

**Title:** Treatment Alternatives to Reduce the Electroencephalographic Risk of Cognitive Decline.

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**Abstract:**

Our research has revealed that theta activity (4-7 Hz) excess in the EEG may serve as an early predictor of neurocognitive disorder (NCD), as suggested by several authors. Notably, Prichep et al. (2006) made a prediction a decade before clinical symptoms appeared. Spinelli et al. (2022) found a positive correlation between frontal theta activity and amyloid uptake. We have noted that excess theta is linked to differences in cortical thickness, EEG effective connectivity, and cognitive processing without cognitive alteration. These findings suggest that an ongoing pathological process may be occurring in healthy elderly individuals with excess theta activity, potentially paving the way for early intervention and prevention strategies. We have successfully applied a neurofeedback (NFB) protocol aimed at theta suppression; however, this treatment can hardly be applied on a mass scale. Therefore, we are also exploring the effects of a modified Mindfulness-based stress reduction (MBSR) treatment. We will present a comparison between both treatments.

Twenty right-handedness older adults with at least 9 years of formal education,  $IQ > 80$ , without psychiatric disorders or history of neurological conditions, and blood analysis within healthy ranges for glucose, cholesterol, triglycerides, hemoglobin, and TSH participated in this study. All had excessive theta power in at least one electrode compared to norms. Two groups were considered: NFB ( $n=10$ ) and MBSR ( $n=10$ ). Before and immediately after treatment, a cognitive test to evaluate executive functions was applied, and a 19-channel EEG was recorded, referred to linked earlobes. For statistical analysis, a non-parametric multivariate permutation test was used.

Following treatment, the NFB group improved executive function scores, and the EEG power was widely reduced in the delta and theta bands and increased in the beta band. In contrast, in the MBSR group, no changes in cognition were observed; however, MBSR was effective in reducing theta and increasing beta power, the changes being less pronounced than those produced by NFB; also, an increase in the alpha band was observed.

The fact that mindfulness can reduce theta activity supports the hypothesis that mindfulness can produce EEG changes, compatible with a decrease in the electroencephalographic risk for NCD. This theta reduction occurs in frontal and parietal areas, suggesting that mindfulness could correct the abnormal activity of the frontoparietal network of attention. An attractive aspect of mindfulness practice is that it is easy to do and is available to everyone, which is an important economic advantage, especially for developing countries like Mexico.



**Biography:**

Thalía Fernández is a professor-researcher at the National Autonomous University of Mexico, where she has worked for 38 years. One of her interests for the past 20 years has been the prevention of cognitive decline in older adults who are at electroencephalographic risk of developing a neurocognitive disorder (NCD). She has more than 100 publications in international peer-reviewed journals, 13 of which are related to this line of research. She has also supervised 40 theses, 12 of which (3 in progress) focus on this issue.