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**Head transplantation**  
**Can it be done?**

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**Date of submission:** 5/5/2018

This report will cover the activities of the second year medicine, basic medical science.

## **Abstract**

Since the turn of the last century, the prospect of head transplantation has captured the imagination of scientists and the general public. The possibility of a human head transplant poses unprecedented philosophical and neuroethical questions. Principal among them are the personal identity of the resultant individual, her metaphysical and social status: Who will she be and how should the “new” person be treated - morally, legally and socially - given that she incorporates characteristics of two distinct, previously unrelated individuals, and possess both old and new physical, psychological, and social experiences that would not have been available without the transplant? This report will be discussing the history of the technical hurdles that need to be overcome, and determine if it is even possible to perform such a procedure on humans today.

## **Introduction**

A head transplant is an experimental surgical operation involving the grafting of one organism's head onto the body of another; in many experiments the recipient's head was not removed but in others it has been. Experimentation in animals began in the early 1900s. As of 2018, no durable success had been achieved.[1][2]

## **Discussion**

Switching heads sounds pretty “Frankenstein” for sure. It sounds like a plot from a horror movie. But scientists believe a human head transplant could soon become a reality. In 1954, Russian doctor Vladimir Demikhov performed a series of experimental operations creating two-headed dogs. He successfully grafted the head and forelegs of one dog onto the neck of another. Amazingly, both heads could see, hear, smell and swallow. The longest any one of his experimental animals lived was 29 days. This limited survival was mainly due to an immune response of the recipient to the donor. Fast-forward to 1970 in the United States where head transplant experiments were attempted with rhesus monkeys. Dr. Robert White in Cleveland was able to perform a head transplant where the monkey survived neurologically intact for 36 hours, although it could not move. After nine days, the head was rejected by the monkey's immune system, and the animal died. The largest obstacle cited by the transplant team was the inability to connect the spinal cord.[3] The importance of connecting the head to the spinal cord is to conduct motor and sensory information and to coordinate certain reflexes and central pattern generators.[4] Since then, experiments have continued in China with mice, and some progress has been made in the understanding of spinal cord connection. And while nothing has been tried yet with humans, an Italian surgeon and member of a think tank devoted to the advancement of brain stimulation named Sergio Canavero is convinced he has a method to transplant a human head that will work and is gearing up to try it out.[3] Dr Canavero claims that bathing the spinal cord in a chemical called polyethylene glycol could provide sufficient stickiness for a repair to “take”. Even so, the logistics of such a transplant are mountainous. First, two surgical teams are required, and must operate in the same theatre in tandem. The donor head and recipient body (from a brain-dead individual) must be cooled to minimize oxygen requirements; and, for both heads, the neck tissue and blood vessels cut. The blood vessels are temporarily plugged back together using small tubes. Then both spinal cords are cut as cleanly as possible. The teams then swap the heads over, and get to work on the transplant. The spinal cord ends are washed with the polyethylene glycol and the

muscles and arteries are stitched together. The new patient is put in a coma for up to a month, and electrical implants used to stimulate the spinal cord, in the hope that nerve connections will grow. When the patient wakes up, Dr Canavero claims, he or she will be able to move, feel their face, and speak in their own voice. Walking would take a year of physiotherapy. And, of course, immunosuppressant drugs are a life-long must. The biggest barrier will be social acceptance: heads occupy an understandably iconic role in the way that we view our own bodies, and the bodies of others. Heads contain brains, and therefore our minds and, for the spiritually minded, the soul. Faces betray our emotions. That makes both headless and disembodied heads peculiarly frightening concepts.[5] Some other challenges are, some nerves associated with the vocal cords loop down from the brain, down the neck and back up again. Reconnecting them may pose a larger challenge to the surgeons, and speech may be affected. The esophagus might not be totally leak-proof after reattachment, leading to potential complications with digestion.[6] The vertebral arteries that travel within the bone are smaller and would be a whole new challenge and given these arteries supply the brain stem and posterior part of the brain any debris or gas bubbles entrained will probably cause death.[7] Thirty-six hours of surgery, years of therapy and \$11-13 million later, done. Seems pretty easy, no?

## Conclusion

In conclusion, if head transplantation could be done, it will lead to a new era in science & medicine. Imagine if it becomes just an ordinary procedure to do. what this could do to the world. Disabled people actually being given the chance to walk again, people with cancer getting a new body to live a normal life, and if you're overweight and you don't feel like working out, just take your head go to a doctor and place it on a thin body...fascinating, isn't it? Can it be done? We'll find out in the next coming years.

## Reference

1. Lamba, N; Holsgrove, D; Broekman, ML (December 2016). "The history of head transplantation: a review". *Acta neurochirurgica*. 158 (12): 2239–2247. doi:10.1007/s00701-016-2984-0. PMC 5116034 Freely accessible. PMID 27738901.
2. Furr, A; Hardy, MA; Barret, JP; Barker, JH (May 2017). "Surgical, ethical, and psychosocial considerations in human head transplantation". *International journal of surgery (London, England)*. 41: 190–195. doi:10.1016/j.ijssu.2017.01.077. PMC 5490488 Freely accessible. PMID 28110028.
3. Garden, H., Medicine, M. and Treatments, M. (2018). How Human Head Transplants Could Work. [online] HowStuffWorks. Available at: <https://health.howstuffworks.com/medicine/modern-treatments/human-head-transplant2.htm>.
4. Yıldız (2018). Head transplant yildiz harun. [online] Slideshare.net. Available at: <https://www.slideshare.net/offizier34/head-transplant-yildiz-harun>.
5. Ft.com. (2018). The long, unnerving history of the head transplant. [online] Available at: .
6. Garden, H., Medicine, M. and Treatments, M. (2018). How Human Head Transplants Could Work. [online] HowStuffWorks. Available at: <https://health.howstuffworks.com/medicine/modern-treatments/human-head-transplant4.htm>.

7. Anon, (2018). [online] Available at: <https://www.quora.com/What-are-the-challenges-of-the-new-head-transplant-surgery>.