

## **Injection Anaesthetics**

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**by the end of this lecture you  
should be able to**

- formulate a plan to induce (and if necessary, maintain) anaesthesia with an injectable drug

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**9 month old cat for spay**



What would you use for induction?

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## **definitions**

- general anaesthesia
- local anaesthesia
- regional anaesthesia
- neuroleptanalgesia
- dissociative anaesthesia

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### typical anaesthetic

- premed
  - sedative and analgesic
- induction
  - injection anaesthetic
- maintenance
  - inhalation anaesthetic & oxygen
  - muscle relaxant?
- recovery
  - analgesic

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### induction agent

- unconsciousness
- muscle relaxation
- (analgesia)

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### consider

- age
- temperament
- health
- species
- breed
- venous access
- cost

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### age

- very young & very old
  - slower metabolism

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### temperament

- control with premed
- treat pain in premed

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### health

- liver function
- kidney function
- anaemia
- debilitation
- shock

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### consider

- age
- temperament
- health
- species
- breed
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### pharmacokinetics

- given iv usually
- cross blood brain barrier
- act in one circulation time
- redistributed
- animal wakes up before drug metabolised

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### dose required depends on

- rate of administration
- concentration
- redistribution
- protein binding
- ionisation
- stimulation / sedation
- (metabolism)
- (acute tolerance)

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### infusion for maintenance

- continuous iv infusion
- rapidly metabolised drugs only
- expensive equipment best
  - drip set can be used

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### single drugs

- thiopentone
- propofol
- alphaxalone
- (ketamine)
- (m)etomidate

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### barbiturates

- thiopentone
- methohexitone
- pentobarbitone
- (thiamylal)
- phenobarbitone
  - anticonvulsant
  - enzyme induction

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### thiopentone

- $t_{1/2\alpha}$  7 minutes
- $t_{1/2\beta}$  4.5 hours
- redistributed to muscle then fat

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### thiopentone

- reliable
- cheap
- works in all species with veins
- but...
- side effects
  - respiratory depression
  - transient cardiovascular depression
  - accumulates if topped up
  - irritant outside vein

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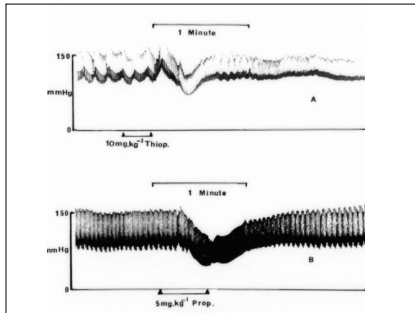
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## chemistry

- weak acid in  $\text{NaCO}_3$
- used as
  - 10% soln in horses - pH 12
  - 2.5% soln in dogs - pH 11
  - 1.25% soln in cats - pH 9.5
- short shelf life once made up



## care

- greyhound type dogs
  - slow recovery

## pentobarbitone

- usually only used for euthanasia
  - metabolised slowly
- can be useful in sheep and goats
  - metabolised rapidly
  - do not use euthanasia formulations!!!
- metaldehyde poisoning
  - anticonvulsant

### propofol

- clinically similar to thio
- less hangover

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### propofol

- t1/2 $\alpha$  7 minutes
- t1/2 $\beta$  37 minutes
- redistributed to muscle then fat

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### propofol

- non water soluble
  - coconut oil / lethicin emulsion
  - polysorbate solution
- opened vials must be thrown away
  - ideal bacterial growth medium

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### side effects

- same as thiopentone
  - greater respiratory depression?
- suitable for greyhounds
- slow metabolism in some cats
- twitching in some dogs
- rough recoveries in some cats
- occasional pain on injection

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### **propofol**

- standard induction drug in people
- can be infused for maintenance
- currently cheapest

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### **alphaxalone**

- Alfaxan
- (Saffan)
- (Althesin)

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### **Saffan / Althesin**

- mixture of alphaxalone & alphadalone
- solubilised in polyethoxylated castor oil (Cremaphore EL)

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### **Alfaxan**

- alphaxalone alone
- solubilised in cyclodextrin

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## alphaxalone

- good anaesthetic
- rapidly metabolised, even in cats

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## alphaxalone side effects

- hypotension in combinations
  - vehicle?
- rough recovery if disturbed
  - can be very rapid recovery

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## Saffan side effects

- allergic reactions
  - dogs - massive histamine release
  - cats - cutaneous oedema
  - other spp - rarely anaphylactoid reactions

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## ketamine

- “dissociative” anaesthetic
- blocks NMDA receptors
- analgesic?
- usually used in combinations

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### ketamine alone

- pro
  - no net CV depression
  - swallowing reflexes partially retained
  - works by any route
- con
  - unpleasant dreams???
  - increased muscle tone / convulsions
  - pain on injection (pH4.5)

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### (m)etomidate

- no CVS depression
- no analgesia
- excitement on induction
- adrenal suppression
- use something else

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### injectable combinations

- $\alpha$ 2 agonist & ketamine
- benzodiazepine & ketamine
- zolazepam & tiletamine
- potent opioid & propofol
- potent opioid & sedative

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### euthanasia

- pentobarbitone  $\pm$ 
  - cinchocaine
  - KCl
  - MgSO<sub>4</sub>
- (T61)

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### 9 month old cat for spay



What would you use?

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### injection anaesthetics

- usually only used for induction
- thiopentone / propofol used for induction
- side effects respiratory and CV depression
- animals wake up from redistribution - metabolism takes much longer
- Saffan used only in cats, Alfaxan can be used in dogs
- ketamine useful in combination, usually with diazepam
- overdose caused transient apnoea
- all drugs are potentially lethal if used incorrectly

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