# CoCo Seminar Series
# Fall 2018

## Complex Dynamics of Protein Aggregation in Alzheimer's Disease

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**Wednesday November 28, 2018 11:00am-12:00pm**
**Engineering Building H-9 (Knoll-MacDonald Commons / Watson Commons)**

Aggregation of amyloid $\beta$ (A$\beta$) peptides is a significant event that underpins neurodegenerative diseases such as Alzheimer disease (AD). A$\beta$ aggregates, especially the low-molecular weight oligomers, are the primary toxic agents in AD. Therefore there is increasing interest in understanding their formation and behavior. Aggregation is a nucleation-dependent process in which the pre-nucleation events are dominated by A$\beta$ homotypic interactions making this a very complex system. In this presentation I will talk about the investigations of heterotypic interactions between A$\beta$ and fatty acids (*FA*s) via mathematical modeling and game theoretic tools undertaken by our research group. We observe that *FA*s influence aggregation dynamics in three broadly-defined *FA* concentration regimes containing non-micellar, pseudomicellar or micellar phases. While the non-micellar phase promotes on-pathway fibrils, pseudomicellar and micellar phases promote predominantly off-pathway oligomers. Off-pathway oligomers saturate within a limited molecular size, and likely with a different overall conformation than those formed along the on-pathway, suggesting the generation of distinct *conformeric strains* of A$\beta$, which may have profound significance for our understanding of the biophysics of protein aggregation. Our results validate previous experimental observations and provide insights into potential influence of biological interfaces in modulating protein aggregation pathways.

Dr. Ashwin Vaidya is an Associate Professor in the Department of Mathematical Sciences and Physics & Astronomy at Montclair State University. His primary research interests lie in the areas of dynamical systems, fluid dynamics and pattern formation.

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