

The Artificial Heart

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The heart is made up of four parts. They are the right and left ventricles and the right and left atriums. The right atrium receives deoxygenated blood from the body. The blood is pumped into the right ventricle where it is then pumped into the lungs to receive oxygen. The then oxygenated blood enters the left atrium where it is pumped into the left ventricle. The left ventricle then pumps the oxygenated blood to the body.

Artificial hearts are used to treat heart failure and are an alternative to waiting for a donor. Heart failure occurs when the left, right, or both ventricles are unable to function properly. They always begin with a failure of the left ventricle and over time progress to including the right ventricle also. The two types of left ventricle failure are systolic failure and diastolic failure. Systolic failure occurs when the ventricle is unable to contract correctly and as a result does not pump enough blood. Diastolic failure also results in not pumping enough blood, but it is caused by the ventricle not relaxing properly which does not allow enough blood to enter it.

The Abiocor artificial heart is comprised of two pumps that act as the left and right ventricles. In between the pumps is an energy converter which is inside a flexible membrane. It is filled with silicone hydraulic fluid. A pump inside of the energy converter contracts against the liquid which expands the flexible membrane causing the left and right ventricles to fill or pump blood. It also include the Implanted TET, External TET, internal battery, and the Patient Carried Electronics (PEC) which all contribute to bringing power to the heart. Also there is the Implanted Controller which

is a computer system which monitors the heart and controls the rate at which it pumps.

In addition to the Abiocor there is also a new design which provides constant pumping of blood throughout the body as opposed to the periodic pumping of the Abiocor or human heart. It is made with continuous flow pumps. Some of the advantages to this design is include its size and efficiency. The Abiocor is very large and can only be implanted in people with large chest cavities while the continuous flow heart is approximately the size of an adult thumb. Also because it works by using only axial pumps it is far more efficient and will last much longer due to having less parts that can break or stop functioning correctly. Some questions have been raised regarding this design because it results in people implanted with it not having a pulse. The long term effects of this on the smaller capillaries in major organs are unknown although tests in animals have yet to show any problems.

Sources

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