

## **Atherogenesis as an Inflammatory Instability**

Lindsey Abel, Southwestern University  
Jaime Kennedy, East Texas Baptist University

### **Abstract:**

Atherosclerosis is a disease characterized by the build up of debris in the form of cholesterol and fatty deposits in the inner lining of the arterial wall. Previous research proposes that atherogenesis, the beginning stages of atherosclerosis, originates from localized inflammation. Modeling the initial inflammatory response of atherosclerosis may increase our understanding and ability to develop treatment for cardiovascular disease. In this study, a system of partial differential equations which combined immune mechanisms and specific biochemical elements was used to analyze the early stages of the growth of a lesion. In particular, we studied how various levels of antioxidants and chemotaxis affect the stability of a lesion in a healthy state. After determining equilibrium points for multiple antioxidant levels, several computer simulations were run with perturbations to the healthy state in order to observe whether the model would return to a stable equilibrium.