

Postdoctoral Fellow – Neuroinflammation and Neurodegeneration in Down Syndrome Using Human Cortical Organoid Models

Boston University | Boston, MA

A postdoctoral fellow position is available in the Laboratory of Molecular Signaling in Neurological Disorders at Boston University to investigate mechanisms of neuroinflammation and neurodegeneration in Down syndrome (DS) and Down syndrome-associated Alzheimer's disease (DS-AD). The position is supported by a recently awarded NIH R01 and offers an opportunity to lead an innovative project using human induced pluripotent stem cell (iPSC)-derived organoid models.

Our laboratory uses human iPSC-derived cortical organoids and assembloid systems, genome engineering, advanced imaging, and molecular approaches to understand how trisomy 21 alters neuronal and glial biology and contributes to neurological dysfunction and Alzheimer's disease.

Research Project

The successful candidate will lead studies investigating the role of HMGN1, a chromosome 21-encoded chromatin-associated protein and alarmin, in regulating neuroinflammatory responses in Down syndrome and DS-associated Alzheimer's disease.

The project will use genetically engineered isogenic euploid and trisomic iPSC lines together with microglia-enriched human cortical organoid models to determine how HMGN1 dosage and extracellular signaling influence microglial and astrocytic inflammatory responses.

Major areas of investigation will include:

- Generation and characterization of iPSC-derived microglia and their incorporation into human cortical organoid and assembloid models
- Investigation of HMGN1 localization, redistribution, and extracellular release in euploid and trisomic neural environments
- Characterization of microglial and astrocytic inflammatory responses to HMGN1
- Advanced confocal microscopy and quantitative imaging of neuron–glia interactions
- Molecular and biochemical characterization of inflammatory signaling pathways
- Integration of cellular phenotypes with transcriptomic and epigenetic datasets generated by the laboratory
- Validation of key findings using human postmortem brain tissue

The fellow will have substantial intellectual independence and will be encouraged to develop related research directions within the broader areas of neuroinflammation, glial biology, Down syndrome, and neurodegeneration.

Qualifications

Applicants should have a PhD, MD/PhD, or equivalent doctoral degree in neuroscience, cell biology, molecular biology, immunology, stem cell biology, or a related discipline.

Candidates with experience in one or more of the following areas are particularly encouraged to apply:

- Human iPSC culture and differentiation
- Cortical organoids or other 3D neural culture systems
- Microglial or neuroimmune biology
- Neuroinflammation or neurodegeneration
- Confocal microscopy and quantitative image analysis
- Molecular and biochemical techniques
- Single-cell transcriptomics or other omics approaches

Prior experience with microglia or iPSC-derived neural models is desirable but not required. We are particularly interested in motivated candidates who would like to develop expertise at the intersection of human stem cell models, neuroinflammation, and neurodegenerative disease.

Research Environment and Career Development

The fellow will join a collaborative research environment at Boston University with access to expertise and resources in neuroscience, stem cell biology, genomics, advanced microscopy, and neurodegenerative disease research.

The position offers strong opportunities for first-author publications, scientific presentations, development of independent research directions, and preparation for fellowship and career-development awards. The department also has a strong commitment to teaching, with opportunities to give lectures, contribute to or teach courses, lead journal clubs, and mentor graduate and undergraduate students.

The fellow will work closely with the principal investigator while having significant intellectual ownership of the project.

How to Apply

Interested candidates should submit the following documents to Dr. Zeldich, ezeldich@bu.edu:

- A curriculum vitae
- A brief statement describing research experience, scientific interests, and career goals
- Contact information for three references