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Capture of Magnetic Nanoparticles in Simulated Blood Vessels: Effects of Proteins and Coating with Poly(ethylene glycol)[1] JAIMEE ROBERTSON, Syracuse University, CHRISTOPHER BRAZEL, University of Alabama — Magnetic nanoparticles (MNPs) have applications in cancer treatment as they can be captured and localized to a diseased site by use of an external magnetic field. After localization, cancer treatments such as magnetically targeted chemotherapy and localized hyperthermia can be applied. Previously, our lab has shown that the percent capture of MNPs is significantly reduced when MNPs are dispersed in protein solutions compared to water or aqueous polymer solutions. The purpose of this study was to determine the effects of proteins on capture efficiency and to investigate the ability of poly(ethylene glycol), PEG, coatings to reduce aggregation of MNPs with proteins, allowing for a greater capture of MNPs in flow. Using Tygon® tubing to simulate blood vessels, a maghemite nanoparticle solution was pumped through a capture zone, where a magnetic field was applied. After passing through the capture zone, the fluid flowed to a spectrophotometer, which measured the absorbance of the solution. The introduction of proteins into the nanoparticle solution reduced the percent capture of MNPs. However, coating the MNPs with PEG aided in preventing aggregation and led to higher capture efficiencies in protein solutions. Additionally, the effects of capture length and protein exposure time were examined. It was found that a higher percent capture is attainable with a longer capture length. Furthermore, on a scale of hours, the percent capture is not affected by the protein exposure time.

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