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Turbulence effects on hemolysis by revisiting experiments with LES computations MESUDE OZTURK, EDGAR O'REAR, DIMITRIOS PAPAVASSILIOU, The University of Oklahoma — Determining mechanically stimulated red blood cell trauma as a function of turbulence properties is required to design prosthetic heart devices [1]. Because blood is typically exposed to turbulence in such devices, the design of prosthetic heart devices depends on determining the effect of turbulent stresses on hemolysis [2,3]. While turbulent stresses increase hemolysis when cells are exposed to them [3], turbulent flow characteristics in the vicinity of lysed blood cells, and the mechanism of cell damage remains uncertain [2,3]. In this work, LES computations are used to investigate the effect of turbulent eddy structure on cell damage. The flow was simulated for classic Couette and capillary tube experiments [3, 4], in order to examine the relation between hemolysis turbulence properties related to the dissipation of turbulent kinetic energy. The hypothesis tested is that eddies that are close in size with the erythrocytes are the ones that are responsible for hemolysis, rather than Reynolds stresses or viscous stresses. We define extensive measures, like the eddy areas for small eddies comparable to the size of the red blood cells, to provide a more general understanding of the mechanical cause of blood trauma. References 1. Quinlan NJ, Dooley PN.. Ann Biomed Eng. 2007;35:1347-56. 2. Aziz A, et al. Ann Biomed Eng. 2007;35:2108-20. 3. Kameneva MV, et al., ASAIO, 2004;50:418-23. 4. Sutera SP, Mehrjardi MH., Biophysical J., 1975;15:1-10.

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