

# Blood Separation in Microfluidic Devices

Eric Chung and John Wikswo

*Vanderbilt University BME Department / Vanderbilt University Department of Physics*

## EXTENDED ABSTRACT

Microfluidics is a relatively new area of science used in measuring biomedical signals. Blood cells were trapped and then separated. The difficulty in this experiment is that trapping cells because it requires extreme amount of precision. However, to add on to that difficulty, the experiment focuses on separating white and red blood cells within the device. Because of the shape of red blood cells, the device is capable, with the correct trap size, to trap white blood cells and allow red blood cell will flow through. The second part of the experiment is focused on creating single cell measurements and determining cell characteristics. By obtaining fluorescently marked CD markers, the strength of the fluorescence shows the amount of clusters that respond to the marker. CD markers were shown to display greater fluorescence when bound and were easily distinguishable from the media that the cells are suspended in. For the purpose of using multiple CD markers the syringe pump was placed at the output of the device instead of the input and pulled back on. At the input of the device a computer controlled valve bank created through unique photolithography technique.

## Results

The results showed that white and red blood cells can be separated by size. Platelet congregation interfered slightly with the separation. However, most of the cells remaining within the device were white blood cells. Microbeads were used to test the new method of pumping and worked similar to the forward pumping method. The valve bank fabrication is still undergoing work and needs test in repeatability. The cells were marked with three different CD markers and showed fluorescent under different filters. This showed that white blood cells could indeed be differentiated by using multiple markers and filters under microfluidic devices.