

Methylene blue and Alzheimer's disease

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Abstract

The relationship between methylene blue (MB) and Alzheimer's disease (AD) has recently attracted increasing scientific attention since it has been suggested that MB may slow down the progression of this disease. In fact, MB, in addition to its well characterized inhibitory actions on the cGMP pathway, affects numerous cellular and molecular events closely related to the progression of AD. Currently, MB has been shown to attenuate the formations of amyloid plaques and neurofibrillary tangles, and to partially repair impairments in mitochondrial function and cellular metabolism. Furthermore, various neurotransmitter systems (cholinergic, serotonergic and glutamatergic), believed to play important roles in the pathogenesis of AD and other cognitive disorders, are also influenced by MB. Recent studies suggest that the combination of diverse actions of MB on these cellular functions is likely to mediate potential beneficial effects of MB. This has lead to attempts to develop novel MB-based treatment modalities for AD. In this review article, actions of MB on neurotransmitter systems and multiple cellular and molecular targets are summarized with regard to their relevance to AD.

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[Therapy of Alzheimer disease].

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Neuropsychopharmacol Hung. 2009 Mar;11(1):27-33.

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The amyloid cascade hypothesis.

Korczyn AD.

Alzheimers Dement. 2008 May;4(3):176-8. doi: 10.1016/j.jalz.2007.11.008.

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