Blood alcohol concentration, open field activity, and c-Fos expression after consumption of 66% alcohol

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Introduction

•Alcohol consumption alters brain activity in areas involved in reward, including increasing dopamine output in the nucleus accumbens (Bassareo et at., 2017) and in negative emotion.

•Many researchers find it difficult to study this phenomenon due to rodent's reluctance to voluntarily consume alcohol, especially in high concentrations (Becker & Ron, 2014; Spanagel, 2003).

•General goals:

(1) Evaluate consumption of 66% alcohol versus water. (2) Observe animal activity in open field central and peripheral areas.
(3) Measurement of BAC in animals.
(4) Assessment of brain activity in regions of interest using c-Fos.

Method

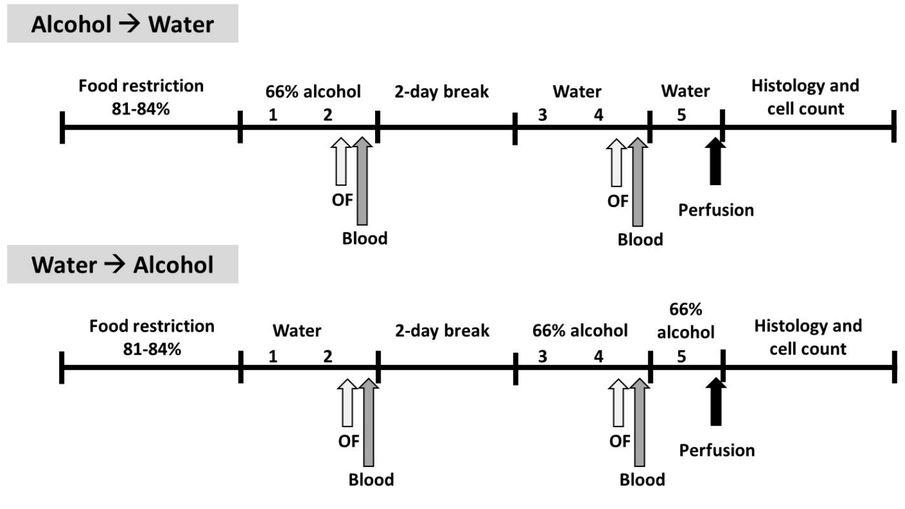
•Animals: 20 food restricted adult Wistar rats with 8 additional animals in yoked cages as control for spillage, evaporation, cage movement, etc.

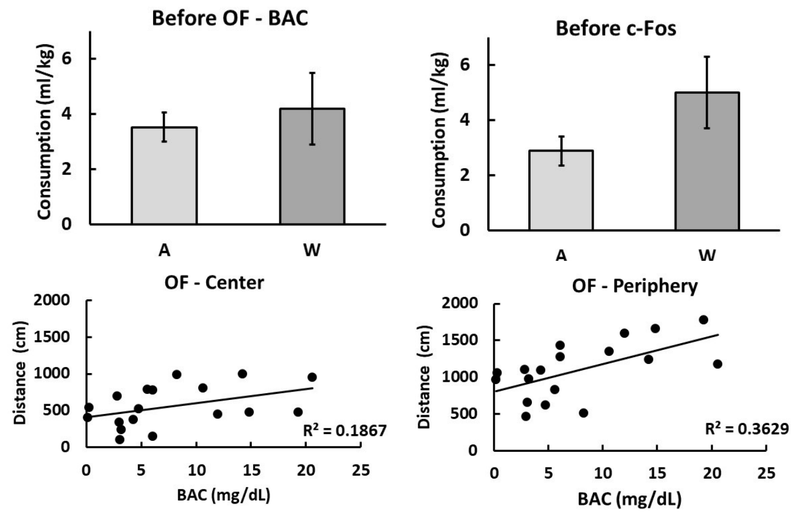
•Consumption tests: random assignment in two equal groups in terms of order of single bottle presentation of 66% alcohol or water for 1hr in their home cages.

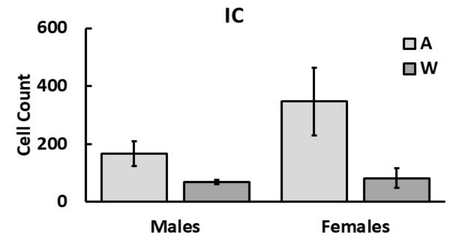
•Open Field test: following consumption at the end of session 2 & 4, animals were exposed to OF for 5min session.

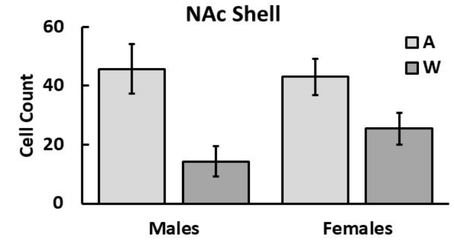
•Blood collection: to measure BAC, blood was sampled from the tail vein after OF.

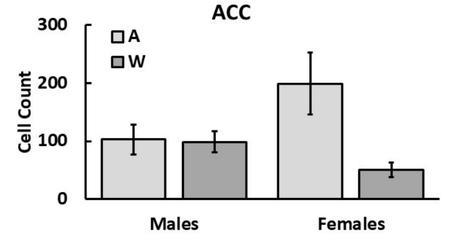
•Histology: After the 5th consumption test, rats were perfused and brains extracted to measure c-Fos, a protein expressed in recently depolarized neuron and a marker for neuronal activity (Chung 2015).











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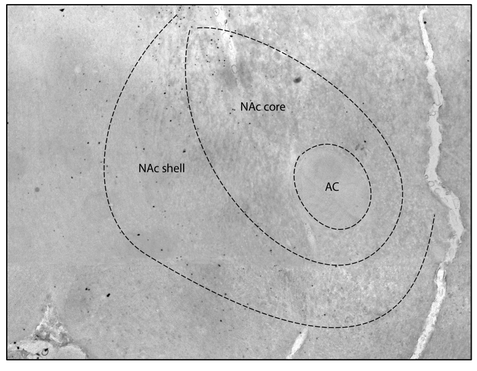

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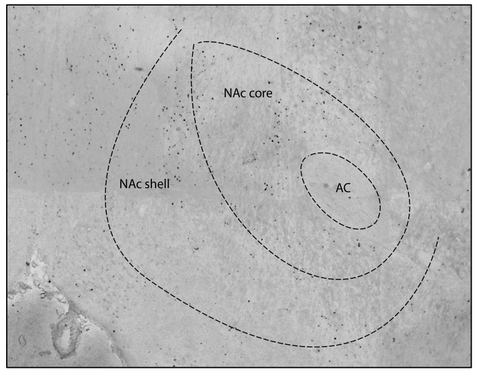

Results

•Animals did not prefer 66% alcohol over water, but did not reject it.

•An increase in plasma BAC correlated with increased activity in the periphery of the OF was found after alcohol exposure.

•Increased activity was shown in the NAc Shell, IC and ACC after alcohol exposure.

Conclusions

•High concentrations of alcohol can be rewarding to in terms of sensation seeking and the search for novel and intense stimuli.

•Future studies are needed to further investigate the complex orosensory and rewarding properties of alcohol and its effect on rodent behavior.

References

Bassareo, V., Cucca, F., Frau, R., & DiChiara, G. (2017). Changes in dopamine transmission in the nucleus accumbens shell and core during ethanol and sucrose self-administration. *Frontiers in Behavioral Neuroscience, 11*, 71

Becker, H. C., & Ron, D. (2014). Animal models of excessive alcohol consumption: Recent advances and future challenges. *Alcohol, 48*, 205-208 (

Chung, L. (2015). A brief introduction to the transduction of neural activity into fos signal. *Development & Reproduction, 19*, 61-67