Rats show aversion to argon over a range of flow rates

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Background

• Laboratory rodents are most commonly euthanized using CO₂ gas.
• However, recent studies have shown that rats find CO₂ aversive.

Aim

• Use approach-avoidance testing to evaluate rat responses to argon and air over a range of flow rates.

Methodology

• Rats (n = 8) were trained to enter the bottom cage for a reward of 20 Honey-Nut Cheerios.
• Air or argon was turned on as soon as rats started eating.
• We tested flow rates of 40, 66, 93, 120, 159, 199, and 239% of the test cage volume per minute.
• We recorded the time and argon concentration at which rats stopped eating and left the test cage.

Results

• In air trials, rats ate for an average of 4.01 min ± 0.01 with no effect of flow rate (P = 0.9514).
• In argon trials, rats ate for an average of 0.36 min ± 0.01 and this eating time decreased with increasing flow rates (P < 0.0001).

• Rats left the test cage sooner as flow rate increased (P < 0.0001).

• Regardless of flow rate, rats always left the test cage between 59-69% argon.
• The argon concentration that rats tolerated increased over the lower flow rates (P = 0.0009) but showed no further increase with the higher flow rates (P = 0.5477).

Discussion

• The oxygen (O₂) concentration corresponding to the highest argon concentration tolerated in this study is 7%.
• Rats might be leaving the test cage because of a difficulty in breathing or because of symptoms like light-headedness and cognitive impairments.

Conclusions

• Rats are averse to the effects of argon over a range of flow rates.
• Research into alternatives to CO₂ euthanasia is still required.