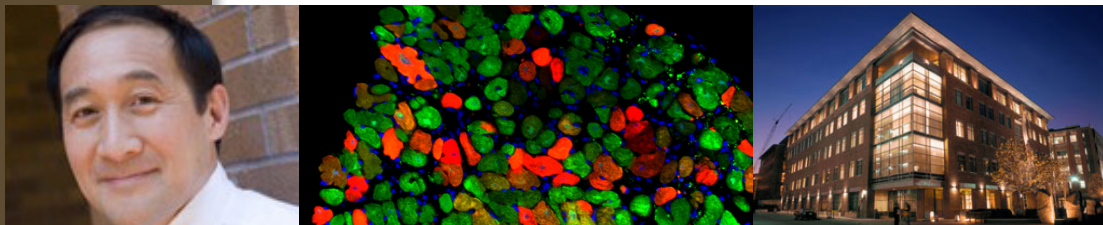


# HSCI Fighting Disease

## Cardiovascular Program

Matters of the heart.



By the time you finish reading this, 12 Americans will have suffered some sort of cardiac event; more than eight men and women will have had heart attacks; and five people will have died of heart disease. For all the talk of an aspirin-a-day keeping the doctor away, and all the TV ads suggesting that cholesterol-lowering medications can provide a new lease on life, heart disease in the US still claims a life each minute—60 lives per hour—1,440 per day. Every day. And that's why the Harvard Stem Cell Institute has developing treatments for cardiovascular disease as one of its main areas of focus.

### Harvard Stem Cell Institute

- 225 Faculty
- 20 Institutions
- 1 Promising Scientific Field

**Collaborative stem cell science speeding the development of safer, more effective treatments for disease**

Current treatments for the damage to heart muscle caused by heart attacks at best only slow the progression of disease leading to heart failure and death; the injury to heart muscle is generally cumulative and irreversible. Even with our best therapies, you have less chance of surviving heart failure than you do of surviving many metastatic cancers; we are simply unable to prevent that progression of disease in which the heart becomes less and less able to move a sufficient volume of blood. For a few patients, heart transplantation

is an option, but there aren't enough donor hearts available. So the only real hope for the millions of people living with heart disease is that new, restorative treatments will be discovered in time.

### **The Heart of the Matter**

It has long been assumed that the heart has little built-in capacity to regenerate. But in just the past few years, many research groups, including several in HSCI, have discovered cells in the heart that have stem cell properties. The challenge for us is to develop ways to harness this ability to generate new heart cells and turn it into effective therapies.

The HSCI Cardiovascular Program, led by Richard T. Lee, MD, a Harvard Medical School Professor of Medicine at Brigham and Women's Hospital, has unique potential to accomplish this mission. We have assembled over a dozen laboratories from across Harvard and its affiliated teaching hospitals into a coordinated effort to generate new heart cells for heart failure patients.

### **From Biology to Bedside**

The program's foundation consists of cardiologists and stem cell biologists who bring world-class clinical experience and fundamental biology to this problem. Some of our investigators are internationally renowned experts in cardiac regeneration and others are young investigators ready to tackle the problem with revolutionary approaches. In just the past few years, for example, HSCI Cardiovascular Program investigator Kenneth Chien, MD, PhD, identified human heart stem cells that can turn into the muscle cells needed to generate the force of the heart's contraction. And program director Rich Lee and colleagues have recently demonstrated that blood stem cells can be used like a medicine to stimu-

late the heart's own stem cells to repair damaged tissue.

We are currently funding two projects with coordinated teams of investigators. One of the projects will identify the genetic programs and control mechanisms that allow cardiac stem cells to turn into cardiac muscle cells. The second project is studying how to enable mature, existing cardiac muscle cells to divide. Both of these projects are important steps toward generating the right types of cells to arrest, and hopefully reverse, the progression of heart failure.

By bringing Harvard investigators together with a common goal of stopping heart failure, the HSCI Cardiovascular Program is leveraging a unique opportunity for regenerative medicine. There just aren't enough therapies for our patients with heart failure, and we believe we can bring new strategies to the bedside with stem cell biology.

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