Pediatric epilepsy

Despite adherence to antiepileptic drugs, refractory epilepsy occurs in approximately 30% of children with epilepsy, and surgical treatment is an important intervention to consider.

Diagnosis

Cserpan et al. selected 16 whole-night scalp EEG recordings of paediatric patients with a focal structural epilepsy. They used an automated clinically validated High-frequency oscillations (HFO) detector to determine HFO rates (80-250 Hz). They evaluated the reproducibility of HFO detection across intervals.

HFO rates were higher in N3 than in N2 and REM (rapid eye movement) sleep and highest in the first sleep cycle, decreasing with time in sleep. In N3 sleep, the median reliability of HFO detection increased from 67% (interquartile range: iqr 57) to 78% (iqr 59) to 100% (iqr 70%) for 5-, 10-, and 15-min data intervals, improving significantly ($p = 0.004$, $z = 2.9$) from 5 to 10 min but not from 10 to 15 min.

They identified the first N3 sleep stage as the most sensitive time window for HFO rate detection. At least 10 min N3 data intervals are required and sufficient for reliable measurements of HFO rates.

The study provides a robust and reliable framework for scalp HFO detection that may facilitate their implementation as an EEG biomarker in pediatric epilepsy [1].

Treatment

Pediatric epilepsy treatment.

Case series

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The study provides a robust and reliable framework for scalp HFO detection that may facilitate their implementation as an EEG biomarker in paediatric epilepsy [2].

A total of 163 participants across four groups took part in the current study: these were (i) individuals who had undergone surgical treatment of drug-resistant focal seizures approximately five years prior as children, and were now largely adolescents or young adults ('Patients'; n = 23), (ii) their caregivers ('Patient Caregivers'; n = 27), (iii) healthy individuals of similar age and gender to the Patients ('Controls'; n = 53), and (iv) their caregivers ('Control Caregivers'; n = 60). Based on similar software validated in adults, we built an interactive computer program, 'Living with Epilepsy', to evaluate the achievement of age-specific developmental tasks in Patients relative to their peers. The Family Adaptability and Cohesion Scale measured family dynamics. The findings showed that in the context of seizure freedom, after pediatric epilepsy surgery, Patients are similar to their healthy peers in terms of attaining developmental tasks, with no differences between the Patient and Control groups ($P > .05$). Family dynamics, however, seemed resistant to postsurgical adaptation, with Patients reporting lower levels of balanced family dynamics (cohesion, flexibility) and higher rates of unbalanced family dynamics (disengagement, chaos, rigidity, enmeshment) relative to Patient Caregivers ($P < .001$-0.041), and the Controls ($P = .011$-0.034). Patients also reported reduced family satisfaction compared with that of Patient Caregivers ($P = .002$), which was associated with polytherapy prior to surgery; that is, more drug-resistant seizures. These findings suggested that childhood-onset epilepsy has a lasting effect on family functioning, even when the child has an optimal medical and psychosocial outcome. These initial findings have significant implications for the provision of pre- to postoperative family support in pediatric epilepsy cases [3].

[1], [2]
Cserpan D, Rosch R, Lo Biundo SP, Sarnthein J, Ramantani G. Variation of scalp EEG high frequency oscillation rate with sleep stage and time spent in sleep in patients with pediatric epilepsy. Clin Neurophysiol. 2022 Jan 12;135:117-125. doi: 10.1016/j.clinph.2021.12.013. Epub ahead of print. PMID: 35085923.

[3]
Rayner G, Micallef S, Abeywickrama R, Wilson SJ. Pediatric epilepsy surgery patients show normal psychosocial development at long-term follow-up despite dissatisfying family dynamics. Epilepsy Behav. 2019 Feb 3;92:245-252. doi: 10.1016/j.yebeh.2019.01.004. [Epub ahead of print] PubMed PMID: 30726768.