

LS LAMP 2010 Summer Research Training Program

Project Description

Title: Microfluidic devices for studying the mechanics of blood flow at the micro scale

Advisor: Sergey S. Shevkoplyas, PhD
Assistant Professor
Department of Biomedical Engineering
500 Lindy Boggs Building
Phone: (504) 314-2940
Email: shevkop@tulane.edu

Overview:

The main purpose of this study is to gain a better understanding of the mechanics of blood flow and of the traffic of circulating cells in networks of microvessels using microfluidic devices and systems. Additional goals of this study are to develop microfluidic devices for testing the mechanical properties of blood cells and other circulating cells, and to develop microfluidic technology for separating sub-populations of blood cells and rare circulating cells from whole blood for point-of-care diagnostics.

Project Objectives:

- Design prototypes of microfluidic devices for studying the rheological behavior of blood and individual blood cells.
- Benchmark the performance of these devices across design iterations by measuring their sensitivity to:
 - reduction of RBC deformability,
 - variation in cell counts and cell activation.

Prerequisites and prior experience desired:

- Diligence, creativity, and the ability to learn new skills quickly and to work in a highly collaborative, dynamic environment productively are required.
- Will be useful, but not required are:
 - some general knowledge in hematology and blood rheology,
 - experience in venipuncture, safe blood handling techniques and in standard methods for blood sample preparation and characterization, and
 - understanding of microscopy, high-speed image acquisition, and image analysis.