Effects of binge-drinking on the motivational valence of meth addiction in C57BL/6J female mice

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Introduction

Methamphetamine is one of the most widely abused drugs worldwide, and there is currently no medical cure for meth addiction. There is also a high rate of comorbidity between alcohol and meth addiction. The first step to developing cures to these diseases is discovering the neurological effects these drugs have on the brain. My research aims to determine whether a history of alcohol increases the risk of meth when using it for the first time.

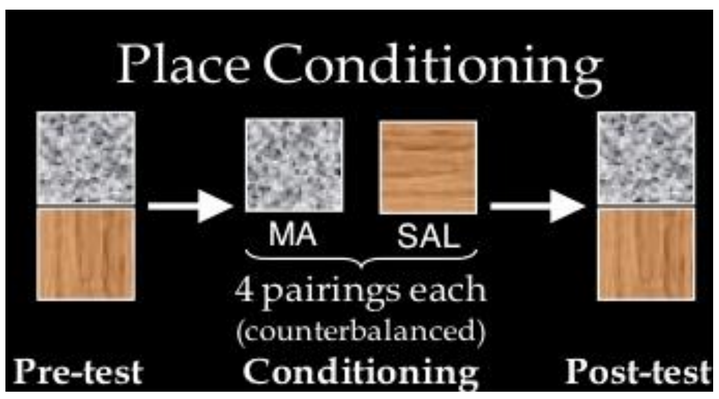
Objectives

1. Our first objective is to simulate a binge-drinking history in mice. 2 hours of alcohol per day, and reaching a BAC of 0.08 is considered binge drinking by the NIAAA. We accomplished this using a modified drinking-in-the-dark paradigm, and allowed the mice to drink for 14 consecutive days.

2. Our second objective is to assess for the affinity of first time meth exposure. This occurred after the binge-drinking period was complete, and we used conditioned place preference (CPP) as a tool to measure the effects of alcohol on the motivational valence of meth in the mice.

Methods

The mice were subjected to a modified 14-day drinking-in-the-dark paradigm. Each day, the mice were moved from the homeroom to the drinking room at 1 pm. The mice were habituated for 1 hour,



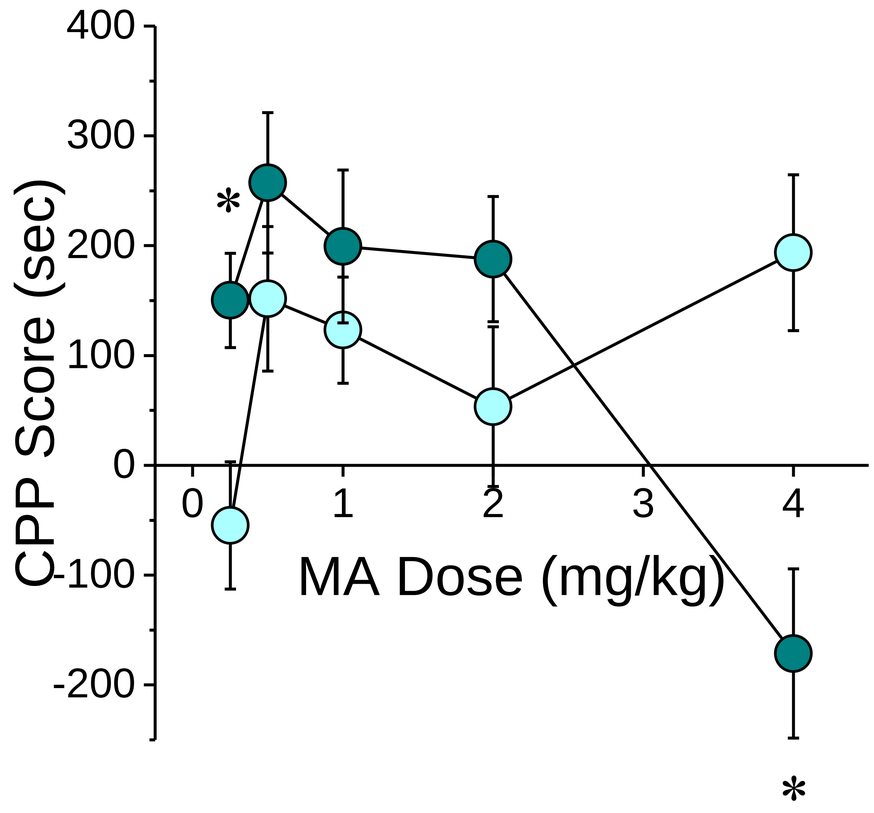
then given 4 bottles of different ethanol concentrations (5, 10, 20, and 40%). The bottles were weighed before and after each session to calculate their alcohol intake. After the 14 days of drinking, the mice were tested for their meth affinity using a conditioned place preference (CPP) procedure. The mice were given saline injections in the morning and methamphetamine (MA) injections (0.25, 0.5, 1, or 4 mg/kg) in the afternoon.

Results

-0.25 mg/kg dose showed significant place preference for binge-drinking mice

-0.5, 1, and 2 mg/kg doses showed no significant place preference

- 4 mg/kg dose showed significant place aversion for binge-drinking mice



Conclusion

We found that, while there was a significant difference in the motivational valence of meth in water vs. binge-drinking mice, this was the only dose that showed significant place preference. The middle doses (0.5, 1, and 2 mg/kg) did show a general trend that drinking has an effect on the motivational valence of MA, however it was not statistically significant. Interestingly, the highest dose (4 mg/kg) showed a significant place aversion to MA. This is a surprising result and would be interesting to study further.

Future Directions

- Increase sample size and sample diversity
- Further investigate effect of highest dose

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