IIT Mandi takes diagnosis of neurological problems one step further

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Invents a new technique to detect abnormal brain characteristics associated with Ischemic stroke

Innovators at the Indian Institute of Technology (IIT) Mandi have invented a method to simultaneously study the variations in nerve functions and brain blood flow associated with brain disorders such as Ischemic stroke. The invented method helps in locating and classifying damaged sites (lesions) in the brain, brought about, or leading to neurological diseases.

Results of this study led by Dr Shubhajit Roy Chowdhury, Associate Professor, School of Computing & Electrical Engineering, IIT Mandi, has been published in IEEE Journal of Translational Engineering in Health and Medicine and the team has been recently granted US patent for the invention. Dr Roy Chowdhury has collaborated with Dr Abhijit Das, a neurologist from Institute of Neurosciences, Kolkata, and Dr Anirban Dutta, Assistant Professor, Restorative Neurorehabilitation, Department of Biomedical Engineering, University at Buffalo, US.

The IIT Mandi team's invention is based on the fact that intricate interactions between nerve cells (neurons) and blood vessels (vasculature), called the NeuroVascular Coupling (NVC) that regulates blood flow in the brain. Diseases such as Ischemic stroke adversely affect the NVC. NeuroVascular Uncoupling results in such cases, wherein, the nerve impulses do not trigger the required blood flow. Timely detection of NVC is critical for the prevention, diagnosis, and treatment of such diseases.

"Our method uses a multi-modal brain stimulation system to differentially stimulate different components of the neurovascular unit (NVU) and observes the resultant electrical nerve signals by EEG (electroencephalography) and blood flow by near infrared spectroscopy (NIRS)," explained Dr Chowdhury.

"The simultaneous assessment of nerve function and brain blood circulation would allow urgent treatment decisions to be made quickly in cases of stroke and hypertension," said the lead researcher. The developed device can also help in identifying the progress of diseases such as Parkinson's and can in fact predict occurrence of these diseases even before presentation of symptoms.

The invention by the IIT Mandi team takes diagnosis of neurological problems one step further and will help in better

detection and treatment of these diseases.