The First Human Heart Transplant: An Event That Shaped the Future of Medicine

By Eamon C. Lujan

Junior Division

Historical Paper

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Introduction

Today, 113,000 people are currently waiting for a life-saving organ transplant. In 2018, 35,629 received organ donations, and 17,000 people donated in that same year. Today, 95% of U.S. adults agree with and support organ donation. Out of those adults, only 54% are actually registered as organ donors. There are 138 million people over the age of 18 who are registered organ donors (organdonor.gov, 2017). Eamon Lujan, a student from Euclid Middle school, received his life saving heart transplant 14 years ago when he was 3 months old. Eamon reflects on how far we've come in our quest to successfully transplant organs. "For centuries, people thought that organ transplantation was impossible," he says. "Throughout history, it certainly was impossible, due to a lack of medical resources and knowledge. That all changed after scientists started to understand why our bodies would reject organs. We only started to consider it a possibility after the first human heart transplant was performed" (Eamon Lujan, 2019). On December 15, 1967, Dr. Christiaan Barnard performed the first successful human heart transplant in history, astounding medical personnel and regular folks alike. The patient died a little more than two weeks later due to rejection, but this was still counted as a massive triumph due to the fact that the heart did indeed function properly before rejection. This proved that heart transplants were possible, and prompted doctors to reignite interest in transplantation and look further into immunosuppressants.

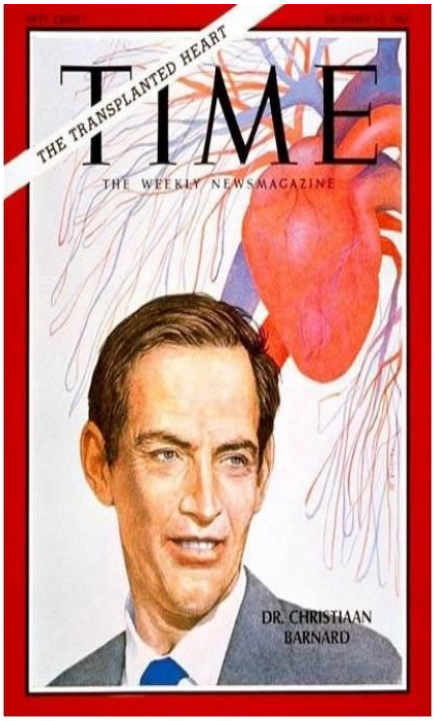
Gods, Monsters, Ram Testicles, and Host Immune Response

The idea of human organ transplants or body part transplants have been around since ancient times. Egyptians and other civilizations have works depicting the transplantation of whole legs or arms. Many ancient gods, deities, and monsters depict man and animal as one. Ra, the Egyptian god of the sun, had the head of a falcon and the body of a man. The Minotaur

was a very large bipedal bull monster, born partially from man. The Sphinx has the head of a woman, the body of a lion and a snake for a tail. Obviously these animals never existed, but the concept of mixing and matching animal parts with humans has always intrigued mankind. In the years leading up to the roaring 20's, doctors had been experimenting with animal testes to create a "youth serum" (Tilney, 5-10 and 27-33). Despite many odd attempts at injecting animal sperm and testes into people's blood stream and in their drinks, it can be soundly concluded this does not give a man his sexual energy back. Please don't try to mix ram testes into your morning coffee. Scientists started to do odd kidney based experiments with dogs to understand human kidneys better. These experiments soon progressed into what can be regarded as the first actual successful transplant between two identical twins. This only solidified what scientists and doctors already knew about host immune responses. Two people of exact genetic tissue can have a organ transplant without rejection. Your immune system is what protects your body from infection and other foreign bodies. Many common immune responses include a runny nose, inflammation, coughing and fever. These are all methods and tactics a sick body's immune system will employ to trap and stop infection as quick as it can. The immune system is an incredibly important part of our body, but it's methodologies backfire when it comes to organ transplants. The immune system is trained to get rid of anything that doesn't belong there or match it's genetic material. Transplanted organs kick this response into overdrive due to its genetic dissimilarities, and the organ will soon be torn apart because of the immune systems reaction (Tilney, 58). This was the one thing separating doctors from success and constant failure.

A Groundbreaking Operation

It was previously unknown whether a fully transplanted heart could function in a new body or even live long outside the body. It was nothing short of a miracle when the first heart recipient, Louis Washkansky, had the heart start beating inside of him and supplying blood to his body. Louis Washkansky was in end stage heart failure and it was a race against the clock. The doctors found a donor who could donate but the main issue was skin color, since they were a team of all white doctors working in Africa. They were concerned they might get accused by the government of “experimentation on black people.” Despite the fact that wasn’t the team’s intention, they stayed away from the donor. It was an incredibly difficult decision considering they may have sealed Washkansky’s fate. Ten days later, a white woman named Denise Darvall was pronounced brain dead after a car crash. Many many hours later, Louis Washkansky now had a donor heart.



December 15, 1967, Time Magazine, showing Dr. Christaan Barnard

A portrait of Dr. Barnard as the cover of Time Magazine, some time after he performed the first human heart transplant

Doctors had managed to keep a heart alive long enough outside the body to attach the veins and arteries together. Because of that, Dr. Barnard was widely regarded as an international celebrity. Washkansky lived for a remarkable 18 days after his transplant, which was astounding. The transplant was performed at Groote Schuur Hospital in South Africa. Dr. Barnard managed to unite medicine, media, and society in a way that had never been done before (Marina Jouert, 2017). Lots of different

politics, ethics, morals, and beliefs came in the way of triumph. Dr. Christiaan Barnard recalls the drive home the morning after. He called the hospital's superintendent to let him know what had happened the night before. "No, it wasn't dogs. It was humans … two humans" (Barnard, 1967).

Back To Square One

Despite Louis Washkansky's death, doctors around the world now knew a human could survive being given a new heart. Upon his death, doctors and scientists were right back where they started. They knew a world of possibilities awaited them where humans could be be given organ donations to extend their life for years and years. Yet their age old enemy, organ rejection, had claimed their triumph and turned it right back into a tragedy. They had no true effective means of immunosuppression on humans. Azathioprine had been found years earlier to have immunosuppressant qualities that could work to keep an organ from rejecting. Most modern transplant patients now take heavy immunosuppressants for a month or so after the transplant and lighter doses once the organ settles. Azathioprine is commonly used in conjunction with Cyclosporine, Tacrolimus or Prednisone to prevent rejection. At the time though, they had realized it may not have been the wisest idea to give Washkansky heavy doses of radiation before his transplant, a common but experimental form of immunosuppression at the time (Tilney, 67-68). Along with this, Washkansky and Darwall's privacy had been destroyed by the lack of medical laws and media coverage. Everyone knew them and their families. This was one of the events that later influenced lawmakers to create HIPAA, the set of laws protecting medical records.

Reignited Public Interest and Successful Immunosuppressants

Despite being put back to square one, the world had a newfound interest in organ transplantation. The year after the first heart transplant, scientists performed a non related bone marrow transplant. It was used to treat a young child's severe combined immunodeficiency disorder. When the first heart transplant was performed, patient and donor privacy was severely breached. Dr. Christiaan Barnard was now a world renowned celebrity. Scientists were still transplanting and working day in and day out to find a new immunosuppressive substance. It took ten years until a man named J.F. Borel found a lone agent in a species of fungi to have nontoxic immunosuppressive qualities. The researchers at Sandoz had a research project to find antibacterial medicines in fungi around the world. In 1962, they isolated an agent in a fungi and named it Ovalacin. Despite being 600 times more potent than Cyclosporine, it was found to have toxic qualities and failed testing. In 1970, scientists created a "general screening test" to find the features of different fungi. Dr. Borel found his sample to have high amounts of cyclosporine, which he concluded may be an immunosuppressant. (Moore, 2016) They injected it into mice and took daily blood tests to monitor their T and B cells. Sure enough, after a week, the mice were found to have fewer white blood cells. This was all a result of the first heart transplant, with many researchers on the lookout for immunosuppressants. Cyclosporine may have been overlooked in any other situation. Using this new medicine, transplants suddenly started to work for a week. Then they worked for a month. Two months, three, four, six, a year! Used in conjunction with Azathioprine and Prednisone, they created the dream combo for transplant patients.

Where Are We Now In the Modern Field of Organ Transplantation?

Eamon Lujan was a pioneer in the transplant field in his own way. Born with Hypoplastic Left Heart Syndrome, he was the first child in Colorado to receive an organ with a non matching

blood type. Dr. Lori West, a pediatric cardiologist from Canada, surmised that when babies are born, their immune systems are simply a blank template. They haven't yet learned to fight off all the diseases in the world, and they hadn't yet learned how to react to other blood types, especially if they're on a cocktail of medicine due to a congenital defect. This means they don't have the same immune response as a grown child does to a non matching blood type in a organ. The procedure was first performed on children in Canada. These cases were found to be successful, and soon select hospitals in the U.S. were cleared to try the procedure. Eamon Lujan was the first child in Colorado to receive a non matching blood type heart. It worked like a charm. On a recent visit to Children's Hospital Colorado for a checkup, he asked his transplant coordinator if non matching organs were common for infants since his experimental transplant. He learned that he had helped to contribute to what is now a common, nationwide practice. Organ donation is a daily occurance. In 2017 alone, about 95 transplants were performed every day (Organdonor.gov, 2017). When you go to renew your license, you're always asked if you want to become an organ donor. Organ donors are given a small heart in the corner of their license, and their organs go to many different people in the event of their death. Their organs go out to save and enhance as many as 8 lives (Organdonor.gov, 2017). If anything had gone wrong more than 50 years ago during Dr. Barnard's historic surgery, Eamon Lujan would not be alive today. The public would have doubted the possibility of organ donation. Yet Dr. Christiaan Barnard didn't fail us. We even have full hands being transplanted to people. In the next 50 years, we'll be imitating those ancient photos where whole legs were taken off and new ones were given. Despite the failure, experimentation and death of Louis Washkansky, we overcame our tragedies and turned them into modern medical triumphs.

Annotated Bibliography

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Wilke, Marelize. “Chris Barnard's First Heart Transplant – the Night He Stared into an Empty Chest.” *Health24*, 29 Sept. 2017, www.health24.com/Medical/Heart/Heart-transplants/chris-barnards-first-heart-transplant-the-night-he-stared-into-an-empty-chest-20170929.

This showed me Groote Schuur hospital and the museum that currently stands there.