Methylphenidate effects in the young brain: Friend or foe?

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Abstract
Attention deficit hyperactivity disorder (ADHD) is one of the most prevalent neuropsychiatry disorders in children and adolescents, and methylphenidate (MPH) is a first-line stimulant drug available worldwide for its treatment. Despite the proven therapeutic efficacy, concerns have been raised regarding the possible consequences of chronic MPH exposure during childhood and adolescence. Disturbances in the neurodevelopment at these crucial stages are major concerns given the unknown future life consequences. This review is focused on the long-term adverse effects of MPH on the brain biochemistry. Reports conducted with young and/or adolescent animals and studies with humans are reviewed in the context of long-term consequences after early life-exposure. MPH pharmacokinetics is also reviewed as there are differences among laboratory animals and human that may be relevant to extrapolate the findings. Studies reveal that exposure to MPH in laboratory animals during young and/or adolescent ages can impact the brain, but the outcomes are dependent on MPH dose, treatment period, and animal's age. Importantly, the female sex is largely overlooked in both animal and human studies. Unfortunately, human reports that evaluate adults following adolescent or child exposure to MPH are very scarce. In general, human data indicates that MPH is generally safe, although it can promote several brain changes in early ages. Even so, there is a lack of long course patient evaluation to clearly establish whether MPH-induced changes are friendly or foe to the brain and more human studies are needed to assess the adult brain changes that arise from early MPH treatment.