manitoba neuroscience network

Taming the wild synapse: MDGAs as negative regulators of synapse development

SEMINAR & VISITING SPEAKER SERIES

DATE
Monday, March 11, 2019
2:30 PM

LOCATION
BMSB, Theatre C

SPEAKER
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OBJECTIVES

1. Understand what negative synapse organizers such as MDGAs are.

2. Understand how loss of negative synapse organizers alters neuronal circuit properties and contributes to corresponding behavioral deficits.

3. Gain insight into alternative molecular targeting strategies that could be used for restoring physiological and behavioral functions that are compromised in neurodevelopmental disorders.

Exciting advancements in our understanding of synapse development suggest that powerful positive and negative synapse organizers control when and where synapses form. Chief among the negative regulators are MDGAs, which are found throughout the brain where they help regulate how synaptic connections form and respond to neural activity. MDGAs exist in two forms; MDGA1 appears to regulate inhibitory synapses that limit cell firing whereas MDGA2 regulates excitatory synapses which increase cell activity. This discussion will begin with recent discoveries about the contributions of MDGA1 to synaptic and circuit properties in vivo. Next, MDGA2, which has been identified as a candidate gene in Autism Spectrum Disorder (ASD), will be discussed in the context of synaptic plasticity, cortical circuit dynamics and rodent behavioral analogs of ASD. Finally, I will introduce ongoing projects focused on countering molecular deficits observed in our autism model as a means for restoring the capacity of autistic brain circuits to undergo synaptic changes, which may hold promise for curtailing the behavioral features of this disorder. Given the rapidly increasing rates of autism, it is essential that we determine if manipulating molecular pathologies associated with loss of MDGA function has therapeutic benefits in neurodevelopmental disorder models.

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