

The [intralaminar thalamus](#) is well implicated in the processes of [arousal](#) and [attention](#). [Stimulation](#) of the intralaminar thalamus has been used therapeutically to improve the level of alertness in minimally conscious individuals and to reduce [seizures](#) in [refractory epilepsy](#), both presumably through [modulation](#) of thalamocortical function. Little work exists that directly measures the effects of intralaminar thalamic stimulation on cortical physiological arousal in humans. Therefore, the goal of Martin et al. was to quantify cortical physiological arousal in individuals with [epilepsy](#) receiving thalamic intralaminar [deep brain stimulation](#).

They recorded scalp [electroencephalogram](#) (EEG) during thalamic intralaminar [centromedian nucleus](#) stimulation in 11 patients with [medically refractory epilepsy](#). Participants underwent [stimulation](#) at 130 Hz and 300 μ s for periods of 5 min alternating with 5 min of rest while stimulus voltage was titrated upward from 1 to 5 V. EEG signal power was analyzed in different frequency ranges in relation to stimulus strength and time.

They found a progressive increase in broadband gamma (25-100 Hz) cortical EEG power ($F = 7.64$, $p < .05$) and decrease in alpha (8-13 Hz) power ($F = 4.37$, $p < .05$) with thalamic CM stimulation. Topographic maps showed these changes to be widely distributed across the cortical surface rather than localized to one region.

Previous work has shown that broadband increases in gamma frequency power and decreases in alpha frequency power are generally associated with states of cortical activation and increased arousal/attention. The observed changes, therefore, support the possible role of cortical activation and increased physiological arousal in the therapeutic effects of intralaminar thalamic stimulation for improving both epilepsy and [attention](#). Further investigations with this approach may lead to methods for determining optimal deep brain stimulation parameters to improve clinical outcomes in these disorders ¹⁾.

¹⁾

Martin RA, Cukiert A, Blumenfeld H. Short-term changes in cortical physiological arousal measured by [electroencephalography](#) during [thalamic centromedian deep brain stimulation](#). *Epilepsia*. 2021 Aug 18. doi: 10.1111/epi.17042. Epub ahead of print. PMID: 34405892.

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