

Local Anaesthetics



analgesic drugs

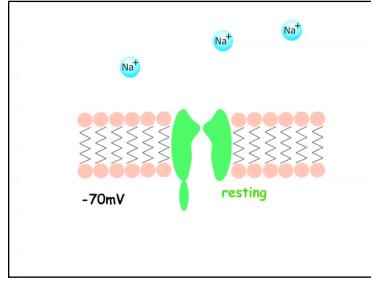
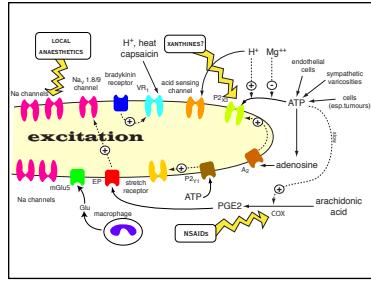
- opioids
- NSAIDs
- α₂ agonists
- local anaesthetics
- others

anaesthesia

- general
- local
- regional

definitions

- anaesthesia = loss of feeling
- analgesia = loss of pain
- local anaesthesia = local analgesia



Na channel subtypes

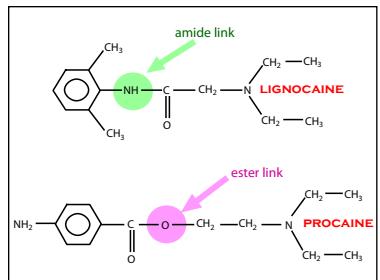
- CNS **Na_v1.1, 1.2, 1.3**
- skeletal muscle **Na_v1.4**
- heart **Na_v1.5**
- dorsal root ganglia **Na_v1.8, 1.9**
- neuroendocrine & peripheral neurones **Na_v1.7**
- all neurones & glia **Na_v1.6**

Na channel blockers

- local anaesthetics
- class 1 antiarrhythmics
- some anticonvulsants

chemistry

- lipophilic end
- hydrophilic end
- amide or ester link in middle
- nb many drugs have this sort of structure

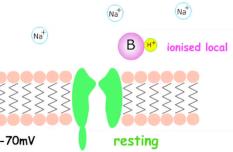


chemistry

- most are weak bases
- most have pK_a 8 - 9

drug access to channels

- via membrane
 - drug must be unionised
- via channel
 - channel must be open



use dependence

- the more the nerve fires,
- the more channels are open,
- the more easily the drug gets in,
- the faster it works
- drugs also bind best to inactivated channels

"incomplete" block

- low doses reduce frequency of firing
- useful for
 - arrhythmias
 - convulsions
 - neuropathic pain
 - horses?

differential block

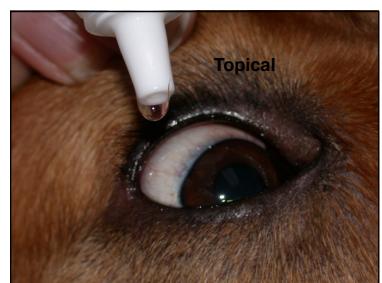
- small fibres blocked faster than big ones
- pain signals carried by small fibres
- pain should be blocked first
- doesn't work very well in real life

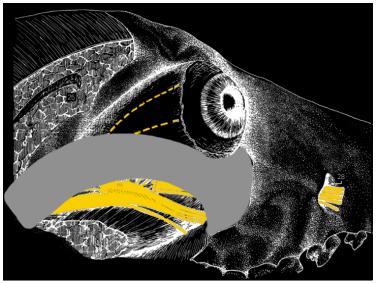
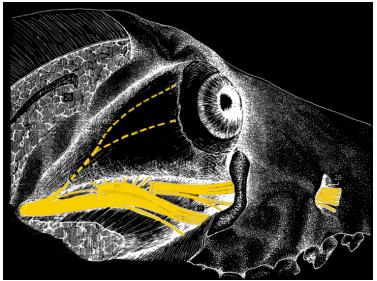
indications for local anaesthetics

- operative analgesia
- postoperative analgesia
- diagnosing lameness
- (arrhythmias)

administration

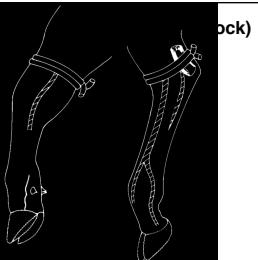
- topical
- local infiltration
- nerve block
- epidural / intrathecal
- Bier's block (IVRA)
- intra-articular
- (iv)



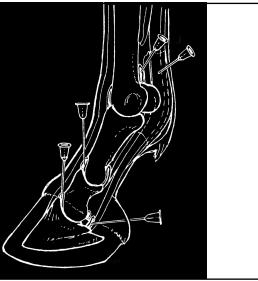


Epidural / Intrathecal

- Contraindications
 - History of Trauma
 - Deformity
 - Systemic or Local Infection
 - Hypovolaemia
 - Clotting Disorder
 - Blood / CSF Aspiration



(block)



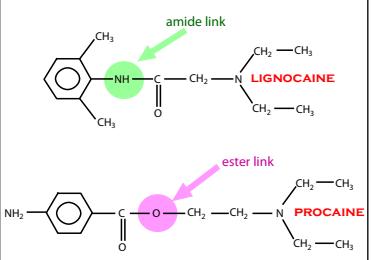
Intra

intravenous

- has been used in people & horses
- does it work??

pharmacokinetics

- injected somewhere near nerve
- penetrate nerve fibres
- diffuse out of nerve
- distributed away by blood
 - vasoconstrictors
- metabolised
- metabolites eliminated

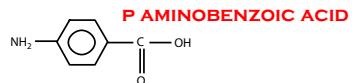
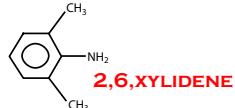


esters

- hydrolysis by non-specific esterases
- plasma and liver
- fast

amides

- N dealkylation
- liver
- slower but still fairly fast



side effects

- convulsions
- sedation
- respiratory depression
- reduced cardiac output
- vasodilatation

toxicity

- overdose
 - sheep
- accidental iv injection

common drug

- lignocaine (= lidocaine USAN)
 - 2% solution pH5.6, pKa7.7
 - onset of action about 2mins
 - lasts 20 - 40 mins
 - very stable - can be autoclaved

less common drugs

- prilocaine
- mepivacaine
- bupivacaine

rarely used drugs

- amethocaine (= tetracaine)
- proxymethacaine
- cinchocaine (= dibucaine)
- ropivacaine
- benzocaine

toxins

- tetrodotoxin
- saxitoxin

channel openers

- DDT and pyrethrum
- veratridine
- some spider and scorpion toxins

What would you do?

- cracked mandibular tooth
- infected tooth
- abscess



local anaesthetics

- stop action potentials by blocking sodium channels
- are weak bases which get into cells in the unionised form, become ionised and bind to the channels in the open or inactivated state.
- show use dependence - rate of onset and depth of block are dependent on action potential frequency
- block pain fibres before motor fibres
- are mainly used for analgesia - particularly in ruminants
- block most excitable tissues if you give too much