Abstract Submitted
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Computational modeling of Endovascular Chemofiltration device for removing toxins from blood VITALIY RAYZ, University of Wisconsin - Milwaukee and Medical College of Wisconsin, BEN TOMPKINS, Penumbra, Inc, ALBERT CHIN, Chemofilter, ANAND PATEL, STEVEN HETTS, University of California San Francisco, UNIVERSITY OF WISCONSIN MILWAUKEE TEAM, UNIVERSITY OF CALIFORNIA SAN FRANCISCO TEAM, PENUMBRA, INC TEAM — Purpose: Chemotherapy drugs injected intra-arterially in order to destroy tumor cells can cause systemic toxic effects. A catheter-based filtering device temporarily inserted into the veins downstream of the tumor can remove chemotherapy drugs out of the blood stream right after these drugs have had their effect on the tumor. CFD modeling can help optimize hemodynamic performance of the chemofilter membrane, which chemically binds the toxins. Methods: Two alternative designs of the chemofilter were evaluated in order to increase the contact area of the membrane, while minimizing its obstruction to the flow. The Navier-Stokes equations were solved with a finite-volume solver Fluent. Virtual contrast injections were computed by solving the advection-diffusion equation in order to determine the effect of the chemofilter configuration on the flow residence time. Results: The results demonstrated that one of the chemofilter configurations, while having a 10-fold larger contact area, is substantially less obstructive to the flow. Additional considerations, such as feasibility of deployment and re-sheathing of the device, will affect its final design. The optimization of the chemofilter hemodynamic performance will help minimize drug toxicity, thus allowing to use high-dose therapy

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