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Continuous, everyday EEG monitoring of epilepsy patients

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Unawareness of seizures complicates precise reporting of seizures, making it difficult for physicians to evaluate the effect of the treatment. Long-term video-EEG during admission can remedy this problem, but it is costly, inconvenient and sometimes just not the right tool for the job. Various research groups have recently outlined the future within portable EEG equipment. They agree that small, portable and convenient systems for instantaneous and continuous EEG monitoring are essential. We present a novel subcutaneous monitoring system developed for unobtrusive, continuous, ultra-long-term EEG applications able to record for weeks, months or years in an outpatient setting. The device consists of two parts: a subcutaneously placed device with three electrodes implanted during a 15 minutes procedure under local anesthesia and an external device for power supply and data storage. The parts are small enough to be wearable during everyday activities, making the device truly mobile. The electrodes can be implanted over a wide area; however, the three electrodes give a limited spatial coverage which necessitates selection of subjects with e.g. a known seizure focus. Thirty (30) subjects have worn the system for at least six weeks. No device related serious adverse events have been observed. The signal is comparable to closely located scalp recordings but with significant fewer movement artefacts. For subjects having temporal lobe epilepsy, the seizures seem to be reliably detectable from the subcutaneous EEG, especially when they show a significant rhythmic component. The novel EEG recorder presents a solution to an unmet clinical need. It provides a method of ultra-long-term EEG recording where a small number of EEG electrodes are sufficient. Results are encouraging, and we continue to recruit patients. When more knowledge and data are obtained the system might even provide a solution to seizure prediction.

Biography

Jonas Duun-Henriksen has received MS in Biomedical Engineering and Industrial PhD degrees from DTU Electrical Engineering, Technical University of Denmark in 2008 and 2013, respectively. His PhD was in collaboration with the company HypoSafe A/S now called UNEEG Medical A/S and Copenhagen University Hospital. After finishing his PhD, he continued in the company as a Scientific Researcher. He is currently the Head of Epilepsy Research at UNEEG Medical A/S and has special responsibility within EEG data quality. In 2018 he started working as a Visiting Researcher in the Richardson Lab at King's College London.

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