Supramolecular Assembly and Structure of Neurofilaments

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Funded by
National Science Foundation
Nanoscale Interdisciplinary Research Teams
National Institute of Health

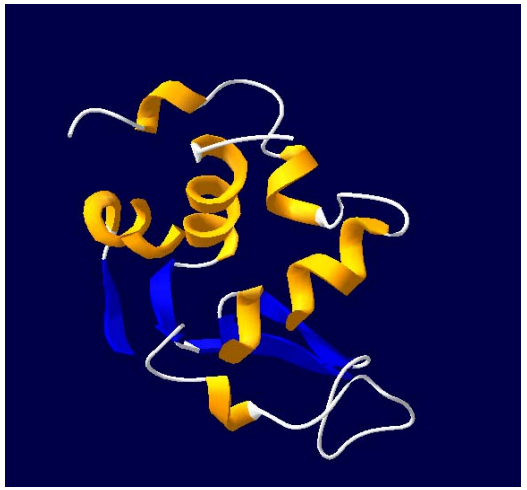
Introduction

- What are neurofilaments
- Protein structure and phosphorylation
- Protein purification
- Structure of neurofilaments
- Experimental data

What Are Neurofilaments?

- Intermediate filaments are a major component of the cytoskeleton in cells
- Neurofilaments are a type of intermediate filament expressed almost exclusively in neuronal cells
- Neurofilaments comprise a majority of the protein in axons and therefore may effect signal transmission in our bodies
- When neurofilaments assemble incorrectly it can cause neurological disorders

Protein Structure and Phosphorylation



- General structure of proteins
- Structure dictates protein interactions
- Phosphorylation is the body's mechanism for regulating protein interaction
- Changing the phosphorylation changes the charge….electrostatic interactions

NF Purification from Bovine Spinal Cord

Homogenize spinal cord in blender

Centrifuge to get rid of cell waste

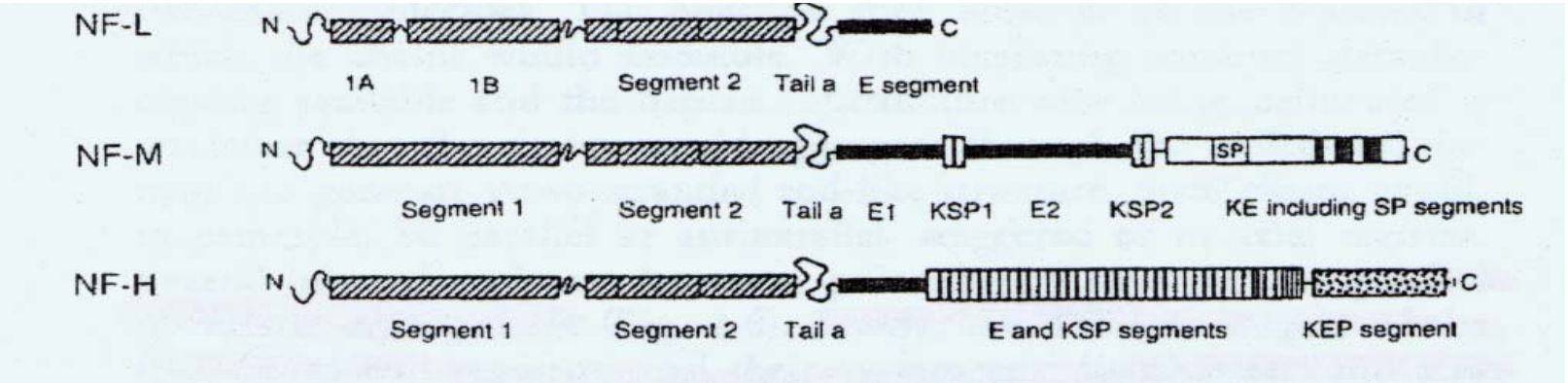
Incubate supernatant in glycerol and pellet neurofilaments

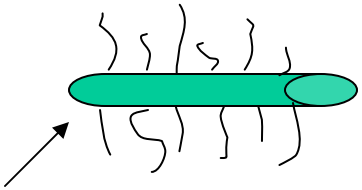
Clarify by centrifuging through sucrose gradient

Ion exchange column

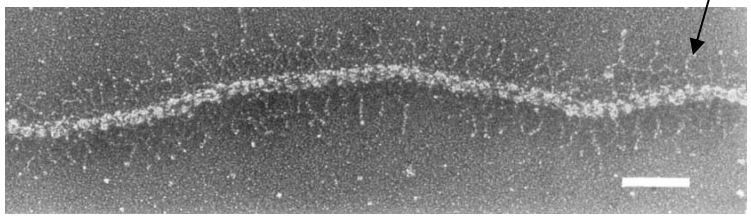
Structure of Neurofilaments

Low, Medium, and High Molecular Weight Neurofilaments





Single NF w/ Sidearms



Courtesy of U. Aebi

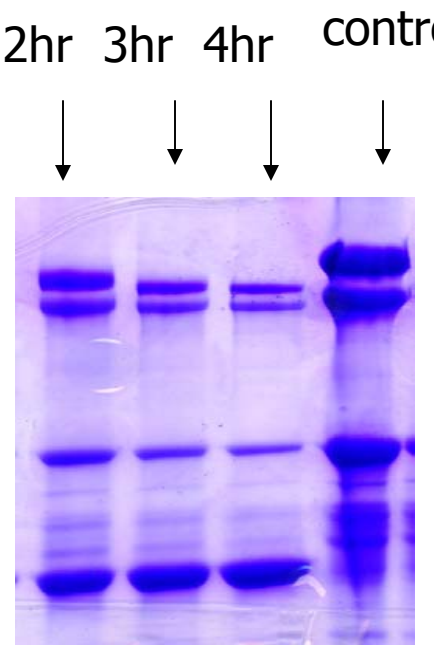
Network of Neurofilaments

Courtesy of Nobutaka Hirokawa

* Paul Janmey

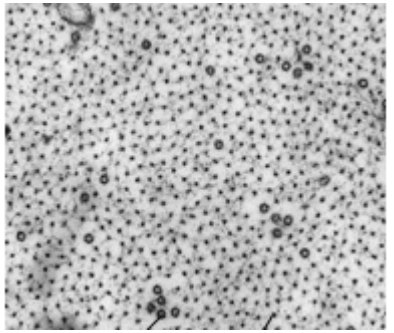
Neurofilament Data

Gel Electrophoresis

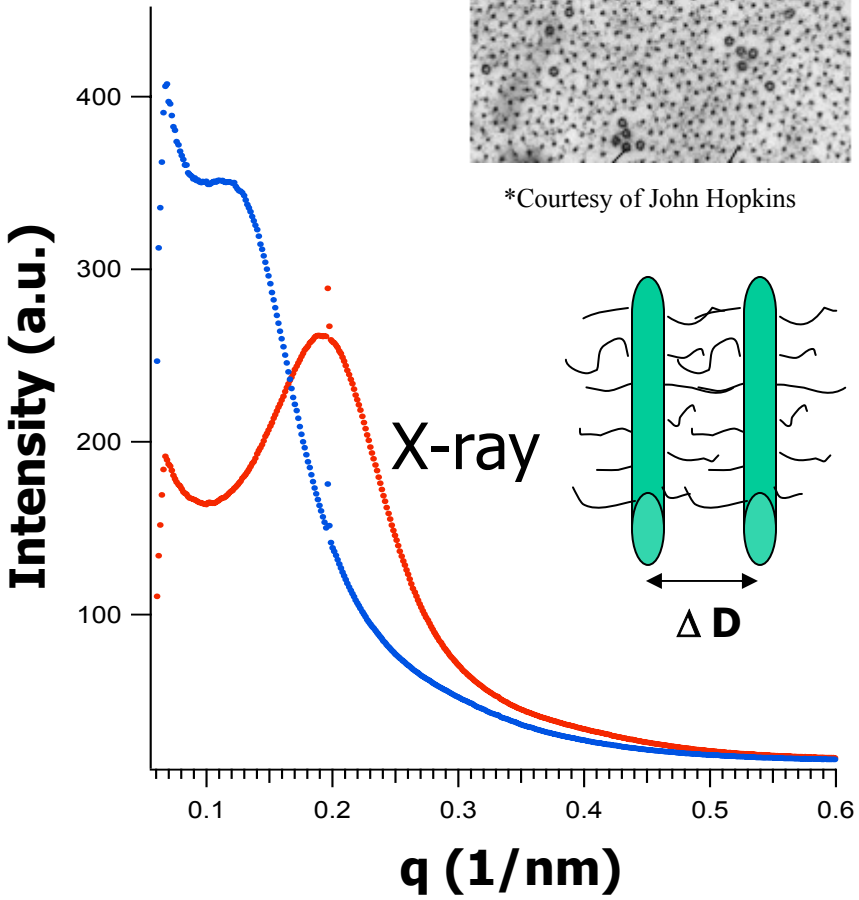


NF's were incubated in phosphatase for different time increments to change phosphorylation

Electron Micrograph



*Courtesy of John Hopkins



Acknowledgements

- **Jayna Jones**
- Prof. Cyrus Safinya
- Trevor Hirst, Nick Arnold, Al Flinck, Liu-Yen Kramer
- Materials Research Laboratory UCSB
- INSET
- National Science Foundation, Nanoscale Interdisciplinary Research Teams, National Institute of Health