Pharmacological Strategies for Managing Neurodegenerative Diseases: A Focus on Alzheimer's and Parkinson's Disease

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Abstract*: Neurodegenerative diseases, including Alzheimer's Disease (AD) and Parkinson's Disease (PD), are progressive disorders characterized by the deterioration of neuronal structure and function, leading to significant cognitive and motor impairments. These conditions pose substantial socioeconomic and healthcare burdens globally. Despite extensive research, no definitive cures exist, and current treatments primarily focus on symptom management rather than halting disease progression.*

This paper explores pharmacological strategies employed in managing AD and PD, focusing on their mechanisms, efficacy, and limitations. For AD, therapies such as cholinesterase inhibitors (Donepezil, Rivastigmine, Galantamine) and NMDA receptor antagonists (Memantine) are highlighted, alongside emerging approaches like anti-amyloid monoclonal antibodies and tau-targeting treatments. For PD, dopaminergic therapies (Levodopa, Carbidopa, dopamine agonists), MAO-B inhibitors, and COMT inhibitors form the foundation of current management strategies, supplemented by advancements in gene therapy and alpha-synuclein aggregation inhibitors.

While these interventions provide symptomatic relief, challenges such as drug resistance, adverse effects, and the lack of disease-modifying therapies remain significant hurdles. Recent advancements, including nanotechnology, immunotherapy, and the application of natural compounds, hold promise for more effective and targeted treatment options.

This paper concludes by emphasizing the importance of precision medicine, innovative drug delivery systems, and multi-target therapies in addressing the complex pathophysiology of AD and PD. Continued research and technological integration are essential for developing therapies that can effectively modify disease progression and improve patient outcomes..

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