Brain diseases are a major potential hazard to human life, such as amyotrophic lateral sclerosis, epilepsy,  
dementia, tumors, stroke, cerebral palsy, etc . The initial goal of BCI was the medical monitoring. There is  
abundant physiological and pathological information in the brain waves. BCI can monitor the neuron physiological activities of the brain by analyzing brain waves, providing important evidence for the diagnosis of brain diseases.

the non-intrusive BCI has the performance of security, the quality of the collected signal is poor and  
unstable. The invasive BCI guarantees the strength and quality of the EEG signal but sacrifices security and it also can also decay.

But there is need for more durable materials because Implanted materials tend to degrade too quickly within the body, and neurotech devices have more complex requirements which make this an even more pressing problem .

**The solution**

Scholars have proposed **semi-invasive** **technology** as the solution of above mentioned types of Brain computer interfaces .

Semi-invasive also known as injectable, combines the advantages of non-invasive and invasive, that is, injecting  
through a syringe can accurately target and locate in specific brain regions, which not only ensures safety but also  
improves the strength and quality of EEG signals. This minimally invasive procedure reduces the pain of patients,  
avoids the acute immune response during implantation and minimizes damage to the neural circuit. Further,  
from the perspective of medical transplants, the damaged parts of brain tissue are usually irregular. Compared with the pre-molded invasive BCI device, this injectable type can achieve the effect of tight filling.

Semi-invasive BCI electrodes can be subdivided into extraneural and intraneural electrodes. The socalled  
external electrodes are in conformal contact with the surface of the brain tissue while the internal electrodes are the type of soft penetration. The external electrodes abandon the idea of chip-based, connect electronic devices with the internal structure of nerves, further blur the brain-computer interface, and truly realize the natural relationship between electrodes and biological tissues. Technically, flexible electrodes have gradually transformed from neural probes to bionic chips. The aim of non-invasive electrodes is low elastic modulus, low electrode impedance and compliant mechanical structure to adapt to the dynamic deformation of the brain, making it rely on the natural adhesion to achieve conformal integration, embedded interconnection and three-dimensional interpenetration.

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