



Pain Physiology and Anatomy

Learning Objectives:

- Be familiar with the primary neurotransmitters involved in modulation of pain.
- Be familiar with the primary receptors involved in modulation of pain.
- Be familiar with the different types of nociceptors and the types of pain they transmit.
- Be able to explain central sensitization at the cellular level.
- Be able to explain peripheral sensitization at the cellular level.
- Be familiar with the physiologic consequences of pain.
- Know the basic anatomy of the nervous system.
- Be familiar with the receptors involved in the physiology of pain.
- Understand the pain pathways.
- Understand how neurons function.
- Be able to explain changes that occur in the spinal cord with chronic pain.
- Be familiar with the 'gate control theory'.

References:

- Fox SM. Chronic Pain in Small Animal Medicine. 2010.
- Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009.
- Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007.
- Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173- 1186
- Matthews KA. "Neuropathic pain in dogs and cats: If only they could tell us if they hurt" VCNA 2008;39(6):1365-1414

Pain Physiology and Anatomy (25 questions)

Weight for exam: 20/100 questions

PHYSIOL&ANATOMY 001

Which of the following substances inhibits excitatory synaptic transmission in the spinal cord?

- A. substance P
- B. glutamate
- C. nerve growth factor
- D. gamma-aminobutyric acid (GABA)

Answer: D

Learning Objectives: Know the primary neurotransmitters involved in modulation of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 002

Which of the following nerve fibers usually mediate nociception that is interpreted as sharp, easily localized pain?

- A. A-alpha
- B. A-beta
- C. A-delta
- D. C

Answer: C

Learning Objectives: Be familiar with the different types of nociceptors and the types of pain they transmit.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 003

Which of the following neurotransmitters is central to the process of sensitization within the dorsal horn of the spinal cord?

- A. glycine
- B. glutamate
- C. serotonin
- D. norepinephrine

Answer: B

Learning Objectives: Be able to explain central sensitization at the cellular level.

References: Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008; 38(6):1173- 1186 Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 004

Which of the following contributes to central sensitization of the dorsal horn?

- A. rapid input from A-alpha fibers
- B. repeated input from C fibers
- C. stimulation of gamma-aminobutyric acid receptors
- D. microglial inactivation

Answer: B

Learning Objectives: Be able to explain central sensitization at the cellular level.

References: Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. Chapter 3; Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2; Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173- 1186

PHYSIOL&ANATOMY 005

Which of following compounds does **NOT** contribute to the development of primary hyperalgesia?

- A. substance P
- B. cytokines
- C. glutamate
- D. bradykinin

Answer: C

Learning Objectives: Be able to explain peripheral sensitization at the cellular level.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

Lamont LA.; "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173- 1186



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 006

Which of the following patterns of plasma concentrations describes the neurohumoral response (stress response) associated with pain?

- A. increased adrenocorticotropin hormone, cortisol, antidiuretic hormone, catecholamines, aldosterone, renin, angiotensin II, and glucose; decreased insulin and testosterone
- B. decreased adrenocorticotropin hormone, cortisol, antidiuretic hormone, catecholamines, aldosterone, renin, angiotensin II, and glucose; increased insulin and testosterone
- C. increased adrenocorticotropin hormone, cortisol, antidiuretic hormone, catecholamines, aldosterone, renin, angiotensin II, and glucose; no changes in insulin and testosterone
- D. decreased adrenocorticotropin hormone, cortisol, antidiuretic hormone, catecholamines, aldosterone, renin, angiotensin II, and glucose; no change in insulin and testosterone

Answer: A

Learning Objectives: Be familiar with the physiologic consequences of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 3

PHYSIOL&ANATOMY 007

What transmits nociception and tactile information on the head?

- A. trigeminal system
- B. limbic system
- C. spinocervicothalamic tract
- D. hypothalamus

Answer: A

Learning Objectives: Know the basic anatomy of the nervous system.

References: Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. Chapter 3

PHYSIOL&ANATOMY 008

How are most C fiber nociceptors characterized?

- A. high threshold mechanoreceptors
- B. low threshold chemoreceptors
- C. low threshold, thermal-mechanical receptors
- D. high threshold, polymodal receptors

Answer: D

Learning Objectives: Be familiar with the receptors involved in the physiology of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 009

Activation of the autonomic nervous system initiated by stress can result in all of the following EXCEPT:

- A. tachycardia
- B. miosis
- C. hypertension
- D. tachypnea

Answer: B

Learning Objectives: Be familiar with the physiologic consequences of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 3



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 010

Which of the following pair of chemical messengers modulates and inhibits excitatory sensory input to the spinal cord?

- A. GABA and glycine
- B. mGluR and NO
- C. KAI and AMPA
- D. NK and ATP

Answer: A

Learning Objectives: Be familiar with the primary receptors involved in modulation of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 011

All of the following may contribute to central sensitization EXCEPT:

- A. there is an increased excitability of dorsal horn neurons
- B. Mg²⁺ ion block is removed from N-methyl-D-aspartate (NMDA) receptors
- C. glial cells are inactivated
- D. input by A-beta fiber mechanoreceptors generates pain

Answer: C

Learning Objectives: Be able to explain central sensitization at the cellular level.

References: Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1

Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173- 1186; Matthews KA. "Neuropathic pain in dogs and cats: If only they could tell us if they hurt" VCNA 2008;39(6):1365-1414

PHYSIOL&ANATOMY 012

Which of the following structures are located in the dorsal horn?

- A. projecting neurons, propriospinal neurons, local interneurons.
- B. neuron cell bodies, ganglia and nuclei.
- C. axons, autonomic neurons.
- D. sensory neurons, motor neurons and interneurons.

Answer: A

Learning Objectives: Know the basic anatomy of the nervous system.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 013

Neurochemicals that are produced by the cell bodies of the dorsal root ganglion, and are important for signal transmission include all of the following, EXCEPT:

- A. bradykinin
- B. endorphin
- C. substance P
- D. calcitonin gene-related peptide

Answer: A

Learning Objectives: Know the primary neurotransmitters involved in modulation of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 014

Pain can contribute to wound infection, morbidity and mortality by increasing the plasma concentration of which substance?

- A. glucose
- B. glycerol
- C. calcium
- D. sodium

Answer: A

Learning Objectives: Be familiar with the physiologic consequences of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 3

PHYSIOL&ANATOMY 015

What is "projection"?

- A. modification of the nociceptive signal, such that the pain is better identified.
- B. conversion of the nociceptive signal to an electrical signal.
- C. relay of the nociceptive signal to the brain for final processing and awareness.
- D. alteration of the nociceptive signal by the brain to elicit protective motor responses.

Answer: C

Learning Objectives: Understand the pain pathways.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 016

What term is used to describe the minimal stimulus required to elicit a transmitted response from a sensory receptor?

- A. action potential.
- B. dermatome.
- C. nociceptor.
- D. threshold.

Answer: D

Learning Objectives: Understand how neurons function.

References: Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1

PHYSIOL&ANATOMY 017

The term "vanilloid" refers to a group of substances related structurally and pharmacologically to:

- A. vanilla
- B. tetrodotoxin
- C. opioids
- D. capsaicin

Answer: D

Learning Objectives: Know the primary neurotransmitters involved in modulation of pain.

References: Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1; Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 018

What is “transduction”?

- A. converting the signal into an awareness of a pain.
- B. relaying a nociceptive signal to the brain.
- C. converting a noxious stimulus into an electrical signal.
- D. relaying a noxious stimulus to the spinal cord.

Answer: C

Learning Objectives: Understand the pain pathways.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 019

Which two regions of the brain participate in integration of descending inhibition?

- A. periaqueductal grey area and rostral ventromedial medulla.
- B. corpus callosum and thalamus.
- C. hippocampus and amygdala
- D. lateral ventricle and hippocampus.

Answer: A

Learning Objectives: Understand the pain pathways.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 020

What is the importance of glial cells in the physiology of pain?

- A. they release proinflammatory cytokines
- B. they block NMDA receptors
- C. they relay sensory information from the spinal cord to the brain
- D. they generate action potentials to facilitate transmission of nociception

Answer: A

Learning Objectives: Be able to explain changes that occur in the spinal cord with chronic pain.

References: Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1

PHYSIOL&ANATOMY 021

The details of the original ‘gate control theory’ have been shown to be inaccurate. However, the basic concept is still helpful. What is the best description of this concept?

- A. Nonnoxious tactile stimulus can inhibit transduction of A-delta and C pain fibers.
- B. Nonnoxious tactile stimulus can cause modulation of nociceptive information in the spinal cord.
- C. Nonnoxious tactile stimulus can cause a distraction to impair pain perception in the brain.
- D. Nonnoxious tactile stimulus of superficial tissues can block sensation by the deeper tissues.

Answer: B

Learning Objectives: Understand the pain pathways.; Be familiar with the ‘gate control theory’.

References: Fox SM. Chronic Pain in Small Animal Medicine. 2010. Chapter 1; Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2



CVPP Learning Outcomes & Sample Questions

PHYSIOL&ANATOMY 022

Pain causes a biologic stress response, particularly if the pain is severe or chronic. Which of the following is NOT a component of the chronic stress response?

- A. increase in lipolysis
- B. increase in protein catabolism
- C. decreased cellular immune response
- D. decreased release of antidiuretic hormone (ADH)

Answer: D

Learning Objectives: Be familiar with the physiologic consequences of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 3

PHYSIOL&ANATOMY 023

What is neuropraxia?

- A. pain due to peripheral nerve injury
- B. loss of conduction of a nerve
- C. abnormal signals are sent by a nerve
- D. anatomical disruption of a nerve

Answer: B

Learning Objectives: Know the types of peripheral nerve injury

References: Unknown

PHYSIOL&ANATOMY 024

With regard to nociception, which of the following statements is FALSE?

- A. C fibers transmit information relatively slowly
- B. A-delta fibers are associated with the initiation of pain
- C. A-beta fibers contain "silent" nociceptors
- D. A-alpha fibers primarily transmit innocuous mechanical stimulation

Answer: C

Learning Objectives: Be familiar with the receptors involved in the physiology of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2

PHYSIOL&ANATOMY 025

Which of the following is a characteristic of A-delta fibers?

- A. unmyelinated
- B. primarily low-threshold mechanoreceptors
- C. associated with sharp, pricking sensation
- D. activated before other nociceptors with acute trauma

Answer: C

Learning Objectives: Be familiar with the receptors involved in the physiology of pain.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 2



CVPP Learning Outcomes & Sample Questions

Pharmacology

Learning Objectives:

- Understand the basic principles of pharmacokinetics: drug bioavailability, metabolism (first pass effect), drug excretion, mechanisms of renal excretion
- Understand the basic principles of pharmacodynamics: agonist /antagonist drug related receptor action, intrinsic activity, efficacy, potency, therapeutic index, etc.
- Understand the pharmacology of epidural drugs
- Be familiar with the classes of drugs used to treat pain i.e. opioids, NSAIDs, alpha-2 agonists, local anesthetics.
- Be able to compare the mechanism of action, potency, routes of administration, and duration of action of commonly used opioid drugs.
- Be familiar with opioid use for pregnancy.
- Know the potential side effects of opioids, including species specific effects in cats (hyperthermia, mydriasis) and dogs (histamine release)
- Know how to reverse effects of opioids.
- Be familiar with the potential side effects of NSAIDs and how to mitigate adverse events
- Understand the implications of COX-1 and COX-2 inhibition.
- Be familiar with the alpha-2 agonists, including potential side effects.
- Be familiar with the local anesthetics: mechanism of action and side effects
- Be familiar with the potential side effects of systemic use of local anesthetic drugs
- Know the potential side effects of various drug: alpha2 agonists, hydromorphone and morphine are associated with increased incidence of vomiting
- Be familiar with adjunctive analgesics, e.g. NMDA antagonists, gabapentin, amitriptyline, bisphosphonates, capsaicin, etc.
- Know which drugs are NMDA antagonists
- Know the indications for adjuvant use of ketamine.
- Be familiar with amantadine and its potential side effects.
- Know the mechanism of action of amantadine.
- Be familiar with gabapentin and its proposed mechanism of action.
- Know the mechanism of action of amitriptyline
- Be familiar with the bisphosphonates and indications for use.
- Know the mechanism of action of tramadol, and possible drug interactions
- Understand the limitations of inhalant anesthetic agents
- Know the indications of various drugs: ketamine is beneficial for somatic pain; alpha 2 agonists for visceral
- Know some strategies for treating neuropathic pain.
- Understand the concept of preemptive analgesia
- Know which drugs are most effective for perioperative pain management.
- Know the appropriate analgesics for neonates.
- Understand central sensitization and its interventions



CVPP Learning Outcomes & Sample Questions

References:

- Fox SM. Chronic Pain in Small Animal Medicine 2010
- Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009.
- Tranquilli WJ, Thurmon JC, Grimm KA. Lumb and Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007.
- Dyson DH. "Analgesia and chemical restraint for the emergent veterinary patient" VCNA 2008(6):1329-1352
- Dyson DH. "Perioperative pain management in veterinary patients" VCNA 2008;38(6):1309-1327.
- Gaynor JS. "Control of cancer pain in veterinary patients" VCNA 2008;38(6):1429-1448
- Gendler A, Brouman JD, Graf KE. "Canine dystocia: Medical and surgical management" Compendium 2007;29(9):551-563
- Johnston SA, McLaughlin RM, Budsberg SC. "Nonsurgical management of osteoarthritis in dogs" VCNA 2008;38(6):1449-1470.
- Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173-1186.
- Lamont LA. "Adjunctive analgesic therapy in veterinary medicine" VCNA 2008;38(6):1187-1203
- Mathews KA. "Pain management for the pregnant, lactating, and neonatal to pediatric cat and dog" VCNA 2008;38(6):1291-1308.
- Papich MG. "An update on nonsteroidal anti-inflammatory drugs (NSAIDs) in small animals" VCNA 2008;38(6):1243-1266.
- Shaffran N. "Pain management: The veterinary technician's perspective" VCNA SAP 2008;38(6) p 1423
- Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230.

Pharmacology (42 questions)

Weight for exam: 20/100 questions

PHARMACOLOGY 001

You are involved in an emergency cesarean section. The bitch was given an anticholinergic, fentanyl, propofol, and sevoflurane. You are now examining the puppies, who are not very active or responsive. What would be most beneficial for the puppies?

- A. give one or two drops of naloxone sublingually
- B. rub and swing vigorously until they vocalize
- C. give one or two drops of doxapram sublingually
- D. give flumazenil in the umbilical vein

Answer: A

Learning Objectives: Be familiar with opioid use for pregnancy.; Know how to reverse effects of opioids.

References: Tranquilli WJ, Thurmon JC, Grimm KA. Lumb and Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. Chapter 45; Gendler A, Brouman JD, Graf KE. "Canine dystocia: Medical and surgical management" Compendium 2007;29(9):551-563; Mathews KA. "Pain management for the pregnant, lactating, and neonatal to pediatric cat and dog" VCNA 2008;38(6):1291-1308.

PHARMACOLOGY 002

Ketamine is often used at microdoses (much lower than dose for anesthesia or chemical restraint). Which of the following statements regarding the use of microdoses of ketamine is FALSE?

- A. Intraoperative use can decrease postoperative anesthetic requirements.
- B. It is often associated with behavioral changes.
- C. When used alone, it does not have any analgesic effect.
- D. It blocks NMDA receptors in the spinal cord.

Answer: B

Learning Objectives: Know the indications for adjuvant use of ketamine.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 003

The efficacy of some drugs has not been established in animals, but indications for use have been extrapolated from humans. Which of the following would be the best additions to a multimodal treatment plan for neuropathic pain?

- A. clonidine and prednisone
- B. diazepam and tramadol
- C. gabapentin and amantadine
- D. carprofen and acepromazine

Answer: C

Learning Objectives: Know some strategies for treating neuropathic pain.

References: Fox SM. Chronic Pain in Small Animal Medicine 2010 Chapter 4; Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

PHARMACOLOGY 004

What is the “therapeutic index” of a drug?

- A. a measure of the likelihood to induce a therapeutic effect in 50% of treated animals
- B. a measure of the likelihood that a drug will cure an animal
- C. the dose of drug required to produce a specific effect in 50% of treated animals
- D. a measure of the margin of safety of a drug

Answer: D

Learning Objectives: Understand the basic principles of pharmacokinetics and pharmacodynamics

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7

PHARMACOLOGY 005

Which of the following agents is **LEAST** effective in inducing preemptive analgesia?

- A. mu opioid agonists
- B. inhalant anesthetic agents
- C. alpha adrenergic agonists
- D. local anesthetics

Answer: B

Learning Objectives: Understand the concept of preemptive analgesia.; Understand the limitations of inhalant anesthetic agents

References: Tranquilli WJ, Thurmon JC, Grimm KA. Lumb and Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. P 376

PHARMACOLOGY 006

Which of the following statements regarding the absorption and distribution of epidural drugs is FALSE?

- A. lipophilic drugs tend to have a faster onset of analgesia than hydrophilic drugs
- B. hyperbaric (high specific gravity) drugs tend to have more rostral spread than hyperbaric or isobaric drugs
- C. lipophilic drugs tend to have less rostral spread compared to more hydrophilic drugs
- D. lipophilic drugs tend to have a shorter analgesic effect than hydrophilic drugs

Answer: B

Learning Objectives: Understand the pharmacology of epidural drugs

References: Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 007

Which is correct when comparing the characteristics of buprenorphine and morphine when given systemically in dogs?

- A. morphine is more efficacious than buprenorphine
- B. morphine is more potent than buprenorphine
- C. morphine is more lipophilic than buprenorphine
- D. morphine has a longer duration than buprenorphine

Answer: A

Learning Objectives: Understand the basic pharmacologic terminology (efficacy, potency, therapeutic index, etc.); Be able to compare the mechanism of action, potency, and duration of action of commonly used opioid drugs.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7 & 9; Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230.

PHARMACOLOGY 008

Which of the following compounds is an NMDA receptor antagonist?

- A. fentanyl
- B. xylazine
- C. methadone
- D. zolazepam

Answer: C

Learning Objectives: Know which drugs are NMDA antagonists

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 9

PHARMACOLOGY 009

Which of the following factors are considered when estimating the duration of action of epidurally administered opioids?

- A. drug pKa
- B. amount of renal function
- C. drug lipid solubility
- D. integrity of the blood-brain barrier

Answer: C

Learning Objectives: Understand the pharmacology of epidural drugs

References: Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230

PHARMACOLOGY 010

Which of the following factors affects the clinical efficacy of a drug?

- A. potency
- B. therapeutic index
- C. intrinsic activity
- D. distribution

Answer: C

Learning Objectives: Understand the basic principles of pharmacokinetics and pharmacodynamics

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 011

Which of the following class of drugs is the most effective for managing surgically-induced pain during the first few hours of the post-operative period?

- A. nonsteroidal anti-inflammatory drugs
- B. opioids
- C. benzodiazepines
- D. antiepileptics

Answer: B

Learning Objectives: Know which drugs are most effective for perioperative pain management.

References: Dyson DH. "Perioperative pain management in veterinary patients" VCNA 2008;38(6):1309-1327.

PHARMACOLOGY 012

Which of the following opioids has the greatest potential to cause endogenous histamine release when administered intravenously?

- A. hydromorphone
- B. oxymorphone
- C. morphine
- D. fentanyl

Answer: C

Learning Objectives: Know the potential side effects of opioids.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 9

PHARMACOLOGY 013

Fentanyl is often administered by constant rate infusion (CRI) when it is being used as part of a perioperative pain management protocol. Why is it delivered by CRI?

- A. very large doses are required
- B. it has a very short duration of action
- C. it must be combined with IV fluids
- D. potential for side effects is unacceptable when given by other routes

Answer: B

Learning Objectives: Know the approximate duration of various opioids.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 9

PHARMACOLOGY 014

With regard to gabapentin, which of the following statements is FALSE?

- A. it is thought to inhibit calcium channels that are upregulated during central sensitization
- B. side effects include drowsiness and weight gain
- C. it has low bioavailability because of the 'first pass' effect of hepatic metabolism
- D. it can be given prophylactically to inhibit hyperalgesia related to incisions

Answer: C

Learning Objectives: Be familiar with gabapentin and its proposed mechanism of action.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173-1186; Lamont LA. "Adjunctive analgesic therapy in veterinary medicine" VCNA 2008;38(6):1187-1203



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 015

Amantadine has all of the following characteristics EXCEPT:

- A. anti-viral properties in people
- B. NMDA receptor antagonist
- C. blocks all peripheral nociception
- D. eliminated by renal excretion

Answer: C

Learning Objectives: Be familiar with amantadine and its potential side effects.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14; Lamont LA. "Adjunctive analgesic therapy in veterinary medicine" VCNA 2008;38(6):1187-1203

PHARMACOLOGY 016

You are managing a dog during recovery from a fracture repair surgery. He is very agitated and becomes worse when you touch the affected leg. Which of the following is LEAST likely to benefit the dog?

- A. additional dose of a mu opioid
- B. low dose ketamine
- C. low dose acepromazine
- D. low dose dexmedetomidine

Answer: C

Learning Objectives: Recognize when acepromazine is and is not indicated.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 176.; Dyson DH. "Perioperative pain management in veterinary patients" VCNA 2008;38(6):1309-1327.; Shaffran N. "Pain management: The veterinary technician's perspective" VCNA SAP 2008;38(6) p 1423

PHARMACOLOGY 017

Which of the following compounds has **NOT** been identified as a potential NMDA receptor antagonist?

- A. ketamine
- B. amantadine
- C. methadone
- D. xylazine

Answer: D

Learning Objectives: Be familiar with the NMDA antagonists.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapters 9,11,14

PHARMACOLOGY 018

Which of the following opioids is likely to have the longest duration of analgesia after a single intravenous dose?

- A. fentanyl
- B. morphine
- C. oxymorphone
- D. buprenorphine

Answer: D

Learning Objectives: Know the approximate duration of effect of the opioids.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 9



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 019

Which of the following potential complications of μ -opioid usage occurs in cats, but is rare in dogs?

- A. hyperthermia
- B. bradycardia
- C. miosis
- D. panting

Answer: A

Learning Objectives: Know the side effects of opioids in cats (hyperthermia) and dogs

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 9

PHARMACOLOGY 020

Alendronate acts by which mechanism?

- A. blocks the NMDA receptors
- B. inhibits osteoclastic activity
- C. blocks sodium channels
- D. antagonizes glial cells

Answer: B

Learning Objectives: Be familiar with the indications for alendronate

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 14

PHARMACOLOGY 021

Potential side effects of nonsteroidal anti-inflammatory drug toxicity include all of the following choices **EXCEPT**:

- A. melena
- B. seizures
- C. vomiting
- D. anuria

Answer: B

Learning Objectives: Be familiar with the potential side effects of NSAIDs

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 10

PHARMACOLOGY 022

What is a contraindication for the administration of an alpha-2 agonist?

- A. seizures
- B. fever
- C. glaucoma
- D. cardiac dysfunction

Answer: D

Learning Objectives: Be familiar with the alpha-2 agonists, including potential side effects.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 11



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 023

What is the best definition of “pharmacodynamics”?

- A. the description of how one drug can change the concentration of another drug in the body
- B. the evaluation of the concentration, activity and effect of drugs within the body
- C. explanation of why a patient may need a higher drug dose over time to get the same effect
- D. the study of the absorption, distribution, metabolism and elimination of drugs in the body

Answer: B

Learning Objectives: Understand the basic principles of pharmacokinetics and pharmacodynamics

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7

PHARMACOLOGY 024

What is the best definition of “pharmacokinetics”?

- A. the evaluation of the activity and effect of drugs within the body
- B. the description of the plasma concentration of a drug and its effects
- C. the rate at which a drug binds to the receptors in the body
- D. the study of the absorption, distribution, metabolism and elimination of drugs

Answer: D

Learning Objectives: Understand the basic principles of pharmacokinetics and pharmacodynamics

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7

PHARMACOLOGY 025

Which of the following therapies would be the best choice to add to a multimodal pain management protocol, with the intent to prevent central sensitization?

- A. low dose of ketamine CRI (constant rate infusion)
- B. morphine epidural
- C. low dose of dexmedetomidine CRI
- D. sedating dose of medetomidine given IV or IM

Answer: A

Learning Objectives: Understand central sensitization and its interventions

References: Lamont LA. “Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies” VCNA 2008;38(6):1173-1186.; Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

PHARMACOLOGY 026

Renal excretion of a substance may include all of the following, EXCEPT:

- A. passive reabsorption
- B. tubular secretion
- C. enterohepatic cycling
- D. glomerular filtration

Answer: A

Learning Objectives: Understand the basic principles of pharmacokinetics: renal excretion

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 027

What is the best reason to avoid oral administration of opioids?

- A. Bioavailability is poor due to 'first pass effect'
- B. Oral opioids are irritating to the stomach
- C. Oral opioids tend to cause gastric reflux
- D. They cause excessive salivation

Answer: A

Learning Objectives: Understand the basic principles of pharmacokinetics: drug bioavailability, first pass effect

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7

PHARMACOLOGY 028

The antinociceptive effect of amantadine is primarily due to which mechanism?

- A. antagonism of NMDA receptors
- B. blockade of magnesium channels
- C. competitive inhibition of substance P
- D. inhibition of L-type calcium channels

Answer: A

Learning Objectives: Know the mechanism of action of amantadine.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

PHARMACOLOGY 029

Tramadol is thought to have several mechanisms of action. Which of the following is NOT attributed to tramadol?

- A. inhibits reuptake of norepinephrine
- B. weak mu receptor agonist
- C. inhibits cyclooxygenase activity
- D. inhibits reuptake of serotonin

Answer: C

Learning Objectives: Know the mechanism of action of tramadol.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

PHARMACOLOGY 030

Which class of analgesics may induce panting in a normal dog?

- A. opioids
- B. alpha-2 adrenergic agonists
- C. nonsteroidal anti-inflammatory drugs
- D. tricyclic antidepressants

Answer: A

Learning Objectives: Know the side effects of opioids.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 9



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 031

Which of the following pair of drugs are both alpha-2 agonists?

- A. xylazine and chlorpromazine
- B. dexmedetomidine and amantadine
- C. medetomidine and xylazine
- D. acepromazine and medetomidine

Answer: C

Learning Objectives: Be familiar with the alpha-2 agonists.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 11

PHARMACOLOGY 032

Which statement is true regarding gabapentin?

- A. it is most effective as an analgesic adjunct
- B. it activates GABA receptors in the spinal cord
- C. it is more effective for dull pain than for sharp pain
- D. it can cause anxiety at high doses

Answer: A

Learning Objectives: Be familiar with the characteristics of gabapentin.

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 14

PHARMACOLOGY 033

Which of the following therapies has been associated with histamine release in dogs?

- A. rapid intravenous administration of morphine
- B. intravenous administration of oxymorphone
- C. rapid intravenous administration of fentanyl
- D. epidural administration of buprenorphine

Answer: A

Learning Objectives: Be familiar with the side effects of opioids

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 9

PHARMACOLOGY 034

Which of the following statements about drug-receptor interactions is correct?

- A. An agonist is a drug that binds to and activates a receptor to elicit a biological effect.
- B. An antagonist is a drug that binds to a receptor and induces a negative biological effect.
- C. A partial agonist is a drug that does not bind to all of the available receptors.
- D. The effect of noncompetitive antagonist drugs can be overcome by greater concentrations of the agonist.

Answer: A

Learning Objectives: Understand the basic principles of pharmacokinetics: agonist /antagonist drug related receptor action

References: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management, 2nd ed. 2009. Chapter 7



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 035

Which of the following drugs may be effective to help prevent gastric ulceration associated with nonsteroidal anti-inflammatory drugs?

- A. misoprostol
- B. cimetidine
- C. omeprazole
- D. sucralfate

Answer: A

Learning Objectives: Be familiar with the potential side effects of NSAIDs and how to mitigate adverse events

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 10; Fox SM. Chronic Pain in Small Animal Medicine 2010 Chapter 5

PHARMACOLOGY 036

Which analgesic class is most suitable for use in the neonatal dog or cat?

- A. nonsteroidal anti-inflammatory drugs (NSAIDs)
- B. benzodiazepines
- C. tricyclic antidepressants
- D. opioids

Answer: D

Learning Objectives: Know the appropriate analgesics for neonates.

References: Mathews KA. "Pain management for the pregnant, lactating, and neonatal to pediatric cat and dog" VCNA 2008;38(6):1291-1308.

PHARMACOLOGY 037

Why is intravenous lidocaine contraindicated in cats?

- A. it can precipitate seizures
- B. it is cardiotoxic
- C. it predisposes to renal failure
- D. it is associated with respiratory depression

Answer: B

Learning Objectives: Be familiar with the potential side effects of systemic use of local anesthetic drugs

References: Fox SM. Chronic Pain in Small Animal Medicine 2010 Chapter 4

PHARMACOLOGY 038

What is the primary mechanism by which lidocaine and bupivacaine provide local analgesia?

- A. desensitize the transient receptor potential (TRP) ion channels in peripheral nociceptors
- B. block sodium channels, thus inhibiting action potentials along A-delta and C fibers
- C. inhibit calcium influx, thus reducing the release of excitatory transmitter substances
- D. enhance potassium efflux, causing hyperpolarization to inhibit conduction in C fibers

Answer: B

Learning Objectives: Know the mechanism of action of local anesthetic drugs

References: Lamont LA. "Multimodal pain management in veterinary medicine: The physiologic basis of pharmacologic therapies" VCNA 2008;38(6):1173-1186.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY 039

When planning anesthesia a dog with a suspected esophageal obstruction, which of the following premedications would be safest?

- A. dexmedetomidine
- B. hydromorphone
- C. morphine
- D. butorphanol

Answer: D

Learning Objectives: Know the potential side effects of various drug: alpha2 agonists, hydromorphone and morphine are associated with increased incidence of vomiting

References: Dyson DH. "Analgesia and chemical restraint for the emergent veterinary patient" VCNA 2008(6):1329-1352

PHARMACOLOGY 040

After surgical repair of a femoral fracture, which of the following would be the most effective analgesic to use in conjunction with a constant rate infusion (CRI) of methadone?

- A. low dose CRI of dexmedetomidine
- B. transmucosal buprenorphine
- C. low dose CRI of ketamine
- D. transdermal fentanyl

Answer: C

Learning Objectives: Know the indications of various drugs: ketamine is beneficial for somatic pain; alpha 2 agonists for visceral

References: Gaynor JS. "Control of cancer pain in veterinary patients" VCNA 2008;38(6):1429-1448

PHARMACOLOGY 041

Which of the following statements regarding the use of nonsteroidal anti-inflammatory drugs (NSAIDs) in dogs is true?

- A. NSAIDs have similar risk of gastrointestinal and renal side effects, regardless of their COX1:COX2 inhibitory ratio (excluding aspirin)
- B. COX-2-specific NSAIDs are more effective analgesics for osteoarthritis as compared to NSAIDs that are less specific for COX-2
- C. prior hepatic disease predisposes a dog to NSAID-induced liver injury
- D. there is scientific evidence to support a 'wash-out' period when switching to a different NSAID (excluding aspirin)

Answer: A

Learning Objectives: Understand the implications of COX-1 and COX-2 inhibition.

References: Papich MG. "An update on nonsteroidal anti-inflammatory drugs (NSAIDs) in small animals" VCNA 2008;38(6):1243-1266; Johnston SA, McLaughlin RM, Budberg SC. "Nonsurgical management of osteoarthritis in dogs" VCNA 2008;38(6):1449-1470.

PHARMACOLOGY 042

If a dog is being given tramadol as part of a multimodal pain management plan, which of the following drugs should be avoided?

- A. etodolac
- B. gabapentin
- C. amantadine
- D. amitriptyline

Answer: D

Learning Objectives: Know the mechanism of action of tramadol, and possible drug interactions

References: Johnston SA, McLaughlin RM, Budberg SC. "Nonsurgical management of osteoarthritis in dogs" VCNA 2008;38(6):1449-1470.



Pharmacologic Delivery Techniques

Learning Objectives:

- Know the potential side effects of epidural analgesia.
- Know the drugs that can be used for epidural analgesia, and potential side effects.
- Know the indications and contraindications for epidural analgesia.
- Know expected duration of various systemic analgesic drugs.
- Know the onset and duration of fentanyl patches in dogs and cats.
- Know specific drugs used for local anesthesia.
- Know the indications for various local and regional blocks.
- Know the technique and indications for dental nerve blocks in small animals.
- Know the indications and potential complications of paravertebral block
- Know which medications are used intraarticularly, and their mechanism of action.
- Know the anatomical landmarks for performing an epidural.
- Understand the use of intraarticular corticosteroids
- Know the various routes of administration of morphine.
- Know how local anesthetics affect the nerves
- Understand the appropriate use of a fenestrated catheter for local anesthetic infusion
- Know how to use oral transmucosal drugs

References:

- Fox SM. Chronic Pain in Small Animal Medicine; 2010, pg 116
- Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009.
- Grant D. Pain Management in Small Animals; 2006.
- Tranquilli WJ, Lamont LA, Grimm KA. Pain Management, 2nd ed 2004
- Lemke and McCreighton "Paravertebral Blockade of the Brachial Plexus in Dogs" VCNA SAP 2008;38(6), pg 1237
- Robertson S. "Managing pain in feline patients" VCNA SAP 38(6) p 1274
- Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230.
- van Weeren and de Grauw. "Pain in osteoarthritis" VCNA EP 2010;26(3): 633

Pharmacologic Delivery Techniques (local, regional, epidural, CRI, stem cell) (24 questions)

Weight for exam: 20/100 questions

PHARMACOLOGY/DELIVERY 001

Which of the following drugs, administered as an epidural, would be LEAST likely to result in hind limb weakness?

- A. morphine
- B. xylazine
- C. lidocaine
- D. bupivacaine

Answer: A

Learning Objectives: Know the side effects of epidural analgesia.; Know the various drugs used for epidural analgesia.

References: Valverde A. "Epidural analgesia and anesthesia in dogs and cats" VCNA 2008;38(6):1205-1230.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 002

Which one of the following premedication techniques (using standard doses) is **LEAST** likely to provide postoperative analgesia to a 2-year-old mixed breed dog undergoing a 75-minute cranial cruciate repair surgery?

- A. intramuscular acepromazine and butorphanol
- B. subcutaneous acepromazine followed by epidural morphine after anesthetic induction
- C. subcutaneous fentanyl, followed by intramuscular oxymorphone 20 minutes prior to recovery.
- D. intramuscular acepromazine and morphine

Answer: A

Learning Objectives: Know the duration of effect for various systemic analgesics.

References: Tranquilli WJ, Lamont LA, Grimm KA. Pain Management, 2nd ed 2004

PHARMACOLOGY/DELIVERY 003

Which of the following statements regarding the response to the application of a 2.5 mg (25 mcg/hour) fentanyl patch in cats is true?

- A. The rate of rise of plasma fentanyl concentration is similar to that observed in dogs.
- B. Most cats become sedated.
- C. Plasma concentrations of fentanyl vary among cats of similar size.
- D. Plasma concentrations of fentanyl persist for 2 to 3 hours after patch removal.

Answer: C

Learning Objectives: Know the onset and duration of fentanyl patches

References: Robertson S. "Managing pain in feline patients" VCNA SAP 38(6) p 1274; Grant D. Pain Management in Small Animals; 2006. pg 157, 422

PHARMACOLOGY/DELIVERY 004

Which of the following treatments is likely to produce the longest duration of post-operative analgesia following amputation of three digits from a dog's hind foot?

- A. intramuscular acepromazine
- B. Bier block of the distal hind limb (intravenous regional lidocaine)
- C. bupivacaine ring block done below the hock preoperatively
- D. preoperative intramuscular meperidine

Answer: C

Learning Objectives: Know specific drugs used for local anesthesia and indications for various local blocks.; Know expected duration of various analgesic drugs.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 15, p168; Tranquilli WJ, Lamont LA, Grimm KA. Pain Management, 2nd ed 2004



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 005

Which one of the following statements concerning the use of epidural anesthesia/analgesia is **FALSE**?

- A. Conditions suitable for surgery are rarely obtained by use of local anesthetics alone.
- B. Epidural opioids can provide adequate analgesia and muscle relaxation suitable for surgery.
- C. Epidural medetomidine decreases heart rate and cardiac output in dogs.
- D. Local anesthetic epidurals should not be used in patients that are hypotensive.

Answer: B

Learning Objectives: Know the drugs that can be used for epidural analgesia, and potential side effects.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 221-222, 454, 173.

PHARMACOLOGY/DELIVERY 006

Which of the following techniques would be LEAST effective as part of multimodal pain management for a lateral thoracotomy in a dog?

- A. interpleural block
- B. intercostal block
- C. opioid epidural
- D. brachial plexus block

Answer: D

Learning Objectives: Know the indications for various local and regional blocks.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 413.

PHARMACOLOGY/DELIVERY 007

Which of the following techniques can be used for local or regional analgesia for a forequarter amputation (removal of limb with scapula)?

- A. brachial plexus block
- B. isolated nerve blocks during surgery
- C. intravenous regional analgesia of the forelimb
- D. intravenous continuous rate infusion of lidocaine

Answer: B

Learning Objectives: Provide appropriate analgesia for forequarter amputation

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 15.

PHARMACOLOGY/DELIVERY 008

Which of the following nerve blocks should be performed to provide local anesthesia to the upper right 1st incisor (tooth #101)?

- A. facial
- B. supraorbital
- C. infraorbital
- D. mental

Answer: C

Learning Objectives: Know the indications for the various dental nerve blocks

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 284.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 009

In which of the following situations would epidural analgesics be CONTRAINDICATED?

- A. there is severe musculoskeletal trauma to the hind limbs
- B. the animal is known to be allergic to antihistamines
- C. there are skin pustules over the dorsum in the lumbosacral region
- D. the animal is anemic

Answer: C

Learning Objectives: Know the indications and contraindications for epidural analgesia.

References: Grant D. Pain Management in Small Animals; 2006. pg 210; Valverde A. "Epidural Analgesia and Anesthesia in Dogs and Cats" VCNA SAP 2008;38(6): pg 1205

PHARMACOLOGY/DELIVERY 010

All of the following are reported as potential complications of paravertebral block of the brachial plexus in dogs EXCEPT:

- A. accidental intrathecal administration
- B. pneumothorax
- C. blockade of the phrenic nerve
- D. accidental intra-articular administration

Answer: D

Learning Objectives: Know the indications and potential complications of paravertebral block

References: Lemke and McCreighton "Paravertebral Blockade of the Brachial Plexus in Dogs" VCNA SAP 2008;38(6), pg 1237

PHARMACOLOGY/DELIVERY 011

Which of the following is true regarding mental nerve block in dogs?

- A. There is some risk of self-mutilation following sensory loss to the tongue
- B. It is best done using a nerve locator.
- C. It often results in excessive salivation and drooling.
- D. It provides analgesia to the lower lip and incisors.

Answer: D

Learning Objectives: Know the technique and indications for dental nerve blocks in small animals.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 361; Tranquilli WJ, Lamont LA, Grimm KA. Pain Management, 2nd ed 2004

PHARMACOLOGY/DELIVERY 012

Which of the following nerves innervate the hard and soft palate?

- A. mental
- B. major and minor palatine
- C. infraorbital
- D. mandibular

Answer: B

Learning Objectives: Know the technique and indications for dental nerve blocks in small animals.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 361.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 013

All of the following are analgesics that are administered intraarticularly in horses, and relieve pain by acting on articular nociceptors, with the EXCEPTION of:

- A. morphine
- B. bupivacaine
- C. triamcinolone
- D. hyaluronic acid

Answer: C

Learning Objectives: Know which medications are used intraarticularly, and their mechanism of action.

References: van Weeren and de Grauw. "Pain in osteoarthritis" VCNA EP 2010;26(3): 633

PHARMACOLOGY/DELIVERY 014

After application of a transdermal fentanyl patch in a dog, how many hours are required to reach the peak analgesic effect?

- A. 0.5-1
- B. 1-2
- C. 2-6
- D. 12-24

Answer: D

Learning Objectives: Know the onset and duration of fentanyl patches

References: Tranquilli and Grimm. Pain Management in the Small Animal Practitioner 2004 pg 70. Old reference; Fox SM. Chronic Pain in Small Animal Medicine; 2010, pg 116

PHARMACOLOGY/DELIVERY 015

What is the most common location for epidural injection in dogs?

- A. L6 – L7
- B. L7 - S1
- C. S1 – Cd1
- D. Cd1 - Cd2

Answer: B

Learning Objectives: Know how to perform an epidural.

References: Valverde A. "Epidural Analgesia and Anesthesia in Dogs and Cats" VCNA SAP 2008;38(6): pg 1205

PHARMACOLOGY/DELIVERY 016

What is the most common location for epidural injection in horses and cattle?

- A. L6 – L7
- B. L7 - S1
- C. S1 – Cd1
- D. Cd1 - Cd2

Answer: D

Learning Objectives: Know how to perform an epidural.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 23.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 017

Potential side effects of an opioid epidural include all of the following, EXCEPT:

- A. hypertension
- B. nausea
- C. pruritus
- D. urine retention

Answer: A

Learning Objectives: Know the potential side effects of epidurals

References: Valverde A. "Epidural Analgesia and Anesthesia in Dogs and Cats" VCNA SAP 2008;38(6): pg 1218

PHARMACOLOGY/DELIVERY 018

Interpleural block may provide analgesia for which of the following conditions?

- A. pancreatitis
- B. kidney stones
- C. cystitis
- D. gastric ulcers

Answer: A

Learning Objectives: Know the indications for the various local and regional blocks

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 281.

PHARMACOLOGY/DELIVERY 019

Drugs given by epidural may have effects within the spinal compartment (spinal effect), or systemically (supraspinal effect), or both. More lipophilic drugs have more supraspinal effect. Which of the following drugs provides analgesia primarily by its spinal effects?

- A. fentanyl
- B. morphine
- C. sufentanil
- D. hydromorphone

Answer: B

Learning Objectives: Be familiar with the potential side effects of epidural morphine

References: Valverde A. "Epidural Analgesia and Anesthesia in Dogs and Cats" VCNA SAP 2008;38(6): pg 1214

PHARMACOLOGY/DELIVERY 020

Which of the following statements concerning intra-articular (IA) corticosteroids is true?

- A. IA triamcinolone has a longer duration of action than methylprednisolone.
- B. Corticosteroids have direct analgesic effect in the joint.
- C. IA corticosteroids are less effective for osteoarthritis compared to more inflammatory arthropathies, such as rheumatoid arthritis.
- D. The risks of IA corticosteroids are thought to outweigh the potential benefits.

Answer: C

Learning Objectives: Understand the use of intraarticular corticosteroids

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 253.



CVPP Learning Outcomes & Sample Questions

PHARMACOLOGY/DELIVERY 021

Which drug, in a special pH-controlled solution, can be applied topically to provide analgesia for corneal ulcers in dogs?

- A. morphine sulfate
- B. gabapentin
- C. fentanyl
- D. ketamine

Answer: A

Learning Objectives: Know the various routes of administration of morphine.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 173.

PHARMACOLOGY/DELIVERY 022

When blocking a peripheral nerve with a local anesthetic, nervous function is disrupted in a predictable order. What is the typical order in which function is lost, from first to last?

- A. pain, warmth, touch, deep pressure, motor function
- B. warmth, touch, pain, deep pressure, motor function
- C. touch, warmth, motor function, deep pressure, pain
- D. motor function, deep pressure, touch, warmth, pain

Answer: A

Learning Objectives: Know how local anesthetics affect the nerves

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 233.

PHARMACOLOGY/DELIVERY 023

Continuous infiltration of local anesthetic through specially designed catheters can be utilized for which of the following procedures?

- A. ovariohysterectomy, castration, tooth extraction
- B. splenectomy, hemilaminectomy, pancreatitis
- C. ear canal ablation, amputation, chain mastectomy
- D. onychectomy, dermal mass removal, thoracotomy

Answer: C

Learning Objectives: Understand the appropriate use of a fenestrated catheter for local anesthetic infusion

References: Fox, SM. Chronic Pain in Small Animal Medicine. 2010 Manson Publishing; London, UK Chapter 7. Pg. 185

PHARMACOLOGY/DELIVERY 024

What is the potential duration of action with oral transmucosal delivery of buprenorphine in cats?

- A. 10 hours
- B. 6 hours
- C. 4 hours
- D. 2 hours

Answer: B

Learning Objectives: Know how to use oral transmucosal drugs.

References: Fox, SM. Chronic Pain in Small Animal Medicine. 2010 Manson Publishing; London, UK Chapter 7. Pg. 187



Physical Medicine/CAVM

Learning objectives:

- Know how to set up TENS e-stim.
- Understand how TENS modulates pain.
- Understand the effects of therapeutic ultrasound.
- Know how to apply therapeutic ultrasound.
- Understand effects of various therapies used in rehabilitation and the indications for each.
- Be able to calculate a dose for laser therapy.
- Understand effects of various physical modalities used in rehabilitation and the indications for each.
- Understand the theoretical mechanisms for acupuncture

References:

- Millis DL, Levine D, Taylor RA. Canine Rehabilitation & Physical Therapy
- Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009
- Cameron MH. Physical Agents in Rehabilitation 2nd ed.
- Prentice WE. Therapeutic Modalities in Rehabilitation 3rd ed.
- Kisner C, Colby LA. Therapeutic Exercise 5th ed.
- Placzek JD, Boyce DA. Orthopaedic Physical Therapy Secrets, 2nd ed.
- Filshie J, White A. Acupuncture a Western Approach
- Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management
- White A, Cummings M, Filshie J. An Introduction to Western Medical Acupuncture

Physical Medicine/CAVM (includes acupuncture, massage, chiropractic...) (13 PT/ 6 AP)

Weight for exam: 15/100 questions

PHYSICAL MEDICINE 001

A veterinarian refers a dog to you, with a request that you perform transcutaneous electrical stimulation (TENS) as an adjunct to pain management. The dog had all four metacarpals fractured and the distal limb is in a cast. How would you handle this?

- A. Place the electrodes on top of the cast, spanning the metacarpal region.
- B. Place the electrodes proximal to the cast, along the pathways of the radial and ulnar nerves.
- C. Place one electrode on the very distal end of the cast and another electrode on the skin proximal to the cast.
- D. Inform the veterinarian that there is no way to apply TENS to this dog without removing the cast.

Answer: B

Learning Objectives: Know how to set up TENS e-stim.; Understand how TENS modulates pain.

References: Cameron MH. Physical Agents in Rehabilitation 2nd ed. Chapter 8 - principals of electrode placement & theories of mechanisms for pain modulation; Prentice WE. Therapeutic Modalities in Rehabilitation 3rd ed. Chapter 19 – mechanisms; Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27



CVPP Learning Outcomes & Sample Questions

PHYSICAL MEDICINE 002

You decide to perform therapeutic ultrasound on the quadriceps muscles of a golden retriever, before beginning some stretching exercises. Choose the best settings for the machine.

- A. 1 mHz, continuous mode, 1.5 W/cm²
- B. 3.3 mHz, continuous mode, 1.5 W/cm²
- C. 1 mHz, pulsed mode, 1 W/cm²
- D. 3.3 mHz, pulsed mode, 1 W/cm²

Answer: A

Learning Objectives: Understand the effects of therapeutic ultrasound.; Know how to apply therapeutic ultrasound.

References: Millis DL, Levine D, Taylor RA. Canine Rehabilitation & Physical Therapy Chapter 19; Cameron MH. Physical Agents in Rehabilitation 2nd ed. Chapter 7

PHYSICAL MEDICINE 003

Within the first day after an arthotomy, which therapy would be CONTRAINDICATED for the affected joint?

- A. passive stretching
- B. passive range of motion
- C. Grade I or II joint mobilizations
- D. massage

Answer: A

Learning Objective: Understand effects of various therapies used in rehabilitation and the indications for each.

References: Kisner C, Colby LA. Therapeutic Exercise 5th ed. Chapter 10

PHYSICAL MEDICINE 004

Which of the following choices correctly defines the unit joule?

- A. cm² x seconds
- B. watts x seconds
- C. wavelength x watts
- D. watts x cm²

Answer: B

Learning Objective: Be able to calculate a dose for laser therapy.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27; Cameron MH. Physical Agents in Rehabilitation 2nd ed. Chapter 12

PHYSICAL MEDICINE 005

For which of the following conditions would heat therapy be beneficial for reducing pain?

- A. a wound within the first few hours or days after an acute injury
- B. the shoulder of a dog with osteosarcoma
- C. an edematous limb after surgery
- D. a chronically arthritic joint

Answer: D

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ee. Chapter 27;Cameron MH. Physical Agents in Rehabilitation 2nd ed. Chapter 6



CVPP Learning Outcomes & Sample Questions

PHYSICAL MEDICINE 006

What is one effect of passive range of motion exercises?

- A. strengthen periarticular muscles
- B. help prevent muscle atrophy
- C. reduce joint pain
- D. stretch periarticular muscle.

Answer: C

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

References: Millis DL, Levine D, Taylor RA. Canine Rehabilitation & Physical Therapy Chapter 13; Kisner C, Colby LA. Therapeutic Exercise 5th ed. Chapter 3

PHYSICAL MEDICINE 007

What is the proposed mechanism by which cryotherapy reduces pain?

- A. It increases cellular metabolism, causing the release of cytokines.
- B. It causes vasodilation.
- C. It lowers the threshold of activation of the muscle spindle
- D. It stimulates thermoreceptors, thus inhibiting painful stimulus by the gate control theory.

Answer: D

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

References: Harris J, Dhupa S. Compendium October 2007. "Cryotherapy"; Placzek JD, Boyce DA. Orthopaedic Physical Therapy Secrets, 2nd ed. Chapter 9

PHYSICAL MEDICINE 008

What is the proposed mechanism by which heat therapy reduces muscle pain?

- A. It increases activity of Golgi tendon organs
- B. It decreases nerve conduction velocities.
- C. It causes vasoconstriction.
- D. It decreases cellular metabolism.

Answer: A

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27

PHYSICAL MEDICINE 009

There are several mechanisms by which transcutaneous electrical stimulation thought to reduce pain. Which of the following statements is NOT one of the suggested mechanisms?

- A. It activates A-beta fibers in the skin and inhibits C fibers in the dorsal horn of the spinal cord.
- B. It stimulates small afferent fibers, resulting in release of endogenous opioids.
- C. It stimulates afferent fibers, which stimulate the descending pain-inhibiting pathway.
- D. It decreases the conduction velocity of the afferent pain fibers.

Answer: D

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27



CVPP Learning Outcomes & Sample Questions

PHYSICAL MEDICINE 010

All of the following are potential contraindications for using transcutaneous electrical stimulation, EXCEPT:

- A. stimulation directly over the heart
- B. stimulation over a metal implant
- C. stimulation of animals with pacemakers
- D. stimulation over the carotid sinus

Answer: B

Learning Objective: Understand effects of various physical modalities used in rehabilitation and the indications for each.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27

PHYSICAL MEDICINE 011

Which of the following is a recommended treatment for trigger points?

- A. gently tapping on the trigger point
- B. application of a static magnet directly over the point
- C. ischemic compression using one or two fingers
- D. effleurage

Answer: C

Learning Objective: Understand effects of various therapies used in rehabilitation and the indications for each.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27; Placzek JD, Boyce DA. Orthopaedic Physical Therapy Secrets, 2nd ed. Chapter 9

PHYSICAL MEDICINE 012

Extracorporeal shock wave therapy has the potential to be used as an analgesic. Currently, accepted applications include all of the following EXCEPT:

- A. muscle pain
- B. osteoarthritis
- C. tendinitis
- D. desmitis

Answer: A

Learning Objective: Understand effects of various therapies used in rehabilitation and the indications for each.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 27

PHYSICAL MEDICINE 013

When performing transcutaneous electrical nerve stimulation (TENS) or electroacupuncture, the machine settings are based on the desired effect. If the machine is set at a low frequency (2-4 Hz), which of the following analgesic effects would you expect?

- A. rapid onset (10 minutes), with short duration of effects (minutes to hours)
- B. delayed onset (30 minutes), with long duration of effects (hours to days)
- C. rapid onset (10 minutes), with long duration of effects (hours to days)
- D. delayed onset (30 minutes), with short duration of effects (minutes to hours)

Answer: B

Learning Objectives: Know how to set up TENS e-stim; Understand how TENS modulates pain.

References: Placzek JD, Boyce DA. Orthopaedic Physical Therapy Secrets, 2nd ed. Chapter 9



CVPP Learning Outcomes & Sample Questions

ACUPUNCTURE 001

Which of the following statements regarding the neuroanatomical features of acupuncture points is FALSE?

- A. Many acupuncture points are located at sites where a nerve penetrates deep fascia, oriented from a deep to more superficial location.
- B. Many acupuncture points on the head are located over foramina where sympathetic nerves exit
- C. Acupuncture points are more often located over sites supplied by three types of nerve fibers (sensory, motor and autonomic), rather than only one or two fiber types
- D. Many acupuncture channels follow neurovascular pathways.

Answer: B

Learning Objective: Understand the theoretical mechanisms for acupuncture

References: Filshie J, White A. Acupuncture a Western Approach, pp 155-156 165-166.; Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management pp 2-12

ACUPUNCTURE 002

What is thought to be the cause of the 'de qi' sensation during acupuncture?

- A. It is most likely due to the needle puncturing the exact center of the acupuncture point.
- B. It is most likely due to the electrical affinity between the metallic needle and charges within the connective tissue.
- C. It is most likely due to the friction generated by the needle being "twirled" in the tissue by the acupuncturist.
- D. It is most likely due to stimulation of A-delta fibers by the needle.

Answer: D

Learning Objective: Understand the theoretical mechanisms for acupuncture

References: Filshie J, White A. Acupuncture a Western Approach pp 14, 72, 139, 397.; Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management pp 25-28, 56.; White A, Cummings M, Filshie J. An Introduction to Western Medical Acupuncture p19.

ACUPUNCTURE 003

From a neuromodulatory perspective, which of the following statements about the micro-trauma from needle introduction is FALSE?

- A. There is an activation of afferent fibers
- B. It causes a release of cytokines
- C. Reflexive pathways to the spinal cord and brain are stimulated
- D. Endorphin release occurs with all acupoints

Answer: D

Learning Objective: Understand the theoretical mechanisms for acupuncture

References: Filshie J, White A. Acupuncture a Western Approach pp 69-82, 219-220.; Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management pp 52-68

ACUPUNCTURE 004

At least five different pathways from the paraventricular nucleus are responsible for the myriad health benefits of acupuncture.

Which of the following is NOT one of these pathways?

- A. Humoral pathway
- B. Sympathetic autonomic neural pathway
- C. Parasympathetic autonomic neural pathway
- D. Hormonal pathway

Answer: D

Learning Objective: Understand the theoretical mechanisms for acupuncture

Reference: Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management pp 42-48



CVPP Learning Outcomes & Sample Questions

ACUPUNCTURE 005

An acupuncture needle is usually tapped through the skin to avoid painful stimulation of the A-delta nociceptors. Is this statement true or false?

- A. True
- B. False

Answer: A

Learning Objective: Understand the theoretical mechanisms for acupuncture

Reference: Filshie J, White A. Acupuncture a Western Approach p 148

ACUPUNCTURE 006

Which one of the following is NOT a direct analgesic effect of electroacupuncture?

- A. Stimulation of C fibers in muscle causing release of opioid peptides in the dorsal horn.
- B. A-delta fiber stimulation of the cortex with subsequent down-regulation of pain in the spinal cord
- C. Stimulation of the hypothalamus to strengthen the body's homeostatic response
- D. Regulation of neurotransmitters including serotonin and enkephalin
- E. Disruption of pain signals through the "Gate Theory" mechanism

Answer: A

Learning Objective: Understand the theoretical mechanisms for acupuncture

References: Ma YT, Ma M, Cho ZH. Biomedical Acupuncture for Pain Management. pp227-232.; Filshie J, White A. Acupuncture a Western Approach pp153-156

Pain Classification

Learning Objectives:

- Know the various classifications of pain, based on anatomic origin or physiologic significance.
- Be familiar with definitions of words describing different types of sensation.

References:

- Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009.
- Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007.

Pain Classification (acute, chronic, neuropathic) (10 questions)

Weight for exam: 8/100 questions

PAIN CLASSIFICATION 001

Various classification systems have been used to characterize pain. How might you classify the pain associated with osteosarcoma?

- A. somatic
- B. visceral
- C. acute
- D. nociceptive

Answer: A

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.



CVPP Learning Outcomes & Sample Questions

PAIN CLASSIFICATION 002

Which of the following best describes neuropathic pain?

- A. pain that is intensified by fear or anxiety
- B. pain resulting from a stimulus that is not normally painful
- C. pain caused injury to the peripheral or central nervous system
- D. pain that only occurs with an intense noxious stimulus

Answer: C

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.

PAIN CLASSIFICATION/ 003

Which of the following statements best describes physiologic pain?

- A. it protects the animal from a cause of potential tissue damage
- B. it is caused by dysfunction of internal organs
- C. it occurs with systemic diseases
- D. it is an autonomic reaction to severe pain

Answer: A

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.

PAIN CLASSIFICATION 004

Neuronal plasticity occurs in the afferent pathways during chronic pain. Plasticity is especially relevant for which type of pain?

- A. neuropathic
- B. somatic
- C. physiologic
- D. visceral

Answer: A

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.

PAIN CLASSIFICATION 005

You are examining an animal with severe back pain. The animal appears to be painful when you gently place your fingers over the femoral artery to check the pulse. What is this animal exhibiting?

- A. allodynia.
- B. primary hyperalgesia
- C. secondary hyperalgesia
- D. hyperpathia

Answer: A

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.; Be familiar with definitions of words describing different types of sensation.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.



CVPP Learning Outcomes & Sample Questions

PAIN CLASSIFICATION 006

Which of the following is most consistent with lancinating pain?

- A. it is poorly localized
- B. it typically occurs with neuropathic pain
- C. it refers specifically to pain caused by a surgical incision
- D. it is a dull, throbbing sensation

Answer: B

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.; Be familiar with definitions of words describing different types of sensation.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.

PAIN CLASSIFICATION 007

You have a border collie in your clinic with a brachial plexus injury, and he appears to have no sensation in his paw. While unobserved in the kennel, he chewed on his paw and removed two digits. What is he most likely experiencing?

- A. boredom
- B. dysesthesia
- C. dysphoria
- D. secondary hyperalgesia

Answer: B

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.; Be familiar with definitions of words describing different types of sensation.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.; Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. Chapter 3

PAIN CLASSIFICATION 008

Which of the following is FALSE regarding chronic pain?

- A. it has no useful biological function or survival advantage
- B. it continues beyond the expected period of tissue healing
- C. the extent of tissue damage correlates with the pain severity
- D. it is often neuropathic

Answer: C

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.

References: Fox SM. Chronic Pain in Small Animal Medicine 2010 p 244

PAIN CLASSIFICATION 009

What is "hyperalgesia"?:

- A. an increased response to a stimulus that is not normally painful.
- B. an exaggerated pain response that is much beyond protective usefulness.
- C. an increased response to a stimulus that is normally painful.
- D. any response to a stimulus at a higher-than-normal threshold.

Answer: C

Learning Objectives: Know the various classifications of pain, based on anatomic origin or physiologic significance.; Be familiar with definitions of words describing different types of sensation.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.



CVPP Learning Outcomes & Sample Questions

PAIN CLASSIFICATION 010/

What is the difference between paresthesia and dysesthesia?

- A. One term refers to an odd sensation, while the other refers to an unpleasant sensory experience.
- B. One term refers to an unpleasant stabbing sensation, while the other refers to an unpleasant burning sensation.
- C. One term refers to a decreased sensitivity to stimulation, while the other refers to an unpleasant sensory experience in a desensitized area.
- D. One term refers to a sensation that is often described as "insects crawling on skin", while the other refers to a loss of sensation.

Answer: A

Learning Objectives: Be familiar with definitions of words describing different types of sensation.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 4.; Tranquilli WJ, Thurmon JC, Grimm KA (eds). Lumb & Jones' Veterinary Anesthesia and Analgesia, 4th ed. 2007. Chapter 3

Pain Scoring and Recognition

Learning objectives:

- Be able to recognize signs of pain in dogs, cats, and horses.
- Be familiar with various pain assessment scales and know how to use them.
- Be able to recognize signs of pain and distinguish from dysphoria.
- Know how often pain should be assessed.

References:

- Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009.
- Hellyer P, Rodan I, Brunt J, et al. "AAHA/AAFP Pain management guidelines for dogs and cats" Journal of the American Animal Hospital Association. 2007; 43:235-248.
- Hielm-Bjorkman AK, Rita H, Tulamo RM. "Psychometric testing of the Helsinki chronic pain index by completion of a questionnaire in Finnish by owners of dogs with chronic signs of pain caused by osteoarthritis" AJVR 2009;70:727-734.
- Robertson S. "Managing pain in feline patients" VCNA SAP 2008;38(6) p 1269
- Shaffran N. "Pain management: The veterinary technician's perspective" VCNA SAP 2008;38(6) p 1423

Pain Scoring and Recognition (10 questions)

Weight for exam: 5/100 questions

PAIN SCORING 001

It is sometimes difficult to distinguish normal from pain-associated behaviors in cats and dogs. Which of the following is most likely to be normal, nonpainful behavior?

- A. decreased appetite
- B. unusual aggression
- C. stretching all four legs when the abdomen is touched
- D. decreased social interaction

Answer: C

Learning objective: Be able to recognize signs of pain.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 64-650.



CVPP Learning Outcomes & Sample Questions

PAIN SCORING 002

Several pain assessment tools have been adapted from human pain research and can be applied to many species. Which of the following types of assessments would most likely need to be modified for use on different species?

- A. Visual analog scale
- B. Simple descriptive scale
- C. Numerical rating scale
- D. Pre-emptive pain score

Answer: C

Learning objective: Be familiar with various pain assessment scales.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 6.

PAIN SCORING 003

Which of the following would be likely to yield the most reliable assessment of pain in an animal?

- A. Measurement of plasma cortisol
- B. Medical physical parameters such as heart rate and blood pressure.
- C. Behavior observed by someone who is familiar with signs of pain in that species of animal.
- D. Use of a pre-emptive scoring system

Answer: C

Learning objective: Be able to recognize signs of pain.; Be familiar with various pain assessment scales.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 441.; Robertson S. "Managing pain in feline patients" VCNA SAP 2008;38(6) p 1269

PAIN SCORING 004

Which of the following is the most common sign of osteoarthritic pain in cats?

- A. limping on the affected limb
- B. hissing or growling at the owner
- C. decrease in jumping onto higher objects
- D. loss of appetite

Answer: C

Learning objective: Be able to recognize signs of pain.; Understand how signs of pain vary between species e.g. signs may be subtle in cats

Reference: Robertson S. "Managing pain in feline patients" VCNA SAP 2008;38(6) p 1269

PAIN SCORING 005

You are watching a dog during anesthetic recovery from a moderately painful surgical procedure. He has already received a dose of hydromorphone. The dog is restless and vocalizing. Which of the following is most appropriate?

- A. If he becomes calmer while you comfort him, there is no need to change his medications.
- B. If he becomes more agitated when you gently palpate around the incision, consider giving more analgesics.
- C. If he is agitated and does not seem to be aware of your presence, reverse the opioid effect with naloxone.
- D. If he is continually agitated, put a towel over his cage door to calm him down.

Answer: B

Learning objective: Be familiar with various pain assessment scales. Be able to recognize signs of pain and distinguish from dysphoria.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 176.; Shaffran N. "Pain management: The veterinary technician's perspective" VCNA SAP 2008;38(6) p 1423



CVPP Learning Outcomes & Sample Questions

PAIN SCORING 006

While managing a dog with chronic osteoarthritic pain, you need to assess how the dog is doing at home. Each time you see the dog, you will have the clients complete a written assessment. What would be the most reliable tool?

- A. the Glasgow composite pain scale.
- B. the Helsinki chronic pain index
- C. a simple descriptive scale.
- D. a visual analog scale.

Answer: B

Learning objective: Be familiar with various pain assessment scales.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: Chapter 6.; Hielm-Bjorkman AK, Rita H, Tulamo RM. "Psychometric testing of the Helsinki chronic pain index by completion of a questionnaire in Finnish by owners of dogs with chronic signs of pain caused by osteoarthritis" AVJ 2009;70:727-734.

PAIN SCORING 007

Which of the following is LEAST likely to indicate pain in horses?

- A. head shaking
- B. rigid stance and reluctance to move
- C. bruxism (teeth grinding)
- D. grunting or groaning

Answer: C

Learning objective: Be able to recognize signs of pain.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. 2009: 442.

PAIN SCORING 008

Regarding the use of pain scales in hospitalized animals, which of the following statements is FALSE?

- A. Pain scales may encourage routine evaluation of hospitalized animals.
- B. Pain scales can be used to determine whether analgesic therapy should be discontinued.
- C. Effective analgesic therapy should result in an animal with a low pain score.
- D. A low pain score indicates that analgesic therapy is sufficient, even if an animal is exhibiting some questionable behaviors.

Answer: D

Learning objective: Understand the appropriate use of pain scale.

Reference: Gaynor JS, Muir WW. Handbook of Veterinary Pain Management 2nd ed. 2009. Chapter 6 pgs 83-84

PAIN SCORING 009

In cats, some diseases cause behavioral changes that are often been ascribed to "old age", rather than pain. Examples include all of the following EXCEPT:

- A. Facet pain of spondylosis
- B. Intervertebral disc disease
- C. Osteoarthritis
- D. Basal cell tumor

Answer: D

Learning objective: Understanding pain in specific species

Reference: Hellyer P, Rodan I, Brunt J, et al. "AAHA/AAFP Pain management guidelines for dogs and cats" Journal of the American Animal Hospital Association. 2007; 43:235-248.



CVPP Learning Outcomes & Sample Questions

PAIN SCORING 010

Frequency of pain assessment depends on the situation. Which of the following is the most appropriate guideline for frequency of pain assessment?

- A. every 4 hours in the postoperative period
- B. a minimum of every 3 months for an animal with chronic pain
- C. every 12 hours for animals with traumatic injuries
- D. yearly for an animal with chronic pain

Answer: B

Learning objective: Know how often pain should be assessed.

Reference: Hellyer P, Rodan I, Brunt J, et al. "AAHA/AAFP Pain management guidelines for dogs and cats" Journal of the American Animal Hospital Association. 2007; 43:235-248.

Nutrition

Learning objectives:

- Be familiar with the dietary supplements used to alleviate signs of osteoarthritis.
- Understand the role of nutrition in managing the chronic pain of arthritis.
- Understand the importance of body conditions score and know how to perform one.
- Understand the relationship between obesity and chronic pain.

References:

- Fox SM. Chronic Pain in Small Animal Medicine 2010
- S. Budsberg, J Bartges. Nutrition and Osteoarthritis in Dogs: Does it Help? Veterinary Clinics of North America 36 (2006) 1307-1323.

Nutrition (obesity, omega-3) (5 questions)

Weight for exam: 5/100 questions

NUTRITION 001

A number of substances have been added to canine diets or promoted as dietary supplements to aid in the management of osteoarthritis. There is minimal evidence for the effectiveness of these substances. Which of the following dietary ingredient has the most scientific support in dogs?

- A. vitamin C
- B. glycosaminoglycan
- C. turmeric
- D. avocado/soybean unsaponifiables

Answer: B

Learning Objective: Be familiar with the dietary supplements used to alleviate signs of osteoarthritis.

References: S. Budsberg, J Bartges. Nutrition and Osteoarthritis in Dogs: Does it Help? Veterinary Clinics of North America 36 (2006) 1307-1323.



CVPP Learning Outcomes & Sample Questions

NUTRITION 002

Nutrition is important as part of the multimodal management of osteoarthritis. Which of the following statements is FALSE?

- A. Weight reduction alone has been shown to improve lameness in overweight dogs with osteoarthritis.
- B. Dietary supplementation with eicosapentanoic acid decreases production of enzymes that contribute to cartilage degeneration in arthritic joints.
- C. Ingestion of omega-6 fatty acids decreases the inflammatory cascade.
- D. Changes in nutrition can modify gene expression.

Answer: C

Learning Objective: Understand the role of nutrition in managing the chronic pain of arthritis.

References: Fox SM. Chronic Pain in Small Animal Medicine Chapter 8

NUTRITION 003

Which of the following criteria is assessed by most body condition score systems?

- A. size of the animal's muscles and joints
- B. fitness of the animal at a walk and trot
- C. the animal's cardiopulmonary endurance
- D. the animal's appearance, fat stores, and muscle mass

Answer: D

Learning Objective: Understand the importance of body conditions score and how to perform one.

References: S. Budsberg, J Bartges. Nutrition and Osteoarthritis in Dogs: Does it Help? Veterinary Clinics of North America 36 (2006) 1307-1323. (pg 1311)

NUTRITION 004

Which of the following is NOT an effect of obesity on the body?

- A. excessive pressure on joints.
- B. increased circulating pro-inflammatory mediators.
- C. decreased mobility, further contributing to obesity.
- D. increased joint stability, minimizing injury.

Answer: D

Learning Objective: Understand the relationship between obesity and chronic pain.

References: S. Budsberg, J Bartges. Nutrition and Osteoarthritis in Dogs: Does it Help? Veterinary Clinics of North America 36 (2006) 1307-1323. (pg 1311)

NUTRITION 005

To make a medical diagnosis of 'obesity', the ideal body weight must be exceeded by AT LEAST what percentage?

- A. 5-10%
- B. 15-20%
- C. 30-40%
- D. 50%

Answer: B

Learning Objective: Understand the relationship between obesity and chronic pain.

References: S. Budsberg, J Bartges. Nutrition and Osteoarthritis in Dogs: Does it Help? Veterinary Clinics of North America 36 (2006) 1307-1323. (pg 1311)



Hospice/Quality of Life/Euthanasia

Learning objectives:

- Be familiar with some strategies for discussing end of life issues.
- Understand what is involved in basic hospice care.
- Understand what constitutes 'quality of life'.
- Know some guidelines for assessing quality of life.

References:

- Gaynor JS, Muir WW. *Veterinary Pain Management* 2nd ed. 2009
- Borden, L.J.N, Adams CL, Bonnett BN, et al. "Use of the measure of patient-centered communication to analyze euthanasia discussions in companion animal practice." *JAVMA* 2010; 237:1275-1287.
- Hellyer, et al. "AAHA/AAFP Pain management guidelines for dogs and cats". *JAAHA* 2007; 43(5):235- 248.

Hospice/Quality of Life/Euthanasia (5 questions)

Weight for exam: 5/100 questions

HOSPICE 001

You are meeting with a client has financial concerns regarding an animal with a serious illness. What would be the best way to start the discussion?:

- A. refrain from discussing the more expensive treatment options
- B. recommend they consider euthanasia
- C. have them speak with the hospital director regarding payment options
- D. inform them of the prognosis and costs associated with all treatment options

Answer: D

Learning Objective: Understand how to discuss end of life issues.

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 30

HOSPICE 002

Family members may need to be given instructions for home care of a debilitated dog. Which of the following would potentially be LEAST beneficial?

- A. provide clean, soft bedding
- B. keep the perianal skin clean with baby wipes or mild soap and water
- C. keep the water bowl out of the dog's reach, to prevent spills
- D. locate the bed in an area that allows social interaction

Answer: C

Learning Objective: Understand what is involved in basic hospice care

References: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. Chapter 30



CVPP Learning Outcomes & Sample Questions

HOSPICE 003

Discussing 'end of life' issues for an animal with a terminal illness can be difficult. Complete the following sentence with the LEAST desirable approach. The veterinarian should:

- A. broach the topic of euthanasia once the diagnosis has been confirmed.
- B. encourage the client to discuss their feelings during each consultation.
- C. wait for the client to mention euthanasia.
- D. encourage the client to work with the veterinarian to make a mutual plan of action.

Answer: C

Learning objective: Understand how to discuss end of life issues.

Reference: Borden, LJM, Adams CL, Bonnett BN, et al. "Use of the measure of patient-centered communication to analyze euthanasia discussions in companion animal practice." JAVMA 2010; 237:1275-1287.

HOSPICE 004

The phrases "animal welfare" and "quality of life" are often used interchangeably. However, some authors believe there is a distinction between these phrases. With regards to animals, which statement would most accurately complete the sentence, "Quality of life is..."?

- A. a multidimensional construct that is subjective and unique to the individual.
- B. a complex construct that combines subjective and objective aspects of the conditions of an animal's life.
- C. ensured by establishing that minimum standards of care are provided.
- D. best determined by having an impartial observer assessment the animal's condition.

Answer: A

Learning objective: Understand what constitutes 'quality of life'

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. St. Louis MO, 2009: 579-580.

HOSPICE 005

What is currently the best method to assess feline quality of life?

- A. Ask the client to compare the cat's current activities to what it used to do.
- B. Have the client make an assessment as to the cat's pain level in the home environment.
- C. Start the cat on treatment for pain and see if there is a noticeable improvement.
- D. Use questionnaires for yourself and the client to determine a modified cat Karnofsky's score.

Answer: D

Learning objective: Know some guidelines for assessing quality of life.

Reference: Gaynor JS, Muir WW. Veterinary Pain Management 2nd ed. St. Louis MO, 2009: Chapter 29.; Hellyer, et al. "AAHA/AAFP Pain management guidelines for dogs and cats". JAAHA 2007; 43(5):235- 248.

Legal Issues

Learning Objectives:

- Be aware of the laws and regulations related to veterinary pain management
- Know the regulations regarding controlled substances.

References:

- United States Department of Justice Drug Enforcement Administration Office of Diversion Control. Practitioner's Manual: An informational outline of the Controlled Substances Act. 2006 Edition
- Hellyer, et al. "AAHA/AAFP Pain management guidelines for dogs and cats". JAAHA 2007; 43(5):235- 248.



CVPP Learning Outcomes & Sample Questions

Legal Issues (3 questions)

Weight for exam: 2/100 questions

LEGAL ISSUES 001

Which of the following statements regarding veterinary pain management for practitioners in the United States is true?

- A. Legal permission to treat painful animal patients is regulated nationally.
- B. Anyone with IVAPM certification may treat a painful animal.
- C. Effective management of chronic pain in animals involves both the veterinary health care team and the client.
- D. The current standard of care in veterinary medicine is that pain management is optional, at the discretion of the care provider.

Answer: C

Learning Objective: Be aware of the laws and regulations related to veterinary pain management

References: AAHA/AAFP Pain Management Guidelines for Dogs & Cats. Journal of the American Animal Hospital Association. September/October 2007, Vol.43 Pg. 246

LEGAL ISSUES 002

Which of the following statements regarding the use of pain medications listed on the United States Drug Enforcement Administration schedule for controlled substances is

FALSE?

- A. Each unit of medication must be accounted for according to state and federal laws.
- B. The interval between refills of medication should be monitored in order to recognize potential diversion.
- C. Medications returned to the practice must be disposed of appropriately.
- D. Record keeping is not required for Schedule IV drugs.

Answer: D

Learning Objective: Be aware of the laws and regulations related to veterinary pain management; Know the regulations regarding controlled substances.

References: United States Department of Justice Drug Enforcement Administration Office of Diversion Control. Practitioner's Manual: An informational outline of the Controlled Substances Act. 2006 Edition pg 1-62

LEGAL ISSUES 003

According to the DEA (Federal Drug Enforcement Agency), all records related to controlled substances must be maintained for a minimum amount of time, unless a state requires a longer period. What is the minimum time required by the DEA?

- A. A. 1 year
- B. B. 5 years
- C. C. 2 years
- D. D. 10 years

Answer: C

Learning Objective: Be aware of the laws and regulations related to veterinary pain management; Know the regulations regarding controlled substances.

References: United States Department of Justice Drug Enforcement Administration Office of Diversion Control. Practitioner's Manual: An informational outline of the Controlled Substances Act. 2006 Edition pg 1-62