Eye Technology

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ELE 282
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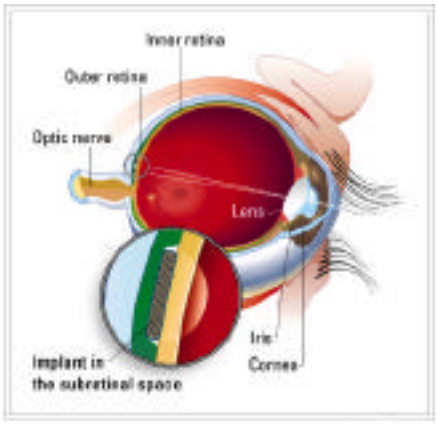
The eye is the sensory organ that provides the body with the most information of its environment. Blindness is classified as having a vision worse than 20/400, which means, that a person can see an object at twenty feet with the clarity of someone with normal vision who sees an object from 400 feet away. Blindness has been researched for centuries because of this crippling effect. Isaac Newton did testing of how pressure on the eye effects vision and color loss that dates back to 1666. And nowadays we are making strides with research and product development to help cure or ease people afflicted with blindness. According to the WHO (World Health Organization) 44 million people in the world are blind. This demographic cost 16 billion dollars in wage losses and care to families every year. Out of that, 43% are caused by Cataracts, 15% are caused by Glaucoma, and 11% are cause by Trachoma. Vitamin deficiency, Retinitis Pigmentosa, and Macular Degeneration are less likely causes, and in the recent years, there has been a vast improvement in technology to help these afflictions.

Retinitis Pigmentosa and Macular Degeneration, are diseases that slowly disable the photoreceptive cells in the retina. These photoreceptor cells are known as rods and cones and are located in the neural tunic of the eye (retina). Rods are numerous and transmit light in black and white, and Cones are much less numerous and transmit color and detail. There are two prominent research projects going on now to cure RP and MD. The first is known as the Artificial Silicone Retina microchip which is developed by Optobionics. It is currently being tested in patients and is looking for FDA approval. These clinical trials began in June 2000, and have shown safety; none of the patients have rejected the implants, and there have been no noticeable side effects from the surgery or implants. But at this time, the efficacy of the implant, or in layman terms, how well it works, is being taken into consideration. This is because as of yet, they have only been able to restore minor shades and shadows to vision.



Drawing by Mike Zang

The second technology is being developed by John Hopkins University along with the University of North Carolina - Chapel Hill and North Carolina State University, and is called the ARCC. This is a different angle on the ASR chip because it is implanted on the retina, rather than in the sub-retinal space, and acts as neurotrophic photosensitive cells which transfer information to the ganglion of the optic nerve. This also requires the patient to wear glasses which will shoot a laser at the chip to provide it with power, while the ASR chip is self powered through solar cells. But as the ASR chip has failed to show the FDA efficacy; the ARCC plans on giving the patient the ability to read a newspaper by having a 250x250 pixel array.

"The development of retinal prostheses is important, because few other alternatives exist for people who have end-stage vision loss," says Stephen Rose, chief research officer at The Foundation. These technologies are breaking ground for the future, and will lead to the eventual cure of blindness as we know it.

http://www.optobionics.com
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Human Anatomy; Martini, Timmons, Tallitsch; pg. 487-497
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