

Precision Medicine to Identify Optimal Diagnostic and Therapeutic Interventions for Parkinson's Disease

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Abstract: Parkinson's disease (PD) is the second most common neurodegenerative disorder afflicting 10 million people worldwide and the fourteenth leading cause of death in the United States. PD is caused by the death of dopaminergic neurons that regulate movement in the substantia nigra pars compacta. Mechanisms contributing to the development of PD in vulnerable individuals include protein misfolding, protein aggregation, and mitochondrial dysfunction. We have developed algorithms for diagnosis and treatment based on review of available knowledge.

Keywords: Precision Medicine, Parkinson's Disease, Movement Disorders, Tremors, Accelerometer, Nuclear Imaging, Genetic Tests, Autophagy, Mitochondrial Dysfunction, Proteasomal Dysregulation, Diagnostic Algorithm, Clinical Neurology

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1. Introduction

Parkinson's disease, the second most common neurodegenerative disorder afflicting 10 million people worldwide and the fourteenth leading cause of death in the United States, is caused by the death of dopaminergic neurons that regulate movement in the substantia nigra pars compacta. Mechanisms contributing to the development of Parkinson's disease in vulnerable individuals include protein misfolding, protein aggregation, and mitochondrial dysfunction. In order to develop guidelines for clinicians to utilize precision medicine to develop treatment plans to address the specific needs of individuals with Parkinson's disease and related conditions, we have developed algorithms for diagnosis and treatment based on the review of available knowledge.

2. Methods

We reviewed the key literature on the pathogenesis of Parkinson's disease on PubMed and Google Scholar in order to propose guidelines for the development of diagnostic and therapeutic interventions for people with Parkinson's disease and related conditions.

3. Results and Discussion

In about 25 percent of patients, clinicians incorrectly diagnose Parkinson's disease. Causes of misdiagnosis include a lack of algorithms and inadequate use of diagnostic modalities. Four main mechanisms that may contribute to the development of Parkinson's disease (misfolding of alpha-synuclein, mitochondrial dysfunction, dysfunctional ubiquitin proteasomal pathways, and abnormal autophagy) and different diagnostic modalities (structured interview and examination, laboratory assessments, neuropathology, genetic testing, neuroimaging) will form the basis for our algorithm for the diagnosis and treatment of Parkinson's disease and related conditions.

Clinicians, administrators, policy planners, advocates, and other concerned individuals will benefit from the adoption of our guidelines for the diagnosis and treatment of Parkinson's disease and related conditions.

4. Conclusions

Clinicians, administrators, policy planners, advocates, and other concerned individuals will benefit from the adoption of our guidelines for the diagnosis and treatment of Parkinson's disease and related conditions.