

Pharmacology of Parkinson's and Alzheimer's Diseases

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Introduction

- Parkinson's and Alzheimer's diseases are neurodegenerative disorders
- They are chronic diseases
- Monitoring the disease to:
 - control the symptoms
 - slow the deterioration
 - get a better prognosis
- Understanding their treatment is crucial for effective management.



Pathophysiology of Parkinson's Disease

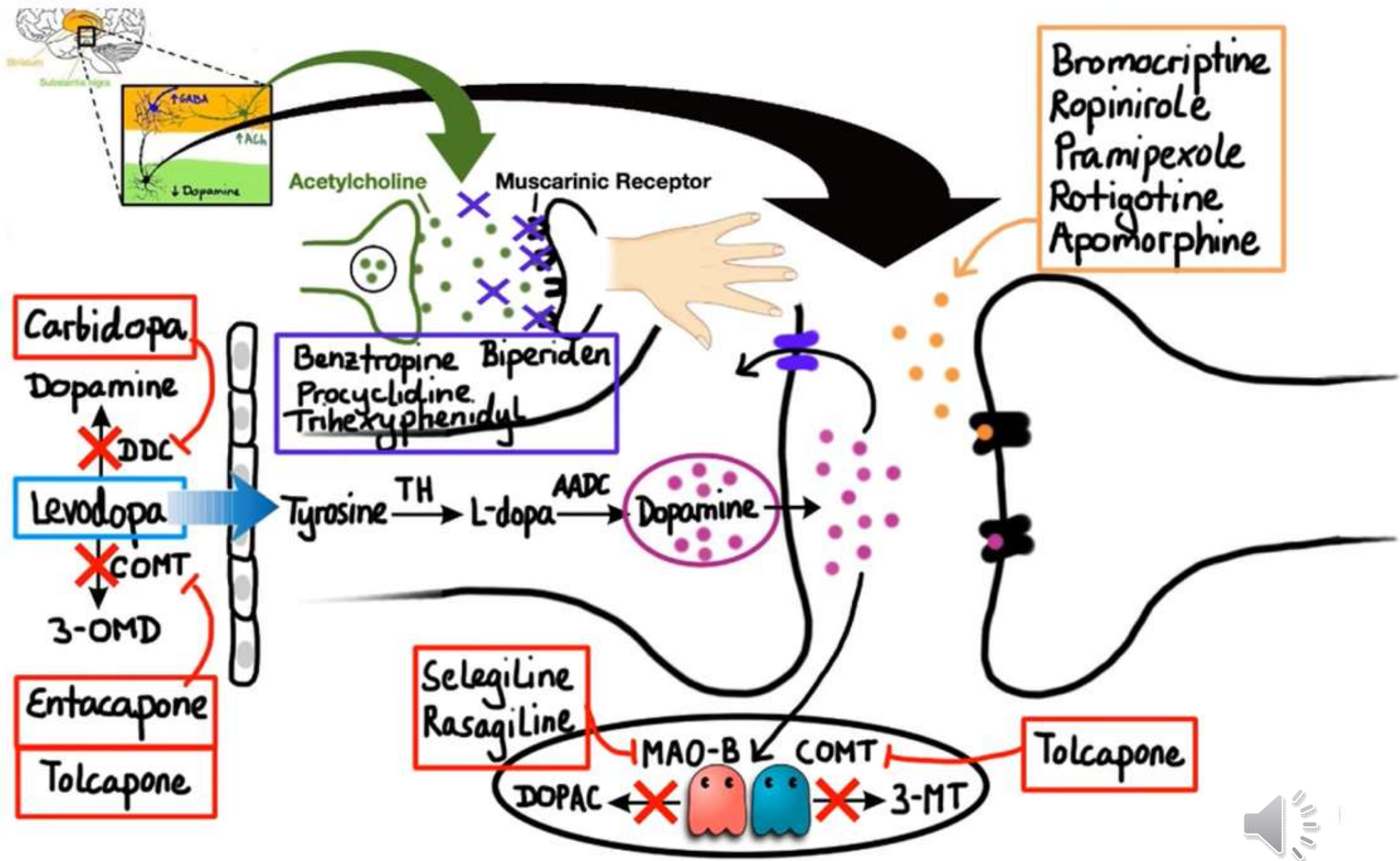
- Progressive loss of dopaminergic neurons in the substantia nigra
- Decreased dopamine levels in the basal ganglia
- Accumulation of Lewy bodies (α -synuclein aggregates)
- Motor symptoms: Bradykinesia, rigidity, tremor, postural instability
- Non-motor symptoms: Depression, cognitive impairment, autonomic dysfunction



Pharmacology of Parkinson's Disease

- Levodopa (L-DOPA) + Carbidopa: Dopamine precursor with peripheral dopa decarboxylase inhibition
- Dopamine Agonists: Pramipexole, Ropinirole
- MAO-B Inhibitors: Selegiline, Rasagiline
- COMT Inhibitors: Entacapone, Tolcapone
- Anticholinergics: Benztropine, Trihexyphenidyl



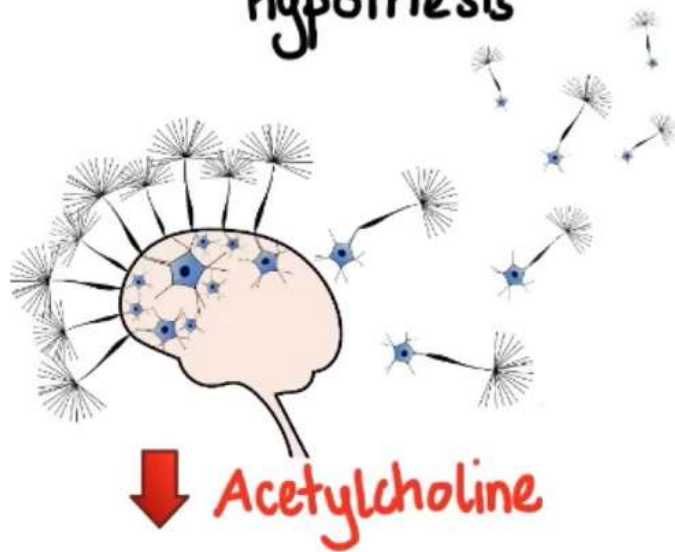


Pathophysiology of Alzheimer's Disease

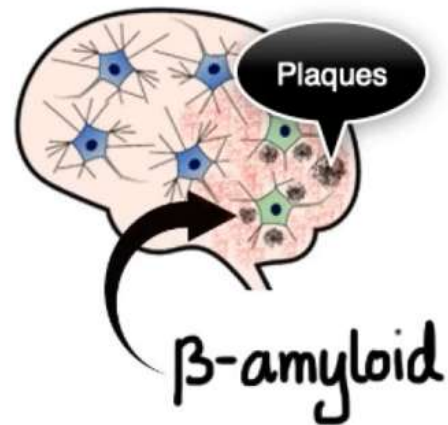
- Progressive loss of cholinergic neurons in the cortex and hippocampus
- Amyloid-beta plaque accumulation
- Neurofibrillary tangles (tau protein hyperphosphorylation)
- Neuroinflammation and oxidative stress
- Symptoms: Memory loss, cognitive decline, behavioral changes



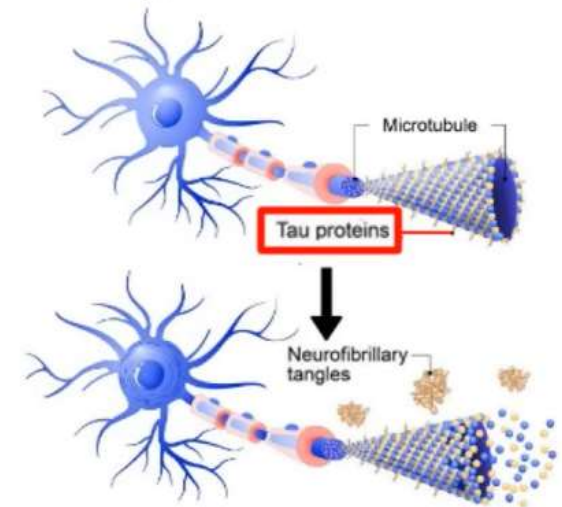
Cholinergic hypothesis



Amyloid hypothesis



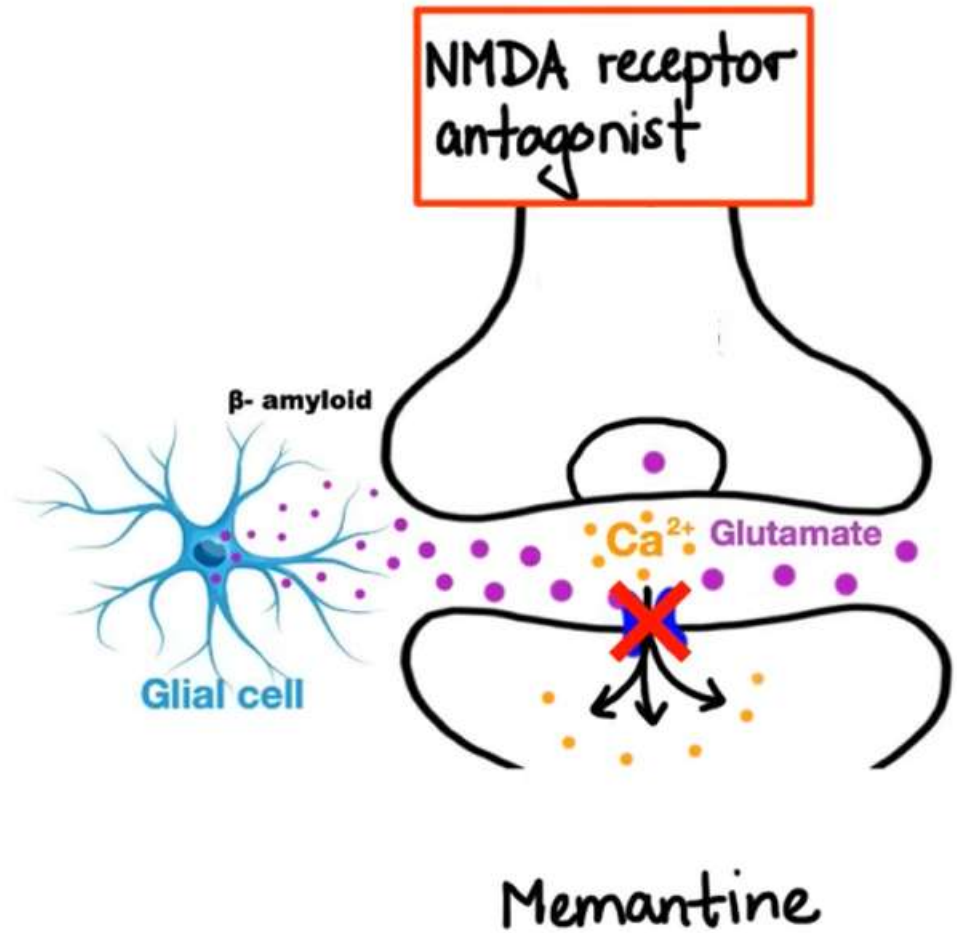
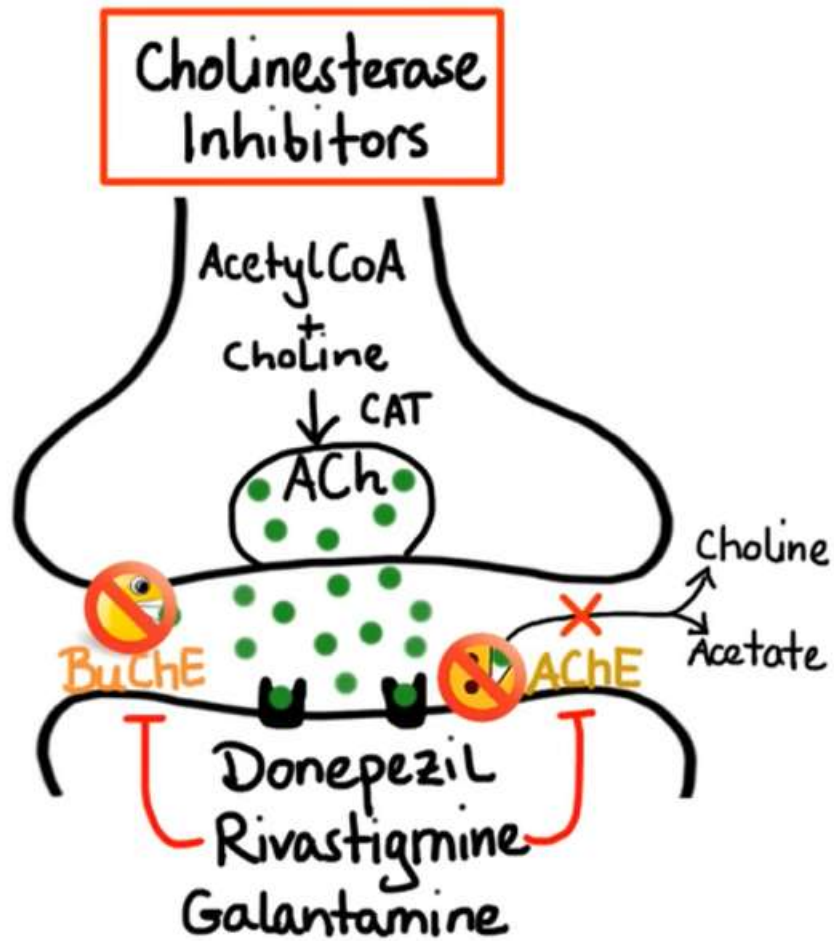
Tau hypothesis



Pharmacology of Alzheimer's Disease

- Cholinesterase Inhibitors: Donepezil, Rivastigmine, Galantamine
- NMDA Receptor Antagonist: Memantine
- Emerging Therapies: Anti-amyloid monoclonal antibodies (Aducanumab, Lecanemab)
- Symptomatic Management: Antidepressants, antipsychotics





Clinical Applications and Guidelines

- Parkinson's: Start treatment based on symptom severity, consider age and side effects
- Alzheimer's: Initiate cholinesterase inhibitors early, memantine for moderate-severe cases
- Monitor for drug interactions and side effects
- Non-pharmacological interventions remain crucial



Adverse Effects and Drug Interactions

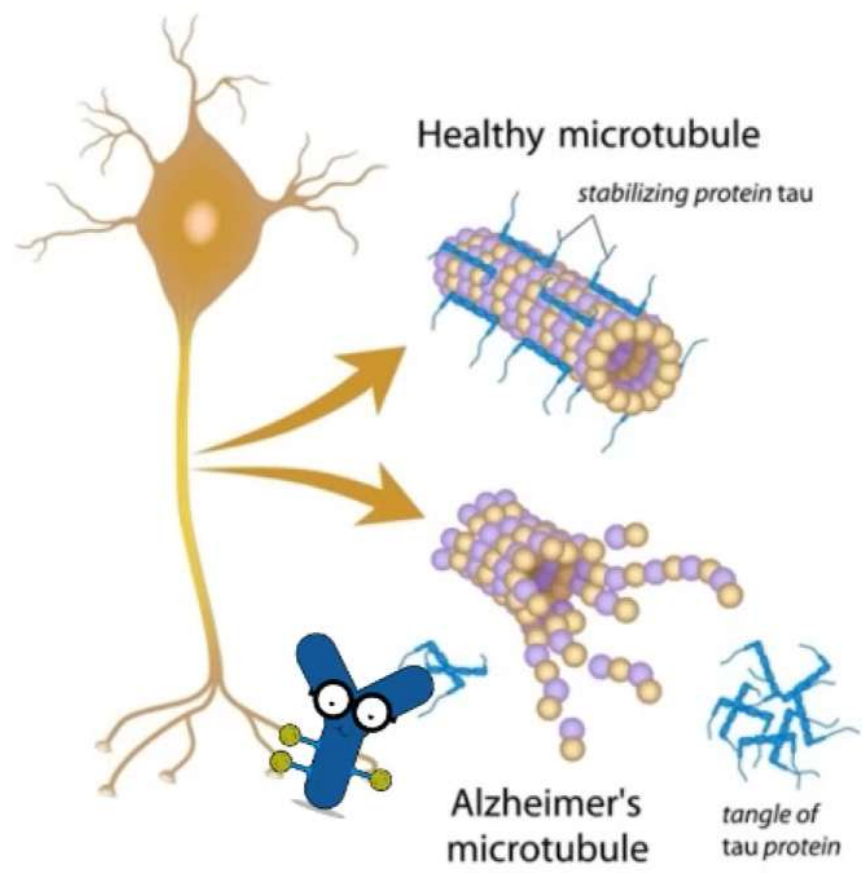
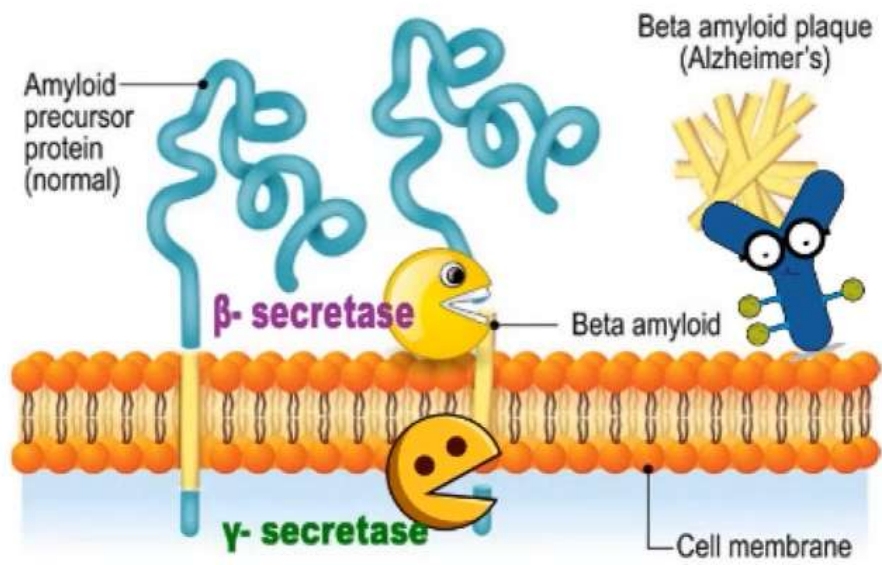
- Levodopa: Dyskinesia, orthostatic hypotension, hallucinations
- Dopamine Agonists: Impulse control disorders, sedation
- Cholinesterase Inhibitors: GI distress, bradycardia
- NMDA Antagonists: Dizziness, confusion
- Drug Interactions: Antipsychotics, antihypertensives, anticholinergics



Latest Research and Future Directions

- Gene therapy and neuroprotective strategies
- Stem cell-based treatments
- Novel monoclonal antibodies for Alzheimer's
- Personalized medicine approaches
- Potential disease-modifying therapies





THANK YOU

