



Abigail C. Snyder  
Freshman  
University of Pittsburgh  
Major: Applied Mathematics

Faculty Advisor: Benita Albert

Program:  
Research Alliance in Math & Science

Email: [snyderac@ornl.gov](mailto:snyderac@ornl.gov)  
Home: [a\\_snyder1@hotmail.com](mailto:a_snyder1@hotmail.com)

## **Research Area: Computational Sciences and Engineering**

ORNL in collaboration with the Vascular Research Lab at the University of Tennessee Medical Center in Knoxville is developing a mathematical model of the vascular disease process intimal hyperplasia (IH). IH may occur in a stenosed artery that has been treated with balloon angioplasty or has been injured in other ways. During the IH process, vascular smooth muscle cells migrate from the middle to the inner layer of the artery wall in response to biochemical gradients of various chemicals such as platelet derived growth factor (PDGF). The student will develop a mathematical model of the Boyden Chamber experiment for cell migration assays. The model will consist of 2 partial differential equations that describe the diffusion, chemotaxis, and haptotaxis of cells in response to a biochemical gradient and will be solved using the finite difference method for various experimental conditions in order to obtain parameter estimates for the diffusion, chemotaxis, and haptotaxis parameters, as well as data from Boyden Chamber experiments for the response of vascular smooth muscle cells to platelet derived growth factor conducted at the UT Graduate School of Medicine in Knoxville .

### **Research Mentor:**

Kara Kruse, M.S.E  
Computational Sciences and Engineering Division  
Oak Ridge National Laboratory

(865) 5745154  
[krusekl@ornl.gov](mailto:krusekl@ornl.gov)