Inhalant anaesthetics as an alternative to CO₂ euthanasia in rats

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Background

- Laboratory rodents are most commonly euthanized with CO₂ 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

Day 1:
- 6/8 rats stayed until ataxic.

Days 2-16:
- Rats usually left very quickly
- Ataxia occurred in only 19/120 trials.

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 CO₂ euthanasia for rats.