ABSTRACT

To investigate the pathways and kinetics of protein aggregation to allow accurate predictive modeling of the process and evaluation of potential inhibitors to prevalent diseases including cataract formation, chronic traumatic encephalopathy, Alzheimer’s Disease, Parkinson’s Disease and others.

ANTICIPATED BENEFITS

To NASA funded missions:
The project is scheduled to fly on Nanoracks in September 2014.

To other government agencies:
Potential to understand the mechanism for several diseases in the US and world population including chronic traumatic encephalopathy, Parkinson's Disease and Alzheimer's Disease.

...
Protein Colloidal Aggregation Project

U.S. states with work

Other Organizations Performing Work
Florida Institute of Technology (FIT)

🌟 Lead center: Kennedy Space Center
• Supporting centers: Glenn Research Center

DETAILED DESCRIPTION

The goal of the Protein Colloidal Aggregation Project is to understand the underlying cause of several major diseases, including Alzheimer's, Parkinson's, and chronic traumatic encephalopathy. These diseases all occur when protein molecules undergo a peculiar and irreversible process in which they aggregate to form tiny fibers of a unique material called amyloid, which the body cannot remove. Despite enormous investment in research, the fundamental physiochemical mechanism of these diseases remains poorly understood. Finding an optimal treatment for any disease is impossible until we fully understand its cause. We believe the central problem in obtaining this understanding is that the most commonly proposed models for amyloid aggregation may be incorrect, and that the process is not fundamentally biological.

MANAGEMENT

Program Executive:
John Faker

Program Manager:
Nancy Zeitlin

Project Manager:
David Tipton

Principal Investigator:
David Tipton

Co-Investigator:
Daniel Woodard
TECHNOLOGY DETAILS

Mechanisms and Techniques to Study Protein Colloidal Aggregation and Its Effects

TECHNOLOGY DESCRIPTION

- The goal of the Protein Colloidal Aggregation Project is to understand the underlying cause of several major diseases, including Alzheimer’s, Parkinson’s, and chronic traumatic encephalopathy. These diseases all occur when protein molecules undergo a peculiar and irreversible process in which they aggregate to form tiny fibers of a unique material called amyloid, which the body cannot remove. Despite enormous investment in research, the fundamental physiochemical mechanism of these diseases remains poorly understood. Finding an optimal treatment for any disease is impossible until we fully understand its cause. We believe the central problem in obtaining this understanding is that the most commonly proposed models for amyloid aggregation may be incorrect, and that the process is not fundamentally biological.

- This technology is categorized as a hardware system for other applications

- Technology Area
  
  - TA06 Human Health, Life Support & Habitation Systems (Primary)

CAPABILITIES PROVIDED

The use of atomic force microscopy and scanning electron microscopy in the evaluation of protein colloidal aggregates and macromolecular networks

1. The capability to observe colloidal aggregation of proteins in microgravity.
2. The effects of macromolecular network formation on biological transport processes.
3. The use of atomic force microscopy in the evaluation of the nanostructure of bone and artificial composite...
TECHNOLOGY DETAILS

POTENTIAL APPLICATIONS (CONT’D)

materials.
IMAGE GALLERY

AFM Image

Protein Colloidal Aggregation

SEM Image
ANTICIPATED BENEFITS

To the nation: (CONT'D)

Potential to understand the mechanism for several diseases in the US and world population including chronic traumatic encephalopathy, Parkinson's Disease and Alzheimer's Disease.