

# REMBRANDT: Remodelling the Brain In Intellectual Disability

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The brain is formed by a myriad of different elements, the neurons that interact dynamically forming a highly connected network. As a result, the brain operates as a non-linear, noisy, highly dimensional system showing an extremely rich dynamical behavior. One of the most challenging questions in neuroscience is how learning and memory, the foundational pillars of cognition, are grounded in stable, yet plastic, states in relevant neurons. Technical limitations however, along with a lack of interdisciplinary integration, have so far hampered the comprehensive elucidation of perturbations underlying dysfunction of cognition-relevant neurons. Children with intellectual disability (ID) and their corresponding genetic mouse models, exhibit a significant deviation of neurobiological mechanisms governing normal brain function and leading to cognitive impairments. Despite the heterogeneity of genetic and environmental aetiologies underlying both syndromic and non-syndromic forms of ID, they are often characterized by overlapping impairments. The disruption of neural plasticity is a common pathognomonic feature related to cognitive impairment across IDs, likely due to deregulation of synaptic protein synthesis and dendritic spine signalosome, thus opening the possibility to discover drugs for restoring cognitive function not restricted to a specific disorder. These discoveries pave the way for a change in paradigm in psychopharmacology.



Professor Mara Dierssen is the director of Cellular and Systems Neurobiology laboratory in the Systems Biology Program, at the Center for Genomic regulation in Barcelona. She is a world expert in the field of intellectual and has received several recognitions for her work (Ramón Trias Fargas, Jaime Blanco or Sisley – Lejeune Awards). Her current work is devoted to decipher brain mechanisms subserving learning and memory, and how they are altered in cognitive pathology. She aims at understanding how the neuronal architecture and connectivity constrain the flow and storage of information in neuronal circuits in human cognitive-related disorders. She is MD, PhD and served as professor at the University of Cantabria where she initiated her work in the behavioral and molecular analysis of the alterations in learning and memory involved in intellectual disability. Dierssen held a researcher position at the Medical and Molecular Genetics Center-Institut de Recerca Oncològica (IRO) in Barcelona, where she started a Neurobiology and Behavior Research Group. From 2001, she is Group Leader at the Center for Genomic Regulation and holds a professorship in the Ramón Llull University of Barcelona. Dierssen serves in several scientific leadership roles including different scientific advisory boards, editorial positions in high impact scientific journals, She was President of the International Behavioral and Neural genetics Society, and of the Spanish Neuroscience Society, and founding member and Secretary General of the Trisomy 21 Research Society. Dierssen is member of the European DANA Alliance for the Brain, and was elected as a Member of the Academia Europea in 2014.