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The Clinical Connectome: From Neurodegenerative to Focal Brain Diseases

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At rest, our brain is never truly at rest. Even in the absence of external input, the brain continues to engage in a variety of intrinsic processes. This organization, termed the "functional connectome," consists of a hierarchical scaffold organized into polyfunctional neural networks, complemented by the "structural connectome," which includes distal and local structural connections between brain regions. Recent theories suggest that this functional and structural scaffold may form the foundation of cognitive abilities. Brain conditions that affect neural health impact the connectome, and the breakdown of connectivity can predict cognitive deficits across a broad range of neurological diseases. This reinforces the idea that the connectome is a fundamental characteristic of cognitive processes.
In this presentation, we will discuss the relationship between brain structural and functional connections and behavior in several neurological diseases, including proteinopathies, stroke, and brain tumors. By examining how the connectome and various pathophysiological mechanisms interact, we can gain valuable insights into the underlying processes that support cognitive abilities. Additionally, we will introduce a recently founded project, in which a work package is dedicated to the characterization of the clinical connectome, spanning from degenerative to focal brain diseases. This project will serve as a foundational repository for studying the impact of pathophysiological mechanisms on brain connectivity.

Presenter: PINI, Lorenzo (Department of Neuroscience, University of Padova & Padova Neuroscience Center, University of Padova, Italy)

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