Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

CFD modeling of catheter-based Chemofilter device for filtering chemotherapy drugs from venous flow[1] NAZANIN MAANI, Purdue Univ, DARYL YEE, Caltech, MICHAEL NOSONOVSKY, Univ of Wisconsin, Milwaukee, JULIA GREER, Caltech, STEVEN HETTS, Univ of California - San Francisco, VITALIY RAYZ, Purdue Univ — **Purpose:** Intra-arterial chemotherapy, a procedure where drugs are injected into arteries supplying a tumor, may cause systemic toxicity. The Chemofilter device, deployed in a vein downstream of the tumor, can chemically filter the excessive drugs from the circulation. In our study, CFD modeling of blood flow through the Chemofilter is used to optimize its hemodynamic performance. **Methods:** The Chemofilter consists of a porous membrane attached to a stent-like frame of the RX Accunet distal protection filters used for capturing blood clots. The membrane is formed by a lattice of symmetric micro-cells. This design provides a large surface area for the drug binding, and allows blood cells to pass through the lattice. A two-scale modeling approach is used, where the flow through individual micro-cells is simulated to determine the lattice permeability and then the entire device is modeled as a porous membrane. **Results:** The simulations detected regions of flow stagnation and recirculation caused by the membrane and its supporting frame. The effect of the membrane's leading angle on the velocity and pressure fields was determined. The device optimization will help the efficacy of drug absorption, while the risk of blood clotting reduces.

[1]NIH NCI R01CA194533

Nazanin Maani
Purdue University

Date submitted: 01 Sep 2017 Electronic form version 1.4