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Modern Therapeutic Approaches for Cognitive Dysfunction: A Focus on Neurological Disease Management

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Abstract:

Cognitive impairment is a defining feature of several neurological disorders, including Alzheimer's disease, Parkinson's disease, Huntington's disease, vascular dementia, multiple sclerosis, and traumatic brain injury. It involves progressive deterioration in memory, executive function, attention, reasoning, decision-making, and language abilities, significantly reducing patient autonomy and quality of life. The underlying mechanisms contributing to cognitive decline are multifactorial, involving synaptic dysfunction, neuronal loss, protein aggregation, oxidative stress, neuroinflammation, mitochondrial impairment, and altered neurotransmission. Advancements in molecular neuroscience have provided deeper insight into disease-specific and shared pathological pathways, leading to the emergence of novel therapeutic targets beyond conventional symptomatic treatment. This thesis provides an extensive examination of the etiological factors, pathological mechanisms, clinical manifestations, diagnostic criteria, and therapeutic interventions associated with cognitive impairment in neurological diseases. Conventional pharmacological approaches—including cholinesterase inhibitors, NMDA antagonists, and dopaminergic agents—offer symptomatic relief but fail to modify underlying pathology. Novel advancements such as monoclonal antibodies targeting amyloid-β and tau, stem-cell-based regenerative strategies, neurotrophic factor delivery, genetic modulation, and nanotechnology- driven drug delivery systems show promise for slowing disease progression. Non-pharmacological interventions involving diet, cognitive rehabilitation, physical exercise, mindfulness, and sleep modulation further strengthen cognitive outcomes when integrated into a multimodal treatment strategy (5). Emerging evidence suggests that a multifaceted therapeutic approach incorporating personalized pharmacological strategies, biomarker-driven diagnostics, lifestyle optimization, and regenerative medicine hold the greatest potential for preventing, delaying, or reversing cognitive decline. This review integrates current literature, clinical trial data, and emerging research trends to provide a comprehensive perspective

on future directions in the management of cognitive impairment in neurological disorders.

Keywords: Cognitive impairment, Neurodegeneration, Alzheimer's disease, Neuroinflammation, Synaptic dysfunction, Neuroprotection, Regenerative therapy**.**

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