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Influence of the *APOE4* allele on brain networks in healthy elderly subjects

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The *APOE* protein is an essential factor in neuroprotection, cognitive function, brain lipid metabolism regulation, neural development, brain plasticity and cerebrovascular function. The *APOE* gene presents 3 major alleles (2, 3 and 4). APOE3 is the most frequent ("wild-type") isoform. *APOE4* has been identified as a major risk factor for dementia and other CNS disorders; however, little is known about its effect on brain activity in healthy conditions. We evaluated brain function using EEG oscillatory activity and linear connectivity in 40 healthy elderly subjects (12 *APOE4* carriers and 28 non-carriers). Source current density and functional connectivity were determined using eLORETA (exact low resolution brain electromagnetic tomography). Functional images of spectral density were computed for six frequency bands: Delta (1.5-4 Hz), Theta (4-8 Hz), Alpha1 (8-10 Hz), Alpha2 (10-13 Hz), Beta1 (13-21 Hz) and Beta2 (21-30 Hz). For functional connectivity analysis, we used a novel index of physiological lagged connectivity resistant to non-physiological artifacts that usually affect other connectivity indices. *APOE4* carriers showed significant higher Alpha1 activity on the right temporal lobe and higher connectivity between the left parietal and left temporal cortex in Alpha1 frequency band than non-carriers. These findings suggest that cortical disturbances in a cortical region of AD patients such as the temporal lobe affect *APOE4* carriers even in asymptomatic stages. Increased Alpha1 connectivity on the left hemisphere may be a potential compensatory mechanism that involves parieto-temporal resources in the left hemisphere preserving a good cognitive status in these individuals with genetic vulnerability.

Biography

Ivan Tellado has completed his Bachelor in Biological Science from University of A Coruña, Spain in 1998. He is the Director of Digital Diagnosis at the EuroEspes Biomedical Research Center. He has published more than 15 papers in reputed scientific journals. His scientific research has been focused on the study of the genotype-phenotype relationship on brain, in particular in age and genotype-related changes on brain activity networks.

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