Michael J. Fox Foundation and Weston Brain Institute Computational Science Fellowship

Section 1: Background and rationale:

Neurodegenerative diseases of aging are among the least understood and most undertreated disorders. Diseases such as Alzheimer's and Parkinson's are placing a large and increasing burden on society with social and economic costs expected to rise significantly within a generation.

Meeting this challenge requires pioneering approaches to accelerating treatments. The high variability of these diseases — across age of onset, rate of progression, and type and severity of symptoms — also means that identifying models for diagnosis, prognosis and disease subtyping has become critical for biomarker and therapeutic development and clinical trial design.

As the world's largest nonprofit funder of Parkinson's research, The Michael J. Fox Foundation for Parkinson's Research (the "Foundation") is dedicated to accelerating a cure for Parkinson's disease and improved therapies for those living with the condition today. The Foundation pursues its goals through an aggressively funded, highly targeted research program coupled with active global engagement of scientists, Parkinson's patients, business leaders, clinical trial participants, donors and volunteers. In addition to funding more than $800 million in research to date, the Foundation has fundamentally altered the trajectory of progress toward a cure. Operating at the hub of worldwide Parkinson's research, the Foundation forges groundbreaking collaborations with industry leaders, academic scientists and government research funders; increases the flow of participants into Parkinson's disease clinical trials with its online tool, Fox Trial Finder; and promotes Parkinson's awareness through high-profile advocacy, events and outreach.

The Foundation has made significant investment in generating comprehensive datasets from Parkinson's disease patients, at-risk individuals, genetic mutation carriers and healthy control subjects to understand disease progression through studies such as the landmark Parkinson's Progression Markers Initiative (PPMI). Numerous other initiatives including the Alzheimer's Disease Neuroimaging Initiative (ADNI) and Accelerated Medicines Partnerships ([AMP Alzheimer's Disease,](#) [AMP Parkinson's Disease](#)) are generating additional high-dimensional datasets.

The W. Garfield Weston Foundation through the Weston Brain Institute (the "Institute") supports translational neuroscience research that accelerates the development of therapeutics for neurodegenerative diseases of aging. To help achieve this, the Institute addresses gaps and inefficiencies in the funding market by supporting high-risk, high-reward translational projects, while leveraging world-class business and scientific expertise in a fast and flexible granting process. In Canada, the Institute commits approximately $10 million/year, for a total of over $50 million to date to support ~250 investigators through our various programs. The Institute was started by The W. Garfield Weston Foundation, which oversees and funds its Canadian programs. The Institute's programs in the UK, the Netherlands, and Ireland are part of the Selfridges Group Foundation. Selfridges Group consists of internationally known luxury department store retailers Brown Thomas and Arnotts in Ireland, Holt Renfrew in Canada, Selfridges in the UK and de Bijenkorf in the Netherlands.

Recently, the Institute has launched the Adjacent Fields Initiative with the goal of ensuring that resources and technologies emerging from fields such as data science, artificial intelligence and machine learning, which are some of Canada's strengths and are particularly suited for the analysis of vast

amounts of data from complex diseases, are directed toward advancing therapeutic development for neurodegenerative diseases of aging.

The Michael J. Fox Foundation and Weston Brain Institute Computational Science Fellowship program is a collaboration between the two organizations with the goal of supporting research that will apply sophisticated computational approaches and expertise to advance therapeutic development for neurodegenerative diseases of aging.

Section 2: Scope of Work:

Projects must support development of a therapeutic and/or tool to accelerate therapeutic development (see Section 4 for definitions), e.g.,

- Computer modeling to uncover new biomarkers, or select therapeutic candidates
- Use of longitudinal, multi-modal open data to identify or validate disease progression models or factors that influence complex clinical outcomes (e.g., rates and disease subtypes)

Expected deliverables should include computational tools, models and/or knowledge derived from application of computational tools that will accelerate therapeutic development for neurodegenerative diseases of aging.

The fellows awarded through this program will form a collaborative community to share ideas, methods and lessons learned in virtual and in-person meetings throughout the award period. The fellows will, for instance, have the opportunity to connect with current U.S.-based Michael J. Fox Foundation Computational Science fellows to share learnings and expertise. Principal investigators and fellows can also collaborate with Drs. Mike Nalls and Andrew Singleton, experts in Parkinson's disease who have an established Michael J. Fox Foundation Computational Science Fellow award, for technical mentorship and domain expertise in Parkinson's disease. In addition, fellows will have opportunities to speak at Foundation or Institute events to promote applying computational science tools and approaches to biomedical research.

Consistent with the spirit of community building and collaboration, any algorithms, code, inventions or discoveries made through this award are expected to be shared with the Foundation and the research community through presentations at national meetings and publications in peer-reviewed journals. Fellows are also strongly encouraged to submit computational tools, models, and code to public repositories (e.g., Github, CRAN, PyPi).

Principal investigators will apply to the Michael J. Fox Foundation for funding of a postdoctoral fellow in their laboratory/team. Successful awardees will be expected to recruit and hire the fellow within approximately three months of award notification (though the selected fellow can be part of the application, if known).

Two 18-month fellowships of $150,000 (US dollar) each for salary support and benefits will be provided for the fellow working in the lab of the awarded researcher. Travel expenses to Foundation or Institution-sponsored events will be provided by the Foundation.

Section 3: Eligibility:

Principal investigators from the Toronto or Montreal area with an interest in compuational analyses and neurodegenerative diseases of aging are welcomed to apply. Principal investigators must hold a position at or above the level of Assistant professor at a CRA qualified donee institution in Canada.

Prior knowledge of neurodegenerative diseases of aging is not required for the fellowship, yet comfort with biomedical data is strongly preferred. Preferred backgrounds include:

- Ph.D. in computational modeling, statistics, computer science, biostatistics, data science, bioinformatics, computational biology or related area
- Interest in biomedical data on neurodegenerative diseases of aging
- Demonstrated fluency in programming languages (R, Python, Matlab, SAS, etc)

Section 4: Definitions

Neurodegenerative diseases of aging: Alzheimer's disease, frontotemporal dementia, dementia with Lewy bodies, multiple system atrophy, Parkinson's disease, progressive supranuclear palsy, vascular contributions to these diseases (not stroke-mediated vascular disease), and prodromes to these diseases (e.g., mild cognitive impairment as prodromal to Alzheimer's disease; REM sleep behavior disorder as prodromal to Parkinson's disease).

Translational: Applied research toward developing therapeutics for the prevention and/or treatment of human disease. For example, for small molecule drug development, this includes target validation to Phase IIa clinical trials. Basic/discovery research, including but not limited to understanding disease mechanisms and discovering genes implicated in disease, is not in scope.

Therapeutic: A pharmacological approach (including small molecules, biologics, cell therapies and vaccines, drug repositioning and repurposing), medical device, surgical intervention, or magnetic or electrical brain stimulation. Therapeutics can be for symptomatic relief, disease modification or prevention. Identification of novel therapeutics is in scope; however, identification of novel therapeutic targets, including genes implicated in disease, is not in scope.

Tools: An item that accelerates development of therapeutics (e.g., imaging techniques or reagents, biomarkers, and diagnostics).