1046-00-1672 **David Gardner** (david.gardner@students.olin.edu), **Yiyang Li** (yiyang.li@students.olin.edu) and **Benjamin Small*** (benjamin.small@students.olin.edu), 1000 Olin Way, Needham, MA 02492. *Nonlinear Dynamics of a Simple Microvascular Network.* Preliminary report.

Blood flow through microvascular networks has been shown to change, oscillate, and even reverse direction without biological control. In order to study this phenomenon, we investigate a model of blood flow through small vessels. Blood flowing through small vessels exhibits rheological properties such as the Fåhræus-Lindqvist effect, which describes the viscosity of blood, and plasma skimming, which governs the separation of red blood cells at diverging nodes. We define a node to be the intersection of exactly three blood vessels, and a network to be the union of two or more nodes. To help understand large complex networks consisting of hundreds of vessels, we begin by studying a simple three node network. Using a variety of analytical and computational tools, we develop methods to find the equilibrium solutions that a given configuration of the three node network can support and the stability of each of these solutions. Our results will be used to design *in vitro* experiments. (Received September 16, 2008)