Identifying therapeutic targets and causes of dopaminergic neuronal degeneration using C. elegans high-throughput genetic approaches

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Funder

The Research Council of Norwsy

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Country

Norway

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Identifying therapeutic targets and causes of dopaminergic neuronal degeneration using C. elegans high-throughput genetic approaches

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The project/programme is most relevant to:

Parkinson's disease & PD-related disorders

Keywords

Parkinson`s disease | C elegans | dopamin degeneration | molecular mechanisms

Research Abstract
Parkinson’s Disease, characterized by the progressive degeneration of dopaminergic neurons, afflicts millions of people. Yet, no effective therapeutic strategies are available.
This work uses Caenorhabditis elegans to study dopaminergic degeneration. C. e legans is a small nematode, highly amenable to genetics and high-throughput approaches, with a simple nervous system that is highly conserved at the level of gene expression and pathology with humans. This study also utilizes a mutant in a Transient Recep tor Potential (TRP) channel, trp-4(d), in which dopaminergic neurons properly develop but later on progressively degenerate.
OBJECTIVES:
1. Understand the molecular mechanisms of dopaminergic neurodegeneration
2. Identify potential therapeutic targets
3. Uncover novel causes of neuronal cell death
STRATEGIES:
1. We will use a candidate approach to investigate which of the known cell death pathways (apoptosis, autophagy, necrosis) mediate trp-4(d) dopaminergic degeneration.
2. We will use an unbiased ‘for ward genetic screening’ approach, i.e. use trp-4(d) mutants and target the genomes with mutagens to identify genes that when mutated, stop dopaminergic cell death. High-throughput genetic technology (automated screening and Whole Genome Sequencing) will b e employed for rapid mutant isolation and identification. Characterization of the retrieved genes will elucidate molecular mechanisms that block dopaminergic degeneration.
3. We will use similar high-throughput genetic screening approaches to find more ge nes like trp-4(d), that when mutated have detrimental effect to the survival of DA neurons either in isolation or in the presence of known Parkinsonism genes.
IMPACT
The expected outcomes are of high medical significance and relevance to human neurodegene rative conditions. The proposed work, employing state of the art methodology, will not only enhance Norwegian competitiveness in disease related research but also contribute to Norwegian technological exc

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