



# STUDYING EFFECTS OF MICROGRAVITY ON BRAIN CELLS

## BY THE NUMBERS

### **81,000 KENTUCKIANS**

ARE CURRENTLY LIVING WITH ALZHEIMER'S DISEASE, RESULTING IN AN ANNUAL ECONOMIC IMPACT OF \$949M+

### **12,000 KENTUCKIANS**

ARE CURRENTLY LIVING WITH PARKINSON'S DISEASE, RESULTING IN AN ANNUAL ECONOMIC IMPACT OF \$642M+

### **5,000 KENTUCKIANS**

ARE CURRENTLY LIVING WITH MULTIPLE SCLEROSIS (MS) RESULTING IN AN ANNUAL ECONOMIC IMPACT OF \$442M+

## **\$3.1 MILLION | WHAT WILL IT DO?**

With a highly competitive grant from NASA and a 10% match from the Commonwealth of Kentucky (\$300,000), NSCF will be able to continue its groundbreaking study of neurodegeneration in space with funds provided for additional ground research AND three more flights to the International Space Station (ISS) through 2027.

## **WHAT'S THE RESEARCH?**

Since its first launch in 2019, NSCF has flown six times to the International Space Station (ISS), sending 3D organoids (miniature replicas) of the human brain to the orbiting laboratory. Organoids for the first six flights have been made from the cells of people with Parkinson's disease and primary progressive MS. Next flights will also include organoids made from the cells of people with Alzheimer's.

## **WHAT'S THE GOAL?**

Researchers can make brain organoids from anyone, including people who have mutations for these diseases. The ultimate goal is to offer flight-proven, validated models of these diseases to industry, academic institutions and foundations to accelerate the development of new diagnostics and novel treatments for neurodegenerative diseases.



# STUDYING EFFECTS OF MICROGRAVITY ON BRAIN CELLS

## WHO IS NSCF?

The National Stem Cell Foundation is a Louisville, Kentucky-based non-profit organization that funds adult stem cell and regenerative medicine research, underwrites a professional development program for middle school science teachers inspiring the next generation of STEM pioneers nationwide, and covers copays and deductibles for children participating in clinical trials for rare diseases when those out-of-pocket costs are beyond a family's means.

## THE MISSIONS

### **July 25, 2019 – August 27, 2019 | SpaceX CRS-18**

Hardware validation flight to the ISS with 3D models of Parkinson's disease and primary progressive MS

### **December 5, 2019 – January 7, 2020 | SpaceX CRS-19**

First in-kind study of neurodegeneration in space with 3D organoid models of the human brain made from cells of people with Parkinson's disease and primary progressive MS that include microglia, immune cell markers of inflammation common to all neurodegenerative diseases

### **December 21, 2021 – January 24, 2022 | SpaceX CRS-24**

Continued study of neurodegeneration and pathways of neuroinflammation on the ISS with organoids made from cells of people with Parkinson's disease and primary progressive MS

### **July 15, 2022 – August 20, 2022 | SpaceX CRS-25**

Advancing study of neurodegeneration on the ISS with organoids made from cells of people with Parkinson's disease and primary progressive MS, dubbed *Cosmic Brain Organoids*

### **January 15, 2024 – February 9, 2024 | Axiom Space Mission 3**

Short term mission study of *Cosmic Brain Organoids* on Axiom Space's third private astronaut mission to the ISS

### **March 21, 2024 – April 30, 2024 | SpaceX CRS-30**

Advancing study on the ISS evaluating the pathways of neuroinflammation in neurodegenerative diseases like Parkinson's disease and MS. Next flights will include organoids made from the cells of people with Alzheimer's disease