Functional connectivity changes in resting state MRI after donepezil treatment in healthy participants

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Introduction: Donepezil is a potent, non-competitive, reversible, clinically effective acetylcholinesterase inhibitor. The primary objective of the present study was to identify possible markers using neuropsychology markers and MRI markers of donepezil's effect in young, healthy, adult volunteers.

Methods: The study had a double-blind, randomized, cross-over design. 30 healthy adult volunteers underwent MRI and neuropsychology assessment after 15 days of donepezil or placebo treatment according to the design. MRI exam is composed of T1-3D and resting state fMRI acquisitions. To evaluate drug effect, we conducted group comparisons on (i) cognitive tests (ii) voxel-based morphometry markers (iii) functional connectivity (FC) markers using seed-related analysis and network analysis.

Results: Considering cognitive assessments and brain morphometry, no statistical difference was found between donepezil session and placebo session. Considering FC, our results showed significant differences of intrinsic FC between donepezil and placebo mainly in Right executive control network (RECN). Precisely, we found a decrease of connectivity in right inferior parietal node with other RECN nodes. The analysis using cingulate cortex and parahippocampal regions as seeds, showed also a complex modulation of FC between the donepezil and placebo conditions.

Conclusions: Among the many markers, only FC is able to detect modification related to donepezil treatment. Indeed, donepezil treatment for 15 days may help to provide a certain reorganization of resting-state networks as compared to the placebo session.