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Spatial dependence of thrombolysis HARI HARA SUDHAN LAKSHMANAN, Department of Chemical and Biomedical Engineering, West Virginia University, JEVGENIA ZILBERMAN-RUDENKO, OWEN MCCARTY, Department of Biomedical Engineering, Oregon Health Science University, JEEVAN MADDALA, Department of Chemical and Biomedical Engineering, West Virginia University — Thrombolysis under hemodynamic conditions is affected by both transport processes and reactions, thus profoundly dependent on the geometry of blood vessels or vasculature. Although thrombosis has long been observed clinically, a systematic and quantitative understanding has not been established in complex geometries such as vasculature, where various factors would affect thrombogenesis and its stability. A thrombus's location determines the effect of hydrodynamic forces on it and rate of tPA diffusion, that would result in either embolization or formation of microaggregates. Preliminary experiments have shown that thrombolysis is not uniform across an entire network with different locations lysing at different rates. Numerical simulations of thrombolysis under hemodynamics in a microfluidic geometry such as a ladder network with a focus on parameters such as reaction rate, shear gradient, velocity and diffusion established the lysis's dependence on geometry. Finite element simulations of blood flow coupled with reactions have been performed in COMSOL and the results were used to develop quantifiable metrics for thrombolysis in a complex geometry.

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