The Effects of Social Environments on Ethanol Intake in Adolescent C57BL/6 Mice
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Introduction

- Alcohol consumption is becoming ever so common among the adolescents of today. Consuming alcohol has numerous effects on the development of an adolescent; as well as lead to serious alcohol-related issues in the future (Allen and Antonishak 2008; Chuang et al. 2005; US Department Health and Human Services 2016; Prentice 2008).
- Heavy alcohol use can lead to neurodegeneration and neuroplasticity changes in accordance with formation of addictive like behaviors.
- Social influences can be seen to be the primary cause in adolescent alcohol consumption.
- Social environments where adolescents get alcoholic cues can range from their parents to peers outside their home.

Review of Literature

- Ethanol remains on the breath of the consumer and can lead to socially influencing another individual. A relationship between exposure to the smell of ethanol and preference was tested using the presence of cotton balls soaked in 100% ethanol to expose weaning rats to the smell of ethanol. Exposure to ethanol vapor increased voluntary intake compared to mice not previously exposed (Bannoura et al. 1997).
- During the weaning period, a dam was given access to alcohol as the pups were not, giving off olfactory cues of alcohol as well as ethanol in milk. Pups receiving olfactory cues and ethanol milk had increased ethanol ingestion compared to pups receiving no ethanol cues (Honey and Galef 2003, 2004; Honey et al. 2004).
- Rodent sibling interactions increased ethanol consumption as well using a demonstrator and observer method (Hunt et al. 2000, 2001).
- Intragastric injections of ethanol to the demonstrator followed by a socialization period with the observer increased ethanol consumption compared to a demonstrator injected with water.
- Peer ethanol influence has been reported to increase ethanol consumption of adolescents. With the demonstrator and observer method it is observed it can increase ethanol consumption of the observer when a conspecific peer is influencing (Maldonado et al. 2008).
- Peer influence can also be seen using a wire mesh divider to separate demonstrator and observer. The demonstrators only liquid source is ethanol or water and after socialization, observers getting ethanol olfactory cues had increased ethanol consumption (Anacker et al. 2011).
- Research shows humans can be socially influenced; parents, siblings, and peers can influence adolescents to consume alcohol.
- As peers may seem to be the strongest influence in human adolescents, parental control can lead to decreased consumption. This suggests that parents may have the ultimate influence and can counter-act social influence elsewhere. (Chuang et al. 2005; Bjorkqvist et al. 2004).
- However, human research is limited to biased surveys and questionnaires.

Hypothesis

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  - Interactions with a single intoxicated socializer will increase ethanol intake significantly more than controls.
  - Mice influenced by their intoxicated mother and sober peers will have a higher ethanol intake compared to mice influenced by intoxicated mother and sober siblings.
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  - Mice influenced by intoxicated peers and sober siblings will have a higher ethanol intake compared to mice influenced by intoxicated peers and sober mother.

Methods and Design

- 20 pregnant C57BL/6 female mice

Expected Results

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  -Figure 1. Representation of the experimental social environments (1-9) (Controls are not shown; 10-12). Controls will be same animals groups as 1, 2, and 3 but each chamber will have water. TS represents the tap subject influence by ethanol or the mother consuming alcohol.

Figure 2. Cage where each individual test subject is housed alone. Cage represents the two-bottle test that will be used in order to determine voluntary alcohol consumption. E represents the ethanol bottle (7%) and W represents the tap water bottle. The bottles’ location will be rotated to avoid locational preference of a bottle by the test subject.

Figure 3. Relationship between the mean ethanol intake (g/kg/day) for test subjects influenced by ethanol consuming mother (+), siblings (-), and peers (+). Controls were housed in a tank with the same liquid but water was the only liquid source for every group.

Figure 4. Relationship between the three chambered environments and the ethanol intake of the test subjects (g/kg/day). (a) Represents the mother consuming ethanol while the mean TS intake from sober influencing siblings (n=5) is compared to the mean intake when influenced by sober peers (n=5). (b) Represents sibling consuming ethanol while the mean TS intake from sober mother (n=5) is compared to the mean intake when influenced by sober peers (n=5). (c) Represents peers consuming ethanol while the mean TS intake influenced by sober mother (n=5) is compared to the mean intake when influenced by sober siblings (n=5).

Literature Cited


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