Carpe Diem – Seize the Day Blog

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Did researchers really find a way to identify brain tissue causing epileptic seizures? Collaborative research being conducted by a team at Carnegie Mellon and the Mayo Clinic recently discovered that fast oscillations in electroencephalography recorded from the scalp can pinpoint brain tissues that are responsible for epileptic seizures. The research was published in the Proceedings of the National Academy of Sciences (PNAS).

What Did the Researchers Find?
The researchers used non-invasive EEG technology with a novel machine-learning algorithm. They found that they could "automatically identify and delineate concurrent high-frequency oscillations and epileptiform spikes." This is a link that relates to epilepsy, and it is hoped that before long, the information garnered from the study could help to change the realm of epilepsy treatment. There are hopes that it could help people to rethink the way imaging and treatment are provided for these patients.

Epilepsy affects many people around the world. It is one of the most common types of neurological disorders and it is estimated that there are at least 70 million people who have epilepsy. It does not seem to have a preference when it comes to affecting people. Epilepsy is found in people of all ages, genders, races, and ethnicities. Currently, there is no cure for epilepsy.

However, there are some treatments available. In some cases, medication can work well as a treatment. However, about 33% of patients with epilepsy do not respond to the use of medication. They still have seizures. Many of the patients choose to have surgery that will remove the tissue in their brains that are thought to be causing the epilepsy if the correct tissue can be identified. This is an invasive procedure, but patients often choose this option in the hopes that they can reduce or eliminate their seizures.

To find the correct areas of the brain for surgery, the doctors will often have to use intracranial electroencephalography, which requires holes to be drilled into the skull or the removal of part of the skull so electrodes can be placed on the brain. This is time-consuming, as it could take weeks for a seizure to occur and be monitored.

The new technology from Dr. Bin He and his team from Carnegie Mellon, along with the Mayo Clinic, can provide a faster, cost-effective, and noninvasive imaging option for these patients. This has the potential to make it easier for doctors to find the areas of the brain that are causing the seizures, so they can determine whether surgery is a viable option for the patient.

The Technology Holds a Lot of Potential
This is not the first research to be done in this area, but it stands out from the previous work done in the field. The new technology will discover and automatically record "the novel link between the high-frequency oscillations and epileptiform spikes".

Dr. He says, "Over the years, HFOs have been identified as a promising biomarker for localizing epileptogenic brain tissues and potentially guiding neurosurgery correlated with the origin of seizures. Challenges exist in that there are both physiological and pathological HFOs. Only pathological HFOs are tagged with epilepsy and helpful for clinical use, and unfortunately, differentiating between the two is highly complicated using current practices and methods. Our team hypothesized and proved through morphological and source imaging evidence that pathological HFOs can be identified by the concurrence of HFOs and epileptiform spikes, all recorded noninvasively over the scalp."

Dr. He believes that if the technology goes to medical centers and hospitals, it has the potential to be life-changing for many patients. Currently, the researchers want to expand their studies to more patients.

Editor's Note: The Carpe Diem – Seize the Day Blog will be distributed and posted weekly.
Always remember – **CARPE DIEM – SEIZE THE DAY!**

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