

Gas Transfer and Hemolysis in Intravascular Lung Assist Device Using PZT Actuator

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In this paper, an analytical solution were developed for the hydrodynamics of the flow through a bundle of sinusoidally vibrated hollow fiber membrane to provide some insight into how wall vibrations might enhance the performance of an intravascular lung assist device. We have shown that the efficiency of oxygen transfer of the IVLAD consisting of HFM improves according to the approved sinusoidal wave at the PZT actuator in fluid flow. The normalized index of hemolysis oxygenator values of the circuit were 0.0014g/mL by exciting a PZT actuator with the sinusoidal wave magnitude of DC 10V and 0.0018g/mL at 50V. A new designed HFM IVLAD in this study demonstrated acceptable level of gas exchange performance with acceptable level of blood compatibility, implying the potential application as implantable lung assist device for patients with acute respiratory distress syndrome.