

General Anaesthetics & Sedatives

by the end of this lecture you
should be able to

- formulate an appropriate sedative plan for any animal

4 yr old cattle dog

- wobbly on hind legs
- for hip x rays



anaesthesia

- no feeling
 - unconsciousness
 - does not respond to stimuli
 - pain
 - surrounding activity
 - appears relaxed!

**excitement
awake & normal
light sedation
deep sedation
general anaesthesia
death**

**anxiolytics
tranquillisers
light sedatives
heavy sedatives
neuroleptanalgesics
general anaesthetics**

**benzodiazepines
butyrophenones
phenothiazines
a2 agonists
opioid & sedative
barbiturates, isoflurane, etc**

sedative indications

- restraint
- (analgesia)
- potentiation of other drugs
- useful side effects
 - antiemetic

anaesthetic indications

- restraint
- analgesia
- euthanasia

balanced anaesthesia

- unconsciousness
- analgesia
- muscle relaxation

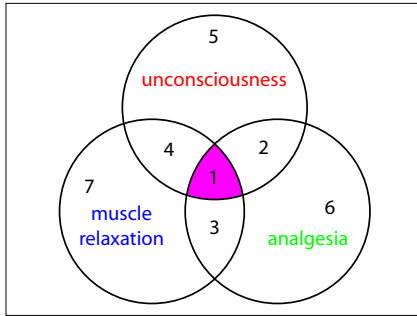
balanced anaesthesia

- 3 different drugs
 - hypnotic
 - eg isoflurane
 - analgesic
 - eg morphine
 - neuromuscular blocker
 - eg atracurium
- large doses of 1 drug
 - eg isoflurane

balanced anaesthesia

- unconsciousness } neurolept
 - analgesia } analgesia
 - muscle relaxation
- sedation {

choose drugs to produce correct balance for each animal



unconsciousness

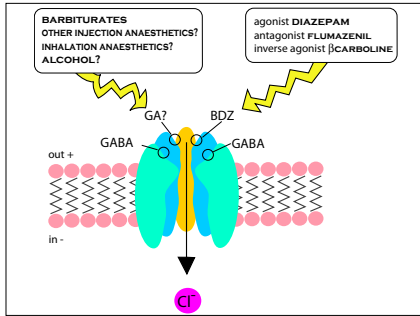
- ascending reticular formation ?
- inputs from
 - nociceptors via spinal cord
 - proprioceptors
 - cortex
 - lots of others?

anaesthetic mechanisms

- interactions with???
- water
 - Pauling, 1960
- lipids
 - Meyer & Overton, 1900
- proteins
 - current theories

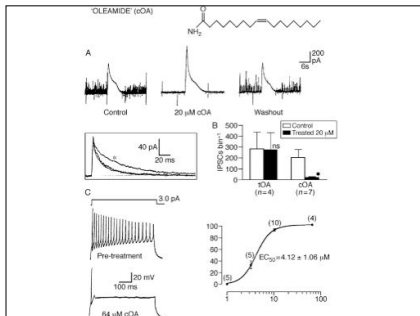
anaesthetic mechanisms

- GABA_AR potentiation
- glycine R potentiation
- nAChR blockade
- NMDA R blockade
- 5HT₃ R blockade
- Ca channel blockade
- Na channel blockade



anaesthetic mechanisms

- GABA_A potentiation
- Ca channel blockade
- Na channel blockade
- nACh blockade



high pressure nervous syndrome

- high pressures reverse anaesthesia (tadpoles)
- high pressures cause excitation (man)

typical anaesthetic

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

ie, lots of drugs which interact!

you need to know your pharmacology!!!

effects of drugs depend on state of animal

- excited?
- in pain?
- shocked?

sedative drugs

- $\alpha 2$ agonists
 - $\alpha 2$ adrenergic R
- phenothiazines
 - D2 R, H, $\alpha 1$ & most others (antagonist)
- benzodiazepines
 - GABAA R (agonist)
- butyrophenones
 - D2 R (antagonist)

α 2 agonists

- xylazine
- detomidine
- medetomidine
- romifidine
- clonidine

α 2 agonists

- xylazine
 - all spp, especially ruminants
 - care in sheep and deer
- detomidine
 - horses
- (dex)medetomidine
 - dogs & cats (people)
- romifidine
 - horses
- clonidine
 - people

α 2 agonist effects

- sedation
- analgesia
- hyper / hypotension
- bradycardia
- smooth muscle spasm then relaxation
- vomiting (dog & cat)
- hypoxaemia (ruminants)
- hypothermia

α 2 antagonists

- atipamezole
- yohimbine
- idazoxan

phenothiazines

- acepromazine
- chlorpromazine
- methotrimeprazine
- promethazine
- prochlorperazine

phenothiazine effects

- sedation
- antiemetic
- vasodilatation
- antimuscarinic
- antihistamine
- lowers temperature
- extrapyramidal stimulation
- analgesic / hyperalgesic

care

- stress / shock
- convulsions
- cardiovascular disease
- Boxers
 - bradycardia
- stallions
 - paraphimosis

benzodiazepines

- midazolam
- diazepam
- hundreds of others in human use
 - main difference is duration of action

benzodiazepine effects

- sedation / excitement
- anticonvulsant
 - first line treatment
 - safe in overdose
- anxiolytic
- appetite stimulant

side effects

- safe even at high doses
- diazepam vehicle?
 - propylene glycol
 - polyethoxylated castor oil
 - coconut oil emulsion

benzodiazepine antagonist

- flumazenil

- **expensive**

butyrophenones

- azaperone
- droperidol
- haloperidol

butyrophenones

- sedative???
- antiemetic
- obsolescent - use something else

obsolete as sedatives

- chloral hydrate
- guaiphenesin
- phenobarbitone
- reserpine
- magnesium
- do not use

neuroleptanalgesia

- sedative
 - phenothiazine
 - acepromazine
 - butyrophenone
 - droperidol
- & analgesic
 - opioid
 - morphine
 - buprenorphine

4 yr old cattle dog

- wobbly on hind legs
- for hip x rays



sedatives

- chose the sedative protocol for each individual animal
- acepromazine produces mild sedation with cardiovascular depression
- diazepam is unreliable on its own but safe
- $\alpha 2$ agonists used in large animals but cause cardiovascular depression and vomiting in dogs & cats
- combinations of a sedative with an opioid give deeper sedation
- deeply sedated animals need to be monitored as for general anaesthesia
