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MEETING ABSTRACT Open Access

Prefrontal cortex glutamate afferents are essential for acute and chronic effects of Ritalin

Sheshali Wanchoo*, Alan Swann, Nachum Dafny

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Background

Progressive augmentation of behavioral response following repeated psychostimulant administrations is known as behavioral sensitization, and is an experimental indicator of a drug's liability for abuse (Robinson and Berridge, 1993; Dafny and Yang, 2006). It is known that Ritalin or methylphenidate (MPD), a drug used to treat Attention-Deficit Hyperactivity Disorder (ADHD), induces sensitization in animals following repeated injections [1,2]. Given that many children suffer ADHD, and are treated with MPD, it is essential to know the neuronal circuitry of MPD action. It was recently reported that bilateral electric (non-specific) lesion of PFC prevented behavioral sensitization after chronic MPD administration (Lee et. al., 2008). Since the PFC sends glutamatergic afferents to both ventral tegmental area (VTA) and nucleus accumbens (NAc), sites that are involved in induction and expression of behavioral sensitization to psychostimulants and as PFC glutamatergic afferents are known to modulate the NAc and VTA dopaminergic neurons [3,4], the objective of this study was to study the role of glutamate from PFC in behavioral sensitization to MPD.

Materials and methods

Locomotor activity of three groups of rats- control, sham operated and group with specific chemical lesion of glutamate neurons of PFC- was recorded using an open-field assay and analyzed. Daily MPD injections were given to all groups on days 9-14 and the animals were rechallenged on the last day after 4 days of washout.

Results

It was found that the acute and chronic effects of MPD were eliminated in the lesion group.

Conclusions

Therefore, PFC glutamatergic afferents are essential for the MPD-induced hyperactivity and are also involved in its chronic effects such as behavioral sensitization to multiple MPD administrations.

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References

1. Askenasy EP, Taber KH, Yang PB, Dafny N: **Methylphenidate (Ritalin): behavioral studies in the rat.** *Int J Neurosci* 2007, **117**:757-794.
2. Dafny N, Yang PB: **The role of age, genotype, sex, and route of acute and chronic administration of methylphenidate: a review of its locomotor effects.** *Brain Res Bul* 2006, **68**:393-405.
3. Kalivas PW, Alesdatter JE: **Involvement of NMDA receptor stimulation in the VTA and amygdale in behavioral sensitization to cocaine.** *J Pharmacol Exp Ther* 1993, **267**:486-495.
4. Kalivas PW: **A role of glutamate transmission in addiction to psychostimulants.** *Addiction Biology* 2000, **5**:325-329.

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Department of Neurobiology and Anatomy, University of Texas-Houston, Houston, USA