Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Effects of Fluid Shear Stress on Cancer Stem Cell Viability[1] BRITTNEY SUNDAY, Case Western Reserve University, URSULA TRIANTAFILLU, RIA DOMIER, YONGHYUN KIM, University of Alabama — Cancer stem cells (CSCs), which are believed to be the source of tumor formation, are exposed to fluid shear stress as a result of blood flow within the blood vessels. It was theorized that CSCs would be less susceptible to cell death than non-CSCs after both types of cell were exposed to a fluid shear stress, and that higher levels of fluid shear stress would result in lower levels of cell viability for both cell types. To test this hypothesis, U87 glioblastoma cells were cultured adherently (containing smaller populations of CSCs) and spherically (containing larger populations of CSCs). They were exposed to fluid shear stress in a simulated blood flow through a 125-micrometer diameter polyetheretherketone (PEEK) tubing using a syringe pump. After exposure, cell viability data was collected using a BioRad TC20 Automated Cell Counter. Each cell type was tested at three physiological shear stress values: 5, 20, and 60 dynes per centimeter squared. In general, it was found that the CSC-enriched U87 sphere cells had higher cell viability than the CSC-depleted U87 adherent cancer cells. Interestingly, it was also observed that the cell viability was not negatively affected by the higher fluid shear stress values in the tested range. In future follow-up studies, higher shear stresses will be tested. Furthermore, CSCs from different tumor origins (e.g. breast tumor, prostate tumor) will be tested to determine cell-specific shear sensitivity.

[1]National Science Foundation grant #1358991 supported the first author as an REU student.

Amy Lang
University of Alabama

Date submitted: 30 Jul 2014 Electronic form version 1.4