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Education

Master in Biology, Health, Agronomy specialized in Physiology, cellular and molecular biology in the University of Poitiers (France).
PhD in Biology, Medicine, Health, University of Poitiers, France, 2011

Current Position

Post-doctoral position, Chargé de Recherches FRS-FNRS, UCL, Brussels, Belgium, since 2011.

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Science

Alzheimer disease (AD) is characterized by two types of lesions in the brain: intraneuronal neurofibrillary tangles (hyperphosphorylated protein tau) and extracellular senile plaques containing an amyloid core made of the amyloid peptide Aβ. Although there is a general agreement for an involvement of neuroinflammation in the pathogenesis of AD, there is no consensus on the protective or deleterious effects of different inflammatory mediators. The proinflammatory cytokine interleukin-1β (IL1β) is a key regulator of inflammation in the central nervous system and is overexpressed during AD pathology. IL1β is potentially involved in different pathogenic processes in AD such as Amyloid Precursor Protein (APP) processing or activation of glial cells, but also in protective mechanisms of which Aβ clearance by activated glia.
It is known that Aβ triggers an activation of NALP3 inflammasome (protein complex responsible for IL1β maturation) in microglia, but nothing is known about astrocytes involvement in these mechanisms, despite the fact that astrocytes are highly represented in the brain and participate to inflammation processes.
Using ASC knockout mice (deficient for ASC, a protein involved in inflammasome activation) crossed with 5xFAD mice, we found that heterozygous (+/-) mice for ASC displayed a decrease in amyloid load coupled with a rescue of the Spatial Reference Memory. We showed in vitro that astrocytes primed with LPS and treated with fibrillar Aβ are perfectly able to produce IL1β, but this production is decreased in ASC +/- cells. Inflammasome activation is linked to phagocytosis with intracellular cathepsin B release. Moreover, ASC+/- astrocytes displayed a higher ability of phagocytosis compared to wild-type or ASC knock-out cells, supporting the decrease in amyloid load observed in ASC heterozygous mice. We are now investigating more deeply the effect of inflammasome

activation or inactivation to elucidate mechanisms involved in amyloid toxicity and amyloid clearance by astrocytes from an inflammatory point of view.

Selected Publications:

Stancu IC, Ris L, Vasconcelos B, Marinangeli C, Goeminne L, Laporte V, Haylani LE, **Couturier J**, Schakman O, Gailly P, Pierrot N, Kienlen-Campard P, Octave JN, Dewachter I. (in press). Tauopathy contributes to synaptic and cognitive deficits in a murine model for Alzheimer's disease. The FASEB Journal. doi :10.1096/fj.13-246702

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Morel M, **Couturier J**, Pontcharraud R, Gil R, Fauconneau B, Paccalin M, Page G. Evidence of molecular links between PKR and mTOR signalling pathways in Aβ neurotoxicity : role of p53, Redd1 and TSC2. Neurobiol Dis. 2009, 36(1):151-61.

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