VISUAL ATTENTIONAL ASSESSMENT IN MILD COGNITIVE IMPAIRMENT AND ALZHEIMER’S DISEASE - RELATIONSHIP TO INTER-HEMISPHERIC METABOLIC IMBALANCES

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Sensitive cognitive markers in the field of visual selective attention might improve the detection of subjects at early stages of dementia like the prodromal phase of mild cognitive impairment (MCI).

For the attentional assessment in patients with MCI and probable Alzheimer’s disease (AD), we used partial report of brief letter arrays in combination with Bundesen’s theory of visual attention (TVA). TVA provides two mathematically independent and quantitative parameter estimates: task-related weighting for prioritizing relevant visual objects (top-down control), and the spatial distribution of attentional weights across the left and right hemi-field.

Compared to an age-, gender- and education-matched healthy control group, MCI patients showed significantly reduced top-down control which further deteriorated in AD subjects. Spatial attentional weighting was significantly unbalanced across hemispheres in MCI and tended to be more lateralized in AD. Across MCI and AD patients, we analyzed the relationship of both parameters to regional glucose metabolism (PET). The more reduced the metabolism in the left temporo-parietal junction (TPJ) the more pronounced was the top-down control deficit. Furthermore, relative hypometabolism in the left TPJ and left inferior parietal lobe (IPL) as compared to the right TPJ and right IPL, respectively, was correlated with direction and degree of spatial bias.

These results indicate that impaired top-down control may be linked to early dysfunction of fronto-parietal attention networks. Accompanying, an early interhemispheric metabolic asymmetry in temporo-parietal cortices might cause a pathological spatial bias. Consequently, both TVA-based parameters may function as early cognitive markers for detecting subjects at risk for probable AD.