ASPET Summer Undergraduate Research Fellowship (SURF) Programs

Building Careers in Pharmacology Toxicology and Pharmaceutical Sciences

Ron Millard
Pharmacology & Cell Biophysics
University of Cincinnati College of Medicine

East Lansing, MI
July 8, 2011
ASPET SURF
Individual and Institutional Training Programs

2011 Pharmacology Graduate Directors’ Meeting

East Lansing, MI
July 8, 2011
21 ASPET SURF Sites

http://www.aspet.org/awards/SURF_institutional_Funded/
21 Current ASPET SURF URLs

- http://pharmacology.case.edu/education/surp.aspx
- http://pharm.lsuhscshreveport.edu/super.htm
- http://www.stritch.luc.edu/depts/pharmacology/index.cfm
- https://pharm.rutgers.edu/content/summer_research_fellowship_program
- http://www.acsu.buffalo.edu/~climb/CLIMBUP.html
- http://ubrp.arizona.edu/
- http://pharmtox.uams.edu/home
- http://pharmacology.ucsd.edu/other/surf.php
- http://www.med.uc.edu/pharmacology/aspet.surf/
- http://pharmacology.ucdenver.edu/summerprog/index.shtm
- http://www.kumc.edu/pharmacology/internship.html
- http://sitemaker.umich.edu/summer_program/home
- http://www.med.unc.edu/pharm/summer-undergraduate-research
- http://www.gradbiomed.pitt.edu/summer_surp.aspx
- http://www.utmem.edu/pharmacology/surf.php
- http://pharmacology.uthscsa.edu/summer.asp
- http://www.utmb.edu/phptoxt/
- http://www.pharmacy.wsu.edu/futurestudents/research.html
Trainee Home Institution Sites (300 mile radius)
UC ASPET SURF Program (2007-2010)

2011 Pharmacology Graduate Directors’ Meeting

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So You Want to Start a Pharmacology SURF Program?

6 Requirements Before Your Start

- Define Goals and Develop the Support Base
- Identify Institutional Partners and Garner Support
- Secure Department (Unit) Commitment
- Identify SURF Program Leadership, Faculty Mentors and Staff
- Design and Create a Program Website
- Prepare and Submit an ASPET SURF Program Proposal
What Will a 10-Week SURF Program Cost?

• **Program Budget** - a minimum of **$25K in hard funds** is needed to support 5 trainees at $4K stipend for 10 weeks. This is sourced as $9K from ASPET, plus a minimum of $16K from all of the institutional cost shares, plus the in-kind cost-share support from the host department in the way of setting up to get students paid, tracking expenses, closeout, etc.

• **Applicant Selection Process** - **40 hours** of staff and program leadership time: Each year we receive ~ 250 online applications just for the ASPET SURF program. Each application, transcript, self-statement and support letters are read to cull the best fitted applications to 40, then to 20, then to 10 finalists. Rolling offers to fill all 5 positions; sometimes 7 positions.

• **Advance Planning** - **40 to 60 hours** of staff and program leadership time: for advance planning in the 12 weeks before the program start to finalize program, match students to faculty, arrange lodging, catering, travel, and transportation, etc.

• **Program Operations** - Once the program starts, the program director(s), faculty mentors, and graduate students are connecting with the ASPET SURF trainees daily and weekly during the 10 week program; minimal staff effort required until the end of the program.
Our ASPET SURF Program Website

The Home Page

How Will I Spend My 10 Weeks?

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<th>WEEK 1</th>
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<td>SURF Seminar (noon-lunch); Scientific Writing; Journal Club; Ethics Case Discussion</td>
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Our ASPET SURF PROGRAM WEBSITE

- Pharmacology Research Seminar by Faculty & Graduate Students
- Online Application Form

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Faculty Mentors
Research Training Emphasis Areas

- Faculty Mentors Links
- Summer Research Areas

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Faculty Research Project Pages

ASPET SURF Program

Research Program Description:
The Belcher laboratory’s research is focused on understanding fundamental molecular mechanisms that regulate estrogen-sensitive development in the brain, heart and reproductive systems. One of our major research efforts is a study to understand the effects of the estrogen-like chemical BPA during fetal development and its effects on health later in life. We are employing molecular biological and systems approaches to elucidate the developmental and signaling pathways that are regulated by endogenous and environmental estrogens in mouse embryos known to have different sensitivities to estrogen-like compounds. Recent results from our laboratory have shown that estrogen and certain environmental estrogens can regulate development of non-endocrine neuronal systems, activity of endocrine organs, as well as events that regulate via a membrane-associated estrogen receptor. Major effects on reproductive function have also been observed in animals exposed to levels of BPA present in humans.

ASPET SURF Project Description:
Under the guidance of Dr. Belcher and with assistance from senior level laboratory researchers, the ASPET summer undergraduate fellow’s research project will focus on the identification of mechanisms of action of estrogenic action in different tissues and organs. As a component of ongoing studies, the ASPET SURF student will engage in molecular and physiological studies of estrogenic actions on the function of the heart and reproductive functions of mice exposed to levels of the estrogenic compound BPA.

Research Program Description:
Dr. Schulz’s research interests include the role of growth factors and neuropeptides in cardiovascular pathophysiology. The overall directions of Dr. Schulz’s research program are two-fold: 1) identity and characterize signaling events involved in protecting the myocardium from isometric injury and cell death following myocardial infarction (i.e., heart attack) and 2) determine the mechanisms by which cardiac hypertrophy and heart failure occur following mycardial infarction or hemodynamic load (high blood pressure or volume overload). The Schulz lab employs in vivo and in vitro approaches to elucidate the contribution of the cGMP and growth factor receptor systems to cardiac pathophysiology. In vivo echocardiography, ex vivo working perfusion and Langendorf whole heart preparations, in vivo hemodynamic measurements, and biochemical and intracellular calcium dynamics of individual isolated cardiomyocytes are routine procedures. In addition, a number of surgical techniques (artery ligation, coronary artery ligation, catheterization) are used. In this research, pharmacological, histological, biochemical, and state-of-the-art molecular biological assays are employed, and include Northern blot and quantitative real time PCR analysis for mRNA expression, and protein analyses via Western blot, ELISA and immuno-staining. Genetic and proteomic tools, including array chips and mass spectrometry, are used to further characterize or identify known and novel mechanisms of growth factor signaling and cardiac pathophysiology. Ongoing research projects include studies at 1) the role of vascular growth factor 2 (PDGF) and cardiotropism and 2) opsonic systems and cardiac hypertrophy and heart failure.

ASPET SURF Project Description:
The ASPET SURF student will be offered a specific research project within the 2 areas of Dr. Schulz’s research program. The student will be engaged in the research with graduate students at different stages of their academic and research program. The student will participate in weekly research progress meetings, make progress reports on the research project, and interact with the laboratory team on a daily basis. The student should expect to perform experiments that include dose-response relationships for cardiac muscle cells and isolated hearts or heart cell lines or isolated heart cell preparations. Skills will be learned to operate and utilize the instrumentation and techniques necessary to make significant progress in the research project. Exposure to and understanding of the relevant scientific literature is expected. Dr. Schulz will meet with the student weekly to assess progress and provide guidance to optimize the ASPET SURF student’s summer research experience. Significant research contributions of the ASPET SURF student will result in co-authorship in published manuscripts.
Now You Can Start Your ASPET SURF Program

6 Steps to Successful Program Delivery

• Set the Calendar and Promote Your Program – 9 to 12 months in Advance of Start Date
• Recruit and Select Applicants Matched to Program – 4 to 6 months in Advance of Start Date
• Match Trainees to Faculty Research Programs and Start Training/Background Readings >1 month before Start Date
• Deliver Your Program, then Evaluate Your Program
• Support Former Trainees and Annual Follow-Up
• Annual Report to Sponsors
Seeking Synergies and Shared Vision
Program Goals and Support Base

• **Goals Fit to Your Environment**
  – Home Unit
  – College and Institution
  – Pipeline for Future Workforce
  – Alignment with State or Region

• **Support Base Shaped by Your Resources**
  – Home Unit Research Enterprise
  – Mentor Capacity and Commitment
  – Institution’s SURF Network and Coordination
Identify Institutional Partners Confirm Their Level of Support

• Your Unit Support
  – Leadership, Faculty, Graduate Students, Research & Administrative Staff
• Your College Support
• Other College Support
• Other SURF Program Partners
• Possible Corporate Partners
Our Institutional Partners/Sponsors

• Vice President For Research
• Associate Dean for Graduate Education and Research, College of Medicine
• Dean, College of Pharmacy
• Department of Pharmacology & Cell Biophysics
• Biomed SURF Program
• McNair Scholars Program
• ASPET Members/Mentors with Active Research Programs
Summer Undergraduate Research Fellowships – University of Cincinnati College of Medicine – Main Portal for Online Applications

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Program Leadership
Faculty Research Mentors
Graduate Students
Research and Administrative Staff

• Right Size Your ASPET SURF Team- You Can’t Do It Alone
  – Identify and Commit a Co-Director
  – Accounts and Sponsors Management
  – SURF Program Coordinator
  – Graduate Student Teaching Assistant

• Right Sizing the Mix of Faculty Mentors
  – Pharmacology Research is Everywhere!
    • Basic, Clinical, and Translational Biomedicine Units
    • Pharmaceutical Science and Pharmacy
    • Nursing and Allied Health Sciences
    • Dentistry, Public Health, Veterinary Medicine
    • Hospital Research Units
    • Biotech Incubators

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Summer Research leads to EB Presentations

- Learning Techniques and Methods
- Understanding the Scientific Process
- Digested the Scientific Literature
- Generating New Data
- Analyzing and Interpreting Data
- Translating Results and Conclusions
- Defending Research Outcomes to Peers
5 Steps in Communicating Research Findings

- **Technical Writing Series and Report**
  - Weekly writing assignments
  - Critical analysis of literature
  - Demonstration of laboratory skills through results
  - Written critiques from mentors and program directors
  - Final revised technical report due week 10

- **Oral Presentations**
  - Slide sets drafted, critiqued, and revised
  - Preliminary results presented at week 6
  - National format presentations at week 9

- **Poster Presentations**
  - Draft critiqued and revised
  - Faculty juried presentations with awards in week 10

- **National Meetings (ASPET-EB, etc.)**
  - Mentors encouraged to promote trainee attendance
  - Co-authored posters presented by students

- **Co-authored Peer-reviewed Publications**
  - Goal achieved by about 20+% of trainees
  - Usually 1 to 2 years after training summer
Careers and Ethical Issues in Research

• Graduate/Professional Degree as Next Step
  – MS or PhD or MD/PhD
  – Pharmacology, Toxicology, or Pharmaceutical Sciences
  – Current graduate student decision stories

• Ethics in Research - Case Studies
  – Conflicts of Interest
  – Authorship
  – Plagiarism

• Careers in Pharmacology
  – Former graduate students in early and mid careers
It’s Critically Important to Involve Graduate Students as:

• Members of the SURF Project Mentor Team
• Next Step Advanced Degree and Career Advisors
• Pharmacology Fundamentals Teachers
• Summer Research Project Supervisors
• First Hand Experts in Ethical Conundrums
Engage SURF Trainees in:

• Understanding the Scientific Inquiry Process
• Acquiring of New Pharmacology Knowledge
• Reading and Analyzing Scientific Literature
• Planning and Conducting a Research Project
• Communicating Research Results
  – Writing a SURF Project Technical Report
  – Co-Authoring a Manuscript
  – Preparing and Delivering Platform/Poster Presentations
  – Presenting at National Meetings (ASPET-EB)
Don’t Forget
Social Program & Awards Program

• Our 2010 Program

• Awards Luncheon

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