

# Perioperative Pain Management Strategies for Small Animal Patients

Ralph Harvey, DVM, MS, Diplomate ACVA  
University of Tennessee  
College of Veterinary Medicine





## Where Are We Now?

---

We stand on the  
shoulders of giants!

Progress achieved through:

- Ambition
- Innovation
- High Expectations





# Advances in Pain Management:

---

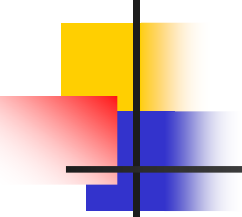
1. Acute Pain  
Operative and Trauma Care
2. Chronic Pain  
Arthritic Pain  
Cancer Pain
3. Critical Care Analgesia



---

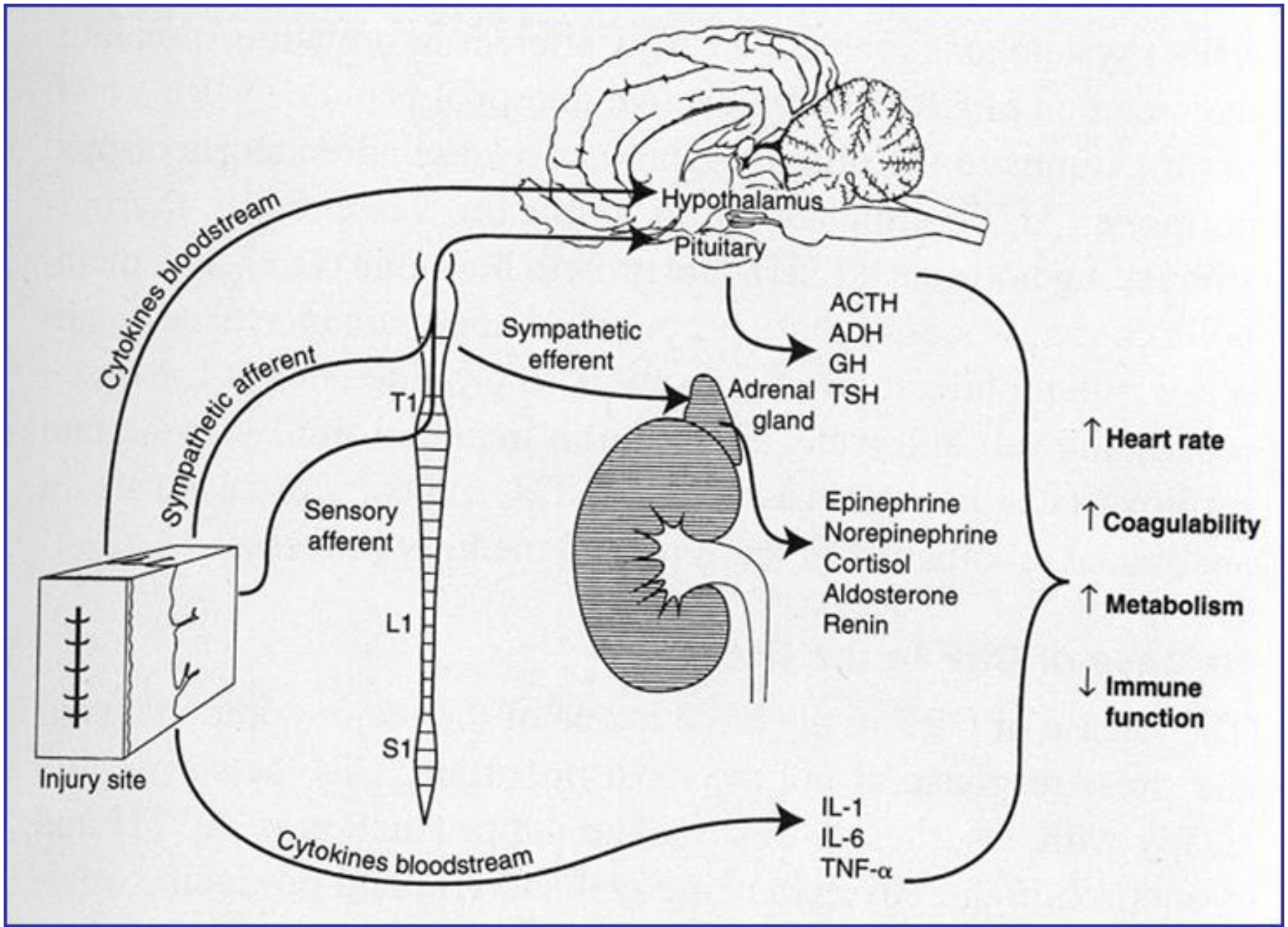
## **Behavioral Indicators of Stress and Pain**

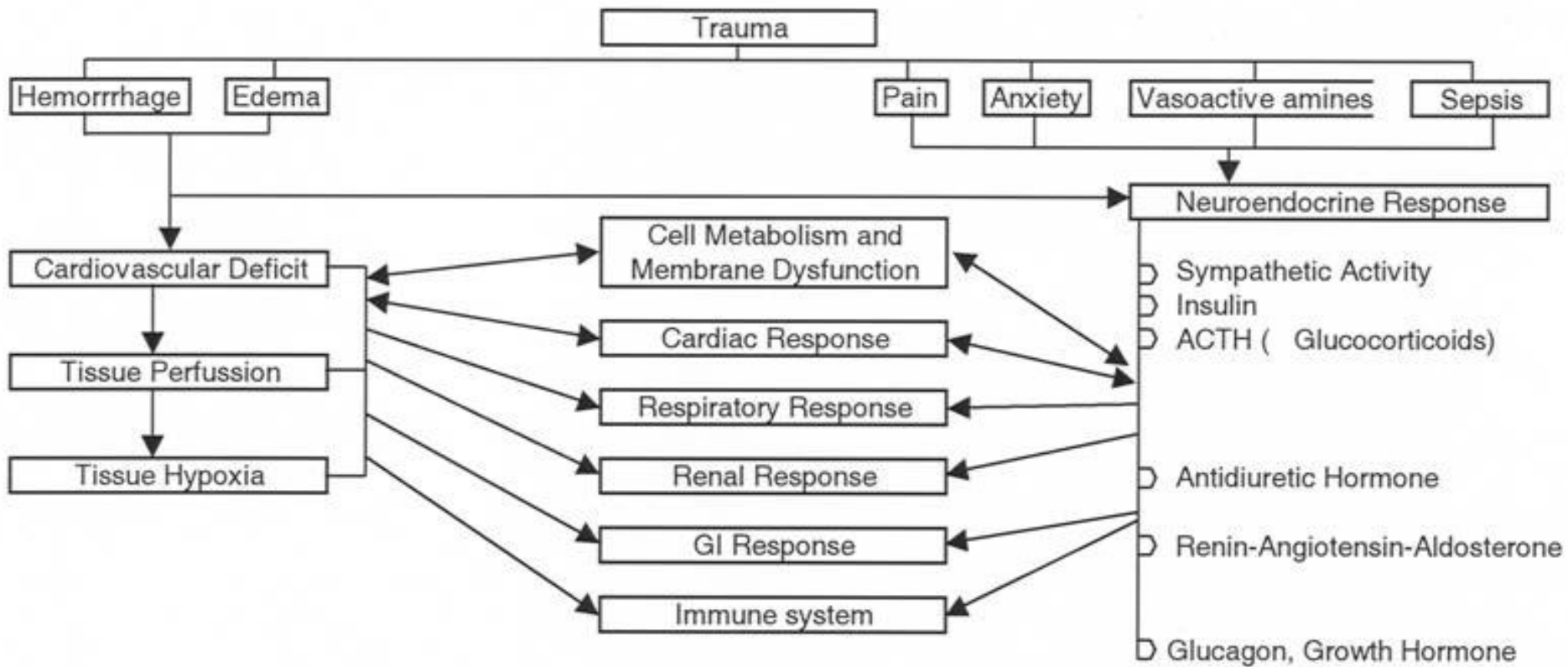
- Appetite
- Activity
- Facial expression
- Appearance
- Attitude
- Vocalization
- Activity
- Posture
- Aggression
- Response to handling

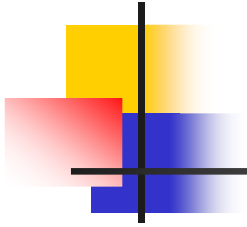


## Systemic Effects of the Stress Response

- Activation of central nervous system (CNS)  
Hypothalamus, amygdala, locus ceruleus (LC)
- Increases in CNS sympathetic output  
Catecholamines
- Endocrine “stress” response  
Pituitary hormone secretion  
Adrenal hormone secretion
- Glucosemia
- Insulin resistance
- Cytokine production
- Acute-phase reaction
- Neutrophil leukocytosis
- Immunologic and hematologic changes









# The Signs of Pain

The definition of pain in humans as an unpleasant sensory and emotional experience with actual or potential tissue damage (Merskey 1979)<sup>1</sup>, may be applied to the animal patient.

## Pain Scores - AAHA PM Standards:

“Pain assessment using a standardized scale or scoring system is recorded in the medical record for every patient evaluation”

- TPR (traditional measurements)
- Physiological parameters
- Sensitivity measurement
- Pain scales...

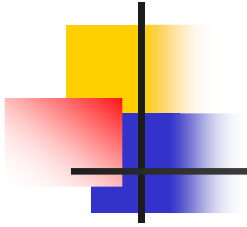


# Options for Evaluation

1. Simple Descriptive Scale
2. Numerical Rating Scale
3. Composite Scale
4. Interactive Visual Analog Scale

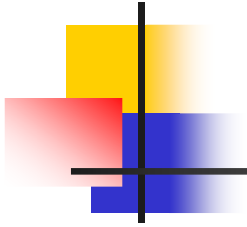
(Evaluations by owners, veterinarians & staff)

*Other pain scales have been developed and should be considered.*



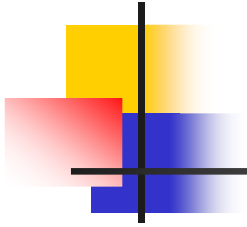
- Pain management is individualized for each patient





## Behaviors as potential indicators of pain in the dog:

- Hunched or prayer position
- Glazed facial expression
- Attention-seeking and whining
- Licking the painful area
- Not hiding the painful body part





# Common behaviors associated with chronic pain:

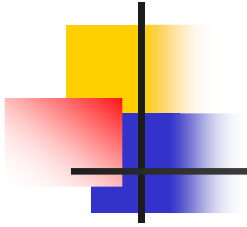
- Temperament - dull, grouchy, and grumpy.
- Posture and locomotion - limited ambulation, altered gait, overt lameness, reluctance to move, difficulty rising, and reduced play behavior.
- Grooming - alteration in or lack of grooming, grooming of specific parts, and licking of painful parts.
- Reduction of activity level.
- Reduction of food and water consumption.
- Inappropriate urination and defecation.

## Species-specific responses to chronic pain:

- Dogs - eating behavior is rarely affected
- Cats - isolation from others in the household, decreased grooming, and cessation of eating
- Horses - inappetance, severe weight loss, dull expression, glazed eyes, and base-wide stance
- Ruminants - weight loss and isolation from the herd
- Pigs - reluctance to rise, reduced social interaction, and little appetite change

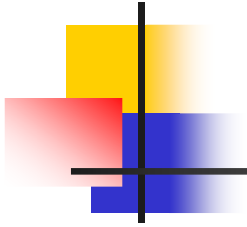
## Documented observation biases:

- Human sensitivity to vocalization and extreme behaviors.
- Lameness evaluation:
  - Affected by joint
  - Severely subject to observer bias
  - Owner evaluation subject to placebo effect
- Caretaker expectation of perceived pain



# Sudden Change in Behavior



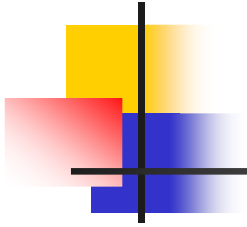


# Options for Evaluation

1. Simple Descriptive Scale
2. Numerical Rating Scale
3. Composite Scale
4. Visual Analog Scale

(Evaluations by owners, veterinarians & staff)

*Other pain scales have been developed and should be considered*





The use of pain scores in animals is more complex than in humans. <sup>5</sup> The use of single signs of pain such as facial expressions may lead to erroneous conclusions.



*( Same Scale as Used in Animal Pain Scoring? )*  
Additional behavioral information is required  
for complete assessment.

# Pain Scales: Numerical Rating Scale (NRS)

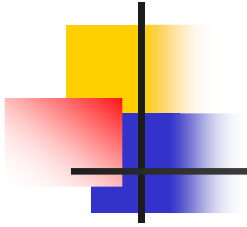
- Scale of 0-10 based on 0 is no pain and 10 is worst possible pain

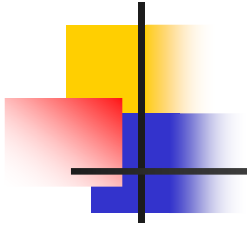


# Pain Scales: Composite Numerical Rating Scale

Composite Scores in this Study Include the Following:

Observation	Score	Criteria
Vocalization	0	No vocalizing
	1	Vocalizing, responds to calm voice & stroking
	2	Vocalizing, does not respond to calm voice & stroking
Movement	0	None
	1	Frequent position changes
	2	Thrashing
Agitation	0	Asleep or calm
	1	Mild agitation
	2	Moderate agitation
	3	Severe agitation





# University of Melbourne Pain Scale

## Physiologic Data

Category	Descriptor	Score
a)	Physiologic data within reference range	0
b)	Dilated Pupils	2
c) <i>Choose only 1</i>	Percentage increase in respiratory rate relative to preprocedural rate	
	> 20%	1
	> 50%	2
	> 100%	3
d)	Rectal temperature exceeds reference range	1
e)	Salivation	2

# Osteoarthritis Scale

Based on Study of Pain associated with Canine Hip Displasia<sup>9</sup>

Question Topic	Range for Dogs with CHD
Locomotion	
Walking	0-3
Trotting	0-4
Galloping	0-4
Jumping	0-4
Laying down	0-4
Getting up	0-4
Difficulty moving after rest	0-4
Difficulty moving after major activity	1-4

# Osteoarthritis Scale

Based on Study of Pain associated with Canine Hip Displasia<sup>9</sup>

Chronic pain index was a sum of 19 or more on the following 11 questions:

Question Topic	Range for Dogs with CHD
Positive Behavior	
Mood	0-3
Play & games	0-4
Negative behavior	
Vocalization (audible complaining)	0-3



# Pain Scales: Visual Analog Scale (VAS)

- Use of the VAS to evaluate pain management  
Scale of no pain to worst pain ever, 0-100 mm



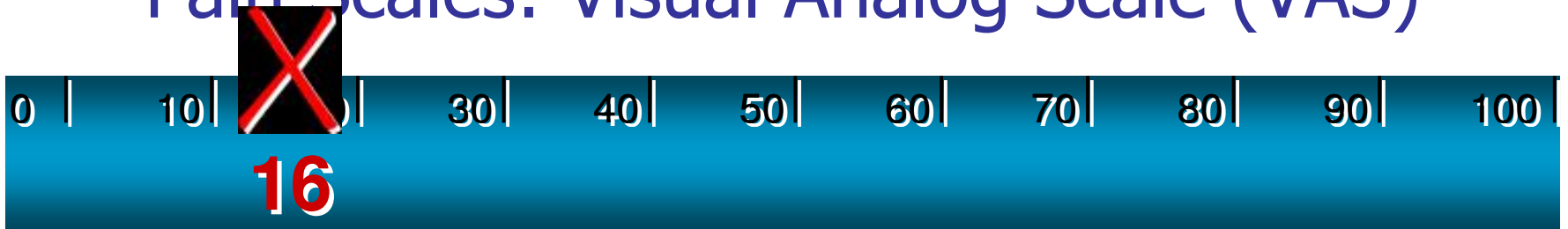
# Pain Scales: Visual Analog Scale (VAS)



Animal with pain requiring treatment



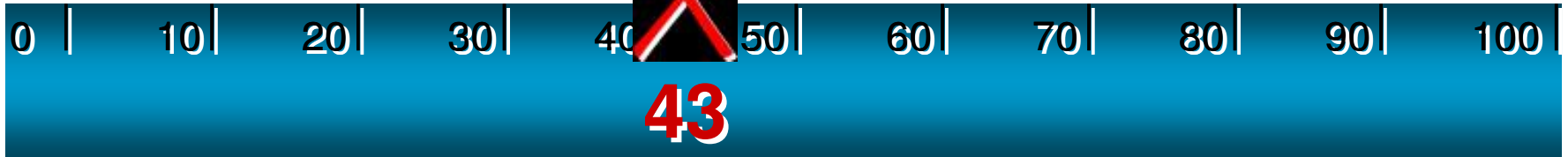
# Pain Scales: Visual Analog Scale (VAS)



Evaluation after treatment



# Pain Scales: Visual Analog Scale (VAS)



Post-treatment. Pain is returning, TIME TO REDOSE.



- There are species-specific variations in the reliability of the behaviors or indicators of pain
- Behavioral differences may be observed when the patient is removed from its normal environment
- Client / owner input should be considered
- Reassessment after treatment should be made by the same individual



# Analgesic Therapies Available:

---

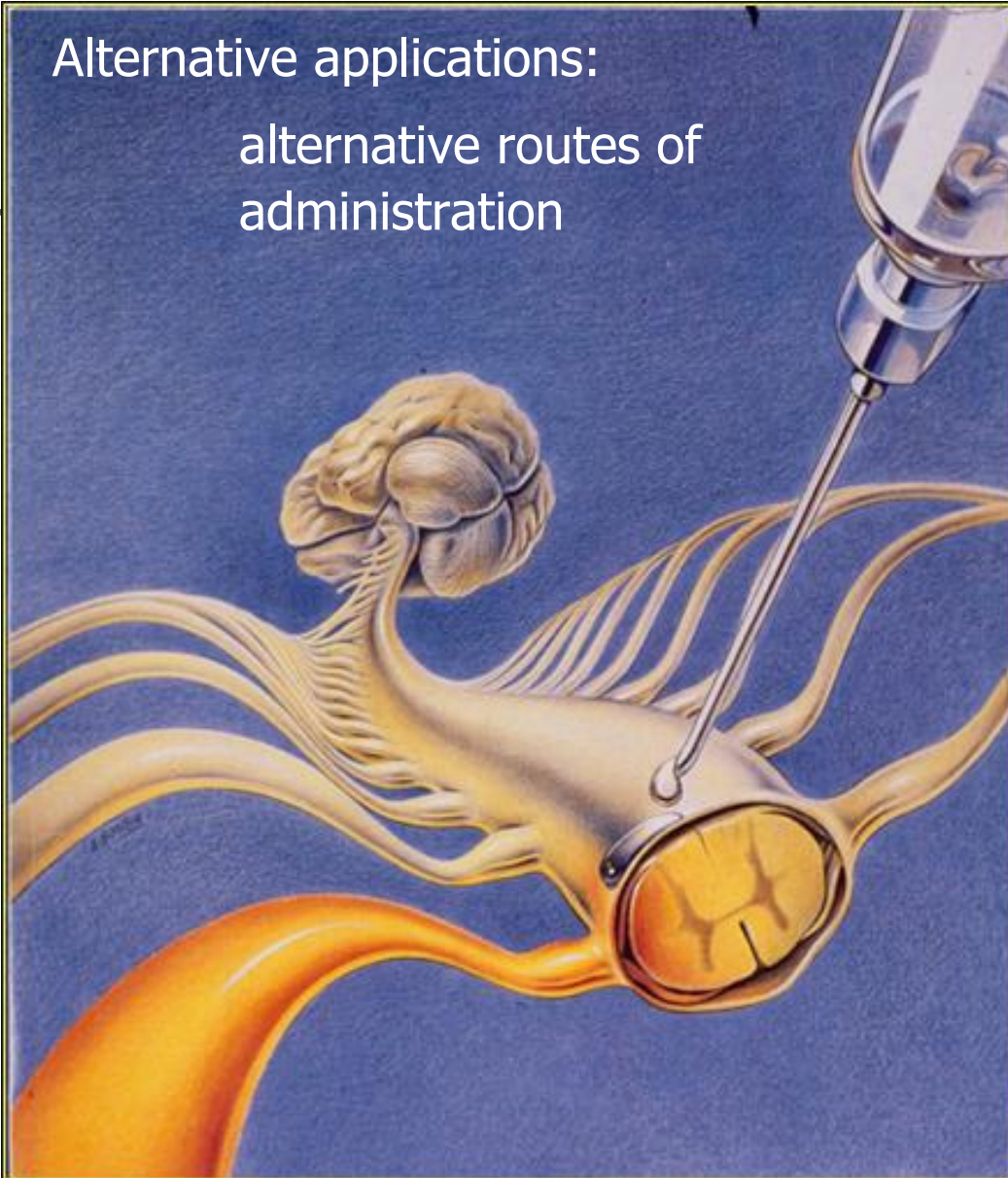
- Thorough Nursing Care
- Alteration of the Environment
- Distraction and Relaxation Technique
- Opioids
- Local or Regional Anesthesia
- Alpha-2 Agonist
- Others

# Principles in Pain Management

1. Preemptive analgesia
2. Balanced analgesia
3. Dose to effect



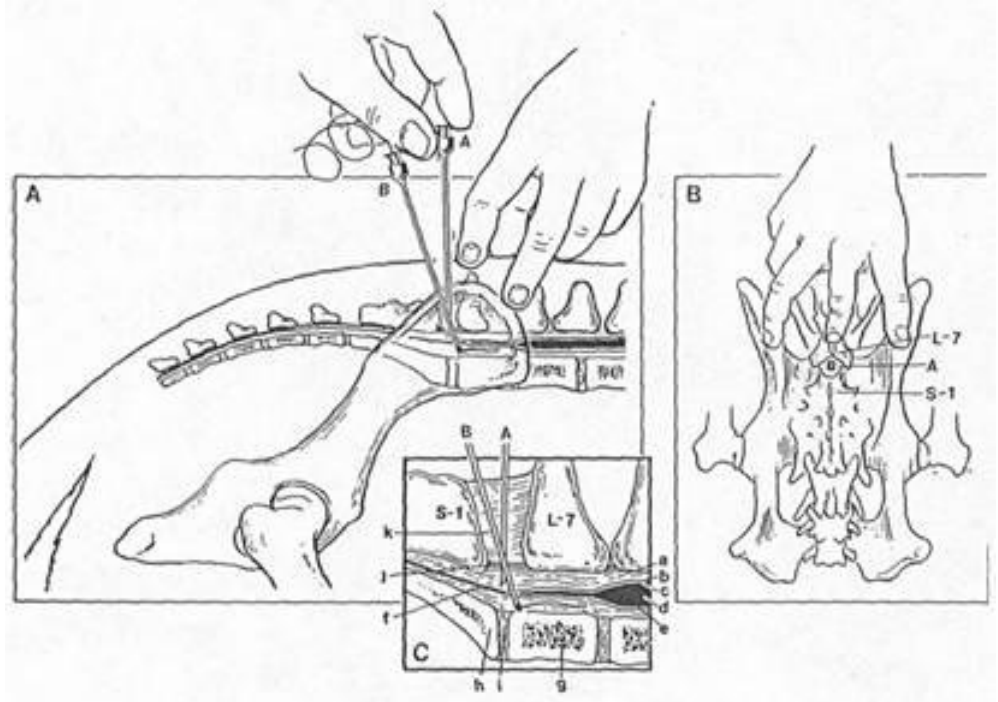
Alternative applications:  
alternative routes of  
administration





# Epidural morphine

- Powerful and sustained analgesia
- Effective throughout the body
- Technically easy
- Cost effective
- Numerous benefits



# Neuroaxial Analgesia:

- 12-24 hours of substantial analgesia
- Decreased “Stress response”
- Epidural Morphine
  - Duramorph (preservative free)
  - Morphine USP
- Bupivacaine or Lidocaine (with volume expansion)



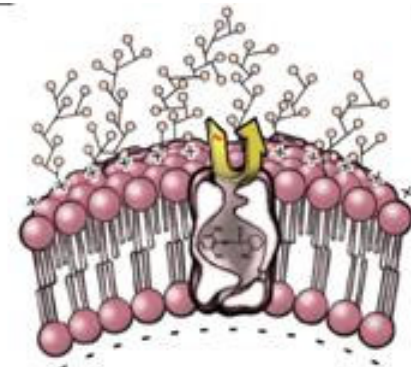
# Fentanyl (Duragesic) Patches

- Consistent (basal) level of strong opioid analgesia (3-5 days)
- Many veterinary applications
- Strictly “off-label”
- Precautions important
- Alternatives: CRI fentanyl or sustained release oral morphine



# Advances in Local Anesthetics:

- Drugs used:
  - Lidocaine
  - Bupivacaine, Ropivacaine
  - Articaine
- Applications:
  - Regional, Specific Nerve Blocks, Infiltration
  - Neuroaxial
    - Epidural, Spinal
  - Intravenous (Lidocaine C.R.I.)
- Locals can be very cheap and effective!



Representation of local anaesthetic binding to the sodium channel



## Lidocaine CRI (constant rate infusion)

---

- Analgesic contribution and reduction in anesthetic requirements
- Reduced inhalant anesthetic requirement improves blood pressures
- Prokinetic
- Possible anti-inflammatory contribution
- Very cost-effective analgesic contribution to opioid analgesics.



# Lidocaine CRI (constant rate infusion)

---

- Loading dose 1-2 mg/kg by slow IV injection over three minutes. Constant Rate Infusion at 50-100 micrograms/kg/minute (0.05-0.1 mg/kg/min) by syringe pump or by controlled drip.
- Easy set-up method: 68 cc of 2% lidocaine added to liter bag of IV fluid, administered at 1 cc/pound/hour will provide 50 micrograms/kg/min. Reduce or discontinue if clinical signs of intolerance or overdose occur: nausea, CNS stimulation (twitching or seizures).



# Analgesic CRI (constant rate infusion)

---

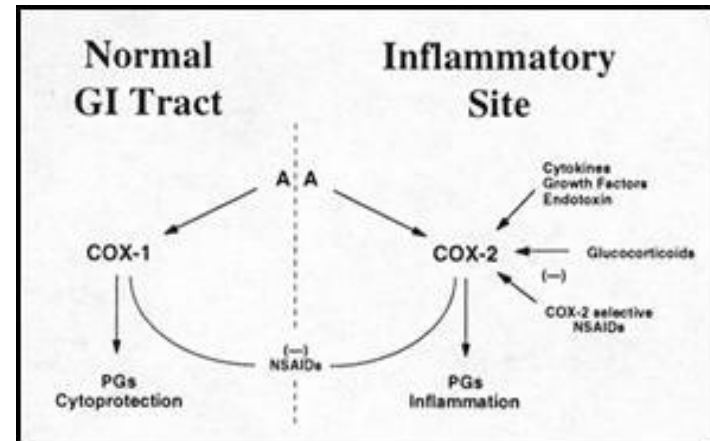
Other CRI options for analgesia:

- Low-dose ketamine
- Fentanyl
- Morphine
- Combinations of analgesics

# Advances in NSAID's:

- Aspirin
- Phenylbutazone
- Ketoprofen
- Carprofen
- Etodolac
- Deracoxib
- Meloxicam
- Previcox
- Other NSAID's
- (Acetaminophen)

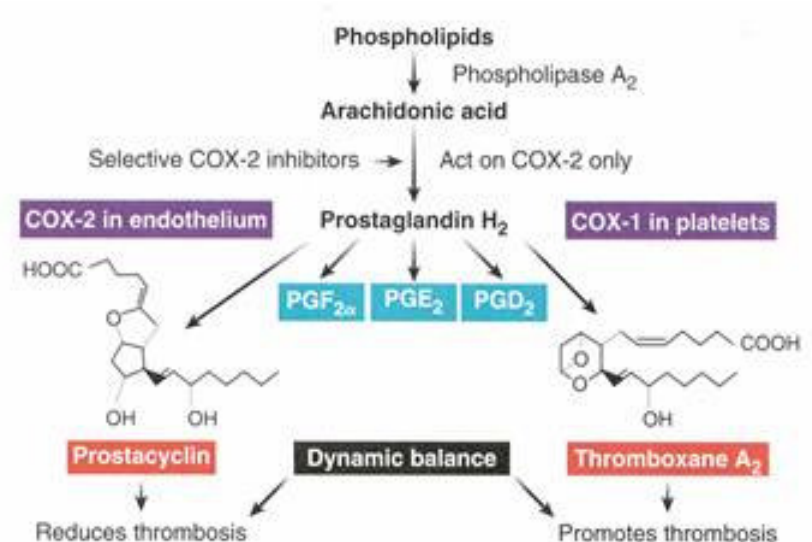
Recognition of additional actions...





# Advances in NSAID's:

- Recognition of tremendous individual patient variability in efficacy AND safety of various NSAID's, and it changes!
- Skill in application and management
- Management of toxicities
  - Cox-2 selectivity
  - Cytoprotective measures
  - Dual pathway Cox/Lox
- Paradigm shift regarding NSAID toxicity?





## Perioperative Dosages for Some NSAID's:

---

### Deracoxib (Deramaxx)

Dogs: 1-2 mg/kg/day

Flavored tablets, Cox-2 selective

Varied opinions on safety



### Tepoxalin (Zubrin)

Dogs 10–20 mg/kg on day 1, then 10 mg/kg/day

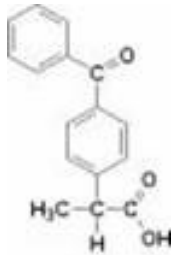
Redi-Tab rapidly disintegrating oral tablets

“Dual-Pathway” Cox/Lox action



# Perioperative Dosages for Some NSAID's:

## Ketoprofen (Ketofen, Anafen, Orudis-KT)



Dogs 2.0 mg/kg IV, SC, IM, Cats 2.0 mg/kg SC once. Repeat 1.0 mg/kg/24h x five days then reassess with reduction of dosing for prolonged use.

## Meloxicam (Metacam, Mobic)



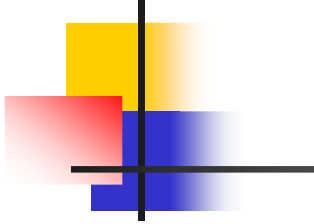
Dogs 0.2 mg/kg IV, SC, PO to start, then 0.1 mg/kg q 24h.  
Cats 0.1 mg/kg IV, SC, PO q 24h. Therapeutic index is narrow.  
Limit duration of treatment. Cat dose is lower than FDA approved.



## Perioperative Dosages for injectable NSAID's:

---

- Carprofen (Rimadyl, Zenecarp)  
Dogs 4.0 mg/kg upon induction, 2.2 mg/kg q24h IV, SC. Or 2.2 mg/kg q12h if required. Cats 4.0mg/kg SC once.
- Ketoprofen (Ketofen, Anafen, Orudis-KT)  
Dogs 2.0 mg/kg IV, SC, IM, Cats 2.0 mg/kg SC once. Repeat 1.0 mg/kg/24h x five days then reassess with reduction of dosing for prolonged use
- Meloxicam (Metacam, Mobicox, Mobic)  
Dogs 0.2 mg/kg IV, SC to start, then 0.1 mg/kg q 24h.  
Cats 0.1 mg/kg (a lower dose than FDA approval is advised) followed by 0.1 mg/kg q 24h for 2-3 days has proved to be efficacious and safe, however the therapeutic index is narrow.



# Case Studies

- Polytrauma
- Multiple Fractures, etc.



# Case Studies

---

- Total Ear Canal Ablation



# Case Studies

- Thoracotomy





# Case Studies

- Evisceration –  
Gored by a  
“Pet” Boar!
- Massive trauma,  
sepsis, shock





# Principles in Pain Management

---

1. Preemptive analgesia
2. Balanced analgesia
3. Dose to effect



