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Agmatine: Multi-Target Pharmacological Actions and Therapeutic Potential of a Novel Biogenic Amine

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Abstract: *Agmatine, a naturally occurring biogenic amine synthesized from the amino acid arginine, has garnered significant attention due to its diverse physiological effects and therapeutic potential. It is primarily produced through the decarboxylation of arginine by the enzyme arginine decarboxylase and is metabolized by enzymes such as agmatinase. Agmatine has been identified as a neuromodulator, influencing several neurotransmitter systems, including NMDA receptors, imidazoline receptors, and nitric oxide pathways, which contribute to its neuroprotective, anti-inflammatory, and antioxidant properties. Additionally, agmatine exerts vasodilatory effects and has been shown to regulate blood pressure, offering potential benefits for cardiovascular health. Recent studies suggest its therapeutic potential in treating neurological disorders such as depression, anxiety, Alzheimer's disease, and stroke, as well as metabolic disorders like diabetes, through mechanisms involving insulin sensitivity and glucose metabolism. Despite promising preclinical and clinical data, the safety profile and optimal therapeutic dosages of agmatine remain areas of ongoing investigation. This review highlights the multifaceted roles of agmatine, examining its biosynthesis, pharmacological actions, and the emerging therapeutic applications across various medical conditions, while also identifying gaps in research and directions for future studies.*

Keywords*:* Agmatine, Biosynthesis, Neuroprotective effects, Neuromodulator, Nitric oxide, Imidazoline receptors, NMDA receptors, Anti-inflammatory, Antioxidant properties, Pain modulation, Cardiovascular diseases, Vasodilation, Blood pressure regulation

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