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Early brain connectivity alterations before amyloid deposition in a rat model of Alzheimer's disease

Guadalupe Soria
Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Spain

Animal models of Alzheimer's disease (AD) are essential in understanding the disease progression and development of early biomarkers. In this study, a transgenic rat model of AD (TgF344-AD) was longitudinally analyzed to describe both cognitive performance and brain connectivity. Cognitive abilities were assessed longitudinally by a delayed non match-to-sample (DNMS). Every three months after DNMS, MRI acquisition was performed including diffusion-weighted MRI and resting state functional MRI, which were processed to obtain the structural and functional connectomes, respectively. Global and regional graph metrics were computed to evaluate network organization in both transgenic and control rats. Less efficient organization of the structural brain networks of the transgenic rats with respect to controls was observed at five months of age, before a significant concentration of β-amyloid plaques is present. Specific regional differences in connectivity were identified in both structural and functional networks. A strong correlation was observed between cognitive performance and brain networks, including whole brain structural connectivity as well as functional and structural network metrics of regions related to reward, memory and sensory performance processes. Despite, the fact that the Tg animals showed a smaller number of responses in the first phase, the hit rate was very similar in both groups throughout the study. The AD also is a connectopathy in the TgF344AD rat model and this integrative approach is without a doubt, a track that promises results much more efficient from the point of view of translational research.

Biography

Guadalupe Soria is Incharge of the Experimental MRI 7T Unit at IDIBAPS, Barcelona. She has specialization studying Neurodegeneration, MRI Biomarkers and Animal Models. Her areas of research interests are discovery of MRI biomarkers for early diagnosis of neurodegenerative disorders such as AD, shortening of the translational gap between preclinical and clinical research and cognitive enhancement as a potential intervention for AD.

guadalupe.soria@idibaps.org

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