

Unirhinal olfactory testing for the diagnostic workup of mild cognitive impairment.

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Introduction and Aim: Olfactory dysfunction is associated with Alzheimer's disease (AD), and already present at pre-dementia stages of the disease. Based on the assumption that early neurodegeneration in AD is asymmetrical and that olfactory input is primarily processed ipsilaterally, we assessed whether unirhinal psychophysical and electrophysiological assessment of olfactory function can contribute to the diagnostic workup of mild cognitive impairment (MCI).

Materials and methods: Olfactory function of 13 MCI patients with positive amyloid PET, 13 aged-matched controls (AC) and 13 patients with post-infectious olfactory loss (OD) was assessed unirhinally using (1) psychophysical testing of olfactory detection, discrimination and identification performance and (2) the recording of olfactory event-related brain potentials. Time-frequency analysis of the electrophysiological data was used to enhance the signal-to-noise ratio of the elicited responses. Psychophysical and electrophysiological assessment of auditory and trigeminal chemosensory function served as controls.

Results: As compared to AC and OD, MCI patients exhibited a marked and significant asymmetry of olfactory performance. This asymmetry efficiently discriminated between MCI and AC (sensitivity: 85%, specificity: 77%), as well as MCI and OD (sensitivity: 85%, specificity: 70%). The behavioral asymmetry was also reflected in the EEG responses. In MCI patients, olfactory stimulation of the best nostril elicited significantly more activity than stimulation of the worse nostril, between 4- 7.5 Hz and 1.2- 1.8 s after stimulus onset. Trigeminal and auditory testing did not show any difference between groups.

CONCLUSION: MCI patients exhibit a marked asymmetry of olfactory function, which could serve as a non-invasive biomarker for the early diagnosis of AD.