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Effect of Varying Fluid Shear Stress on Cancer Stem Cell Viability & Protein Expression[1] RIA DOMIER, YONGHYUN KIM, DAVID DOZIER, URSULA TRIANTAFILLU, University of Alabama — Cancer stem cells cultured *in vitro* in stirred bioreactors are exposed to shear stress. By observing the effect of shear stress on cancer stem cell viability, laboratory cell growth could be optimized. In addition, metastasized cancer stem cells *in vivo* are naturally exposed to shear stress, a factor influencing stem cell differentiation, while circulating in the bloodstream. Changes in protein expression after exposure to shear stress could allow for identification and targeting of circulating cancer cells. In this study, blood flow through capillaries was simulated by using a syringe pump to inject suspensions of Kasumi-1 leukemia stem cells into model blood vessels composed of PEEK tubing 125 microns in diameter. The Hagen-Poisseuille equation was used to solve for operating flow rates based on specified amounts of shear stress. After exposure, cell counts and viabilities were observed using an optical microscope and proteins were analyzed using Western blotting. It was observed that at a one minute exposure to stress, cell viability increased as the amount of shear was increased from 10 to 60 dynes per square centimeter. Results from this research are applicable to optimization of large-scale stem cell growth in bioreactors as well as to the design of targeted cancer therapies.

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