Acute respiratory failure affects the lives over half a million patients each year, with significant mortality rates. While some patients can be treated using conventional respirators, which ventilate the injured lungs, many others cannot. Providing breathing support independent of the lungs is the principal focus of Dr. Brack Hattler’s research group in the Artificial Lung Laboratory at the University of Pittsburgh. His group is developing next generation artificial lungs or blood oxygenators.

The Device:
- The laboratory’s flagship project is the Hattler Catheter, a unique artificial lung inserted as a venous catheter to provide temporary breathing for patients with acute lung failure. It is intended for patients with acute respiratory distress syndrome, pneumonia and exacerbations of chronic lung disease, as well as organ transplant patients and patients in intensive care units.

Goal:
- The objective is to oxygenate the blood and remove carbon dioxide before it gets to the patient’s lungs, and the lungs will then add whatever help they can.

How it Works:
- The IMO device is several feet in length and consists of about 1000 hollow fiber membranes. Oxygen enters these membranes through an external tube, and flows through the fibers under vacuum pressure.

How it Works (Cont):
- Oxygen within each fiber diffuses through tiny pores in the fiber wall into the blood, and is exchanged for carbon dioxide, which diffuses into the fibers and exits the device through a second tube.
- The inflation and deflation of the balloon draws blood directly across the fiber membranes and greatly facilitates the exchange of oxygen and carbon dioxide.
- Since the balloon essentially pumps the blood over the fibers, the device can be designed to offer little impediment to blood flow returning to the heart.

Economics:
- At a price of $4,000, the Hattler Catheter will reduce costs to the hospital, as well as reducing ICU stays by up to half the time. The combination of lower device cost, plus reduced ICU time could result in savings of up to $15,000-$25,000 per patient.
- The technology has been supported thus far by a $5 million grant from the Department of Defense and another $1.5 million from the National Institutes of Health.
- Alung (owned by inventor Dr. Brack Hattler) is going for FDA approval this coming year although will need additional $200,000 for clinical trials.

Sources:
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