DANDRITE
Danish Research Institute of Translational Neuroscience
Nordic EMBL Partnership for Molecular Medicine

AARHUS UNIVERSITY

DANDRITE Topical Seminar

Wednesday 21 June 2023
13:00 – 14:00

Venue: 1874-132 (MBG)

Edi Barkai

Professor at the University of Haifa, Israel

A biophysical mechanism for epigenetic inheritance of enhanced complex learning capabilities

Acquisition of the ability to learn complex tasks, termed 'rule learning', is mediated by enhanced intrinsic neuronal excitability throughout the neuronal population in the relevant brain areas. Here we show that rats trained in complex tasks pass on trans-generationally superb learning capabilities. Such inheritance is also evident when only one of the parents (male or female) is trained, if the F1 generation is fostered by non-trained females and if the F2 or F3 generation is trained without any training of the F1 generation. Notably, offspring excel also in other, completely novel tasks. At the cellular level, the biophysical properties of CA1 pyramidal neurons of trained rats' offspring differ significantly from neurons of controls' offspring. Their excitability is higher, the very same change induced in the brains of the F0 rats only after they acquire the rule. Thus, offspring excel in complex learning tasks since they are born with neurons that show the same biophysical change induced in parents' brains by training for rule learning. We suggest that these changes create favorable set point for future increased plasticity, thereby granting trained rats' offspring superb learning capabilities.

Host: Sadegh Nabavi, DANDRITE Group leader