2010 International Mock Board Exam Coalition

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Written Section – 220 Questions
48 Pages

*This examination is meant to be used as a study tool when preparing for the ACLAM or ECLAM Certifying Examinations. The material presented in this mock examination follows the ACLAM role delineation document, but is not necessarily reflective of the ACLAM or ECLAM Certifying Examinations.*
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1. An immunocompromised adult female *Macaca nemestrina* presented with hyperthermia and a vesicular rash, which started in the inguinal region and progressed to a generalized erythematous rash with lesions on the thorax, abdomen and face, including the lips and mouth. Which of the following diseases are these clinical signs most consistent with?

   a. Human herpes virus 3
   b. Macacine herpes virus 1
   c. Monkey pox
   d. Simian varicella virus
   e. Morbillivirus

2. Cyclosporine therapy can potentially cause which of the following problems in New Zealand White rabbits?

   a. Nephrotoxicity
   b. Photophobia
   c. Gingival overgrowth
   d. Anorexia
   e. Diarrhea

3. Which of the following **WAS NOT** found to be a reliable method for assessing acute pain in mice?

   a. Ultrasonic vocalizations
   b. Assessment by a veterinarian
   c. Lack of normal grooming behavior
   d. Intake of food or water

4. Which of the following inbred rat strains is a model of hereditary hyperbilirubinemia?

   a. Brattleboro
   b. Gunn
   c. Buffalo
   d. Lewis
   e. Copenhagen

5. The Special Emphasis Research Career Award in Pathology and Comparative Medicine offered by the Comparative Medicine Division of the NCRR in the NIH is an example of which of the following grant mechanisms?

   a. R01
   b. K01
   c. T32
   d. G20
   e. K99
6. Which of the following mouse strains has been reported to exhibit CNS signs after routine prophylactic treatment with moxidectin to treat fur mites?

   a. C57BL/6
   b. Senescence-accelerated mouse (SAMP8)
   c. AKR/J
   d. BALB/cAnNCrlBr
   e. NOD

7. According to the Animal Welfare Act and its regulations, who is responsible for ensuring investigators have appropriately considered alternatives to procedures that may cause more than momentary or slight pain or distress to the animals?

   a. The veterinarian
   b. The investigator
   c. The IACUC
   d. The Institutional official
   e. The Animal Welfare Information Center

8. A new employee in your animal facility wants to take the Laboratory Animal Technician (LAT) AALAS certification exam. This employee is a Certified Veterinary Technician, has a Bachelor of Science in Biotechnology, and has not previously taken an AALAS certification exam. What other requirements must the employee satisfy to be eligible to take the LAT exam?

   a. No other requirements; this employee is already eligible
   b. 6 months of experience in laboratory animal science
   c. 1 year of experience in laboratory animal science
   d. 2 years of experience in laboratory animal science
   e. Successful completion of the LATg plus 0.5 years of experience in laboratory animal science

9. What is the primary target organ in natural infections of mouse thymic virus (MTV)?

   a. Liver
   b. Kidney
   c. Salivary gland
   d. Thymus
   e. Spleen
10. Necropsy of a thin adult rat demonstrated lymph node congestion, scrotal and cerebellar hemorrhage, peritesticular fibrinous exudate, and splenomegaly. These findings are consistent with which of the following etiologic agents?
   a. Rat virus
   b. Rat cytomegalovirus
   c. Sialodacryoadenitis virus
   d. Hantavirus
   e. Rat cardiovirus

11. Which of the following IS NOT a miniature pig breed?
   a. Hanford
   b. Hormel
   c. Pietrain
   d. Pittman Moore
   e. Yucatan

12. In accordance with recognized rules of nomenclature which of the following designate a mouse strain with the genetic background of C57BL/6 and the ApoE allele originating from C3H/HeJ but where the donor strain is mixed?
   a. B6/Cg<sup>tmApoE-C3H/HeJ</sup>
   b. C3(Cg).B6-<i>ApoE</i>
   c. B6.Cg-<i>ApoE</i>
   d. B6/C3H<sup>tmApoE</sup>
   e. C3/B6<sup>tmApoE</sup>

13. Which of the following animal species is a widely used animal model for investigations into biliary physiology and the pathophysiology of gallstone formation?
   a. Dipodomys spectabilis
   b. Marmota monax
   c. Sigmodon hispidus
   d. Geomys bursarius
   e. Cynomys ludovicianus

14. According to the Animal Welfare Regulations and the Guide for the Care and Use of Laboratory Animals, what is the minimum required floor space for a rabbit that weights 4.3 kg?
   a. 1.5 ft<sup>2</sup>
   b. 3.0 ft<sup>2</sup>
   c. 4.0 ft<sup>2</sup>
   d. 5.0 ft<sup>2</sup>
   e. 6.0 ft<sup>2</sup>
15. Which of the following agencies enforces the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)?

   a. U.S. Fish and Wildlife Service
   b. Environmental Protection Agency
   c. Occupational Safety and Health Administration
   d. Centers for Disease Control and Prevention
   e. U.S. Department of Agriculture

16. In which of the following aging and degenerative disorders in rats is disease incidence comparable between males and females?

   a. Chronic progressive nephropathy
   b. Myocardial degeneration/fibrosis
   c. Alveolar histiocytosis
   d. Polyarteritis

17. A squirrel monkey presented with weight loss, jaundice, and clinical chemistry values consistent with pancreatitis. Post mortem examination revealed nematodes in the pancreatic ducts. What is the most likely etiology?

   a. Trichuris spp.
   b. Ascaris lumbricoides
   c. Athesmia foxi
   d. Trichospirura leptostoma
   e. Pterygodermatites alphi

18. A PI has anaesthetized a rat with an injectable preparation and has observed marked polyuria or diuresis. To which of the following agents would you attribute this effect?

   a. Chloral hydrate
   b. Ketamine
   c. Medetomidine
   d. Pentobarbital
19. For Animal Care of the Animal and Plant Health Inspection Service (APHIS) to grant approval for a microchip implantation identification system in breeding stock or research animals, which of the following requirements must be met?

   a. The microchip may be placed in any anatomical location as long as the microchip location is included in the animal identification record
   b. Animals with microchips that transfer to another licensee/registrant must always be given a tag/tattoo during transit even if a compatible scanner is available at the receiving facility
   c. The animal identification records must include the name of the microchip manufacturer and the microchip number
   d. The microchip scanner device must be readily available to the APHIS inspector and/or facility employee accompanying the APHIS representative

20. All of the following are characteristics of the Zucker rat **EXCEPT**?

   a. Hypercholesterolemia
   b. Hypercortisolism
   c. Hyperinsulinemia
   d. Hyperlipidemia
   e. Hyperphagia

21. Effective sanitation of caging equipment can be achieved by which of the following combinations of temperature and minimum exposure time?

   a. 180°F for 1 second
   b. 161°F for 10 seconds
   c. 143°F for 30 seconds
   d. 143°F for 15 minutes

22. According to the Animal Welfare Act and its regulations, an institutional animal care and use committee include which of the following?

   a. At least five members, including one veterinarian
   b. At least three members, including a scientist
   c. At least five members, include an unaffiliated member
   d. At least three members, including a veterinarian and an unaffiliated member
   e. At least three members, including a scientist, veterinarian, and an unaffiliated member
23. Which of the following is not a characteristic of natural infections with ectromelia virus?

a. The presence of a complex of hepatic and epithelial lesions bearing typical inclusions
b. Highly contagious with primary transmission via inhalation of viral particles
c. Amputation and necrosis of the distal extremities in mice that survive infection
d. High mortality in susceptible mouse strains

24. Hamsters are least likely to develop antibiotic-associated enterocolitis with which of the following antibiotics?

a. Cephalosporins
b. Erythromycin
c. Penicillins
d. Tetracycline
e. Vancomycin

25. Which of the following anesthetic agents has been associated with repeated reports of adynamic ileus, intestinal obstruction, and death in rats?

a. Alpha chloralose
b. Halothane
c. Urethane
d. Chloral hydrate
e. Tribromoethanol

26. The immunological problems in nonobese diabetic (NOD) mice include deficits in all of the following except?

a. Antigen presentation
b. T cell regulation
c. NK cell dysfunction
d. Absence of the complement protein C3
e. Cytokine production

27. The Brattleboro rat serves as a model for which one of the following endocrine diseases?

a. Diabetes insipidus
b. Diabetes mellitus
c. Hyperadrenocorticism
d. Hypoadrenocorticism
e. Hypothyroidism
28. According to the Guide for the Care and Use of Laboratory Animals, what is the maximum number of mice, each weighing up to 25 grams, which can be housed in a cage with 72 square inches of floor space?
   a. 2  
   b. 3  
   c. 4  
   d. 5  
   e. 6  

29. When working with indigenous or exotic agents with potential for aerosol transmission (e.g. Coxiella burnetii), which of the following practices and/or barriers are required?
   a. Separate building  
   b. Exhaust air not recirculated  
   c. Clothing change before entering  
   d. All wastes are decontaminated before removal from the facility  
   e. All procedures conducted in Class III biological safety cabinet  

30. Which of the following statements best describes the CMAR certification program?
   a. Requires one year of total work experience if one has a BA/BS education level  
   b. Includes a series of exams organized by AALAS and the Institute for Certified Professional Managers  
   c. Designates laboratory animal professionals with substantial accounting experience  
   d. Includes a practical examination that requires candidates to demonstrate rodent biomethodology skills  
   e. Is the European equivalent of AALAS certification  

31. Which of the following antigens should be used for the serological detection of mouse adenovirus (MAdV) infections in mice irrespective of the assay employed?
   a. MAdV-1 antigen  
   b. MAdV-1a antigen  
   c. MAdV-2 antigen  
   d. MAdV-2b antigen  
   e. No reliable antigen available to detect ALL MAdV strains  

32. Which of the following mouse strains is hepatitis-resistant when infected with Helicobacter hepaticus?
   a. A/JCr  
   b. C57BL/6  
   c. C3H/HeNCr  
   d. SJL/NCr
33. Which of the following injectable anesthetic agents is carcinogenic?
   a. Alphaxolone-alphadolone
   b. Chloral hydrate
   c. Etomidate
   d. Inactin
   e. Urethane

34. Which of the following species has a buccal pouch that has been widely used for studies of human oral cancer development?
   a. Guinea pig
   b. Hamster
   c. Rabbit
   d. Rat

35. The standard rodent antibody production test procedure starts with the inoculation of the test or control article into which of the following hosts?
   a. Species specific cell culture line
   b. Chicken embryos
   c. Specific pathogen free animals
   d. Neonatal mice

36. Which of the following describes the main purpose of a Venturi valve in a laboratory animal facility?
   a. Regulates the flow of gas within an anesthesia circuit
   b. Provides a constant flow of water to an animal cage while maintaining a drop of water at the end of the valve to make it easier for the animals to find the water source
   c. Prevents clogging of bedding removal systems
   d. Maintains constant airflow, independent of air pressure, indefinitely without requiring recalibration or routine maintenance

37. Which of the following is considered a major allergen produced by the sebaceous glands (in skin and hair shafts) and is found in the saliva of cats?
   a. Fel d 1
   b. Felis d 1
   c. Fel d 2
   d. Fel d 2β
38. You evaluate a mouse with scaly skin, regional hair loss, abrasions, and ulcerations. When examining microscopically a skin scraping from this mouse, you observe a mite with a single tarsal claw on the second pair of legs. Which of the following mites did you identify?

a. Myobia musculi
b. Myocoptes musculinus
c. Radfordia affinis
d. Radfordia ensifera
e. Psorergates simplex

39. Aged gerbils can develop protrusion of the nictitating membrane and conjunctiva with bulbar proptosis. What is the underlying cause of this condition?

a. Infection of the Harderian gland
b. Optic neuritis leading to inflammation and glaucoma
c. Retrobulbar adenoma
d. Trauma
e. Unknown

40. Which of the following describes minute volume when ventilating a laboratory animal?

a. The amount of gas delivered in a single breath
b. Tidal volume multiplied by respiratory rate
c. The total amount of gas present within a nonrebreathing anesthesia circuit
d. Tidal volume multiplied by the inspiratory flow rate

41. Which of the following models of myocardial ischemia in rabbits can be achieved with a closed chest technique?

a. Metallic coil embolization
b. Arterial puncture needle technique
c. Pneumatic occluder
d. Cryoinfarction

42. In accordance with recognized rules of nomenclature for mice, the designation “C57BL/6JEi-tth” represents which of the following types of mouse strains?

a. Outbred
b. Coisogenic
c. Congenic
d. Consomic
e. Conplastic
43. Which of the following chemical disinfectants is classified as a denaturant?
   a. Ethanol
   b. Hydrogen peroxide
   c. Chlorine dioxide
   d. Glutaraldehyde
   e. Povidone-iodine

44. Which of the following agencies enforces the International Air Transportation Association (IATA) Live Animals Regulations?
   a. Public Health Service
   b. Food and Drug Administration
   c. Centers for Disease Control and Prevention
   d. Animal and Plant Health Inspection Service
   e. U.S. Fish and Wildlife Service

45. Which of the following types of viruses is transmissible from humans to ferrets and from ferrets to humans?
   a. Calicivirus
   b. Herpesvirus
   c. Orthomyxovirus
   d. Morbillivirus
   e. Paramyxovirus

46. Which of the following is a DNA virus of mice?
   a. Ectromelia virus
   b. Lactate dehydrogenase virus
   c. Murine leukemia virus
   d. Pneumonia virus of mice
   e. Sendai virus

47. In general, the side effects of analgesic-antipyretic and anti-inflammatory drugs are due to inhibition of which of the following cyclooxygenase (COX) isoenzymes?
   a. COX-1
   b. COX-2
   c. COX-3
   d. All COX isoenzymes
48. Which of the following behavioral tests are recommended should an investigator want to assess depression in a genetically modified rodent with inherent locomotor abnormalities?
   a. Tail-suspension test
   b. Porsolt swim test
   c. Conditioned taste preference
   d. Vogel conflict test

49. Which of the following mouse strains is the most sensitive to irradiation?
   a. C57BL/6
   b. BALB/c
   c. C3H
   d. A

50. What is the minimum inward airflow velocity required when using a class III biological safety cabinet?
   a. 25 linear feet per minute
   b. 50 linear feet per minute
   c. 75 linear feet per minute
   d. 100 linear feet per minute
   e. Not applicable

51. A research facility shall notify the Animal Care Regional Director by certified mail of any change in the name, address, or ownership, or other change in operations affecting its status as a research facility, within how many days after making such a change?
   a. 5
   b. 7
   c. 10
   d. 15
   e. 30

52. Membership on AAALAC's Council on Accreditation is for a period of how many years for each elected term?
   a. 1 year
   b. 2 years
   c. 3 years
   d. 4 years
   e. 5 years
53. Which of the following viruses in mice produces syncytia in multiple organs?
   a. Adenovirus
   b. Mouse hepatitis virus
   c. Mouse thymic virus
   d. Polyoma virus

54. All of the following items are examples of an internal support cost center EXCEPT?
   a. Animal husbandry
   b. Animal health care
   c. Cage washing
   d. Internal animal research facility administration
   e. Refuse disposal

55. Use of which of the following anesthetic agents has been associated with hyperglycemia?
   a. Ketamine
   b. Xylazine
   c. Propofol
   d. Pentobarbital
   e. Tiletamine

56. Weights of which of the following organs or tissues have been used as a bioassay in the detection of estrogenic compounds in rodent diets?
   a. Ovaries
   b. Mammary glands
   c. Uterus
   d. Brain

57. Which of the following statements best describes recombinant inbred mouse strains?
   a. Strains developed by single-pair random matings of mice from an F2 generation created by crossing mice of two inbred strains.
   b. Strains developed by single-pair matings of mice from an F2 generation created by crossing mice of an inbred strain and an outbred strain.
   c. Strains developed by one or more backcrosses to one parental strain after the F1 generation and before inbreeding is begun.
   d. Strains developed by brother sister matings of an outbred line for 20 generations or more.
58. What is a RAST inhibition test used for?
   a. Demonstrate IgE specific antibodies to an allergen
   b. Evaluate bacterial contamination of hard surfaces
   c. Confirm PCR identification of transgenic DNA sequences
   d. Determine personality traits in a pre-employment screening test

59. Which of the following species IS NOT covered by the Animal Welfare Act and its regulations?
   a. Cavia porcellus
   b. Peromyscus leucopus
   c. Sigmodon hispidus
   d. Trachemys scripta elegans

60. Which of the following bacteria is the most common cause of caseous abscessation of lymph nodes and internal organs in sheep and goats?
   a. Actinobacillus lignieresii
   b. Arcanobacterium pyogenes
   c. Corynebacterium pseudotuberculosis
   d. Fusobacterium necrophorum
   e. Staphylococcus aureus

61. Which of the following ectoparasites in rats is also a vector for Haemobartonella muris?
   a. Radfordia ensifera
   b. Ornithonyssus bacoti
   c. Polyplax spinulosa
   d. Notoedres muris
   e. Hoplopleura pacifica

62. In rabbits, which of the following drugs may have to be used at higher preoperative doses and with more frequent redosing to maintain its effects as it is rapidly degraded into inactive products?
   a. Acepromazine
   b. Glycopyrrolate
   c. Chlorpromazine
   d. Atropine
   e. Propiopromazine
63. Fecal glucocorticoid metabolites are commonly used for measuring which of the following?
   a. Sexual maturity
   b. Stress
   c. Diabetic status
   d. Analgesic efficacy

64. Changes in T2 weighted MRI is generally accepted as a measure of which of the following?
   a. Blood flow due to increased fluid velocity
   b. Bone density due to decreased magnetic penetration
   c. Tissue damage due to increased intracellular and extracellular free water
   d. Muscle mass due to increased fibrous mass

65. Which of the following is NOT a cause of false-negative reactions to the intradermal tuberculin test in nonhuman primates?
   a. Concomitant disease such as measles
   b. Early or advanced stages of disease
   c. Isoniazid therapy
   d. Exposure to Freund’s complete adjuvant

66. Which of the following new world nonhuman primates is listed in Appendix I of CITES?
   a. Callithrix jacchus
   b. Callithrix geoffroyi
   c. Aotus trivirgatus
   d. Saguinus oedipus
   e. Saimiri boliviensis boliviensis

67. Which of the following injectable anesthetic or immobilization agents should be avoided in the rabbit due to potential nephrotoxic effects?
   a. Telazol
   b. Medetomidine
   c. Propofol
   d. Urethane
   e. Fentanyl/droperidol
68. Which of the following viruses causes subclinical disease in African old world monkeys yet may induce fulminant disease in old world monkeys from Asia?
   a. Cercopithecine herpesvirus 1  
   b. Saimirine herpesvirus 1  
   c. Simian T-cell leukemia virus  
   d. Simian immunodeficiency virus

69. Which of the following viruses is the most susceptible to chemical disinfection?
   a. Sendai virus  
   b. TMEV  
   c. MPV  
   d. MadV-1  
   e. EDIM

70. Which of the following rodents is frequently used for auditory research due to their large accessible tympanic bullae?
   a. Chinchilla laniger  
   b. Octodon degus  
   c. Meriones unguiculatus  
   d. Sigmodon hispidus  
   e. Cynomys ludovicianus

71. A number of performance tests can be used to certify proper functioning of biological safety cabinets. Which of the following performance tests is an indicator of airflow direction but not velocity?
   a. Downflow velocity and volume test  
   b. Inflow velocity test  
   c. Airflow smoke patterns test  
   d. HEPA filter leak test  
   e. Cabinet leak test

72. Which of the following statements DOES NOT apply to toe clipping in rodents as a form of identification?
   a. Provides a permanent method of identification  
   b. Can have an effect on behavioral testing  
   c. Requires IACUC approval  
   d. Should only be performed on weanling animals
73. According to the Animal Welfare Act and its regulations, each licensed research facility must provide the common name and numbers of animals used or held for use in research, tests, experiments, or for teaching in an annual report. Which of the following statements best describes the counting of animals for this annual report?

- a. Animals are counted once even if they are used in multiple proposals
- b. Animals are counted once for each proposal they are used in
- c. An animal in a study lasting for 3 years should only be counted once during those three years
- d. Counted animal numbers may be an estimate

74. Which of the following best describes Saimirine herpes virus 1?

- a. Alpha herpesvirus that causes severe disease in squirrel monkeys
- b. Alpha herpesvirus that causes severe disease in tamarins
- c. Gamma herpesvirus that causes severe disease in tamarins
- d. Gamma herpesvirus that causes severe disease in squirrel monkeys
- e. Beta herpesvirus that causes cytomegaly

75. Rabbits primarily excrete calcium in which of the following?

- a. Bile
- b. Feces
- c. Urine
- d. All of the above

76. Which of the following drugs is an example of a commonly used dissociative agent?

- a. Tiletamine
- b. Acepromazine
- c. Xylazine
- d. Diazepam

77. Which of the following terms best describes the B6.HRS(BKS)-Cpe^{fat}/J mouse?

- a. Coisogenic strain
- b. Congenic strain
- c. Inbred strain
- d. Recombinant strain
- e. Substrain
78. Which of the following nonhuman primate species is the most susceptible to experimental infection with Creutzfeldt-Jacob disease and other transmissible spongiform encephalopathies?

a. Aotus spp.
b. Pan spp.
c. Papio spp.
d. Saimiri spp.

79. Which of the following mouse strains CANNOT be perpetuated using a continued brother-sister mating system?

a. C57BL/6J  
b. BXD-1/Ty  
c. CcS1(N4)  
d. B6C3F1  
e. DBA/2J

80. According to the Animal Welfare Act and its regulations, who has the responsibility to ensure that all scientists, research technicians, animal technicians, and other personnel involved in animal care, treatment, and use are qualified to perform their duties?

a. IACUC  
b. Attending Veterinarian  
c. Institutional Official  
d. Research Facility  
e. Chief Executive Officer

81. In which of the following nonhuman primate families can cheek pouches be found?

a. Callitrichinae  
b. Callitrichidae  
c. Cebidae  
d. Cercopithecoidae  
e. Cercopithecidae

82. Which of the following bacteria would be the most likely cause of a foul smelling liquid stool containing mucus, frank blood and mucosal fragments in a macaque?

a. Helicobacter spp.
b. Lawsonia intracellularis  
c. Mycobacterium tuberculosis  
d. Shigella spp.
83. Which of the following drugs is an alpha-2 adrenergic antagonist?
   a. Dexmedetomidine
   b. Yohimbine
   c. Etomidate
   d. Romifidine
   e. Flumazenil

84. Which of the following strains of mice is the most frequent source of embryonic stem cells from which most gene-targeted mice are derived?
   a. C57BL/6
   b. BALB/c
   c. C3H/He
   d. 129
   e. FVB/N

85. All of the following are canine models of human diseases EXCEPT?
   a. Gray collie - cyclic hematopoiesis or neutropenia
   b. Bedlington terrier - Wilson’s disease
   c. Doberman pinscher - globoid cell leukodystrophy (Krabbe’s disease)
   d. Golden retriever - Duchenne muscular dystrophy

86. Which of the following vitamins in laboratory rodent diets is most sensitive to autoclaving?
   a. A
   b. B₁
   c. B₆
   d. D₃
   e. Folate

87. According to the Guide for the Care and Use of Laboratory Animals, HEPA-filtered recycled air without gaseous filtration can be used only if room air is mixed with at least what percent fresh air?
   a. 15%
   b. 25%
   c. 50%
   d. 75%
88. Which of the following NIH Institutes or Centers is the major source of public funding for research in laboratory animal medicine, comparative medicine, or comparative pathology?

   a. National Institute of General Medical Sciences
   b. NIH Clinical Center
   c. National Center for Research Resources
   d. National Center for Comparative Medicine
   e. National Cancer Institute

89. A biohazard sign must be posted on the entrance of any room in which there are biohazardous agents. All of the following information should be included on the sign EXCEPT?

   a. Identify the agent(s)
   b. Provide name of principle investigator and room supervisor
   c. Provide the names of all personnel authorized to enter area
   d. List emergency phone numbers
   e. Identify any special requirements for entry

90. STLV has a high rate of infection in which of the following nonhuman primates?

   a. Owl monkeys
   b. Squirrel monkeys
   c. Tamarins
   d. Baboons
   e. Chimpanzees

91. All of the following statements apply to the preparation and use of tribromoethanol as an anesthetic in mice EXCEPT?

   a. Tribromoethanol is unstable if stored at room temperature
   b. Tribromoethanol is stable if exposed to light
   c. Tribromoethanol provides anesthesia suitable for short surgical procedures
   d. Tribromoethanol’s decomposition products are toxic and irritating
   e. Tribromoethanol is classed as a sedative-hypnotic

92. Which of the following animals is the most suitable model for study of human hepatitis B virus (HBV) infection in man?

   a. Didelphis virginiana
   b. Pachyuromas duprasi
   c. Marmota monax
   d. Cynomys ludovicianus
93. For knockout mouse studies, blastocysts from which of the following inbred mouse
strains have been used almost exclusively as recipients of genetically engineered embryonic stem
cells?
   a. FVB/N
   b. C57BL/6
   c. 129/SvEv
   d. SJL/J
   e. C3H

94. The use of which of the following disinfectants in footbaths in areas housing livestock
demonstrated significant reduction in bacterial growth compared to quaternary ammonia
compounds?
   a. Chlorine dioxide
   b. Hypochloric acid
   c. Iodine
   d. Phenolic compounds
   e. Potassium peroxymonosulfate

95. If not called for by an APHIS official, an official tag identifying a dog or cat that has
been euthanized or died must be retained by a research facility for how long?
   a. 1 year
   b. 2 years
   c. 3 years
   d. 4 years
   e. 5 years

96. Successful reproduction in rnu/rnu rats is most likely with which of the following
breeding schemes?
   a. Homozygous male x homozygous female
   b. Heterozygous male x homozygous female
   c. Homozygous male x heterozygous female
   d. Heterozygous male x heterozygous female

97. An owl monkey housed in the same corridor as squirrel monkeys presents with
conjunctivitis and oral ulcerations that progress to generalized pruritis, anorexia, depression and
death. Histologically, the lesions are characterized by multifocal to coalescing areas of necrosis
with syncytia and intranuclear viral inclusions. What is the most likely etiology?
   a. Ateline herpesvirus 2
   b. Cercopithecine herpesvirus 1
   c. Saimirine herpesvirus 1
   d. Saimirine herpesvirus 2
98. Which of the following best describes meloxicam, a long-acting nonsteroidal anti-inflammatory drug (NSAID)?  
   a. Nonselective cyclooxygenase (COX)  
   b. COX 1 inhibitor  
   c. COX 2 inhibitor  
   d. COX 3 inhibitor  

99. Which of the following strains of rabbits has a normal functioning LDL receptor but still maintains a hypercholesterolemic state?  
   a. Watanabe heritable hyperlipidemic  
   b. Caldwell  
   c. St. Thomas Hospital  
   d. Conaway  
   e. La Ville Hospital  

100. Diabetic (db/db) mice are found to have a single gene-defect affecting the expression of which of the following receptors?  
   a. Leptin receptor  
   b. Insulin receptor  
   c. Cholecystokinin receptor  
   d. Neuropeptin Y receptor  

101. Which of the following statements regarding rabbits IS NOT consistent with the Animal Welfare Act and its regulations?  
   a. Indoor housing facilities for rabbits need not be heated.  
   b. Auxiliary ventilation, such as exhaust fans and vents or air conditioning, shall be provided when the ambient temperature is 85°F or higher.  
   c. Primary enclosures shall be constructed and maintained so as to provide sufficient space for the animal to make normal postural adjustments with adequate freedom of movement.  
   d. If primary enclosures are equipped with wire or mesh floors, the troughs or pans under such enclosures shall be cleaned at least twice each week.
102. According to the Animal Welfare Act and its regulations, the Institutional Animal Care and Use Committee can have no more than how many members from the same administrative unit of the facility?
   a. 1
   b. 2
   c. 3
   d. 4
   e. There is no limit

103. Mammary tumors are most commonly seen in which of the following types of rats?
   a. Brown Norway
   b. Fischer 344
   c. Long-Evans
   d. Sprague-Dawley

104. Which of the following organs is the site of infection for *Helicobacter hepaticus* infection in mice?
   a. Stomach
   b. Liver
   c. Gallbladder
   d. Kidney
   e. Intestine

105. Which of the following opioids is considered a mixed agonist-antagonist?
   a. Morphine
   b. Methadone
   c. Butorphanol
   d. Naloxone

106. Experimental autoimmune encephalomyelitis in laboratory rodents and nonhuman primates is model for which of the following diseases?
   a. Globoid cell leukodystrophy
   b. Subacute sclerosing panencephalitis
   c. Motor neuron disease
   d. Multiple sclerosis
107. Which of the following are mouse models of systemic lupus erythematosus?

a. (NZB×NZW)F1, LDLr-/-
b. Stat1-/-, (NZB×NZW)F1
c. Stat1-/-, C3H/gld
d. Rag1-/-, Stat1-/-
e. MRL/lpr, (NZB×NZW)F1

108. The first step of the nitrogen or nitrification cycle within the biofilter of a zebrafish housing system results in ammonia being converted to _____ by _____ spp. bacteria.

a. Ammonium; Nitrosomonas
b. Nitrate; Nitrobacter
c. Nitrite; Nitrobacter
d. Nitrite; Nitrosomonas

109. According to the Guide for the Care and Use of Laboratory Animals, the institutional animal care and use committee should review the animal care program and inspect the animal facilities and activity areas at least once every how many months?

a. 2 months
b. 4 months
c. 6 months
d. 12 months
e. 18 months

110. Which of the following recommended practices will help protect animal facility workers against noise-induced hearing loss?

a. Limit employee exposure of noise to 100 decibels averaged over an 8-hour work shift
b. Have an industrial hygienist survey noise levels in the animal facility
c. Institute a hearing conservation program initiated in accordance with EPA standards
d. Conduct audiometric testing as part of the pre-employment screening

111. Which of the following drugs is commonly used to induce diabetes in swine?

a. Asparginase
b. Mechlorethamide
c. Mitoxantrone
d. Streptozotocin
e. Vincristine
112. Which of the following agents can female guinea pigs transmit to their offspring during parturition, resulting in congenital conjunctivitis?
   a. Corynebacterium diptheriae
   b. Histoplasma capsulatum
   c. Chlamydophila caviae
   d. Rickettsia mooseri
   e. Porphyromonas gingivalis

113. Which of the following inhalational anesthetics contains preservatives?
   a. Halothane
   b. Isoflurane
   c. Sevoflurane
   d. Desflurane

114. Meriones unguiculatus has historically been an important animal model for the study of which of the following diseases?
   a. Cytomegalovirus (CMV) mononucleosis
   b. Epilepsy
   c. Respiratory syncytial virus (RSV) pneumonia
   d. Hantaviral respiratory syndrome

115. When using viral vectors for in vivo gene delivery in gene therapy trials of large animal models of disease, which of the following viral vectors requires dividing cells to productively infect target cells of the host animal?
   a. Adeno-associated viruses
   b. Adenoviruses
   c. Herpes simplex viruses
   d. Retroviruses

116. Which of the following methods DOES NOT dechlorinate water sufficiently for use by amphibians?
   a. Passing water through activated charcoal filters
   b. Aging open containers of water for 12 hours
   c. Aerating water
   d. Adding sodium thiosulfate
117. According to the Guide for the Care and Use of Laboratory Animals, dead animals and animal tissue waste should be stored below what temperature to reduce putrefaction?

   a. 1 °C  
   b. 2 °C  
   c. 5 °C  
   d. 7 °C  
   e. 9 °C

118. Which of the following bacteria in rats is the causative agent for rat bite and Haverhill fevers in humans?

   a. Salmonella cholerasuis  
   b. Streptobacillus moniliformis  
   c. Bacillus piliformis  
   d. Pasteurella pneumotropica  
   e. Citrobacter rodentium

119. Which of the following mouse strains is resistant to lethal infection with ectromelia virus?

   a. DBA/2  
   b. BALB/c  
   c. C57BL/6  
   d. C3H  
   e. DBA/1

120. Which of the following statements best describes non-depolarizing neuromuscular blocking agents?

   a. Competitive antagonists to acetylcholine (ACh) at postsynaptic ACh receptors  
   b. Competitive antagonists to ACh at presynaptic ACh receptors  
   c. Non-competitive antagonists to acetylcholine (ACh) at postsynaptic ACh receptors  
   d. Non-competitive antagonists to ACh at presynaptic ACh receptors

121. Cats that are deficient in the enzyme α-L-iduronidase develop which of the following syndromes or diseases?

   a. Chediak-Higashi syndrome  
   b. Krabbe’s disease  
   c. Hurler syndrome  
   d. Niemann-Pick disease  
   e. Wardenburg’s syndrome
122. Using NIH guidelines for determining per diem rates, indirect costs are also known as which of the following costs?

   a. Institutional facilities and administrative costs
   b. Office of Management and Budget (OMB) costs
   c. Non-allocable costs
   d. Over budget costs

123. All of the following compounds have vitamin K activity EXCEPT?

   a. Manaquinones
   b. Menadione
   c. Menadione sodium bisulfate complex
   d. Phylloquinones
   e. Pyridoxine

124. Which antibody class is primarily responsible for laboratory animal allergen development?

   a. IgA
   b. IgD
   c. IgE
   d. IgG
   e. IgM

125. When the drug N-nitroso-N-ethylurea (ENU) is injected into male mice, which of the following changes are created in the germ cells?

   a. Single base pair mutations
   b. Small chromosome deletions
   c. Chromosome rearrangements
   d. Robertsonian translocation
   e. DNA fragment transposition

126. What law promulgated authority for creation of good laboratory practice for nonclinical laboratory studies?

   a. Animal Welfare Act
   b. Food, Drug and Cosmetic Act
   c. Health Research Extension Act
   d. Federal Insecticide, Fungicide and Rodenticide Act
   e. Toxic Substances Control Act
127. Under which of the following circumstances can potassium chloride be used for euthanasia of swine?

   a. In newborn piglets
   b. In fetal piglets
   c. In conjunction with heavy sedation or tranquilization
   d. In conjunction with general anesthesia
   e. By intracardiac administration in an awake animal

128. Which of the following best characterizes the ovulation response of C57BL/6 mice when used for transgenic studies?

   a. Low
   b. Intermediary
   c. High
   d. No response

129. Which of the following is used as a mutagen for phenotype-driven mutagenesis in laboratory mice?

   a. Cre
   b. ENU
   c. loxP
   d. TNF

130. Which of the following treatments **WILL NOT** reduce overgrowth of microbes like Pseudomonas spp. in drinking water provided to immunodeficient rodents?

   a. Hyperchlorination
   b. Acidification
   c. Reverse osmosis
   d. Alkalinization
   e. Antibiotic administration

131. Which of the following forms is a log of work-related illness and injury?

   a. OSHA Form 301
   b. OSHA Form 300
   c. OPPR Form 207
   d. NIOSH Form 101
132. Which of the following etiological agents is the most likely cause of epistaxis and mucohemorrhagic nasal discharge in cynomolgus macaques?

a. Moraxella catarrhalis  
b. Klebsiella pneumoniae  
c. Streptococcus pneumoniae  
d. Bordetella bronchiseptica  
e. Pasteurella multocida

133. Which of the following immunodeficient mouse strains lacks T cells, B cells, and natural killer cells?

a. Athymic nude  
b. SCID-beige  
c. SCID  
d. Xid  
e. Rag 1

134. Which of the following is the most commonly used drug for chemical restraint of nonhuman primates?

a. Xylazine  
b. Ketamine  
c. Acepromazine  
d. Butorphanol  
e. Diazepam

135. Which of the following assisted reproductive technologies can be used to generate progeny from spermatozoa which have been repeatedly frozen and thawed?

a. Embryonic stem cell recombination  
b. Intracytoplasmic sperm injection  
c. In vitro fertilization  
d. Pronuclear injection

136. When only one copy of a gene is present in the whole genome that allele is called which of the following?

a. Homozygous  
b. Wild-type  
c. Heterozygous  
d. Hemizygous  
e. Mutant
137. In rabbits, how frequently do kits nurse?
   a. Once daily
   b. Twice daily
   c. At 2-3 hour intervals throughout the day
   d. At 2-3 hour intervals throughout the night

138. At a minimum, for personnel who are symptomatic for laboratory animal allergies, the use of a dust-mist respirator should be required to control symptoms and should be certified by which of the following agencies?
   a. CDC
   b. NIOSH
   c. OSHA
   d. NIH

139. Which of the following estrous cycle stages would yield a vaginal swab from a mouse with predominantly cornified epithelial cells and polymorphonuclear leukocytes?
   a. Anestrus
   b. Estrus
   c. Diestrus
   d. Metestrus
   e. Proestrus

140. Hemophilia B is a deficiency in which of the following factors?
   a. Factor VII
   b. Factor VIII
   c. Factor IX
   d. Factor X

141. All of the following anesthetic agents in fish work by blocking the conduction of sodium channels EXCEPT?
   a. Benzocaine
   b. Lidocaine
   c. Metomidate
   d. MS-222
142. Which of the following statements best describes how environmental factors can affect the health of *Danio rerio*?

a. Ambient room temperature should be maintained at 5° to 10°C below that of the containment system water
b. Water pH should be within 7.0-8.0 to facilitate higher concentrations of un-ionized NH₃
c. Elevated nitrite levels are relatively nontoxic
d. Excessive levels of dissolved oxygen can be fatal if not corrected quickly
e. No more than 8 hours of natural or fluorescent light should be provided on a daily basis

143. Reyes-like syndrome, although relatively rare, has been principally associated with which of the following mouse strains?

a. B6C3F1
b. BALB/cByJ
c. C3H/HeNCr
d. C57BL/6
e. DBA/2

144. Gamma irradiation mainly renders microorganisms nonviable by which of the following mechanisms?

a. Formation of pyrimidine dimers
b. Oxidation
c. DNA cleavage or breaks
d. DNA methylation
e. Disruption of histone complex

145. The principal hazardous characteristics of a specific pathogen or agent include all of the following **EXCEPT**?

a. Its capability to infect and cause disease in a susceptible human or animal host
b. Its virulence as measured by the severity of disease
c. Its virulence as measure by annual healthcare costs
d. The availability of preventive measures for the disease
e. The availability of effective treatments for the disease

146. In bullfrogs, the tympanum is larger than its eye in which sex?

a. Female
b. Male
c. Both sexes
d. Neither sex
147. Which of the following is the predominant circulating blood leukocyte in the laboratory mouse?
   a. Neutrophil
   b. Lymphocyte
   c. Eosinophil
   d. Monocyte
   e. Heterophil

148. According to the 2007 AVMA Guidelines on Euthanasia, which of the following methods of euthanasia is not considered an acceptable method for rodents?
   a. Barbiturates
   b. Carbon dioxide
   c. Decapitation
   d. Inhalant anesthetics
   e. Microwave irradiation

149. What event resulted in the genotype of the B6.129P2-Apoem1Unc/J, an important animal model of atherosclerosis?
   a. Spontaneous mutation in the mouse Apolipoprotein-E gene
   b. Transgenic insertion of the human Apolipoprotein-E gene
   c. Transgenic insertion of the mouse Apolipoprotein-E gene
   d. Targeted mutation of the mouse Apolipoprotein-E gene on a congenic mouse strain

150. Which of the following mutations leads to retinal degeneration in C3H mice?
   a. Mutation of Pde6b<sup>rd1</sup> gene
   b. Mutation of <i>rd</i> gene
   c. Mutation of MMTV gene
   d. Mutation of the tyrosine locus

151. Which of the following types of nonhuman primates requires vitamin D<sub>3</sub> in their diet?
   a. Prosimians
   b. Platyrhine primates
   c. Catarrhine primates
   d. Old world monkeys
152. Which of the following biosafety levels (BSLs) would be recommended for indigenous or exotic agents with potential for aerosol transmission?

a. BSL-1  
b. BSL-2  
c. BSL-3  
d. BSL-4

153. Which of the following organizations provides the unified voice for the scientific community on legislative and regulatory matters affecting laboratory animal research?

a. AALAS  
b. NABR  
c. ASLAP  
d. ILAR  
e. ACLAM

154. Which of the following factors can have profound effects on the formation of urinary solids in rodents?

a. Dietary protein intake  
b. Urinary pH  
c. Water consumption  
d. Dietary mineral intake  
e. Administration of renally excreted test articles

155. Which of the following natural or experimental routes of transmission of *Encephalitozoon cuniculi* HAS NOT been reported in rabbits?

a. Transplacental  
b. Arthropod vectors  
c. Inhalation  
d. Ingestion

156. Which of the following is highly effective in treating malignant hyperthermia when administered at the onset of clinical signs?

a. Potassium chloride  
b. Isoflurane  
c. Pentobarbital  
d. Dantrolene
157. The senescence-accelerated mouse strains were developed through selective breeding based on graded scores for senescence and pathologic phenotypes of which of the following mouse strains?

   a. BALB/c  
   b. C57BL/6  
   c. C57BL/10  
   d. AKR/J  
   e. Wistar-Furth

158. A comprehensive anatomical and functional ultrasound evaluation may be achieved by the combination of all of the following techniques **EXCEPT**?

   a. Bi-dimensional (2D)  
   b. B-mode  
   c. Doppler with or without color  
   d. FLAIR  
   e. M-mode

159. Newly imported nonhuman primates must be quarantined for a minimum of how many days at a CDC-registered primate import facility?

   a. 16 days  
   b. 31 days  
   c. 40 days  
   d. 61 days  
   e. 91 days

160. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is enforced by which of the following organizations?

   a. Environmental Protection Agency  
   b. U.S. Fish and Wildlife Service  
   c. Centers for Disease Control  
   d. Animal and Plant Health Inspection Service  
   e. National Institutes of Health

161. In which of the following anatomical structures is *Streptobacillus moniliformis* normally found as a commensal organism in rats?

   a. Nasopharynx  
   b. Oral cavity  
   c. Salivary glands  
   d. Small intestine
162. Which of the following statements **DOES NOT** apply to *Aspiculuris* spp. eggs of rats and mice?

   a. They are resistant to dessication
   b. They are resistant to many disinfectants
   c. They are resistant to high temperatures
   d. They can be identified using fecal flotation

163. Which of the following analgesics has been reported to cause pica in rats?

   a. Meloxicam
   b. Carprofen
   c. Flunixin meglumine
   d. Butorphanol
   e. Buprenorphine

164. The ferret is commonly used in all of the following models used in the field of respiratory diseases **EXCEPT**?

   a. Airway xenograft model of cystic fibrosis
   b. Pulmonary Fibrosis
   c. Influenza
   d. Severe Acute Respiratory Syndrome

165. Which of the following animals is most susceptible to experimental infection with herpes simplex virus type 1?

   a. Degu
   b. Mice
   c. Naked mole rat
   d. Rat

166. In nonhuman primates, old mammalian tuberculin tests should be read at which of the following intervals?

   a. 0, 24 and 48 hours
   b. 12, 24 and 48 hours
   c. 24, 48 and 72 hours
   d. Every 2 weeks for a total of 6 weeks
   e. Every 7 days for a total of 3 weeks
167. Which of the following drugs can be used alone as an acceptable method of euthanasia in fish and amphibians?
   a. Benzocaine
   b. Chloral hydrate
   c. Chloroform
   d. Cyanide
   e. Strychnine

168. How many lobes are present in the rat’s right lung?
   a. 1
   b. 2
   c. 3
   d. 4
   e. 5

169. Which of the following species has been associated with a Mycobacterium gordonae infection?
   a. Danio rerio
   b. Xenopus tropicalis
   c. Xenopus laevis
   d. Oryzias latipes
   e. Takifugu rubripes

170. Which of the following neurotransmitters is the principal inhibitory neurotransmitter in the mammalian nervous system?
   a. Glycine
   b. Serotonin
   c. Norepinephrine
   d. Gamma-amino-butyric-acid
   e. 5-hydroxy-tryptamine

171. Which of the following imaging methods **DOES NOT** emit ionizing radiation?
   a. Radiographs
   b. CT
   c. MRI
   d. PET
   e. SPECT
172. Which of the following is an acceptable method or agent for inactivating prions?
   a. Irradiation
   b. Boiling
   c. Formalin
   d. NaOH
   e. Alcohols

173. A ________ is an agreement in which the Agency (USDA) gives notice of an apparent violation and agrees to accept a specified penalty to settle the matter.
   a. Complaint
   b. Consent decision
   c. Stipulation
   d. Decision and order
   e. Bribe

174. Where is the sinoatrial node located in the mouse cardiovascular system?
   a. Right Auricle
   b. Right Atrium
   c. Base of the Heart
   d. Anterior Vena Cava
   e. Left Atrium

175. Which of the following etiological agents causes Glasser's Disease?
   a. Erysipelothrix rhusiopathiae
   b. Haemophilus parasuis
   c. Pasteurella multocida
   d. Streptococcus suis
   e. Transmissible gastroenteritis coronavirus

176. According to the 2007 AVMA Guidelines on Euthanasia, which of the following inhalant euthanasia agents requires a monitor be placed in the room to warn personnel of hazardous concentrations?
   a. Argon
   b. Carbon dioxide
   c. Carbon monoxide
   d. Nitrogen
177. Experimental autoimmune encephalomyelitis was first associated with which of the following?

a. Distemper vaccination in dogs as a model for measles in humans  
b. Parvovirus vaccination in dogs as models for measles in humans  
c. Radiation therapy provided as a treatment for brain tumors  
d. Pasteur’s rabies vaccine in humans

178. Nets are typically used to capture nonhuman primates up to what weight?

a. 1 kg  
b. 2.5 kg  
c. 3.5 kg  
d. 4 kg  
e. 4.5 kg

179. Multiple major survival surgeries are discouraged by the Guide for the Care and Use of Laboratory Animals and the Animal Welfare Act and its regulations but may be permitted under all of the following circumstances EXCEPT?

a. Cost savings  
b. Routine or emergency veterinary procedure by the attending veterinarian  
c. Scientific justification provided by the principal investigator in writing  
d. Special circumstances approved by the administrator of APHIS  
e. IACUC approval

180. Which of the following descriptions would apply to encephalomyocarditis virus?

a. Single stranded RNA cardiovirus  
b. Single stranded RNA coronavirus  
c. Single stranded DNA parvovirus  
d. Double stranded RNA reovirus  
e. Single stranded RNA paramyxovirus

181. In Meriones unguiculatus, which of the following is the most common spontaneous neoplasm found in females greater than 3 years of age?

a. Squamous cell carcinoma of the sebaceous ventral marking gland  
b. Mammary fibroadenoma  
c. Ovarian granulosa cell tumor  
d. Splenic hemangioma  
e. Hepatocellular carcinoma
182. All of the following are examples of physiologic consequences of untreated or undertreated pain EXCEPT?

a. Increased blood pressure
b. Increased cardiac output
c. Increased heart rate
d. Increased respiratory rate
e. Increased tidal volume

183. Which of the following IS NOT measured by a Swan-Ganz catheter?

a. Aortic root pressure
b. Cardiac output
c. Pulmonary artery occlusion pressure
d. Pulmonary wedge pressure
e. Systolic, diastolic, and mean pulmonary artery pressures

184. In which of the following diets is the concentration of all of the ingredients (quantitative ingredient formulation) publicly available?

a. Closed-formula diet
b. Constant nutrition diet
c. Open-formula diet
d. Fixed formula diet

185. Who is responsible for the appropriate training of new members of the institutional animal care and use committee (IACUC)?

a. Institutional official
b. Institution
c. IACUC chair
d. Attending veterinarian
e. Animal resources director

186. Which of the following is not considered criteria for diagnosing Lyme disease in a dog?

a. Rapid response of clinical signs after appropriate antibiotic therapy
b. Presences of fever, limping or malaise
c. Positive IFA or ELISA for *Borrelia*
d. History of exposure to *Ixodes* ticks
e. History of vaccination
187. Which of the following best describes the function of the glenoid labrum?
   a. Passive shoulder stabilization  
   b. CSF conduit between the lateral ventricles  
   c. Maintenance of balance during cross extensor activities  
   d. Alternative metabolic shuttle pathway involved in aspirin toxicity

188. All of the following are general clinical signs of pain in the rat EXCEPT?
   a. Buphthalmia  
   b. Expiratory grunts  
   c. Poor gait  
   d. Stretching  
   e. Teeth chattering

189. Blastocyst production in C57BL/6 mice may be reduced when mice are housed under which of the following conditions?
   a. Ventilated racks  
   b. 40% relative humidity  
   c. Static racks  
   d. Corncob bedding

190. According to the Animal Welfare Act and its regulations, the ambient temperature in the sheltered part of the facility for nonhuman primates must not fall below 45°F and must not rise above 85°F for how many consecutive hours?
   a. 2  
   b. 3  
   c. 4  
   d. 5  
   e. 6

191. Which of the following statements describes sponsored research as defined by the Office of Management and Budget (OMB) Circular A-21?
   a. All research activities that are sponsored by Federal agencies and organizations  
   b. All research activities that are sponsored by Federal and non-Federal agencies and organizations  
   c. All research and developmental activities that are sponsored by Federal agencies and organizations  
   d. All research and developmental activities that are sponsored by Federal and non-Federal agencies and organizations
192. Which of the following statements best describes clitoral length in female offspring of Macaca mulatta?

a. Increased clitoral length due to excess maternal androgen is common
b. Clitoral length is highly variable and has no relationship to fertility
c. Androgen-induced increases in clitoral length is divided into fetal and paternal sources
d. Maternal estrogens are closely associated with clitoral formation and length

193. Which of the following statements DOES NOT apply to rabbit fur mites?

a. Genus and species - Leporacarus gibbus
b. Diagnosis may be made with tape test, fur pluck, skin scraping, and hair combing
c. Populates the distal 1/3 of the hair shaft of the dorsal lumbar and tail area
d. Life cycle is not completed on the host

194. Which of the following classes of drugs provides no degree of analgesia?

a. Alpha-2 adrenergic agonists
b. Opioids
c. Neuromuscular blocking agents
d. NSAIDs
e. NMDA-receptor antagonists

195. Available data indicate that, temperature, humidity and concentrations of gases and particulate matter are often _____ in an animal’s microenvironment than in the macroenvironment?

a. Equal
b. Lower
c. Higher
d. Unrelated

196. Which of the following Animal Biosafety Levels (ABSL) involves practices using agents associated with human disease that results only from ingestion as well as percutaneous and mucous membrane exposure?

a. ABSL-1
b. ABSL-2
c. ABSL-3
d. ABSL-4
e. ABSL-5
197. All of the following represent phases of the hair cycle EXCEPT?
   a. Anagen
   b. Catagen
   c. Metagen
   d. Telogen

198. All of the following are opioid receptors EXCEPT?
   a. Mu
   b. Kappa
   c. Delta
   d. Lambda

199. All of the following laboratory animals are classified as induced ovulators EXCEPT?
   a. Cat
   b. Ferret
   c. Guinea pig
   d. Rabbit
   e. Woodchuck

200. According to the Public Health Service Policy on Humane Care and Use of Laboratory Animals, a satellite facility is any containment outside of a core facility or centrally designated or managed area in which animals are housed for more than how many hours?
   a. 8 hours
   b. 12 hours
   c. 24 hours
   d. 36 hours
   e. 48 hours

201. Which of the following species has the smallest RBC diameter?
   a. Dog
   b. Horse
   c. Pig
   d. Goat
   e. Cat
202. Urethral obstruction caused by seminal coagulum in C57BL/6J mice was associated with which of the following anesthetic agents?

a. Isoflurane  
b. Ketamine/xylazine  
c. Ketamine/dexmedetomidine  
d. Ketamine/medetomidine  
e. Sevoflurane

203. Which of the following can cause a female rat to have persistent estrus and cystic follicles in the ovaries without formation of corpora lutea?

a. Continuous light  
b. Restriction of feed access  
c. Noise  
d. 12:12 light to dark cycle  
e. Vibration

204. In terms of radiation absorbed dose, what is one Gray equivalent to?

a. 10 Rads  
b. 100 Rads  
c. 1,000 Rads  
d. 10,000 Rads

205. Which of the following agents is responsible for hepatic coccidiosis in rabbits?

a. Eimeria intestinalis  
b. Eimeria piriformis  
c. Eimeria irresidua  
d. Eimeria stiedae  
e. Eimeria perforans

206. Which of the following ruminants is considered to be the most sensitive to xylazine?

a. Cattle  
b. Goats  
c. Sheep  
d. Deer
207. In the laboratory, a period of deep hibernation can be induced in woodchucks by removing food and reducing the room temperature to ________ or lower?

   a. 5°C  
   b. 10°C  
   c. 15°C  
   d. 20°C  
   e. 25°C

208. Which of the following phenomena possibly represents the most common source of genetic variation within rodent colonies?

   a. Spontaneous mutations  
   b. Genetic manipulation  
   c. Breeding errors  
   d. Genetic drift

209. Antibiotic therapy is not recommended for food poisoning caused by enterohemorrhagic E. coli infection, because it increases the risk of serious complications, due to the release of which of the following toxins from killed bacteria?

   a. Aflatoxin  
   b. Exotoxin C  
   c. Neurovatin  
   d. Ochratoxin  
   e. Verotoxin

210. Thigmotactic species benefit from which of the following housing considerations?

   a. Perches  
   b. Increased wall space  
   c. Individual housing  
   d. Group housing  
   e. Cage complexities

211. According the Guide for the Care and Use of Laboratory Animals, accessories such as cage tops should be sanitized how often?

   a. At least once daily  
   b. At least once weekly  
   c. At least once every two weeks  
   d. At least once monthly
212. Which of the following factors is associated with “fading infant syndrome” in nonhuman primates?
   a. Inadequate dietary levels of vitamins A and C
   b. Increased plasma copper
   c. Housing animals in galvanized steel caging
   d. Decreased levels of dietary zinc
   e. Housing animals in stainless steel cages

213. According to the Animal Welfare Act and its regulations, which of the following species SHOULD NOT be housed outdoors under any circumstances?
   a. Guinea pigs
   b. Hamsters
   c. Rabbits
   d. Tamarins
   e. Any species may be housed outdoors provided facilities are located in an appropriate climate and shelter is available

214. Decreased osteoblast and increased osteoclast formation or activity can result in which of the following conditions?
   a. Anemia
   b. Dementia
   c. Myalgia
   d. Osteochondrosis
   e. Osteoporosis

215. Which of the following values is the minimum recommended humidity level in an animal housing room?
   a. 20%
   b. 25%
   c. 30%
   d. 70%

216. Minerals and organic compounds in the urine from which of the following animals often adhere to cage surfaces and necessitate treatment with acid solution before washing?
   a. Ferrets
   b. Dogs
   c. Axolotls
   d. Hamsters
   e. Swine
217. Regarding human exposure to inhalant anesthetics, the concentrations of halogenated anesthetic gases should be less than _____?
   
   a. 1 ppm  
   b. 2 ppm  
   c. 5 ppm  
   d. 10 ppm  
   e. 25 ppm  

218. What is the theoretical average percentage of host genome in a N10 backcross generation?
   
   a. 99.8 %  
   b. 98 %  
   c. 96 %  
   d. 99.9 %  
   e. 100 %

219. When a genetic analysis using SNPs is performed, what is one looking for?
   
   a. Changes in one nucleotide  
   b. Length variation in nucleotide repetition  
   c. Polymorphisms in DNA fragment length not due to nucleotide repetition  
   d. Viral sequences  
   e. Microsatellites

220. All of the following types of grants from NIH require instruction in responsible conduct of research **EXCEPT**?
   
   a. F32  
   b. K01  
   c. R01  
   d. T32

END OF EXAM