“The Pharmacology of ADHD: Catecholamines and the Prefrontal Cortex”

Craig Berridge, PhD
Professor, Department of Psychology
University of Wisconsin-Madison

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ABOUT THE TALK

Attention-deficit hyperactivity disorder (ADHD) is a childhood-onset disorder that is associated with significant risks. Currently, psychostimulants (methylphenidate/Ritalin; amphetamine/Adderall) are the most effective and widely used treatments for ADHD. At clinically-relevant doses, these drugs act as cognitive-enhancers, improving cognitive functions dependent on the prefrontal cortex broadly within the population. Surprisingly, we know little about how these drugs work to improve cognition and ameliorate the symptoms of ADHD. To better understand the neural mechanisms involved in the cognition-enhancing and behavioral-calming actions of psychostimulants we initiated a series of pharmacokinetic, behavioral, neurochemical and electrophysiological studies. This work indicates that therapeutic doses of psychostimulants increase the activity of the catecholamine neurotransmitters, norepinephrine and dopamine, preferentially within the prefrontal cortex, resulting in an improvement in the signal processing abilities of prefrontal cortical neurons. These observations provide new insight into the neural mechanisms involved in the therapeutic actions of stimulants and other drugs used in the treatment of ADHD. Additionally, these studies provide potentially important information for the development of novel pharmacological treatments of ADHD and other conditions associated with an impairment in prefrontal cortex-dependent function.