



National Institute
on Drug Abuse



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

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Global Impacts of Meth Abuse

- ▷ 24,000,000 abusers worldwide¹
- ▷ No medical treatments for addiction
- ▷ There is a high rate of comorbidity
between methamphetamine and alcohol²
- ▷ A history of alcohol abuse increases risk
for meth addiction³

1 <https://www.drugabuse.gov/publications/research-reports/methamphetamine/letter-director>
2 UN Office on Drugs and Crime, 2015
3 Fultz & Szumlinski, 2018

Binge-Drinking Effects on Affective Valence

- ▷ Previous research from our lab has shown a link between binge-drinking and methamphetamine affinity (Fultz & Szumlinski, 2018)
- ▷ Similar experiments have been conducted using the same procedure, but with different variables

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Objectives

- ▷ 1. Establish a history of binge-drinking and alcohol dependence through successive alcohol exposure
- ▷ 2. Assess for the affinity of first-time methamphetamine exposure through conditioned place-preference (CPP)

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Alcohol Exposure

- ▷ 23 adult female mice
 - 11 alcohol-drinking + 12 water-drinking
- ▷ 14 days of drinking, followed by 3 days of rest



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Drinking Schedule

11 am - Lights are turned off

1 pm - Mice are moved to drinking room

2 pm - Alcohol is given to mice (only 11)

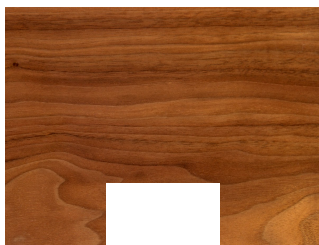
4 pm - Alcohol is taken/mice returned to home cages



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Conditioned Place-Preference (CPP)

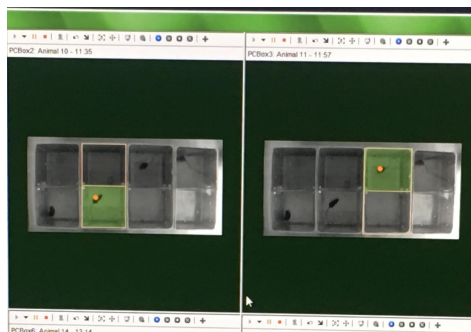
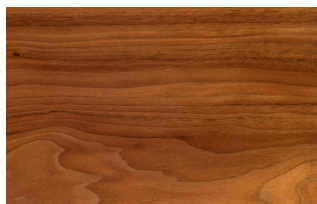
Day 1: Pre-test (open divider)



4 PM: Allow mice to choose which side they prefer
(determined by greater time spent on a given side)

Conditioned Place Preference (CPP)

Day 2-5: Place Conditioning (closed divider)



9 AM: Inject mice w/ (0.01 mL x g) saline, place on preferred side

4 PM: Inject mice w/ 0.25, 0.5, 1, or 4 mg meth/kg bodyweight, place on non-preferred side

Conditioned Place-Preference (CPP)

Day 6: Post-test (open divider)

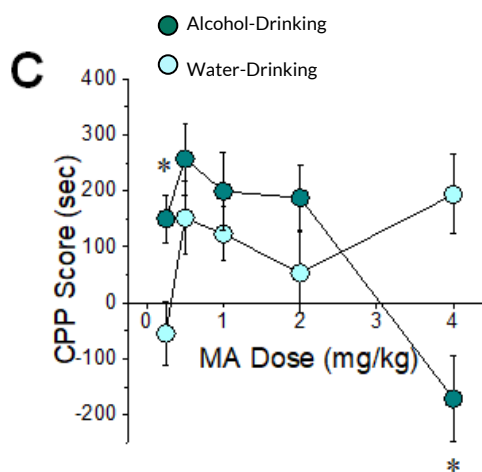


Allow mice to choose which side they prefer.

Hypothesis: A greater amount of time spent will be spent on non-preferred side, due to methamphetamine association

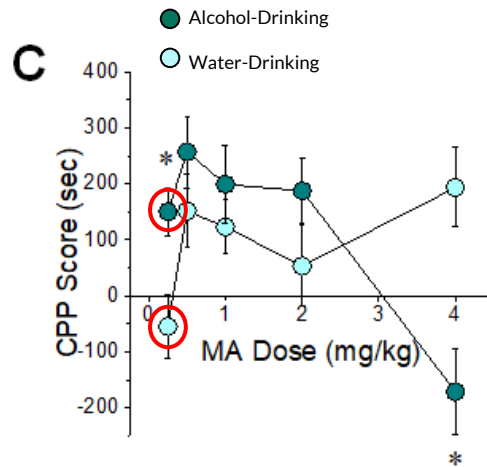
Lowest Dose Showed Significant Place Preference

- ▷ 0.25 mg/kg dose showed significant **place preference** for drinking mice
 - Place preference = Preference to be on one side



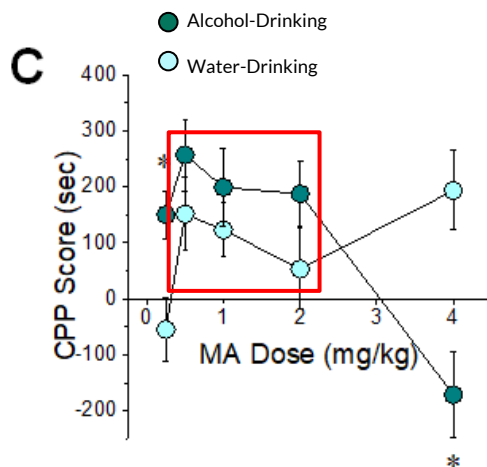
Lowest Dose Showed Significant Place Preference

- ▷ 0.25 mg/kg dose showed significant **place preference** for drinking mice
 - Place preference = Preference to be on one side



Middle Doses Showed No Significant Preference

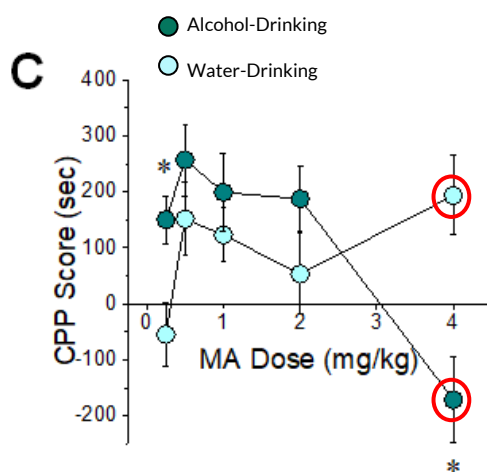
- ▷ General trend shows that alcohol has an effect, although not statistically significant ($p > 0.05$)



Highest Dose Showed Significant Place Aversion

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

- Place aversion: Preference to stay away



Results for Objective 1

- ▷ Average intake was 4.57 ± 0.5 g/kg
 - (>0.08 BAC)
- ▷ Exceeded minimum level for binge-drinking
- ▷ Successfully established a history of binge-drinking

Results for Objective 2

- ▷ Although not significant, a general trend showed prior binge-drinking increased motivational valence of methamphetamine
- ▷ Interestingly, the highest dose showed an opposite effect to the observed general trend

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Limitations

- ▷ Small sample size (n=23)
- ▷ Uncontrolled variables during CPP (temperature, noise, light)
- ▷ Possible inflicted stress during handling
- ▷ Multiple researchers running CPP

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Future Directions

- ▷ Increase sample size and sample diversity
- ▷ Further investigate effect of highest dose
 - Behavioral scoring, immunoblotting
- ▷ Microdialysis to study neurotransmitter activity

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Acknowledgements

- ▷ Leo Jimenez-Chavez
- ▷ Michal Coelho
- ▷ Karen Szumlinski
- ▷ Samantha Davis & CSEP
- ▷ My family and EUREKA! friends

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References

1. National Institute on Drug Abuse. (2013, September). Letter from the Director. Retrieved August 6, 2018, from <https://www.drugabuse.gov/publications/research-reports/methamphetamine/letter-director>
2. Simons, J. S., Oliver, M. N., Gaher, R. M., Ebel, G., & Brummels, P. (2005). Methamphetamine and alcohol abuse and dependence symptoms: Associations with affect lability and impulsivity in a rural treatment population. *Addictive Behaviors, 30*(7), 1370-1381.
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