Program Manual
University of Washington
Training Program in Cardiovascular Disease
Department of Medicine
Division of Cardiology

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UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE
TRAINING PROGRAM IN CARDIOVASCULAR DISEASE

Overview

The UW Fellowship Training Program in Cardiovascular Disease is an ACGME-accredited program designed to prepare trainees for a career of excellence in Cardiology research and scholarly work, teaching, and patient care. There are seven (7) trainees accepted into our program each year. Application to our training program is made via the ERAS online application system. All positions are filled via the National Residency Match Program. Cardiology trainees are recruited to a standard ACGME fellowship training track. Cardiology trainees begin their fellowship with a core curriculum comprising 2 years of clinical training with rotations in inpatient cardiology, cardiac catheterization, echocardiography, nuclear cardiology, electrophysiology, adult congenital heart disease, heart failure and transplantation, cardiac consultation, coronary care ICU, mechanical circulatory support, and ambulatory cardiovascular care. Year 3 of training allows trainee differentiation into one of three pathways, dependent on career goals, the Clinician Scholar pathway, the Clinician Educator pathway, and the Research Scholar pathway. Research is an integral part of our fellowship training program, with dedicated research time provided in the third ACGME year of training for all pathways. Trainees in the Clinician Scholar pathway complete an integrated 3rd year of advanced clinical and scholarly work, including clinical quality improvement initiatives. Trainees in the Clinician Educator pathway complete an integrated 3rd year of advanced clinical and research training, with additional focus on mentored teaching activities and development of curricular materials. Trainees accepted to the Research Scholar pathway complete a 3rd and 4th year of training in research in basic sciences, health services, population science or clinical investigation under the guidance of a research mentor.

Prerequisites

Prerequisites include completion of an ACGME accredited three-year residency in internal medicine from a U.S. based training program, outstanding clinical skills, and demonstration of prior research interest and experience. Because of the critical role that research training plays in the formation of future academic cardiologists, close attention is paid by the fellowship selection committee to applicants’ aptitude for and experience in research. Moreover, all fellows are expected to conduct substantive research during their fellowship training, with presentation and publication of the results of their work.
Fellowship Clinical Training Sites

Fellows rotate through four affiliated University of Washington Hospitals. UW Medicine hospitals and programs consistently rank highly in U.S. News and World Report’s annual “Best Hospitals” issues.

The University of Washington Medical Center (UWMC) is a 450-bed hospital with a 46-bed medical/surgical critical care center. Cardiovascular services at the University of Washington Medical Center include specialized clinical teams in cardiac catheterization, echocardiography, clinical electrophysiology, advanced heart failure and cardiac transplantation, nuclear cardiology, advanced cardiovascular imaging, adult congenital heart disease, and cardiothoracic surgery.

Harborview Medical Center (HMC). HMC is a 413-bed hospital with a 63-bed critical care center owned by King County and managed by the University of Washington. Harborview is a world-renowned Level 1 adult and pediatric trauma center. Cardiovascular services include an active coronary care unit service, cardiology clinics and consultation service, echocardiography, and cardiac catheterization laboratories.
Seattle Veterans Affairs Medical Center (VAMC) has 268 beds with 82 beds assigned to the medical service, including 18 medical intensive care/coronary care unit beds. The cardiology service at the VA Medical Center maintains an active cardiac catheterization laboratory, inpatient and outpatient clinical cardiology, electrocardiography, and echocardiography services.

Northwest Hospital & Medical Center (NWH) is a full-service community hospital, with 281 beds, located just north of Seattle. A full-service community hospital, is located just north of Seattle. The cardiology service at NWH offers elective rotation experience in cardiac catheterization, cardiac rehabilitation, and peripheral artery disease management.
Clinical Training

Year 1 and year 2 clinical rotations are scheduled over a consecutive time period (4 week blocks, 13 blocks each year):

**Year 1**
- Cardiology A UWMC (general inpatient cardiology wards)
- Cardiology B UWMC (heart failure/transplantation inpatient cardiology wards)
- UWMC echocardiography
- Harborview inpatient cardiology consultation/cardiac catheterization
- Harborview echocardiography
- VAMC inpatient cardiology consultation
- VAMC cardiac catheterization
- Intermittent overnight call for specialty consult services, cardiac procedures, inpatient services
- Ambulatory continuity clinic

**Year 2**
- Cardiac intensive care unit
- UWMC advanced echocardiography
- UWMC electrophysiology
- UWMC inpatient cardiology consultation
- UWMC nuclear cardiology
- UWMC adult congenital heart disease
- UWMC cardiac catheterization
- Intermittent overnight call for specialty consult services, cardiac procedures, inpatient services
- Ambulatory continuity clinic

**Year 3**
- Cardiac intensive care unit
- UWMC mechanical circulatory support consultation (VAD)
- UWMC junior attending general inpatient Cardiology wards
- Advanced subspecialty electives
- Intermittent overnight call for specialty consult services, cardiac procedures, inpatient services
- Ambulatory continuity clinic

**Electives (offered during Year 3 unless otherwise specified)**
- Research elective (year 2)
- Advanced imaging (intraoperative echo, CT/MRI, advanced echocardiography)
- Adult congenital heart disease
- Heart failure/MCS
- Nuclear Cardiology (advanced training for Nuclear boarding)
- Advanced Electrophysiology
- Advanced cardiac catheterization
- Critical care cardiology night float
- Clinical quality improvement
Teaching Conferences

1. **Division of Cardiology Grand Rounds** on Fridays from 7:30 to 8:30 AM (September – June). Grand Rounds include at least 1 research conference per month, regular clinical-pathologic correlation conferences, and topics of clinical interest. Each fellow presents at least once with other presentations by Cardiology faculty, faculty from related disciplines, and visiting speakers.

2. **Cardiology Tutorials** on Fridays from 8:30 to 9:30 AM. (All year, with conferences from 7:30 to 9:30 AM during the summer when Grand Rounds are not held.) Cardiology tutorials provide a comprehensive introduction to cardiovascular disease with emphasis on pathophysiology, pathology, pharmacology, diagnostic imaging techniques, and research methods. Tutorials are scheduled by the Fellowship Program Administrator and Fellowship Program Assistant, and are coordinated with systematic readings from a major cardiology textbook.

3. **Cardiac Multi-Disciplinary Clinical Case Conference**, Wednesday’s, 7:30 to 8:30 AM, weekly, with collaboration of Cardiology, CT-Surgery and Cardiac Anesthesia in these discussions. The cases and background information are presented by the Cardiology Fellows on a rotating schedule.

4. **Journal Club** is a monthly dinner meeting arranged by the Cardiology Fellows. Fellows present recent journal articles of general interest, describing the content of the article and directing a brief discussion of its strengths and weaknesses. All fellows are strongly encouraged to pre-read the selected articles and provide an interactive dialogue on current cardiology topics. Attendings with an interest in the area of the articles are invited to share their perspective and experience.

5. **Fellows’ Research Conference** is held once monthly. Fellows present ongoing work in a venue that is relatively informal, non-threatening, and interactive. Constructive dialogue and questions are encouraged and suggestions regarding research directions and approaches are solicited from the attendees. Presentations are forward-looking, including presentation of new hypotheses as well as plans for acquiring grant funding that would allow the hypotheses to be tested. A **Faculty Research Conference** also is presented monthly. Opportunities for collaborative work are emphasized and suggestions for fellow involvement in faculty projects are particularly welcome.

6. Fellows may attend other conferences, such as Cardiovascular Biology Breakfast Club and Medicine Grand Rounds, as their rotations and schedules allow.

7. Subspecialty weekly conferences in a variety of areas of expertise such as multimodality cardiac imaging, interventional Cardiology, electrophysiology, and heart failure and cardiac transplantation, and adult congenital heart disease. Fellows are encouraged to attend as their schedules permit. Participation in various didactic courses, CME courses and lecture series are encouraged as long as they do not interfere with other required assignments and clinical duties.
8. Other lectures/conferences scheduled throughout the year by the Department of Medicine and School of Medicine. In addition, fellows are encouraged to attend one national scientific meeting annually. Partial support for travel is provided. Conferences are regularly scheduled including topics such as: OSHA and radiation safety regulations, continuous quality improvement, risk management.

9. Fellows on VAMC rotations participate in the weekly Friday VAMC Cardiology Conference and fellows on HMC rotations participate in the first/third Friday conferences at HMC.

10. Fellows are encouraged to attend the Ethics in Medicine lecture series.
Research Training

The University of Washington is one of the largest, best supported, and most productive research universities in the world. Cardiology fellows have access to a broad spectrum of outstanding research training programs at the University of Washington Medical Center and at affiliated institutions such as Harborview Medical Center, the VA Puget Sound Medical Center, the Fred Hutchinson Cancer Research Center, the Puget Sound Blood Center, the Institute for Systems Biology, and the Northwest Lipid Research Laboratory. Research opportunities are available in laboratory-based, clinical, and population-based research. Many of our fellows pursue research training under the guidance of a member of the Cardiology Division. However, collaborations with investigators outside of the division are also common. Research is an integral part of the UW Fellowship Training Program in Cardiovascular Disease, with dedicated research time provided in the third ACGME year of training for all pathways. All fellows are expected to conduct substantive research during their fellowship years and publish the results of their work. Research is a critical component of our program, preparing trainees for a science-based career such as modern medicine and is consistent with the recommendations of the Core Cardiology Training Statement (COCATS 4). In addition, the ACGME requires that all accredited Cardiology training programs:

- Ensure a meaningful, supervised fellowship research experience with appropriate protected time.
- Provide fellows with training in the design and interpretation of research studies, responsible use of informed consent, research methodology, and interpretation of data.
- Ensure that fellows are advised and supervised by faculty members who are proficient in the design and conduct of research.
Year 1 training
Fellows meet with the Associate Program Director for Research, to define research interests and explore opportunities. By the end of the first year, fellows identify a faculty research mentor and begin discussion of possible research projects. Fellows with an interest in the Research Scholar pathway should apply to this program by the end of the first year.

Resources: University of Washington faculty and departmental web sites
Fellowship program manual and website
Faculty, including Drs. Rosario Freeman, April Stempien-Otero, Francis Kim, David Dichek

Timeline:: July-December: Fellow researches potential projects/mentors, shared areas of interest either clinical or research. In consultation with fellowship directors, fellows select a research planning adviser. Fellows should have a short list of possible topics/projects (can be a stand-alone project or part of a larger project carried on by the research mentor). January: Associate Director for Research meets with fellow to help identify research and career goals. A list of potential research mentors is formulated. Meetings with potential mentors scheduled over the next few months.

Year 2 training
Fellows are able to schedule a research block elective to initiate work on their research project. By May 1 (preceding start of second year), fellows update their Individualized Development Plan and submit a research proposal with their mentor's commitment to work with them. This proposal should include a summary of the research project, the specific research activities that are planned during the research month, and anticipated scholarly work (paper, chapter, grant application), signed and agreed on by the research mentor.

Year 3 training
Clinician Scholar pathway: Trainees complete an integrated ACGME 3rd year of advanced clinical and scholarly work, including clinical quality improvement. Fellows choose a faculty mentor during the first year and are provided clinical quality improvement/research blocks during the third year of fellowship training. Scholarly work and clinical research are focused within the area of subspecialty interests. Clinical rotations in this pathway include core rotations in specialized inpatient consultation and critical care. Additionally, advanced clinical subspecialty elective time is provided.

Requirements Year 3 Clinician Scholar pathway:
1. Clinical training time during the year 3 fellowship training includes: specialized inpatient consultation and critical care rotations, advanced subspecialty clinical electives, maintenance of a weekly continuity clinic and intermittent overnight call for specialty consult services, cardiac procedures, inpatient services.
2. Individual Development Plan (IDP) initiated in year 1. The IDP is updated and discussed with the program director/faculty at semi-annual and annual evaluation meetings to clarify short and long-term academic and career goals.
3. Complete a substantive, in-depth clinical quality improvement project under the mentorship of a faculty member. Fellows will submit a project proposal with the
mentor’s commitment to work with them which includes a summary of the project, the specific investigative activities that are planned, and anticipated scholarly work (protocol, publication, intervention, meeting submission), signed and agreed on by both the fellow and faculty mentor. Approval by program director is required.

4. During year 2 training, fellows will be provided an option for a quality improvement elective to begin their project. Fellows committed to a clinical research project will also assess the need for Human Subjects approval for their projects, design data collection forms, and develop a timeline for data collection and publication prior to completion of fellowship training.

5. Fellows present interim results of quality improvement projects at cardiology conferences, submit clinical case presentations, and, where appropriate, submit abstracts/prepare manuscripts for presentation and publication. Faculty mentor should attend these presentations.

6. Fellows present an in-depth clinical topical review at a UW Cardiology Grand Rounds in the area of their specialty or subspecialty interest.

7. Interested fellows may prepare grant applications to fund clinical research during Year 3 of training. The program director and associate program director must be notified 6 months in advance of this submission. For extramural grant funding applications, such as the ACC or AHA, application to earlier funding cycles (award notification by winter preceding funding period) is mandatory. In the rare case where application to a later funding cycle is needed, (award notification by the spring preceding funding period), fellows are subject to the clinical training schedule adjustment needed to meet the funding requirements of the grant, which may delay the grant start date.

**Clinician Educator pathway:** Trainees complete an integrated ACGME 3rd year of advanced clinical and research training, with additional focus on mentored teaching activities and development of curricular materials to strengthen educational skill sets and prepare the trainee for a career in academic cardiology, including development of a formal teaching portfolio. Trainees choose a faculty mentor during the first year and are provided protected scholarly work development blocks during the third year of fellowship training. Teaching activities and curricular materials are focused within the area of subspecialty interests. Trainees are expected to teach in multiple clinical settings, and will receive feedback on teaching skills. Trainees in this track participate as small group co-leaders for the UW Medical School MedSci530 Circulatory Systems course. Clinical rotations in this pathway include core rotations in specialized inpatient consultation and critical care. Additionally, advanced clinical subspecialty elective time is provided.

Requirements Year 3 **Clinician Educator pathway:**

1. Clinical training time during the year 3 fellowship training includes: specialized inpatient consultation and critical care rotations, advanced subspecialty clinical electives, maintenance of a weekly continuity clinic and intermittent overnight call for specialty consult services, cardiac procedures, inpatient services.

2. Individual Development Plan (IDP) initiated in year 1. The IDP is updated and discussed with the program director/faculty at semi-annual and annual evaluation meetings to clarify short and long-term academic and career goals.

3. Develop a teaching portfolio
4. Lead morning small group Cardiology A teaching sessions ~10 sessions (each session is 30 minutes). Feedback on teaching is provided.
5. Teach as co-leaders of small group for the UW MedSci 530 medical student course along with a faculty mentor. Feedback on teaching is provided.
6. Complete a substantive educational initiative or scholarly project under the mentorship of a faculty member. Submit an education proposal with the mentor's commitment to work with them which includes a summary, specific activities planned, and anticipated work (protocol, materials), signed and agreed on by both the fellow and faculty mentor. Approval by program director is required. Options include:
   1. Develop/revise rotation-specific curricula
   2. Write teaching scripts for Card A/CCU/resident lecture series
   3. Manage specific rotation with attending
   4. Develop or revise an educational conference
   5. Create teaching materials for other educational initiatives within cardiology such as medical student courses, resident rotation materials, simulated teaching activities
   6. Other novel approaches to education
7. Complete a clinical quality improvement project under the mentorship of a faculty member. Fellows will submit a project proposal with the mentor's commitment to work with them which includes a summary of the project, the specific investigative activities that are planned, and anticipated scholarly work (protocol, publication, intervention, meeting submission), signed and agreed on by both the fellow and faculty mentor. Approval by program director is required.
8. During year 2 training, fellows will be provided an option for a quality improvement elective to begin their project.
9. Fellows present interim results of education work or quality improvement projects at cardiology conferences, submit clinical case presentations, and, where appropriate, submit abstracts/prepare manuscripts for presentation and publication. Faculty mentor should attend these presentations.
10. Fellows present an in-depth topical review at a UW Cardiology Grand Rounds in the area of their specialty or subspecialty educational interest.
11. Interested fellows may prepare grant applications to fund clinical research during Year 3 of training. The program director and associate program director must be notified 6 months in advance of this submission. For extramural grant funding applications, such as the ACC or AHA, application to earlier funding cycles (award notification by winter preceding funding period) is mandatory. In the rare case where application to a later funding cycle is needed, (award notification by the spring preceding funding period), fellows are subject to the clinical training schedule adjustment needed to meet the funding requirements of the grant, which may delay the grant start date.

**Research Scholar pathway:** After completion of 2 years of core clinical curricular training, trainees who plan a significant research component in their careers spend a minimum of two years obtaining research experience designed to provide necessary tools in techniques of investigator-initiated clinical, translational and/or bench based basic research. A commitment to research training is required, with development of a detailed research plan coordinated by the trainee, research mentor, program director, and Division Head. A clinical research scholar pathway provides trainees with the appropriate statistical background and expertise in clinical
research methodology to succeed as a clinical investigator, utilizing formal coursework through the UW School of Public Health.

Grant writing is an essential component of research career development for fellows aspiring to become independent investigators, and trainees in this pathway are required to apply for grant funding. With the assistance of a faculty led mentoring team, competitive candidates apply for grant funding early during year 2 of training. Extramural funding sources include AHA fellowships and individual NIH F32. Internal funding sources include NIH-sponsored research training grants (T-32) for eligible candidates (US citizens or permanent residents) including the Cardiovascular Research Training Program, the Palliative Care Research Fellowship, and the Genetic Approaches to Aging.

After year 4, fellows who intend to become independent principal investigators in laboratory-based, clinical, or population-based research may need to extend their research training. Research mentors guide fellows whose aptitude and interest for research remain high towards submission of faculty transition grants such as the NIH K08 or K23, and the American Heart Association Scientist Development Grant or Fellow to Faculty Award. NIH KL2 awards, which provides 2 years of faculty-level salary support and a mentored training environment for fellows who wish to develop a career in clinical research are awarded through a competitive process by the Institute of Translational Health Sciences (ITHS).

Requirements **Research Scholar pathway:**

1. Years 3 and 4 are devoted primarily to research under the guidance of a faculty mentor and mentoring committee. Clinical training time during year 3 of fellowship training meets ACGME training requirements, and includes maintenance of a weekly continuity clinic and intermittent overnight call for specialty consult services, cardiac procedures, inpatient services. During year 3 of training, fellows are responsible for specialized inpatient consultation and critical care rotations, the specifics of which are dependent on stipulations of individual grant awards.

2. Individual Development Plan (IDP) initiated in year 1. The IDP is updated and discussed with the program director/faculty at semi-annual and annual evaluation meetings to clarify short and long-term academic and career goals.

3. Fellows develop a mentoring committee by the end of year 1 and apply for research fellowship grants during a second year research elective block elective. Current institutional training grants support fellows working in basic and applied cardiovascular biology, imaging, health care outcomes, bioengineering, and epidemiology. External fellowship grant applications are typically submitted to the American Heart Association, the American College of Cardiology, the National Institutes of Health, and other professional societies, private agencies, or corporate foundations. Fellows must meet the training and research time requirements of research awards.

4. Fellows prepare grant applications to fund research beginning in July of Year 3 of training. For extramural grant funding applications, such as the ACC or AHA, application to earlier funding cycles (award notification by winter preceding funding period) is preferred. In the cases where application to a later funding cycle is needed, (award notification by spring preceding funding period) fellows are subject to the training schedule adjustment needed to meet the salary funding requirements of the grant.

5. Fellows are expected to complete a substantive cardiovascular disease research project.
6. Fellows present interim results of research projects at cardiology research conferences, submit abstracts, and prepare manuscripts for presentation and publication. Faculty mentors are required attend these presentations.

7. Fellows present an in-depth review of their research work at UW Cardiology Grand Rounds

8. Fellows receive training in the scientific and practical “survival skills” that are required for success as an independent investigator. These skills include writing manuscripts and grants, speaking, biomedical ethics, financial management, job finding, and mentorship. Training in these areas is provided by formal courses and by the research mentors on an informal basis. Research Scholars in epidemiologic and population sciences will complete Masters level training in these skills.
Appointments/Stipends/Benefits

Details of the Fellowship Position Agreement for the University of Washington are available at:

http://uwmedicine.washington.edu/Education/Graduate-Medical-Education/Prospective-Residents-and-Fellows/Pages/default.aspx

After beginning training, most fellows will be reappointed to successive years of training, but this is not binding upon either the fellow or the Program Director. A fourth year of research training requires application or arrangement with the Research Scholars Program.

In October of 2014, the University of Washington Housestaff Association (UWHA) was certified as the labor union and exclusive bargaining representative for the majority of residents and fellows in the UW School of Medicine (UW SOM) and in the UW School of Dentistry (UW SOD). The UW/UWHA Collective Bargaining Agreement was ratified November 1, 2016, and will be in effect through June 30, 2019.

The UW/UWHA Contract is available at:

http://hr.uw.edu/labor/unions/uw-housestaff-association/uwha-contract

Stipends are reviewed annually and determined at the Institutional level. The current UW resident stipend schedule is available at:


These salaries are adjusted annually. Medical insurance and basic life insurance are provided to all fellows and their dependents. Supplemental life insurance, disability insurance, and retirement benefits also are available. All Cardiology fellows receive three weeks of vacation per year.

Fellows organize evening and weekend call schedules throughout the three years of training. On average, first year fellows are on-call an every 4th night/weekend and second/third year fellows every 5th night/weekend. Cardiology fellows are entitled to staff privileges at the University, including use of the library, and membership to the Intramural Sports Activities Building.

Although fellows in the general Cardiology training program are not concurrently trained for board eligibility in subspecialty ACGME fellowships, the University of Washington Cardiology program does offer subsequent subspecialty fellowship training in interventional Cardiology, electrophysiology, adult congenital heart disease, and advanced heart failure/cardiac transplantation. These fellowship programs require a separate application process, and are between one to two years in length, depending on the specialty.
UNIVERSITY OF WASHINGTON TRAINING PROGRAM IN CARDIOVASCULAR DISEASE
ADMINISTRATIVE GUIDELINES 2017-2018

Specific Guidelines for detailed University of Washington procedures and policies for fellows are contained in the Fellowship Position Appointment Agreement, which each fellow receives. This contract provides for a variety of procedures, should they be needed, including emergency or exceptional leave requirements, termination of contract, grievances, etc. The following Administrative Guidelines apply specifically to the Cardiology Fellowship Programs. Additional information is also available at the UW Graduate Medical Education website:

http://www.uwmedicine.org/education/gme/prospective-residents

1. Administration Office and Communication

All questions regarding fellowship issues should be handled by the Fellowship Office.
   Fellowship Office Hours:  Monday-Friday – 8:30AM – 5:00PM
   Phone/Voice mail: 206-685-1397
   Fax: 206-685-9394
   Email : uwcardapps@cardiology.washington.edu

2. Evaluation of Clinical Performance and Documentation of Procedures

A description of each clinical rotation, including principal responsibilities for both inpatient and outpatient components, is provided at the beginning of the fellowship year and on the Cardiology fellowship website. Faculty provide feedback to each fellow at the end of the rotation regarding clinical performance and areas for improvement. Online evaluations of fellow performance are obtained after each rotation. Evaluations are reviewed by trainees with the Fellowship Director or Associate Fellowship Directors every 6 months.

The ACGME requires that fellows maintain records of procedures performed during their Fellowship Training. Records should include date, supervising physician, exact procedure performed, any complications and the fellow’s role. Procedure logs are maintained using the same online system used to complete and review evaluations. It can be accessed by going to https://uw.medhub.com/index.mh. Every 6 months, the procedure log and total numbers of procedures are reviewed with the fellowship Program Director or associate fellowship Program Directors

3. Participation in Program Development

Fellows actively participate in program development of the Cardiology fellowship program:

- Informal lunches with the program directors and selected faculty to discuss areas for improvement
- Online evaluations of faculty and rotations by the fellows
- Participation by Chief Fellows on the Fellowship Committee
- Annual confidential online evaluation of the Fellowship Program through MedHub
4. On-Call Responsibilities

On-call responsibilities are approximately every 4th night and every 4th weekend for the 1st year fellows, every 5th night/weekend for 2nd year fellows and approximately every 5th night/weekend for 3rd year fellows. On-call responsibilities are divided as follows (with Attending coverage for each):

**General Cardiology** (Cardiology A) The fellow assigned to the Cardiology A service provides in-house day call responsibilities (rounding with the attending, supervising housestaff, and managing inpatient care for the Cardiology A service) during the week at UWMC from 8AM to 8PM. A separate on-call fellow schedule is provided for nighttime and weekend at home/call-in coverage. In addition to in-house call responsibilities, the Cardiology A fellows participate in night procedure call (see below). The line of supervision is the Cardiology A attending.

**Heart Failure** (Cardiology B) The fellow assigned to the Cardiology B service provides in-house day call responsibilities (rounding with the attending and managing inpatient care for the Cardiology B service) during the week at UWMC from 8AM to 8PM. A separate on-call fellow schedule is provided for nighttime and weekend at home/call-in coverage. Night admissions to the Cardiology B service between 8PM to 8AM are done by a separate faculty in-house hospitalist/nocturnist. Fellows assigned to the Cardiology B rotation also provide at-home call for the Cardiology B service to answer clinical questions and maintain continuity of clinical care. The line of supervision is the Cardiology B attending.

**CCU** The fellow assigned to the CCU service provides in-house day call responsibilities (rounding with the attending and managing inpatient care for the CCU service) during the week at UWMC from 8AM to 8PM. A separate on-call fellow schedule is provided for nighttime and weekend at home/call-in coverage. Night admissions to the CCU service between 8PM to 8AM are done by a separate faculty in-house hospitalist/nocturnist. Fellows assigned to the CCU rotation also provide at-home call for the CCU service to answer clinical questions and maintain continuity of clinical care. The line of supervision is the CCU attending.

**Cardiology Procedures:** The fellow takes calls for general cardiology and consults, emergent cath lab procedures and echocardiography at UWMC and HMC, supervised by on-call faculty for each of the respective specialties (cardiology A attending – consults, interventional cardiology faculty – cath lab procedures, echocardiography faculty – echo procedures). During weekday nights, the fellow takes at home call for electrophysiology consults as well (supervised by electrophysiology faculty).

5. Hours of Duty

Fellows must adhere to the ACGME requirements for hours of duty (mandatory):

- No more than 80 hours per week in house (averaged over 1 month).
- No more than 30 consecutive hours on duty (in house)
- At least 1 day in 7 free of duty, when averaged over four weeks.
- Fellows should have 10 hours free of duty, and 8 hours between scheduled duty periods.
- Fellows must have at least 14 hours free of duty after 24 hours of in-house duty.
- At-home call counts towards the 80-hour maximum weekly hour limit.
To effectively follow these rules requires efficiency, open lines of communication among members of all health care teams, the ability and willingness to effectively sign out pending tasks. Fellows also help ensure that the medicine residents meet the hours of duty rules and help them learn to work as a team so they can leave on time while still providing excellent patient care. All fellows submit a record of their duty hours online in MedHub weekly.

6. Lines of Supervisory Responsibility

On each clinical rotation, the fellow is supervised by the cardiology attending on that service both in direct patient care activities and in performing and interpreting diagnostic and therapeutic procedures. During the research month(s), each fellow has a designated supervisor. A weekly cardiology continuity clinic is supervised by the clinic faculty mentor. Evening and weekend on-call attendings are designated for each cardiology sub-specialty.

7. Training for Conduct of Human Subjects Research

Training in the conduct of human subjects research is required for all fellows who plan to do patient based research and also is required for “key personnel” receiving funding from the National Institutes of Health (NIH), Education in the basics of human subjects research that meets the NIH requirement is available on a regular basis via In-Person Sessions, CITI Web-Based Training, and the Investigator 101 CD ROM. The Human Subjects Division also provides and coordinates other training opportunities related to human subjects research. A listing of in person and online training courses are available at: http://www.washington.edu/research/hsd/training.html.

8. Vacations

Fellows have three weeks of vacation per year as stated in the Fellowship Position Appointment (15 business days and 6 weekend days). Vacations are scheduled with the fellowship office. The schedule for the academic year is completed by May of the preceding academic year. Any changes to the vacation schedule are approved by the Cardiology fellowship office and Program Director. Vacations are scheduled in one-week increments from Sunday through Saturday. We try to limit instances of fellows missing more than one week of any given rotation and we try to ensure that multiple fellows are not on vacation concurrently. Fellows should notify their continuity clinical attending at the beginning of the year and direct rotation supervisor at least four weeks in advance of vacation plans. It is the responsibility of the fellow to ensure they do not have any on-call responsibilities when on vacation. http://www.uwmedicine.org/education/gme/residents-fellows

Vacation cannot be taken on months when the fellow is assigned to the inpatient cardiology services. For all other clinical rotations, when fellows are on vacation, the attending is responsible for clinical services.

Fellows provide cross coverage between assigned rotations for urgent clinical issues as follows:
- UWMC echo, consult, and adult congenital heart disease fellows
- UWMC 2nd Year EP fellow and EP fellows
• UWMC 2nd Year cath lab fellow and interventional fellows
• HMC echo and consult/cath fellows
• VAMC cath and ECG fellow

For cross-covering arrangements, only urgent issues are covered and should not interfere with the educational component of training.

9. Travel to scientific meetings

Our fellowship programs allow time and partial funding for trainees to attend 1 national scientific meeting annually at which original research is presented. Most fellows choose to attend the AHA or ACC meetings, or other scientific sessions (such as The Heart Rhythm Society, the Heart Failure Society, or the American Society of Echocardiography meetings). We encourage fellows to submit original research abstracts for presentation. All travel must be pre-approved prior to making any arrangements. Scientific meeting assignments are made annually by the fellowship office as part of rotation/vacation scheduling. Any requests for change should be directed to the fellowship office as soon as possible. We provide, per UW GME and Division Policies, for meeting registration, airfare, or hotel - $350 per year. For second and third year trainees, additional funds may be available. Receipts are required for reimbursement for Registration and Lodging. Airfare is approved and paid for following these instructions:

1. **Registration**: Email a PDF of the online registration receipt.

2. **Airfare**: Once travel has been approved by the fellowship office, fellows proceed with making arrangements. Flights must be approved by the fellowship office prior to final booking. (Do not pay directly for airfare; we have a special account set up which gets charged).

3. **Hotel**: The fellowship only reimburses for hotels assigned via the conference housing site or at the UW per diem rate. Fellows are encouraged to share rooms whenever possible and get a separate receipt for each person.

To guarantee reimbursement, receipts must be submitted to the fellowship office within **30 days of completion of your trip**. When administrative duties are delinquent, fellows will not be allowed to receive reimbursement until all administrative tasks are complete. The fellow should ensure appropriate on-call and clinic coverage during absences.

10. Outside Professional Activities

Outside professional activities ("moonlighting") is not prohibited, but must not interfere with fellowship trainee responsibilities and duties or result in deterioration of the fellow's clinical or research performance. Involvement in Outside Professional activities must be consistent with ACGME policies and are included in hours of duty reporting. Advance written approval for outside professional activities is required. The fellow should submit the request form to the Program Director indicating the activity and the amount of time involved. If the Program Director approves of this activity, the paperwork will be forwarded to the Graduate Medical
Education Office for approval. This approval must be renewed annually. Please see the detailed policy and copy of the Moonlighting form on the following link:

http://www.uwmedicine.org/education/Documents/gme/Moonlighting-Policy.pdf

11. Housestaff Coverage

Every year there is 1 housestaff IM residency event where overnight in-house patient care responsibilities are covered by fellows. Cardiology fellows are expected to provide coverage for the Cardiology services of UWMC, HMC and the VAMC for this event, and will be compensated.

12. Parking

Fellows are responsible for their own transportation and parking arrangements. In order to attend conferences and continuity clinics, paying double parking fees may be needed on some days. Fellows are only responsible for paying one parking permit per day. If reimbursement for the second payment is needed, printed documentation of two parking fees in one day must be brought to the fellowship office at the end of each rotation for reimbursement. We encourage use of the Health Sciences Shuttle when traveling between UWMC and HMC.

There are 2 options for parking at the UWMC. 1) Purchase an entire year (set up as a payroll deduction) or a month at a time or 2) PPUP Program at Portage Bay Garage: RECOMMENDED. Located west of UWMC, if residents/fellows are not eligible for payroll deduction, a Husky Card Account may be used as a payment option. The Husky Card Account must be set up prior to signing up for PPUP. Once signed up with UW Commuter Services, you enter the garage by swiping your Husky Card. This parking program does allow in and out privileges (for single entry, not available for carpools) and must be renewed at the end of each year.

For more information: http://www.uwmedicine.org/education/gme/residents-fellows/parking

There are no fees for parking at the VAMC. At Harborview you are required to either acquire a monthly parking permit or the HMC PPUP plan. You must obtain green & white liability waiver forms at the HMC Parking and Commuter Services Office. Pay the fee and a parking permit will be issued for the dates that you will rotate at HMC. Escort services are available at the UWMC and at HMC for walking to your car late at night (598-7337, 685-9255).

14. Appointment and Reappointment

Fellow reappointment to successive years of training is done each year, contingent on adequate trainee performance and achievement of competency goals. Following successful completion of 3 years of training in the general Cardiology fellowship program, fellows are eligible for the ABIM examination in Cardiovascular Disease. Competency in cardiology subspecialties requires additional training. Subspecialty fellowship programs in adult congenital heart disease, advanced heart failure and cardiac transplantation, interventional cardiology and electrophysiology require participation in a separate ACGME-accredited training program following completion of the general Cardiology fellowship program. Additionally, there are non-ACGME subspecialty fellowships in advanced multimodality imaging, structural interventional cardiology, and complex coronary and advance hemodynamic support (CHiP).
Participation in our general fellowship training program does not guarantee acceptance into our subspecialty fellowship training programs, but internal applicants are generally competitive for these positions.

15. ID Badges

All fellows are required to wear a current photo ID badge for each medical center at all times when in or entering the building. ID badges must be displayed above the waist and be visible.

16. Radiation Safety

All fellows are provided with 1 Radiation Exposure Badge and a ring by the Radiation Safety Office, which are required whenever radiation exposure is likely. Fellows are required to wear lead aprons as instructed by the Cath Lab attendings. Badges and rings are to be turned in monthly to the Fellowship Office. Instruction in basic radiation safety is provided annually. Additional information is available from the UW Radiation Safety Office.

17. Health

All fellows are required to have annual influenza vaccination, respiratory mask fitting and TB testing by the Employee Health Office (Room NN210).

18. Licensing

Each fellow's Washington State Medical License must be current. A current copy of both the Washington State License and the DEA License must be on file in the Fellowship Office. If fellows do not moonlight they may obtain their DEA license through the fee exempt protocol.

19. Learning Gateway

The e-Learning is developed by UW Medicine Learning Gateway as in previous years. Learning Gateway training focuses on safe patient care which has been standardized across UW Medicine based on state and national policies for safer patient care. The modules have been designed to help residency and fellowship programs meet certain of the ACGME competency education requirements. Please refer to the GME website for additional information:

http://www.uwmedicine.org/education/gme/residents-fellows/online-training

All fellows are required to complete several online modules using the Learning Gateway prior to beginning training.

20. UW HIPAA Compliance Training (online module due within 30 days of start date)

21. VA Puget Sound Health Care System (VA Online Training due prior to start of rotation at the VA)
22. Clinical Documentation

The Cardiology Fellowship requires that all clinical care be documented concurrently with provision of care. Specifically, the medical record for all clinic visits, consults and procedures must be completed on the same day as the service was provided. In addition, any significant telephone or email contact with a patient should be documented in the medical record. All electronic notes must be signed within 72 hours of the clinical visit.

23. Adult Cardiac Life Support

Each fellow's ACLS training must be current. A current copy of the ACLS training must be kept on file at the fellowship office.

24. Conscious Sedation

Advanced training and documentation of competency in conscious sedation is required during the first 6 months of fellowship, per UW Medicine requirements.
UNIVERSITY OF WASHINGTON CARDIOVASCULAR DISEASE FELLOWSHIP TRAINING PROGRAM
ESSENTIAL ABILITIES REQUIREMENTS FOR APPOINTMENT, REAPPOINTMENT, RETENTION
AND CERTIFICATION

Essential abilities are academic performance requirements that refer to those physical,
cognitive and behavioral abilities required for satisfactory completion of all aspects of a
graduate medical curriculum, and the development of personal attributes required by the
faculty of all fellows at certification. The essential abilities required by the curriculum are in the
following areas: motor, sensory, communication, intellectual (conceptual, integrative, and
quantitative abilities for problem solving and diagnosis) and the behavioral and social aspects of
the performance of a physician. These are attributes each Cardiology Fellow must possess and
the use of a third party for the fulfillment of these attributes is not adequate. Additionally,
fellows must be legally authorized to practice in all healthcare clinical training sites.

Motor Skills
• Physical dexterity to master technical and procedural aspects of patient care.
• Adequate physical stamina and energy to carry out taxing duties over long hours.
• Bilateral upper extremity manual dexterity to perform complex diagnostic and therapeutic
cardiovascular procedures.

Sensory Abilities
• Fellows must be able to gather information with all senses, especially sight, hearing, and
touch, in order to gather a medical and psychosocial history, perform a physical
examination, and diagnose and treat patients.

Communication Skills
• Fellows must be able to communicate effectively with patients, including gathering informa-
tion appropriately, explaining medical information in a patient-centered manner, listening
effectively, recognizing, acknowledging and responding to emotions, and exhibiting sensitiv-
ity to social and cultural differences.
• Fellows must be able to communicate effectively and work cooperatively with supervisors,
other fellows, residents, health care team members and staff.

Intellectual Abilities
• Fellows must be able to comprehend and learn factual knowledge from readings and
didactic presentations, gather information independently, analyze and synthesize learned
material and apply information to clinical situations. Fellows must be able to develop habits
of life-long learning.
• Fellows must be able to develop sound clinical judgment and exhibit well-integrated knowl-
edge about the diagnosis, treatment, and prevention of illness within their scope of
practice. They must be comfortable with uncertainty and ambiguity in clinical situations,
and seek the advice of others when appropriate.

Behavioral, Social and Professional Abilities
• Fellows must possess the emotional maturity and stability to function effectively under
stress that is inherent in medicine and to adapt to circumstances which are unpredictable or
that change rapidly. They must be able to interact productively, cooperatively and in a
collegial manner with individuals of differing personalities and backgrounds, and be an active contributor to the process of providing health care by demonstrating the ability to engage in teamwork and team building. They must demonstrate the ability to identify and set priorities in patient management and in all aspects of their professional work. They must be punctual and perform work in a timely manner.

- Fellows must be capable of empathetic response to individuals in many circumstances and be sensitive to social and cultural differences.
- Fellows must exhibit an ethic of professionalism, including the ability to place others’ needs ahead of their own. They must exhibit compassion, empathy, altruism, integrity, responsibility and tolerance, as well as demonstrate the ability to exercise the requisite judgment required in the practice of medicine.
The Training Program in Cardiovascular Disease is designed to prepare trainees for an academic career of excellence in Cardiology research, teaching, and patient care. Our program's educational goals and objectives reflect ACGME requirements for accreditation (www.acgme.org) that address each of the 6 competencies. In addition, our program is aligned with the COCATS Guidelines for Training in Adult Cardiovascular Medicine (www.acc.org).

The 6 ACGME Competencies are:
- Patient Care and Procedural Skills (PC)
- Medical Knowledge (MK)
- Practice-Based Learning and Improvement (PBLI)
- Interpersonal and Communication Skills (ICS)
- Professionalism (PROF)
- Systems-Based Practice (SBP)

The core curriculum of our program is an intense 24 month block of clinical rotations. The first two years of fellowship training are clinically rigorous and designed to expose trainees to the broad spectrum of clinical cardiology. Fellows manage a high acuity patient population at state-of-the-art facilities, serving as cardiology consultants for acutely ill medical and surgical patients, participating in critical cardiovascular care, providing ongoing, ambulatory care and performing and interpreting both invasive and noninvasive diagnostic procedures.

Training in the competencies is provided through:
- Close one-on-one attending-fellow provision of patient care in inpatient and outpatient settings, with increasing levels of independence during the training period.
- Direct faculty teaching of cardiovascular procedures including indications, performance and study interpretation.
- A series of didactic conferences on core cardiovascular knowledge.
- Clinical and research conference presentations.
- Research training under the supervision of a faculty mentor, including dedicated research time, journal clubs, and training in research methods and ethics.
- A teaching curriculum that includes training in presentation of clinical cases, writing review articles, written and oral presentation of research data, and teaching medicine residents and medical students.
- Involvement in the quality improvement activities of the Cardiology Division for optimizing our patient care systems and participation in academic and clinical administrative functions of the Division.
- Responsibility for providing continuous care to patients by implementation of appropriate call schedules and mechanisms for handling unexpected coverage issues.

Evaluation of trainee’s competency in each area is documented by:
- Direct one-on-one observation of patient care and procedures.
- Written (online) evaluations by supervising faculty for each month-long rotation
- Review of procedure logs.
• Procedural proficiency evaluations in echocardiography, nuclear cardiology and cardiac catheterization.
• Fellow self-evaluation narratives submitted every 6 months.
• 360 degree evaluations by academic, technical and nursing staff members.
• An updated CV including teaching conferences, presentations and publications.
• One on one meetings with each trainee and the Fellowship Program Director or Associate Program Directors every 6 months, summarized in a letter.
• Summary letter at completion of training documenting areas of clinical proficiency, final procedure numbers, narrative comments on clinical performance and a synopsis of research experience. A passing score on the ABIM examination in Cardiovascular Disease.
EDUCATIONAL GOALS

Inpatient Cardiac Care

- Efficient and accurate diagnostic approach to hospitalized patients with a wide range of cardiac diseases.
- Manage a wide range of acute cardiac diseases
  - Evaluation of and management for various types of valvular heart disease
  - Recognize and treat complications of endocarditis that may lead to hemodynamic instability. Understand timing for surgery in patients with endocarditis
  - Manage vasoactive drips for hypertensive emergency
  - Manage STEMI/NSTEMI, including indications for and timing of coronary intervention
  - Recognize complications that may occur after ACS and manage them appropriately
  - Assess volume status by both clinical exam, with invasive monitoring, and with imaging modalities
  - Develop an intricate understanding of hemodynamics from right heart catheterization measurements including target values for each parameter
  - Determine optimal medical therapy and appropriate timing of these therapies for heart failure including diuretics, RAAS inhibition, beta-blockade, digoxin, and inotropes
  - Manage inotropes and pressors, and understand the nuances and differences between the different types

- Inpatient cardiology consultation and the appropriate role of the consultant.
- Participatory and leadership skills as part of a team of professionals.
- Become more sensitive and skilled in interacting with patients and families.
- Develop communication skills with other health care providers, including referring physicians, cardiac surgeons, pharmacists, nurses, and cardiovascular allied health professionals.
- Integrate multiple clinical disciplines (cardiothoracic surgery, cardiothoracic anesthesia, critical care, etc.) in the collaborative inpatient care of patients with cardiac disease, including in the intensive care unit.

Adult Congenital Heart Disease

- Learn the anatomy and physiology of common congenital heart lesions and the types of repairs used to treat them.
- Learn the long-term complications of repaired congenital heart disease and the need for lifelong care.
o Coordinate care for complex patients across a multidisciplinary team including cardiologists, surgeons, interventionalists, anesthesiologists, obstetricians and geneticists in order to provide optimal patient care.

o Understand how to plan and interpret a complex congenital catheterization including the definition of cardiac anatomy, physiology and shunt physiology. To learn how to plan the catheterization with the interventional cardiologist.

o Learn the role of cardiac MRI in the evaluation of patients with congenital heart disease.

o Present patients in the monthly ACHD conference, including preparation of MRI images, and be able to communicate the reasons for surgical or procedural consideration.

**Ambulatory Cardiac Care**

o Learn the differential diagnosis for common presenting symptoms and signs and appropriate diagnostic testing strategies.

o Learn appropriate management of cardiac disease in the outpatient setting including use of diet, pharmacological therapy, exercise, cardiac rehabilitation, and the appropriate timing of surgical or percutaneous interventions.

o Learn cardiac risk factor evaluation and modification in patients with or at risk for cardiac disease, including dietary and other life style modifications, smoking cessation therapy, lipid-lowering therapy, and other effective strategies.

o Learn the appropriate intervals for periodic evaluation and testing of patients with chronic cardiac disease.

o Knowledge and experience in the diagnosis, evaluation, and management of patients with peripheral vascular disease, including physical examination, review of diagnostic testing, appropriate medical therapy, and indications for intervention.

o Knowledge and experience about the role of cardiac rehabilitation in the management of adults with cardiovascular disease.

o Gain a longitudinal perspective regarding the clinical course of patients with chronic disease.

o Communication skills with referring physicians and other health care providers.

o Integrate inpatient and outpatient management of patients with heart disease, including incorporation of cardiac diagnostics in clinical decision making with appropriate involvement of subspecialists across multiple disciplines.
Electrocardiography and Cardiac Arrhythmias

- Learn the diagnostic approach to and appropriate management of cardiac arrhythmias.
- Learn the indications for, management, risks and follow-up of cardiac pacemakers, implantable defibrillators and cardiac resynchronization devices.
- Learn the indications for, management, risks and follow-up of invasive diagnostic electrophysiologic testing and catheter ablation procedures.
- Gain a basic understanding of device interrogation, re-programming, threshold and sensing tests and to have the opportunity to evaluate device rhythm events and participate in decision making regarding those events.
- Manage post-cardiac arrest patients including the institution of cooling protocols when appropriate
- Management of VT storm including with antiarrhythmics, post-ablation, gangliectomy
- Management of refractory afib/flutter including medical therapy and cardioversion
- Place and manage temporary pacing wires for high grade heart block
- To interpret at least 3,500 12-lead ECGs and at least 150 24-hour ECGs.
- Perform and interpret stress ECG studies (at least 200 cases).
- Correlate ECG and stress test findings with clinical diagnosis, prognosis, and management.
- Gain competency in performing DC cardioversion (at least 10 cases) and in insertion and management of temporary pacemakers (at least 20 cases).

Echocardiography

- Learn normal and abnormal tomographic cardiac anatomy, physiology, and pathophysiology.
- Learn principles of echocardiographic instrumentation, fluid dynamics, cardiac hemodynamics, and imaging and Doppler artifacts.
- Learn indications for and limitations of echocardiography including appropriateness criteria.
- Performance and interpretation of transthoracic echocardiography with scanning at least 150 patients and interpreting at least 300 studies.
Learn indications and risks of stress echocardiography and transesophageal echocardiography and participate in performing at least 100 stress echo studies, 20 contrast studies, and 50 transesophageal echo studies.

Correlate data from echocardiographic, physical examination and other diagnostic procedures.

Communicate with referring physicians the clinical significance of the echocardiographic findings in the context of the patient's specific disease process.

**Nuclear Cardiology & Advanced Cardiac Imaging**

Learn the basic concepts of radiotracer delivery, uptake and release kinetics and their relationship to coronary anatomy

Learn the basic operation of gamma cameras.

Learn the principles of patient selection, performance, monitoring, interpretation, and reporting of exercise and pharmacological stress testing including appropriateness criteria.

Learn how to acquire, reconstruct and analyze radionuclide ventriculograms and myocardial perfusion images including both SPECT and PET.

Understand the indications and clinical utility of CT imaging for coronary, aortic and other cardiac disease.

Perform and interpret nuclear cardiology studies, to integrate the results with other clinical parameters, and to assess the impact of the study on subsequent clinical management.

Understand the indications and clinical utility of cardiac magnetic resonance images for assessment of anatomy and function in patients with both congenital and acquired heart disease.

Correlate data from different cardiac imaging modalities, physical examination and other diagnostic procedures.

Communicate with referring physicians the clinical significance of cardiac imaging findings in the context of the patient's specific disease process.

**Cardiac Catheterization**

Evaluate patients undergoing invasive procedures in the cardiac catheterization laboratory, understanding the indications/risks/benefits for the procedure, and reviewing potential alternate diagnostic approaches.
- Knowledge of normal and abnormal coronary artery and intracardiac anatomy, physiology, and pathology.

- Knowledge and understanding of intracardiac hemodynamics and its relationship to various pathophysiologic states.

- Participate in a team based clinical practice in evaluating, explaining and obtaining consent, and reviewing study results with the patient.

- Gain experience in arterial/venous cannulation from various anatomic sites, catheter manipulation, and image acquisition during diagnostic angiography procedures, including understanding image plane orientation, radiographic instrumentation, and factors that impact image quality.

- Demonstrate knowledge of radiation safety issues and techniques to minimize radiation exposure.

- Perform and interpret left heart catheterizations with coronary angiography, right heart catheterizations, pericardiocentesis and intra-aortic balloon pumps.

- Correlate angiographic and clinical findings and formulate an appropriate therapeutic approach for each patient based on these findings.

- Knowledge in the role of interventional cardiology, interventional radiology, and vascular surgery in various therapeutic approaches in caring for patients with peripheral vascular disease.

- Knowledge and experience in the role of interventional cardiology and cardiac surgery in various therapeutic approaches. To learn about the factors important in the patient selection for such procedures and work collaboratively in determining clinical treatment plans.

**Heart Failure and Cardiac Transplantation, and Mechanical Circulatory Support**

- Learn the appropriate diagnosis and treatment of heart failure in the acute care setting including use of invasive hemodynamic monitoring, use of continuous infusion intravenous medications and other acute care treatment options.

- Learn the diagnosis and treatment of chronic heart failure in the outpatient setting.

- Learn the pharmacology of agents used in the treatment of heart failure.

- Learn the indications for heart transplantation, the pre-transplant evaluation protocol, and post-transplant follow-up.

- Identify cellular and humoral rejection based on clinical findings, echo features, and pathology from endomyocardial biopsy, and donor specific antibody profiles.
o Recognize the acuity of heart transplant patients that are actively rejecting. Manage acute cellular with augmented immunosuppression with IV steroids and ATG. Manage humoral rejection with plasmapheresis, IVIG, and medical therapies.

o Learn the indications for ventricular assist device implantation, both pulsatile and continuous flow devices, and to work with the cardiac surgical team to provide longitudinal follow-up for these patients.

o Understand longitudinal perspective regarding the clinical course of patients with advanced heart failure and understand indications for patient counseling regarding end-of-life decision making.

o Understand the indications for mechanical circulatory support as a bridge to cardiac transplantation and as destination therapy. Understand indications and device selection for short-term MCS including IABP, Impella devices

o Understand how patients should be evaluated for mechanical circulatory support, including the contraindications and comorbidities relevant to the decision to place a device.

o Understand the immediate post-operative issues in managing patients with MCS and participate in the long-term management of patients with MCS with a focus on: management of right heart failure, anticoagulation, evaluation of VAD dysfunction/thrombosis, evaluation and management of infection and GI bleeding, management of ventricular and atrial arrhythmias

o Interpret VAD data from each device and understand the implications of data provided from each device.

o Understand indications and device selection for short-term MCS and for durable MCS as bridge to transplant (BTT) and destination therapy (DT).

o Understand patient evaluation and selection for MCS

o Understand the differences in device types, mechanics and physiology of device therapy, and how indications, anatomy and/or surgical technique can impact device choice.

**Research**

o Identify a research problem, critically analyze the relevant literature and formulate a competitive research proposal.

o Learn the benefits of peer review and constructive criticism during all phases of research.

o Learn to formulate a testable hypothesis and describe how to test it.
Learn research methodologies specific to the individual research project.

Learn the basics of experimental design, including the appropriate use of control groups.

To understand and apply the concepts of sample size and statistical power to the design of experiments and interpretation of data.

Learn to collect, organize, and preserve experimental data.

Learn to analyze experimental and observational data objectively and evaluate the quality, impact, and limitations of the data.

Develop skills important in clear organization and presentation of research results.

Learn the strengths and weaknesses of basic, clinical, and health services research techniques.

Learn responsible conduct of research including general issues of scientific integrity as well as issues specific to the individual research product including animal care requirements, protection of privacy, informed consent, and institutional approval of human investigation.

Learn to evaluate the risks and benefits of a research project from the points of view of the research subjects and society.

**Teaching and Practice Based Learning**

Use recommended textbooks and online resources to develop effective self-study methods for continuing medical education.

Learn effective teaching and presentation skills.

Remain current regarding the research literature.

Learn to synthesize information from multiple sources, including print and electronic media.

Develop an approach to life-long learning.

**Areas beyond general Cardiology that require additional training:**

- Electrophysiology, including permanent pacer and ICD implantation*

- Interventional Cardiology*
• Advanced heart failure and cardiac transplantation*

• Adult congenital heart disease*

• Nuclear Cardiology (board-eligibility)**

• Echocardiography (board-eligibility)**

* Formal training in a subspecialty ACGME fellowship program is available for these training pathways. Internal candidates are generally competitive applicants, but fellowship positions in the subspecialty programs are not guaranteed. Application is made early in the 2nd year of general cardiology training.

** Training may be achieved within the context of the general cardiology fellowship if additional clinical time, and, if needed, coursework and laboratory sessions, are completed, along with the requisite number of clinical studies and demonstration of competency.
ROTATION GUIDELINES

**General inpatient cardiology (Card A, UWMC)**

1. Supervise the Medicine R2/R1s for patient admissions including the initial evaluation, plans and orders
2. Work closely with the attending cardiologist in decision-making and patient management.
3. Evaluate patients with acute cardiac disease (heart failure, arrhythmias, chest pain) in the Emergency Department and on other inpatient services.
4. Facilitate communication with primary providers and outpatient physicians regarding inpatient patient status and hospital course.
5. Present case-oriented lecture discussions to medical housestaff for morning didactic sessions
6. Read and study the ACC/AHA guidelines for patient management of common cardiac diagnoses including acute myocardial infarction, acute coronary syndromes, atrial fibrillation, congestive heart failures, etc.

**Cardiology consultation and cardiac catheterization (HMC cath/consult)**

1. Supervise the inpatient Cardiology Consult Service.
2. Evaluate (with the housestaff) and perform acute interventions in unstable patients (right heart catheterization, vasopressor or inotropic support, temporary pacers, unstable arrhythmias, thrombolytic therapy, urgent cardiac catheterization, emergency echocardiography or pericardiocentesis).
3. Present case-oriented didactic presentation to medical housestaff and students at one noon hour conference per month.
4. Evaluate patients for cardiac catheterization and participate in performance and interpretation of the catheterization procedure
5. Read and study recommended textbooks and articles on ECG interpretation and clinical cardiology.

**Cardiology Consults (UWMC consult)**

1. Perform cardiology consults and appropriate follow-up with the Consult Attending. Teach medical students on the consult rotation.
2. Perform DC cardioversions on inpatients and outpatients including pre-procedure evaluation, the cardioversion procedure, TEE if needed and coordinating post-procedure medical therapy and follow-up.
3. Review at least ECGs daily with the medical students and the Consult Attending.
4. Read and study the ACC/AHA guidelines for management of conditions commonly encountered on the consult service.

**Nuclear Cardiology Imaging (UWMC)**

1. Develop skills in serving as a consultant to multiple non-cardiology clinical services that are requesting advice on appropriate study.
2. Participate in performance and interpretation of nuclear cardiac studies including exercise stress perfusion imaging, pharmacologic perfusion imaging, and radionuclide ventriculography. Studies will include both SPECT and PET/CT.

3. Correlate results of noninvasive imaging with coronary angiography and clinical outcomes.

4. Participate in reading sessions of other thoracic and cardiac imaging modalities including chest tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET).

Cardiac Catheterization I (VAMC)

1. Evaluate and develop the initial management plan on patients admitted for cardiac catheterization.

2. Perform and interpret diagnostic catheterization with the attending cardiologist.

3. Perform post-procedure patient evaluation and discuss results with the housestaff. Maintain communication with the physicians on the Cardiology service and the Catheterization Lab.

4. Correlate angiographic and clinical findings. Discuss impact of angiographic findings on patient management.

5. Plan and participate in the Friday VAMC Cardiology Conference.

6. Read and study recommended textbooks and articles on cardiac catheterization and clinical cardiology.

Cardiac Catheterization II, Advanced cath (UWMC cath)

1. Evaluate, write a brief H & P, and develop the initial management plan on patients scheduled for cardiac catheterization.

2. Perform and interpret diagnostic catheterization with the attending cardiologist. Participate in or observe percutaneous coronary and other interventions when time allows.

3. Perform post-procedure patient evaluation and discuss results with the housestaff. Maintain communication with the physicians on the Cardiology service and the catheterization lab.

4. Correlate angiographic and clinical findings. Discuss impact of angiographic findings on patient management.

5. Read and study recommended textbooks and articles on cardiac catheterization and clinical cardiology.

Echocardiography I and Exercise Testing (UW Echo I)

1. Know the indications and potential risks of echocardiographic procedures and exercise stress testing. Provide patient counseling regarding testing, including consent, where needed for medical procedures.

2. Perform echocardiograms under the supervision of a qualified sonographer.

3. Interpret echocardiograms under the supervision of the echocardiography attending.

4. Perform scheduled treadmill exercise and stress echo tests and review the results with an attending.
5. Read and study recommended books and articles on echocardiography.

6. Correlate echocardiographic findings with physical examination findings and other clinical data. Interact with referring physicians when echocardiograms are requested and when further interpretation of echocardiographic results is needed.

Echocardiography (HMC echo)
1. Perform echocardiograms under the supervision of a qualified sonographer.
2. Interpret echocardiograms under the supervision of the echocardiography attending.
3. Evaluate patients for whom a transesophageal echocardiogram has been requested.
4. Interpret and review electrocardiograms with rotating medical students, residents and consult service attending.
5. Read and study recommended books and articles on echocardiography.

Echocardiography (UW Echo II)
1. Participate in the performance and interpretation of complex transthoracic echocardiography studies.
2. Perform and interpret pharmacologic stress echocardiographic studies.
4. Perform contrast echocardiographic studies when needed.
5. Read advanced textbooks and article on echocardiographic diagnosis.

Electrophysiology and Cardiac Arrhythmias (UWMC EP)
1. Attend outpatient EP and pacer ½-day follow-up clinics ~2 per week.
2. Perform DC cardioversions on inpatients and outpatients who have an implanted pacer or defibrillator.
3. Perform temporary pacer insertions under the supervision of an attending cardiologist. (Temporary pacer insertions may occur on other rotations, depending on clinical indications.)
4. Interpret 24 hour ECGs and event monitors with attending supervision.
5. Participate in EP and/or operating room procedures for diagnosis and treatment of arrhythmias.
6. Perform consults on patients needing device implantation or with refractory arrhythmias.
7. Assist in management of inpatients on the nonresident arrhythmia service.
8. Read and study recommended textbooks and articles on electrophysiology and arrhythmias.

Heart Failure and Cardiac Transplantation (Card B, UWMC)
1. Participate in admission and day-to-day management of patients on the inpatient service in collaboration with the ARNPs on the service. Work closely with the attending on patient management including leading daily work rounds.
2. Consult upon and follow CT surgical patients following VAD insertion or cardiac transplantation.

4. Attend the weekly multidisciplinary cardiac transplant recipient selection committee meeting; presenting patients for initial transplant consideration and providing follow-up on hospitalized patients.

5. Provide weekend daytime coverage for the inpatient service under the supervision of the inpatient attending.

6. Read and study recommended textbooks and articles on heart failure, pharmacology, and heart transplantation.

**Adult Congenital Heart Disease (UWMC ACHD)**

1. Perform inpatient cardiology consults in conjunction with the Congenital Heart Disease attending.

2. Provide appropriate comprehensive outpatient management in patients with congenital heart disease utilizing multiple clinical disciplines (~Congenital Heart Disease, EP clinic, genetics, pulmonary hypertension, and high risk obstetrics clinic).

3. Reviewing and integrate results from various cardiac imaging modalities and diagnostics in the care of patients with congenital heart disease (echocardiography, cardiac MR, CT, catheterization laboratory).

4. Understand the systems-based multidisciplinary approach to comprehensive care of patients with Congenital Heart Disease (obstetrics, genetics, electrophysiology, heart failure/transplant, cardiothoracic surgery). Attend and participate in the multidisciplinary Congenital Heart Disease conference (once monthly).

5. Read and study the ACC/AHA guidelines for management of Congenital Heart Disease.

**Cardiac Critical Intensive Care (UWMC CCU)**

1. Participate in admission and day-to-day management of patients on the inpatient service in collaboration with the ARNPs on the service. Work closely with the attending on patient management including leading daily work rounds.

2. Perform bedside right heart catheterization and interpret hemodynamics in critically ill patients with heart failure.

3. Patient management integrating medical management, cardiac diagnostics, and appropriate consultation of other clinical services.

3. Provide weekday daytime coverage for the CCU ICU inpatient service under the supervision of the inpatient attending.

4. Read and study recommended textbooks and articles on heart failure, pharmacology, critical care, and heart transplantation.

**Mechanical Circulatory Support (UWMC)**

1. Participate in management of perioperative phase in MCS patients.

2. Participate in long-term management of patients with MCS including: anticoagulation strategies and goals, management of hypertension, diagnosis and treatment of VAD dysfunction or thrombosis, managing driveline and other MCS-related infections,
manage arrhythmias, participate in echocardiographic imaging related to optimization of VAD speed

3. Interpret data and complete a documented interrogation for each MCS device and understand the implications of the data being provided from each device, including when and how to adjust parameters to optimize device function.

**Cardiology Consults (UWMC consult)**

1. Perform cardiology consults and appropriate follow-up with the Consult Attending. Teach medical students on the consult rotation.

2. Perform DC cardioversions on inpatients and outpatients including pre-procedure evaluation, the cardioversion procedure, TEE if needed and coordinating post-procedure medical therapy and follow-up.

3. Review at least ECGs daily with the medical students and the Consult Attending.

4. Read and study the ACC/AHA guidelines for management of conditions commonly encountered on the consult service.

**Cardiac Critical Intensive Care night float elective (UWMC CCU float)**

1. Participate in intermittently scheduled, primary care of patients in the CCU (continuous in-house, 8pm-8am). Clinical responsibilities include overnight admission and clinical management of patients on the CCU inpatient service, under the supervision of call-in, on-call inpatient attending.

2. Perform bedside right heart catheterization and interpret hemodynamics in critically ill patients with heart failure.

3. Patient management integrating medical management, cardiac diagnostics, and appropriate consultation of other clinical services.

4. Read and study recommended textbooks and articles on heart failure, pharmacology, critical care, and heart transplantation.

**Cardiac Imaging and Echocardiography elective (UW Echo III)**

1. Participate in the performance and interpretation of complex transthoracic echocardiography studies, stress echocardiographic studies

3. Evaluate patients for transesophageal echocardiography, participate in patient management, performance of the procedure and interpretation

4. Participate in intraoperative transesophageal studies and observe cardiac surgical procedures in patients with a range of cardiac diseases.

5. Participate/observe radiology based cardiac imaging procedures, including cardiac computed tomography and cardiac magnetic resonance imaging. Participate in post-processing of cardiac imaging procedures.

6. Read advanced textbooks and article on echocardiographic diagnosis.

**Northwest Hospital Cardiac Diagnostics and Rehabilitation (NWH) elective**

1. Evaluate, write a brief H & P, and develop the initial management plan on patients scheduled for cardiac catheterization.
2. Perform and interpret diagnostic catheterization with the attending cardiologist. Participate in or observe percutaneous coronary and other interventions when time allows.

3. Perform post-procedure patient evaluation. Maintain communication with referring providers and the catheterization lab.

4. Perform and interpret diagnostic evaluation in patients with suspected peripheral vascular disease. Participate in or observe peripheral vascular percutaneous interventions when time allows.

5. Correlate angiographic and clinical findings. Discuss impact of angiographic findings on patient management.

6. Supervise cardiac rehabilitation and review referrals for adults with cardiovascular disease.

7. Read and study recommended textbooks, articles, and ACC/AHA guidelines on cardiac catheterization and clinical cardiology.

**Continuity Clinic**

1. All fellows are assigned a 1/2 day per week continuity clinic during ACGME fellowship training.

2. In each clinic session, the fellow will typically see 1-3 new and 3-6 return patients.
USEFUL WEBSITES

**University of Washington**
University of Washington Department of Medicine (DOM)
www.depts.washington.edu/medweb

University of Washington Graduate Medical Education (GME)
http://uwmedicine.washington.edu/Education/Graduate-Medical-Education/Pages/default.aspx

University of Washington a Fellowship Position Agreement:
http://uwmedicine.washington.edu/Education/Graduate-Medical-Education/Prospective-Residents-and-Fellows/Pages/default.aspx

The UW/UWHA Contract:
http://hr.uw.edu/labor/unions/uw-housestaff-association/uwha-contract

University of Washington Regional Heart Center (RHC)
http://www.uwmedicine.org/services/cardiology

MedHub https://uw.medhub.com/index.mh
ACLS Simulator http://depts.washington.edu/anesth/tips/simulation.shtml

**Training Guidelines**
American Board of Internal Medicine (ABIM) www.abim.org
Accreditation Council for Graduate Medical Education (ACGME) www.acgme.org
ACGME common program requirements for Cardiology:
https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/141_cardiovascular_disease_int_med_2016.pdf
ACC 2015 Core Cardiovascular Training Statement (COCATS 4)
http://www.onlinejacc.org/content/65/17/1721

**National Professional Organizations**
American College of Cardiology (ACC) www.acc.org
American Heart Association (AHA) www.americanheart.org
American Society of Echocardiography (ASE) www.asecho.org
American Society of Nuclear Cardiology (ASNC) http://www.asnc.org/
Heart Failure Society of America (HFSA) http://www.hfsa.org/
Heart Rhythm Society (HRS) http://www.hrsonline.org/
Society for Cardiovascular Angiography and Interventions (SCAI) http://www.scaionline.org
Society of Cardiovascular Magnetic Resonance (SCMR) http://www.scmr.org/
Society of Cardiovascular Computed Tomography (SCCT) http://www.scct.org/

**Other Useful Sites**
National Center for Health Statistics (NCHS) http://www.cdc.gov/nchs/index.htm
National Institutes of Health www.nih.gov
NIH Loan Repayment www.lrp.nih.gov
Teaching Curriculum

**Goal:** Teaching skills are essential for a successful academic career. During fellowship training there will be opportunities to improve teaching skills in various formats with supervision and feedback from faculty, peers and students.

**Specific Teaching Requirements (all trainees):**

**Cardiology/CT Surgery Clinical Conferences:** All fellows present clinical cases with presentation of diagnostic studies and a concise review of the relevant literature. Each fellow presents between 10 and 15 times (30 minutes each).

**Cardiology Grand Rounds:** These 1 hour formal presentations provide an opportunity for fellows to present a rigorous review of the literature on a focused topic or present their own research results. Each fellow works with a faculty mentor on selection of a topic, preparation of slides and presentation style. Each fellow presents at Grand Rounds between 1 and 3 times.

**Resident Teaching:** Cardiology Fellows provide both bedside teaching and didactic sessions to the Medicine Residents during rotations on inpatient Cardiology at both UWMC and HMC. Fellows also teach medical students on the VA ECG and UWMC Cardiology Consult service.

**Medical Student Teaching:** Cardiology Fellows also provide bedside teaching and didactic sessions for 3rd and 4th year medical students on the Cardiology Consult rotation at UWMC (2 months).

**Cardiology Fellows:** Cardiology Fellows will be given a specific assignment, under the supervision of a faculty member, to develop or update teaching material for each clinical rotation (for example, a cardiac cath workbook or echo workshops). This may include QA or developing approaches to measuring competency.

Additionally, trainees may elect to differentiate training in the 3rd year of training in the: **Clinician Educator pathway:** Trainees complete an integrated ACGME 3rd year of advanced clinical and research training, with additional focus on mentored teaching activities and development of curricular materials to strengthen educational skill sets and prepare the trainee for a career in academic cardiology, including development of a formal teaching portfolio. Trainees choose a faculty mentor during the first year and are provided protected scholarly work development blocks during the third year of fellowship training. Teaching activities and curricular materials are focused within the area of subspecialty interests. Trainees are expected to teach in multiple clinical settings, and will receive feedback on teaching skills. Trainees in this track participate as small group co-leaders for the UW Medical School MedSci530 Circulatory Systems course. These interactive 2 hour small group sessions occur 3 times a week for one month with the fellow and a faculty member working together on teaching. In addition to teaching skills, this experience provides an intense review of cardiac anatomy, physiology, pharmacology and pathology.
**Research Training Resources:**
Departmental and Divisional web sites usually provide lists of faculty and research interests. Access Departmental web sites (e.g., Physiology, Epidemiology, Biochemistry, Bioengineering, Immunology): [http://www.washington.edu/home/departments/departments.html](http://www.washington.edu/home/departments/departments.html)

Department of Medicine, Division web sites are accessed through: [http://depts.washington.edu/medweb/divisions/index.html](http://depts.washington.edu/medweb/divisions/index.html)

The Institute of Translational Health Sciences [https://www.iths.org/ED](https://www.iths.org/ED)

Training grant web sites:

Cardiovascular Pathology Training Program: [http://courses.washington.edu/cvptg/](http://courses.washington.edu/cvptg/)

Epidemiology and population science - Cardiovascular Health Research unit: [http://depts.washington.edu/chru/index.htm](http://depts.washington.edu/chru/index.htm)


Clinical research - KL2 program, pursued after fellowship is completed: [http://www.iths.org/education/kl2](http://www.iths.org/education/kl2)

Department of Genome Sciences web site for a list of biomedical research-related seminars: [http://www.gs.washington.edu/news/related.htm](http://www.gs.washington.edu/news/related.htm)

“Survival Skills for the Research Years” course. This 3-day course, offered annually during the summer, covers topics of interest to fellows interested in research careers, including writing manuscripts, giving oral presentations, grant writing, funding, and job negotiations. [http://depts.washington.edu/flworien/](http://depts.washington.edu/flworien/)

All Departments and most organized research units present seminar series during the academic year. The list is not meant to be exhaustive:

1. Cardiovascular Breakfast Club (Tuesday 9:00 am UW SLU): [http://slubio.blogspot.com/?view=classic](http://slubio.blogspot.com/?view=classic)
2. Institute for Stem Cell and Regenerative Medicine Research Update (Tuesday 4pm UW SLU): [http://depts.washington.edu/iscrm/education/events/seminars.php](http://depts.washington.edu/iscrm/education/events/seminars.php)
3. Medical Genetics journal club (Wednesday 8:30 am, K250)
6. Biochemistry Seminar Series (generally Thursdays at 4:00):  
   http://depts.washington.edu/biowww/index.html
7. Immunology seminar series (generally Mondays at 3:30): see  
   http://immunology.washington.edu/seminars-and-events
8. Pathology Seminar Series (generally Wednesdays at 4:30)  
   http://www.pathology.washington.edu/PathNews/seminars/
9. Fred Hutchinson Cancer Research Center Current Biology Seminar Series  
   (Tuesdays at 12:00)  
10. Bioengineering weekly seminars (Thursdays 12:30):  
    http://courses.washington.edu/bioetalk/

A mentoring guide is found in the HHMI publication “Making the Right Moves: a Practical Guide to Scientific Management for Postdocs and New Faculty” available at:  
http://www.hhmi.org/resources/labmanagement/moves.html
Fellow Bios

Katie Benziger
I grew up in Arden Hills, Minnesota and studied neurobiology at Macalester College for undergraduate and then attended the University of Minnesota Medical School. In June 2011, I left behind the snow in Minnesota in exchange for a little rain (definitely a good choice) to start internal medicine residency at UW. My husband, son and I love Seattle and all of the outdoor activities nearby – camping, hiking, snowboarding, biking, etc. It is a very family friendly place to live. I am interested in global health and cardiovascular disease epidemiology and I will complete my Masters in Epidemiology as part of my fellowship. I was a Fogarty International Clinical Research Scholar in 2009-10 in Lima, Peru and have continued to collaborate with my colleagues in Peru as part of the Global Health Pathway in residency. The UW is an excellent place to train and the has not only an excellent Department of Cardiology but an outstanding Department of Global Health as well, which is why I chose to stay here for my fellowship.

Robin Brusen
I was born in Chicago and, after several years in Iowa, my family moved to Minnesota. I went back to Chicago for my undergraduate degree in biomedical engineering at Northwestern University. For medical school, it was back to the Twin Cities for a 5-year combined MD/MS in biomedical engineering. After that I spent the next three years at Columbia Presbyterian in New York City and am now excited to have the next phase of my career in Seattle. I have always been fascinated by Seattle (it's like my home town but with better weather!) and when I interviewed it just seemed like the perfect fit. It has a three-hospital system for a diverse patient population, one of the premier research institutions in the country, particularly for biomedical engineering and innovation, and a cosmopolitan city that offers any cultural or outdoor activity you could want year around.

Selma Carlson
I spent my childhood living on the Adriatic coast in Dubrovnik, Croatia until my family moved to chilly Minnesota in middle school. I went to Brown University for undergrad, and majored in International Relations and Public Health. I spent the following two years as a Fulbright Scholar in Vienna, Austria before starting medical school at the University of Minnesota. During medical school, I did an internship at the World Health Organization in Switzerland studying global health and cardiovascular disease epidemiology. The UW has been an excellent place to train for residency, with great mentors in Medicine, Cardiology and Global Health through the IHME. I have a strong interest in medical education and have appreciated the innovative opportunities for clinical education and teaching. My husband and I have made wonderful friends in the area, and enjoy hiking, biking, cooking, and spending time with family and friends.

Billy Chen
Billy grew up in Los Angeles before finding his way to Boston for medical school at Boston University. There, he completed his MD/PhD with brief stints at Vanderbilt and the National Institute of Health in Bethesda. His PhD focus was on sarcomere homeostasis, studying Ankrd1/CARP and its role in doxorubicin induced sarcopenia and cardiomyopathy. At the NIH, he helped with MRI validation studies looking at regions-at-risk post myocardial infarction. Prior to fellowship, he trained at Boston Medical Center in Internal Medicine, where he was active in Resident/Fellow advocacy as part of Massachusetts Medical Society and American Medical Association. After training, he worked as an ICU hospitalist at University of Washington Medical Center while doing research in the Murry Lab, focusing on stem cell therapies in post infarct models.

Tiffany Chen
I grew up in Hershey, PA (aka Chocolatetown, USA), before going off to college at MIT, where I majored in Electrical Engineering & Computer Science as well as Biology. I returned to Hershey to attend medical school at Penn State and joined the rest of my family in becoming a Nittany Lion. For residency, I wanted to move back to New England and trained at Brown, where I subsequently stayed for a hospitalist year before bidding farewell to Little Rhody. I decided to come to UW for fellowship because of the balance of unique research opportunities and excellent clinical training. I felt the training at UW is especially strong in adult congenital heart disease and echo imaging, which are my current areas of interest. I am excited to discover new eateries in Seattle and continue my hobbies of playing piano, tennis, skiing, traveling, and enjoying the outdoors. Go Seahawks.
Amy Cheney
I grew up on beautiful Lake Whatcom, in Bellingham, WA. My involvement in competitive soccer and interest in the liberal arts led me to Whitman College in Walla Walla, WA. While acclimating to the more extreme temperatures of eastern Washington, I pursued a degree in piano performance, and completed premedical studies. I then spent a year living in Philadelphia, PA, after which I attended the University of Washington School of Medicine. I migrated south to complete Internal Medicine residency at UC Davis in Sacramento, CA, where I rediscovered my love of skiing at South Lake Tahoe (with variable amounts of snow), developed a taste for microbrews, and spent an amazing year as a chief resident. I chose to return to the University of Washington for cardiology fellowship because of the phenomenal clinical training, extensive research opportunities, emphasis on echocardiography, and commitment to medical education. I am greatly looking forward to reconnecting with friends and family, and to once again calling Seattle and the Pacific Northwest home.

Katie Dawson
I grew up in Reno, NV and went to college at the University of Nevada, Reno where I obtained a degree in biochemistry. Upon completing my degree I decided to stay in Reno and attend medical school at the University of Nevada. Having spent the majority of my life in Reno, I decided it was time to see the world (or rather, 1-2 states west) and moved to Portland, OR to attend Internal Medicine residency at Oregon Health and Science University. I couldn't be more pleased to be coming to the University of Washington for cardiology fellowship and to finally be living in the same city as my fiancé who works in Seattle. My clinical interests are in advanced heart failure and transplant cardiology and I hope to complete advanced training after completing fellowship.

Patrick Goleski
I was raised in Detroit, Michigan and completed my undergraduate training at the University of Michigan in mechanical engineering before heading to Chicago to teach high school math through Teach for America. I returned four years later to Ann Arbor to begin my medical training. It was there I met my wife, Tiffany. We came to Seattle for residency training after which I worked as a hospitalist/nocturnist at UW prior to beginning cardiology training. I am generally interested in the application of mechanical engineering to solve cardiology problems. More specifically I am interested in device design and complex modeling of cardiac function. In my spare time, I enjoy hiking, traveling, cooking and most especially fly fishing.

Mariko Harper
Hometown: Nanaimo, Vancouver Island, British Columbia. I went to undergraduate and medical school at the University of British Columbia in Vancouver. I met my husband when I was a graduate student in NYC and thus ultimately decided to pursue my graduate medical education in the US. I have loved my time as a resident at UW and am very excited to continue my fellowship training at this institution – I love the diversity of the patient population, the outstanding faculty mentorship and teaching, and the plethora of research opportunities. My research interests include electrophysiology and echocardiography. I love the Pacific NW and in my free time I enjoy running, trying out new restaurants, and spending time with my family.

Hans Huang
I was raised in Northern California and attended the University of California Santa Cruz for my undergraduate training in molecular and cellular biology. I moved to the Midwest for medical school at the Medical College of Wisconsin where I met my wife, and together we completed our residency training at the University of Minnesota. I am excited to be returning to the West Coast and look forward to the outdoor activities the Pacific Northwest has to offer. In my spare time I enjoy spending time with my family, hiking, snowboarding, tennis, and trying out new restaurants.

Tara Jones
I was born and raised in Mitchell, SD. Initially upon graduation from high school I attended the University of Minnesota in Minneapolis as a pre-med major. Being young at the time, I was not entirely certain of where my career in healthcare would take me, and I decided to transfer to South Dakota State University to complete a PharmD program, as I have a long family history of pharmacists. During that time, I moved to Orlando, FL to intern with a pharmacy corporation there. Ultimately, upon graduation from the PharmD program, I decided that my passion did indeed lie in becoming a physician. I attended the medical school at the University of South Dakota, and continued my education in an internal medicine residency at the University of Nebraska Medical Center in Omaha, NE. I am excited to further my education and career in the cardiology fellowship program at the University
David Lam
I was born in Hong Kong. My family immigrated to Canada when I was five years old and I spent my childhood in Toronto. I attended college at the University of Pennsylvania where I majored in bioengineering. I completed medical school at the Geisel School of Medicine at Dartmouth in New Hampshire. My residency training was at Beth Israel Deaconess Medical Center in Boston. I met my fiancée at Dartmouth and am getting married prior to fellowship. I have lived on the east coast for almost my entire life, and am excited to head west to UW for cardiology fellowship. Outside of work, I like to run, hike, explore, eat, and spend time with family and friends.

Julio Lamprea
I was born and raised in Ibague, Colombia. I finished medical school in Bogota at Javeriana University, and then moved to Baltimore to complete an MPH in biostatistics and epidemiology and subsequently a PhD in cardiovascular epidemiology at Johns Hopkins. I stayed in Baltimore for my residency in internal medicine at University of Maryland. I’m really excited to start my fellowship in cardiology at the UW. I believe the program offers great clinical training as well as outstanding opportunities in clinical and epidemiological research within the cardiology department and with the School of Public Health. I’m also looking forward to initiate a career in global health and explore opportunities to collaborate with IHME.

James Lee
I was born and raised in Midland, Michigan and then went to the University of Michigan where I graduated with a degree in Cell and Molecular Biology. I completed medical school at Wayne State University in Detroit, Michigan where I was active in a variety of community development projects. I finished residency in Atlanta, Georgia at the Emory University School of Medicine. I am currently in a fellowship program in advanced cardiovascular imaging with CT and MRI at the Piedmont Heart Institute also in Atlanta. The University of Washington appealed to me due to its strengths in clinical care, research, and cardiac imaging. I am excited to be moving to Seattle where I can pursue great food, an active lifestyle, and enjoy time with my family.

Song Li
I grew up in China and came to the U.S. as an AFS exchange student when I was fifteen. I went to high school in Ann Arbor, Michigan, followed by undergrad in Iowa at Grinnell College. My major was biochemistry, which inspired my interest in medicine. I went to medical school at Dartmouth in New Hampshire, and upon graduation moved to Atlanta for internal medicine residency, followed by a chief resident year at Emory University School of Medicine. Having lived in the Midwest, the Northeast, and the South (plus a few months of away rotations in California), I am really looking forward to moving to Seattle to complete my “tour” of the U.S. I am interested in many areas of cardiology and have done research mostly in Heart Failure. In my spare time, I enjoy watching movies, cooking, and tennis.

Vidang Nguyen
I was born in Denmark and grew up in the Danish countryside, becoming quite skilled in both the art of LEGO building and ping pong. I moved to Seattle when I was 17 and did my undergrad at the University of Washington. I went to medical school at Tulane University in New Orleans, which was an amazingly colorful experience. I decided to return to the Pacific Northwest for my residency training and came back to the University of Washington. I am ecstatic to stay at UW for my cardiology fellowship. The mentorship and support from the department has been outstanding, and I am excited to continue building on the foundation that I have here. I am interested in advanced heart failure and clinical outcomes research. I like to run, hike, bike and eat brunch – all of which Seattle is perfect for.

Charles (Rick) Rossow
I was born in Tacoma, Washington and am a native of the Pacific Northwest. I completed medical school, residency and a 4-year post-doctoral fellowship in cardiac ion channel physiology at the University of Washington, investigating the signaling pathways leading to remodeling of repolarizing potassium currents after injury. As a physician and a basic scientist, my goal is to work at the interface of science and medicine. I chose to stay at the UW for my fellowship training because I have seen firsthand the excellence of both clinical medicine and research. The mixture of clinical training and basic science research at UW is second to none. Seattle is a great place to raise a family with all the offerings of a major city mixed with easy access to the outdoors. I enjoy spending time with my
wife and our young daughter. I have been active in the local climbing community as a member of the Olympia and Tacoma Mountaineers. In my free time I enjoy skiing, climbing, mountain biking, fly fishing and sailing.

Jill Steiner
I grew up in East Brunswick, NJ, and then attended college at Penn State, graduating with a degree in Biobehavioral Health and a minor in Spanish. I completed medical school at the Penn State College of Medicine, and then moved to Washington, DC for my residency at Georgetown. I am married to my partner of 14 years, and together, we enjoy cooking, hiking and travelling.

Karman Tandon
Go Huskies! My wife Danielle and I are very excited to be back in Seattle for Cardiology Fellowship. I initially moved to the Seattle area in grade school, after living in Mumbai, Madras, Los Angeles, San Francisco, and Princeton. I was a Husky for my undergrad in Biomedical Engineering and for Medical School, then briefly at Johns Hopkins for an MPH in Biostatistics, and most recently at the University of Michigan for residency (Go Blue!). While in Ann Arbor, we had our son Copen, who is growing up way too fast. My research interests are in engineering and in clinical trials. My hobbies include travelling, wakeboarding, snowboarding, camping, and eating and drinking all the great cuisine Seattle has to offer.

Dennis Wang
For my father’s work, I was born and raised in a hospital-subsidized compound in Taipei where all of my neighbors were physicians, nurses, or dentists. Such an early exposure to the hospital setting later inspired me to consider medicine as a career option. My family immigrated to the San Francisco Bay Area when I was 10. While I enjoyed the biological sciences in high school, I contemplated between pursuing medicine and computer science, latter a popular career choice in the Silicon Valley at the turn of the century. For this reason, I decided to attend UC Berkeley, which is known for its strengths in both biology and engineering. Over the next few years through volunteering at a local hospital and working in research labs, I finally decided to go into medicine despite already having finished the course requirements for computer science. For my love in both basic science research and clinical medicine, I subsequently pursued a combined MD/PhD training at UC Irvine. For my PhD training, I chose to work in a rigorous molecular biology/biochemistry lab because I believed that a solid training in laboratory sciences would enhance my understanding of the intricacies of human physiology at the molecular level, an instrumental factor in making important medical discoveries. Under the guidance of the world-renown molecular biologist, Dr. Wen Hwa Lee, I undertook a thesis project to elucidate the molecular mechanisms that fine-tune the rate of aerobic cellular respiration via the regulation of a mitochondrial protein complex. Following medical school, I did my internal medicine training at Baylor College of Medicine, where I became interested in cardiology because the associated diseases are extremely common yet often difficult to treat let alone cure. Furthermore, the heart serves as an excellent model for me to continue pursuing my interest in mitochondrial biology, cellular energetics and regeneration. During my free time, I enjoy travelling, reading, and spending time with my family.

Enrique Zolezzi
I was raised in Matamoros, a small Mexican town bordering Brownsville, Texas and then went to high school in Monterrey. Afterwards, I moved to Boston where I obtained a degree in Computer Science and Engineering from MIT. I spent several years in New York City working in investment banking before pursuing my dream of becoming a doctor at the Mount Sinai School of Medicine. I completed my internal medicine residency at Northwestern, and I’m now excited to be in Seattle where my sister, brother-in-law and 3 year old nephew are living. I enjoy playing the guitar, outdoor activities, good restaurants and home barbecues.
<table>
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<tr>
<th>Year Graduated</th>
<th>Name</th>
<th>Additional Training</th>
<th>Current Activity</th>
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<tr>
<td>2016</td>
<td>Sophia Airhart</td>
<td>AHA research fellowship</td>
<td>AHFTC fellow, Allegheny Health</td>
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<td>Jason Huang</td>
<td>EP fellowship, UPenn</td>
<td>EP Fellow, UPenn</td>
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<td></td>
<td>Kate Kearney</td>
<td>ICARD fellowship 2017, UW</td>
<td>Senior research fellow, UW, Seattle, WA</td>
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<td></td>
<td>Juan Ortega-Legaspi</td>
<td>NIH T-32 CV Training Grant</td>
<td>Senior research fellow, UW, Seattle, WA</td>
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<td>Shalin Patel</td>
<td>AHFTC fellowship 2017, UPenn</td>
<td>Hudson Valley Heart, NY, Practice physician</td>
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<td>Nina Rashedi</td>
<td>Cardiac Imaging fellowship</td>
<td>Cardiac imaging fellow, Columbia University</td>
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<td>Daniel Yang</td>
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<td>2015</td>
<td>Paco Bravo</td>
<td>Cardiac Imaging fellowship</td>
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<td>Christopher Greenman</td>
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<td>Ivan Medvedev</td>
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<td>Aneet Patel</td>
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<td>Mark Willcox</td>
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<td>Anchorage, AK, Practice physician</td>
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<td>2014</td>
<td>Steve Farris</td>
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<td>Joanna Ghobrial</td>
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<td>ACHD Fellow, University of California Los Angeles</td>
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<td>Oscar Gonzalez</td>
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<td>Matthew Hartman</td>
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<td>Jehu Mathew</td>
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<td>Gregory Wood</td>
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<td>Andrew Cheng</td>
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<td>Todd Dardas</td>
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<td>Manoj Kesarwani</td>
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<td>John Mignone</td>
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<td>Farid Moussavi-Haramani</td>
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<td>Elisa Zaragoza-Macias</td>
<td>UW research fellowship</td>
<td>Peace Health, Bellingham, WA, Practice physician</td>
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<td>Jaekyoung Hong</td>
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<td>Southern Oregon Cardiology, Medford OR, Practice physician</td>
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<td>Steven Le</td>
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<td>Jason Linefsky</td>
<td>Health Services Research Grant</td>
<td>Emory University, Atlanta VAMC, GA, Faculty</td>
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<td>Pankaj Madan</td>
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<td>Methodist Physicians, San Antonio TX, Practice physician</td>
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<td>Greg Roth</td>
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<td>University of Washington, Faculty</td>
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<td>Christopher Thomas</td>
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<td>Institution/Position</td>
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<td>2011</td>
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<td>Benziger, Katie</td>
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<td>PRISMA-style systemic review on the global burden of bradyarrhythmias in collaboration with the Global Burden of Disease study at the Institute for Health Metrics and Evaluation</td>
<td>Greg Roth, MD</td>
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| Brusen, Robin     |                              | 1) Get Going Trial  
2) Wearable multimodality patient monitor                                                                                                                                                    | 1) Michael Chen, MD  
2) David Linker, MD                                      |                             |
| Carlson, Selma    |                              | 1) Diagnostic and Treatment Capacity for Heart Failure in Sub-Saharan Africa: an Analysis of Uganda and Kenya  
2) Limited supplies of antihypertensive medications in primary care settings in three African countries  
3) Accuracy of Preliminary Interpretations of Echocardiograms by Cardiology Fellows | 1) Greg Roth, MD  
2) David Watkins, MD, Herbie Duber, MD, and Greg Roth, MD  
3) James Kirkpatrick, MD                                      |                             |
| Chen, Billy       |                              |                                                                                                           |                                                                      |                             |
| Chen, Tiffany     |                              | Pulmonary Hypertension in TAVR                                                                                                                               | Creighton Don, MD, PhD, Carolina Masri, MD                           |                             |
| Goleski, Patrick  |                              | Predicting Successful Strategies for Hybrid Percutaneous Revascularization of Coronary Chronic Total Occlusions                                                                                     | Jamie McCabe, MD                                                     |                             |
| Jones, Tara       |                              | Patterns, Predictors and outcomes of antiplatelet use in patients undergoing CTO PCI: Insights from the OPEN CTO registry                                                                                       | Ravi Hira, MD                                                       |                             |
| Lamprea, Julio    |                              |                                                                                                           |                                                                      |                             |
| Li, Song          |                              | 1) Identification of novel risk factors for heart failure readmissions and predictive model development.  
2) Application of the Seattle Heart Failure Model in predicting mortality in patients discharged following acute heart failure hospitalization | 1) Todd Dardas, MD  
2) Wayne Levy, MD                                                  |                             |
| Steiner, Jill     | 2/29/2016 – 2/28/17         | Palliative care of ACHD patients                                                                                                                            | James Kirkpatrick, MD                                               | T32 – Pulmonary             |
| Zolezzi, Enrique  |                              | Temporal Changes in the complexity of PCI in the NCDR CATH PCI Registry from 2007-2014                                                                     | Creighton Don, MD, PhD                                              |                             |

### 2016

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<td>Novel Nutritional Therapy for Mitochondrial Dysfunction in Systolic Heart Failure</td>
<td>Kevin O’Brien, MD</td>
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<td>1. PCI Operator Attributable Harm in the NCDR CathPCI database</td>
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<td>2. Coronary angiogram findings in post-cardiac arrest patients</td>
<td>2. Francis Kim, MD</td>
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<td>Development of a Universal Donor Embryonic Stem Cell for Cardiac Regeneration</td>
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<td>2. Implementation of appropriate discharge planning for post ACS Low LVEF patients</td>
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<td>Aortic Valve Stenosis and Outcomes in the Cardiovascular Health Study</td>
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<td>Determinants and Significance of Left Ventricular Systolic Dysfunction in Acute Myelogenous Leukemia Patients.</td>
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<td>Knowledge based 3D right ventricular ejection fraction versus standard echocardiographic function assessment to predict right ventricular failure after left ventricular assist device implantation</td>
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<td>Vitello, Andrea</td>
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<td>Clinical and Pathologic Predictors of Ventricular Arrhythmias in Advanced Heart Failure Patients</td>
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<td>Additive Utility of Makers of Cardiac Calcification in Cardiovascular Risk Assessment and Prediction: Beyond Framingham Risk Factors</td>
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<td>Specific Pathways and the Role of Plasmin in Cardiac Macrophage-Induced Fibroblast Activation in Human Cardiac Fibrosis</td>
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<td>Altered Mineral Metabolism and Incident Atrial Fibrillation</td>
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<td>Can an aerobic exercise training program in patients with ICDs for secondary prevention of sudden cardiac arrest improve cardiac autonomic activity and reduce the frequency of ventricular arrhythmias?</td>
<td>Cynthia Dougherty ARNP</td>
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<td>Evaluation of Plaque Morphology by Optical Coherence Tomography and Serum Markers in Non-Occlusive Segments of Coronary Arteries</td>
<td>Kelley Branch, MD</td>
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<td>2-Deoxy adenosine triphosphate improves contraction in human end-stage heart failure.</td>
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<td>Transcriptional profiling of human embryonic stem cells undergoing cardiac directed differentiation</td>
<td>Charles Murry, MD</td>
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<td>Risk stratification of Adults with Congenital Heart Disease and Heart Failure using the Seattle Heart Failure Model</td>
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<td>Improvement in skeletal muscle mitochondrial function following left ventricular assist devices</td>
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<td>Evaluation of gender difference in atherosclerotic plaque composition by MRI. A sub-study of the Carotid Plaque Composition (CPC) Study.</td>
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<td>Will Carotid Intima-media Thickness (CIMT) Continue to Improve after Long-term Lipid Therapy? – A Carotid Ultrasound Study in FATS 20-year</td>
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<td>A Pharmacokinetic Approach to Measuring Treatment Disparities in Heart Failure</td>
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<td>The Seattle Heart Failure Model: Predictive Value and Application in the Acute Heart Failure Setting</td>
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<td>Bradley, Steven L.</td>
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<td>“Appropriateness of Percutaneous Coronary Interventions”; &quot;Missed Opportunities for Pharmacologic Risk Reduction in Ischemic Heart Disease&quot;</td>
<td>Stephan D. Fihn, MD</td>
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<td>Busch, Joshua L.</td>
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<td>Cardiac Computed Tomography, Integrated Perfusion and Angiography</td>
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<td>Do, Rose Q.</td>
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<td>Defining the Role of Nitrite in Resuscitation from Cardiac Arrest</td>
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<td>Hanna, Ramy L.</td>
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<td>Repolarization Parameters and Arrhythmia Vulnerability in the Sudden Cardiac Death in Heart Failure Trial</td>
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<td>Moorman, Alec J.</td>
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<td>The Seattle Heart Failure Model and Geographic Variation in Heart Failure Hospitalizations</td>
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<td>Pacini, Eric L.</td>
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<td>Non-invasive guidance of catheter ablation of atrial flutter utilizing the surface electrocardiogram</td>
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<td>Shadman, Ramin</td>
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<td>The Prognostic Value of Electrocardiographic Parameters in Congestive Heart Failure: Analysis of the SCD-HeFT Trial</td>
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<td>Kurtz, Christopher</td>
<td>7/1/07-6/30/10</td>
<td>Characterizations of right ventricular shape and function in pulmonary hypertension with 3D – Echocardiography.</td>
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<td>Muñoz, Luis</td>
<td>7/1/07-6/30/10</td>
<td>Lp-PLA2 as a marker for high risk coronary plaques and increase risk for cardiovascular events post PCI</td>
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<td>Sinha, Abhishek (Abhi)</td>
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<td>Comparing carotid MRI to carotid ultrasound in assessment of atherosclerosis change in response to lipid therapy</td>
<td>Xue-Qiao Zhao, MD</td>
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<td>Aoukar, Pierre</td>
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<td>Effects of Long-term Therapy with LDL-lowering plus HDL-raising on Carotid Intima-Media Thickness (CIMT) – Familial Atherosclerosis Treatment Study 20-year Observational Study (FATS-OS)</td>
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<td>The effects of omega-3 fatty acids on exercise efficiency in the metabolic syndrome: A randomized double blind placebo controlled pilot study</td>
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<td>Melford, Ryland(Trey) E.</td>
<td>7/1/06-6/30/09</td>
<td>Antiplatelet Therapy for High-Risk Percutaneous Coronary Intervention: Is P2Y12 Receptor Blockade Adequate?</td>
<td>Kenneth G. Lehmann, MD</td>
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<td>Phan, Binh An P.</td>
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<td>Direct Assessment of Carotid Plaques Using Contrast-Enhanced Carotid MRI</td>
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<td>Woo, Joan Susie</td>
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<td>Subclinical Left Ventricular Diastolic Dysfunction and Incident Cardiovascular Disease in the Cardiovascular Health Study</td>
<td>Stephan D. Fihn, MD</td>
<td>Department of Veterans Affairs, Health Services Research and Development</td>
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2008
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<td>Mechanistic Evaluation of the Anti-Inflammatory Properties of HDL as Assessed by Shotgun Proteomics</td>
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<td>Blatt, Joseph A.</td>
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<td>Utility of Defibrillation Threshold Testing in the Sudden Cardiac Death in Heart Failure Trial</td>
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<td>Don, Creighton W.</td>
<td>7/1/04-6/30/08</td>
<td>Clopidogrel Dosing for NSTEMI Patients and Radial Versus Femoral Access for PCI in ACS Patients</td>
<td>Jeffrey L. Probstfield, MD</td>
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<td>Huehnergarth, Kier V.</td>
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<td>Comparison of Coronary Calcium Scoring Between Non-Contrast and Contrast- Enhanced Coronary Computed Tomograhpic Images</td>
<td>Kelley R. Branch, MD, James H. Caldwell, MD</td>
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<td>Role of uPA in Accelerated Atherosclerosis</td>
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<td>Electrocardiographic Predictors of Mortality in the Sudden Cardiac Death in Heart Failure Trial</td>
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<td>Strote, Justin A.</td>
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### 2007

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<td>Cawley, Peter J.</td>
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<td>Utilization of Magnetic Resonance Imaging for Coronary Artery Plaque Characterization</td>
<td>Chun Yuan, PhD, Tom S. Hatsukami, MD</td>
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<td>Chen, Kent Y.</td>
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<td>Cellular Therapies for Myocardial Infarct Repair</td>
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<td>Scholnick, Joshua D.</td>
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<td>MRI Surveillance of Coronary Bypass Graft Stenosis</td>
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<td>Wong, Wai Shun</td>
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<td>Effect of Multiple ICD Shocks on Mortality in the Sudden Cardiac Death in Heart Failure Trial</td>
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2006

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<td>Chen, Grace P.</td>
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<td>Global and Regional Sympathetic Nervous System Function Before and During Left Ventricular Assist Device Placement</td>
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<td>Schaefer, Benjamin M.</td>
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<td>Inheritance of Bicuspid Aortic Valves: Phenotypic and Genotypic Classification</td>
<td>Peter H. Byers, MD Catherine M. Otto MD</td>
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<td>Perioperative Beta Blockade in Patients Undergoing Surgery for Acute Hip Fracture</td>
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<td>Chung, Kiyon</td>
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<td>Prevention of Sudden Cardiac Death</td>
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<td>The Effects of Omega-3 Fatty Acids on Endothelial Function in the Metabolic Syndrome</td>
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<td>Tabibiazar, Ramin</td>
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<td>The Effects of Beta Blockers on Regional Pre- and Post-Synaptic Sympathetic Nervous System in Patients with Congestive Heart Failure</td>
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<td>Urnes, Kara K.</td>
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<td>Use of a Three-Dimensional Cardiac Imaging Simulator for Training and Competency Assessment in Echocardiography</td>
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<td>Branch, Kelley R.</td>
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<td>Collaborative Care Model versus Standard of Care in Treating Chronic Stable Angina</td>
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<td>Role of Urokinase Plasminogen Activator in Vascular Remodeling</td>
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<td>Development of a Cardiovascular Educational Curriculum for Medical Residents</td>
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<td>Functional Mitral Regurgitation: Does Form Follow Function?</td>
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<td>Willems, James P.</td>
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<td>Cholesterol Management Among VA Patients with Coronary Artery Disease</td>
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<td>Lipoprotein/Proteoglycan Interactions in Restenosis</td>
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<td>Macrophage-Mediated Immunity to Salmonella Infection</td>
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<td>Minami, Elina</td>
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<td>Myocardial Infarct Repair: Effects of Stem Cell Grafting and Accelerated Angiogenesis</td>
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<td>Cardiac Effects of Fish Consumption</td>
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<td>Predictors of Repeat Revascularization within One Year after Initial Percutaneous Coronary Intervention</td>
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2017

Katie Benziger


Robin Brusen


Selma Carlson


Tiffany Chen


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Hans Huang


James Lee


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Song Li


Vidang Nguyen


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2016
Sophia Airhart


Katie Benziger


**Tara Jones**

**2015**

**Sophia Airhart**

**Kate Kearney**

**Katie Benziger**


**Tara Jones**

**Robin Brusen**

**Mariko Harper**

**James Lee**

**Song Li**
May; 60(5): 731-9.

2014

Sophia Airhart


Katie Benziger

Patrick Goleski

Jason Huang

Nina Rashedi
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When Should We Operate in Asymptomatic Severe Aortic Stenosis
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Jill Steiner

Julio Lamprea
James Lee


Farid Moussavi-Harami

2013
Kate Kearney

Jason Huang

Ivan Medvedev


Juan Ortega-Legaspi

Farid Moussavi-Harami


Shalin Patel


Nina Rashedi


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2012

Paco Bravo, MD


**Oscar Gonzalez, MD**


**Christopher Greenman, MD**


**Aneet Patel, MD**


**Andrea Vitello, MD**


**2011**

**Stephen Farris, MD**


**Joanna Ghobrial, MD**


**Jehu Mathew, MD**


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**Zachary Steinberg, MD**


**2010**

**Todd Dardas, MD, MS**


**Sunil Dhar, MD**


**Todd Goldman, MD**


Matt Hartman, MD


Manoj Kesarwani, MD


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Elisa Zaragoza-Macias, MD


2009

Andrew Cheng, MD
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Pankaj Madan, MD


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Farid Moussavi-Harami, MD


**Gregory Roth, MD**


**2008**

**Joshua L. Busch, MD**


**Rose Q. Do, MD**


**Ramy Hanna, MD**
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**Jason Linefsky, MD**


**Alec Moorman, MD**


**Eric Pacini, MD**
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Ramin Shadman, MD

2007

Steven M. Bradley, MD


Christopher E. Kurtz, MD


**John Mignone, MD**


**Luis D. Muñoz, MD**

Munoz L, Shadzi P, Triller M, Moore A, Colley K, Zhao Q; Effect of intensive lipid therapy on Lp-PLA2 in the Carotid Plaque Composition by MRI during lipid-lowering study (CPC) , ATVB scientific session 2010, San Francisco, CA.

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**Joan Susie Woo, MD**


**2006**

**Jay Chen, MD**


Chen J, Naseem RH, Joglar JA. Prior Cocaine Use is Associated with a High Defibrillation Threshold During ICD Implantation. *Heart Rhythm*, 2006; 3:162,70.

Hui-San Chung, MD

Eric Krieger, MD


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Jefferson Baer, MD
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Joshua M. Buckler, MD


Kier V. Huehnergarth, MD

Ranjini Krishnan, MD

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David S. Owens, MD


Binh An P. Phan, MD


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**Jordan M. Prutkin, MD, MSc**


Caldwell Visiting Professor, March 2016
Dr. Muriell Jessup pictured with Dr. James Caldwell and Fellows