

Design of Artificial Lung using the PZT Actuator

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The purpose of this work was to assess and quantify the beneficial effects of gas exchange according to the various frequencies of the sinusoidal wave that was excited by the PZT actuator, for patients suffering from acute respiratory distress syndrome (ARDS). The experimental design and procedure are then applied to the construction of the new device to be used to assess the effectiveness of the membrane vibrations. We developed an analytical solution for the hydrodynamics of flow through a bundle of the sinusoidal vibrated hollow fibers with the intention of gaining insight into how the wall vibrations might enhance the performance of the intravenous lung assist device. As a result, the vibration method is very effective in increase gas transport. The gas exchange efficiency for the vibrating intravascular lung assist device can be increased by emphasizing the following design features: consistent and reproducible fiber geometry, and most importantly, an active means of enhancing convective mixing of water around the hollow fiber membranes. The experimental design and procedure are then given for a device used to assess the effectiveness of membrane vibrations.