

Artificial Heart

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Heart failure is a big concern. What makes heart failure such a big concern and problem to patients is the small number of options available. If a patient needs a new heart he or she has to be put on a waiting list. The amount of hearts available that match the recipient could be severely limited. The fact is that many patients die while waiting for a heart to open up for them.

A temporary fix to this problem is the use of an artificial heart. An artificial heart is just what it sounds to be. It is a prosthetic device that is implanted into a person in order to simulate the function of the heart. The artificial hearts are designed to prolong the life of a person who has a considerably short life expectancy, usually less than a month.

Many attempts at creating an ideal artificial heart have been designed. The first artificial heart, Jarvik-7 was implanted in 1982 into a Seattle dentist Dr. Barney Clark and designed by Dr Robert Jarvik. The heart prolonged the life of the patient by one-hundred and twelve days. The longest lasting patient to be implanted with the Jarvik-7 lasted 620 days.

Despite the value of life attained by this miraculous breakthrough, there were a substantial amount of complications to be worked up. One concern was the size of the machine and mobility. Dr Robert Barney was permanently hooked up to a four-hundred pound air compressor. Another issue was the risk for infection. The earliest designed required tubes to travel through piercings in the skin. This proved to be a prime target for bacteria growth and infection in the body. A final life threatening concern was the risk of clotting. The original design was invented before anatomist had a greater understanding of the cardiovascular system and how blood flow operated. Coarse building materials and turbulence would cause

a clot to build up and break off into the bloodstream and eventually cause thrombosis.

Since the Jarvik-7 two-and-a-half decades ago, technology has been increased immensely to the point where patients can live a normal life with an implanted artificial heart and not have to worry about failure while they wait for a donor heart. Some of the most significant advancements that may be small, but make the artificial hearts better include biosynthetic tissues that are engineered to not generate an immune response from the body. Advanced design technology allows for simulation of most efficient chamber design to prevent blood clots. The understanding of heart rate and pressure in coincidence with advanced barometric aircraft sensors allow for regulation of the artificial heart based on real time needs of the patient. Finally a wireless power technology called Transcutaneous Energy Transfer is used to eliminate infection risks.

The future looks very bright for artificial hearts. A few designs already exist on the market that are approved by the FDA. Currently there is no permanent fix, as all mechanical devices wear out with time. But the lifespan of devices is increasing and the risks associated are decreased.

- <http://www.texasheartinstitute.org/Research/Devices/j7tah.cfm>
- <http://health.howstuffworks.com/artificial-heart1.htm>
- <http://abcnews.go.com/Health/HeartDiseaseNews/Story?id=6129800&page=1>
- <http://www.sciam.com/article.cfm?id=not-just-a-pump&page=1>