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EEG as a functional biomarker of nicotine activity: Evidence from a pilot study of adults with late-life depression

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Late-life depression (LLD) is a debilitating condition that is associated with poor response to antidepressant medications and deficits in cognitive performance. Nicotine has emerged as a potential candidate to improve cognitive performance in patients with LLD. We report results from a pilot study of transdermal nicotine in LLD examining whether nicotine treatment would improve cognitive performance and mood. The study additionally used electroencephalography (EEG) recordings as a tool to test for potential mechanisms underlying the effect of nicotine. Eight non-smoking participants with LLD completed EEG recordings at baseline and after 12 weeks of transdermal nicotine treatment (NCT02816138). Nicotine augmentation treatment was associated with improved performance on an auditory oddball task. Analysis of event-related oscillations showed that nicotine treatment was associated with reduced beta desynchronization at week 12 for both standard and target trials. The change in beta power on standard trials was also correlated with improvement in mood symptoms. This pilot study provides preliminary evidence for the impact of nicotine in modulating cortical activity and improving mood in depressed older adults