Comparative Medicine-April-August, 2006

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1. What test is the "gold standard" for characterizing aquaporin function?

- A. Lymphocyte swelling assay
- B. Aquaporin cell assay
- C. Xenopus oocyte swelling assay
- D. Chicken egg swelling assay
- E. Neutrophil swelling assay

1. What test is the "gold standard" for characterizing aquaporin function?

- A. Lymphocyte swelling assay
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- C. Xenopus oocyte swelling assay
- D. Chicken egg swelling assay
- E. Neutrophil swelling assay
- Answer: C

2. What are the 2 groups of aquaporins?

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- Those that are water-permeable only
- Those that are permeable to water and glycerol, urea and other small molecules

3. In what mouse strain has a spontaneous nephrogenic diabetes insipidus, including renal medullary lesions with increasing age, been identified?

3. In what mouse strain has a spontaneous nephrogenic diabetes insipidus, including renal medullary lesions with increasing age, been identified?

- **SWR/J mice**
- **(Also, NDI and SWV mice)**

- *4. While studying aquaporins, what background lesions in CD-1 mice may confound problems found in mice lacking aquaporins?*

4. While studying aquaporins, what background lesions in CD-1 mice may confound problems found in mice expressing mutations in aquaporins?

- **High incidence of spontaneous renal lesions, including cortical cysts (4.7%), hydronephrosis (6.7%), tubular dilatation (5.9%), and tubular dilatation-regeneration (4.7%).**

5. What is the function of aquaporin molecules?

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- **To transport water across cell membranes**

6. As is the case with many studies using genetically engineered mice (GEM), what kinds of problems were identified in studies of GEM mice created to affect aquaporins?

6. As is the case with many studies using genetically engineered mice, what kinds of problems were identified in studies of GEM mice created to study aquaporins?

- **Lack of information on genetic background of mice; use of outbred, or hybrid backgrounds causing genetic heterogeneity which is difficult to distinguish from the mutation of interest; mice may be inbred, which will cause inbreeding depression which may be mistaken for affects of the mutation; use of background strains that are likely to have lesions in the systems of interest; insufficient information on backcrossing; probably others**

- Ref for questions 1-6

- Wasson, K. Phenotypes of aquaporin mutants in genetically altered mice. Comp Med 56(2): 96-104, 2006.

- ***7. What is thought to be much of the reason for recurrence of colon cancer after primary treatment in humans?***

7. What is thought to be much of the reason for recurrence of colon cancer after primary treatment in humans?

- **Minimal residual disease (MRD), characterized by disseminated tumor cells in blood, bone marrow and lymph nodes**

- ***8. How did the authors of a recent publication propose to improve the induction of metastasis and MRD in a mouse model of colon cancer?***

8. How did the authors of a recent publication propose to improve the induction of metastasis and MRD in a mouse model of colon cancer?

- **Use established colon cancer cell lines, rather than tumors collected from humans**

- Ref for Questions 7-8
- Thalheimer, A, B. Illert, M. Bueter, et al. Feasibility and limits of an orthotopic human colon cancer model in nude mice. Comp Med 56(2): 105-109.

9. What Helicobacters other than H. hepaticus were found in a recent survey of mice and rats from Swedish laboratory animal facilities?

9. ***What Helicobacters other than H. hepaticus were found in a recent survey of mice and rats from Swedish laboratory animal facilities?***

- **H. ganmani, H. typhlonius, H. rodentium, and an uncharacterized Helicobacter most similar to H. apodemus**

- Ref for Question 9
- Johansson, SK, RE Feinstein, KE Johansson, et al. Occurrence of Helicobacter species other than H. hepaticus in laboratory mice and rats in Sweden. Comp Med 56(2): 110-113, 2006.

10. What is preemptive analgesia, and why might it be desirable?

10. What is preemptive analgesia, and why might it be desirable?

- **Analgesia given before the noxious stimulus occurs (ie. Before surgery). Theoretically, it prevents the numerous impulses that occur during a traumatic event such as surgery from reaching the CNS and possibly contributing to peripheral and central sensitization of the CNS. If sensitization is limited, theoretically analgesia should be accomplished more easily.**

- ***11. What effects other than analgesia have been reported after administration of buprenorphine in rodents?***

11. What effects other than analgesia have been reported after administration of buprenorphine in rodents?

- **It ameliorates the postoperative stress response, can modify feeding, reduces postoperative urine output, delays or extends the duration of the postoperative recovery phase upon repeated administration, adversely affects postoperative growth due to pica (especially in SD rats).**

- ***12. In a recent study of repeated administration of buprenorphine in rats, what significant adverse effects were reported in the postoperative period?***

12. In a recent study of repeated administration of buprenorphine in rats, what significant adverse effects were reported in the postoperative period?

- **Body weight returned to normal more slowly in treated rats than in untreated rats.**

- Ref for Questions 10-12
- A. Bomzon. Are repeated doses of buprenorphine detrimental to postoperative recovery after laparotomy in rats? Comp Med 56(2): 114-118, 2006.

- ***13. What other disease conditions have been associated with amyloidosis in macaques?***

13. What other disease conditions have been associated with amyloidosis in macaques?

- **Rheumatoid arthritis, viral infection, parasitism, chronic catheterization, enterocolitis,**

- ***14. What type of amyloidosis (ie, in what tissues) are displayed by rhesus macaques (Macaca mulatta)?***

14. What type of amyloidosis (ie, in what tissues) are displayed by rhesus macaques (Macaca mulatta)?

- **Generalized and cerebral**

15. In a recent study, what imaging methods, if any, were found to be diagnostic for amyloidosis in pig-tailed macaques (Macaca nemestrina)?

15. In a recent study, what imaging methods, if any, were found to be diagnostic for amyloidosis in pig-tailed macaques (Macaca nemestrina)?

- **Ultrasound was not**
- **Radiology was diagnostic for hepatic amyloidosis**

16. Which of the following serological tests were different (p<.1) in M. nemestrina with amyloidosis, versus animals without amyloidosis, in a recent study?

- **GGT**
- **ALT**
- **AST**
- **Bilirubin**
- **Total cholesterol**
- **Albumin**
- **ALP**
- **SAA**

16. Which of the following serological tests were different (p<.1) in M. nemestrina with amyloidosis, versus animals without amyloidosis, in a recent study?

- **GGT - high**
- **ALT – high among animals with GI amyloid**
- **AST – no change**
- **Bilirubin - slightly increased, p>.1 not significant**
- **Total cholesterol - high**
- **Albumin - low**
- **ALP – no change**
- **SAA - high**

16. Which of the following serological tests were different (p<.1) in <u>M. nemestrina</u> with amyloidosis, versus animals without amyloidosis, in a recent study?

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- **ALT – high among animals with GI amyloid**
- **AST – no change**
- **Bilirubin - slightly increased, p>.1 not significant**
- **Total cholesterol - high**
- **Albumin - low**
- **ALP – no change**
- **SAA- high**
- **In summary, ALP, GGT and cholesterol indicate some cholestasis caused by hepatic amyloidosis; low albumin is probably related to GI loss due to GI amyloidosis**

- Refs for Questions 13-16
- Hukkanen, RR, HD Liggitt, DM Anderson, et al. Detection of systemic amyloidosis in the pig-tailed macaque (Macaca nemestrina). Comp Med 56(2): 119-127, 2006.

- ***17. What enzyme converts cortisol to cortisone in humans? What cortical adrenal enzyme is active in humans?***

17. What enzyme converts cortisol to cortisone in humans? What cortical adrenal enzyme is active in humans?

- **11 Beta-hydroxysteroid dehydrogenase 2 (11B-HSD2)**
- **Cortisol, cortisone is inactive**

- ***18. In what ways do squirrel monkeys handle high serum cortisol levels (relative to humans) to avoid impacting electrolyte levels and blood pressure, according to a recent study?***

18. In what ways do squirrel monkeys handle high serum cortisol levels (relative to humans) to avoid impacting electrolyte levels and blood pressure, according to a recent study?

- **Probably increased peripheral conversion of cortisol to cortisone (inactive), and increased excretion of free corticosteroids and the cortisol metabolite 6Beta-hydroxycortisol**

- Ref for 17-18.
- Scammell, JG, JM Westberry, PW Sadosky, et al. Cortisol metabolism in the Bolivian Squirrel Monkey (Saimiri boliviensis boliviensis). Comp Med 56(2): 128-135, 2006.

19. About what percentage of old, unthrifty sheep in New Zealand have intestinal adenocarcinoma?

A. 1.6%
B. 70 %
C. 50%
D. 7 %
E. 0.2%

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- ***A. 1.6%***
- **B. 70 %**
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- **D. 7 %**
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- **Answer: A, (also 1.6 % of clinically normal adult sheep)**

20. Where did most of the ovine adenocarcinomas develop, and how does this compare with the disease in humans?

20. Where did most of the ovine adenocarcinomas develop, and how does this compare with the disease in humans?

- **Jejenum (100%)**
- **In humans, only 4% develop in the small intestine (70% in the colon, 26% in the rectum)**

- ***21. What are some commonly used rodent models of intestinal adenocarcinoma?***

21. What are some commonly used rodent models of intestinal adenocarcinoma?

- **1- mice or rats with administration of carcinogens**
- **2- mice with specific genetic mutations (ie. MIN mice)**
- **3- implanting cells lines or neoplastic tissue into mice or rats (usually immunodeficient rodents).**

22. *How did distant metastasis compare between the ovine model, and disease in humans?*

22. How did distant metastasis compare between the ovine model, and disease in humans?

- **Rate is higher, about 52% versus 10 to 25 in humans. Site also differed, hepatic in humans, intra-abdominal peritoneum in sheep**

23. What type of tumors do MIN (Multiple Intestinal Neoplasia) mice develop spontaneously?

23. What type of tumors do MIN (Multiple Intestinal Neoplasia) mice develop spontaneously?

- **Intestinal adenomas (large numbers)**
- **NOT colon or rectal, and not adenocarcinoma, as in people**

- **Reference for Questions 19-23:**
- **Munday, JS, Brennan, MM, AM Jaber, et al. Ovine intestinal adenocarcinomas: histologic and phenotypic comparison with human colon cancer. Comp Med. 56(2): 136-141, 2006.**

24. When a gene is removed by homologous recombination, and a deficiency in a mouse is created that is expected to be lethal, but is not, and the mice might even be normal, what might the explanation be?

24. When a gene is removed by homologous recombination, and a deficiency in a mouse is created that is expected to be lethal, but is not, and the mice might even be normal, what might the explanation be?

- **Another gene in the same family may function, because gene families may function similarly**

- **25. What enzyme in the adrenal medulla, is the rate-limiting enzyme in catecholamine synthesis?**

25. What enzyme in the adrenal medulla, is the rate-limiting enzyme in catecholamine synthesis?

- Tyrosine hydroxylase (Th), catalyzes the conversion of tyrosine to L-dopa

- Ref for Questions 24, 25
- Takahashi, E and T Nagasu. Enhanced expression of Ca2+ channel alpha1A and Beta4 subunits and phosphorylated tyrosine hydroxylase in the adrenal gland of N-type Ca2+ channel alpha1B subunit-deficient mice with a CBA/JN genetic background. Comp Med 56(3): 168-175, 2006.

- ***26. What gender of mouse (C3HeB-db/db)was more susceptible to diabetes, and why?***

26. What gender of mouse (C3HeB-db/db)was more susceptible to diabetes, and why?

- **Males. Estrogen was shown to facilitate hepatic glucose uptake and storage in rodents, and suppresses excessive hepatic glucose output in susceptible mice**

- ***27. What are the characteristics of IRS1 deficient mice?***

27. What are the characteristics of IRS1 deficient mice?

- **Growth retarded**
- **Skeletal muscle insulin deficient**
- **No diabetes**

- ***28. Why are IRS1-deficient mice NOT diabetic?***

28. Why are IRS1-deficient mice NOT diabetic?

- **The hyperinsulinemia associated with the Beta cell hyperplasia in these mice compensates for the insulin-resistant state**

29. What are the characteristics of the IRS2-deficient mice (with regard to glucose metabolism)?

29. What are the characteristics of the IRS2-deficient mice (with regard to glucose metabolism)?

- Diabetic
- Inadequate Beta cell proliferation
- Insulin resistance
- Hyperleptinemia
- Increased adiposity

- Reference for questions 26-29
- Hashimoto, H, T. Arai, A. Takeguchi, et al. Ontogenetic characteristics of enzyme activities and plasma metabolites in C57BL/6J:Jcl mice deficient in insulin receptor substrate 2. Comp Med 56(3) 176-187, 2006.

30. What growth factors may affect the development of mouse embryos?

30. What growth factors may affect the development of mouse embryos?

- **EGF (Epidermal Growth factor)**
- **TGF alpha-transforming growth factor alpha**
- **EGF receptor**

- ***31. How might these growth factors affect growth of cloned mouse embryos?***

31. How might these growth factors affect growth of cloned mouse embryos?

- **Cloned mouse embryos have poor growth and survival rates; this may be because of low levels of EGF, TGF alpha and EGF receptor**

- ***32. How did adding antibodies to EGF, TGFalpha and EGF receptor affect mouse embryos fertilized in vivo or embryos created through IVF?***

32. How did adding antibodies to EGF, TGFalpha and EGF receptors affect in vivo fertilized mouse embryos, and embryos fertilized in vitro?

- **Survival and growth of all embryos was decreased, although the effect was greater in IVF embryos versus embryos fertilized in vivo**

33. About 35% of cloned mouse embryos developed from 1-cell to blastocyst stage. What treatment was found to create about this rate of development in mouse embryos fertilized in vivo or in vitro?

- **A. Treatment with antibody to EGF**
- **B. Treatment with antibody to TGF alpha**
- **C. Treatment with antibody to EGF-R**
- **D. Treatment with antibody to EGF and TGF alpha**
- **E. Treatment with antibody to KLH**

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- **B. Treatment with antibody to TGF alpha**
- **C. Treatment with antibody to EGF-R**
- ***D. Treatment with antibody to EGF and TGF alpha***
- **E. Treatment with antibody to KLH**

- **Answer: D**

- ***34. About 35% of cloned mouse embryos developed from 1-cell to blastocyst stage.Since treatment of mouse embryos with antibodies against EGF and TGF alpha yields similar rates of development, what does this suggest?***

34. About 35% of cloned mouse embryos developed from 1-cell to blastocyst stage.Since treatment of mouse embryos with antibodies against EGF and TGF alpha yields similar rates of development, what does this suggest?

- **This suggests that cloned embryos may be deficient in EGF and TGF alpha, and this deficiency may be the reason for the poor developmental potential of cloned embryos.**

- Reference for questions 30-34
- Dadi, TD, M Li and KCK Lloyd. Development of mouse embryos after immunoneutralization of mitrogenic growth factors mimics that of cloned embryos. Comp Med 56(3): 188-195, 2006.

35. In a recent study, what differences were found between 25- and 65-day old mice in learning to navigate a maze, and why?

35. In a recent study, what differences were found between 25 and 65-day old mice in learning to navigate a maze?

- **25-day old mice acquired the maze more slowly. This is thought to be related to greater emotional reactivity in the younger animals, and more periods of freezing, which is behavior related to anxiety**

- ***36. Why is “return to home cage” a positive reinforcement for learning to navigate a maze in mice?***

36. Why is “return to home cage” a positive reinforcement for learning to navigate a maze in mice?

- **It’s not known**

- *37. What groups of mice respond poorly to traditional motivators, such as food deprivation, or the Morris water maze?*

37. What groups of mice respond poorly to traditional motivators, such as food deprivation, or the Morris water maze?

- **Aged animals, inbred strains, genetically manipulated mice**

- Reference for questions 35-37
- Blizard, DA, VK Winheimer, et al .”Return to Home Cage” as a reward for maze learning in young and old genetically heterogeneous mice. Comp Med 56(3): 196-201, 2006.

38. In a recent study, using NIH/S male mice, which examined various types of environmental enrichment, what type of enrichment increased aggression between cagemates?

- **A. Nesting material only**
- **B. Nesting material plus a tube**
- **C. Nesting material plus a box**

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- **A. Nesting material only**
- **B. Nesting material plus a tube**
- **C. Nesting material plus a box**

- **Answer: A**

.39. In male NIH/S mice in a recent study, what type of enrichment increased the anxiety of the mice, based on the elevated plus maze?

39. In male NIH/S mice in a recent study, what type of enrichment increased the anxiety of the mice, based on the elevated plus maze?

- **No type of enrichment studied**

- ***40. In a recent study of male NIH/S mice, what were some of the physiological parameters affected by the increased aggression associated with housing with nest material only?***

40. In a recent study of male NIH/S mice, what were some of the physiological parameters affected by the increased aggression associated with housing with nest material only?

- **Weight gain was reduced**
- **Reduced epididymal adipose tissue**
- **Enlarged spleens**

- Reference for questions 38-40
- EK Kaliste, SM Mering, et al. Environmental modification and agonistic behavior in NIH/S male mice: nesting material enhances fighting but shelters prevent it. Comp Med 56(3): 202-208, 2006

41. What was one of the first strains of mouse to be used for study of xenogeneic transplanted cells?

41. What was one of the first strains of mouse to be used for study of xenogeneic transplanted cells?

- **SCID mouse**

42. What were problems that caused inefficiency of engraftment in SCID mice?

42. What were problems that caused inefficiency of engraftment in SCID mice?

- **High natural killer cell activity**

.*43. What are some advantages to using the nonobese diabetic SCID mouse for the study of hemopoietic stem cell biology and engraftment?*

43. What are some advantages to using the nonobese diabetic SCID mouse for the study of hemopoietic stem cell biology and engraftment?

- **Defects in natural killer cell and macrophage function**

44. In a recent study of NOD/SCID mice given total body irradiation, what problem was associated with sudden weight loss, and often death?

44. In a recent study of NOD/SCID mice given total body irradiation, what problem was associated with sudden weight loss, and often death?

- **Damage to incisor teeth, including increased mobility, excessive length, crooked and breakage**

- ***45. Have there been other reports of tooth abnormalities after whole body irradiation?***

45. Have there been other reports of tooth abnormalities after whole body irradiation?

- **Yes, but not in NOD/SCID mice, reports were from C57BL/6j (also with higher dose of irradiation, and longer time frame (8-9 weeks, as opposed to 5-7 weeks in the current study)**
- **Why did the authors speculate that there was a difference in what was seen in NOD/SCID mice in this study, versus other studies?**

45. Had tooth abnormalities been reported before after whole body irradiation?

Yes, but not in NOD/SCID mice, in C57BL/6j (also with higher dose of irradiation, and longer time frame (8-9 weeks, as opposed to 5-7 weeks in the current study)

- Why did the authors speculate that there was a difference in what was seen in NOD/SCID mice in this study, versus other studies?

- Substrain variation is possible, possibly the irradiator used. This study used a ^{137}Cs irradiator. However, using this irradiator, 100's of other mice of other strains have not developed abnormalities of the incisors.

Reference for questions 41-45

SR, Larsen, JA Kingham, MD Hayward, et al. Damage to incisors after nonmyeloablative total body irradiation may complicate NOD/SCID models of hemopoietic stem cell transplantation. Comp Med 56:209-214, 2006.

.46. What treatments have shown promise in animal models for polycystic kidney disease (PKD)?

46. What treatments have shown promise in animal models for polycystic kidney disease (PKD)?

- **Feeding soy protein in the diet**
- **Administration of potassium citrate**
- **Administration of tyrosine kinase receptor inhibitor targeting epidermal growth factor inhibitors, with a transforming growth factor and tumor necrosis factor converting enzyme**

- ***47. What are the advantages to using ultrasonography for evaluation of kidneys in mouse models of PKD?***

47. What are the advantages to using ultrasonography for evaluation of kidneys in mouse models of PKD?

- **MRI, or PCR are alternatives, and renal palpation. PCR is invasive. MRI is expensive, and more time-consuming than ultrasound. Palpation is not reliable until 4-5 weeks of age, and neither palpation nor MRI provides a quantitative measure of renal size that can be followed serially.**

- *48. In ultrasonography, what is the main scatterer (of sound) in the kidney at low insonation frequencies? At high frequencies (over 5 MHz)?*

48. In ultrasonography, what is the main scatterer in the kidney at low insonation frequencies? At high frequencies (over 5 MHz)?

- **Glomerulus, glomerular arteries**

.49. Using ultrasound, what differences were found in kidneys of wild-type versus juvenile cystic kidney (jck) mice?

49. Using ultrasound, what differences were found in kidneys of wild-type versus juvenile cystic kidney (jck) mice?

- **Kidneys were larger in PKD mice. Starting at 3 weeks of age, echo intensity of kidney was increased in the PKD mice versus wild-type.**

- Reference for questions 46-49

- R. Pollard, R Yunis, D Kultz, et al. Ultrasound detection and characterization of polycystic kidney disease in a mouse model. Comp Med 56: 214-221, 2006.

- ***50. What 3 new norovirus strains were identified in a recent publication?***

50. What 3 new norovirus strains were identified in a recent publication?

- **Norovirus-2, -3 and -4**

- ***51. How long were noroviruses persistent in tissues and feces of CD-1 mice in this study?***

51. How long were noroviruses persistent in tissues and feces of CD-1 mice in this study?

- **At least 8 weeks (which is the longest they were tested for)**

- ***52. Do Noroviruses produce any clinical signs in mice?***

52. Do Noroviruses produce any clinical signs in mice?

- **In some immunodeficient mice, yes. Mice lacking components of the immune system, such as signal transducer, activator of transcription 1 or interferon alpha, beta and gamma receptors may die. (Other immunodeficient mice survive)**

- Reference for questions 50-52

- Hsu, CC, LK Riley, HM Wills et al. Persistent infection with and serologic cross-reactivity of three novel murine noroviruses. Comp Med 56(4): 247-251, 2006.

53. What clinical problems were evaluated in a recent study of Candida albicans infection in inbred mice?

53. What clinical problems were evaluated in a recent study of Candida albicans infection in inbred mice?

- **Sleep and body temperature, both of which are problematic in humans with renal disease**

- ***54. What differences (in general) in sleep and body temperature were found in 9 inbred strains of mice after infection with Candida albicans?***

54. What differences (in general) in sleep and body temperature were found in 9 inbred strains of mice after infection with <u>Candida albicans</u>?

- **Ranged from reduced sleep with reduced Delta-wave amplitude during slow wave sleep (DWA) to increased sleep with increased DWA. Fever or hypothermia were measured in the various strains.**

- Reference for questions 53-54

- Toth, LA, and LF Hughes. Sleep and temperature responses of inbred mice with Candida albicans-induced pyelonephritis. Comp Med 56(4): 252-261, 2006.

- ***55. In a recent study, how early in the gestation of the mouse were gestational sacs reliably detected by ultrasound imaging?***

55. In a recent study, how early in the gestation of the mouse were gestational sacs reliably detected by ultrasound imaging?

- **9.5 days post-coitus**

- ***56. What 2 measurements were shown to correlate well with gestational age of mice in a recent study using ultrasound imaging?***

56. What 2 measurements were shown to correlate well with gestational age of mice in a recent study using ultrasound imaging?

- **Biparietal diameter (skull diameter) and crown-rump length**

57. In a recent study, mouse gestation was investigated by ultrasound imaging, using isoflurane for brief anesthesia. There is evidence in other studies that isoflurane may cause toxicity to mouse embryos. What anesthetic may be a better choice for use in pregnant mice?

57. In a recent study, mouse gestation was investigated by ultrasound imaging, using isoflurane for brief anesthesia. There is evidence in other studies that isoflurane may cause toxicity to mouse embryos. What anesthetic may be a better choice for use in pregnant mice?

- **Enflurane, which was shown in one study to produce little toxicity to mouse fetuses. Injectable anesthetics were thought to be inferior due to increased CV or respiratory effects, plus increased difficulty in controlling them.**

- Reference for questions 55-57

- Brown, SD, Zurakowski, D, Rodriguez, DP, et al. Ultrasound diagnosis of mouse pregnancy and gestational staging. Comp Med 56(4): 262-271, 2006.

58. What acute respiratory problems are caused by <u>Chlamydia pneumoniae</u> in humans? What chronic problems have been associated with <u>C. pneumoniae</u>?

58. What acute respiratory problems are caused by <u>Chlamydia pneumoniae</u> in humans? What chronic problems have been associated with <u>C. pneumoniae</u>?

- **Pneumonia, bronchitis, and pharyngitis; asthma and atherosclerosis**

59. What is the major immunogenic protein in Chlamydia other than C. pneumoniae?

59. What is the major immunogenic protein in Chlamydia other than C. pneumoniae?

- **MOMP-Major outer membrane protein**

- ***60. Was MOMP recognized by systemic antibodies in mice infected with C. pneumoniae?***

60. Was MOMP recognized by systemic antibodies in mice infected with C. pneumoniae?

- **Yes, but weakly. Omp2(Outer Membrane Protein) and Hsp60 (Heat Shock Protein) were recognized more strongly**

- Reference for questions 58-60

- Penttila, T, E Wahlstrom, JM Vuola, et al. Systemic and mucosal antibody response in experimental Chlamydia pneumoniae infection in mice. Comp Med 56(4): 272-278, 2006.

- ***61. Skin from what species is accepted as most suitable for studies of human dermal repair?***

61. Skin from what species is accepted as most suitable for studies of human dermal repair?

- **Pig**

- ***62. In what ways does human skin resemble pig skin?***

62. In what ways does human skin resemble pig skin?

- **Anatomically and physiologically, including thickness and structure of dermal and epidermal layers, epithelial regeneration time, physiology of wound healing, blood vasculature, regulation of body temperature; also biochemical, including amount structure and distribution of glycoproteins, proteoglycans and glycosaminoglycans, as well as collagen**

- ***63. What are the benefits of using titanium chambers for wound infection models?***

63. What are the benefits of using titanium chambers for wound infection models?

- **Titanium prevents skin contraction and withstands rubbing because of its rigidity, it is biocompatible, and reusable after repeated sterilization**

- ***64. What are the disadvantages of using titanium for chambers to study wound infection?***

64. What are the disadvantages of using titanium for chambers to study wound infection?

- **The model is not suitable to study wound closure by contraction; and there is an initial high cost**

- Reference for questions 61-64

- Steinstraesser, L, JJ Vranckx, A Mohammadi-Tabrisi, et al. A novel titanium wound chamber for the study of wound infections in pigs. Comp Med 56: 279-285, 2006.

- ***65. In a recent study comparing bama minipig cytochrome p450 to human cytochrome p450 (CYP), which CYP appeared to be well modeled by minipig CYP?***

65. In a recent study comparing bama minipig cytochrome p450 to human cytochrome p450 (CYP), which CYP appeared to be well modeled by minipig CYP?

- **CYP3A4 (the main drug metabolizing enzyme)**

- ***66. Were all human CYP's found to be similar to minipig CYPs?***

66. Were all human CYP's found to be similar to minipig CYPs?

- **No, there were marked differences in the function of inhibitors of CYP's other than CYP3A4, leaving in question whether other CYP's are similar.**

- **Reference for questions 65, 66**

- **Li, J, Y Liu, J Zhang, et al. Characterization of hepatic drug-metabolizing activities of Bama miniature pigs (Sus scrofa domestica). Comp Med 56(4): 286-290, 2006.**

- ***67. In humans, what changes in follicle-stimulating hormone (FSH) and luteinizing hormone (LH) occur around menopause?***

67. In humans, what changes in follicle-stimulating hormone (FSH) and luteinizing hormone (LH) occur around menopause?

- **Both increase gradually**

- ***68. What criteria appears to indicate that reproductive cycling of chimpanzees continues until death?***

68. What criteria appears to indicate that reproductive cycling of chimpanzees continues until death?

- **Cyclic anogenital swelling (not births)**

69. What function was suggested by authors of a recent article

- ***for anogenital swelling that continued after reproductive cycling had stopped in aged chimpanzees?***

69. What function was suggested by authors of a recent article for anogenital swelling that continued after reproductive cycling had stopped in aged chimpanzees?

- **Anogenital swelling may serve to assist in group transfer, as changes in social group composition have been shown to influence anogenital swelling patterns; may serve to maintain affiliative relationships within the social group, since females receive more social grooming from males and females when they have anogenital swelling.**

70. At about what age did hormonal assays indicate that perimenopause and menopause occurred in a captive chimpanzee population?

70. At about what age did hormonal assays indicate that perimenopause and menopause occurred in a captive chimpanzee population?

- **Perimenopause- 30-35 years. Menopause-prior to 40 years**

- ***71. How did the levels of FSH and LH in aging chimpanzee females change over time in a recent study?***

71. How did the levels of FSH and LH in aging chimpanzee females change over time in a recent study?

- **Levels increased until menopause, around 35 years of age, then decreased until death. A bell-shaped curve resulted.**

- **Reference for questions 67-71:**

- **Videan, EN, J Fritz, CB Heward, et al. The effects of aging on hormone and reproductive cycles in female chimpanzees (*Pan troglodytes*). Comp Med 56(4): 291-299, 2006.**