Perspective on Visual prosthesis (Bionic eye).

Shamim Ahmad*

Department of Ophthalmology, Aligarh Muslim University, Aligarh, India

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Description

The bionic eye is an electrical prosthesis surgically implanted into a human eye to enable for light transduction (the conversion of light from the environment into signals the brain can process) in persons who have serious retinal impairment. The retina is a light-sensitive tissue layer in the inner eye that converts images from the outside world into neurological impulses, which are subsequently transferred through the optic nerve to the thalamus, and eventually to the primary visual cortex in the occipital lobe of the brain. Middle-aged or older people with very impaired vision due to age-related macular degeneration or retinitis pigmentosa are the most likely candidates for a bionic eye. In order for the bionic eye to function as intended, certain retinal ganglion cells must stay intact while the retina is injured by those diseases. Affected persons must have been able to see at some point in their life in order for the gadget to function by creating nerve connections in the brain.

About the study

With approximately 40 million people globally suffering from blindness and another 124 million suffering from low vision, it's no surprise that scientists are working hard to find new techniques to restore vision. The creation of a so-called bionic eye or bionic eye implants is one such endeavour.

The goal of bionic eye researchers is to create technology that is as effective for visual problems as cochlear implants are for hearing disabilities. However, the strategies used by different scientists to accomplish this vary. Furthermore, when compared to cochlear implants for hearing loss, bionic eye technology is still in its infancy. There are several bionic eye implants under development, but only one is currently available in the United States, and it is solely for blindness caused by certain eye conditions. However, as research progresses, high-tech artificial eyes may soon aid an increasing number of individuals.

Bionic eye implantation is also rendered useless if the optic nerve or visual brain have been severely damaged. An external camera and transmitter, as well as an internal microprocessor, make up the bionic eye. Before transmitting high-frequency radio waves, the camera is put on a pair of spectacles, where it organises the visual stimuli of the environment. An electrode array is surgically implanted into the retina to make up the stimulator microchip. In place of degraded retinal cells, this acts as an electrical relay. The stimulator receives the radio waves released by the external camera and transmitter, and then fires electrical impulses. The impulses are relayed by the few remaining retinal cells, which then transmit them to the optic nerve pathway as normal, resulting in vision. In 2012, a basic form of the bionic eye was implanted for the first time. The patient, who had retinitis pigmentosa and had severe visual loss, said he could see light but couldn't tell the difference between things in his environment. Bionic Vision Australia, an Australian firm, manufactured the first model. Since then, more improved technologies have been created and deployed in newer versions implanted in patients with retinitis pigmentosa. Patients have been able to see glimpses of their surroundings, allowing them to make out abstract images, yet their vision has not totally recovered.

Conclusion

Further research could improve the bionic eye's level of sharpness, and alternative materials, such as diamond, are being evaluated for their suitability in the implant. The long-term consequences of implanting a bionic eye are unknown.

*Correspondence to

Shamim Ahmad

Department of Ophthalmology

Aligarh Muslim University

Aligarh, India

E-mail: shamimshamim@rediffmail.com

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