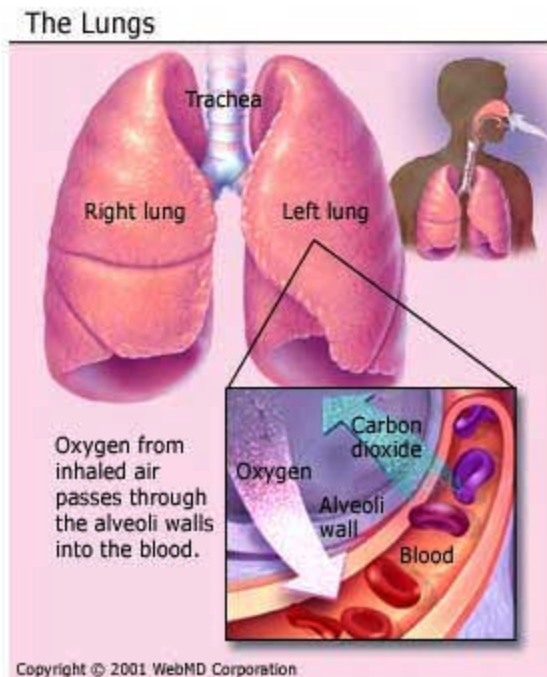


David Marcus
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Biomedical Seminar
Artificial Lungs

About twelve to twenty times per minute, day after day, you use your lungs. Your lungs expand and contract and by doing so supplying life-sustaining oxygen to your body and removing the waste product carbon dioxide. When you breathe the oxygen travels down the back of your throat into your trachea. Your trachea then divides into two air passages called bronchial tubes. The bronchial tube leads to the left lung and right lung. For your lungs to perform optimally, these airways need to be open during inhalation and exhalation, and free from inflammation or swelling and excess or abnormal amounts of mucus. The bronchioles end in tiny balloon-like air sacs called alveoli. Your body has over 300 million alveoli. The alveoli are surrounded by a mesh of tiny blood vessels called capillaries. The Oxygen from the inhaled air goes through the alveoli walls and into the blood directly where it leaves the lungs and is carried to your heart. From Your heart it pumps it through your body to provide oxygen to the cells of your tissues and organs. As the cells use the oxygen, carbon dioxide is produced and absorbed into the blood. Your blood then carries the carbon dioxide back to your lungs through the capillaries, where it is removed from the body when you exhale.



Asthma, Emphysema, Bronchitis, Pneumothorax, Apnea, Pulmonary edema, Smoke inhalation, and Carbon monoxide poisoning are all causes for lung damage. When your lungs are damaged they can not function properly. This is where the biomedical engineers come in. They came up with the idea of implantable lungs.

At present, mechanical ventilators and Extracorporeal Membrane Oxygenators (ECMO) are being used to provide oxygen to the blood in patients. In the future research suggests that the use of an intravascular lung assist device (Hattler catheter) is effective enough for short-term support. Implantable thoracic artificial lungs are still being developed and tested in animals, but may in the future; provide a bridge to lung transplantation.

Intravascular lung-assist devices target short-term assistance, for acute respiratory diseases and are located in the body. These devices can only provide partial respiratory support, and provide oxygen to the blood before it reaches the lungs, to allow the lungs to recover.

Implantable thoracic artificial lungs are far more invasive and technically demanding, but may allow long-term, total or near total respiratory support.

The Intravascular Lung-Assist Devices (Hattler Catheter) and Implantable Thoracic Artificial Lungs are still being developed. Thromboembolisms, arrhythmias, gas embolisms, right ventricular strain and infection are the main causes for concern for both devices and will be the focus of improvement in later models of the artificial lung. With in 1-3 years time this technology will be used on humans.

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