CBST Seminar

Center for Biomanufacturing Science & Technology

UNIVERSITY OF DELAWARE

DATE:
April 27, 2016
TIME:
10:00 a.m.
LOCATION:
366 Colburn Lab

Dr. Regina Murphy

Professor, Chemical & Biological Engineering

University of Wisconsin-Madison

Dr. Murphy is the Smith-Bascom Professor of Chemical and Biological Engineering. She received her S.B., Ph.D. from Massachusetts Institute of Technology. Her research interests include physical chemistry of protein-protein interactions and amyloid protein aggregation. Murphy Research Group focuses on beta-amyloid and Alzheimer's disease, developing a mathematical model for the kinetics of Aβ aggregation, strategies for the rational design of inhibitors of amyloid protein toxicity, polyglutamine peptides and proteins, and genetic mutations in neurodegenerative diseases. Dr. Murphy is the author of numerous publications and has received many awards, including an NSF Presidential Young Investigator's Award, the Jordi Folch-Pi Award, American Society for Neurochemistry, the James G. Woodburn Award for Excellence in Teaching, the Chancellor's Teaching Award, and the Spangler Award for Technology Enhanced Instruction.

"Peptide Mimics of Amyloid Binding Domains"

'Amyloid' is a general term describing protein aggregates of cross-β-sheet conformation and fibrillar morphology. Amyloid deposits are connected to several degenerative disorders including Alzheimer's, Huntington's, and the prion diseases. In Alzheimer's disease (AD), for example, the intrinsically disordered peptide β-amyloid (Aβ) spontaneously self-associates into soluble oligomers and insoluble fibrillar aggregates that are believed to lead to neuronal dysfunction and death, motivating the search for compounds that selectively bind to and inhibit Aβ oligomerization and/or neurotoxicity. Numerous small molecules that can alter Aβ aggregation have been extensively explored as therapeutic agents against AD, although to date none have been clinically effective. Antibodies against Aβ have also been tried, with limited success. A third approach is to design peptides and peptidomimetics that bind to Aβ. Peptides have potential advantages over small molecules in terms of better affinity and specificity, but they can be more easily tuned via chemical means for bioavailability, homogeneity, and stability compared to antibodies. In this talk, we will present our work in defining the Aβ-binding domain of specific proteins in cerebrospinal fluid that may act as natural neuroprotective agents. We will also describe our efforts to create peptide mimics of the natural Aβ-binding domain, which interact with Aβ specifically and protect against Aβ-induced neurotoxicity.