zukureview

SAVE & EXIT

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1	2	3	4	5	6	7	8	9	10

Doxorubicin HCL is one of the most commonly used antineoplastic drugs in small animal medicine, used alone or in combination to treat a variety of carcinomas and sarcomas.

Like many antineoplastic agents, Doxorubicin is myelosuppressive.

What other side effect is it well known for in dogs, particularly Dobermans, Great Danes, Boxers and Rottweilers?

Neurologic disturbance (seizures)	HIDE
Depigmentation / photosensitivity	HIDE
Nephrotoxicity	HIDE
Cardiotoxicity	HIDE
Hepatotoxicity	HIDE

NEXT LEAVE BLANK

Correct:

Cardiac toxicity is one of the primary adverse effects associated with Doxorubicin. Dog breeds which are pre-disposed to dilated cardiomyopathy (DCM) particularly Dobermans, Great Danes, Boxers and Rottweilers, must be monitored carefully.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 483-6, Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 210-11 and the Merck Veterinary Manual online edition.

zukureview

SAVE & EXIT

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Which one of the following drugs is most useful for the initial treatment of follicular cysts in dairy cattle?

Diethylstilbesterol	HIDE
Progesterone	HIDE
Prostaglandin F2-alpha	HIDE
Estradiol benzoate	HIDE
Gonadotropin-releasing hormone	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Follicular cystic ovarian disease in cattle has been treated many ways, but of the choices listed here, gonadotropin-releasing hormone (GnRH) may be the best.

GnRH initiates the release of luteinizing hormone (LH) from the anterior pituitary. The LH surge initiates the luteinization or rupture of the follicle. Prostaglandin F2 (PGF2)-alpha may be given 7 days later to speed the onset of estrus.

Human chorionic gonadotropin (HCG) has been used historically as a source of LH, but the efficacy and cost of the GnRH makes that drug superior to HCG.

Think more of prostaglandin F2 (PGF2)-alpha as the primary treatment of luteal cysts. Unfortunately, it can be difficult to definitively differentiate between follicular and luteal cysts in a clinical setting so often both are treated as follicular cysts.

Here is an easy way to remember key difference between follicular and luteal cysts:
- **Follicular** cysts are like follicles that need to be encouraged to ovulate by the

- **Follicular** cysts are like follicles that need to be encouraged to ovulate by the administration of GnRH (leading to LH surge).
- **Luteal** cysts are like corpora lutea and need to be encouraged to lyse by the administration of PGF2-alpha.

Manual rupture of large follicular cysts was a common treatment in the past, but may traumatize the ovary.
Most recent references (Smith, Rebuhn, Pasquini) and Dr. Lisle George, (professor emeritus, UC Davis large animal medicine) say to avoid manual rupture due to potential risk of adhesions and hemorrhage.
Some references (Merck) and practitioners say the risk is minimal, but the state of current clinical practice weighs against manual rupture.

Use of diethylstilbesterol in food producing animals is prohibited by the United States Food and Drug Administration.

Luteal Cystic Ovary Disease in Cattle

By **Jonathan Statham, MA, VetMB, DCHP, MRCVS, Veterinarian, Bishopton Veterinary Group**

Luteal cystic ovary disease is characterized by enlarged ovaries with one or more cysts, the walls of which are thicker than those of follicular cysts because of a lining of luteal tissue. Incidence ratios of follicular versus luteal cysts vary greatly because of diagnostic tendencies of individual veterinarians. Classically, luteal COD is defined as the presence of a fluid-filled ovarian structure >25 mm diameter persisting >7 days in the absence of a CL and with a wall diameter >3 mm, usually associated with abnormal reproductive signs. Normal lacunae formation in CL may be incorrectly classified as luteal COD.

Etiology and Pathogenesis:

The basic causes of true luteal cysts are believed to be the same as for follicular cysts. The release of luteinizing hormone (LH) may be somewhat greater than that occurring when follicular cysts develop, and sufficient to initiate luteinization of follicles but inadequate to cause ovulation. Luteal cysts may be an extension of follicular cysts such that the nonovulatory follicle is partially luteinized spontaneously or in response to hormonal therapy.

Clinical Findings:

Luteal cysts are accompanied by normal conformation and anestrous behavior. Rectal palpation reveals a quiescent uterus characteristic of the luteal phase of the estrous cycle. Luteal cysts are recognized as smooth, fluctuant domes protruding above the surface of the ovary. Usually, they are single structures.

Luteal cysts are differentiated from follicular cysts on the basis of palpable characteristics of both the structure and the uterus and, to some extent, on the cow's behavior. Progesterone assay and ultrasonography can help differentiate between follicular and luteal cysts, although with either method a final diagnostic decision remains somewhat subjective. On attempts to manually rupture the cystic structure, follicular cysts burst or rupture under minimal pressure whereas luteal cysts cannot be ruptured with reasonable force. Both types of cysts respond to LH or GnRH therapy, but $PGF_{2\alpha}$ will lyse some luteal cysts and generally all diestrual CL structures.

Treatment and Control:

The treatment of choice is luteolytic doses of $PGF_{2\alpha}$ if a correct diagnosis can be ascertained. A normal estrus is expected in 3–5 days. The major limitation of this treatment is the difficulty in accurately estimating the amount of luteal tissue present. If the structure being diagnosed as a luteal cyst is really a developing CL (as discussed above, sometimes called a cystic CL), it may not respond because dairy cows do not become highly responsive to the luteolytic action of $PGF_{2\alpha}$ until day 6 after estrus. Ultrasound examination is increasingly common and facilitates diagnosis of ovarian structures. Luteal cysts also respond to human chorionic gonadotropin and GnRH therapy that is effective in the treatment of follicular cysts, but the next estrus could occur 5–21 days after treatment. Manual rupture of luteal cysts is not recommended because of the risk of trauma and hemorrhage. Because of poor estrus detection practices on many dairy farms, the treatment of choice for both follicular and luteal cysts is intravaginal progesterone/prostaglandin (a fixed timed artificial insemination protocol) (see Treatment of Follicular Cystic Ovary Disease in Large Animals). Application of this protocol in affected cows promotes timely breeding after treatment.

zukureview

SAVE & EXIT

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In which situation is the use of acepromazine is contraindicated?

In combination with atropine	HIDE
Geriatric animals	HIDE
Organophosphate toxicity	HIDE
Hepatic disease	HIDE
Cardiac disease	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Phenothiazine tranquilizers like acepromazine may exacerbate the toxic effects of organophosphate (OPP) exposure.

OPPs are cholinesterase inhibitors. Toxic effects typically grouped in 3 categories:

Muscarinic (salivation, lacrimation, urination, diarrhea, dyspnea, emesis-SLUDDE)
Nicotinic (muscle fasciculations)
Central (ataxia, nervousness, seizures)

Treat by reactivating cholinesterase, muscarinic blockade and prevention of further absorption of the toxin. Use diazepam, pentobarbital and pralidoxime (2PAM) to treat acute OPP toxicity.

You CAN use acepromazine with atropine. You can also use ace in geriatrics or animals with hepatic or cardiac disease, but must use with caution, and in lower doses.

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Which one of the following choices correctly explains how dobutamine increases blood pressure?

Decreases release of norepinephrine, producing vasoconstriction	HIDE
Inhibits dopamine secretion in the vasomotor center of the brain	HIDE
Alpha-1 blockade peripherally to increase venous return to the heart	HIDE
Beta-1 receptor stimulation, increasing myocardial contractility	HIDE
Cardiac muscarinic receptor activation increases heart rate	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

A beta-1 agonist, dobutamine increases the strength of myocardial contraction to increase blood pressure.

Dobutamine is a very potent inotrope with a short half life. It must be diluted and administered as an infusion to improve cardiac function in anesthetized and critical care patients.

Decreased release of norepinephrine is the mechanism of action of alpha-2 receptor agonists such as xylazine and medetomidine.

Muscarinic M_2 receptor blockade in the heart inhibits cardiac parasympathetic tone, allowing sympathetic tone to have a greater effect and heart rate increases. See this with anti-cholinergics such as atropine and glycopyrrolate.

Antagonism of alpha-1 receptors produces vasodilation and sometimes hypotension. This effect is seen with acepromazine.

zukureview

SAVE & EXIT

PREV NEXT

1	2	3	4	5	6	7	8	9	10
✗	✓	✓	✓	✓	✓	✗			

Which one of the following choices is the most useful treatment for a dog or cat with gastroduodenal ulcer disease?

Prednisone	HIDE
Metoclopramide	HIDE
Cisapride	HIDE
Famotidine	HIDE
Maropitant	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Famotidine is a histamine receptor (type 2) antagonist that effectively reduces gastric acid secretion. This stops the acid induced damage and allows ulcerated areas to heal.

These are typically the first line of therapy in small animals.

Proton pump inhibitors (e.g., omeprazole) strongly inhibit acid production and are used in cases of severe gastric ulceration or in cases in which the underlying cause is difficult to address.

Misoprostol is a prostaglandin E1 analog that is suggested for use by some authors as an adjunct treatment for gastric ulcers, but is most effective to prevent ulceration induced by non-steroidal anti-inflammatory drugs in dogs.

Misoprostol is a prostaglandin E1 analog that is suggested for use by some authors as an adjunct treatment for gastric ulcers, but is most effective to prevent ulceration induced by non-steroidal anti-inflammatory drugs in dogs.

Sucralfate is an adjunct treatment for patients with ulceration. It binds to ulcerated mucosa like a medical bandage, protecting these areas from further damage.

Cisapride and metoclopramide are prokinetic drugs, they stimulate gastrointestinal motility.

Drugs control acid reflex
stimulate gastrointestinal motility.

Maropitant (Cerenia®) is an antiemetic.

Prednisone is a steroid, which can be associated with the development of gastric ulcers.

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SAVE & EXIT

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1	2	3	4	5	6	7	8	9	10

Which drug is most similar in action to atropine?

Etomidate	HIDE
Docusate	HIDE
Methotrexate	HIDE
Glycopyrrolate	HIDE
Dantrolene	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

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1

Which dr

Etomida

Docusat

Methotr

Glycopy

Dantrole

Correct:

Atropine and glycopyrrolate are anticholinergic drugs primarily used as PREANESTHETICS, to prevent bradycardia, and to dry up airway secretions.

Atropine is also used in emergency treatment of organophosphate intoxication in dyspneic animals (along with pralidoxime (to decrease muscle fasciculations) and anticonvulsants such as pentobarbital or diazepam (Valium®), if needed).

Expect mydriasis (dilated pupils) and slowed gut activity with these drugs.

Docusate is a stool softener.

Etomidate is a non-barbiturate human anesthetic.

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PREV

1

Which dr

Etomida

Docusat

Methotr

Glycopy

Dantrole

Expect mydriasis (dilated pupils) and slowed gut activity with these drugs.

Docusate is a stool softener.

Etomidate is a non-barbiturate human anesthetic.

Dantrolene is a muscle relaxant used for post-anesthesia myositis in horses and in dogs and cats with functional urethral obstruction.

Methotrexate is an antineoplastic / immunosuppressant used primarily to treat lymphomas in dogs and cats.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 126-31, 641-4 and the Merck Veterinary Manual online edition.

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Which of the following choices is the best resource to determine the meat or milk withdrawal time of a medication for administration to a food animal?

Check the formulary in your truck	HIDE
Call a knowledgeable colleague	HIDE
Ask the farmer	HIDE
It is unnecessary as long as you maintain good records	HIDE
Food Animal Residue Avoidance Databank	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

The Food Animal Residue Avoidance Databank (FARAD) is the best resource.

A food animal vet must know the meat or milk withdrawal time for any medication being administered to a food animal. Also important to know the label indication for each drug.

The US Food and Drug Administration is an invaluable additional resource.

Click here to see a list of drugs prohibited for extra-label use in food animals.

The farmer, colleagues, and textbooks may not have the most current information.

Refs: The US Food and Drug Administration and the Food Animal Residue Avoidance Databank.

PREV NEXT

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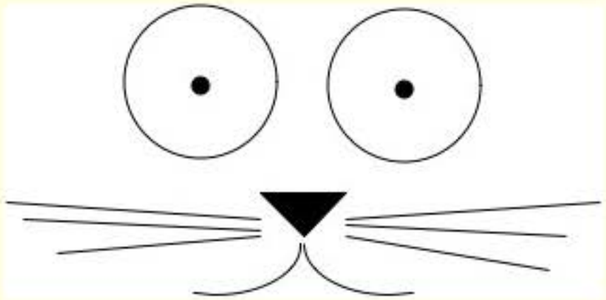
Which drug will make a cat's eyes look like this?



Pilocarpine	HIDE
Docusate	HIDE
Etomidate	HIDE
Atropine	HIDE
Dantrolene	HIDE

BACK NEXT

Correct:

Pilocarpine is a topical MIOTIC (pupil constrictor) that is mainly used to diagnose cranial nerve III lesions.

Expect mydriasis (dilated pupils) with atropine and glycopyrrolate . These anticholinergic drugs are primarily used as a PREANESTHETICS, to prevent bradycardia and dry up airway secretions.

Docusate is a stool softener.

Etomidate is a non-barbiturate human anesthetic.

Dantrolene is a muscle relaxant used for post-anesthesia myositis in horses and in dogs and cats with functional urethral obstruction.

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Which of the following drugs is a human oral hypoglycemic agent sometimes used in combination with dietary therapy when owners cannot give insulin?

Amitryptyline HCL	HIDE
Fomepizole	HIDE
Glipizide	HIDE
Azathioprine	HIDE
Pergolide mesylate	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Glipizide is a human oral hypoglycemic agent. Glipizide is sometimes used in with dietary therapy to manage cats with uncomplicated type 2 diabetes mellitus and no history of ketoacidosis.

Glipizide is not a substitute for insulin therapy. It is recommended only when owners cannot give insulin injections and/or may be considering euthanasia.

Amitryptyline HCL is a tricyclic antidepressant used for behavior disorders like self mutilation, neuropathic pruritus.

Azathioprine is an immunosuppressive agent used in DOGS with immune-mediated diseases, but is usually NOT USED in cats because they are very sensitive to bone marrow suppressive effects.

Fomepizole (4-MP) is used to treat ethylene glycol toxicity primarily in DOGS, but appears to be effective in cats if used at higher dosages.

AAHA Diabetes Guidelines 2010 for dogs and cats

Connally HE, et al. 2010. Safety and Efficacy of High-dose Fomepizole Compared with Ethanol Therapy for Ethylene Glycol Intoxication in Cats. *J Vet Emerg and Crit Care*; 20(2): 191-206.

Refs: Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 374-5, Plumb's Veterinary Drug Handbook, 7th ed. pp. 604-5, 626-9 and the Merck Veterinary Manual online edition.

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SAVE & EXIT

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The major active ingredient in most IV euthanasia solutions is:

Potassium chloride	HIDE
Phenobarbital	HIDE
Pentobarbital	HIDE
Phenytoin	HIDE
Thiopental	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Pentobarbital is one of the most commonly used drugs in IV euthanasia solutions.

For the most complete reference on veterinary euthanasia, see the 2013 AVMA Guidelines on Euthanasia.

The AVMA report states IV injection of a barbituric acid derivative is the PREFERRED METHOD for euthanasia of dogs, cats, other small animals, and horses.

Potassium chloride can be used in conjunction with general anesthesia.

Phenytoin and lidocaine are often added to pentobarbital-containing euthanasia solutions to increase cardiac depressant effects.

Thiopental is an ultra-short acting thiobarbiturate used for anesthesia induction and for short procedures. It is currently unavailable in the U.S. and Canada.

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SAVE & EXIT

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Which of the following might be applicable to idiosyncratic drug reactions?

Therapeutic drug monitoring	HIDE
Avoidance or cessation of drug once identified	HIDE
Dose reduction of drug	HIDE
Decreased risk with appropriate screening prior to therapy	HIDE
Brief withdrawal from drug	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

The appropirate way to deal with idiosyncratic reactions is avoidance or cessation of the drug once it has been identified as a problem.

Idiosyncratic reactions are uncommon and occur for no known reason. They are not dose-dependent and typically occur after several days of treatment.

Therapeutic drug monitoring, dose reduction, and brief withdrawal do not help prevent or treat idiosyncratic drug reactions. These are ways to decrease the risk of dose-dependent drug reactions.

Refs: Bassert and Thomas, McCurnin's Clinical Textbook for Veterinary Technicians,

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11	12	13	14	15	16	17	18	19	20
✓	✗	✓	✓	✗	✗	✓	✗		

Which one of the following choices is the mechanism of action of diazepam?

Antagonizes the effects of dopamine in basal ganglia	HIDE
Activates kappa receptors in cerebellum and spinal cord	HIDE
Enhances GABA receptor binding, inhibits neural activity in brain	HIDE
Agonist at alpha-2 receptors to decrease release of norepinephrine	HIDE
Inhibits N-methyl-D-aspartate receptors in spinal cord	HIDE

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Binding of a benzodiazepine (BZ) to the gamma-amino butyric acid (GABA) receptor enhances the binding of the inhibitory neurotransmitter GABA. A chloride channel opens, the cell membrane becomes hyperpolarized, and neuronal activity is inhibited.

Sedation, muscle relaxation, and anti-seizure effects are seen with BZs. Diazepam and midazolam are the BZs used most often in veterinary medicine. Zolazepam is combined with tiletamine in the general anesthetic Telazol®.

BZs are often used with opioids as premedication prior to general anesthesia in small ruminants, young foals, and older or compromised small animals (SA). Agitation can be seen when given as premedication to young healthy SA patients, especially cats.

Xylazine, medetomidine, romifidine, and detomidine are alpha-2 agonists.

Acepromazine is a dopamine antagonist in the brain. Ketamine is a N-methyl-D-aspartate (NMDA) receptor antagonist. Butorphanol activates opioid kappa receptors.

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11	12	13	14	15	16	17	18	19	20
✓	✗	✓	✓	✗	✗	✓	✗		

Which of the following is an example of a dose-dependent drug reaction?

Facial excoriations with methimazole	HIDE
Hepatopathy with carprofen	HIDE
Bone marrow suppression with phenylbutazone	HIDE
Renal disease with aminoglycosides	HIDE
Arthropathy with potentiated sulfonamides	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

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Arthropathy with potentiated sulfonamides

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Renal disease and aminoglycosides is an example of a dose-dependent drug reaction. Dose-dependent drug reactions affect all members of a type of animal (or many animals) and are predictable. The risk increases with increasing dose.

The remaining choices are all examples of idiosyncratic reactions. Idiosyncratic reactions are uncommon and occur for no known reason. They do not occur in all members of a type of animal. They are not dose-dependent and typically occur after several days of treatment.

Refs: Bassert and Thomas, McCurnin's Clinical Textbook for Veterinary Technicians, 8th edition, p. 1016.

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11	12	13	14	15	16	17	18	19	20
✓	✗	✓	✓	✗	✗	✓	✗	✗	✓

Which one of the following is an indication for the use of atropine?

Prokinetic in a horse with large intestinal impaction and ileus	HIDE
Resolve sinus tachycardia	HIDE
Antidote for pralidoxime toxicity	HIDE
Increase lacrimation in animal with keratoconjunctivitis sicca	HIDE
Treatment of bronchoconstrictive disease	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Atropine is an anticholinergic drug used to treat bronchoconstriction and as a preanesthetic to dry up airway secretions and treat sinus BRADYCARDIA.

Pralidoxime is a drug used to treat muscular fasciculations that is sometimes used along with atropine to treat animals with organophosphate toxicity.

Atropine is contraindicated in a horse with large intestinal impaction because it promotes ileus.

However, short acting anticholinergic drugs like scopolamine butylbromide (Buscopan®) can be used to temporarily relieve gas distention in horses with spasmodic colic or treat horses with esophageal obstruction.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 126-31, 641-4 and the Merck Veterinary Manual online edition

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21	22	23	24	25	26	27	28	29	30

Acepromazine maleate and barbiturate drugs like phenobarbital and pentobarbital share which TWO characteristics?

Cause hypotension, lack analgesic activity	HIDE
Cause hypothermia, need increased dose in older animals	HIDE
Cause sedation, patients' eyes stay open	HIDE
Cause hypertension, penile protrusion in large animals	HIDE
Need higher dose in patients with hepatic disease, anticonvulsant effects	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Acepromazine and barbiturates (i.e. pentobarbital) do NOT have significant analgesic activity and can cause hypotension.

Remember that pentobarbital is the barbiturate most commonly found in EUTHANASIA solutions, causing respiratory depression and cardiac arrest at euthanasia-dose levels.

The drug associated with eyes staying open is KETAMINE in CATS. Remember to put ophthalmic lubricant ointment on cat eyes when using ketamine.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 543-4, 762-8, Plumb's Veterinary Drug Handbook, 8th edition, *Acepromazine Maleate, Pentobarbital Sodium* and the Merck Veterinary Manual online edition.

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21	22	23	24	25	26	27	28	29	30

Sodium-phosphate-containing enemas are specifically contraindicated in which group?

Animals with megacolon	HIDE
Pot-belly pigs	HIDE
Cats	HIDE
Dogs weighing more than 20 kg	HIDE
Geriatric animals	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Enemas containing sodium phosphate (like Fleet® enemas, a human product) are contraindicated in cats and small dogs because they can cause severe hyperphosphatemia and subsequent hypocalcemia.

Avoid administration of phosphate-containing enemas to:

Cats

Small dogs (under 10 kg)

Patients with severe obstipation or compromise of the colonic wall

Patients with **compromised renal function**

Patients with hypernatremia, hyperphosphatemia, or hypocalcemia.

Sodium biphosphate or sodium phosphate enemas are hyperosmotic cathartics that draw fluid into the intestine by osmosis.

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SAVE & EXIT

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21	22	23	24	25	26	27	28	29	30

What happens if phenylbutazone is accidentally injected intramuscularly (IM) in a horse?

Nothing, that's a normal route	HIDE
Granuloma formation	HIDE
Swelling, necrosis	HIDE
Anaphylaxis	HIDE
Urticaria, wheals	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Accidental peri-vascular injection of phenylbutazone (IM, or SC) is very irritating, causing swelling, necrosis, sloughing.

Accidental intra-arterial injection of phenylbutazone can cause CNS stimulation, seizures, collapse and death in horses. Toxic effects of phenylbutazone include ulcerating gastroenteritis (oral cavity, stomach, and right dorsal colon) with hypoalbuminemia and diarrhea, and renal papillary crest necrosis.

Refs: Plumb's Vet Drug Handbook, 8th ed. pp. 845-847, Orsini and Divers, Manual of Eq. Emergency 2nd ed. 679-80, and the Merck Veterinary Manual online edition.

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21	22	23	24	25	26	27	28	29	30

Which animal is particularly susceptible to nonsteroidal anti-inflammatory drug (NSAID) toxicosis?

Horses	HIDE
Dogs	HIDE
Rabbits	HIDE
Cattle	HIDE
Cats	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Definitions | Report a Problem

Aspirin is toxic in Cat
Diclofenac is toxic in Dog
Phenylbutazone Iv in horse lead to collaps and death

Correct:

Cats are deficient in glucuronyl transferase, the hepatic enzyme that conjugates most NSAIDs with glucuronic acid as part of the normal metabolism and breakdown of these drugs. It takes less drug to cause NSAID toxicosis in cats. Common NSAIDS include ibuprofen, carprofen (Rimadyl ®), aspirin, naproxen and acetaminophen (Tylenol ®).

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 204-10 and the Merck Veterinary Manual online edition.

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SAVE & EXIT

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21	22	23	24	25	26	27	28	29	30

What adverse effect has been documented in association with repeated oral administration of diazepam to cats as an appetite stimulant or anxiolytic?

Seizures	HIDE
Paradoxic hyper-excitability	HIDE
Hypotension and collapse	HIDE
Renal toxicity	HIDE
Hepatic failure	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct: **Hepatic failure**

Be aware that use of ORAL diazepam as an appetite stimulant in cats is controversial, primarily because of case reports of serious hepatotoxicity.

Intravenous diazepam can stimulate a cat to eat within a few seconds after administration, but the effect is not sustained.

Mirtazapine and cyproheptadine may be used as appetite stimulants in cats.

For serious metabolic imbalances like hepatic lipidosis, nutritional support and fluids are the foundation of therapy rather than appetite stimulants. Vitamin K1 and water-soluble B vitamin supplementation are also typically indicated.

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The following drugs are commonly needed for emergency resuscitation and are kept in the *crash cart*.

Which one of the following choices correctly combines the drug, its mechanism of action, and the effect seen in the patient?

Lidocaine, calcium channel blocker, anti-arrhythmic	HIDE
Epinephrine, adrenergic agonist, vasodilation	HIDE
Atropine, anti-cholinergic, decreased heart rate	HIDE
Dobutamine, alpha agonist, substantially decreased cardiac output	HIDE
Vasopressin, vasopressin receptor agonist, vasoconstriction	HIDE

BACK NEXT LEAVE BLANK

Vasopressin, vasopressin receptor agonist, vasoconstriction.

Vasopressin (V), also called anti-diuretic hormone (ADH), is released in large amounts from the pituitary gland in times of emergency or great stress, especially when hypotension is present.

It acts on V receptors found on blood vessels (V1) and causes profound vasoconstriction.

V is used during cardiopulmonary cerebral resuscitation to increase blood flow back to the heart via this peripheral vasoconstriction.

During normality, ADH acts at receptors on renal tubules and collecting ducts (V2) to prevent excretion of water when osmolality increases.

So, when dehydrated, ADH helps retain fluid to bring blood volume and osmolality back to normal

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SAVE & EXIT

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21	22	23	24	25	26	27	28	29	30
✓	✓	✗	✗	✗	✗	✓	✓		

Most antibiotics are TOXIC to small pets like hamsters, guinea pigs and rabbits.

Which set of antibiotic drugs listed here are O.K. to use in hamsters, mice, rats, guinea pigs and rabbits?

Chloramphenicol, Trimethoprim Sulfa (TMS), Tetracycline	HIDE
Amoxicillin, Erythromycin, Trimethoprim Sulfa (TMS)	HIDE
Tetracycline, Amoxicillin-clavulanic acid, Cephalexin	HIDE
Trimethoprim Sulfa (TMS), Chloramphenicol, Enrofloxacin (Baytril®)	HIDE
Enrofloxacin (Baytril®), Cephalexin, Clindamycin (Antirobe®)	HIDE

BACK NEXT LEAVE BLANK

Correct: Trimethoprim Sulfa (TMS), Chloramphenicol, Enrofloxacin (Baytril®)

In general, remember ETC (Enrofloxacin (Baytril®), Trimethoprim Sulfa (TMS), Chloramphenicol). These 3 "ETC" antibiotics are ok in rabbits, guinea pigs, hamsters and other rodents. (Reference also Plumb's Veterinary Drug Handbook, 7th ed.)

Rabbits, hamsters and other rodents are particularly sensitive to enterotoxemia. Most antibiotics disturb their normal gut flora, particularly the beneficial gram-positive bacteria which digest high-fiber food and keep pathogenic clostridial organisms from over-growing.

Refs: The Merck Veterinary Manual online edition

zukureview

SAVE & EXIT

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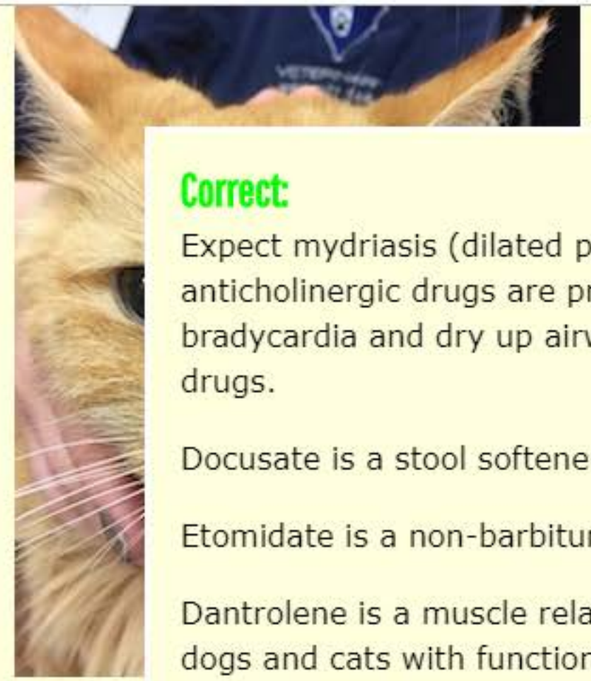
21	22	23	24	25	26	27	28	29	30
✓	✓	✗	✗	✗	✗	✓	✓	✗	

Which drug will make a cat's eyes look like this?

Dantrolene	HIDE
Atropine	HIDE
Etomidate	HIDE
Docusate	HIDE
Pilocarpine	HIDE

BACK NEXT LEAVE BLANK



Correct:

Expect mydriasis (dilated pupils) with atropine, (and also with glycopyrrolate). These anticholinergic drugs are primarily used as a PREANESTHETICS, to prevent bradycardia and dry up airway secretions. Expect slowed gut activity with these drugs.

Docusate is a stool softener

Etomidate is a non-barbiturate human anesthetic.

Dantrolene is a muscle relaxant used for post-anesthesia myositis in horses and in dogs and cats with functional urethral obstruction.

Pilocarpine is a MIOTIC. With Pilocarpine, expect tiny constricted pupils.

Dantrole	
Atropine	HIDE
Etomidate	HIDE
Docusate	HIDE
Pilocarpine	HIDE

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Which one of the following choices lists indications for metronidazole use?

Inflammatory bowel disease, anaerobic infections, giardiasis	HIDE
Pseudomonas infections, antinausea, superficial pyoderma	HIDE
Lymphoplasmocytic rhinitis, cryptosporidiosis, megaesophagus	HIDE
Trichuris vulpus, *Candida* otitis, salmonellosis	HIDE
Aerobic infections, immunostimulant, promotility agent	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct: Inflammatory bowel disease, anaerobic infections, giardiasis

Metronidazole is effective against *obligate* anaerobes (ie. *Bacteroides* spp., *Clostridium* spp.) and giardiasis. It is also amebicidal, trichomonacidal and has inhibitory effects on cell-mediated immunity, making it potentially useful in the treatment of inflammatory bowel disease.

Metronidazole is NOT effective against *facultative* anaerobes or obligate aerobes.

Important potential adverse effects include neurologic signs, hepatotoxicity, and GI upset.

Refs: Plumb's Veterinary Drug Handbook, 8th edition, *Metronidazole*, and Merck Veterinary Manual online edition

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31	32	33	34	35	36	37	38	39	40

Which one of the following chemotherapeutic agents must not be used in cats?

Lomustine	HIDE
Azathioprine	HIDE
Cyclophosphamide	HIDE
Carboplatin	HIDE
Chlorambucil	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | Definitions | Report a Problem

SAVE & EXIT

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31

Which or

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Correct:

Azathioprine may cause devastating bone marrow suppression in the feline patient.

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 134-8 and the Merck Veterinary Manual online edition.

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31	32	33	34	35	36	37	38	39	40

Why are most antibiotics contraindicated in rabbits and hamsters?

Lack sufficient hepatic p450 oxidase to metabolize	HIDE
Highly permeable blood-brain barrier	HIDE
Highly sensitive to renal toxicity	HIDE
Disrupts gram positive gut flora	HIDE
Their little hearts just can't take it	HIDE

BACK NEXT

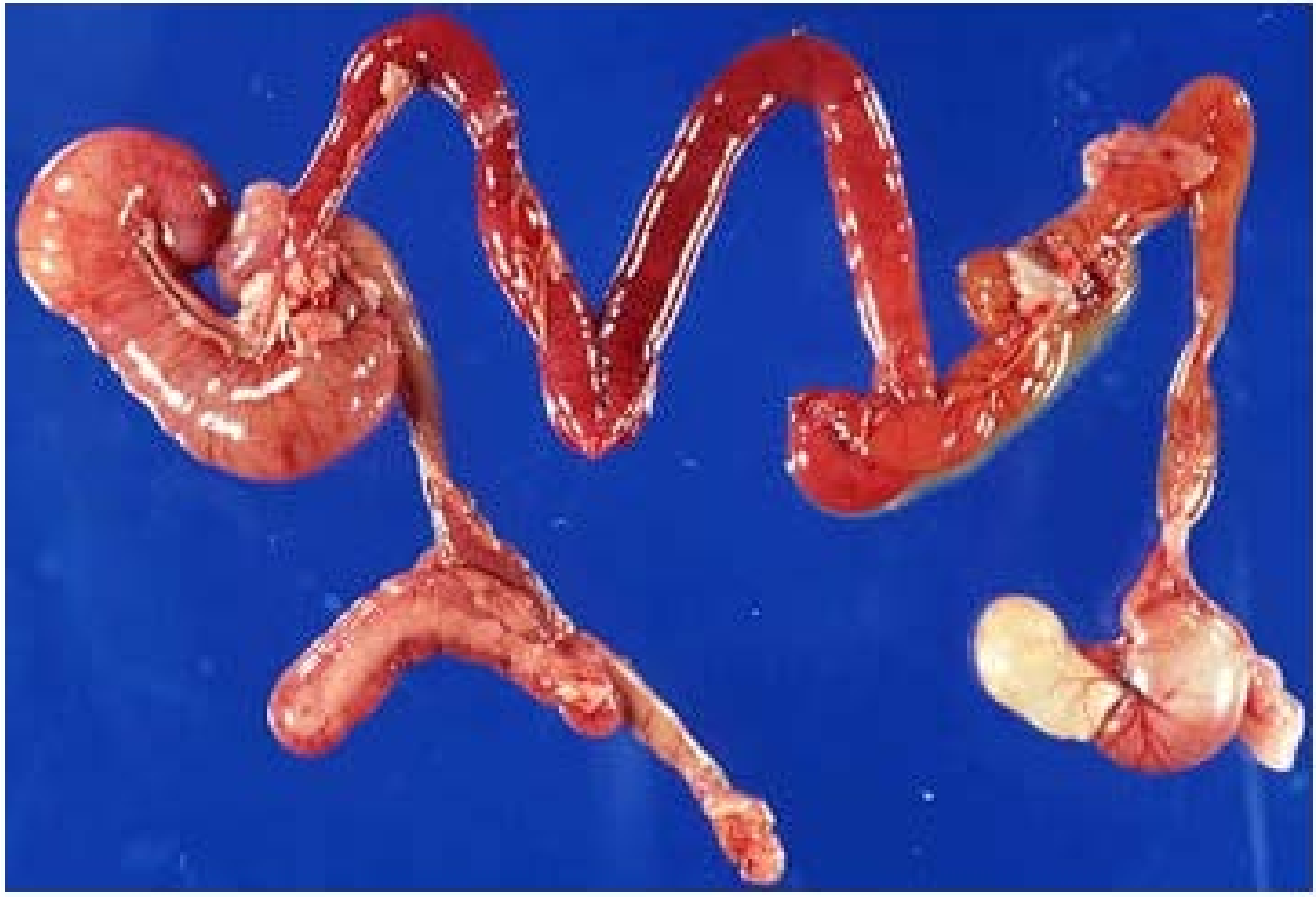
Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Rabbits, hamsters and other rodents are very sensitive to enterotoxemia. Most antibiotics disturb their normal gut flora, particularly the beneficial gram-positive bacteria which digest high-fiber food and keep pathogenic clostridial organisms from over-growing. Antibiotic-related clostridial enteropathies have been associated with *CLOSTRIDIUM DIFFICILE* in hamsters. (remember- "DIFFICULTY with ABX = *C. DIFFICILE* in hamsters"). If you see an image of dark-red hamster intestines , think ABX-related clostridial overgrowth

In general, remember ETC (Enrofloxacin (Baytril), Trimethoprim Sulfa (TMS), Chloramphenicol). "ETC" antibiotics are ok in rabbits, guinea pigs, hamsters and other rodents.

DON'T confuse with Wet Tail (proliferative enteritis), thought to be caused by *Lawsonia intracellularis* and brought on by stress, dietary changes.

Clostridium difficile , gross lesions, hamster



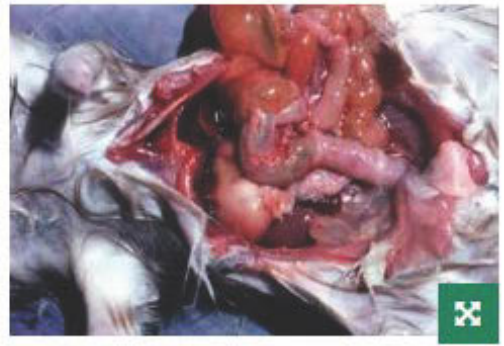
Courtesy of Dr. J. Glenn Songer.

Gross lesions of Clostridium difficile in a hamster.

Infectious Diseases

Bacterial Infections:

Diarrhea may occur in Syrian hamsters of any age and is known as "wet tail," although this euphemism is frequently used to describe the disease in young hamsters. Proliferative ileitis is the most significant intestinal disease of 3- to 10-wk old Syrian hamsters and results in high mortality. It is caused by the intracellular bacterium *Lawsonia intracellularis*. Treatment involves correcting life-threatening electrolyte imbalance and dehydration, administering antibiotics, and force feeding. Several antibiotic treatments are recommended, including doxycycline (5–10 mg/kg, PO, bid for 5–7 days), enrofloxacin (10 mg/kg, PO or IM, bid for 5–7 days), and trimethoprim-sulfamethoxazole (30 mg/kg, PO, bid for 5–7 days). Symptomatic treatment with bismuth subsalicylate may be given if diarrhea persists. Replacement electrolyte and glucose solutions should be given orally, and electrolyte fluid replacement such as saline or lactated Ringer's solution should be given at a dosage of 20 mL/100 g body wt once daily. Sequelae of proliferative ileitis in surviving Syrian hamsters may include eventual obstruction, intussusception, or rectal prolapse.

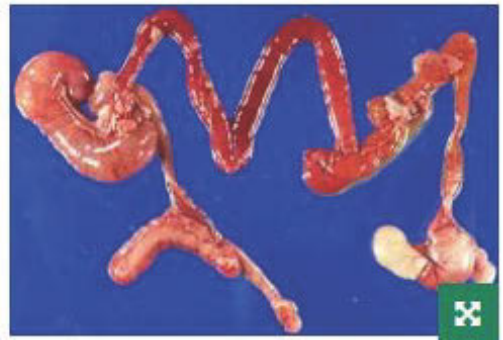


Proliferative ileitis, gross lesions, hamster

Courtesy of Dr. Louise Bauck.

Diarrhea in adult Syrian hamsters is associated with *Clostridium difficile* enterotoxemia and, as in guinea pigs, may occur 3–5 days after administration of antibiotics such as penicillin, lincomycin, or bacitracin.

Tyzzer disease due to *Clostridium piliforme* is seen in Syrian hamsters and is usually precipitated by stress such as overcrowding, high environmental temperature and humidity, heavy internal and external parasite load, and nutritionally inadequate diets. *C piliforme* is opportunistic in immunosuppressed animals and not seen in immunocompetent animals.



Bacterial pseudomycetoma has been described in several dwarf hamsters. The treatment is excision.

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SAVE & EXIT

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31	32	33	34	35 M	36	37 M	38	39	40

Which of the following is the correct explanation of the mechanism of action of epinephrine when it is used during cardiopulmonary cerebral resuscitation (CPCR)?

Activate cardiac receptors in the myocardium	HIDE
Stimulate respiratory centers in the brain	HIDE
Improve cardiac contractility	HIDE
Increase coronary circulation via peripheral vasoconstriction	HIDE

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Increase coronary circulation via peripheral vasoconstriction.

Epinephrine causes intense peripheral vasoconstriction via its effect on alpha adrenergic receptors. This promotes a shift of the blood volume back to the heart which increases aortic and coronary blood flow.

There is no way to directly 'restart' an arrested heart. Cardiac contractions resume when oxygen delivery is restored and energy production is adequate,

Vasopressin also produces peripheral vasoconstriction via activation of V_1 receptors on vasculature. It is often used in addition to or instead of epinephrine during CPCR.

Download a free issue of the Journal of Vet Emergency and Critical Care with CPCR guidelines for animals

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31	32	33	34	35 M	36	37 M	38	39	40

Which drug / caution--contraindication combination is INCORRECTLY MATCHED?

Chloramphenicol / food animals	HIDE
Amitraz (Mitaban®) / Giant breed dogs	HIDE
Clindamycin / rabbits	HIDE
Griseofulvin / pregnancy (Known teratogen in cats)	HIDE
Ivermectin / Collies	HIDE

BACK NEXT LEAVE BLANK

Overview | Mark this Question | Lab Values | | Report a Problem

Correct:

Amitraz, a treatment for generalized demodicosis, must be used with caution in TOY breeds, NOT giant breeds. Amitraz may be toxic to cats, rabbits and must use with caution in DIABETICS because can cause hyperglycemia. Typically used as a dip once weekly for one month beyond a negative skin scrape.

Expect sedation: WARN Owner 30% patients can have sedation, lethargy, anorexia 12-36 hours post treatment; 11-30% will not be cured.

Note that daily oral Ivermectin can be effective, even when Amitraz fails. BEWARE Ivermectin is contraindicated in collies, sheepdogs, herding breeds.

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An 8 month old Newfoundland puppy is treated for generalized demodicosis with amitraz. The owner should be informed about what common side effect?

Sedation	HIDE
Urticaria	HIDE
Hypoglycemia	HIDE
Anaphylaxis	HIDE
Mydriasis	HIDE

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Correct:

Sedation. Amitraz is used to treat generalized demodicosis as a dip. The most common side effect to watch out for with amitraz is SEDATION, seen in 30% of patients within 12-36 hours after treatment.

Atipamezole or yohimbine have been used as reversal agents for amitraz and xylazine.

Refs: Plumb's Veterinary Drug Handbook, 7th ed. pp. 1397-1402 and Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 342-43 and the Merck Veterinary Manual online edition.

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41	42	43	44	45	46	47	48	49

What is the definitive treatment for equine Cushing's disease?

Prednisone	HIDE
Methimazole	HIDE
Mitotane	HIDE
Pergolide	HIDE
Fludrocortisone	HIDE

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Overview | Mark this Question | Lab Values | Definitions | Report a Problem

Correct:

Definitive treatment is daily oral pergolide, a dopamine agonist.

Cushing's disease in horses is caused by pituitary pars intermedia dysfunction secondary to loss of dopaminergic inhibition. Excess ACTH produced by the hyperplastic pituitary causes the adrenal glands to produce excess steroids. The hyperplastic pituitary produces other hormones in addition to ACTH that lead to the clinical syndrome.

Mitotane is used to treat hyperadrenocorticism in dogs. Methimazole is a treatment for hyperthyroidism in cats. Fludrocortisone and prednisone are steroids used to treat hypoadrenocorticism in dogs.

A 10 kg male neutered Cocker spaniel with a history of pruritus is referred to your clinic for a second opinion.

Except for a history of pruritus, the patient is otherwise healthy.

The patient was given 5 mg of dexamethasone sodium phosphate subcutaneously a few days prior to presentation for presumed allergic dermatitis.

The dog left the first clinic on a tapering course of prednisone starting at 5 mg orally every 12 hours.

The patient is now anorexic, anemic, and has melena. Gastrointestinal ulceration is suspected.

Which one of the following choices would best explain the dog's current issues?

Dexamethasone overdose	HIDE
Clinical signs are unrelated to the medications	HIDE
Prednisone should not be used after a dexamethasone injection	HIDE
Gastrointestinal ulceration is common in dogs with allergic dermatitis	HIDE
Excess prednisone administration	HIDE

BACK NEXT

Correct:

This is a dexamethasone overdose.

Dexamethasone, a glucocorticoid hormone, is 8-10 times more potent than prednisone. It has a half-life of 48 hours in the patient.

Inappropriate dosing of dexamethasone is a common mistake in practice due to a lack of knowledge of the relative potencies of glucocorticoids.

A good rule of thumb is to calculate your typical prednisone and divide it by 8 to get your dexamethasone dose.

Click here for a table of relative glucocorticoid potencies.

Refs: Plumb's Veterinary Drug Handbook, 8th edition and Merck Veterinary Manual online edition.

Hormonal Therapy for Integumentary Disease

By **Michael Shipstone, BVSc, FACVSc, DACVD**

Glucocorticoids:

Glucocorticoids have profound effects on nearly all cell types and organ systems, particularly immunologic and inflammatory activity. They may be used in either an anti-inflammatory or immunosuppressive capacity, depending on the dosage selected. Glucocorticoids are used for hypersensitivity dermatoses, contact dermatitis, immune-mediated diseases (eg, pemphigus, pemphigoid, lupus erythematosus), and neoplasia (eg, mast cell tumor, lymphoma). Glucocorticoids may be classified according to their duration of effect and relative potency (see Table: Glucocorticoids). They may be administered PO, IV, IM, or SC.

Glucocorticoids

Drug	Relative Potency	Duration of Effect
Hydrocortisone (cortisol)	1	<12 hr
Prednisolone	4	12–36 hr
Prednisone	4	12–36 hr
Methylprednisolone	5	12–36 hr
Triamcinolone	5	12–36 hr
Flumethasone	15–30	36–48 hr
Betamethasone	25	>48 hr
Dexamethasone	30	>48 hr

The anti-inflammatory dosage of prednisolone is 0.5–1 mg/kg/day in dogs (severe cases may require 2 mg/kg/day) and 1–2 mg/kg/day in cats. This dosage is given for an induction period of 5–7 days and then reduced to the lowest possible maintenance dosage (ideally 0.25 mg/kg, every 48–72 hr or lower in dogs). Maintenance doses must be given ≥48 hr apart to minimize adrenal suppression and chronic adverse effects. The immunosuppressive dosage of prednisolone is 2.2 mg/kg/day in dogs (up to 6.6 mg/kg/day may be required in severe disease) and 4.4 mg/kg/day in cats.

The induction period is generally longer (10–20 days) than with anti-inflammatory dosing but is then gradually tapered in a stepwise fashion to an alternate-day dosing regimen once there is evidence of disease remission. Treatment should never be stopped abruptly, because of the risk of inducing signs of hypoadrenocorticism. If relapse occurs during the tapering process, the dose is increased to at least one step above the point at which the relapse occurred and tapered again if possible. In many cases, therapy may be withdrawn entirely without relapse, whereas others require lifelong treatment.

Administration PO is preferred, because dosing can be more closely regulated and physiologic processes are disrupted less than with repositol forms. In some cases, difficulties with animal handling or owner adherence may require injectable therapy. This is normally satisfactory for acute, short-term disease that does not require repeated administration (eg, a single injection of methylprednisolone acetate alters adrenocortical function in dogs for up to 10 wk).

Adverse effects include polyuria, polydipsia, polyphagia, weight gain, increased susceptibility to infection, GI ulceration, pancreatitis, osteoporosis, hyperglycemia, steroid myopathy, and calcinosis cutis. The extent and severity of adverse effects are related to the dose, duration, and type of glucocorticoid used, along with individual animal sensitivity. The most commonly encountered infections are urinary tract infections, pyoderma, and pulmonary infections. Urinary tract infections may develop in many animals on longterm glucocorticoid therapy (68% in one study), and these animals may show no clinical signs of the infection. Urine should be cultured for bacterial growth every 3–6 mo in all animals on longterm therapy.

Progressive hepatocellular swelling due to glycogen accumulation may develop during glucocorticoid therapy. Alkaline phosphatase (ALP), ALT, and γ-glutamyl transferase all show progressive increases. In dogs, the initial ALP increase is due to hepatic ALP but later is due to a cortisone isoenzyme.

Most injectable forms are labeled for IM use; however, they are commonly given SC. Local areas of alopecia, pigmentation, and epidermal and dermal atrophy may be seen with SC injection.

Thyroid Hormone:

Thyroid hormones are indicated as replacement therapy for primary, secondary, and tertiary hypothyroidism. Most cases of canine hypothyroidism are primary in nature and are due to autoimmune destruction of the thyroid gland. Drug-induced low hormone levels or “euthyroid sick syndrome” are not indications for supplementation with thyroid hormones.

Synthetic levothyroxine (T_4) is the drug of choice for canine hypothyroidism. Most dogs respond clinically to a dosage of 0.02 mg/kg, bid. Insufficient serum levels after 4–6 wk of treatment or lack of a clinical response after 12 wk are indications to increase the dose. Synthetic liothyronine (T_3) may be used for those rare animals that cannot convert T_4 to T_3. It should not be used for routine treatment of hypothyroidism, because it bypasses the normal cellular regulatory pathways and has a short half-life. Dosage is 4–6 mcg/kg, PO, bid-tid. Crude preparations from thyroid tissue and synthetic thyroid hormone combinations that mimic the T_4:T_3 ratio in people should not be used in animals.

Signs of thyrotoxicosis in cats and dogs are rare. They include polyuria, polydipsia, nervousness, aggressiveness, panting, diarrhea, tachycardia, pyrexia, and pruritus. Complications in dogs are usually related to concurrent cardiac or adrenal insufficiencies. In animals with a marginal cardiac reserve, T_4 medication should be initiated at one-fourth the recommended dosage and gradually increased to full dosage over a 1-mo period.

Trilostane:

Trilostane is a hormonally inactive, steroid competitive inhibitor of the adrenal enzyme 3β-hydroxysteroid dehydrogenase. It is used in treatment of pituitary-dependent hyperadrenocorticism. It inhibits the production of progesterone and 17-hydroxyprogestrone and their end products, including adrenal, gonadal, and placental hormones. However, the inhibition of adrenal steroidogenesis occurs at lower doses than those required to inhibit steroid hormone synthesis in other organs. The recommended starting dosage for dogs is 2–10 mg/kg/day, PO, but this may be increased or decreased, based on periodic adrenocorticotropic hormone (ACTH) stimulation test results (performed 3–8 hr after trilostane administration). If the post-ACTH plasma cortisol concentration is <20 nmol/L, trilostane administration should be stopped for 48–72 hr and the ACTH stimulation test repeated. If the post-ACTH plasma cortisol concentration is 20–200 nmol/L, the dosage should not be altered. If the post-ACTH plasma cortisol concentration is >200 nmol/L, the dosage should be increased.

Adverse effects include depression, ataxia, hypersalivation, vomiting, muscle tremors, and skin changes. Sudden death has been reported in a small number of cases. Iatrogenic hypoadrenocorticism can occur but is generally reversible. Because of its inhibition of placental hormones, trilostane is contraindicated in pregnant and nursing animals and in any animals intended for breeding. Serial biochemical, electrolyte, and hematologic analyses and ACTH stimulation tests should be performed to monitor hepatic and renal function before treatment and at 10 days, 4 wk, 12 wk, and every 3–6 mo thereafter.

Mitotane (o,p′DDD):

o,p′DDD is a chlorinated hydrocarbon with potent adrenocorticolytic effects causing selective necrosis of the zona fasciculata and zona reticularis and partial or complete necrosis of the zona glomerulosa. It is used to treat pituitary-dependent hyperadrenocorticism. Before starting therapy, food intake (amount), time taken to eat, and the 24-hr water intake should be recorded to determine a baseline. Once this has been established, a loading dose is administered daily (25 mg/kg, bid) until the animal becomes lethargic, water intake drops, appetite is reduced, or the animal has other GI adverse effects (vomiting, diarrhea) or after 5 days of administration. An ACTH stimulation test should be performed to confirm whether adequate suppression of the adrenals has been achieved.

Most dogs respond to o,p′DDD therapy at the initial loading dose within 5–10 days, and the decision to change to maintenance therapy should be based on clinical signs (reduced appetite and water intake) and ACTH stimulation test results. Dogs with a post-ACTH plasma cortisol concentration <25 nmol/L should receive no medication for 2 wk and should then be treated with 25 mg/kg/wk divided into 2 or 3 doses. Dogs with a post-ACTH plasma cortisol concentration of 25–125 nmol/L should receive 25 mg/kg/wk in 2 or 3 doses, and dogs with a post-ACTH cortisol concentration >125 nmol/L should receive 50 mg/kg/wk.

During maintenance therapy, an ACTH stimulation test should be performed after 1 mo and then every 3–4 mo. If the post-ACTH plasma cortisol concentration is <25 nmol/L, the dose of o,p′DDD

should be reduced; if the concentration exceeds 125 nmol/L, the dose should be increased, usually by about 20%–25% weekly. Although most dogs are stable on maintenance therapy, their adrenal reserve may not be adequate to handle major stress (physiologic or psychologic). In these cases, o,p′DDD administration should be discontinued and replaced with glucocorticoids (0.2 mg/kg/day, PO, tapered) during this period.

Adverse effects are relatively common, particularly in cases of o,p′DDD overdose. These include signs of hypoadrenocorticism, eg, weakness, ataxia, depression, vomiting, diarrhea, and inappetence. Biochemical and hematologic analysis may be unremarkable despite systemic illness. Treatment includes lowering the dose or ceasing administration of o,p′DDD and supplementing with glucocorticoids. Clinical improvement is usually seen within 1–6 hr. Iatrogenic hypoadrenocorticism is the most serious adverse effect and may develop at any time during maintenance treatment. Administration of o,p′DDD should be stopped and appropriate supplementation with glucocorticoids and mineralocorticoids started. Other rare CNS adverse effects include ataxia, apparent blindness, circling, and head pressing.

Progesterones:

The two most commonly used forms of progesterone are megestrol acetate and medroxyprogesterone acetate. Megestrol acetate has a quick onset of action and potent glucocorticoid and slight mineralocorticoid activity, and it may be given PO. Medroxyprogesterone acetate is antiestrogenic and has significant glucocorticoid activity. Neutered male and female cats with bilateral alopecia suspected to be caused by sex hormone imbalances may respond to treatment. The dosage of megestrol acetate is 2.5–5 mg/cat, PO, every 48 hr, decreasing to every 1–2 wk for maintenance. Medroxyprogesterone acetate is given at a dosage of 50–100 mg/cat, IM, and may be repeated in 3–6 mo.

Progestagens should be avoided whenever possible because of adverse effects; severe, prolonged adrenocortical suppression is seen even with low doses. Diabetes mellitus has been reported in cats treated with megestrol acetate. Decreased spermatogenesis, pyometra, increased levels of growth hormone with acromegaly, mammary gland hyperplasia and tumors, and behavioral changes may be seen.

Growth Hormone:

Growth hormone (somatotropin) is a polypeptide produced by the anterior pituitary that acts either directly on target tissues or indirectly through insulin-like growth factors (somatomedins) produced by the liver (also see The Pituitary Gland). It is necessary for hair growth and for development of elastin fibers in the skin. It is used to treat growth hormone–responsive alopecia in dogs. Either bovine, porcine, or human growth hormone (0.1 IU/kg, 3 times/wk for 4–6 wk) is effective. Hair usually regrows in 2–3 mo, and remission may last from 6 mo to 3 yr. Growth hormone is diabetogenic, and dogs can develop transient or permanent diabetes mellitus during therapy. Weekly monitoring of blood glucose before and during therapy is recommended.

Sex Hormones:

Several syndromes in dogs and cats have been attributed to imbalances of sex hormones; however, the etiopathogenesis of these disorders is generally poorly documented. Hypoestrogenism in spayed female dogs, hypoandrogenism in male dogs, and feline acquired symmetric alopecia may respond to sex-hormone therapy. Dosages for sex-hormone replacement therapy are empirical. Hypoestrogenism in spayed female dogs may be treated with diethylstilbestrol (0.02 mg/kg/day for 3 wk of every month

until hair regrows or for a maximum total dose of 1 mg/dog). After hair regrows, the maintenance dosage should be given 1–2 times/wk. An alternative protocol is to treat every other day or twice weekly until a response is seen. Hair regrowth should be evident in 3–4 wk, with a complete response within 4 mo. Exogenous estrogen can cause bone marrow hypoplasia, so a CBC and platelet count should be performed weekly during therapy. Other potential adverse effects include induction of estrus, hepatotoxicity, nymphomania, abortion, pyometra, or prostatic hyperplasia. Cats are highly sensitive to estrogens, and a total dose of 10 mg of diethylstilbestrol can be lethal.

Hypoandrogenism of male dogs may be treated with methyltestosterone, 0.5–1 mg/kg, PO, up to a total maximal dose of 30 mg every 48 hr. Alternatively, testosterone proprionate can be given IM once weekly at dosages of 0.5–1 mg/kg, or every 4–16 wk at 2 mg/kg. Complications include aggressive behavior, greasy hair coat, prostatic hypertrophy, and hepatotoxicity. Liver function should be evaluated before treatment and monthly during therapy.

Repositol testosterone, 12 mg/cat, IM, may be given once for treatment of feline acquired symmetric alopecia or may be combined with a low dose of diethylstilbestrol, 0.625 mg/cat, IM, or with a low dose of estradiol, 0.5 mg/cat, IM. Hepatobiliary disease has been reported in cats given testosterone.

Melatonin:

Melatonin is produced in the pineal gland and is involved in the control of photoperiod-dependent molting of some mammals. Secretion is inversely related to daylight length and is highest during the winter. Various canine hair-growth disorders including recurrent flank alopecia, pattern baldness, and excessive tricholemmal keratinization have improved with melatonin supplementation. Recurrent flank alopecia may be treated with 36-mg SC implants. Oral melatonin is also available; an empirical dosage of 3–6 mg/dog, tid-qid, has been used successfully.

zukureview

SAVE & EXIT

Score: 34 / 49 (69%)

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41	42	43	44	45	46	47	48	49

Which one of the following statements about the use of steroids in horses is false?

Can cause immunosuppression	HIDE
Used to treat Cushing's disease	HIDE
Potent anti-inflammatory effects	HIDE
Associated with laminitis	HIDE

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Correct:

Steroids are not used to treat Cushing's disease.

Equine Cushing's disease (otherwise known as pituitary pars intermedia dysfunction) is caused by a benign hyperplasia of the pituitary gland secondary to loss of dopaminergic inhibition. This is a different cause from Cushing's disease in dogs. The excess ACTH made by the hyperplastic pituitary leads to excessive cortisol release from the adrenal gland, so steroids would not be used to treat this disease.

Steroids do have potent anti-inflammatory effects and can cause immune suppression. Steroids have been associated with the development or exacerbation of laminitis in horses with preexisting risk factors for laminitis (e.g., insulin dysregulation, Cushing's disease, endotoxemia).

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What category of drug is budesonide?

Glucocorticoid	HIDE
Antibiotic	HIDE
Analgesic	HIDE
Bronchodilator	HIDE
Parasiticide	HIDE

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Correct:

Budesonide is a glucocorticoid used in inhalant preparations for asthma or orally in prednisolone-intolerant patients, particularly those with inflammatory bowel disease (IBD) or diabetes mellitus.

Budesonide can be used orally in animals with IBD with limited systemic glucocorticoid effects because of extensive first pass metabolism.

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 167-8 and the Merck Veterinary Manual online edition.

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41	42	43	44	45	46	47	48	49

Which choice is PERMITTED for use in food animals?

Chloramphenicol	HIDE
Furazolidone	HIDE
Estradiol cypionate	HIDE
Dexamethasone	HIDE
Diethylstilbesterol	HIDE

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41

Which ch

Chloram

Furazoli

Estradio

Dexame

Diethylstilbesterol

Correct:

Dexamethasone is allowed in food animals, but may cause abortion in pregnant animals. Typically, use dexamethasone in cattle to induce parturition (20-30 mg, IM, given within 2 wk of normal term).

Click here to see a list of drugs prohibited for extra-label use in food animals.
Here is an FDA summary on the Ins and Outs of Extra-Label Drug Use in Animals.

Diethylstilbesterol (DES) is banned for use in food producing animals and should never be used.

Chloramphenicol has been associated with bone marrow suppression/aplastic anemia in exposed humans, and is contraindicated in food-animals.

According to a 2006 report from the Food and Drug Administration (FDA) the use of

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41

Which ch

Chloram

Furazoli

Estradio

Dexame

Diethylst

Chloramphenicol has been associated with bone marrow suppression/aplastic anemia in exposed humans, and is contraindicated in food-animals.

According to a 2006 report from the Food and Drug Administration (FDA) the use of Estradiol cypionate (ECP) in animals is **illegal**. ECP has been used as an estrogenic hormone for reproductive therapy in food animals, but even extra-label, this is not allowed.

Furazolidone a nitrofuran, is not allowed in food animals.

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 426-8, 530-3, 853-7, Update on drugs prohibited from extralabel use in food animals, Davis, et al., JAVMA, Vol 235, No.5, Sep 1,2009 and the Merck Veterinary Manual online edition.

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41	42	43	44	45	46	47	48	49

Lethargy and sedation is seen in almost a third of canine patients treated with which drug?

Amitraz	HIDE
Terbutaline	HIDE
Yohimbine	HIDE
Melarsomine	HIDE
Cyclosporine	HIDE

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41

Lethargy

- Amitraz
- Terbutal
- Yohimbi
- Melarso
- Cyclospo

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FINISH

Correct:

Thirty percent of patients treated with amitraz (Mitaban ®) may experience sedation, lethargy, anorexia 12-36 hours post treatment. Amitraz may be toxic to cats, rabbits. Use with caution in DIABETICS because it can cause hyperglycemia. Use with caution in TOY BREEDS.

Amitraz is one treatment for generalized demodicosis. Other treatments include Ivermectin (Ivomec®) or topical imidacloprid and moxidectin for ivermectin-sensitive dogs.

Refs: Blackwell's 5-Minute Vet Consult Canine Feline, 4th ed. pp. 342-3 and the Merck Veterinary Manual online edition.

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1	2	3	4	5	6	7	8	9	10

Levetiracetam (Keppra) is included in which one of the following drug categories?

Anti-inflammatory	HIDE
Antibacterial	HIDE
Antifungal	HIDE
Anticonvulsant	HIDE
Antihelminthic	HIDE

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PREV

Levetirac

Anti-infl

Antibact

Antifung

Anticonv

Antihelmintic

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Correct:

Levetiracetam is a well-tolerated anticonvulsant in dogs and cats.

Used as a first-line agent or in conjunction with other anticonvulsants (e.g., phenobarbital, potassium bromide) if seizure control is inadequate.

It is one of a few anticonvulsants that is cleared by the kidneys.

Refs: Plumb, Veterinary Drug Handbook, 7th ed. pp. 798-800, Cote, Clinical Veterinary Advisor-Dogs and Cats, 3rd ed. pp. 322-4 and the Merck Veterinary Manual online edition.

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Which of the following is a kappa receptor agonist and a mu receptor antagonist?

Butorphanol	HIDE
Diamorphine	HIDE
Naltrexone	HIDE
Diprenorphine	HIDE
Naloxone	HIDE

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PREV

1

Which of

Butorph

Diamorp

Naltrexc

Dipreno

Naloxone

Butorphanol is a synthetic opioid and a kappa receptor agonist and a mu receptor antagonist. Its analgesic effects are produced by stimulation of the kappa receptor.

Nalbuphine and pentazocine are other opioid agonist-antagonists. These are kappa receptor agonists, but are considered antagonists or partial agonists at the mu receptor.

Diamorphine (also called diacetylmorphine) is not an opioid antagonist. It is a derivative of morphine.

Naloxone, naltrexone, and nalmefene, and diprenorphine are opioid **an**tagonists. All work to antagonize the mu, kappa, and delta receptors; naloxone and nalmefene have greater activity at mu receptors.

Naltrexone and diprenorphine are used to reverse carfentanil and etorphine, respectively. Carfentanil and etorphine are very potent opioids used in wildlife.

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Sodium-phosphate-containing enemas are specifically contraindicated in which group?

Dogs weighing more than 20 kg	HIDE
Geriatric animals	HIDE
Pot-belly pigs	HIDE
Cats	HIDE
Animals with megacolon	HIDE

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PREV

1

Sodium-

Dogs we

Geriatri

Pot-belly

Cats

Animals with megacolon

HIDE

Correct:

Enemas containing sodium phosphate (like Fleet® enemas, a human product) are contraindicated in cats and small dogs because they can cause severe hyperphosphatemia and subsequent hypocalcemia.

Avoid administration of phosphate-containing enemas to:
Cats
Small dogs (under 10 kg)
Patients with severe obstipation or compromise of the colonic wall
Patients with **compromised renal function**
Patients with hypernatremia, hyperphosphatemia, or hypocalcemia.

Sodium biphosphate or sodium phosphate enemas are hyperosmotic cathartics that draw fluid into the intestine by osmosis.

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NEXT

1	2	3	4	5	6	7	8	9	10

Which of the following receptors is activated to produce analgesia when butorphanol is given?

Sigma	HIDE
Alpha	HIDE
Delta	HIDE
Kappa	HIDE
Beta	HIDE

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SAVE & EXIT

PREV

1

Which of
given?

Sigma

Alpha

Delta

Kappa

Beta

Correct:

Butorphanol is a synthetic opioid, a kappa receptor agonist and a mu receptor antagonist. Its analgesic effects are produced by stimulation of the kappa receptor.

The analgesic effect of butorphanol is short lived, usually well less than 2 hours in dogs. Adverse side effects are uncommon.

Butorphanol can be used to reverse morphine and other mu agonists since although it binds to the mu receptor, it has no effect and functions as an antagonist.

Mild sedation is seen in younger patients, but greater effects develop in older or sick animals.

HIDE

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1

Which of
given?

Sigma

Alpha

Delta

Kappa

Beta

Improved sedation is also seen when given in combination with tranquilizers or sedatives, e.g. acepromazine or alpha-2 agonists, in all species, due to synergistic effects.

Visceral pain is mediated via kappa receptors, so butorphanol is very useful in horses with colic. In healthy horses, head tremors occur at first that dissipate within a few minutes.

See videos or a powerpoint presentation on Classification, mechanisms and effects of opioid receptors by Dr. Flavio Guzman at *Pharmacology Corner*.

Refs: Gaynor & Muir Handbook of Vet Pain Mgt 2nd ed. pp. 170-1, Riviere & Papich Vet Pharm & Therapeutics, 9th ed. pp. 325-6 and the Merck Veterinary Manual online edition.

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What adverse effect has been documented in association with repeated oral administration of diazepam to cats as an appetite stimulant or anxiolytic?

Paradoxic hyper-excitability	HIDE
Renal toxicity	HIDE
Seizures	HIDE
Hypotension and collapse	HIDE
Hepatic failure	HIDE

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PREV

1

What ad
of diazep

Paradox

Renal to

Seizures

Hypoter

Hepatic failure HIDE

Correct:

Be aware that use of ORAL diazepam as an appetite stimulant in cats is controversial, primarily because of case reports of serious hepatotoxicity.

Intravenous diazepam can stimulate a cat to eat within a few seconds after administration, but the effect is not sustained.

Mirtazapine and cyproheptadine may be used as appetite stimulants in cats.

For serious metabolic imbalances like hepatic lipidosis, nutritional support and fluids are the foundation of therapy rather than appetite stimulants. Vitamin K1 and water-soluble B vitamin supplementation are also typically indicated.

Refs: Plumb's Vet Drug Handbook, 7th ed. pp. 408-14, Center SA, et al., *Fulminant*

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1	2	3	4	5	6	7	8	9	10

The analgesia produced by morphine is caused by activation of which of the following receptors?

Mu	HIDE
Alpha	HIDE
Beta	HIDE
Sigma	HIDE
Delta	HIDE

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PREV

1

The anal
receptor

- Mu
- Alpha
- Beta
- Sigma
- Delta

Correct

The **mu** opioid receptor is activated by morphine to produce analgesia. Mu receptors are located in the brain, spinal cord, and in the periphery.

Sedation, ileus, respiratory depression, nausea and vomiting, etc are also seen.

Inflammation increases expression of opioid receptors; this is the rationale for intra-articular use of morphine.

The delta receptor is an opioid receptor but it is not activated by morphine. Sigma is no longer considered an opioid receptor.

Stimulation of the kappa receptor also produces analgesia, however, morphine has less affinity for this receptor.

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PREV

1

The anal
receptor

- Mu
- Alpha
- Beta
- Sigma
- Delta

Alpha and beta receptors are part of the sympathetic nervous system. Numerous medications act on these - alpha-2 agonists (e.g., xylazine, dexmedetomidine) and the beta-blockers (e.g., propranolol, atenolol), respectively.

Catecholamines such as epinephrine, norepinephrine, dopamine, etc. also act at symphathetic receptors.

See videos or a powerpoint presentation on classification, mechanisms and effects of opioid receptors by Dr. Flavio Guzman at *Pharmacology Corner*.

Refs: Gaynor & Muir Handbook of Vet Pain Mgt 2nd ed. pp. 164-7, Riviere & Papich Vet Pharm & Therapeutics, 9th ed. pp. 306-14 and the Merck Veterinary Manual online edition.

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1	2	3	4	5	6	7	8	9	10
✗	✓	✓	✓	✓	✓		✓		

Which of the following is an endogenous anti-nociceptive neurotransmitter that also plays a key role in nausea and vomiting?

Histamine	HIDE
Verapamil	HIDE
Glutamate	HIDE
Pentoxifylline	HIDE
Serotonin	HIDE

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PREV

1

Which of
key role

Histamir

Verapan

Glutama

Pentoxif

Serotonin HIDE

Correct:

Serotonin.

Serotonin is an inhibitory (anti-nociceptive) neurotransmitter in the brain, important in descending inhibition of pain impulses in the spinal cord.
Serotonin is also very active peripherally in the GI tract. It has been shown to play a key role in the vomiting response to chemotherapeutics. Serotonin receptor antagonists such as ondansetron are potent antiemetics often used prior to the administration of chemotherapeutics.

Glutamate is an excitatory neurotransmitter released by neurons in the spinal cord. It is part of both the physiologic and the pathologic pain response.
High levels of glutamate released with intense pain lead to the 'wind-up' phenomenon and central sensitization.

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PREV

1

Which of
key role

Histamir

Verapan

Glutama

Pentoxif

Serotonin

HIDE

Verapamil is a calcium channel blocker. Calcium channel blockers are antiarrhythmic and have negative inotropic effects (decrease force of cardiac muscle contraction).

Pentoxifylline is a phosphodiesterase inhibitor that has rheologic and antiinflammatory properties.

Histamine can stimulate nociceptors as part of the pain response, and also causes eosinophil chemotaxis, arteriolar dilation, increased capillary permeability, and nonvascular smooth muscle contraction.

See very good overviews of pain physiology: An introduction to pain pathways and mechanisms by Danielle R, Curran N, and Stephens R, from University College London Hospital, UK.

Refs: Gaynor & Muir Handbook of Vet Pain Mgt 2nd ed. pp. 18-28, Lamont LA, DVM,

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1	2	3	4	5	6	7	8	9	10
✗	✓	✓	✓	✓	✓		✓	✗	

Which one of the following drugs is most associated with aplastic anemia in exposed humans?

Amoxicillin/clavulanic acid	HIDE
Chloramphenicol	HIDE
Ceftriaxone	HIDE
Oxytetracycline	HIDE
Ciprofloxacin	HIDE

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PREV

1

Which or
humans?

Amoxici

Chloram

Ceftriax

Oxytetra

Ciprofloxacin HIDE

Correct:

Chloramphenicol has been associated with bone marrow suppression/aplastic anemia in exposed humans, and is PROHIBITED IN FOOD ANIMALS.

Note that trimethoprim-sulfa, a sulfonamide family antibiotic, has been associated with bone marrow suppression at high doses and in cases of overdosage.

Refs: Plumb's Veterinary Drug Handbook, 8th edition, *Chloramphenicol, Amoxicillin/Clavulanic Acid* and the Merck Veterinary Manual online edition.

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Chemotherapy is effective against many cancers because it targets rapidly dividing cells.

Side effects often occur because chemotherapy drugs also attack normal tissues in the body that have a high rate of cell turnover.

Which of the following tissues contain rapidly dividing cells under normal, homeostatic circumstances?

Adrenal glands; peripheral nervous system	HIDE
Bone marrow; gastrointestinal tract	HIDE
Heart; cerebral cortex	HIDE
Kidney; spleen	HIDE
Liver; lungs	HIDE

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11 12 13 14 15 16 17 18 19 20

Chemoth

Side effe
that hav

Which of
circumst

Adrenal

Bone ma

Heart; c

Kidney;

Liver; lungs

HIDE

Correct:

Bone marrow, gastrointestinal (GI) tract and hair are susceptible to the effects of chemotherapy due to their high rate of cell turnover. Related side effects may include myelosuppression, GI signs (e.g., nausea, vomiting, diarrhea, anorexia) and poor hair regrowth, respectively.

Chemotherapy is used to control the growth and spread of cancer cells. It is useful in the treatment of systemic (body-wide) cancers such as lymphoma. Chemo is also used as an adjunct to surgery and/or radiation to reduce the risk of metastasis.

Combination chemotherapy (the use of multiple chemotherapy drugs) is advantageous because different drugs kill neoplastic cells by different mechanisms. This approach reduces the chances that cancer cells will become resistant to treatment compared to monotherapy (e.g., prednisone as a single agent).

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11 12 13 14 15 16 17 18 19 20

used as an adjunct to surgery and/or radiation to reduce the risk of metastasis.

Chemoth

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Combination chemotherapy (the use of multiple chemotherapy drugs) is advantageous because different drugs kill neoplastic cells by different mechanisms. This approach reduces the chances that cancer cells will become resistant to treatment compared to monotherapy (e.g., prednisone as a single agent).

A good-to-excellent quality of life is the goal during any of chemotherapy regimen. If this goal is not achieved, dose adjustments, alternate protocols or treatment cessation should be considered.

Refs: Cote, Clinical Veterinary Advisor–Dogs and Cats, 3rd ed. pp. 610-3 and Merck Veterinary Manual online edition.

Adrenal
Bone m
Heart; c
Kidney;
Liver; lungs HIDE

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PREV

NEXT

11	12	13	14	15	16	17	18	19	20

Which one of the following choices is the mechanism of action of diazepam?

Inhibits N-methyl-D-aspartate receptors in spinal cord	HIDE
Antagonizes the effects of dopamine in basal ganglia	HIDE
Enhances GABA receptor binding, inhibits neural activity in brain	HIDE
Activates kappa receptors in cerebellum and spinal cord	HIDE
Agonist at alpha-2 receptors to decrease release of norepinephrine	HIDE

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11

Which or

Inhibits

Antagor

Enhance

Activate

Agonist at alpha-2 receptors to decrease release of norepinephrine

Correct:

Binding of a benzodiazepine (BZ) to the gamma-amino butyric acid (GABA) receptor enhances the binding of the inhibitory neurotransmitter GABA. A chloride channel opens, the cell membrane becomes hyperpolarized, and neuronal activity is inhibited.

Sedation, muscle relaxation, and anti-seizure effects are seen with BZs. Diazepam and midazolam are the BZs used most often in veterinary medicine. Zolazepam is combined with tiletamine in the general anesthetic Telazol®.

BZs are often used with opioids as premedication prior to general anesthesia in small ruminants, young foals, and older or compromised small animals (SA). Agitation can be seen when given as premedication to young healthy SA patients, especially cats.

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PREV

11

Which or

Inhibits

Antagor

Enhance

Activate

Agonist at alpha-2 receptors to decrease release of norepinephrine

BZs are often used with opioids as premedication prior to general anesthesia in small ruminants, young foals, and older or compromised small animals (SA). Agitation can be seen when given as premedication to young healthy SA patients, especially cats.

Xylazine, medetomidine, romifidine, and detomidine are alpha-2 agonists.

Acepromazine is a dopamine antagonist in the brain. Ketamine is a N-methyl-D-aspartate (NMDA) receptor antagonist. Butorphanol activates opioid kappa receptors.

Refs: Muir, Hubbell, Bednarski, and Skarda's Handbook of Veterinary Anesthesia, 4th ed. pp. 34-6, and Grimm, Tranquilli, and Lamont's Essentials of Anes and Analgesia in SA, 2nd ed. pp. 48-50.

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