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About New Haven

# Overview of Educational Programs

The Yale Cardiovascular Medicine fellowship training programs are based at two hospitals- Yale-New Haven Hospital (YNHH) and the West Haven Campus of the VA Connecticut Healthcare System (VACT). The Section of Cardiovascular Medicine at Yale consists of over 150 faculty members with a strong commitment to fellowship education. The fellowship has nearly 50 fellows, including training programs in general cardiovascular medicine, as well as subspecialty training in adult congenital heart disease, advanced heart failure and transplantation, cardiac Imaging (nuclear cardiology, echocardiography, CT/MRI), electrophysiology, interventional cardiology (coronary interventions, peripheral vascular interventions, and structural heart disease), and research fellowships

# General Cardiovascular Medicine Fellowship

## Overview

The Yale University Fellowship Training Program in Cardiovascular Disease is an ACGME-accredited program that provides the trainee with outstanding skills in clinical cardiology and cardiovascular research. Fellows will develop their basic and clinical knowledge, procedural skills, clinical judgment, professionalism and interpersonal skills required as a specialist in cardiovascular diseases. The program emphasizes training of academic cardiologists who will become leaders in clinical cardiology and cardiovascular research. For more information, please download our [Complete Program Brochure](https://medicine.yale.edu/intmed/cardio/education/curriculum_2016_269631_284_4633_v1.pdf).

The general cardiovascular medicine training program consists of a minimum of a three-year period of training. Core clinical training is completed in a minimum 24-month period of monthly rotations through the many aspects of clinical cardiology including consultative care, cardiac intensive care unit, congestive heart failure, cardiac imaging (echo, nuclear, CT/MRI), interventional cardiology, and electrophysiology. The third year is designed by the fellow and his or her mentor(s) as an individualized program for advanced training in one or more clinical areas and academic research training to prepare the trainee for his or her specific career. All fellows must complete a research project during the course of their fellowship. Select fellows may continue training beyond the core fellowship in many clinical and investigative areas, including the ACGME-sponsored fellowships of interventional cardiology, advanced heart failure and transplantation, and electrophysiology. Throughout three years of clinical training, fellows maintain continuity clinics within the Yale Medical Group and the VACT. Depending on the area of interest and individual fellow’s performance, a fourth or fifth year of training may be offered.

The program follows the Guidelines for Training in Adult Cardiovascular Medicine Core Cardiology Training Symposium (COCATS 4) published by the AHA and ACC. These guidelines are available at [www.acc.org,](http://www.acc.org/search#q=training%20statements&first=0) and copies are available in the Cardiovascular Medicine Fellowship Office.

The primary objective of the Fellowship Training Program in Cardiovascular Disease is to provide an academically and clinically rigorous environment for the fellows to obtain the necessary skills to become an outstanding specialist in cardiovascular diseases and to optimize each fellow’s opportunities for a career in academic cardiology. These skills include a deep fund of basic and clinical knowledge, procedural skills, clinical judgment, professionalism, interpersonal skills, critical evaluation of evidence, and research skills.

## Application Process

The program accepts nine trainees per year for a minimum of three years. All applications will be electronically processed through the ERAS (Electronic Residency Application Service) [website](http://www.aamc.org/students/medstudents/eras/fellowship_applicants/440778/register.html). We do accept applications from individuals holding visas.  The Section of Cardiovascular Medicine actively supports the Yale University policies and programs for affirmative action. The Fellowship Program believes that diversity is essential in academic institutions and is fully committed to recruitment and development of minority group members and women for careers in cardiology.

## Curriculum

The Fellowship Program consists of the following curricula elements:

### Clinical Experience

The program is designed to provide a high level of clinical training. Each rotation provides opportunity for the fellow in management of acutely and chronically ill patients, observation of and participation in therapeutic interventions, and teaching of medical students, residents, and colleagues.

Both hospitals function as primary and tertiary care institutions. YNHH serves as a primary care hospital for the greater New Haven area and as a tertiary/quaternary care center for southern New England. VACT is a primary care hospital for veterans in the state of Connecticut, and serves as a tertiary care center for the southern New England, Rhode Island and eastern New York areas.

The patients from these institutions represent a wide variety of both common and rare cardiovascular disorders and provide excellent exposure to all areas of cardiovascular medicine in a demographically diverse population.

To facilitate transition into fellowship, all first year core fellows spend the first 2 months rotating through key clinical areas in order to gain exposure to all aspects of clinical cardiology at both sites.

### Duty Hours (box)

The fellowship program is dedicated to complying with ACGME guidelines for duty hours. Each fellow will not spend more than 80 hours per week, on average, caring for patients during a four- week rotation. Each fellow will average at least one weekend day (24 hours) per week free from clinical duties. Moonlighting activities at the institution will be monitored by the Program Directors for inclusion in the duty hour calculation. The Duty Hours Policy can be found at the back of the curriculum Appendix A, which includes the Moonlighting Policy.

### Inpatient Care

Within the months of core clinical training, nine months are dedicated to clinical consultative (non-laboratory) responsibilities. These experiences include the YNHH and VACT Consult services (five to six months), the YNHH CICU service (two to three months), and the YNHH Heart Failure and Transplantation (one to two months).

These rotations comply with the ACGME requirements and ACC guidelines for the clinical core experience. Each rotation is structured in a similar fashion, with the fellow working under the direct supervision of a cardiology faculty member. In each rotation, the fellow is responsible for initially evaluating patients and formulating recommendations for treatment. This initial evaluation is then discussed with the attending, who makes the final evaluation and treatment recommendations. Medical residents and/or medical students may be present on any of these rotations as well.

The trainee is expected to provide comprehensive evaluation of the patient’s cardiovascular illness in a prompt and concise manner, formulate a prioritized differential diagnosis, and outline the evaluation. The trainee should be able to enter a clear and legible document in the patient’s record. The trainee should be able to communicate their evaluation in a clear and concise manner to the attending physician as well as to other members of the health care team. Interactions with colleagues and allied personnel should be conscientious, respectful, responsible, punctual and appropriate. The trainee must exhibit humanistic qualities when interacting with patients and their families and demonstrate integrity, respect and compassion.

### YNHH Cardiac Intensive Care Unit (CICU)

This rotation provides exposure to critically ill cardiac patients. The goals of this rotation are to develop skills related to the care of acutely and critically ill patients, including hemodynamic monitoring, hemodynamic support, and ventilator management. The fellow is responsible for supervising the house staff team in the management of all CICU patients. The fellow is primarily responsible for those patients admitted to the CICU who are under the care of the CICU attending. The fellow assists with the management of patients under the care of full-time Yale faculty and private cardiologists in the CICU. The fellow is also responsible for coordinating care of patients who undergo primary coronary interventions for acute myocardial infarction, from the point of the emergency department, to post-procedure care (with the interventional team). A dedicated CICU attending will oversee all aspects of the fellow’s duties, will make daily rounds with the fellow and housestaff team, and will be available for any questions. Teaching rounds are held at least 3 times per week with all members of the CICU team.

#### Advanced Heart Failure

The Yale Center for Advanced Heart Failure and Heart Transplantation has received ACGME certification as an approved center to offer Advanced Heart Failure and Transplant Cardiology Certification, as developed by the American Board of Internal Medicine (ABIM). This new cardiology sub-specialty is designed to recognize the qualifications of physicians who specialize in advanced heart failure and transplant cardiology. This certification encompasses the special knowledge and skills required of cardiologists for evaluating and optimally managing patients with heart failure, particularly those with advanced heart failure; those with devices, including ventricular assist devices; and those who have undergone or are awaiting transplantation. Training includes management of patients with advanced heart failure, including evaluating prognosis, performance and interpretation of cardiopulmonary stress testing, management of patients requiring invasive hemodynamic monitoring and intravenous inotropic/pressor agents and the assessment of candidacy for heart transplant. It also includes evaluation of the need for mechanical circulatory support using both short-term and long-term platforms and the management of patients on LVAD’s as bridge to transplant as well as the management of immediately post-transplant and long-term post-transplant patients including the use and monitoring of immunosuppression drugs, performance of endomyocardial biopsies, interpretation of cardiac pathology, management of rejection and common problems encountered in the post-transplant population.

#### Inpatient Rotations (box)

* YNHH and VACT Consultative Services
* YNHH Cardiac Intensive Care Unit (CICU)
* YNHH Heart Failure and Transplantation

See [the complete brochure](https://medicine.yale.edu/intmed/cardio/education/fellowship/curriculum/PostDoctoral%20Fellowship_2016_134645_284_16141_v2.pdf%22%20%5Co%20%22POSTDOCTORAL%20FELLOWSHIP%20TRAINING%20PROGRAM%202016) for more on these rotations.

### Laboratory-Based Experiences

The program provides clinical training in the following areas: cardiac catheterization (four months), electrophysiology (two months), and imaging (seven to ten months). Imaging includes echocardiography, nuclear cardiology, positron-emission tomography, magnetic resonance, and computerized tomography. Other skills acquired during these rotations include exercise stress testing, ECG interpretation, cardio-pulmonary testing, tilt-table testing and ambulatory electrocardiography interpretation.

### Cardiac Catheterization

YNHH Cardiac Catheterization Laboratories and the VACT Catheterization Laboratory. The YNHH laboratory performs over 3000 diagnostic procedures and more than 1300 interventional procedures annually. The VACT lab performs more than 800 catheterizations annually and more than 200 interventional procedures. The fellow will acquire the cognitive and motor skills to perform left and right heart catheterizations. All procedures are performed under the direct supervision of an attending.

### Echocardiography

The primary experience for echocardiography includes the YNHH Echocardiography Service (which performs more than 9000 transthoracic and more than 450 transesophageal examinations per year) and the VACT echocardiography lab. The populations includes a wide spectrum of acquired and congenital heart disease in patients of varying age and gender. Stress echocardiography is performed at YNHH, as well as in the Branford cardiology office, and fellows are encouraged to become familiar with this technique. A searchable repository of digital echocardiography cases is available on the computer in the YNHH Echocardiography reading area.

Echo training during general cardiology fellowship provides a strong knowledge base and practical skills in echocardiography. Fellows have didactic teaching and case conferences and hands-on training to perform two-dimensional and Doppler transthoracic imaging, exercise and dobutamine stress echocardiographic testing, and contrast imaging using the most current ultrasound equipment is emphasized. Fellows also receive training in three-dimensional echo imaging as it is integrated into our routine transthoracic and transesophageal echocardiographic studies.

Advanced echo training to achieve level III emphasizes higher level of skills in 2D transesophageal echocardiography, the use of 3D transesophageal echo acquisition and analysis of 3D data in echo lab, interventional procedures and intraoperative echocardiography. Clinical echocardiographic research is highly encouraged with opportunities provided in the echo lab or core lab.

### Nuclear Cardiology and Stress Testing

The primary experience for this rotation includes the YNHH Nuclear Cardiology and Exercise Laboratory and the VACT Nuclear Cardiology Laboratory. YNHH laboratory is one of the largest clinical nuclear cardiology laboratories in the world, performing more than 8,000 clinically requested tests each year; including SPECT, SPECT/CT, CZT SPECT/CT and PET/CT. The VACT nuclear lab includes SPECT/CT and PET/CT. Both laboratories engage clinical evaluation and diagnosis and research.

All general cardiology fellows have the opportunity to obtain 4 months of dedicated training in nuclear cardiology, with hands-on training in radiotracer preparation and camera quality control, leading to level II certification. For those fellows pursuing advanced training in cardiac imaging, a physics course is provided that meets NRC requirements for level II certification. The clinical training in nuclear cardiology involves high volume clinical exposure with state-of-the-art solid-state detector systems, hybrid SPECT/64-slice CT scanner, and cardiac PET/64-slice CT imaging with integrated exposure to non-contrast and contrast cardiac CT imaging. Participation in clinical research during these elective months is available and strongly encouraged.

### Cardiac MRI/CT

The primary experience for this rotation includes the YNHH cardiac CT/MRI laboratory and the VACT cardiac CT/MRI Laboratory. Both sites are joint programs with the Department of Radiology & Biomedical Imaging. Its purpose is to introduce the fellow to the background, basics and applications of advanced cardiovascular imaging techniques including cardiovascular computed tomography (CT) and magnetic resonance (CMR).

### Electrophysiology and Pacemaker/ICD follow-up

The primary Electrophysiology experience occurs at YNHH (Dr. Joseph Akar, Director) during a minimum of two dedicated months. The YNHH EP Laboratory provides comprehensive clinical services including arrhythmia consultation, cardiac pacing, defibrillator and resynchronization therapy. During this rotation, the fellow will work under the supervision of electrophysiology attendings and advanced fellows.

The primary goals of the Yale Clinical Cardiac Electrophysiology Fellowship Program (CCEP) are to train superb academic clinical cardiac electrophysiologists who understand and appreciate the basic mechanisms of normal and abnormal cardiac rhythms provide technically excellent and humane care to their patients and who advance the field through clinical practice, research and training. In addition to obtaining outpatient and inpatient consultative experience, CCEP fellows spend the majority of their time performing procedures in three state-of-the-art hybrid OR-EP laboratories. More than 1200 procedures are performed annually including device implants, complex ablations (atrial fibrillation, ventricular tachycardia, epicardial ablations), and laser lead extractions. Yale CCEP fellows are fluent in the use cutting-edge technology including intracardiac echo, three-dimensional mapping and robotics. A didactic EP curriculum is held weekly which focuses on complex intracardiac electrogram interpretation, presentation of novel science, and CCEP board review. Yale CCEP fellows are highly encouraged and expected to participate in ongoing research projects and scholarly activities.

### Ambulatory Experience

The goals of the ambulatory experience are to provide exposure to out-patient cardiology practice, including both consultative and continuity experiences, to provide a means for clinical follow-up of patients recently discharged from the hospital. The out-patient experience is comprised of the VACT Cardiology Clinic, the YNHH Yale Physicians Building, and the Saint Raphael campus outpatient clinic.

These longitudinal clinics provide the fellow the opportunity to follow and manage patients in continuity for three years in an out-patient setting. Fellows participate in dedicated continuity clinics and alternate clinic weeks between sites one-half day every week during their core clinical training. Fellows see on average one new patient and 6-8 return patients on their clinic day, and are directly responsible for care of the patients to which they have been assigned. Fellows then see these patients in follow-up throughout their core years. On each day, attendings are available solely to supervise the fellows in this capacity.

The patient populations in these clinics provide a diverse experience in terms of gender, socioeconomic status and reason for referral. Routine management of common cardiology problems, pre-operative evaluations prior to noncardiac surgery, evaluations for potential revascularization procedures (surgical and interventional), post-revascularization follow-up, follow-up of recently discharged patients, and referrals for complex cardiology problems are similar in all venues.

### Technical and Other Skills

### Technical and Procedural Skill Requirements

The program provides sufficient experience for the fellows to acquire skill and proficiency in the performance and interpretation of:

1. History and physical examination. This is supervised by faculty members while on the clinical services. The fellows have the opportunity to correlate their physical findings with results of cardiac diagnostic procedures.
2. Basic and advanced cardiac life support. Fellows entering their training have documented certification in ACLS. Their ability to supervise complex resuscitative procedures and treat complex acute life-threatening arrhythmias takes place in the CCU rotation.
3. Elective cardioversion. Both in-patient and out-patient cardioversions of atrial arrhythmias are performed by the fellows and supervised by the faculty members.
4. Bedside right heart catheterization pacemakers (transvenous and transcutaneous). In the CCU, cardiology fellows will perform bedside right heart catheterization under the supervision of faculty members for the first several months. The insertion and management of temporary pacemakers is performed routinely in the electrophysiology and catheterization laboratories, as well as in emergencies in the CCU.
5. Right and left heart catheterization including coronary arteriography. Fellows perform and participate in at least 100 diagnostic catheterizations in the Yale and VA cath labs.
6. Exercise stress testing. Fellows perform a minimum of 50 tests.
7. Echocardiography. Fellows perform at least 75 studies, including transthoracic and transesophageal, and interpret 150 studies.
8. Pericardiocentesis. Performed during the cardiac catheterization rotations at YNHH and the VA.
9. Programming and follow-up surveillance of permanent pacemakers. Performed on an out-patient basis during the electrophysiology rotation.
10. Nuclear cardiology studies. Fellows will learn the basic aspects of image acquisition and interpretation in at least 100 cases.

### Procedural Logs

Fellows are expected to keep complete and accurate logs of their procedures during their core training.

The following procedures should be included in procedure logs at minimum. Fellows seeking advanced training in subspecialty areas (e.g. echocardiography) should consult the ACC website (guidelines for training) as well as professional societies (e.g. American Society of Echocardiography, American Society of Nuclear Cardiology, etc) for specific requirements, and add to this list as appropriate to meet professional goals.

1. Catheterization (min. 100)
2. Echo (min. 75)
3. Pericardiocentesis
4. Temporary pacers
5. ACLS training documentation

Additional Procedural Opportunities

The program provides opportunities for fellows to acquire experience with the performance and interpretation of:

1. Intracardiac electrophysiologic studies. As part of the electrophysiology rotation, fellows assist in performing and interpreting at least 15 such studies in two years.
2. Intra-aortic balloon counterpulsation. As part of the catheterization laboratory rotation and in the CCU.
3. Percutaneous transluminal coronary angioplasty and other interventional procedures. Fellows assist in these procedures on a limited basis during their core training for exposure to the technique. All fellows are versed in the indications for, management of and complications of patients with regard to interventional procedures.

### Additional Interpretive Opportunities

The program provides sufficient experience for fellows to acquire skill in the interpretation of:

1. Chest x-rays. On an individual basis with the attending radiologist as well as didactic training.
2. Electrocardiograms. As part of the weekly conference schedule, ECGs are reviewed. All clinical services require ECG review. ECGs are read at the VA by the fellow with the attending cardiologist. A minimum of 3500 ECGs must be interpreted over the course of the two-year core fellowship.
3. Ambulatory ECG recording. Supervised at the VACT and the YNHH EP lab, a minimum of 150 recordings will be interpreted by each fellow.
4. Radionuclide studies of myocardial function and perfusion. Intensive rotation with didactic and practical interpretation during the Nuclear Cardiology rotations.
5. Cardiovascular literature. A monthly Journal Club is held to review a recent manuscript, and formal training in clinical epidemiology is provided during the core didactic sessions each month. Attendance is mandatory and is recorded at each session.

### Formal Instruction

The educational goals are achieved through the Cardiology Core Curriculum which includes an introductory summer series of didactic lectures during the first two months of each year and subsequent didactic lecture series throughout the year covering a variety of topics in Cardiovascular Disease.

The training program provides didactic instruction in the following ACGME specified topics:

### Basic science

1. Cardiovascular anatomy
2. Cardiovascular physiology
3. Cardiovascular metabolism
4. Molecular biology of the cardiovascular system
5. Cardiovascular pharmacology
6. Cardiovascular pathology

### Prevention of cardiovascular disease

1. Epidemiology and biostatistics
2. Risk factors
3. Lipid disorders

### Evaluation and management of patients (with the following):

1. Coronary artery disease and its manifestations and complications
2. Arrhythmias
3. Hypertension
4. Cardiomyopathy
5. Valvular heart disease
6. Pericardial disease
7. Pulmonary heart disease
8. Peripheral vascular disease
9. Cerebrovascular disease
10. Heart disease in pregnancy
11. Congenital heart disease in adults
12. Cardiovascular trauma

### Management of:

1. Acute and chronic congestive heart failure
2. Acute myocardial infarction and other acute ischemic syndromes
3. Acute and chronic arrhythmias
4. Preoperative and postoperative patients
5. Cardiac transplant patients
6. Geriatric patients with cardiovascular disease

### Diagnostic techniques, including:

1. Magnetic resonance imaging (at YNHH)
2. CT angiography
3. Positron emission tomography

### Clinical Case Conferences and Specialty Lectures

The monthly conference schedules are maintained and distributed by the Fellowship Office, posted and sent electronically to all fellows and faculty. Attendance is tracked via sign-in sheets.

|  |  |
| --- | --- |
| **Event** | **Frequency** |
| Advanced Hemodynamics/Angiography Review | Monthly |
| Basic Science Series | Monthly |
| Congenital Heart Disease | 4 Lectures per Year |
| Cardiac Pathology - Hearts with Henry | Quarterly |
| Cardiology Grand Rounds | Biweekly |
| Cardiology Case Conference YNHH | Biweekly |
| Multidisciplinary Cardiac Conference - VACT | Twice per Week |
| Clinical Epidemiology Series | Monthly |
| ECG Conference | (weekly, July-January) |
| Electrophysiology Conference | Weekly (January-July) |
| Echocardiography Cardiac Imaging Conference | Weekly |
| Clinical Reasoning | Monthly |
| Journal Club | Monthly |
| Interventional Cardiology Conference | Weekly |
| Morbidity and Mortality | Quarterly |
| Variable Topics Conferences | Daily (Beginning 7:30am or Noon) |
| Nuclear Cardiology Conference | Weekly |
| Cardiac Imaging Conference | Weekly |
| Humanities in Cardiology Conference | Monthly |
| Board Review | Monthly |

### Research Experience Requirement

Cardiology trainees take an active role in both the clinical and basic science research within the Section of Cardiovascular Medicine. All fellows are assigned a research mentor during matriculation into the program. Research mentorship is continued throughout the first two years of clinical training to help guide the trainee towards a clinical research experience related to a field of clinical sub-specialization, or to a basic science laboratory in anticipation of an investigative career in cardiovascular diseases.

Research activity is initiated during the first two years but usually does not come to completion until the third or subsequent years of training. Fellows present papers at national meetings including those of the American Heart Association and the American College of Cardiology. Fellows receive instruction in research at a number of levels. First, through Journal Club they are exposed to critical assessment of the medical and scientific literature. Second, they are lectured on basic methods in clinical research within the Department of Medicine summer lecture series. Third, there is a Core Curriculum and series of lectures in Basic Science Cardiovascular Research directed by Dr. Bender during the year. Finally, the individual instruction and mentorship which the faculty member provides to the trainee is ongoing during the fellowship and the essential part of the trainee's research experience.

In addition, the trainees are involved in several scholarly activities including teaching the medical housestaff and students, presenting lectures at Cardiology Grand Rounds, presenting articles at Journal Club (both general cardiology and within the individual laboratories), presenting their research at the annual Cardiology Trainee Research Symposium and national meetings.

#### Scholarship (box)

The program makes scholarship a high priority and requires completion of either original research (published in a peer reviewed journal) or substantial scholarly work related to cardiology, as a requirement for completing the training program. Guidance in planning research directions with the trainee is provided by the Program Director. Research is supervised directly by the individual faculty mentor.

While it is not expected that every fellow’s project will result in publishable work, it is expected that every fellow conducts an original research project with the guidance of appropriate faculty members.

## Evaluation Process

The Cardiology trainee's clinical and technical competence is observed on a daily basis by the cardiology faculty, assessed in detail and documented in the trainee's record. Specifically, the trainee's knowledge base in cardiovascular diseases, skills in history taking and physical examination, clinical judgment, clinical management and consultation are assessed. In addition, the technical proficiency with respect to specialized cardiac procedures is documented. Finally, communication skills, humanistic qualities, professional attitudes and behavior, and commitment to scholarship are evaluated. A standardized trainee evaluation form issued by the American Board of Internal Medicine is completed by the supervising faculty member at the end of the rotation (Appendix B) through the MedHub system.

### Feedback

The trainees receive feedback at the end of each rotation. In addition, twice a year, the Program Director or Associate Program Director meet with each trainee to provide feedback on their performance with counseling and, when necessary, remedial assignments. Fellows document their cardiovascular procedures in log books or electronic procedure documention in the EMR which are submitted to the Program Director for evaluation and future credentialing. Yearly advancement in the fellowship program is dependent upon successful completion of each year of training. The Program Director is responsible for assessing each fellow’s performance, and ultimately deciding whether advancement is appropriate. Decisions are based on evaluations, direct observation, and feedback from faculty, peers, students, and other staff.

### Training Summary

The Program Director provides a detailed written evaluation of the clinical performance and academic accomplishments of each subspecialty trainee at the completion of the program. Evaluations document the degree to which the fellow has acquired clinical competence and technical skills. This can be used to substantiate recommendations and judgments provided to hospital credentialing committees, certifying boards, licensing agencies, and other appropriate bodies. Fellows receive certification on the basis of satisfactory completion of their 3 years. In the event of adverse evaluation, trainees are offered the opportunity to address the judgment on their academic deficiencies or misconduct before an independent clinical competence committee outside the Section of Cardiovascular Medicine within the Department of Medicine.

### Faculty Participation

The Faculty of the Section of Cardiovascular Medicine is involved in every aspect of the fellowship training. The full-time faculty includes over 130 members with expertise covering all of the subspecialty areas of cardiology. Clinical evaluation, procedural skills, research and academic work is overseen by full time faculty members. The faculty provides not only didactic teaching and clinical supervision but also professional mentoring for trainees aspiring to careers in cardiovascular disease.

### Procedure for Faculty Evaluations

The trainees complete written evaluations of each faculty member supervising his/her activity during each rotation through the MedHub system. Trainees also complete evaluations twice yearly for all faculty members to whom they have been exposed. In addition, the Program Directors meet bimonthly with the fellows to discuss their clinical experiences and to acquire feedback on their faculty supervision. The ABIM approved form for Faculty Evaluations is used (Appendix C).

**Fellowship Training Program Brochure**

[Click here to download the complete Fellowship Program curriculum.](https://medicine.yale.edu/intmed/cardio/education/fellowship/PostDoctoral%20Fellowship_2016_134645_1095_16140_v2.pdf)

## Appendix - Section Policies

### Supervision of Fellows

In all rotations, fellows are supervised by attending physician faculty. Lines of responsibility are delineated in the curriculum. Faculty schedules assign responsibility for supervision to specific faculty members, as well as on-call responsibilities, so as to provide fellows with appropriate supervision and consultation. Issues related to monitor resident fatigue and workload are addressed routinely at monthly faculty meetings and in more depth during periodic faculty educational retreats.

### Duty Hours

Duty hours for fellows in cardiovascular medicine include all clinical and academic activities, including time spent in-hospital during on-call periods.

The program adheres to the limitations of an average 80-hour work week and 1 day in 7 free of educational and clinical responsibilities (averaged over a 4-week period).

Fellows will document actual hours spent in-hospital during on-call periods, and submit a monthly report to the fellowship administration. Hours spent in-hospital apply towards the 80-hour work week standard, but not to the 24-hour continuous duty limit.

### On-call Activities

Call is taken from home for fellows in cardiovascular medicine during the second/third year. All fellows share primary call responsibilities over a 2-year period. One fellow is on-call per night, resulting in an average on-call frequency of 1 day in 18.

The program directors monitor frequency of call, actual time spent in hospital, and overall service demands of the on-call schedule. Program directors review this with each fellow every 6 months, and adjust schedules when warranted.

### Moonlighting Policy

Cardiovascular fellows will not be permitted to moonlight within the institution (i.e. Yale-New Haven Hospital or VACT) unless approved by the Program Director.

If program directors believe that external moonlighting is interfering with the ability of a resident to perform his/her duties, or affects the overall performance in a negative fashion, the resident will be advised to stop moonlighting, and that failure to take corrective action will jeopardize their ability to successfully complete the program.

Fellows on J-1 visas are NOT permitted to do any moonlighting.

### Oversight

Oversight of the duty hours for cardiovascular fellows is provided by the program directors, in accordance with institutional policies.

Attending faculty are responsible for providing back-up support for all fellows during normal duty and on-call hours.

### University Policies

The section adheres to all applicable university-wide policies that pertain to fellows. These include but are not restricted to policies on grievance procedures, maternity/family leave, behavior in the workplace, and professional credentialing.

University policies are available through the Office of Graduate Medical Education (688-1449; Room TMP 236)

# Advanced Fellowship Training

Advanced fellowship training refers to the one or more years of focused training in a specific area of cardiology, in addition to the core ABIM/ACGME required foundation in general cardiology. Training is available in a variety of clinical and research areas and is tailored to the goals and skills of each fellow. The tracks listed below represent common sequences of training, but modifications can be made if approved by the program director. Please complete [this application](https://medicine.yale.edu/intmed/cardio/education/fellowship/curriculum/CARDIOVASCULAR%20MEDICINE%20TRAINING%20PROGRAM%20APPLICATION_349129_284_16141_v1.pdf) for advanced training.

Advanced Cardiac Imaging *(Dr. Judith Meadows, Director)*

The goal for this track is for individuals to attain expertise in at least one imaging modality (Level III), advanced exposure in the other modalities and to gain appropriate investigative skills for a career in academic cardiology. Training will take place at both clinical sites (Yale New Haven Hospital and the VA Connecticut Healthcare System). In general, two years of training is recommended. The fellow will identify a research mentor and project, to be conducted over a one to two-year period. The particular structure of the training sequence will vary, depending on the goals of the trainee.

For those interested in truly advanced training in cardiovascular imaging, funding is available for 2 to 3 years of research training in imaging technology, and molecular and translational imaging, through an NIH funded T32 training grant as part of the [Yale Translational Research Imaging Center (Y-TRIC).](https://medicine.yale.edu/intmed/cardio/ytric/) This training can involve: hands-on research experience on clinical 1.5T and 3T MR magnets for pre-clinical or clinical research, pre-clinical experience with microCT, microSPECT/CT, and high-resolution mouse echocardiography, pre-clinical or clinical experience with PET/CT, SPECT/CT, or 3D ultrasound, or pre-clinical training in the ranostic multi-modality probe development.

Advanced Heart Failure and Transplantation *(Dr. Daniel Jacoby, Director)*

This ACGME-accredited track is appropriate for individuals who wish to pursue academic careers in heart failure and transplantation. In addition to level 3 training in heart failure, fellows will identify a research mentor and project, to be conducted over a two-year period.

Electrophysiology *(Dr. Lynda Rosenfeld, Director)*

This ACGME certified program is a two-year program and requires completion of a three-year fellowship in Cardiovascular Medicine. At the completion of this program, individuals will achieve level 3 training in electrophysiology and will be eligible for ABIM board certification in Clinical Cardiac Electrophysiology.

Interventional Cardiology *(Dr. Joseph Brennan, Director)*

This is a one-year ACGME-accredited program that is performed upon completion of a three-year fellowship in Cardiovascular Disease. The main objective of the Fellowship Training Program in Interventional Cardiology is to provide an academically and clinically rigorous training program for the cardiology trainee to obtain the necessary skills in cardiac interventional procedures. The fellowship program includes three trainees for the twelve-month training program and offers unequaled opportunities in both peripheral vascular interventions as well as structural heart disease. A second year of training is available to select individuals with specific interests in peripheral or structural heart disease interventions. Individuals will achieve level 3 training in interventional cardiology, and be eligible for ABIM board certification in both Cardiovascular Disease and Interventional Cardiology.

Structural Interventions *(Dr. John Forrest, Director)*

This is a one-year fellowship program designed to provide advanced training in interventions in structural heart disease (e.g. TAVR, etc). This program includes intensive laboratory procedural experience as well as inpatient and outpatient care exposure. Individuals will obtain advanced training in these structural interventions, following completion of a previous coronary interventional cardiology fellowship.

Peripheral Vascular Interventions *(Dr. Carlos Mena, Director)*

This is a one-year fellowship designed to provide expertise in peripheral vascular interventions and medical therapy. This is usually completed following a three-year core cardiology fellowship, but can be completed as part of an intensive third-year core fellowship training experience. Fellows will be involved in all aspects of peripheral vascular disease care, including intensive procedural exposure, outpatient evaluation, inpatient management and non-invasive imaging.

# Cardiovascular Research Training Fellowships

Research training is offered in all areas of clinical cardiology, basic investigations and outcomes research. Qualified individual may be eligible for support by NIH funded T32 training programs in vascular biology and translational molecular imaging. Other training options include a Department of Medicine Investigative Medicine PhD program that leads to a Yale PhD degree, Clinical Investigator Program offered by Yale CTSA leading to an [MS degree in clinical research](https://medicine.yale.edu/education/research/mhs/master.aspx) and a National Clinician Scholars Program leading to an MS degree in health service research.

Cardiology trainees are expected to take an active role in clinical or basic science research.  Based on the interests and background of our trainees, dedicated research training may occur prior to basic clinical training.

Guidance is provided by Dr. Edward Miller (Fellowship Director), Dr. Jeffrey Bender (CVRC Director), Dr. Albert Sinusas (Y-TRIC) and Dr. Eric Velazquez (Section Chief), as well as other faculty members and mentors.  A specific mentoring program will pair a faculty member to a fellow for general mentorship of career goals and training.  In most cases, this relationship will begin prior to the formal start of fellowship in order to help with the transition.  Research training is available in all clinical sub-specialties, clinical epidemiology and health sciences research and several areas of basic and translational cardiovascular research.

Advanced research training for fellows is coordinated by the Program Director. The length of training, sequence relative to clinical training, and identification of specific laboratory/mentor will depend on a number of variables, including previous training, current goals, and available lab resources. In general, such training involves a multi-year commitment on the part of both fellow and faculty mentor. Fellows potentially interested in research are encouraged to discuss options with faculty early in their training, and to speak to a broad range of faculty so as to be fully aware of the scope of the options.

Research training can be accomplished within the scope of the general cardiology fellowship but may also be performed as part of a number of specific programs that are available at Yale. Information is available on the section’s website. These include:

1. [NIH T-32 training grant in vascular biology](https://medicine.yale.edu/intmed/cardio/ycvrc/) (Dr. Jeffrey Bender, Director)
2. [NIH T-32 training grant in translational cardiac imaging](https://medicine.yale.edu/intmed/cardio/ytric/) (Y-TRIC, Dr. Albert Sinusas, Director)
3. [Investigative Medicine (Ph.D.) Program](https://medicine.yale.edu/investigativemedicine/).
4. [Yale Masters of Health Sciences (MHS) program](https://medicine.yale.edu/education/research/mhs/)
5. [ABIM Research Pathway](https://medicine.yale.edu/intmed/residency/traditional/apply/abim.aspx) (coordinated with the residency program in Internal Medicine)
6. [The National Clinician Scholars Program](https://medicine.yale.edu/intmed/nationalcsp/) (NCSP); formerly Robert Wood Johnson Clinical Scholars Program) is directed by Dr. Cary Gross and is designed to train physicians to be leaders in health care delivery, policy, design and implementation of clinical research, and outcomes research. The program is one of only four in the country, and is comprised of rigorous course work and practical experiences, with formal training in critical thinking and quantitative research methods. The program is competitive, and applicants who wish to pursue such training during fellowship must apply in the 2nd year of training. If accepted, the 2-year program will include the 3rd year of general cardiology training, as well as a 4th additional year.
7. Clinical and Translational Research.Focused, in-depth training can be arranged in clinical and translational research for fellows, and is coordinated by the Program Director. The length of training, sequence relative to core clinical training, and identification of specific laboratory/mentor will depend on a number of variables, including previous training, current goals, and available lab resources. In general, such training involves a multi-year commitment on the part of both fellow and faculty mentor. Opportunities vary widely, and include areas such as noninvasive imaging, outcomes research, interventional cardiology, and heart failure.

Fellows are eligible for basic and translational science research training through NIH sponsored training grants in vascular biology and noninvasive imaging.  Training in basic science research is also available in selected Medical School laboratories outside of the Section if appropriate mentoring is available.  Fellows with particular interest in clinical research are encouraged to apply to participate in the [National Clinician Scholars Program](https://medicine.yale.edu/intmed/nationalcsp/), or the [Investigative Medicine PhD Program](https://medicine.yale.edu/investigativemedicine/), which offers doctoral degrees in basic or clinical research within the context of fellowship training.  In the addition, the Section of Cardiovascular medicine at Yale School of Medicine supports and encourages trainees in the American Board of Internal Medicine Research Pathway to apply to our program.

Because we make every effort to individualize the training program for our fellows, we recognize that training paths may differ.  For example, some trainees may go directly into their clinical cardiology fellowship from residency and focus their training in a particular subspecialty of cardiology, integrating academic projects into three years of clinical training.  Others may devote two or more years to intensive research prior to completing their clinical training in cardiology.  Below are examples of different training pathways taken by our fellows.

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|  | **Traditional Cardiology Training** |  |
| Internal Medicine Residency (3 years) | General Clinical Cardiology Fellowship (3 years) |  |
|  | **Research Pathways** |  |
| Internal Medicine Residency (3 years) | General Clinical Cardiology Fellowship (2 years) | Research Fellowship (1-3 years) |
| Internal Medicine Residency (3 years) | Research Fellowship (1-3 years) | General Clinical Cardiology Fellowship (2 years) |
|  | **ABIM Research Pathway** |  |
| Internal Medicine Residency (2 years) | Research Fellowship (3 years) | General Clinical Cardiology (2 years) |
| Internal Medicine Residency (2 years) | General Clinical Cardiology (2 years) | Research Fellowship (3 years) |

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# Current Fellows

## General Fellows

## Adult Congenital Heart Disease

## Advanced Heart Failure and Transplantation

## Cardiovascular Imaging

## Electrophysiology

## Interventional

## Interventional - PV fellows

## Interventional - Structural fellows

## T32/Research Fellows

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