

Neurotherapia

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Abstract

Scientists know that controlling these signals is equivalent to controlling the body, and that is why they are taking advantage of them to remedy or alleviate a long list of diseases and disabilities. Neuroprosthesis and neuroimplants are devices that, placed somewhere between the brain and an organ or tissue, restore lost power.

Introduction

A large part of spinal cord injuries continue to be the main cause of numerous investigations in the field of neuron rehabilitation. Injury to a high level of the spinal column or spinal cord can cause a total loss of function of the lower extremities and also a total or partial paralysis of the upper extremities.

This will allow people with pathology to carry out daily movements with their hands such as grabbing a glass to drink, water or brush their teeth.

Neuroprosthesis or device implantation is the result of the latest technological advances, mainly in microelectronics, computing and surgery. Currently it is the part of the study that is contributing the most to improving the quality of life of people with neurological injuries.

Neuroprosthesis

Neuroprosthesis is the implantation of a chip in brain with the goal to stimulate a person's nervous system through electrical impulses to improve general motor abilities. The most widely used device in neuroprosthesis is the cochlear implant, used to restore the ear. However, there are also implants that make it possible to restore vision and even cognitive functions, emulating the brain in the latter case.

The first known cochlear implant was created in 1957. Other milestones include the first motor prosthesis for foot drop in hemiplegia in 1961, the first auditory brainstem implant in 1977 and a peripheral nerve bridge implanted into the spinal cord of an adult rat in 1981. In 1988, the lumbar anterior root implant and functional electrical stimulation (FES) facilitated standing and walking, respectively, for a group of paraplegics.

Regarding the development of electrodes implanted in the brain, an early difficulty was reliably locating the electrodes, originally done by inserting the electrodes with needles and breaking off the needles at the desired depth. Recent systems utilize more advanced probes, such as those used in deep brain stimulation to alleviate the symptoms of Parkinson's disease. The problem with either approach is that the brain floats free in the skull while the probe does not, and relatively minor impacts, such as a low speed car accident, are potentially damaging. Some researchers, such as Kensall Wise at the University of Michigan, have proposed tethering 'electrodes to be mounted on the exterior surface of the brain' to the inner surface of the skull. However, even if successful, tethering would not resolve the problem in devices meant to be inserted deep into the brain, such as in the case of deep brain stimulation (DBS).

I. The vision implant

In the normal eye, light information is captured by photoreceptor located in the retina. This information is transmitted to the ganglion cells, where it is interpreted and sent to the brain through the optic nerve.

In a retinal implant, the photoreceptors that stop working in the damaged retina are replaced by artificial rods and rods.

II. Cochlear implants

Cochlear implants are neural prostheses that have revolutionized the treatment of persons with deafness and severe hearing loss. Cochlear implants improve most recipients' ability to communicate and are considered safe and effective for appropriately selected adults and children with severe to profound sensorineural hearing loss. These biomedical electronic devices convert sound into electrical current that stimulates the auditory nerve, resulting in the sensation of sound. In 1985, the U.S. Food and Drug Administration (FDA) approved the first cochlear implant for use in postlinguistically deafened (hearing loss > 100 dB HL) adults aged 18 years and older, who did not benefit from the use of amplification. By 2000, the FDA approval had extended the implantable age to 12 months, and broadened the general hearing criteria. During the subsequent years, advances in technology allowed implants to stimulate different portions of the auditory nerve based on sound frequencies in the incoming signal. At this time in many developed countries, the issues are whether to implant the child or adult with unilateral or bilateral implants and whether to implant the two ears simultaneously or sequentially.

III. Implant cerebral

The emulation of the brain impulse processing function of the neuronal hippocampus to correct irreversible brain damage caused by accidents or diseases such as parkinson's or alzheimer's is possible through the use of neuroprosthesis. Sometimes this implant is also called the BCI (Brain Computer

Interface) . The term brain in this case is use to refer to neruous system.

This type of implant is quantitatively different from the previous ones, since the demanged neuronal ar of the hippocampus is replaced by an artificial device or silicon neurons. The hippocampus is the region of the brain involved in the generation of long-term memory and is responsible for the recognition and indentification of characteristics of object in a collection.

Deterioration or damage tothe hippocampus produces memory disorders.

The hippocampus fuctions as a closed loop system, stimuli from the neocortex enter through the entorhinal cortex and propagate towards the intrinsic subregions of the hippocampus to return again to the neocortex. The intrinsic transverse to the axis of the hippocampus, in a manner similar to a set of circuits interconnect in parallel.

Conclusion

Although technological advances in this field is very wide, there are still obstacles to overcome. The have created biologically realistic mathematical models of the fusion of the brain, produced biomimetic microchips that incorporate these models and integrate them into the central electrical nervous system, developing the duration and quality of material of components, however the biocompatibility between human tissuesnd electrodes varies depending on each person.

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