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**Pulsatile Flow and Transport of Blood past a Cylinder: Basic Transport for an Artificial Lung.** JENNIFER R. ZIERENBERG, HIDEKI FUJIOKA, JAMES B. GROTBERG, University of Michigan — The fluid mechanics and transport for flow of blood past a single cylinder is investigated using CFD. This work refers to an artificial lung in which oxygen travels through fibers oriented perpendicularly to the incoming blood flow. A pulsatile blood flow was considered: $U_x = U_0 [1 + A \sin(\omega t)]$, where $U_x$ is the velocity far from the cylinder. The Casson equation was used to describe the shear thinning and yield stress properties of blood. The presence of hemoglobin (i.e. facilitated diffusion) was considered. We examined the effect of $A$, $U_0$ and $\omega$ on the flow and transport by varying the dimensionless parameters: $A$; Reynolds number, $Re$; and Womersley parameter, $\alpha$. Two different feed gases were considered: pure $O_2$ and air. The flow and concentration fields were computed for $Re = 5$, 10, and 40, $0 \leq A \leq 0.75$, $\alpha = 0.25$, 0.4, and Schmidt number, $Sc = 1000$. Vortices attached downstream of the cylinder are found to oscillate in size and strength as $\alpha$ and $A$ are varied. Mass transport is found to primarily depend on $Re$ and to increase with increasing $Re$, $\alpha$ and decreasing $A$. The presence of hemoglobin increases mass transport. Supported by NIH HL69420, NSF Fellowship

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