



## ACZM MULTIPLE CHOICE EXAM QUESTIONS

The ACZM exam committee has released twenty-five of the Day 1 multiple choice questions and five of the Day 2 multiple choice questions from the exam database for candidate inspection/review. There are five Day 1 questions from each of the Day 1 exam areas (Terrestrial Mammals, Herpetofauna, Avian, Wildlife, and Aquatics). The Day 2 questions are only from the General Zoo exam.

These 30 questions will be deleted and not used again in the exam. They represent older, journal questions, but still reflect the current style of the questions in content and in level of difficulty. We are posting them to the ACZM website for all exam applicants to examine a "typical" Day 1 and Day 2 question. Highlighted responses represent the correct answer.

### HERPETOFAUNA

Which of the following statements concerning the use of vacuum-assisted closure (VAC) of shell and skin wounds in chelonians is correct?

- A. VAC can be used to close surgical wounds following malignancy debulking.
- B. VAC reduces scar formation, but does not increase the speed of wound healing.
- C. VAC requires an adequate seal and maintenance of appropriate negative pressure for success.
- D. VAC enables aquatic turtles to be maintained in water during treatment.
- E. VAC can be used to treat dorsal shell injuries where the lungs have been penetrated.

Which two methods are recommended for the best analysis of reptilian uroliths?

- A. Infrared spectroscopy and optical crystallography
- B. Scanning electron microscopy and chemical analysis
- C. Chemical analysis and infrared spectroscopy
- D. Optical crystallography and x-ray microanalysis
- E. X-ray microanalysis and scanning electron microscopy

Which of the following organisms was the most susceptible to growth inhibition in a bath with tricaine methane sulfonate (MS-222)?

- A. *Batrachochytrium dendrobatidis*
- B. *Aeromonas hydrophila*
- C. *Flavobacterium meningosepticum*
- D. *Enterobacter cloacae*
- E. *Pseudomonas fluorescens*



## HERPETOFAUNA

What set of the following is associated with spinal deformities and myositis in San Marcos Salamanders (*Eurycea nana*)?

- A. Microsporidian infection
- B. Excess dietary vitamin A
- C. Inappropriate supplemental light spectrum in captivity
- D. Iridovirus infection
- E. Vitamin D and calcium deficiency

Which of the following best represents the sequence of muscle relaxation in reptiles undergoing general anesthesia?

- A. Neck > front limbs > hind limbs > tail tone > righting reflex
- B. Righting reflex > neck > front limbs > hind limbs > tail tone
- C. Front limbs > neck > hind limbs > righting reflex > tail tone
- D. Neck > front limbs > hind limbs > righting reflex > tail tone
- E. Front limbs > neck > hind limbs > tail tone > righting reflex



## AQUATICS

Which of the following is true regarding anesthetic and surgical techniques in Gulf of Mexico sturgeon (*Acipenser oxyrinchus desotoi*)?

- A. Sturgeon are refractory to tricaine methanesulfonate (MS222) anesthesia.
- B. Aspiration of the swim bladder provides no benefit in laparoscopic visualization of the gonads.
- C. Phacoemulsification has been effective in removing cataracts caused by *Diplostomum* spp.
- D. Propofol results in an extreme excitatory phase after intravenous administration.
- E. Atipamezole has not been shown to be effective in reversing the effects of medetomidine.

Regarding intracoelomic catheterization of koi (*Cyprinus carpio*) using a 23 gauge butterfly needle apparatus, which of the following is true?

- A. It was easily accomplished with the needle inserted at the lateral line into the coelomic cavity.
- B. Some leakage of drug occurred, but injected enrofloxacin reached potentially therapeutic serum concentrations.
- C. The catheter could be maintained patent for up to 1 week with heparin, but enrofloxacin administration was fatal.
- D. It was easily established, but patency could not be maintained past 24 hours in most fish.
- E. The enrofloxacin dosing interval must be extended to prevent excessive serum concentrations due to extensive bioavailability via this administration route.

Which of the following is true regarding polar bears (*Ursus maritimus*) and vitamin A?

- A. The main circulating transport form of vitamin A is retinyl ester.
- B. Vitamin A oversupplementation can result in hepatic neoplasia and greening pelage.
- C. Wild polar bears ingest low quantities of vitamin A from their natural diets.
- D. Vitamin A is sequestered into specialized hepatocytes called Ito cells.
- E. Retinol binding protein is predominantly localized in hepatocyte nuclei.



## AQUATICS

Which of the following is correct regarding domoic acid toxicity in California sea lions (*Zalophus californianus*)?

- A. The source of domoic acid is a toxic dinoflagellate, *Karenia brevis*.
- B. The primary vector prey for domoic acid in California sea lions is shellfish.
- C. The most prominent clinical signs are vomiting and diarrhea.
- D. California sea lions spontaneously recover and do not have long-standing disease.
- E. A major gross pathologic finding is bilateral hippocampal atrophy.

Epidemiologic evaluation of lobomycosis in the bottlenose dolphin populations (*Tursiops truncatus*) from the southeastern USA determined that the:

- A. Waterways with increased salinity and pollutants have dolphin populations with increased disease.
- B. Causative organism is different in humans (*Candida spp.*) and dolphins (*Blastomyces spp.*).
- C. Grossly visible, white verrucous lesions are produced by a granulomatous dermal infection.
- D. Causative organism is directly contagious from contact with infected dolphins or humans.
- E. Disease is epidemic in the southeastern USA and endemic in Asian waterways.



## TERRESTRIAL MAMMALS

Which of the following is true regarding equine herpes-1 (EHV-1) in zoological species?

- A. Giraffes are not susceptible to disease, but have been found to have antibody titers to EHV-1.
- B. EHV-1 in Thomson's gazelles and giraffes has been reported to cause neurologic disease that primarily affects the spinal cord, as in horses.
- C. Susceptibility to EHV-1 varies in New World camelids: llamas are resistant to infection, but alpacas develop neurological signs.
- D. Thomson's gazelles have only developed the respiratory component of the disease and have survived infection.
- E. Zebras act primarily as carriers, but clinical disease has occurred in this species as well.

Papillomavirus in Egyptian fruit bats (*Rousettus aegyptiacus*) was associated with:

- A. Basosquamous carcinoma.
- B. Squamous cell carcinoma.
- C. Cranial edema.
- D. *Pasteurella*-like bacterial pneumonia.
- E. Periarticular hyperostosis.

Immune-mediated keratoconjunctivitis sicca in red wolves (*Canis rufus*) has been successfully treated with:

- A. Topical artificial tears.
- B. A subconjunctival cyclosporine sustained-release implant.
- C. Short-term topical flurbiprofen solution.
- D. Surgical transplantation of the contralateral lacrimal gland.
- E. Oral prednisone every other day.



## TERRESTRIAL MAMMALS

Which of the following is true regarding poxvirus infections in non-human primates?

- A. Poxvirus is only transmitted via insect vectors and is therefore not considered to be horizontally transmitted.
- B. Outbreaks in New World monkeys resulting in mortalities have been observed in captive settings.
- C. New World monkeys have a higher risk of being infected than Old World monkeys.
- D. Electron microscopy is not helpful diagnostically since poxvirus inclusions lack characteristic features.
- E. Infection with poxvirus in New World monkeys causes small, raised, benign skin lesions which are self-limiting.

Which of the following have been the most helpful in trying to confirm an antemortem diagnosis of visceral and neural *Baylisascaris* spp. infection in an orangutan?

- A. MRI scans and ELISA serology for *Baylisascaris* antibody.
- B. Cytology and *Baylisascaris* serology on spinal fluid.
- C. Ocular examination and PCR for *Baylisascaris* on peripheral blood.
- D. Response to treatment with albendazole and prednisone.
- E. Bone marrow aspirate of the ileum and fecal parasite float.



## Avian

Which diagnostic test is most useful for the detection of occult blood in cockatiel (*Nymphicus hollandicus*) excrement?

- A. Cytologic examination of feces for erythrocytes.
- B. A commercial guaiac-based chromogen test.
- C. Radiolabeling of erythrocytes and measuring fecal radioactivity.
- D. Quantifying the fluorescence of Hb-derived porphyrins with spectrophotometry.
- E. A commercial tetramethylbenzidine-based test.

In a study of psittacine birds with feather-destructive behavior,

- A. Fungi other than *Malassezia* spp. or *Candida* spp. were frequently identified.
- B. Fungi were cytologically identified in significantly greater numbers from the propatagium.
- C. *Candida* spp. was the only fungal isolate.
- D. *Malassezia* spp. was the only fungal isolate.
- E. Fungi were infrequently identified cytologically from unaffected or affected birds.

Which of the following agents can cause necrotizing splenitis, hepatitis, and ventriculitis in captive-raised raptors and is transmitted by the ingestion of day-old domestic chicks?

- A. Adenovirus
- B. Poxvirus
- C. Paramyxovirus
- D. Herpesvirus
- E. Picornavirus

Avian vacuolar myelinopathy (AVM):

- A. Can be detected in raptors after ingestion of AVM-affected waterfowl.
- B. Affects only bald eagles (*Haliaeetus leucocephalus*) and American coots (*Fulica americana*).
- C. Is caused by a toxin unique to the aquatic plant, *Hydrilla verticillata*.
- D. Affects wild bird populations primarily between May and September.
- E. Has been documented in mammals that have ingested infected birds.



## AVIAN

The population decline in greater sage-grouse (*Centrocercus urophasianus*) in the western United States is primarily due to what factor?

- A. High mortality from infection with Western equine encephalitis virus.
- B. Outbreaks of necrotic enteritis due to *Clostridium colinum*.
- C. High mortality from infection with West Nile virus.
- D. Renal failure due to environmental contamination with cadmium (Cd).
- E. Outbreaks of necrotic enteritis due to *Clostridium perfringens*.





## WILDLIFE

Which of the following statements is true concerning lobomycosis?

- A. Species naturally affected are humans, bottlenose dolphins (*Tursiops truncatus*), and tucuxi (*Sotalia fluviatilis*).
- B. Occurrence in marine mammals is limited primarily to Atlantic and Pacific coasts of Central and South America.
- C. Increased alkaline phosphatase and decreased alpha macroglobulins are associated with infection in dolphins.
- D. Definitive diagnosis depends on culture on Sabaroud's dextrose agar.
- E. Skin lesions in dolphins are predominantly around the vent, mouth, and axillary regions.

Which of the following immunological changes have been reported in FIV-infected wild lions?

- A. CD4+ lymphocyte proliferation
- B. Increase in CD4+ / CD8+ ratio
- C. CD4+ lymphocyte depletion
- D. Decrease in CD5- lymphocytes
- E. Decrease in CD8+ lymphocytes

A free-ranging Przewalski's horse (*Equus caballus przewalskii*) is found dead with evidence of pulmonary edema, tubulonephrosis, hemosiderosis, and splenic congestion. What is the most likely cause of death?

- A. *Toxoplasma gondii*
- B. *Klossiella equi*
- C. *Babesia caballi*
- D. Equine infectious anemia
- E. *Streptococcus equi*



## WILDLIFE

Which of the following statements concerning heartwater (*Cowdria ruminantium*) is true?

- A. Experimental evidence suggests that North America lacks tick species capable of acting as vectors for *Cowdria ruminantium*.
- B. *Cowdria ruminantium* has been experimentally transmitted through a tick vector from eland, giraffe, and kudu to domestic small ruminants.
- C. White-tail deer do not develop clinical disease when experimentally exposed to *Cowdria ruminantium*.
- D. The tick vector involved in the transmission of *Cowdria ruminantium* in Africa is *Amblyomma maculatum*.
- E. Long term carrier states have not been demonstrated in African ruminants.

Wild eastern gray kangaroos (*Macropus giganteus*) ranging near an aluminum smelter exhibited chronic lameness due to osteophytosis, osteopenia, incisor enamel hypoplasia, abnormal tooth wear, and abnormal bone matrix mineralization. Which of the following was detected at elevated levels in their bone tissue?

- A. Lead
- B. Selenium
- C. Fluoride
- D. Mercury
- E. Copper



## GENERAL ZOO – DAY 2

Which of the following regarding scapulohumeral luxation in nondomestic ruminants is true?

- A. A biceps tendon transposition can be used to reduce medial scapulohumeral luxations only, with no success in lateral luxations.
- B. Gait deficit in a ruminant immediately following biceps tendon transposition is indicative of nerve damage and carries a poor long-term prognosis.
- C. Surgical reduction of a scapulohumeral luxation has a better prognosis when concurrent humeral fracture or cartilage damage is present.
- D. Biceps tendon transposition was used successfully to reduce scapulohumeral luxations in larger species (> 250 kg).
- E. Gait deficit in a ruminant immediately following biceps tendon transposition is anticipated and normally resolves within 3-6 weeks post-operatively.

Which of the following best reflects measles infection in captive gorillas (*Gorilla gorilla*)?

- A. Maternal antibodies are expected to interfere with vaccine efficacy before 12 months of age.
- B. Gorillas were implicated in an outbreak of respiratory disease in a captive setting.
- C. Vaccination with a human measles vaccine does not provide protective titers.
- D. Seropositive animals with no vaccination history have been documented.
- E. Old World primates may serve as measles reservoirs for New World primates.

Which of the following statements is true regarding zoo animal pharmacology?

- A. Volume of distribution and elimination half-life for enrofloxacin in scimitar-horned oryx were documented as consistent with those reported in other artiodactylids.
- B. Therapeutic oxytetracycline serum concentrations in African elephants have been documented at 96 hours following a single intramuscular injection.
- C. Mean bioavailability for sulfadimethoxine was calculated at less than 50% in pharmacologic trials for camels and llamas.
- D. Amikacin pharmacokinetics in scimitar-horned oryx and African elephants are best represented as a two-compartment model as has been documented for other species.
- E. Camels and llamas should receive a daily standard domestic artiodactylid dose (30 mg/kg) of sulfadimethoxine to achieve therapeutic serum concentrations.



## GENERAL ZOO – DAY 2

Coccidioidomycosis in Przewalski's horses:

- A. Is typically associated with equine rhinopneumonitis.
- B. Often occurs concurrently with outbreaks in other exotic equids.
- C. Is more common than piroplasmosis in free-ranging populations.
- D. Commonly shows osteomyelitis and pneumonia at necropsy.
- E. Is characterized by increased susceptibility in subadult male animals.

Regarding the use of melengestrol acetate (MGA) in feed for contraception of captive ungulates:

- A. An increased number of dystocias were observed after MGA supplementation.
- B. A substantial increase in the incidence of pyometra was observed after MGA supplementation.
- C. Herd fecundity rates after MGA supplementation were lower than pre-MGA rates.
- D. A substantial increase in perinatal mortality was observed after MGA supplementation.
- E. Herd rates of neoplasia were increased after MGA supplementation.