Cheap Technology Like Transcranial Direct Current Stimulation (tDCS) Could Help in Stroke Rehabilitation in South Asia

Citation

Permanent link
http://nrs.harvard.edu/urn-3:HUL.InstRepos:13347579

Terms of Use
This article was downloaded from Harvard University’s DASH repository, and is made available under the terms and conditions applicable to Other Posted Material, as set forth at http://nrs.harvard.edu/urn-3:HUL.InstRepos:dash.current.terms-of-use#LAA

Share Your Story
The Harvard community has made this article openly available. Please share how this access benefits you. Submit a story.

Accessibility
Editor, Stroke is caused by a disturbance in the supply of blood to the brain due to vascular pathology, thereby exhibiting a loss of brain function related its vascular territory. Stroke can be either ischemic or hemorrhagic. It is generally recognized that starting an individualized rehabilitation program as soon as possible after a stroke event, increases the chances of a patient recovering lost function sooner and to a greater extent.

Transcranial direct stimulation (tDCS) is one type of Non-Invasive Brain Stimulation (NIBS), which is a technology that holds promise for the future studies on diagnosis and therapeutic applications in different brain diseases. Major advances in this emerging field have been made relatively quickly, from new stimulation protocols for research to their application for the treatment of neurological and psychiatric diseases. But there is a serious question among developing countries with limited financial and human resources, about the potential returns of an investment in this field and regarding the best time to transfer this technology from controlled experimental settings to health systems in the public and private sectors.

With any new medical tool, the scientific community should ask what it offers that established methods do not in terms of diagnostic, prognostic, and therapeutic aspects of clinical practice. A new tool might have several benefits including: earlier establishment of a definitive diagnosis for a given clinical presentation, better prediction of the disease course, further support for sustained and intensive interventions, identification of the most suitable treatment strategy, and improvement of clinical outcome as a therapy itself. Current work indicates that NIBS may show promise in all of these areas.

Stroke is the third most common cause of death and the first leading cause of disability in developed and developing countries (American Heart Association, 2005). According to World Health Organization estimates, 5.5 million people died of stroke in 2002, and approximately 20% of these deaths occurred in South Asia (SA) (Feigin, 2005). Contrary to decline in the incidence of the disease in the Western population, the burden of the disease in SA countries (India, Pakistan, Bangladesh, and Sri Lanka) has inclined and is expected to rise (World Health Organization, 2007). Considering a high population, absolute number of stroke in SA would be in millions. Its consequences are myriad ranging from physical disability to death, to psychologic, social and economic consequences. These consequences do not only affect the individual or his/her family but also society as a whole.

There is not any published study showing that patients affected with stroke related disorder in SA receive any therapeutic treatment related brain stimulation. The main reason for this disparity is the lack of resources in such countries. We therefore propose a simple technique of brain stimulation that seemed long forgotten, but has received renewed attention, named transcranial Direct Current Stimulation (tDCS). This treatment is inexpensive, easy to administer, non-invasive and painless (Fregni & Pascual-Leone, 2007).

Advantages over tDCS by affecting a wider region of brain involving not only primary motor cortex but also premotor, supplementary motor, and somatosensory cortices, all of which have been shown to have a role in the recovery process in various studies (Nitsche et al., 2003). Stroke alters the balance between excitation and inhibition between the hemispheres, which suggests that...
Basic and Clinical Neuroscience

Given the extensive health technologies available, it is often difficult for developing countries to decide which emerging technologies are best suited for their own needs with their current resources. In the long run, maintaining the lifestyle of neurologically impaired individuals can be extremely costly and time-consuming.

tDCS in clinical practice is promising as it gives another opportunity to modulate synaptic strength and brain function through top-down controlled manner, meaning that this intervention could be applied according to its patho-mechanisms and lesion locations of various clinical disorders. Moreover, by combining with bottom-up input like exercise or training, it could be used as additive therapeutic approach. Future Hopes for tDCS in clinical field would be developing more potent and disease-specific stimulation paradigm as well as training protocol for long-term therapeutic effect.

After a decade of speculation and experimentation, NIBS has not yet yielded any treatments that effectively alleviate any disorder. Despite this fact, interest remains high, perhaps due to the intuitive appeal of non-invasive stimulation and modulation of plastic neural circuits. Thus, intermittent treatments directed at the cortex may not be strong enough to provide meaningful change.

Conclusion

tDCS is useful technique to modulate and induce plastic changes in the brain thereby use it therapeutically in various disorders including stroke, which is worth to start to develop in South Asia in many aspect.

References


