Introductory Remarks to Symposium 5

The role of co-proteinopathies in neurodegenerative diseases: bystander or disease driver?

Evgeni Ponimaskin and Franziska Richter Assencio, Hanover

Proteinopathies encompass a diverse group of over 50 diseases marked by the accumulation of misfolded proteins leading to cellular dysfunction. Among the most devastating proteinopathies are neurodegenerative disorders such as Alzheimer's disease (AD), frontotemporal dementia (FTD), Parkinson's disease (PD), and Amyotrophic Lateral Sclerosis (ALS). Despite their prevalence, no curative or preventive strategies are currently available for these conditions. Neurodegenerative proteinopathies are typically categorized based on the dominant protein found in misfolded or aggregated form. In PD, for example, alpha-synuclein (aSyn) forms the primary component of Lewy bodies. Similarly, Tau protein predominates in AD and FTD, while TDP-43 inclusions are hallmark features in ALS.
This "one protein - one disease" paradigm is useful for classification but oversimplifies the complexity observed as these diseases progress. Increasingly, research shows that co-occurring proteinopathies are common, with multiple misfolded proteins contributing to pathogenesis and exacerbating disease progression. The prevalence of co-pathologies is reported at over 60% across different neurodegenerative diseases. These findings suggest that co-proteinopathies represent the rule rather than the exception. The extent and mechanisms by which co-pathologies influence disease severity and progression are still under investigation.

This symposium will shed light on the current understanding and future directions concerning co-pathologies in neurodegenerative diseases, focusing on their mechanisms and therapeutic implications. Tiago Outeiro, Yun Kyung Kim, Josephine Labus, Franziska Richter, and Asima Nayak will specifically explore the interplay of misfolded Tau, aSyn, and TDP-43 proteins. These proteins, usually soluble under normal conditions, can aggregate into neurotoxic oligomers and fibrils when influenced by increased levels, aberrant post-translational modifications, or changes in cellular homeostasis. This symposium will offer attendees a comprehensive overview of how co-proteinopathies may shape the pathophysiology and inform the development of therapeutic strategies.

Symposium 5

Wednesday, March 26, 2025
14:30 - 16:30, Lecture Hall 103

Chairs: Evgeni Ponimaskin and Franziska Richter Assencio, Hanover

14:30 **Opening Remarks**

14:35 Tiago Outeiro, Goettingen
FROM BIOLOGY TO CLASSIFICATION: UNDERSTANDING PARKINSON'S DISEASE AND RELATED SYNUCLEINOPATHIES (S5-1)

14:55 Yun Kyung Kim, Seoul, South Korea
FOUR-REPEAT TAU IN ATYPICAL PARKINSONISMS; STRATEGIES FOR COMBAT (S5-2)

15:15 Josephine Labus, Hanover
CELLULAR MECHANISMS DRIVING TAU AND TDP-43 AGGREGATION IN NEURODEGENERATIVE DISEASES (S5-3)

15:35 Franziska Richter, Hanover
ALPHA-SYNUCLEIN AND TAU IN PARKINSON'S DISEASE, BYSTANDERS OR PARTNERS-IN-CRIME? (S5-4)

16:05 Asima Nayak, Bonn
CHARACTERIZATION OF LEWY BODY-LIKE STRUCTURES IN CELLULAR SYSTEM AND PATIENT SAMPLES (S5-5)

16:15 **Discussion and concluding Remarks**