

# Melatonin in Alzheimer's Disease: A Latent Endogenous Regulator of Neurogenesis to Mitigate Alzheimer's Neuropathology

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Melatonin, a pineal gland synthesized neurohormone is known as a multifunctioning pleiotropic agent which has a wide range of neuroprotective role in manifold age-related neurodegenerative disorders especially Alzheimer's diseases (AD). AD is a devastating neurodegenerative disorder and common form of dementia which is defined by abnormal and excessive accumulation of several toxic peptides including amyloid  $\beta$  ( $A\beta$ ) plaques and neurofibrillary tangles (NFTs). The Alzheimer's dementia relates to atrophic changes in the brain resulting in loss of memory, cognitive dysfunction, and impairments of the synapses. Aging, circadian disruption,  $A\beta$  accumulation, and tau hyperphosphorylation are the utmost risk factor regarding AD pathology. To date, there is no exact treatment against AD progression. In this regard, melatonin plays a crucial role for the inhibition of circadian disruption by controlling clock genes and also attenuates  $A\beta$  accumulation and tau hyperphosphorylation by regulating glycogen synthase kinase-3 (GSK3) and cyclin-dependent kinase-5 (CDK5) signaling pathway. In this review, we highlight the possible mechanism of AD etiology and how melatonin influences neurogenesis by attenuating circadian disruption,  $A\beta$  formation, as well as tau hyperphosphorylation. Furthermore, we also find out and summarize the neuroprotective roles of melatonin by the blockage of  $A\beta$  production,  $A\beta$  oligomerization and fibrillation, tau hyperphosphorylation, synaptic dysfunction, oxidative stress, and neuronal death

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Alzheimer's disease

Amyloid ?

Circadian rhythm

Melatonin

Neurofibrillary tangles

amyloid beta protein

cyclin dependent kinase 5

glycogen synthase kinase 3

melatonin

tau protein

transcription factor CLOCK

melatonin

Alzheimer disease

cholinergic system

circadian rhythm

clock gene

disease exacerbation

enzyme regulation

gene expression regulation

hormone action

human

nerve cell necrosis

nervous system development

nervous system inflammation

neuropathology

neuroprotection

nonhuman

oligomerization

oxidative stress

protein phosphorylation

protein synthesis

Review

signal transduction

synapse

Alzheimer disease

animal

biosynthesis

brain

drug effect

molecularly targeted therapy

pathology

pathophysiology

Alzheimer Disease

Animals

Brain

Circadian Rhythm

Humans

Melatonin

Molecular Targeted Therapy

Neurogenesis