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MEDICAL CENTER



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## URMC Graduate Education:

historical perspective

Departmental PhD Programs



Interdisciplinary clusters as Y1  
recruiting tool



Departmental PhD Programs



# Biomedical Science PhD Programs

- Biochemistry and Molecular Biology
- Biomedical Engineering
- Biophysics, Structural, and Computational Biology
- **Cellular and Molecular Pharmacology and Physiology**
- Epidemiology
- Dental Science
- Genetics, Genomics & Development
- Immunology, Microbiology & Virology
- Neuroscience
- Neurobiology and Anatomy
- Pathways of Human Disease
- Statistics
- Toxicology
- Translational Biomedical Science (CTSA - Epi/Comm)
- **\*Cardiovascular Sciences (HHMI) Fellowship\***



- Endowed by Richard T. Aab
- 15 tenure-track faculty (1/3 clinician-scientists), 8 junior faculty
- Cardiovascular Program Project Grant
- >100 faculty, students, staff
- 100,000 sq ft

[www.urmc.rochester.edu/cvri](http://www.urmc.rochester.edu/cvri)

## Why a disease-focused Fellowship?

- Institutional strength, translational
- Strong, committed core basic and clinical faculty
- Focused instruction/education
- Scalable to generalized program with multiple disease foci
  
- Currently not a degree-granting program
- Close ties with MSTP
- CTSA Program is Epidemiology/Community (T2) focused

# Coursework

- Core URMC graduate curriculum
- Core PhD program-specific courses (generally, Pharmacology with CVD component)
  - Student may elect other degree-granting program curriculum(e.g. Path, BME)
- Cardiovascular Biology and Disease (next slide)
- Clinical Clerkships (more details later)
- CTSA-derived course in clinical trial design and analysis
- Student Colloquium
- MIG Coursework satisfies elective requirements

# Cardiovascular Biology and Disease (Part 1)

## Week 1: Cardiac structure and function

- Circulation and heart as a pump (Chest X ray, echo, MRI)
- General anatomy and histology of adult and developing heart

## Week 2: Blood vessel structure

- General anatomy and histology of adult vasculature including lymphatics
- Smooth muscle cell differentiation and contraction

## Week 3: Blood

- Clotting and thrombosis
- Histology, blood lineages, vascular progenitors

## Week 4: Cardiovascular function I

- Cardiovascular receptors and signal transduction
- Matrix and integrin biology in the vessel wall

## Week 5: Cardiovascular Function II

- E-C coupling and cardiovascular contraction and relaxation
- Hypertension and vascular reactivity

## Week 7: Electrophysiology I

- Cardiac ion channels and action potential
- The electrocardiogram and arrhythmia

## Week 8: Paper discussions and Review sessions

- Paper discussion
- Review session

## Week 9: Electrophysiology II

- The electrocardiogram and arrhythmia (Introduction and mechanism) II
- Clinical manifestation & Principles of Therapy of Arrhythmia

## Week 10: Endothelial function

- Endothelial cell hemodynamics
- Endothelial dysfunction and redox regulation

## Week 11: Introduction to Cardiovascular Patho-physiology

- Atherosclerosis
- Lab: Gross cardiovascular pathology

## Week 12: Cardiac signal transduction and function

- Acute phase: inotropes, catecholamines and phosphodiesterase inhibitors
- Chronic phase:  $\beta$ -blockers, ACE inhibitors, other drugs and devices

## Week 13: Mitochondria function and pulmonary hypertension

- Mitochondria and cardiac metabolism
- Pulmonary hypertension

## Week 14: Paper discussions and Review sessions (Abe & Yan)

- Paper discussion
- Review Session

# Seminar / Journal Club

(enrichment activities)

- Weekly Aab CVRI Seminar Series
  - 18-20 external faculty per year
  - Lunch with Seminar Speaker, as well as wine/cheese reception post-seminar
- Weekly Aab CVRI student/postdoc journal club
- “Monthly Mingle” to acknowledge CVRI successes (publications, awards, birthdays, etc)
- URMC Monthly Seminar: Science Careers
  - Optional: GWIS (Graduate Women in Science)

# Clinical Clerkship

- Three clinical clerkships with three clinical or clinician-scientist faculty (generally Cardiology)
  - Student chooses three faculty (generally cardiology sub-specialty), 8-10 weeks weekly observation (clinic, rounds, etc)
  - Y1 Spring - Y2 Fall
  - Generally, one of these faculty will be chosen as thesis co-mentor and committee member

## “Comprehensive Exam”

- Choose unmet need observed in clinical clerkship
  - Think big
  - 10 years, unlimited funds, present/defend research proposal to address unmet need



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# Recruiting Strategies

# Summer Undergraduate Program

~40 students (>450 applicants); 13 minority students  
Mean GPA 3.6 (range 2.9 - 4.0)

Includes freshmen (~10%)  
10 weeks of intensive hands-on research  
~\$4500 stipend, travel assistance, paid on-campus housing, enrichment activities, seminars, GRE course

Students go on to outstanding graduate education positions

<http://www.urmc.rochester.edu/gebs/summer.htm>

## **PREP** (Postbaccalaureate Research Education Program)

1-year training program for underrepresented minority students with a baccalaureate degree seeking to improve skills/competitiveness for graduate school applications

- (1) Intensive mentored research training;
- (2) Coursework (graduate-level, individually-tailored);
- (3) Enrichment (monthly meetings, special seminars with visiting minority scientists, more)
- (4) Rolling admissions
- (5) For students seeking PhD, or MD/PhD

<http://www.urmc.rochester.edu/smd/mbi/education/prep/>

## Entering Class, Fall 2010

- Goal: 3 students in first year
- Advertising: initiated early December 2010
  - Application deadline December 31
- Outcome: 4/4 students offered have accepted entry for fall 2010
  - Other students may choose to transfer to HHMI MIG in CVS fellowship
- One student a UofR Sproull Fellow (offered to top two applicants each year)
- One student sent a unsolicited grant proposal as part of application



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We look forward to learning with/from you