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Modeling Flow Past a TrapEase Inferior Vena Cava Filter MICHAEL SINGER, WILLIAM HENSHAW, Lawrence Livermore National Lab, STEPHEN WANG, Kaiser Permanente — This study uses three-dimensional computational fluid dynamics to evaluate the efficacy of the TrapEase inferior vena cava (IVC) filter. Hemodynamics of the unoccluded and partially occluded filter are examined, and the clinical implications are assessed. The IVC, which is the primary vein that drains the legs, is modeled as a straight pipe, and a geometrically accurate model of the filter is constructed using computer aided design. Blood is modeled as a homogeneous, incompressible, Newtonian fluid, and the method of overset grids is used to solve the Navier-Stokes equations. Results are corroborated with in-vitro studies. Flow around the unoccluded filter demonstrates minimal disruption, but spherical clots in the downstream trapping position lead to regions of stagnant and recirculating flow that may promote further clotting. The volume of stagnant flow and the peak wall shear stress increase with clot volume. For clots trapped in the upstream trapping position, flow is disrupted along the cava wall downstream of the clot and within the filter. The shape and location of trapped clots also effect the peak wall shear stress and may impact the efficacy of the filter.

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