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Fluid Dynamics of Magnetic Nanoparticles in Simulated Blood Vessels[1] LAUREN BLUE, MARY KATHRYN SEWELL, CHRISTOPHER S. BRAZEL, University of Alabama — Magnetic nanoparticles (MNPs) can be used to locally target therapies and offer the benefit of using an AC magnetic field to combine hyperthermia treatment with the triggered release of therapeutic agents. Here, we investigate localization of MNPs in a simulated environment to understand the relationship between magnetic field intensity and bulk fluid dynamics to determine MNP retention in a simulated blood vessel. As MNPs travel through blood vessels, they can be slowed or trapped in a specific area by applying a magnetic field. Magnetic cobalt ferrite nanoparticles were synthesized and labeled with a fluorescent rhodamine tag to visualize patterns in a flow cell, as monitored by a fluorescence microscope. Particle retention was determined as a function of flow rate, concentration, and magnetic field strength. Understanding the relationship between magnetic field intensity, flow behavior and nanoparticle characteristics will aid in the development of therapeutic systems specifically targeted to diseased tissue.

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