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PRIZE FOR NEURO BIOLOGY

Tara LeGates, Ph.D.
Assistant Professor
University of Maryland
Baltimore County

2020 Finalist: Tara LeGates, Ph.D.

Tara LeGates received a B.S. in Biopsychology from Rider University where she studied circadian rhythm entrainment with Dr. E. Todd Weber. She received her Ph.D. from Johns Hopkins University studying the impact of light on mood regulation and cognitive function with Dr. Samer Hattar. Dr. LeGates completed a postdoctoral fellowship with Dr. Scott Thompson at the University of Maryland School of Medicine and established the importance of the strength and plasticity of hippocampus-nucleus accumbens synapses and reward behavior. Dr. LeGates is now an Assistant Professor in the Department of Biological Sciences at the University of Maryland Baltimore County (UMBC). Her lab studies how neuronal circuits integrate information to regulate behavior and their alterations in psychiatric disorders.

Reward Behavior is Regulated by the Strength of Hippocampus-Nucleus Accumbens Synapses

Rewards are powerful stimuli that drive goal-directed behaviors. The nucleus accumbens (NAc) integrates information from multiple brain regions regulate this process. Dr. Tara LeGates, under the mentorship of Dr. Scott Thompson, identified an important relationship between hippocampus-NAc excitatory synaptic strength and reward behavior. Their work in mouse models established that potentiation of this synapse is implicitly rewarding and identified the molecular mechanisms underlying this plasticity. Furthermore, they determined that this synapse is required for contextually based goal-directed behaviors. Chronic stress, a common precipitator of depressive episodes, induces anhedonia. The authors observed a concomitant weakening of hippocampus-NAc synapses and plasticity deficits, and these stress-induced changes in synapses and behavior were reversed with antidepressant treatment. This work established that modulation of hippocampus-NAc synaptic strength is a critical regulator of reward-related behaviors and identifies a potential treatment target, a major advance towards deciphering the neurobiological basis for reward and pathophysiology underlying depression.

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