

A red mushroom with white spots, resembling a fly agaric, is centered in the image. It has a bright red cap with numerous white, irregular spots and a white stem. The mushroom is growing in a field of dry, brown grass. The text "Analgesic Drugs" is overlaid in yellow on the mushroom's cap.

Analgesic Drugs

Opioids

analgesic drugs

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

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

opioids

- opiates
 - from opium
 - morphine, codeine
- opioids
 - anything which binds to opioid receptors and can be displaced by naloxone



Papaver somniferum





opioid receptors

	<i>endogenous ligands</i>	<i>main effects</i>
μ	β endorphin, endomorphins	analgesia, respiratory depression, euphoria
δ	enkephalins	analgesia, hormonal effects
κ	dynorphins	analgesia, dysphoria, diuresis
(σ	?	psychotic effects, analgesia?)
(ORL1	nociceptin	increases pain??)

new names

- μ = MOP (μ opioid peptide)
- δ = DOP
- κ = KOP
- ORL_1 = NOP

receptor subtypes

?



A red mushroom with white spots, likely a fly agaric, is the central visual element. It has a bright red cap with numerous white, irregular spots and a thick, white, slightly wrinkled stem. The mushroom is growing in a field of dry, yellowish-brown grass. The background is slightly blurred, emphasizing the mushroom.

μ agonists

- morphine
- (heroin)
- pethidine (=meperidine USAN)
 - pethidine derivatives
- methadone

phenylpiperidines

A red mushroom with white spots, resembling a fly agaric, growing in a field of dry grass. The mushroom is the central focus of the image, with its bright red cap and white spots contrasting sharply with the dry, brownish-yellow grass. The background is a dense field of similar grass, creating a textured, natural setting.

- fentanyl
- alfentanil
- carfentanil
- sufentanil
- lofentanil
- remifentanil, etc

morphine effects

- analgesia
- euphoria



μ receptor effects

- open K^+ channels
- close Ca^{++} channels
- direct inhibition of neurotransmitter release?

morphine's sites of action

- spinal cord
- thalamus
- periaqueductal grey matter
- nucleus raphe magnus
- ventral tegmental area
- cortex?
- peripheral nerves?
- macrophages?

A red mushroom with white spots, likely a Amanita muscaria, is the central focus of the image. It is positioned in the upper right quadrant, with its cap showing a vibrant red color and numerous white, star-shaped spots. The mushroom is growing on a bed of dry, brown grass. The background is a soft-focus field of similar grass, creating a natural, outdoor setting. The overall lighting is somewhat dim, giving the image a slightly moody or mysterious feel.

side effects

- vomiting
- sedation / excitation
- euphoria
- gut effects
- muscle rigidity
- respiratory depression
- urinary retention
- cough suppression

more side effects

- increased intra-cranial pressure
- histamine release
- bradycardia
- miosis
- addiction



morphine pharmacokinetics

- **poor systemic availability po**
 - **bioavailability 20%**
- **fat soluble**
- **metabolised by glucuronidation**
 - **cats!**
- **eliminated by kidney and in bile**
 - **enterohepatic recirculation!**
- **elimination variable**

indications

- strong analgesia
- anaesthesia premed
 - give before pain starts if possible!
- diarrhoea
- coughing

contra-indications

- severe head injury
- upper respiratory tract injury
- unconsciousness?



morphine dose

- all species 0.1 – 1mg/kg sc/im
- only one dose in cats
- use low dose in horses



tolerance

- increased metabolism
- decreased receptor affinity
- receptor down regulation
- receptor – effector uncoupling
- effector system adaptation
- neuronal plasticity

dependence

A red mushroom with white spots, likely an Amanita muscaria, is growing in a field of dry, yellowish-brown grass. The mushroom has a bright red cap with numerous white, irregular spots and a thick, white, slightly wrinkled stem. The background is a dense field of dry grass, creating a textured, natural setting.

- **physical**
 - withdrawal syndrome
- **psychological**
 - operant conditioning

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

red tape

- **most useful drugs are controlled under the Misuse of Drugs Act**
 - **must be locked away**
 - **use recorded**
 - **given by a vet**
 - **(much) more later in the course**

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.

other drugs

- **methadone**
- **pethidine**
- **fentanil & analogues**

phenylpiperidines

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- fentanyl
- alfentanil
- carfentanil
- sufentanil
- lofentanil
- remifentanil, etc

mixed agonists

	μ	δ	κ	σ
butorphanol	-/(+)		(++)	+
buprenorphine	(+++)	0	(+)?	0
nalbuphine	-	-	(++)	+?
pentazocine	-	+	++	+
etorphine	+++	+++	+++	0
tramadol				

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 have a slightly textured surface. The background is a dense field of dry, yellowish-brown grass.

severe pain

- **morphine**
- **methadone**
- **fentanyl**

moderate pain

- morphine
- methadone
- buprenorphine
- (butorphanol)



anaesthetic premed

- morphine
- (pethidine)
- (butorphanol)



intra-op analgesia

- fentanyl
- alfentanil



chemical immobilisation

- carfentanil
- etorphine



A large, red mushroom with white spots is centered in the background. The mushroom has a thick, slightly textured cap and a thick, white stem. It is surrounded by dry, brown grass. The text 'routes' is written in a bold, yellow font over the mushroom's cap.

routes

- **iv (care with morphine in dogs)**
- **im / sc**
- **intra-articular**
- **epidural / intrathecal**
- **po**

A red mushroom with white spots, resembling a fly agaric, is centered in the background. The text is overlaid on the image.

antagonists

- **naloxone**
 - have some handy when using carfentanil or etorphine
- **naltrexone**
- **partial agonists**
 - **diprenorphine**
 - **levorphanol**

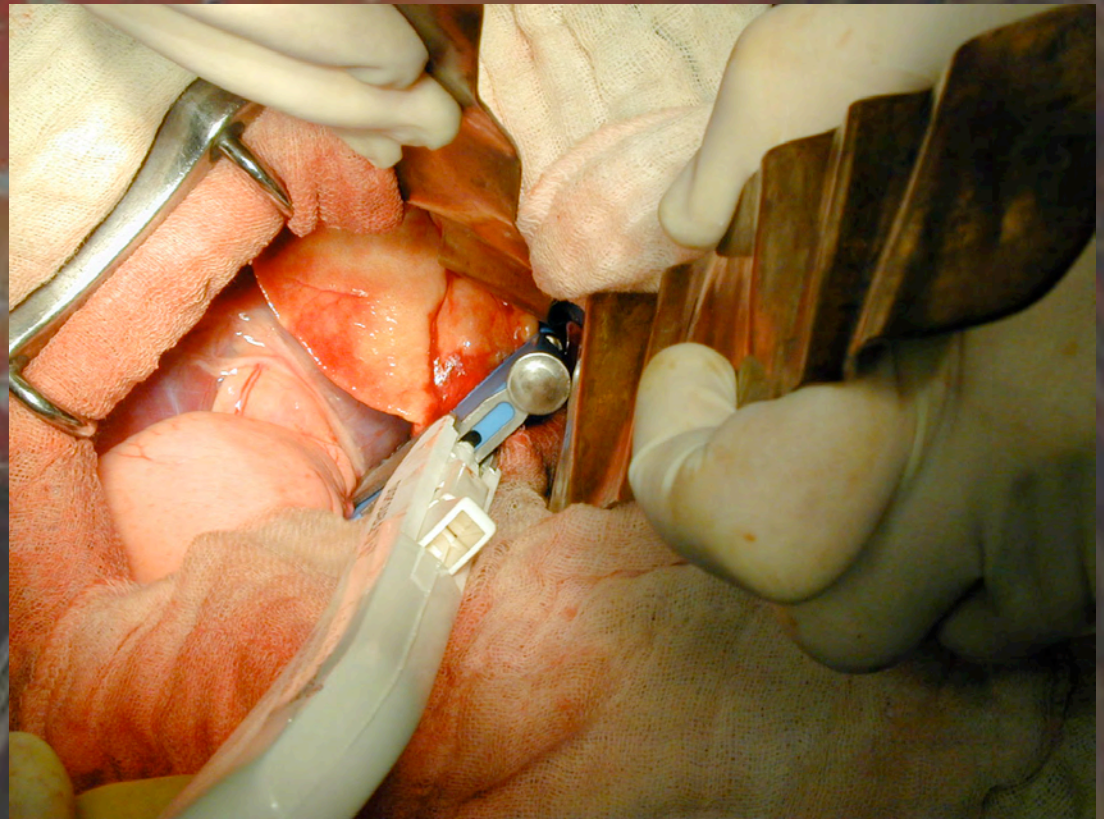
A red mushroom with white spots, likely a fly agaric, growing in a field of dry grass. The mushroom has a bright red cap with numerous white, irregular spots. The stem is thick and appears to have a white or light-colored base. The background is a dense field of dry, yellowish-brown grass.

other uses

- **diarrhoea**
 - loperamide
 - diphenoxylate
 - codeine
- **coughing**
 - codeine
 - butorphanol

What do you do?

- 9yr old labrador
- lung lobectomy
- premed morphine & sedative
- anaesthesia – thio & halothane
- still responds to surgery



opioids

- the main group of strong analgesics
- main effects – analgesia & euphoria, interact with anaesthetics to increase depth
- side effects vomiting and possible respiratory depression, but not usually in animals in pain
- overdose causes excitement in cats and horses
- metabolised slowly in cats
- if in doubt about an animal's pain – give morphine