Drug could reverse scourge of cerebral malaria for survivors

May 1 2012

MSU is teaming up on a clinical trial in Africa with Bio-Signal Group, which has created a portable, wireless EEG monitoring device, called microEEG. Credit: Courtesy photo

Michigan State University researchers, with the help of a groundbreaking medical device, are starting a clinical trial in Africa they hope will provide relief for the hundreds of thousands of children who survive cerebral malaria but are left stricken with epilepsy or other neurologic disorders.

The impact of those disorders via loss of human potential and lack of societal contribution is immeasurable, said Gretchen Birbeck, a professor of neurology and ophthalmology in the College of Osteopathic Medicine.

Birbeck is leading the trial in the central African nation of Malawi that will use levetiracetam, or LVT, an anti-seizure medication used in the United States and other developed nations. However, the drug has never been tested to target cerebral malaria seizures.

"Seizure management in malaria endemic regions such as sub-Sahara Africa is challenging because the available antiepileptic drugs can suppress respiration, and assisted ventilation is unavailable," Birbeck said. "LVT does not have that effect, and if we can optimize a seizure control treatment that is both affordable and accessible in resource-limited settings, we may be able to improve neurologic outcomes in cerebral malaria survivors."

The research, part of MSU's Blantyre Malaria Project at Queen Elizabeth Central Hospital, is being funded with a nearly $2 million grant from the National Institutes of Health's National Institute of Neurological Disorders and Stroke.

Cerebral malaria is a severe form of malaria affecting the brain, occurring predominantly in children, with a mortality rate of 15-25 percent. It affects about three million children every year, primarily in sub-Saharan Africa.

Almost a third of cerebral malaria survivors develop epilepsy or other neurologic disorders, according to research Birbeck – also director of MSU's International Neurologic & Psychiatric Epidemiology Program – published previously in The Lancet Neurology.

The new clinical trial will test the safety and feasibility of LVT to control seizures in children specifically with cerebral malaria. Instead of delivering the drug intravenously, which is too costly for most developing nations such as Malawi, it will be given via a tube in the nasal passage, an effective method in hospitals and clinics that lack resources.

About 40 children will be selected for the trial. If all safety standards are met, dosage will be increased until 75 percent of children are free of seizures for 24 hours (typically, only 20 percent of children admitted with cerebral malaria and seizures are seizure free in the first 24 hours).

To accurately test whether children are staying seizure free, MSU is collaborating with New York-based biotechnology firm Bio-Signal Group, which has created a portable, wireless EEG monitoring device, called microEEG that can accommodate up to 32 electrodes and connects via Bluetooth technology to a small monitoring machine.

"Unfortunately, many children who survive malaria continue to have seizures with no physical symptoms, but their brains still are being damaged," Birbeck said. "To evaluate the effectiveness of LVT, we need continuous EEG monitoring, which is very tough to do even in the best environment."

Bio-Signal's microEEG features a monitor the size of a deck of cards that can be worn on the arm, with a collection of wires going to the electrodes on the child's head. The monitor then transfers data in real-time to a computer, where it quickly can be analyzed and shared with colleagues.

"This state-of-the-art technology, which we believe can be used effectively in our resource-limited setting, allows us to conduct this trial," Birbeck said.

If the clinical trial shows LVT can be safe and potentially effective for seizure control in cerebral malaria, Birbeck and her team will proceed with a phase III randomized clinical trial.

"Since LVT is relatively affordable for short-term use and feasibly could be delivered in resource-limited settings, this therapy could potentially

be scaled up for broad use throughout malaria endemic African countries," she said.

Provided by Michigan State University