Opioids

At least three opioid receptors have been identified; mu, kappa, and delta, however only

mu, and kappa receptor are routinely manipulated to provide analgesia. Opioid

receptors are present in peripheral tissues, including joint capsule, in the dorsal horn of

the spinal cord, and in high density in the brain. Binding of the opioid agonists

increases K+

 conductance which causes hyperpolarization and decreases

neurotransmitters such as; acetylcholine, substance P, dopamine, and norepinephrine.

Side effects associated with opioids include respiratory depression, bradycardia,

decreased GI motility and nausea.

Pure mu-opioid agonists commonly available are morphine, hydromorphone,

oxymorphone and fentanyl. Pure agonists have a dose dependant effect.

Buprenorphine is a partial mu-agonist and as such will have a ceiling effect, such that

increased dosing will not increase the effect.

Butorphanol is a kappa-opioid agonist (with mu opioid antagonist activity). In general,

the kappa agonists provide less intense analgesia, but also cause fewer side effects.

Since all opioids decrease ventilation, they should be used cautiously in patients that

are in respiratory dysfunction or who are hypoxemic.

What’s new for opioids??

Fentanyl patches have become quite popular for treating pain in a variety species. The

ability to provide fairly steady state analgesia for days and while at home is

advantageous. Cats in particular can have a positive behavior change while the patch

is being used. After placement, therapeutic levels are reached in the cat in ~6hrs and

~12 hr in the dog. Patches are designed to last ~3 days, but differences can occur with differences in uptake; warm skin facilitates uptake whereas cold skin decreases uptake.

Patches should NOT be cut. Fentanyl has a large human abuse risk.

Transmucosal buprenorphine Buprenorphine is a partial mu agonist, which means it

has a ceiling effect (i.e. after a certain dose, giving more does not result in more

analgesia). Buprenorphine can be administered trans-mucosally (not orally) at

0.02mg/kg (20ug/kg). Research has shown that transmucosal administration is as

effective and IV administration in cats4

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Tramadol

Tramadol is classified as an opioid agonist and has a mild mu opioid action, but its

metabolite (M1) has 200x the opioid binding affinity of the parent compound.

Additionally, some if not most of tramadol analgesic properties are due to inhibition of

reuptake of norepinephrine and serotonin (5HT).

Tramadol is well absorbed orally, but cats in particular dislike the taste.

Tramadol should be used with caution for patients taking other serotonin uptake

inhibitors; (e.g. selegiline hydrochloride (Anipryl®) or fluoxetine (Prozac®). Elevated

serotonin levels can lead to “Serotonin Syndrome” which can be expressed as

drowsiness, restlessness, altered mentation, muscle twitching, high body temperature,

shivering, diarrhea, unconsciousness and death.

High doses may cause anorexia.