopkins’ strengths, such as biomedical engineering and applied physics, uniquely positions the HVI to resolve challenges in cardiac care. Ultimately, HVI achievements will prevent substantial cardiovascular deaths, decrease cardiovascular deaths, enable doctors to better manage existing diseases, and provide better quality of life for people with heart and vascular diseases.

PHILANTHROPY, LARGE AND SMALL, IS VITAL TO OUR SUCCESS
Philanthropy is needed now more than ever before. Research grants have become increasingly competitive. The success rate for grant applications submitted to the National Institutes of Health (NIH) hit an all-time low of 18% in 2011, down dramatically from 32% in 1999-2003. The National Heart, Lung, and Blood Institute only funds 11% of submissions. The reduction in funding poses a significant problem even for Johns Hopkins, though we continue to be one of the most successful institutions in securing NIH support. Simultaneously, changes in healthcare financing have resulted in reduced clinical revenues; whereas once clinical margins were sufficient to cross-subsidize activities related to education and training, and to support the pilot studies that are so critical but are not generally funded by research grants, now clinical revenues are needed to meet clinical expenses. As NIH support continues to decrease and clinical care can no longer cover the costs of education and discovery, we must depend on significant philanthropic investment. Philanthropy plays a critical role. In this time of great opportunity, but within a constrained economy, our ability to make big strides toward better prevention and treatment of heart disease depends upon the generosity and foresight of our donors.

WHAT WILL IT TAKE?

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<tr>
<th>PRIORITY</th>
<th>SPECIFIC FUNDING NEEDS</th>
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<th>ENDOWMENT</th>
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In 2002, generous support from two families enabled Johns Hopkins to establish the Center for Inherited Heart Disease—a focal point for patient care and research devoted to inherited forms of heart disease.
Rising to the Challenge:
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