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TITLE

Natural Polyphenols Decrease Oxidative Stress and Inflammation in Neurons and Astrocytes in Primary Culture

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Alzheimer's disease (AD) is the most common cause of dementia among all synaptic abnormalities, and memory loss associated with aging. The AD is characterized by the accumulation of senile plaques, formed by the beta-amyloid peptide, the appearance of neurofibrillary tangles with tau protein hyperphosphorylation and activation of glial cells causing inflammation. Currently, the mechanism by which neural cell death occurs in AD is still not clearly established, although we know that both oxidative stress and inflammation are implicated in the pathophysiology of the disease. Therefore, the study of molecular mechanisms and the search for new agents to prevent mitigate or cure disease, natural polyphenols as proposed in this application, is of great clinical interest. In the present work aimed to study the toxicity of beta-amyloid peptide in primary cultures of neurons and glial cells from rat brain. We analyzed cell viability, growth, apoptosis and the mechanisms of damage caused by beta-amyloid. In parallel we determined the possible protective effects of natural polyphenols on adverse actions that develops this peptide, both oxidative stress and inflammation. Here we demonstrated an increase in neuronal cell death after 10 μM Aβ addition during 24 h and only 60% of viable cells were detected compared with control cells (100%). Using resveratrol (10 μM) 24 h. before Aβ addition we noted an increase in viability about a 28% (resveratrol + Aβ = 88%). Other polyphenols such as, genistein, pterostilbene, curcumin and Epigallocatechin gallate, produced also changes in the viability of neurons with the toxic peptide Aβ (1-42). To elucidate the mechanisms of polyphenol action we analyzed the intracellular signaling pathways activated by these molecules. Our hypothesis is that polyphenols could have neuroprotective effects, reducing the risk of AD, controlling the progression of the disease. Therefore, with the overall aim of understanding the consequences of AD neurodegeneration, together with oxidative stress and inflammation, we study genetic and signaling mechanisms in both untreated cells and in treated with polyphenols. Consequently, these studies may have a dual purpose: to improve understanding of the pathophysiology of AD, and b) to evaluate possible therapeutic application of natural polyphenols.

Biography

Dr. S.L. Valles was one of the pioneers in Alzheimer inflammation and oxidative stress research at the University of Valencia, Spain. She and her team were the first to demonstrate the protective effect of estrogens and phytoestrogens in neurons and astrocytes in primary culture after toxic Aβ (1-42) addition. Oxidative stress and inflammation increase after Aβ toxic peptide is added to the cells. Polyphenols decrease the oxidative stress and the induction of inflammation in neural cells. She actually is the chief of her lab group and has served as reviewer of many journal from Elsevier Editorial. She is a member of the prestigious Faculty of Medicine of the University of Valencia, doing research and academic duties. She is a member of the Biochemistry and Molecular Biology Spanish Society. She also is professor of the international master degree in "Neuroscience and biotechnology", grant from the EEC (European Economic Community). She is currently interested in neurodegeneration and adult neurogenesis. Finally she is in the Comity of Brain Bank from Spain..