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論文題目	Long Time Constant May Endorse Sharp Waves and Spikes Than Sharp Transients in Scalp Electroencephalography: A Comparison of Both After-Slow Among Different Time Constant and High-Frequency Activity Analysis (頭皮脳波の長い時定数で棘波・鋭波と鋭一過性波と適切に判別することができる異なる時定数における後続徐波解析と、高周波活動解析の比較研究)		
(論文内容の要旨)			
<p>Background: Appropriate Electroencephalography (EEG) readings are crucial for making the diagnosis of epilepsy, especially for the detection of epileptiform discharges (EDs): sharp waves and spikes. However, only by visual inspection it is still inaccurate even for certified electroencephalographers to distinguish EDs from morphologically resembling normal or non-specific sharply contoured waveforms, i.e., sharp transients (Sts). Under long time constant (TC) settings (e.g., 2 s), slow activities are not attenuated as compared with the conventional settings (e.g., 0.1—0.3 s). Long TC may be beneficial for detecting the after-slow activity of EDs. However, the degree of detection of after-slow activity of EDs under different TC conditions has not been systematically analyzed and there was no study about the endorsement of the definition of Sts with lesser after-slow as opposed to EDs.</p> <p>Objective: In this study, the chief question was whether long TC is useful for detecting the after-slow activity of EDs and for differentiating EDs from Sts. The classification of these two groups was also endorsed by high-frequency activity (HFA) that is considered to have a selective association with EDs.</p> <p>Methods: Sixty eight after-slow activities preceded by 32 EDs (26 sharp waves and six spikes) and those of 36 Sts were collected from 52 patients with partial and generalized epilepsy (22 men, 30 women; mean age 39.08 ± 13.13 years) defined by visual inspection. Frequency of HFA associated with the apical component of EDs and Sts was investigated to endorse the EDs selectively. After separating nine Sts that were labeled by visual inspection but did not fulfill the amplitude criteria for after-slow of Sts, finally 59 activities (32 EDs and 27 Sts) were analyzed about the total area of after-slow under three TCs (long: 2 s; conventional: 0.3 s; and short: 0.1 s).</p> <p>Results: 1) The total area of after-slow in all 32 EDs under TC 2 s was significantly larger than those under TC 0.3 s and 0.1 s ($p < 0.001$). Conversely, no significant differences were observed in the same parameter of 27 Sts among the three different TCs. 2) Compared to Sts, HFA was found significantly more often with the apical component of EDs ($p < 0.05$). 3) Regarding separated nine Sts, the total area of after-slow showed a similar tendency to that of 27 Sts under three different TCs.</p> <p>Conclusion: These results suggest that long TC could be useful for selectively detecting EDs by differentiating from Sts. These findings are concordant with the results of the HFA analysis, endorsing the current operational definitions of EDs and Sts, and also the International Federation of Clinical Neurophysiology guidelines.</p>			

(論文審査の結果の要旨)

てんかんの診断では、脳波上の鋭波や棘波などのてんかん性放電 (EDs) は棘成分に後続徐波を伴う波形特徴がある。しかし EDs と非特異的な鋭一過性波 (Sts) を視察で特異的に区別することは難しい。本研究で申請者らは、脳波計の 2 秒の長い時定数では従来の 0.1-0.3 秒の時定数と比べ、徐波の減衰率が軽度で EDs の後続徐波をより明瞭に記録でき Sts との区別に有用かを検討した。52 名のてんかん患者の過去の臨床脳波で、専門医が視察同定した EDs 32 個と Sts 36 個を解析した。操作的定義として後続徐波の振幅が先行棘成分の 50%以上を EDs、以下を Sts とすると、視察同定の EDs32 個全て、Sts27 個が合致した。合致した計 59 個の後続徐波面積を、3 種類の時定数 (2/0.3/0.1 秒) で計測した。また先行棘成分に重畳する高周波活動 (HFA) はてんかん病態を示唆するため、EDs と Sts の先行棘成分の HFA を評価した。その結果、1) EDs の後続徐波面積は、時定数 2 秒で有意に大きかったが、Sts では 3 つの時定数で差はなかった。2) Sts より EDs でより HFA との一致を認めた。本研究は、長い時定数が EDs と Sts の区別に有用で、専門医の視察判定の有用性を担保し臨床的相違を明らかにした。

以上の研究は、脳波のてんかん性放電の波形特性の解明に貢献し、臨床神経学・てんかん学の発展に寄与するところが多い。

したがって、本論文は博士 (医科学) の学位論文として価値あるものと認める。

なお、本学位授与申請者は、令和 4 年 1 月 21 日実施の論文内容とそれに関連した試問を受け、合格と認められたものである。

要旨公開可能日： 年 月 日 以降