

EDITORIAL

Neuroprotection Mechanisms and their Potential Applications

Unraveling the multiple mechanisms of neuroprotection and their underlying pathways is crucial to develop new interventions aimed at preserving neural structure and function in the case of injured, diseased or aged brain. In this Special Issue, many researchers have provided an overview of the most recent literature on the different aspects of neuroprotection, ranging from lifestyle and dietary factors to new pharmacological targets.

Behavioral interventions based on cognitive stimulation and physical activity have been shown to significantly counteract age-related cognitive impairments and dementia [1-3]. In fact, this kind of interventions promote the formation of a cognitive and brain reserve [4] that allows buffering brain damage during a long period of time without the appearance of cognitive symptoms. The neuroprotective effects of an active lifestyle on brain and cognitive functions usually impaired in the elderly have been successfully mimicked in rodents through the paradigm of Environmental Enrichment (EE), in which animals benefit from the sensory, physical, cognitive and social stimulations provided [1, 4]. Furthermore, growing evidence from rodents and humans suggests that physical exercise *per se* exerts a beneficial action on the brain throughout the lifespan and in the case of peripheral and central nerve injuries [2, 3]. The improvements in functional recovery induced by physical exercise can be ascribed not only to the enhancement of cardiac and immune functions, but also to the modulation of neurotrophic factors signaling and the involvement of pro-regenerative effects [2, 3].

Recently, a growing interest has emerged in the beneficial effects of positive social interactions on health. Several animal and human studies have linked social interactions and health throughout the lifespan, with a focus on current knowledge of the possible mediating role of opioids and oxytocin [5].

Nutrition can be considered as another source of neuroprotection. The quest for a healthy aging has led to the extensive study of polyphenols [6, 7] and omega-3 polyunsaturated fatty acids [8] with the aim to disrupt and prevent age-related deficits and mental diseases.

Cholinergic system is a neurotransmitter system that primarily degenerates in Alzheimer's disease (AD), the most common form of old age dementia [9]. Interestingly, cholinergic receptors-mediated post translational modifications (PTMs) affect the biosynthesis, proteolysis, degradation and expression of amyloid precursor protein (APP) [10]. Thus, the specific role of cholinergic neurotransmission and PTMs in AD could be crucial to validate effective therapeutics.

We all hope that the present Special Issue could be of inspiration for the development of novel treatments and neuroprotective interventions for a wide range of nervous system diseases.

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