Screen to Determine Effect of Drugs on PFC-Dependent Cognition for ADHD, PTSD and Other Disorders

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Technology description

Description

The prefrontal cortex (PFC), which is the most anterior part of the brain, plays a key role in higher cognitive function. Cognitive processes dependent on the PFC are impaired in several disorders and conditions, including attention deficit/hyperactivity disorder (ADHD), sleep deprivation, post-traumatic stress disorder (PTSD) and aging.

Limited pharmacological treatments that improve PFC-dependent cognition are available. Psychostimulants, such as methylphenidate (MPH, also known as Ritalin) and amphetamine, are the most effective class of drugs for treating ADHD. But use of these stimulants is risky and may lead to adverse side effects. More effective non-stimulant drugs that improve PFC-dependent cognition are needed.

However, such drugs are difficult to identify. Currently, the only way to assess whether a chemical compound will improve PFC-dependent cognition is to administer the compound to animal or human test subjects and measure their performance in standard behavioral tests of PFC-dependent cognition. This procedure is labor intensive and requires extensive training and expertise.

UW-Madison researchers have developed a simpler, easily obtained method for predicting whether a test compound will improve PFC-dependent cognition. The method involves measuring the electrical brain activity of PFC neurons in test subjects, including humans and laboratory animals, such as rats. Specifically, this approach involves determining the effects of a test compound on an evoked electrical response in a subject’ s PFC. The direction and magnitude of the effect on the evoked response predicts whether the compound or drug improves PFC-dependent cognition. In previous tests, this assay accurately identified the dose range over which MPH enhances PFC-dependent cognition.

Application area

This approach may be of particular interest for drug discovery programs seeking to identify compounds with potential use as cognitive enhancers.

It also could be used in drug discovery programs to identify compounds that may adversely affect PFC function.

Institution

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