



Evaluation of the Neurobiological Effects of Natural Phenolics from In Vitro, In Silico, and In Vivo Perspectives

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Abstract

Plant phenolics have always been of great interest in pharmacognostic research due to their significant pharmacological effects. They have demonstrated neuroprotective properties through various molecular and pathological mechanisms. Since the 2000s, our ongoing research has reported numerous coumarins, flavonoids, terpenoids, and other compounds with promising neurobiological effects, particularly against Alzheimer's disease (AD). We tested the potential neuroprotective effects of thirty-seven selected phenolic compounds using a combination of in vitro, in vivo, in silico, and molecular methods. Their inhibitory effects on cholinesterase (ChE) and β -secretase 1 (BACE1), as well as their antioxidant activity, were evaluated using microtiter assays. Our findings led us to further examine rosmarinic acid, gallic acid, and 3-hydroxytyrosol for their anti-amnesic activity through passive avoidance tests in scopolamine-induced mice, novel object recognition tests (NOR), novel tank diving tests (NTT), and Y-maze test models in zebrafish (*Danio rerio*). The active ChE inhibitors underwent molecular docking simulations, and the *in silico* toxicity of the selected active compounds was assessed. Some inhibitory compounds were tested on genes associated with AD using a human neuroblastoma (SH-SY5Y) cell line. The anti-aging effects of the selected phenolics were also evaluated using *Drosophila melanogaster* (fruit fly) strains. In this talk, the latest findings from our team on the neurobiological potential of selected plant phenolics will be discussed.

Keywords: Plant phenolics, neuroprotection, enzyme inhibition, passive avoidance test, zebrafish

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