

FLAVONOIDS USE FOR THE PREVENTION AND THERAPY OF NEURODEGENERATIVE DISEASES IN ELDERLY- FOCUS ON FUNCTIONAL PRESERVATION AND REHABILITATION

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INTRODUCTION: Flavonoids neuroprotection include mechanisms such as antioxidant, antiapoptotic, anti-neuroinflammatory and modulation of various cellular and intracellular targets. In neurodegenerative diseases blood-brain barriers (BBB) breakdown is an early biomarker of human cognitive dysfunction, therefore brain accessibility of flavonoids is a challenge for their potential therapeutic use.

MATERIALS & METHODS: This review emphasizes on current trends of research and development on flavonoids; a Goggle Scholar and Pubmed search was performed on this topic with focus on functional status and rehabilitation in elderly suffering from neurodegenerative diseases.

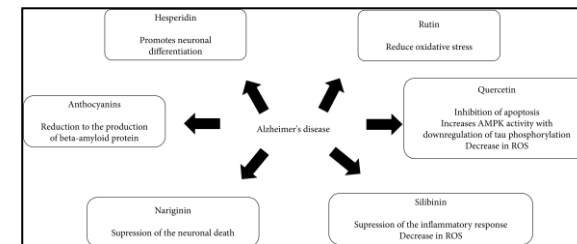
RESULTS: Flavonoids are known for anti-oxidative, anti-inflammatory, anti-carcinogenic and neuroprotective effects. A number of phenolic compounds proved to interfere with the aggregation of the A β peptide by targeting multiple pathways in Alzheimer's disease (AD). Similar to AINS therapies, some flavonoids are capable of reducing perceived joint pain and stiffness while also improving joint flexibility.

- Resveratrol induced a decrease of A β levels in cerebrospinal fluid and a reduction of neuroinflammation biomarkers in mild-to-moderate AD.
- Quercetin inhibits Tau phosphorylation and A β aggregation that are the main hall mark of AD. It also guards neuronal cell by decreasing neuroinflammation and oxidative strain, which improves motor functions and mobility.
- Ginkgo biloba extracts exhibits antiapoptosis, neuroprotective, anti-inflammatory, mitochondrial protection, and acts as antidepressant, anti-amnesic, antioxidant, CNS stimulant. It also enhances neurotransmission, neuroplasticity and protects toxic amyloid beta proteins.
- Luteolin showed able to mitigate pathogenic AD mechanisms, including neuroinflammatory processes and the impairment of brain glucose metabolism.
- Baicalin penetrates easily the BBB, preventing neuronal loss, with a neuroprotective function against ischemia-reperfusion injury through activation of γ -aminobutyric acid (GABA) signaling.
- Morin inhibits β -secretase and γ -secretase that helps in the prevention of further plaque development in nerve cells.
- Hesperidin presents a neuroprotective role acting on glial cells, microglia, and astrocytes, promoting reduction of neuroinflammation and oxidative stress.
- Licorice flavonoid oil supplementation improved body balance control and may contribute to fall prevention, while pomegranate polyphenols enhanced cognitive and functional recovery after stroke.

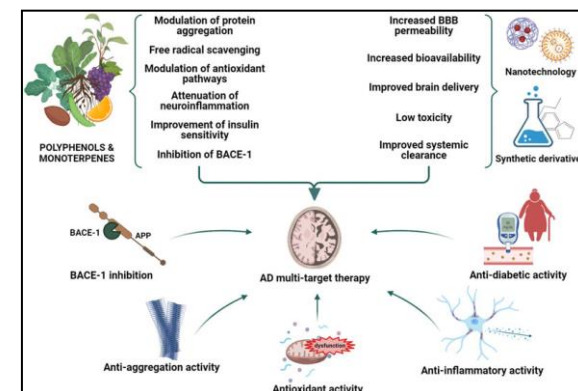
CONCLUSIONS: Many recent studies have correlated flavonoid intake with the improvement of cognition, attenuation of neuroinflammation and oxidative stress, improving physical functionality and rehabilitation. Possible challenges were identified but also strategies to overcome them using novel drug delivery systems.

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Possible mechanisms of action of flavonoids against Alzheimer's disease. (Source: de Andrade Teles RB et al. "Flavonoids as Therapeutic Agents in Alzheimer's and Parkinson's Diseases: A Systematic Review of Preclinical Evidences". *Oxid Med Cell Longev.* 2018 May 10;2018:7043213)



Polyphenols and monoterpenes as potential bioactive agents in Alzheimer's disease (AD) multi-target therapy. (Source: Piccialli I, et al. "Exploring the Therapeutic Potential of Phytochemicals in Alzheimer's Disease: Focus on Polyphenols and Monoterpenes". *Front. Pharmacol.* 2022;13:876614).