Artificial Organs: Good or Bad?
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In the 1999 film *Bicentennial Man*, Robin Williams plays the character of Andrew Martin, a unique robot who has the ability to understand and experience human emotions. Because he is a robot, he outlives several generations of his family. Andrew grows tired of seeing all the people he loves grow old and die, so he sets out to make himself human by creating artificial organs to replace his robotic circuitry. His artificial organs are then used mass produced to help everyone. By the end of the movie he has created artificial organs for every major organ in the human body. In the world today, we are striving to create organs much like those Andrew created. If this ability was attained, what ramifications would we face by replacing ourselves with artificial organs? I will explore similar questions and possibilities later, but first I must give you a little history of artificial organ research and a look at how it is used today.

Research into developing ways to prevent illnesses such as kidney failure began as far back as the late 1800’s.¹ Scientists first tried their luck by experimenting with kidneys. Most methods of that era however, consisted transplants of animal organs into humans. While the immediate results were good, the patients died about 2 weeks after the procedure. In 1933 the first human-to-human kidney transplant was performed.² Once again, the initial results were excellent, but death followed shortly thereafter.

As research continued, the other discoveries were made that aided scientists in their efforts. For example, in the 1940’s Sir Peter Medawar discovered that the human immune system rejects cells or organs deemed “foreign” to the system. The development and use of immune suppressant injections in the 1950’s resulted in some transplant success. Finally, in 1954 Joeseph E. Murray performed the first truly successful kidney transplant without any immunosuppressive medications. These successes lead to the discovery of tissue typing of organs. Tissue typing is the process of matching the blood and tissue type between donor and recipient.

Although the kidney is not the only organ to go through similar research and development processes, it is a good example. While much was accomplished in the early 1900’s, the majority of the development and success of artificial organs has occurred in the last 50 years.

The developments of these organs have evolved into many of the machines or processes that thousands of people use everyday. For example, modern day surgery would not be possible without artificial heart and lung support. All of these advances in technology allow the creation of improved procedures or devices to be used in the future.

In fact, nearly 1 out of 10 people in the US have an implanted medical device. While this statistic is staggering to think about, it is a little misleading about the integrity of artificial organs. Most of the artificial organs today are not permanent transplants; we have not reached that mark yet. In reality, they are temporary devices used primarily for

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3 Lenoir, pg. 2.
4 PS. Malchesky, Artificial Organs and Vanishing Boundaries, Pg. 77
5 Malchesky, pg. 82.
people on long transplant waiting lists. For example, a man with a failing heart may have a temporary (artificial) heart transplanted allowing him to function regularly while he waits to receive his real heart.

The heart is one of several primitive artificial organs. There are also artificial lungs, ears, eyes, kidneys, pancreas, liver, and reproductive organs. As I mentioned before, all of these artificial organs or implants are not permanent solutions. Hopefully in the years to come we will see permanent versions of these organs.

While we are waiting for these permanent organs, there are devices being tested that may revolutionize the way we fight particular diseases. For example, Dr. Tejal Desai has created a biohybrid device implanted in a patient that can secrete regular dosages of insulin to a diabetic, without being attacked by the immune system. While this device is still being tested, it is a perfect example of technology on the horizon that may change how we fight diseases such as diabetes.

The future of artificial organs looks bright as labs across the world are researching numerous artificial organs. At the McGowan Center of Artificial Organ Development at the University of Pittsburgh, tests are being done on full scale, permanent artificial kidneys and blood vessels. The University of New Mexico is working on a muscle

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6 Lenoir, pg. 2

7 Dr. Tejal Desai. Boston University College of Engineering.  
http://www.bu.edu/dbin/bme/faculty/?prof=tdesai

replacement for people with muscular dystrophy. These new artificial advancements are sure to be seen within the next decade.

And in the more distant future, researchers are already working on computer chips that will be implanted into the brain or spinal cord to give artificial vision to the blind, hearing to the deaf, and speech to victims of stroke. We can expect to see the first trials of these devices to come in the next 50 or so years.

These new technologies and procedures will soon be able to alleviate many of the illnesses that we struggle with today. It is imperative that we continue to research these artificial organs and computer chips, because it will be sooner rather than later that we ourselves will be relying on them to cure our sicknesses. As Max More said, “We should not reject the products of applied science; neither should we implement powerful new technologies without foresight and proactive preparation.” We must find a balance between utilization of new technology and taking advantage of it.

Now I’d like to speculate a little bit about what the distant future may hold if we do indeed take advantage of technology. Please keep in mind that these are hypothetical situations, but also, this doesn’t mean that they are total fantasy. According to many of the articles I have read in this class, the general consensus is that artificial technologies are going to bloom within our lifetime, and the era of artificially intelligent robots is rapidly approaching. I am trying to ask some thought provoking questions to help let your imagination run with the idea of organ replacement.

9 Ibid, pg. 2
10 Ibid, pg. 2
How long will it take before we reach the same status of Andrew Martin from *Bicentennial Man*? How long will it be before every organ can be replaced without any chance of failure or immune system rejection? If we’re already finding ways to replace even our blood vessels, is there anything we can’t replace or enhance?

Let’s suppose that we do have this ability, and that there is no organ, vessel, muscle, or tissue that we cannot replace or enhance, and that there is no limit to who may receive the organs. The life span of the average person would drastically increase. Is this fair? How far should we let people take this? What is to stop someone from replacing everything in their body with artificial organs?

Now let’s think of the economic ramifications of the dramatically increased life span of people worldwide. Overpopulation will become a major issue. Will worldwide birth control programs be implemented to reduce the stress of overpopulation? With an increase in people comes an increase in the amount of food required to feed them. Today in 2005 we are already fearing problems of overpopulation and the earth reaching its maximum support capacity as early as 2050.\(^\text{12}\)

Consequences aside, once people have the means to cheat death, they will. As soon as it is available, anyone and everyone with the ability to afford it will replace their organs. For example, Hollywood movie and music stars will want to preserve their immaculate appearances. What if the price of the organ replacement procedure doesn’t become affordable for everyone? It won’t be long until there is a vastly stratified population between the people who can afford the new transplants, and those who can’t.

This stratification will quickly put enormous pressure on the economy. What happens if the price does become affordable for everyone?

How do we plan to prevent against this technology from being taken advantage of? How do we stop it from becoming just another procedure you can get from your local plastic surgeon? I think that we must put legislation into effect limiting or setting guidelines for organ replacement. We cannot let organ replacement become a mainstream commercial business. We have to stipulate that organ replacement can only be used for life-threatening medical illnesses or special circumstances. If we don’t make laws prohibiting people from taking advantage of the technology, than those with the ability to do so, will.

Regardless of legislation regulating organ replacement, the classification of these modified humans must be considered. For example, if someone were to replace all their organs with artificial organs and electronic enhancers, are they still considered human? If they are still considered human, are they treated the same as those who are not enhanced? I can easily see discrimination and prejudice forming between those who are artificially enhanced and those who are all natural. A good example of such discrimination is the movie *Gattaca* (1997), where there are the elite (enhanced) people who look down upon those that are natural (God-children).

How can someone with the majority of their body made of artificial organs still be considered a human? I don’t know. There must be a line drawn somewhere that distinguishes between human and cyborg. Will there be a certain percent that someone would have to be in order to be considered a human? Does someone have to be at least 51% human, and once they fall below the 50% mark they are considered cyborgs?
Several weeks ago, one of my fellow students gave a presentation on Robot Rights. He talked about two periods of the future: when robots try to humanize themselves and take over the human race, and an age where humans will roboticize themselves in order to reclaim their dominance over the robot race. Assuming that I didn’t completely misunderstand or misinterpret what he was saying, I can see how artificial organs could possibly lead to such revolutions. These periods of struggle are based on the assumption that technology will reach a certain level. More specifically, that the artificial intelligence in robots will be indistinguishable from that of an actual human being.

Looking back at the movie *Bicentennial Man*, Andrew Martin, a full-fledged robot, humanizes himself through development of artificial organs, and by the end of the movie he is officially deemed a human. As we continue to develop artificially intelligent robots and they begin to think for themselves, they will want to become as human as possible. Artificial organs, like those Andrew Martin created, are perfect for accomplishing that task. Once the robots humanize themselves into “superhumans”, what is to stop them from overtaking us?

On that same note, we humans will be able to use that same technology to roboticize ourselves. We will be able to replace parts of ourselves and enhance ourselves to become our own race of “superhumans”. Once we become superhumans or cyborgs, we will be able to overtake the robots and reclaim our dominance. Of course this seems like science fiction fantasy, but to some experts, these periods of struggle for dominance between humans and robots, is not so far fetched.
Now I would like to make some personal predictions of what may happen in the future. I do think that we will continue to make breakthroughs in medical technology allowing us to replace organs with artificial ones. I also believe that we will create computer chips giving partial sight to the blind, hearing to the deaf, and mobility to the paralyzed. These are all realistic goals that we will reach in my lifetime. As these technologies continue to grow, legislation will undoubtedly be passed about how and when they can be used. As far as the struggle for domination between artificially intelligent robots and humans, I don’t have any input. I just know that if/when it happens, artificial organs and enhancers will play a major role.

In conclusion, artificial organ research and development has been going on for decades. We have made a lot of progress in the last 50 years due to other scientific discoveries. As our technologies increase, we must have the forethought to prevent them from being taken advantage of. Development of artificial organs is without a doubt something that we must pursue, but we must do so intelligently.

Works Cited


