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### Complex and differential neuroglial morphological and metabolic alterations during the progression of Alzheimer's disease and ageing

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Neuroglial cells are fundamental for brain homeostasis and therefore represent the intrinsic brain defence system. Thus, all forms of neuropathological processes inevitably involve glial cells. Neurodegenerative diseases, including Alzheimer's disease (AD) disrupt brain connectivity affecting neuronal-neuronal, neuronal-glial and glial-glial interaction. Furthermore, neurodegenerative processes trigger universal and conserved glial reactions classically represented by astrogliosis and microglial activation. The recently acquired knowledge allows us to regard the neurodegenerative diseases as primarily gliodegenerative processes, in which glial cells determine the progression and outcome of neuropathological processes such as AD and ageing. We have recently probed this active pathological role, by showing: (i) an astroglial generalised atrophy with a concomitant astrogliosis just restricted to A $\beta$  plaques presence, ii) alterations in glutamate glial metabolism, iii) changes in S-100 trophic factor and (iv) an early resting microglial recruitment in the affected areas, even before the presence of activated/macrophagic microglial cells. These glial alterations, which are complex and region dependent are fundamental for the disruption of neural networks connectivity as well as with the neurotransmitters imbalance that underlie the amnesic deficits associated with AD. However, we have recently demonstrated that psychostimulative processes, such as exposure to enriched environment and voluntary running, can not only revert this generalized astrocytic hippocampal and cortical atrophy but also potentiate their hypertrophy which could trigger new insights into the search for a potential therapeutic treatment of AD and pathological ageing.

#### Biography

Jose Julio Rodriguez, PhD, received his doctorate in Neurobiology from the Complutense's University of Madrid in 1995. Over the last 18 years of research experience in centers in Switzerland (Novartis Pharma), France (INSERM), USA (Cornell Medical College & Florida Atlantic University) and United Kingdom (The open University & The University of Manchester), till in 2010 he obtained his full time tenure Professorship in Spain where he is member of IKERBASQUE (Basque Foundation for Science) and is associated with the Department of Neurosciences, at the Medical School of the University of the Basque Country UPV/EHU in Bilbao as well as with the Institute of Medical Research "BioDonostia" in San Sebastián. His current research interests are centred on the neuroanatomy of neural circuits in the context of memory-related plasticity under normal and pathological conditions (such as neurodegeneration, stroke, brain trauma, depression, epilepsy and stress). He is designing series of in vivo experiments aimed at specific modification of these systems, by either functional (enriched environment, physical activity or dietary changes) or molecular biological (viral-based transfection with relevant signal-related molecules).

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