

ETHANOL VAPOR SELF-ADMINISTRATION REVEALS THAT FEMALE WISTAR RATS ARE MORE LIKELY TO BECOME HIGH INTENSITY BINGE USERS THAN MALE RATS

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Purpose:

Alcohol binge use can increase escalation of alcohol use in humans, and National Institute on Alcohol Abuse and Alcoholism (NIAAA) has described High Intensity (HI) binge drinking which is consuming twice the alcohol as a binge user in a 2-hour period. Binge and HI binge drinking increase negative health and social outcomes for humans, however there are few animal models exhibiting voluntary self-administration of similar amounts of alcohol. Previous work shows that male rats escalate self-administration of ethanol vapor to the point of becoming dependent and that ~25% of male Wistar rats binge ethanol vapor to reach blood alcohol levels (BALs) in the 300-450 mg% range (de Guglielmo et al., 2017, George lab unpublished data). Our recent study included females and evaluated sex differences in ethanol vapor self-administration (EVSA) in Wistar rats. **Our hypothesis was that some rats that self-administer ethanol vapor will be High Intensity binge users.**

Methods:

Adult, female and male Wistar rats were used for this study. Rats were tested under a fixed ratio 1 schedule of reinforcement for 8 hr sessions every other day and the duration of alcohol vapor puff increased every 8 sessions from 2, to 5, to 10 minutes. Rats received 1 puff of ethanol vapor with a 20 s time out period for each nosepoke into the drug associated nosepoke port. Tail blood was collected throughout the experiment and blood alcohol levels (BALs) were measured by gas chromatography.

Results:

Our criteria for High Intensity binge use of ethanol vapor are that rats have BALs over 160 mg/dL, which is twice the BAL for meeting binge use criteria (80 mg/dL), after their final 8 hr session of self-administering 10-minute-long ethanol vapor puffs. Female rats learned to discriminate between active and inactive nosepoke ports earlier and more accurately than males. Female rats self-administered more ethanol vapor than males. BALs increased throughout the ethanol vapor sessions, with female levels being higher than males. In fact, all the High Intensity binge users of ethanol vapor from this cohort were female rats.

Conclusions:

These results demonstrate the relevance of the ethanol vapor self-administration model to study binge ethanol use and demonstrate that females are particularly vulnerable to High Intensity binge use of alcohol.

References

de Guglielmo G, Kallupi M, Cole MD, George O. Voluntary induction and maintenance of alcohol dependence in rats using alcohol vapor self-administration. *Psychopharmacology (Berl)*. 2017 Jul;234(13):2009-2018. doi: 10.1007/s00213-017-4608-7. Epub 2017 Mar 24. PMID: 28342089; PMCID: PMC5658208.