THE UNIVERSITY OF BRITISH COLUMBIA

animal welfare program

Inhalant anaesthetics as an alternative to CO_2 euthanasia in rats

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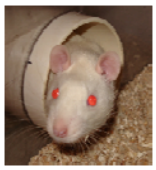
Background



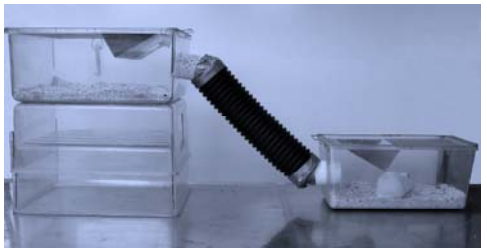
- Laboratory rodents are most commonly euthanized with CO_2 gas.
- However, recent studies have shown that rats find this gas aversive.
- Anaesthetic gases are commonly used to induce unconsciousness in humans and animals, and could be a suitable alternative.

Aim

- Use approach-avoidance testing to evaluate rat responses to halothane and isoflurane.

Methods

- Rats were trained to enter the bottom cage for a reward of 20 Honey Nut Cheerios.
- Halothane or isoflurane was delivered while rats were eating.
- We recorded dwelling time, amount of time rats left before expected recumbency, and whether rats were ataxic before leaving.



Experiment 1:

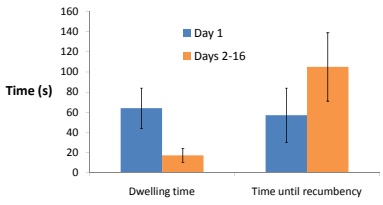
- Rats were **not allowed to re-enter** cage.
- Tested **4 concentrations** of each drug.
- Drugs delivered with a **vaporizer**.

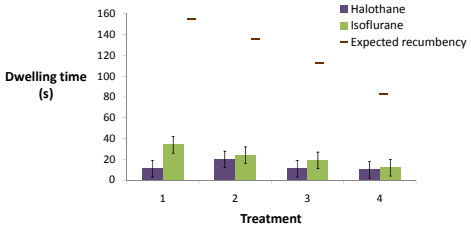
Experiment 2:

- Rats were **allowed to re-enter** at will.
- Tested **1 concentration** of each drug.
- Drugs delivered in a soaked **cotton ball**.

Results

Experiment 1





DAY 1:

- 6/8 rats stayed until ataxic.

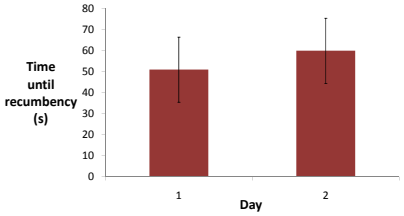
DAYS 2-16:

- Rats usually left very quickly
- Ataxia occurred in only 19/120 trials.

DAYS 2-16:

- Rats remained in the cage **longer with isoflurane** than with halothane ($P<0.05$).
- Rats stayed closer to the time of expected recumbency with **higher concentrations** of each drug ($P<0.0001$).

Experiment 2



- When allowed to re-enter, rats stayed as close to recumbency on day 2 as on day 1 ($P=0.627$).

DAY 1:

- 8/9 rats stayed until ataxic.

DAY 2:

- 9/9 rats stayed until ataxic.

Discussion

- Initial avoidance upon re-exposure may be due to rats' inherent avoidance of anything that produces a state change, whether negative or positive.
- Rats willingly tolerate exposure to anaesthetics until severely ataxic.
- At this point, rats are already experiencing partial analgesia and amnesia.

Conclusion

- **Induction with inhalant anaesthetics is a more humane alternative to CO_2 euthanasia for rats.**