Mouse macrophage cell printing and shear forces on cell membranes

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Abstract

The overall goal of this research project is to determine the feasibility of cell bio-ink printing into patterns. The specific summer objective of the research preformed was to determine the effects of shear forces and cell attachment of macrophage cell suspension during transportation, pumping and printing. RAW macrophage cell membranes can withstand shear forces well over the highest tested pressure of 400,000 Pascals. Forces three orders of magnitude higher would be necessary to cause cell destruction. Decrease in cell concentration, cell death and aggregation are small factors in the overall health of macrophage cells after syringe pumping. Printing of macrophage bio-ink was successful using an Epson C88 + printer and a refillable black T0601 ink cartridge. The printed cell solution can create visible cell images in small, yet defined patterns. Cell attachment to transparencies in media is not yet perfected but the cells do survive the printing process and can continue to reproduce. The data and results derived from syringe pump flow rate assessment gave parameters for bio-ink cartridge printing for future tissue engineering on a cellular level.