Concomitant behavioral and VTA neuronal study on the effect of MPD in the developing Brain

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Methylphenidate (MPD) is the most frequently prescribed psychostimulant used in children and adolescents to treat attention deficit hyperactivity disorder (ADHD). However, recently its recreational use is becoming more prevalent in teenagers and college students for its ability to improve cognitive ability, which is concerning given that the long term effects of chronic MPD exposure on the developing brain are not fully understood. One of the areas MPD acts upon in the brain is the ventral tegmental area (VTA), which is part of the motivation/rewards system and also involved with cognition and addiction. Behavioral locomotor activity was recorded in 151 adult and 156 adolescent freely behaving rats using an open field computerized animal activity system. The two age groups each were divided into 4 subgroups: saline (control), 0.6, 2.5, 10.0 mg/kg MPD. The experiment lasted 10 days: 6 injection days, 3 washout days, and a day for MPD rechallenge. In both age groups, chronic administration of the same dose elicited behavioral sensitization in some animals and behavioral tolerance in others. Overall, the ratio of sensitized versus tolerant animals in adolescents was found to be greater than the ratio in adults. The VTA neuronal activity was recorded alongside every behavioral recording. 10.0 mg/kg MPD had the strongest rechallenge effect in adolescents while 0.6 mg/kg MPD had the strongest rechallenge effect in adults. Our study shows that acute and chronic MPD exposure exerts different effects on the brains of adolescent and adult rats. Finally, this study could further alter the way physicians prescribe psychostimulants such as MPD to children and adults.

Biography
William Ip is a second year medical student at the University of Texas McGovern Medical School. Born and raised in Texas, he attended the University of Texas at Austin where he graduated and received his Bachelor of Science and Arts in Biochemistry in 2015. Currently, William is pursuing his medical degree with an interest in surgery at McGovern Medical School serving as an officer for Surgical Student Association and an executive board member for Surgical Corps.

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