

GOALS FOR FELLOWSHIP TRAINING AND CAREER

My overall career goal is to carry out translational research at the intersection of chemistry and vascular biology as an independent investigator, care for patients with a clinical practice in cardiology, and teach at an academic medical center. Upon completing my MD/PhD training, I plan to pursue a residency in internal medicine followed by a fellowship in cardiology, and I will seek out a residency program that offers substantial protected time for research. Residency and fellowship will prepare me for a faculty position at an academic medical center, where I will use the majority of my time to run a research lab, and will also see patients and teach. I hope to align my research and clinical work to carry out experiments based on my clinical experience and to use my research as the basis for novel diagnostics and therapeutic interventions in the clinic. Additionally, I hope to help bridge the gap between clinicians and scientists and help form new collaborations that could not take place without my training. I have tailored the training plan in this fellowship proposal to give me the skills and knowledge I will need to meet these career goals, taking advantage of the exceptional training environment of the Deiters lab and the University of Pittsburgh-Carnegie Mellon University Medical Scientist Training Program (MSTP).

The proposed experiments I will carry out in this proposal will give me a unique opportunity to learn techniques from chemical biology and vascular biology that I will rely on as the foundation for my career. First, I will develop my skills in organic synthesis. Few investigators in translational cardiology are able to use organic synthesis to prepare new molecules to be used in their research. I believe that this skill will be incredibly useful for my future work. Dr. Deiters is an extremely respected synthetic chemist with well over 100 publications in top journals in the field, and the larger environment of Pitt's Department of Chemistry is well-established and well-equipped as a leader in organic, biological, and medicinal chemistry, making this a superb training environment. Second, I will develop my skills in probing redox biology with innovative cell culture models by working with Dr. Weber's group. Dr. Weber has developed several unique assays to understand redox biology in living tissue. I am excited to learn to use his recently-developed superfusion system for modeling ischemia/reperfusion (I/R) injury in stroke that is capable of producing nearly instantaneous changes in tissue oxygen tension. I will apply this system for the first time to myocardial I/R, and I believe that working on this novel model will be an invaluable experience for my training. I am also looking forward to expanding my knowledge of confocal microscopy that I have built up from my coursework in imaging, which will build on my prior experience with epifluorescence microscopy. Third, I will learn how to investigate my therapeutic approach as a treatment for myocardial I/R under Dr. Wang's group's expert guidance. Specifically, I will learn to perform coronary ligation surgery on rats, and how to phenotype the animals afterwards using histological staining, echocardiography, and PV catheterization. Concomitantly, I will complete a Longitudinal Clinical Clerkship (LCC) with Dr. Frederick Crock, an accomplished cardiologist and expert in echocardiography, who will teach me about the clinical ramifications of my results and will provide advice on the experiments.

The experiments, coursework, seminars, and conferences outlined in this proposal will also cultivate my intellectual development as an investigator. By working closely with Dr. Deiters, the other members of our group, and the team of consultants and collaborators I have assembled, I will gain more experience in the intellectual skills I will need to carry out the scientific method: forming hypotheses, designing experiments, analyzing data with statistics, and critically interpreting results in the context of the scientific literature, among other skills. I will bolster these skills by presenting my results at group meetings, VMI Research in Progress meetings, biological chemistry division seminars, and semiannual thesis committee meetings. Apart from my own research, this proposal comprises many activities that will enhance my knowledge of principles of chemical and vascular biology, of the latest findings in the field, and of how they apply to clinical practice (see **Sponsor and Co-Sponsor Information**). These critical skills and concepts will give me the foundation I need for my future career as a physician-scientist.

For my professional development, I will present my work at multiple conferences with diverse audiences, including the American Chemical Society National Meeting and the NOX Family (NADPH Oxidases) Gordon Research Conference. These conferences will help me form critical connections with clinicians and scientists at other institutions and will give me experience presenting my work to audiences with different areas of expertise. Overall, I believe that my proposed training plan and research project are ideally suited to help me reach my goal of becoming a translational researcher in cardiology with an active, complementary clinical practice.