

# **Comparison of the sedative, cognitive, and analgesic effects of ethanol, nitrous oxide, and sevoflurane**

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# Anaesthetic effects

- Obtund
- Immobilise
- Other more subjective effects
  - Amnesia
  - Drowsiness
  - Drunkenness
  - Analgesia

**Subanaesthetic doses may distinguish different effect patterns**

- Sevoflurane
  - Volatile anaesthetic; probably GABA effects
- Nitrous oxide
  - Known effects on NMDA receptors
- Ethanol
  - GABA, glycine, and NMDA

Subanaesthetic dose: allows measures of subjective effects, amnesia, cerebral function

# Study design

- Nested within subject
- Low and high dose to assess dose-response
- Subanaesthetic dose: “equiMAC” up to 0.24
  - Nitrous oxide 15 and 25%
  - Sevoflurane 0.3 and 0.5%
  - Ethanol 80-100 mg/100ml  
(Chosen to cause similar impairment as the greater dose of nitrous oxide)
- All given double blind

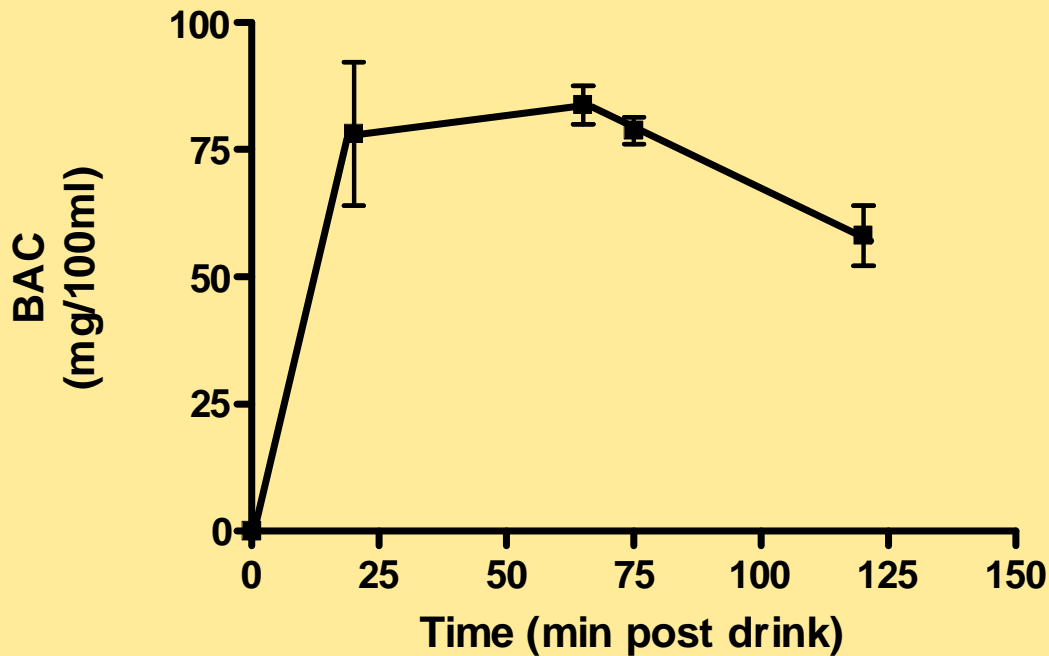
# Study plan

- T tube reservoir system, two way valve, tight mask, analysed by Datex AS5 for oxygen, Nitrous oxide, Sevoflurane, Carbon dioxide.
- Practice sessions with mask off and then mask on
- Baseline, alcohol drink, tests at 20 and 75 min
- Sessions with placebo, alcohol, nitrous and sevo
- Random order of high and low concentrations of inhaled agents in each session
- Analysis of covariance followed by t tests

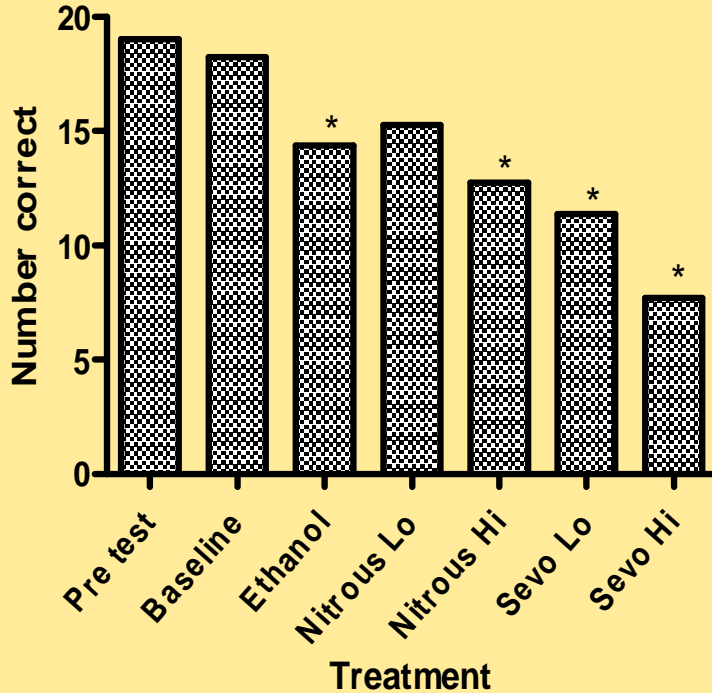
# Tests

- Spiral maze and zig-zag tracking
- Four choice reaction task
- Logical reasoning
- Word list learning short and long term memory
- VAS for mood, drunkenness, drowsy
- Threshold to touch, pain with von Frey hairs
- Lion alcolmeter S-D2 for exhaled alcohol

## Blood alcohol concentration

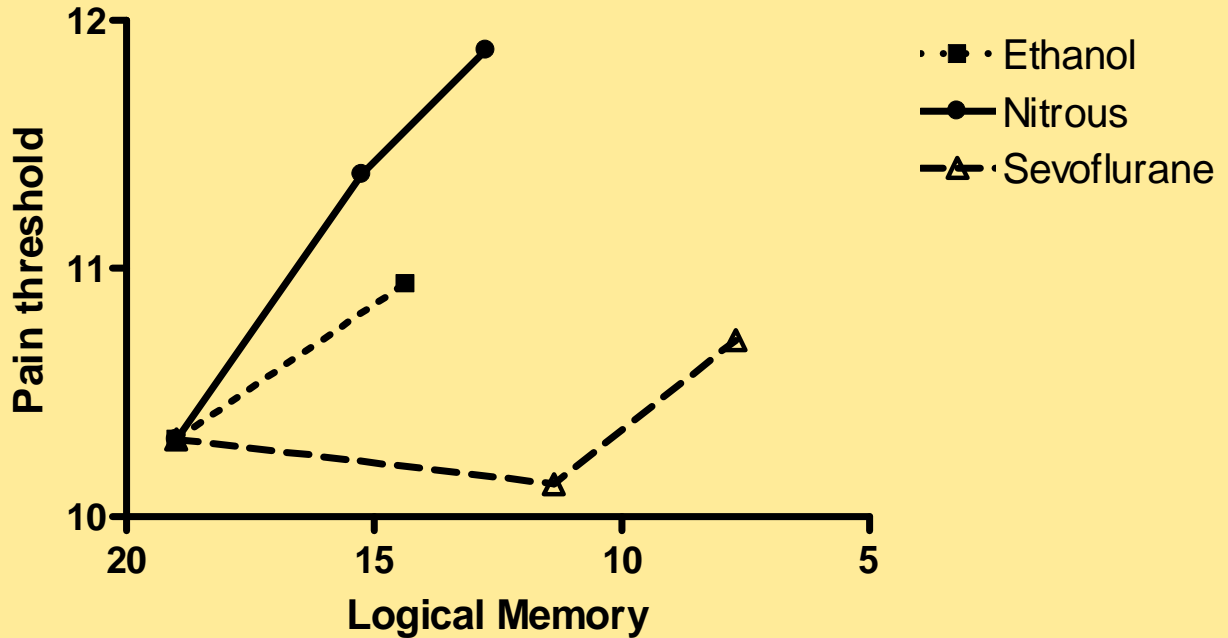


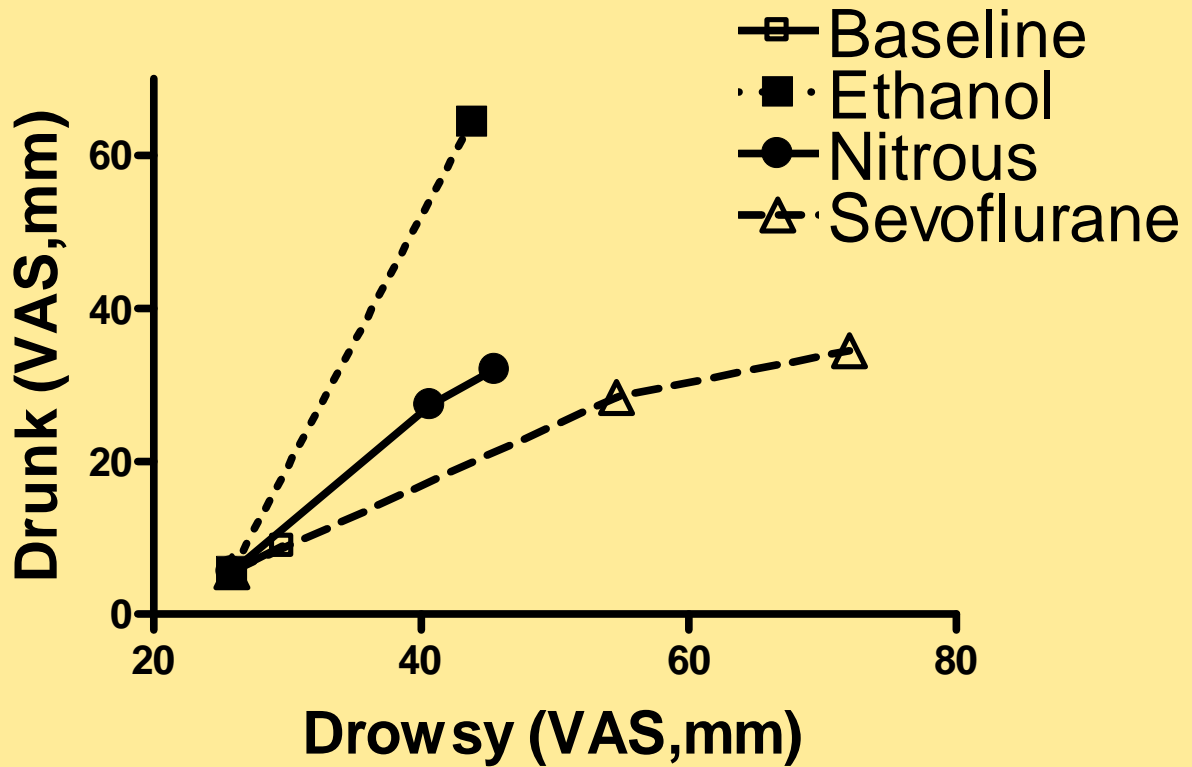
## Logical Working Memory





# Analgesia vs Logical memory





# Conclusions

- Patterns of effect are specific:
  - Sevoflurane causes drowsiness, poor logic
  - Nitrous analgesic, less drowsiness
  - Alcohol increases errors, causes drunkenness
- Subjective tests of subanaesthetic doses allow analysis of different effects
- May allow characterisation of other agents