

The latest treatment of congestive heart failure, and newest synthetic hearts res...

[Technology](#), [Development](#)



The heart is one of the vital organs in a human body. This is the organ that determines the functionality of the other organism through supply of nutrients and oxygen, and removal of waste products from the body. Once the organ is affected or becomes ineffective, the individual will suffer a number of problems encompassing all the body system. One of the worst heart problems that an individual may develop is congestive heart failure (CHF). The condition renders heart muscles incapacitated to pump blood to the rest of the body. Ideally, the problem start from one side of the heart (left or right), which later engraves the whole organ over time (Goldthwaite, Rosenstrauch, & Oettgen, 2006). The most common cause of CHF is coronary artery disease, which result to poor oxygen and nutrients supply. It is estimated that over 4. 8 million people in America are suffering from this condition.

Adult stem cell therapy

The common management approach is through heart transplant, which has not been effective due to lack of heart donors. Contemporary, scientists have engineered new approach for reducing the rate of individual succumbing to this condition. Such discoveries include use of synthetic heart transplants and more prominent adult stem cell intervention. Stem cell therapy has attracted ample researchers in determining an effective treatment for this condition. Researchers have based their argument on the ability of the stem cell to differentiate to specialized cells. The heart has three key sets of cells that need to be developed in order to arrive at a healed heart.

Cardiomyocyte cells are involved in mechanical function of the heart, vascular endothelial cells vital in internal lining of the blood vessels while

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smooth muscle cells composes blood vessels wall (Goldthwaite, Rosenstrauch, & Oettgen, 2006). Therefore, effectiveness of the stem cell therapy lies in the ability of the cell to differentiate into these sets of heart cells.

CHF causes death of heart cells. As a common rule in the body, the body has to replace old cells and through triggering stem cell differentiation. However, the defective stem cells in the heart may fail to assume differentiation role, thereby leaving the organ with the option to source stem cells from other avenues. Chemical produced by the heart muscle ensnares circulating bone marrow stem cells that differentiate to replace the dying cells. The number of stem cells present in produce by the body reduces with age, a counter current trend with CHF, whose rate increases with age. The fact that the cells from the bone marrow are attracted in the muscle of the heart for replenishing the dead cells forms the bases stem cell therapy.

In the treatment of heart failure, autologous stem cells are injected into the heart muscle and monitored for the development. These stem cells are extracted from the patient's bone marrow or the adipose tissue and deposited as close as possible in the heart. This deposition of cells into the heart muscle is affected by the diseased organ, which suffers the problem inadequate oxygen and nutrients supply. Therefore, the cells differentiation rate is slow compared to that of a healthy heart. In this connection, researchers have indulged in developing the different cell of the heart in the laboratories, then introducing them into the heart. This approach has recorded successful trials in a number of researches. Several hospitals in the developed world have adopted stem cells therapy in treating CHF patients

since the discovery by the University of Buffalo. One such hospital is the Angeles Hospital (Patel, 2005).

In a study conducted by Patel et al in 2005 where 20 patients (10 subjected to autologous stem cell into the body and 10 acted as a control group) were enrolled in the study, there was a remarkable improvement in myocardial function among those who received the stem cells. It is believed that, with this therapy approach in place, the world will record a significant decline in population of individual succumbing to congestive heart failure.

Newest synthetic heart

Difficulties in securing a heart donor to save the thousand individuals suffering from CHF and other fatal heart problems ignited the idea of developing artificial heart. The struggle in arriving at an effective replacement of the heart has taken years with improvement being made of the previous discoveries. Despite these advances, over 200000 patients die of Congestive Heart Failure alone in USA. Since 2000, the rate of morbidity and mortality of those suffering from CHF has been on the rise. In addition, compatibility issues surrounding heart transplant have affected the effectiveness of using natural heart. Mechanism modifies the body to retain the foreign heart leads to a weakened immunity system, escalating susceptibility of other diseases. These reasons among other have accelerated the need to move into the synthetic heart n treatment of heart failures.

The newest approved synthetic heart in the medical field in AbioCor.

However, researchers are still working on the effectiveness of “ Pulseless

Heart”, which is yet to be introduced into the market. AbioCor was approved by the Food and Drug Administration on January 2001. A successful transplant was conducted on July 2 200 (Samuel et al. 2004). The device was the first adventure intended to be used for destination therapy. It was devised in a way that does not necessitate the use of percutaneous lines. The device comprises of two constituents internal and external components. The internal constituent is made up of four parts; thoracic unit, battery, controller and transcutaneous energy transfer. The external components comprise of transcutaneous energy transfer coil, batteries, transcutaneous module and a bedside support.

In a study conducted by Dowling et al, 2003, seven patients were put on AbioCor. The patient recorded significant improvement, but full benefits from the device were incapacitated by already progressed condition, which had resulted to multiple end organ failure. The complications associated to disease progress and effect, other than the device itself led to the patient not to enjoy the remarkable discovery. The initial recipient trials of the device are said to have been conducted on a 59 year old man. The man, who had problems in blood coagulation, recorded improvement in tolerance to anticoagulation drugs. Three months after operation, there was a reason to celebrate the discovery since the patient was able to “ make more than twenty trips out of the hospital” (Dowling et al. 2003. p. 96), which was a problem before instituting the therapy approach. However, the condition of the patient deteriorated after suffering from stroke after eighteen weeks and four days post operatively. According to Samuel et al. 2004, use of the device has opened up a new approach in managing the condition. Several

institutions have installed and adopted the use of this program devise in managing condition such as CHF and fixed pulmonary hypertension.

In conclusion, adoption of technology in the medical field has been of incredible imperativeness. Researches in this field have escalated the rate of generating new approaches in treating of chronic and end stage condition, which are adamant to respond to conventional drugs.

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