

A close-up photograph of a red mushroom with white spots, likely a fly agaric, growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The stem is thick and white. The background is a dense field of dry, yellowish-brown grass.

Local Anaesthetics

analgesic drugs

- opioids
- NSAIDs
- $\alpha 2$ agonists
- local anaesthetics
- others

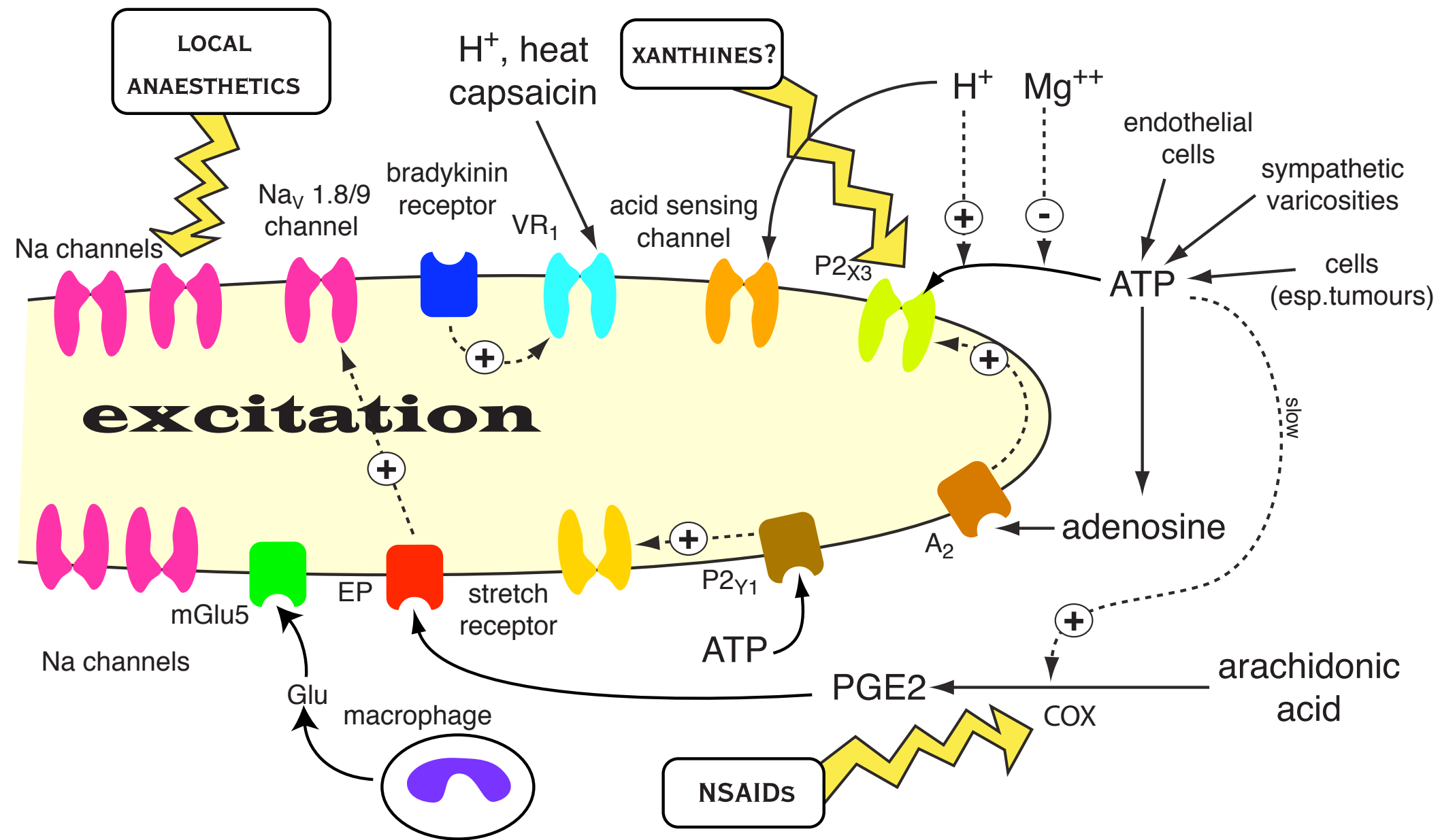
anaesthesia

A red mushroom with white spots, likely an Amanita muscaria, is growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The stem is white and appears to be partially buried in the grass. The background is a dense field of dry, yellowish-brown grass.

- general
- local
- regional

definitions

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

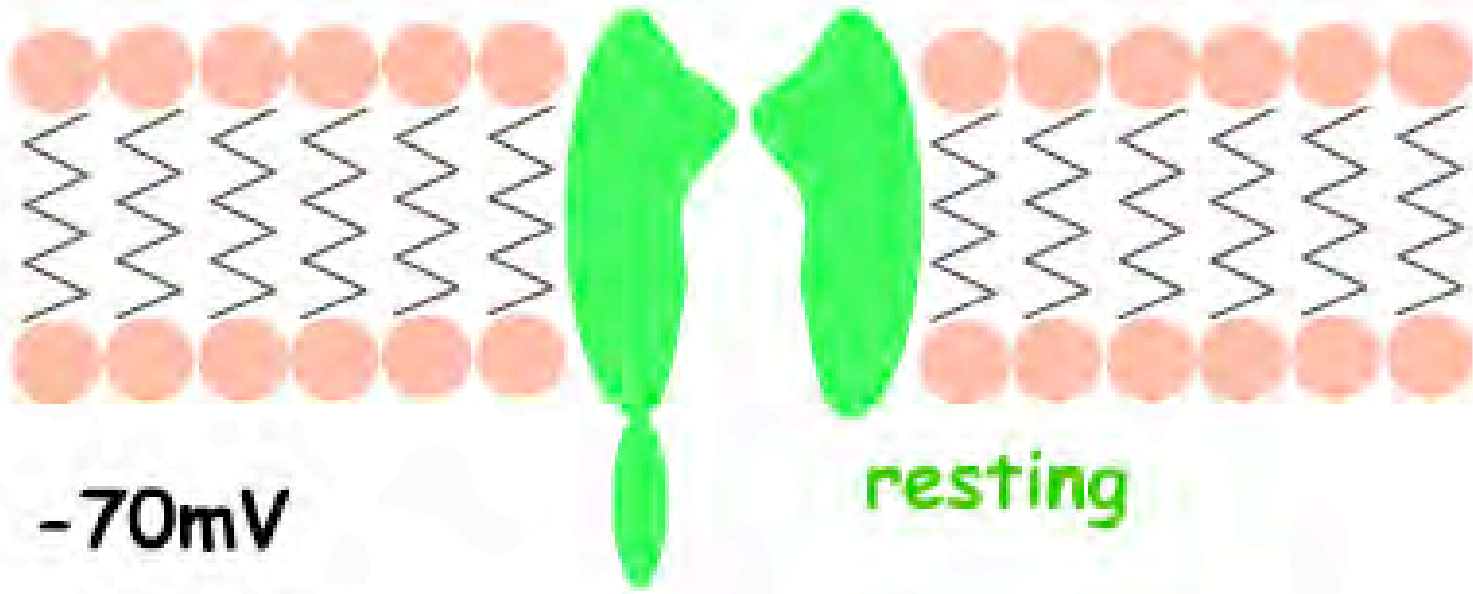


RUN

Na^+

Na^+

Na^+



Na channel subtypes

- CNS $\text{Na}_v1.1, 1.2, 1.3$
- skeletal muscle $\text{Na}_v1.4$
- heart $\text{Na}_v1.5$
- dorsal root ganglia $\text{Na}_v1.8, 1.9$
- neurendocrine & peripheral neurones $\text{Na}_v1.7$
- all neurones & glia $\text{Na}_v1.6$

Na channel blockers

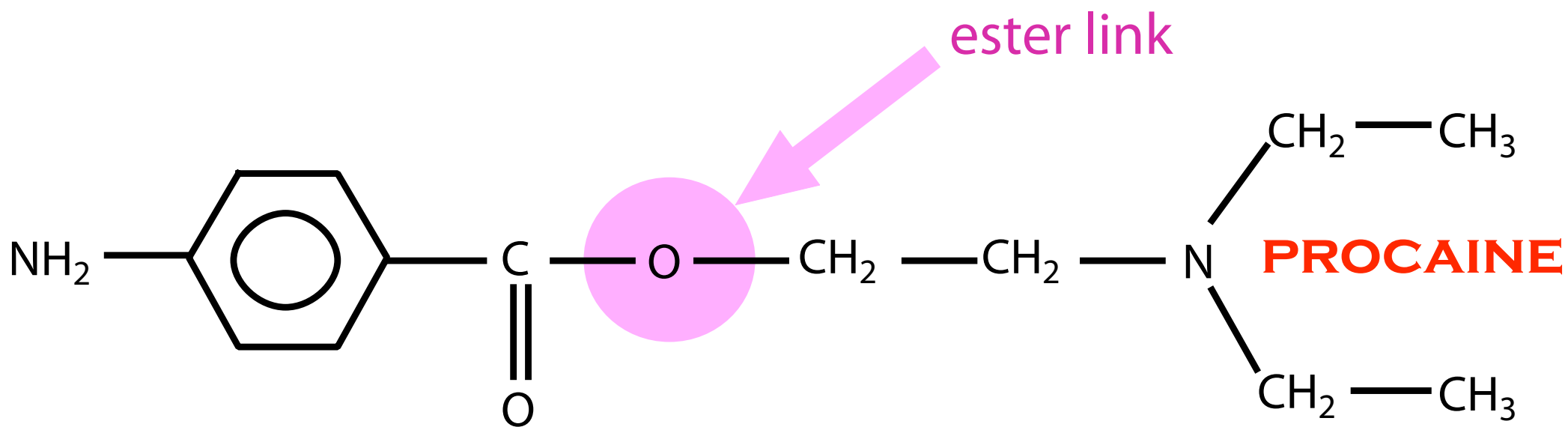
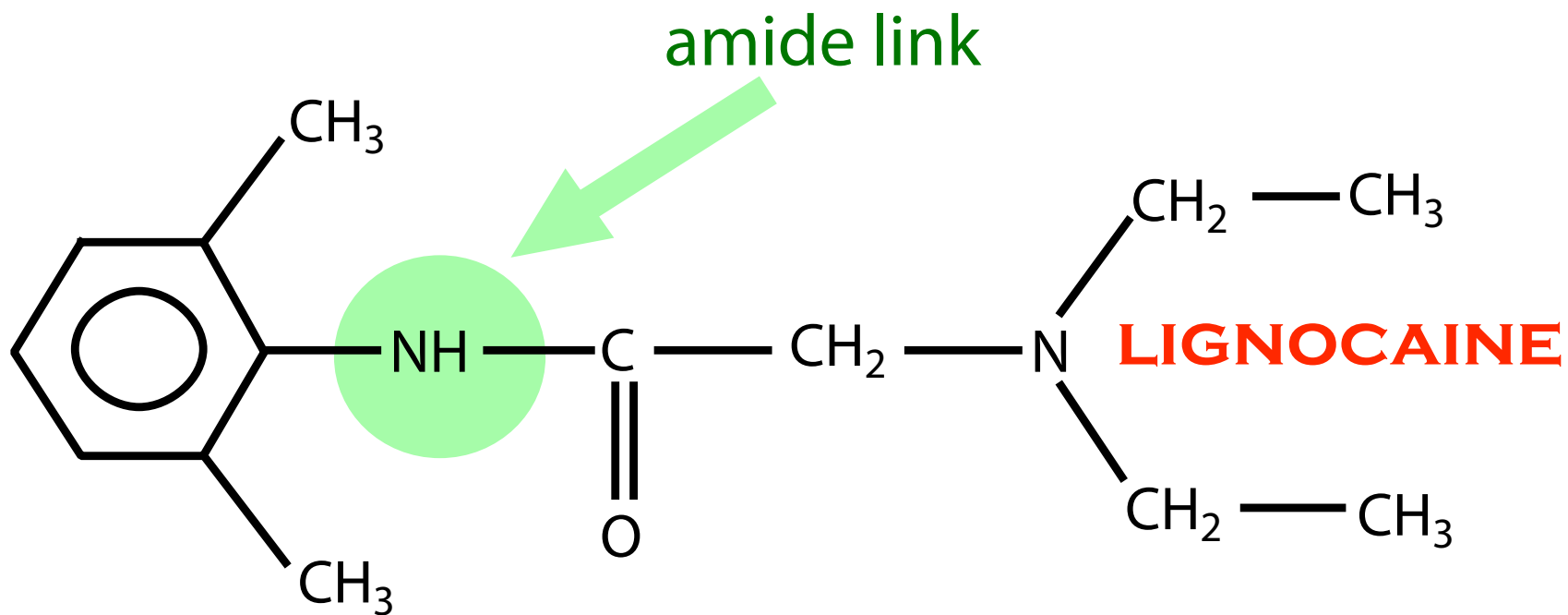
- local anaesthetics
- class 1 antiarrhythmics
- some anticonvulsants



chemistry

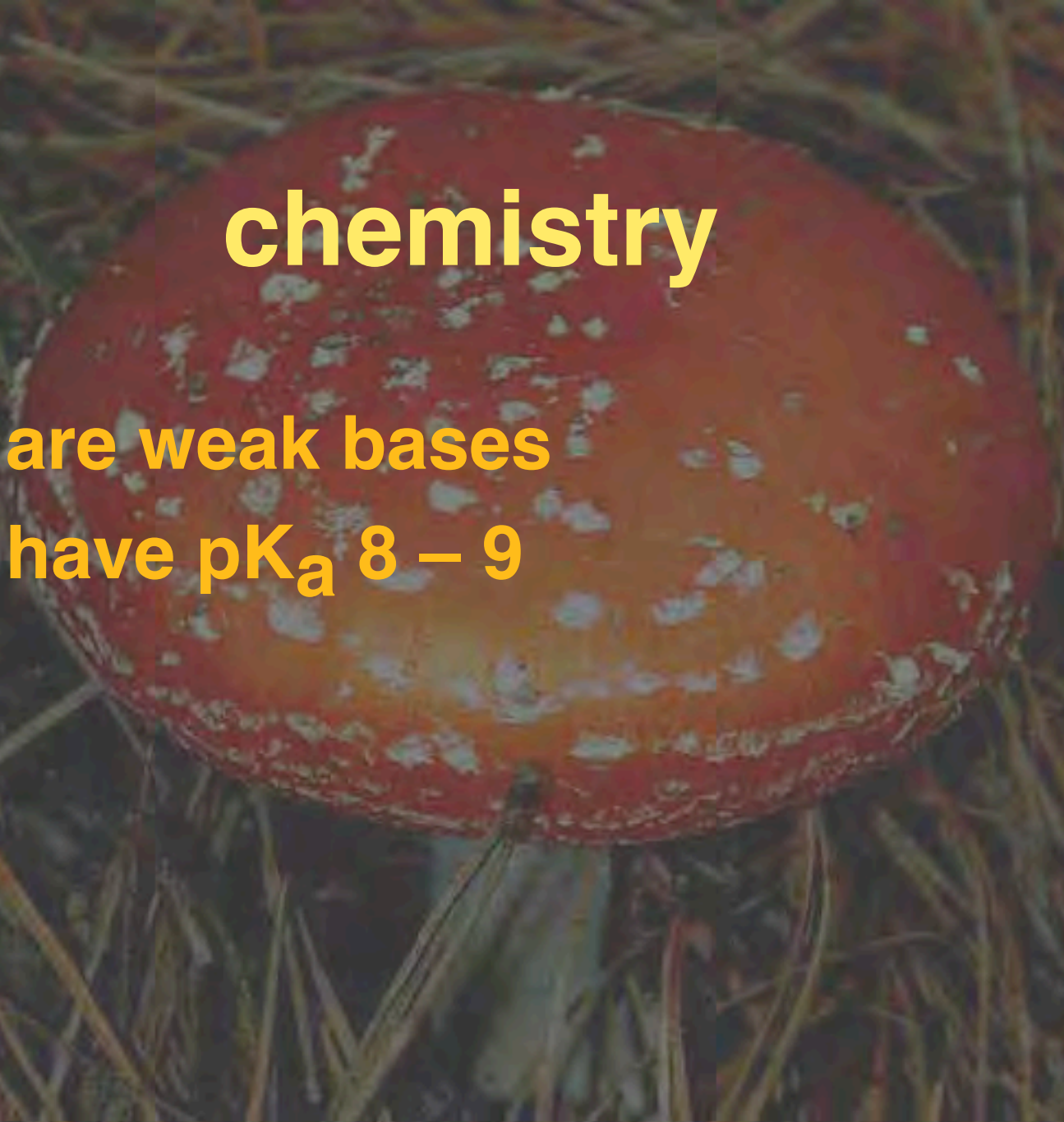
A photograph of a red mushroom with white spots, likely a fly agaric, growing in a field of dry grass. The mushroom is the central focus, with its bright red cap and white spots contrasting against the muted, brownish-green background of the grass. The lighting is soft, and the overall tone is somewhat somber due to the dark overlay.

- 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



RUN

Na^+

Na^+

Na^+

B H^+

ionised local



-70mV

resting

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)

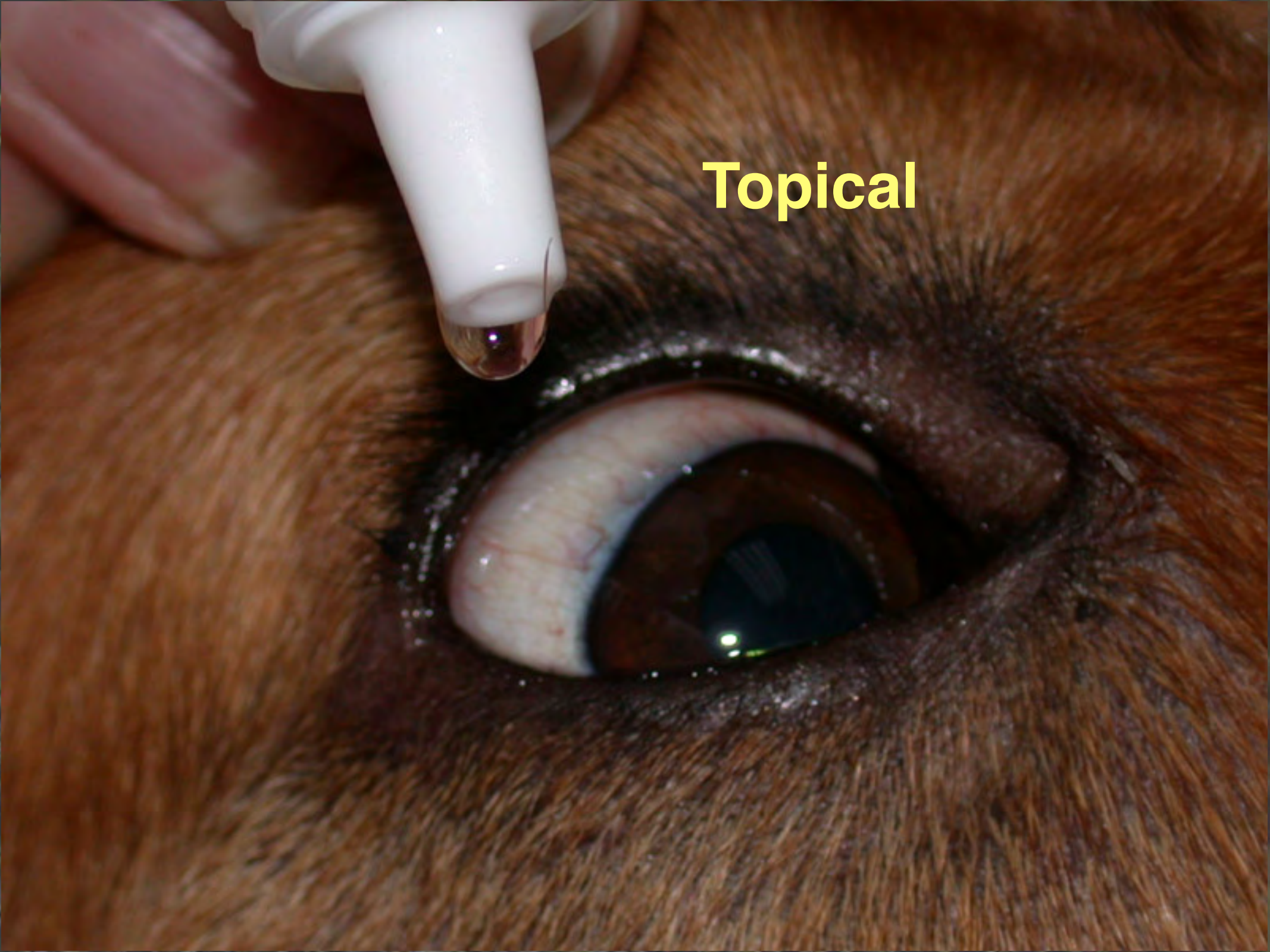


administration

A large, red mushroom with white spots is the central focus of the image. It is set against a background of dry, brown grass. The mushroom's cap is broad and slightly flattened, with numerous small, white, irregular spots scattered across its surface. The stem is thick and white, partially visible at the bottom. The overall lighting is soft, and the colors are somewhat muted, giving it a natural, slightly somber appearance.

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

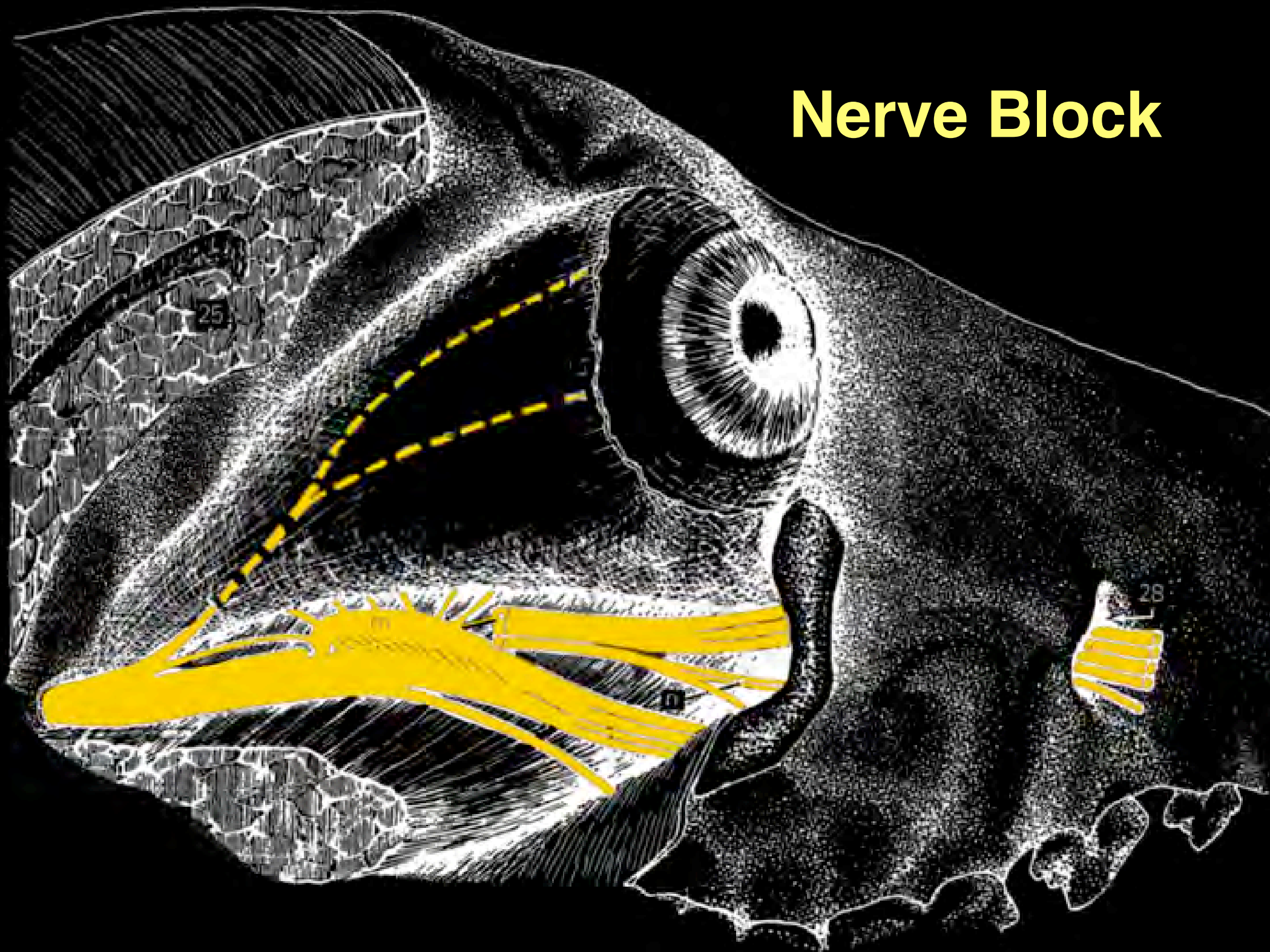
Topical



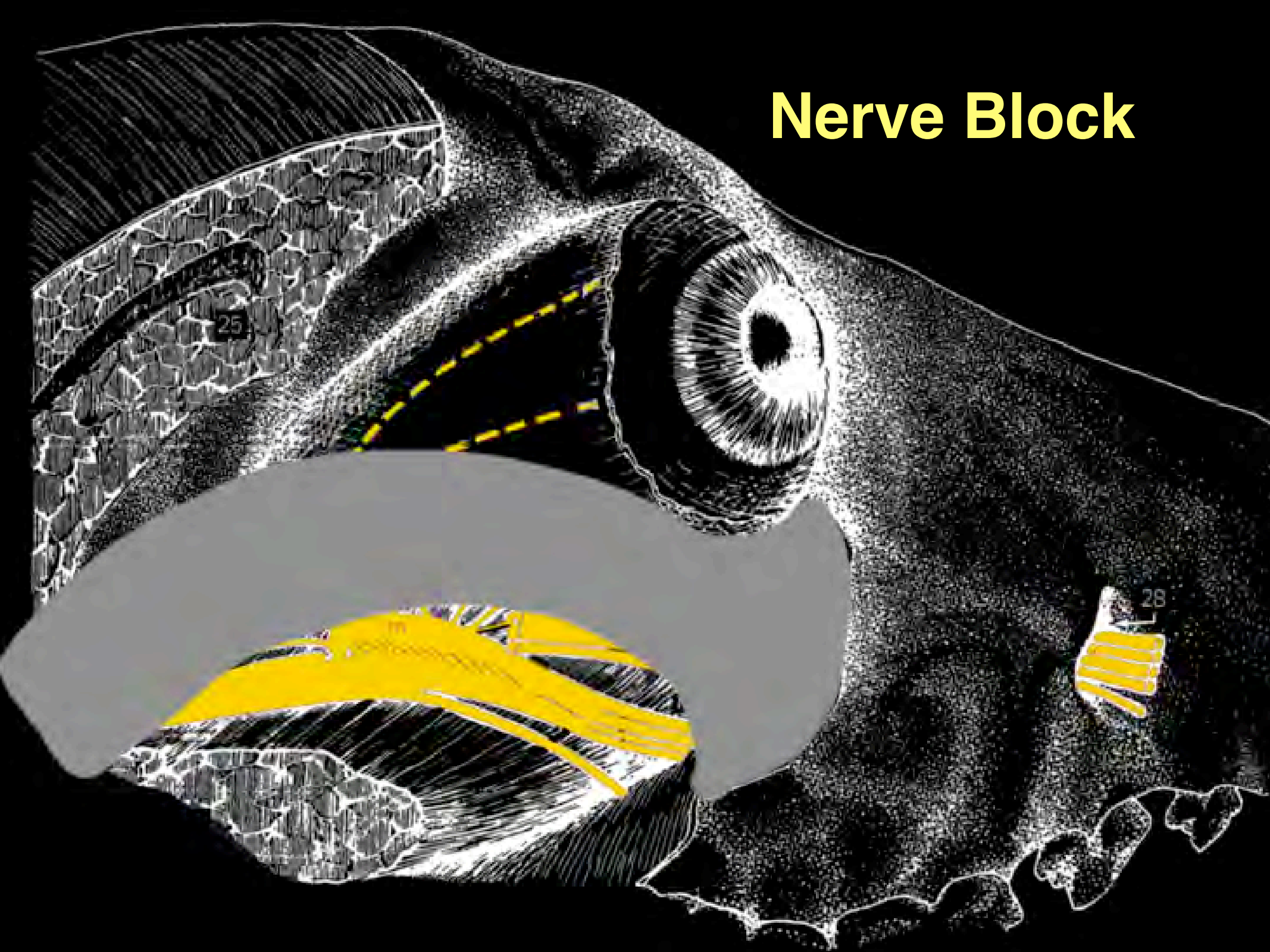


local infiltration

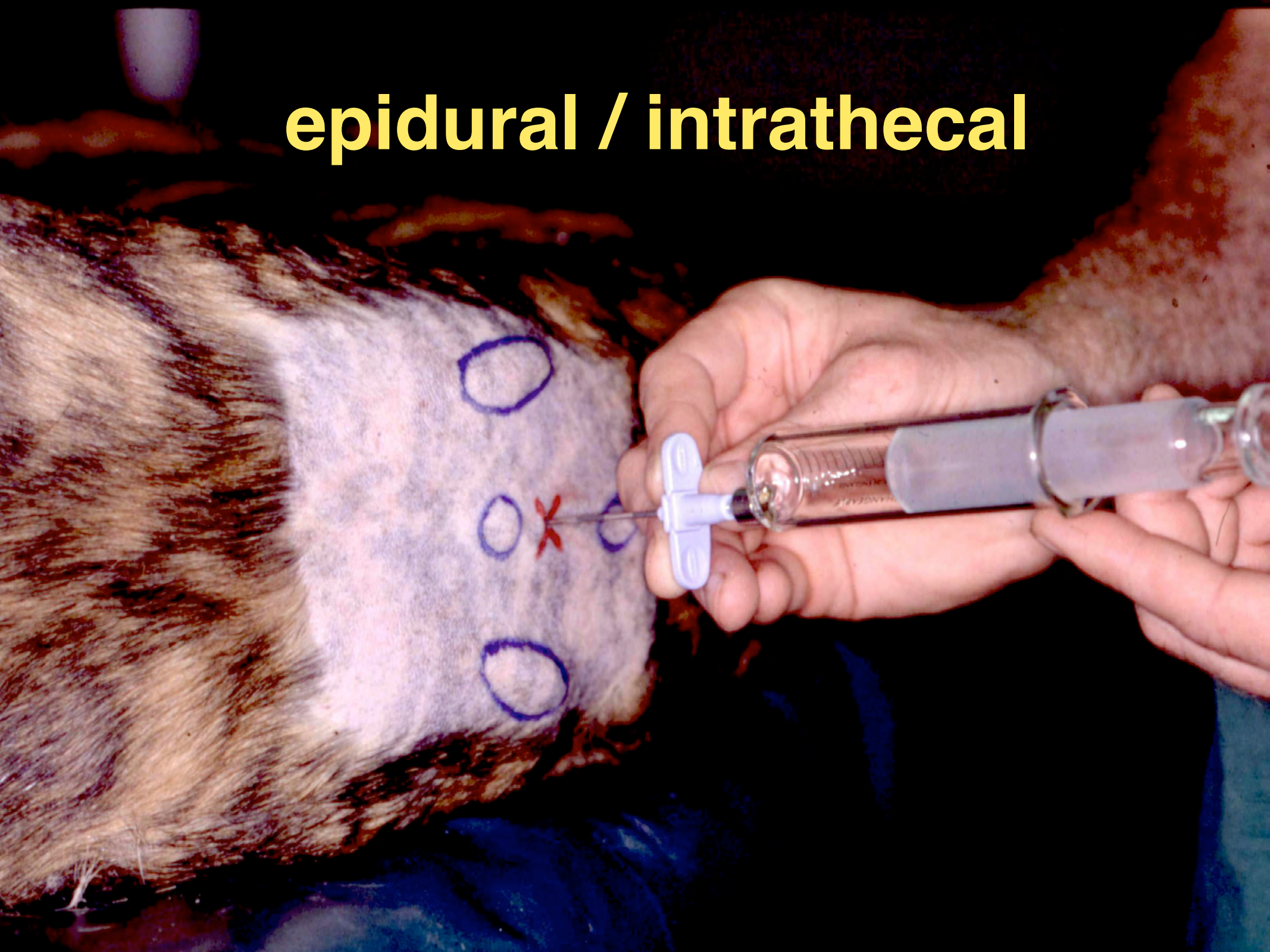
Nerve Block



Nerve Block



epidural / intrathecal

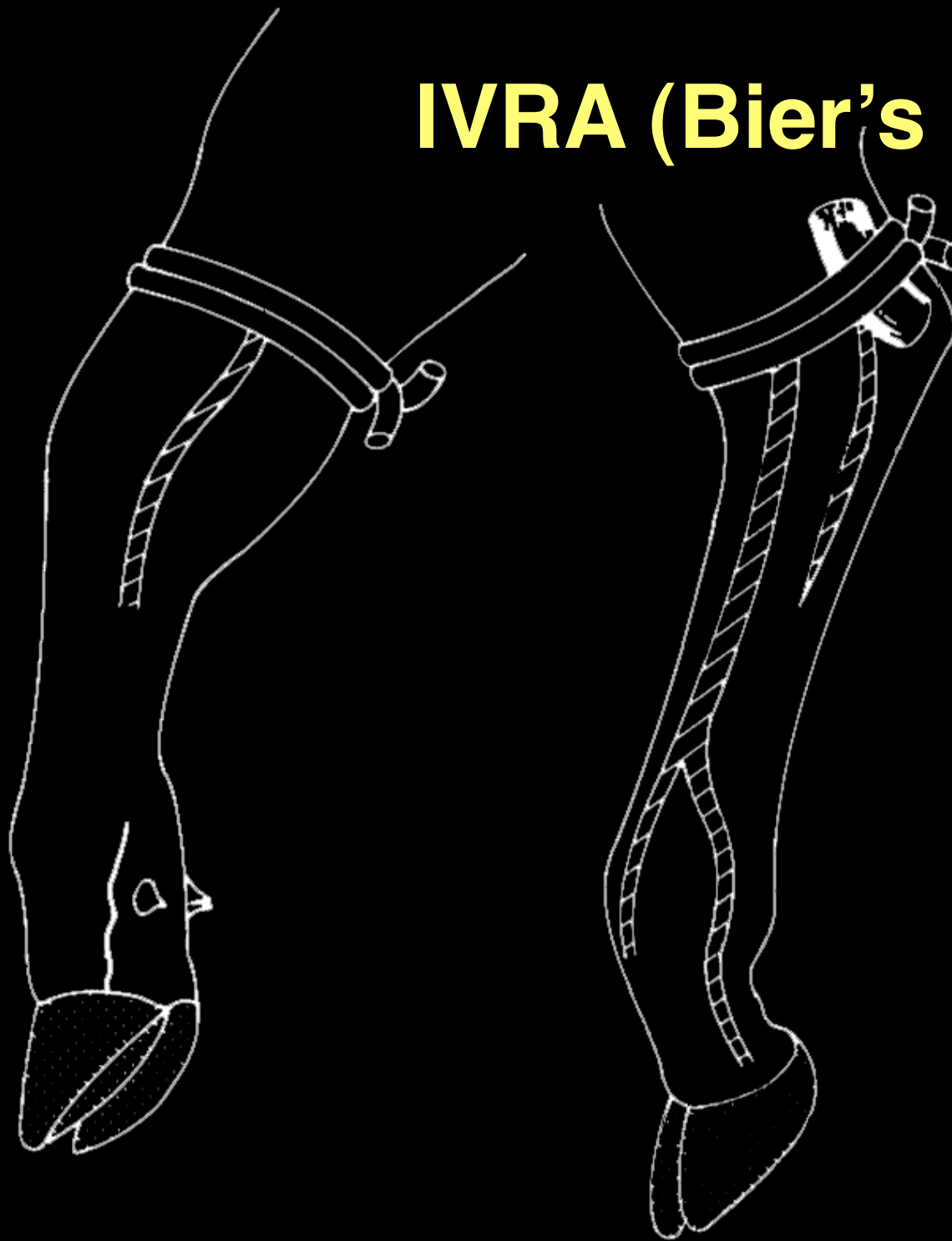


Epidural / Intrathecal

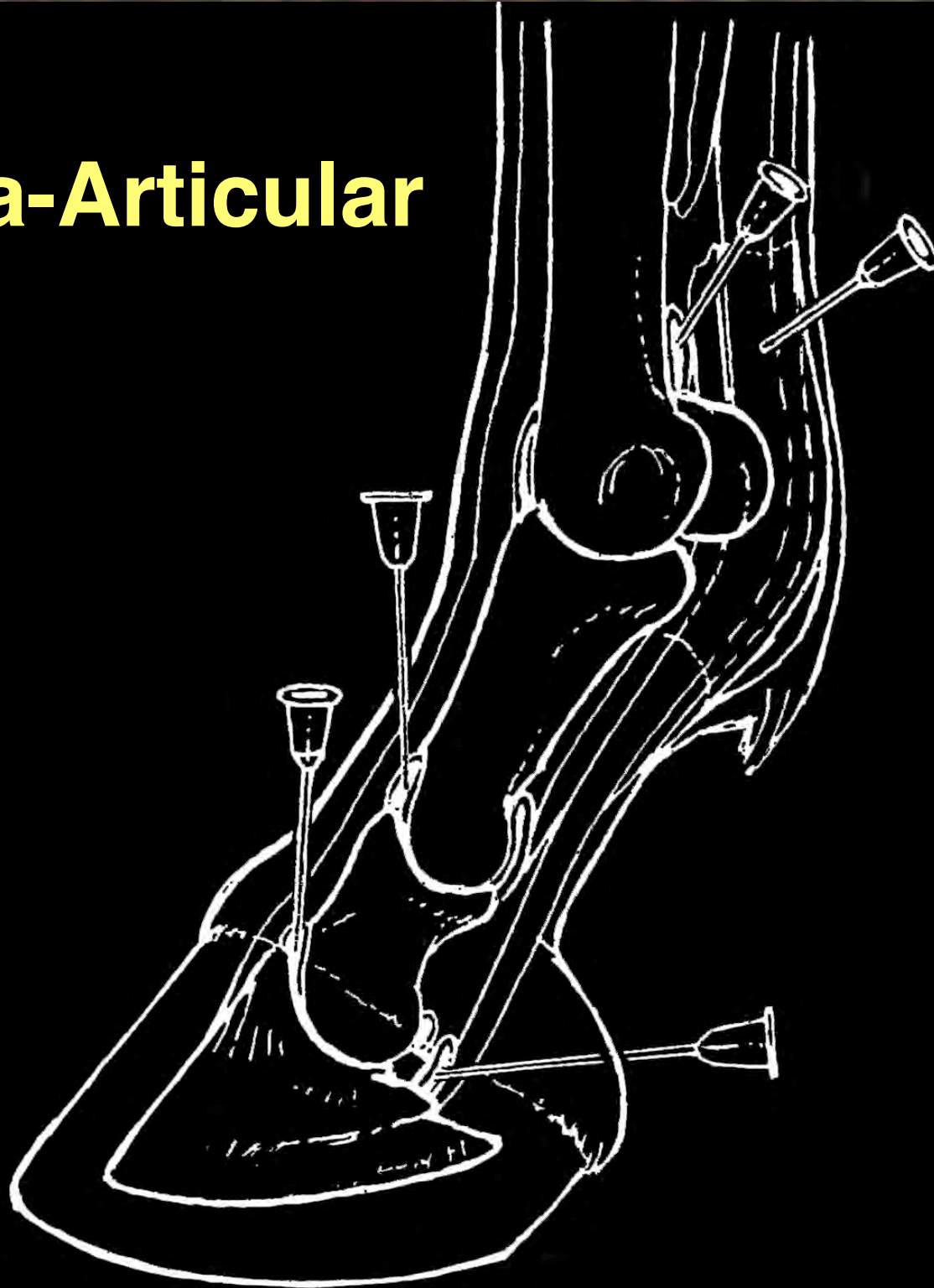
A red mushroom with white spots, likely a Amanita muscaria, is the central visual element. It is positioned in the upper right quadrant of the slide, partially overlapping the title. The mushroom has a bright red cap with numerous white, irregular spots. It is growing on a bed of dry, brown grass. The background is a dark, blurred field of similar grass, creating a natural, somewhat somber atmosphere.

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

IVRA (Bier's Block)

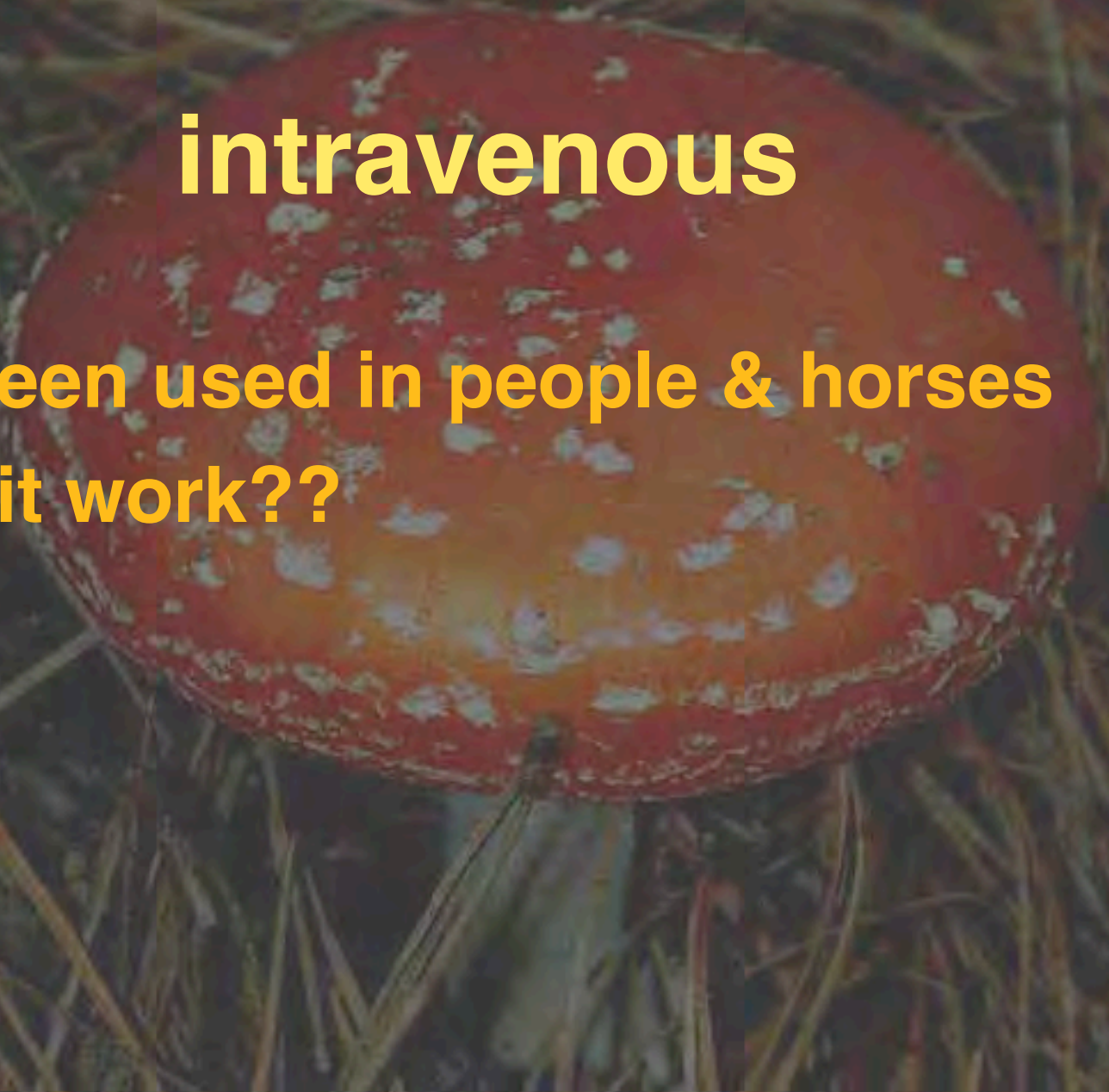


Intra-Articular



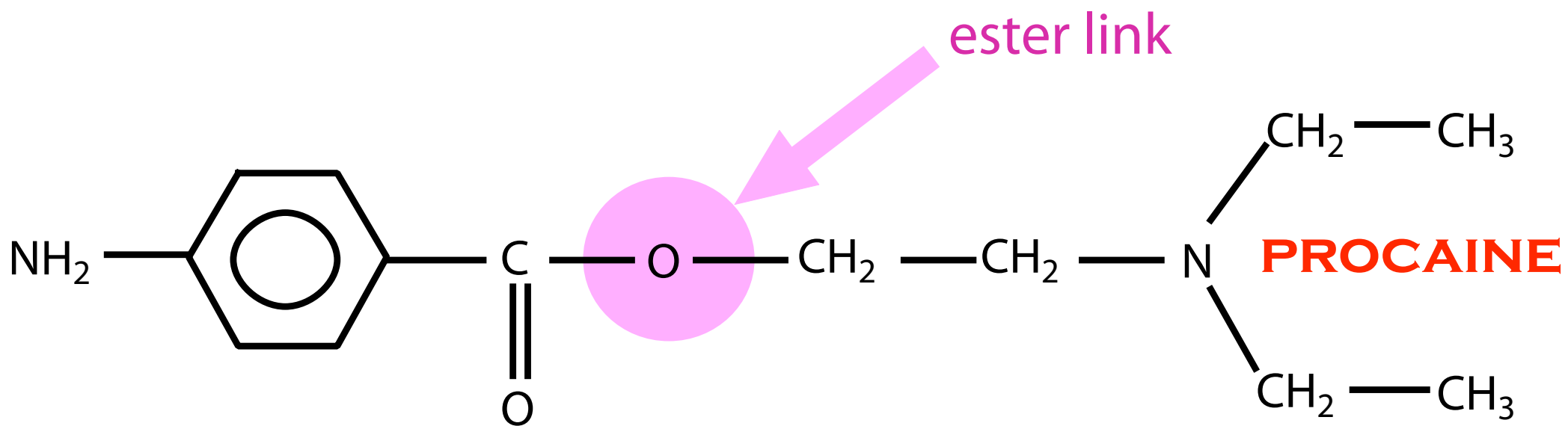
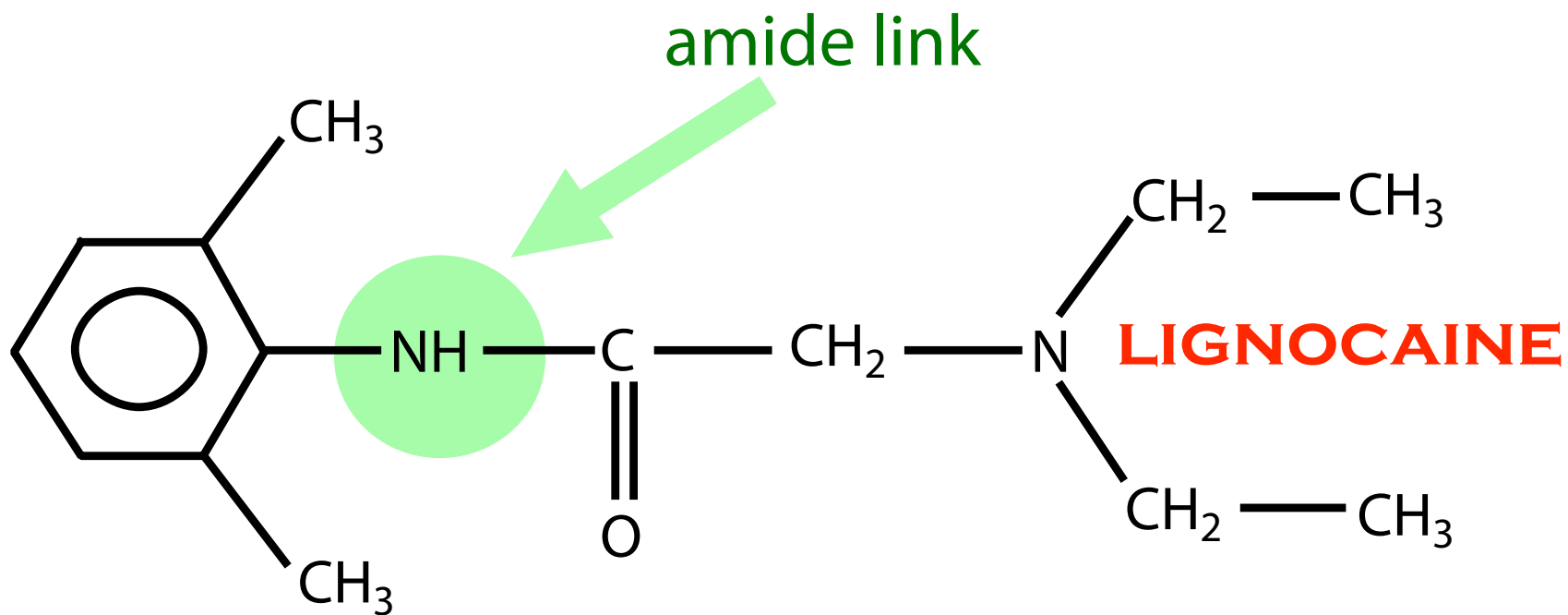
intravenous

- **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



A red mushroom with white spots, likely an Amanita muscaria, is growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The background is a dense field of dry, yellowish-brown grass.

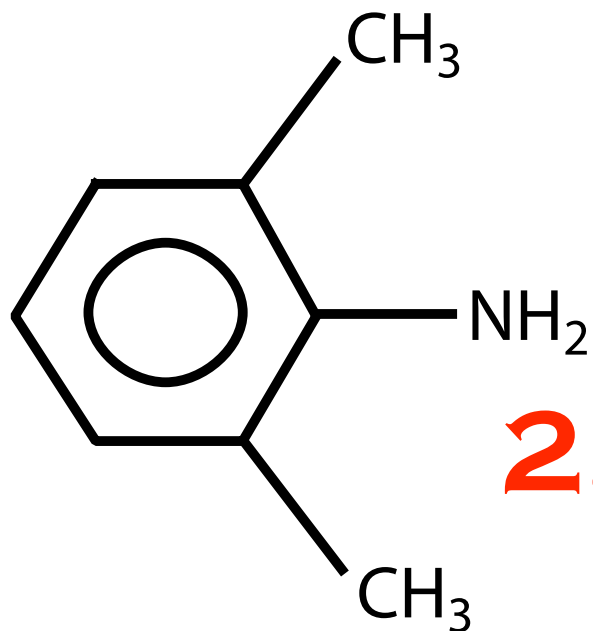
esters

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

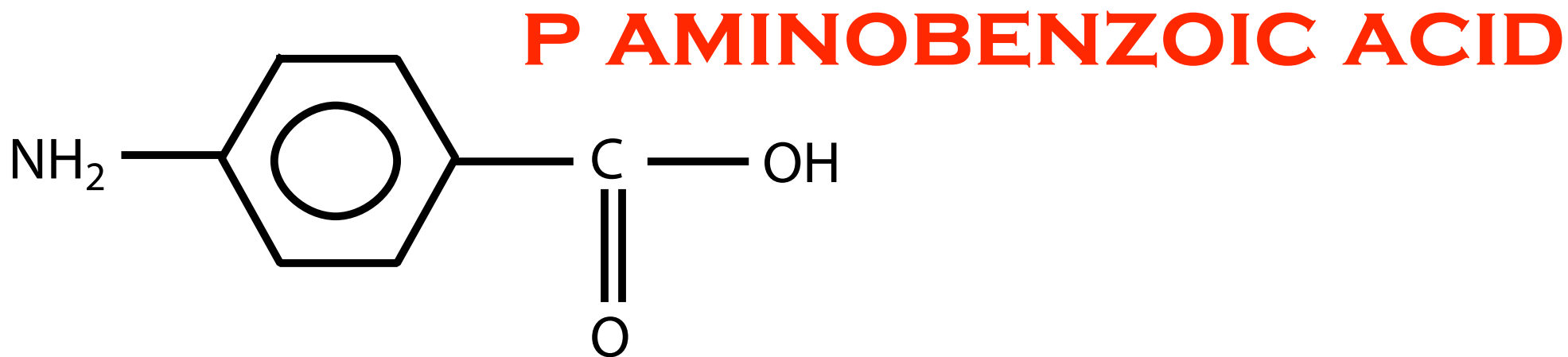
A red mushroom with white spots, likely an Amanita muscaria, is growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The stem is white and appears to be partially buried in the grass. The background is a dense field of dry, yellowish-brown grass.

amides

- **N dealkylation**
- **liver**
- **slower but still fairly fast**



2,6,XYLIDENE



A red mushroom with white spots, likely a fly agaric, is shown in the background. The mushroom has a bright red cap with numerous white, irregular spots. It is growing in a field of dry, yellowish-brown grass. The text 'side effects' is overlaid on the upper part of the mushroom cap in a bold, yellow font.

side effects

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

A red mushroom with white spots, likely an Amanita muscaria, is growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The background is a dense field of dry, yellowish-brown grass.

toxicity

- overdose
 - sheep
- accidental iv injection

A red mushroom with white spots growing in grass. The mushroom is the central focus, with its cap showing a vibrant red color and several white, irregular spots. It is surrounded by dry, brownish grass and some green blades. The background is slightly blurred, emphasizing the mushroom.

common drug

- **lignocaine (= lidocaine)**
 - 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

A photograph of a red mushroom with white spots, likely an Amanita muscaria, growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The stem is white and appears to have a fine, hair-like texture. The background is a dense field of dry, yellowish-brown grass.

toxins

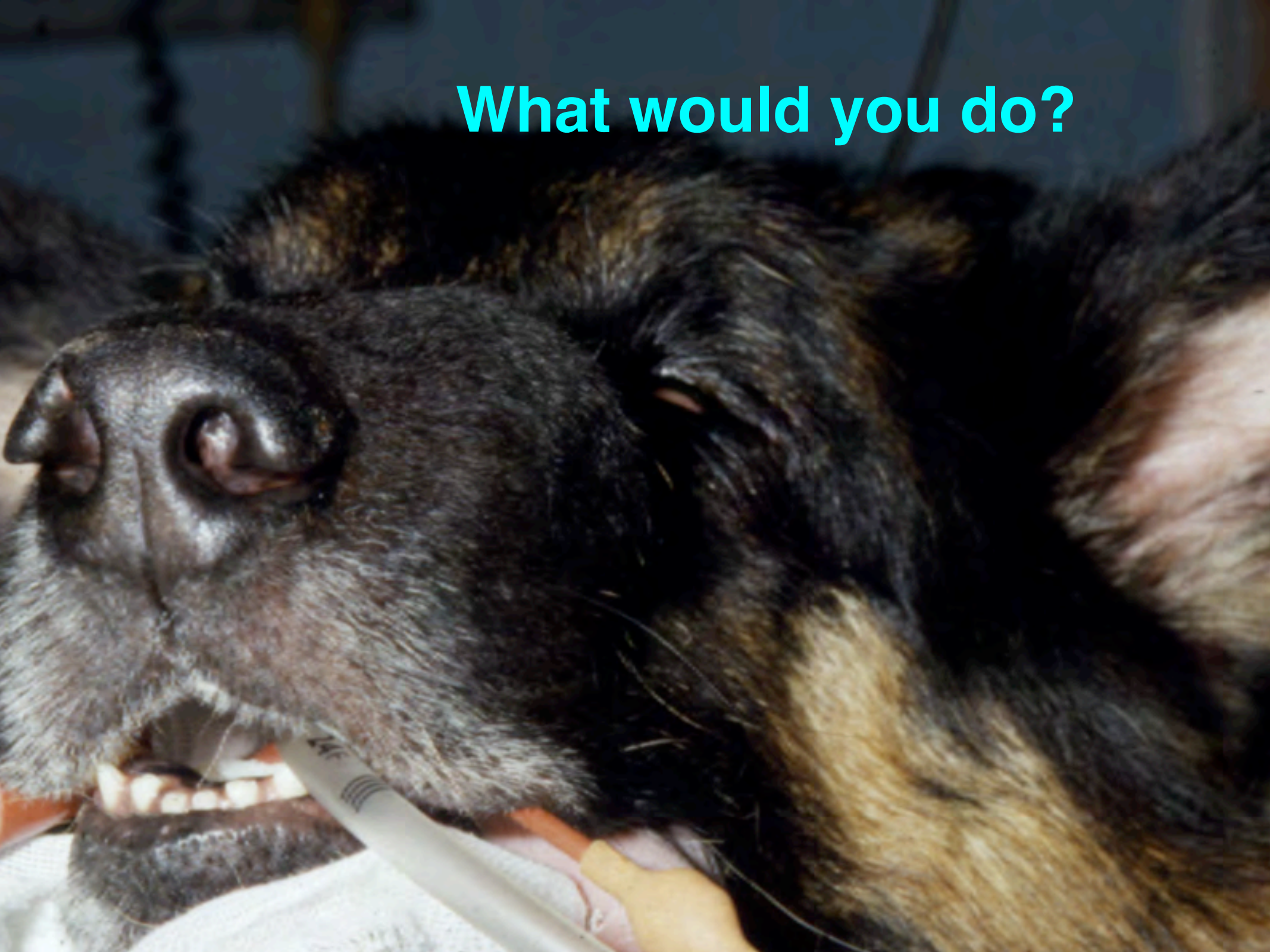
- **tetrodotoxin**
- **saxitoxin**

channel openers

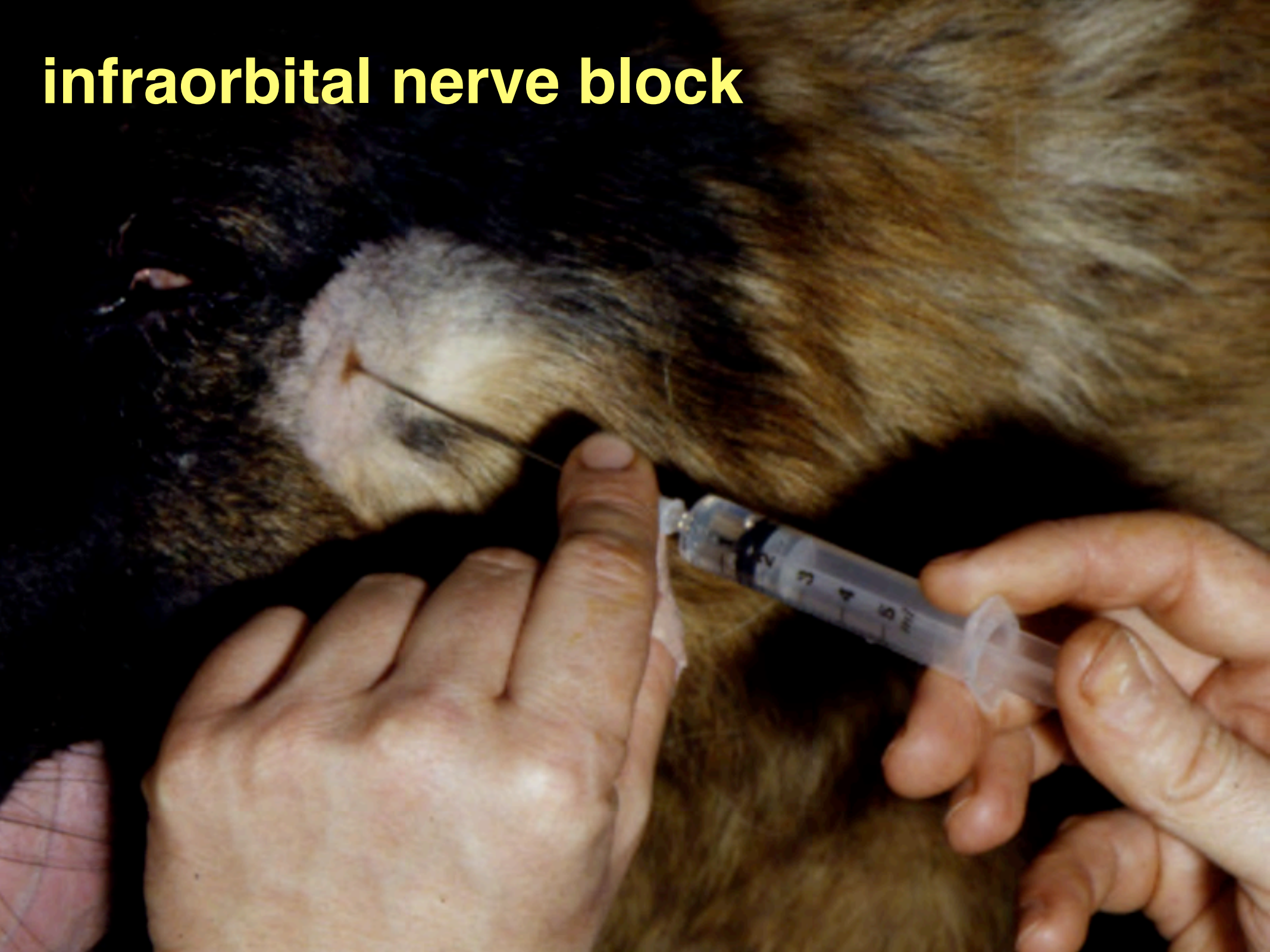
- DDT and pyrethrum
- veratridine
- some spider and scorpion toxins



What would you do?



infraorbital nerve block



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**