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Journal Article: A Systematic Review on Isoquinoline Derivatives as Emerging Multi-target Agents in Alzheimer's and Parkinson's Disorder Therapy

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Abstract:

Introduction: Neurodegenerative disorders, including Alzheimer's, Parkinson's, multiple sclerosis, amyotrophic lateral sclerosis, and Huntington's disease, are characterized by progressive neuronal loss driven by damage or apoptosis. Although their precise etiologies remain unclear, neuronal degeneration is a common pathological hallmark. Methods: This review compiles and critically evaluates studies investigating the potential of isoquinoline derivatives to mitigate neurodegeneration. Particular attention is given to their inhibitory effects on key enzymes implicated in these disorders and structural modifications aimed at improving potency and reducing toxicity. Results: Experimental findings demonstrate that isoquinoline derivatives exhibit significant inhibitory activity against several neurodegeneration-related enzymes. These compounds show promise in attenuating disease progression in preclinical models, supporting their potential as therapeutic leads. Discussion: Isoquinoline derivatives display multitarget properties, and structural optimization has enhanced their efficacy and safety profiles. Their multifunctional nature could offer advantages over current single-target therapies by improving efficacy and reducing adverse effects. Conclusion: Isoquinoline derivatives represent promising scaffolds for developing novel therapeutics targeting neurodegenerative disorders. However, most data are limited to in vitro and early-stage preclinical studies. Comprehensive mechanistic investigations, standardized in vivo evaluations, and early-phase clinical trials are required to establish their pharmacokinetics, blood–brain barrier permeability, safety, and therapeutic potential.

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