

Mending is a
worldwide activity
(refer to figure



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Mending a Broken Heart Essay Heart is the most important organ of the body and the key of blood circulation. It is located beneath the sternum (breastbone) and is about the size of our fist.

The heart beats average seventy beats per minute and pumps about 5 liters of blood per minute, in another term total volume of blood in the human body each minute. Humans are not able to survive without hearts and many scientists have been focusing on technologies to mend a broken, damaged, heart. There are four heart replacement technologies that are most well-known to modern scientists: ' Human Heart Donation', ' Xenotransplantation', ' Tissue Engineering', and ' Artificial Heart'. Each method has rescued many lives who suffered or could die from the malfunction heart. To begin with, I would like to describe about ' Human Heart Donation'. This method, as the name suggests, is a worldwide activity (refer to Figure 1.

) which is an act of replacing the malfunction heart with healthy donor's heart which is donated from charity or possibly individual volunteers. " Donation is key to saving the life of a patient who is waiting for a heart transplant as the severity of the weakened heart is critical." (Donors1.

org, 2018) Figure 1. Global rates of kidney transplantation from living and deceased donors. " Reproduced from Global Observatory on Donation and Transplantation (GODT) by permission of WHO.

"(Who. int, 2018) As such, the situations applying this method, can be when other treatments for heart damage have not worked, which can lead to heart failure in the future. When the operation of heart transportation is done, people will be able to recover in just a few weeks although they will be weak

at the beginning. It is also very crucial to have simple activities to strengthen their body and health; “ pushing, pulling or heavy lifting until your breastbone is fully healed.” (Bhf. org. uk, 2018) Second heart replacement technology is ‘Xenotransplantation’. As the prefix, ‘ Xeno-’ means alien, strange, and guest, this technology, unlike from ‘ Human Heart Donation’, is “ any procedure that involves the transplantation, implantation or infusion into a human recipient of either live cells, tissues, or organs from a nonhuman animal source.

” (Fda. gov, 2018) This technology was developed by the fact that the need for the human organs far exceeds the current low supply. Figure 2. is a statistic that shows thousands of people are waiting for organs.

Figure 2. A quarterly statistic of transplant waiting list in United Kingdom (Organ Donation – English, 2018) To elaborate on, there are advantages of ‘ Xenotransplantation’, not only increasing the supply of source but also the therapeutic use. The technology can play a huge role in certain diseases such as diabetes and neurodegenerative disorders, in situation where human materials are not usually available. Third of all, there is a technology called, ‘ Tissue Engineering’. The heart muscle disease has been recognized at tipping point for progression to heart failure.

National statistics from United States indicates that there are over five million people damaged by heart failure each year and about three hundred thousand deaths. Furthermore, the fully-grown heart muscle cells cannot divide into injured cells. The scar tissues result into area of damaged myocardium. Thus, the best approach to solve this issue is to avoid such scar

formation or simply replace the formed scar tissue with functioning cardiac muscle tissue. On the contrary, there are limitations due to short length of cell life and poor cellular integration with receiving the heart tissue. The final technology is replacing the useless heart with 'Artificial Heart'. An artificial heart, indicated in Figure 3, is a "prosthetic device that is implanted into the body to replace the original biological heart.

" (ScienceDaily, 2018) Figure 3. A picture of a man with the 'Artificial Heart' (Baptist-health.com, 2018) As I have mentioned above regarding 'Xenotransplantation', there is a short supply of human organs, thus there is an obvious credit which would lower the demand for heart transplants when using the artificial heart. Moreover, due to components of artificial heart are metals and plastics, the components are not rejected by our body's immune system. On the contrary, patients have to take special drugs to thin the blood cell in order to prevent from strokes. The situations can be serious when they are hurt in some accidents where they bleed a lot. In this regard, I would like to explain about 'Xenotransplantation' in detail. To briefly summarize and outline some emphasis of the previous points, I would like to discuss about its pros and cons and, later on, about its ethical issues.

To begin with, heart transplants can save thousands or more lives every year, however there is insufficient number of human organs donated. The shortage has led to attempts to develop animal organs that can be transplanted into humans. Such developments had resulted in saving lives more than expectations. Furthermore, it decreased the opportunities of organ trading on the black market. The sale of human organs on the black market has been a

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huge issue. Some had kidnapped children to sell their organs for huge amount of money and people died from diseased organs purchased in the black-market.

With this in our head, transplanting with organs from animals, instead of using the organs from human, can tremendously reduce this type of trade. (ConnectUS, 2018) On the contrary, there are some cons, disadvantages, regarding 'Xenotransplantation'. Recipients might be infected by unrecognized infectious agents and tremendous spread of infection through their close contacts or into the huge human population. Referring to the document from the FDA, they commented that "Moreover, infectious agents may not be readily identifiable with current techniques." (Fda.gov, 2018) In addition, there are higher risks of 'Xenotransplantation' due to shorter life length of animal organs.

Massive portion of animal's population have much shorter life length of humans, in another term, means that even though there are high success rate of transplant, there would still be a greater risk of the organs wearing out or dying quickly. Thus, a person would need to have several operations for organ transplants over his or her life as the animal's organs can easily wear out. Furthermore, there is another consideration regarding ethical issues. In current state, it is widely known that many animals for the 'Xenotransplantation' are also susceptible to pain and suffering similar to humans. Some who supports 'Xenotransplantation' insist that there aren't any logical evidences to differentiate the pain or suffering felt by animals from those felt by humans. Pain is pain wherever and whenever it is caused. I strongly believe that it is wrong to weight the suffering less heavily

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that those of animals to humans. We are all similar living organisms and we all have rights to live and to choose freely.

In this regard, when evaluating the acceptability of using the organs of animals for 'Xenotransplantation', a judgment must be made regarding whether the pain and suffering to animals is justified by the benefits for the humans. (Nuffield Bioethics, 2018) Therefore, one of the four heart replacement technology, 'Xenotransplantation' should be considered more before using them for humans as animals also feel the same amount of pain like humans do. Also, each of the four replacement technologies need to be developed by future scientists in order to save more than millions of lives who are currently suffering greatly from broken heart.