Electroencephalogram rhythms may be measured in terms of power (μV2) or its square root, amplitude (μV). EEG power was derived for all frequency bands using amplitude (μV). However, we refer to “alpha power” from this point forward, as this term is more commonly understood.

In subarachnoid hemorrhage (SAH), transcranial Doppler/color-coded-duplex sonography (TCD/TCCS) is used to detect delayed cerebral ischemia (DCI). In previous studies, quantitative electroencephalography (qEEG) also predicted imminent DCI. This study aimed to compare and analyze the ability of qEEG and TCD/TCCS to early identify patients who will develop later manifest cerebral infarction.

Mueller et al. analyzed cohorts of two previous qEEG studies. Continuous six-channel-EEG with artifact rejection and a detrending procedure was applied. Alpha power decline of ≥ 40% for ≥ 5 hours compared to a 6-hour-baseline was defined as a significant EEG event. Median reduction and duration of alpha power decrease in each channel were determined. Vasospasm was diagnosed by TCD/TCCS, identifying the maximum frequency and days of vasospasm in each territory.

34 patients were included (17 male, mean age 56 ± 11 years, Hunt and Hess grade: I-V, cerebral infarction: 9). Maximum frequencies in TCD/TCCS and alpha power reduction in qEEG were correlated ($r = 0.43$; $p = 0.015$). Patients with and without infarction significantly differed in qEEG parameters (maximum alpha power decrease: 78% vs 64%, $p = 0.019$; summed hours of alpha power decline: 236 hours vs 39 hours, $p = 0.006$) but showed no significant differences in TCD/TCCS parameters.

There was a moderate correlation between TCD/TCCS frequencies and qEEG alpha power reduction but only qEEG differentiated between patients with and without cerebral infarction.

Significance: qEEG represents a non-invasive, continuous tool to identify patients at risk of cerebral infarction [1].

1)
Mueller TM, Gollwitzer S, Hopfengärtner R, Rampp S, Lang JD, Stritzelberger J, Madžar D, Reindl C, Sprügel MI, Dogan Onugoren M, Muehlen I, Kuramatsu JB, Schwab S, Huttner HB, Hamer HM. Alpha power decrease in quantitative EEG detects development of cerebral infarction after subarachnoid hemorrhage early. Clin Neurophysiol. 2021 Mar 26:S1388-2457(21)00465-X. doi: 10.1016/j.clinph.2021.03.005. Epub ahead of print. PMID: 33867261.