Brigham and Women's Hospital

Cardiovascular Genetics Center

Hypertrophic Cardiomyopathy Clinic

The HCM Clinic at Brigham and Women's Hospital applies the latest scientific discoveries to patient care.

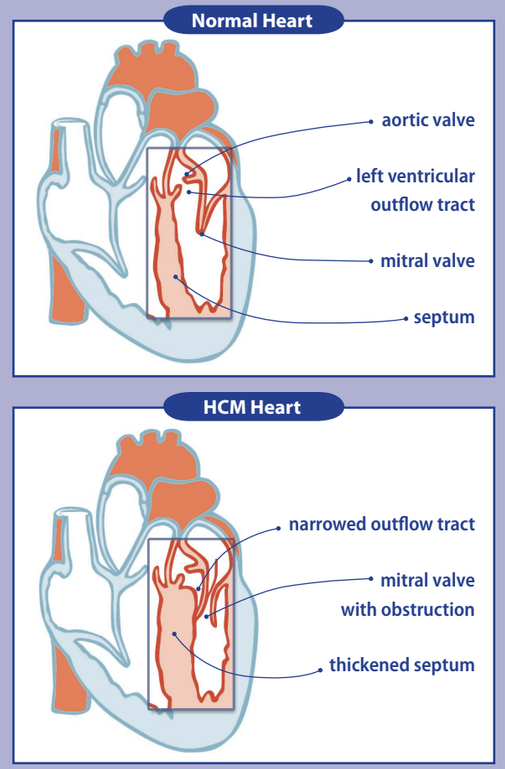
The Hypertrophic Cardiomyopathy (HCM) Clinic at Brigham and Women's Hospital provides state-of-the-art care to patients and families that is founded on scientific discovery. In the 1980's, a critical breakthrough was made by our researchers, led by Christine Seidman, MD, Director of the Cardiovascular Genetics Center at BWH. Studying families with HCM, a poorly understood yet relatively common inherited heart condition, the researchers identified the first gene responsible for the disease. This has allowed further understanding of the molecular changes that cause HCM and its progression, and will enable therapies aimed at disease prevention and improved prognosis. With this information, BWH developed the first genetic tests that provide definitive diagnosis to HCM patients and family members.

Cutting edge research continues to inspire the Brigham and Women's Hospital HCM Clinic. Our team of internationally recognized specialists work with each patient to provide a complete individualized care plan, from diagnosis to treatment, based on the latest discoveries.

Understanding HCM: The Facts

HCM is the most common inherited cardiovascular condition, affecting about 1 in 500 to 1 in 1000 people. The disease is characterized by an abnormal increased thickening in the wall of the left ventricle (called left ventricular hypertrophy or LVH), the main pumping chamber of the heart. With HCM, the heart muscle may become stiff, making it difficult for it to relax. As a result, the heart requires higher pressure than normal to fill, which consequently can lead to shortness of breath, chest pain and dizziness. In some people, there may be obstruction to the flow of blood out of the heart, leading to similar symptoms and producing a murmur which can be heard with a stethoscope.

Other conditions, such as high blood pressure, can cause the heart muscle to thicken, but with HCM, the thickening occurs without an obvious cause. Under a microscope, cells that make up heart muscle tissue are aligned in a disorderly fashion (termed disarray) and there may also be more scar tissue (termed fibrosis).



Above: detail of a normal heart including the left ventricle. Below: the same area of a heart with HCM.

Diagnosis and Treatment of HCM

Patients at the HCM clinic have access to the full spectrum of cutting-edge diagnostic technologies and treatment services available at Brigham and Women's Hospital. Our team will work to provide a care plan tailored to meet your individual needs in addition to the unique needs associated with HCM. Treatment is aimed at relieving symptoms, reducing the obstruction of blood flow, and preventing sudden death in those who are at high risk. Treatment of symptoms is achieved with medication in some patients, and with surgery or heart catheterization procedures in others. As our team manages your condition, we collaborate with BWH experts throughout the field of cardiovascular medicine, so you have access to specialists in advanced heart disease, electrophysiologists, interventional cardiologists and cardiac surgeons, all of whom are dedicated to the highest level of clinical care. In addition, we work closely with referring physicians to ensure that proper care is comprehensive and ongoing.

With proper medical attention, most people with HCM can lead full, normal, active lives. Evaluation may include:

- Comprehensive consultation
- Advanced cardiac imaging including:
  - Echocardiography
  - Cardiac MRI
  - Nuclear cardiology
  - Cardiac catheterization
- Exercise testing
- Genetic testing
- Family screening
- Assessment of the risk for sudden cardiac death and the need for an implantable cardioverter defibrillator (ICD)
- Surveillance and specialized care for heart rhythm disturbances
- Medical therapy to improve symptoms
- Specialized treatment for obstructive HCM with alcohol septal ablation or surgical septal myomectomy
- Treatment for advanced heart failure

Genetic Testing

Genetic testing involves taking a sample of DNA from blood, saliva or tissue and analyzing the genes that are most commonly known to cause HCM.

Our research has taught us that HCM is caused by mutations in a group of related genes that make up what is known as the cardiac sarcomere . The sarcomere is a network of proteins that make up the molecular motor of the heart and coordinate the contraction and relaxation of the heart muscle. A mutation in any one of at least 11 genes which make components of the sarcomere can lead to HCM.

When testing a family, we begin by testing a person known to have HCM. If a mutation is identified in that individual, then testing can be performed on other family members to look for that specific mutation or mutations.

Genetic Counseling

The diagnosis of HCM has implications for other family members. A trained genetic counselor will review your family history and discuss implications of the diagnosis with you and your family. In addition, the genetic counselor can serve as a resource to other family members who may have questions about the diagnosis. It is important to us that you understand all aspects of your condition and we are always available to answer questions.

Reasons some consider genetic testing:

- Confirmation of a diagnosis
- Family evaluation
- Pre-symptomatic testing
- Reproductive counseling, including prenatal testing

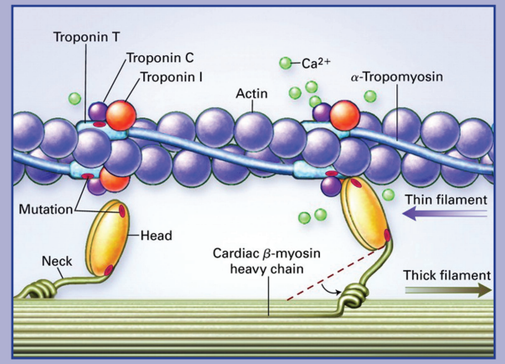


Illustration of the sarcomere

The sarcomere is a network of proteins that coordinate the contraction and relaxation of the heart muscle. The force of a contraction is generated by components of thick and thin filaments that slide past each other. **(Adapted from Kamisago, M. et al. N Engl J Med. 2000;343:1688-96. Copyright © 2000 Massachusetts Medical Society. All rights reserved.)**

Family Screening

An important step in the management of an individual with HCM is to assess the risk to his or her family, including future generations. It is important to ask family members (parents, siblings, aunts, uncles, grandparents, cousins, children) if there are any cases of heart problems, sudden death, unexplained deaths and/or major health problems. A physical examination, electrocardiogram, and echocardiogram are recommended for all immediate family members of a patient diagnosed with HCM because they may carry the gene mutation and be at risk for HCM, even if they are feeling well.

Research

Currently there are no known ways to prevent or reverse HCM in people who carry a gene mutation that causes the condition. Right now treatment once HCM has developed is focused on managing symptoms. Our research continues to focus on gaining a better understanding of the molecular and cellular processes that lead to HCM so we understand the sequence of events involved from inheriting the mutation to developing clinical signs of the disease. This may enable us to discover ways to slow or stop its progression.

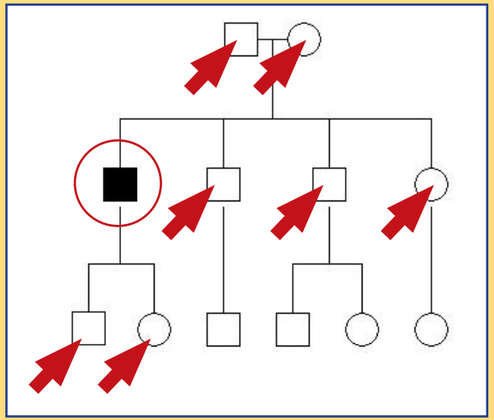
We are pioneering clinical trials that focus on treating family members who carry a gene mutation with medication before the condition develops, to see if treatment can slow the onset of HCM. For more information about HCM clinical trials, please visit the following websites:

www.brighamandwomens.org/cvcenter/genetics

www.clinicaltrials.gov.

Family Pedigree

The black square represents an individual with HCM. The red arrows point to first degree relatives who should seek clinical evaluation for HCM.



About the Cardiovascular Genetics Center

The Cardiovascular Genetics Center at Brigham and Women's Hospital is composed of a multidisciplinary team of internationally recognized physicians and scientists working together to combine comprehensive clinical care with cutting-edge research. Our mission is to provide the best treatment for patients and families with inherited heart conditions.

We are uniquely dedicated to understanding and treating inherited cardiovascular disease including:

- Hypertrophic Cardiomyopathy (HCM)
- Familial Dilated Cardiomyopathy (DCM)
- Inherited Arrhythmias and Sudden Death
- Familial Aortic and Intracranial Aneurysms
- Marfan Syndrome and Connective Tissue Disorders

To learn more about us, please visit our website at www.brighamandwomens.org/cvcenter/genetics.

The Cardiovascular Genetics Center Team: Neal Lakdawala, MD; Allison Cirino, MS CGC; Carolyn Ho, MD; Christine Seidman, MD; Barbara McDonough, RN; Akshay Desai, MD

Cardiovascular Genetics Center Team

Christine Seidman, MD
Director, Cardiovascular Genetics Center

Carolyn Ho, MD
Medical Director, Cardiovascular Genetics Center

Allison Cirino, MS, CGC
Program Coordinator
Genetic Counselor

Akshay Desai, MD
Associate Physician

Neal Lakdawala, MD
Physician

Barbara McDonough, RN
Research Nurse Coordinator

Libby Sparks, RN
Research Nurse Coordinator

Advanced Heart Disease

Kenneth L. Baughman, MD
Director, Advanced Heart Disease Section

Lynne W. Stevenson, MD
Co-Director, Cardiomyopathy and Heart Failure Program

Akshay Desai, MD
Associate Physician

Cardiac Arrhythmias

Michael Sweeney, MD
Director, Cardiac Pacing and Implantable Device Therapies

William Stevenson, MD
Director, Clinical Cardiac Electrophysiology Program

Laurence Epstein, MD
Director, Cardiac Arrhythmia Service

Interventional Cardiology

Pinak Shah, MD
Associate Physician, Cardiac Catheterization Laboratory

Andrew Eisenhauer, MD
Associate Director, Cardiac Catheterization Laboratory
Director, Inteventional Cardiovascular Medicine Services

Cardiac Surgery

Ralph Bolman, MD
Chief, Cardiac Surgery

Gregory Couper, MD
Director, Heart Transplant and Circulatory Assist Program

Prem Shekar, MD
Staff Surgeon

Multi-Disciplinary Affiliations

Pediatric Cardiology

Steven Colan, MD
Director, Cardiac Noninvasive Laboratory and HCM Clinic
Children's Hospital Boston

Ann Marie Valente, MD
Assistant in Cardiology
Children's Hospital Boston

Renee Margossian, MD
Assistant in Cardiology
Children's Hospital Boston

Ronald Lacro, MD
Associate in Cardiology
Children's Hospital Boston

Obstetrics and Gynecology

Katherine Economy, MD
Maternal Fetal Medicine

Louise E. Wilkins-Haug, MD, PhD
Medical Director, Center for Fetal Medicine and Prenatal Genetics

Genetics

Michael F. Murray, MD
Division of Genetics

Design and content development by Acorn Creatives, Needham, MA.
Photograph on page 7 by Hughes Photography, Needham, MA.

Hypertrophic Cardiomyopathy Clinic

Cardiovascular Genetics Center

BRIGHAM AND WOMEN'S HOSPITAL

Contact Us

For general inquiries: 617-732-7921
To schedule an appointment: 617-732-4837
www.brighamandwomens.org/cvcenter/genetics