Miniboard Exam- General Pathology 2010 Answer Key

1. *Mycobacterium avium* subsp. *paratuberculosis* utililizes TLR2 to induce the production of which cytokine to promote survival in host mononuclear phagocytes:
A. IL-8
B. IL-10 (VP 2008, pp. 829-841)
C. IL-12
D. TNF-α
E. TGF-β

2. Which of the following results in **benign** adrenocortical tumors:
A. Dysregulated expression of the *IGF2* gene cluster
B. Activation of the Wnt/β-catenin pathway
C. Dysregulated cyclic adenosine monophosphate signaling (VP 2009, pp. 194-210)
D. Inactivation of the p53 tumor suppressor
E. Increased expression of Cyclin B and Cyclin E

3. Caspase independent apoptosis is mediated by:
A. Granzyme A (Tox Path 2007, pg. 501 and 503 of pp. 495-516)
B. Granzyme B
C. DISC (Death-inducing signaling complex)
D. c-FLIP
E. Toso

4. Leukotrienes have all of the following effects on leukocytes EXCEPT:
A. Increased production in bone marrow
B. Increased adhesion to blood vessel endothelium
C. Increased transmigration across vessel walls
D. Decreased survival in tissues (NEJM 2007, pp 1841-1854)
E. Increased activation in tissue

5. All of the following cause **bone resorption** EXCEPT:
A. Increased thyroid hormone
B. Increased glucocorticoids
C. Normal to increased estrogen (JKP vol 1, pp. 7-8)
D. Increased parathyroid hormone
E. Increased PDGF (Platlet derived growth factor)

6. Which of the following are components of *Bacillus anthracis* toxin?
i. Ischemic factor
ii. Edema factor
iii. Lethal factor
iv. Toxin A
v. Protective antigen

A. i, iii, v
B. i, ii, iii
C. ii, iii, iv
D. ii, iii, v (Robbins CH8, p. 362)
E. i, iii, iv

7. All of the following are anti-apoptotic proteins except?

A. Bcl-2
B. Bax (Robbins CH1, p. 28-9)
C. Mcl-2
D. Bcl-XS
E. Bcl-XL

8. Which of the following increases mitochondrial permeability during apoptosis?
A. Bak (Robbins CH1, p. 28)
B. Bim
C. Bid
D. Bad
E. Cytochrome C

9. Which of the following is/are inhibited by protein C?
i. Factor Va
ii. Factor VIIIa
iii. Factor Xa
iv. Protein S
v. Thrombomodulin

A. i
B. i, ii (Robbins CH4, p. 116)
C. i, ii, iii
D. ii, iii, iv
E. iv, v

10. All of the following are inhibited by ATIII except?
A. Factor IIa
B. Factor VIIa (McGavin CH2, p 81)
C. Factor IXa
D. Factor Xa
E. Factor XIIa

11. All are true concerning arterial thrombi EXCEPT:
A. Tend to grow retrograde from the point of attachment
B. Originate at sites of turbulence
C. Contain lines of Zahn
D. Are frequently occlusive
E. Tend to be gelatinous and are nonlaminated (RC p123-124)

12. T_H17 cells appear be most involved in which of the following hypersensitivities:
A. Type I
B. Type II
C. Type III
D. Type IV (RC p198)
E. T_H17 cells do not exist

13. All of the following concerning T_H17 cells are true, Except
A. Is in a subset of CD8+ T cells (RC p195)
B. Recruit neutrophils
C. Recruit monocytes
D. Serve as a host defense against bacteria
E. Involved in auto-immune reactions

14. The most potent eosinophil-activating cytokine known is:
A. IL-1
B. IL-2
C. IL-3
D. IL-4
E. IL-5 (RC p200)

15. Which of the following is NOT found in platelet alpha granules:
A. Thrombospondin
B. Platelet factor 4
C. Serotonin (New Robbins pg. 117)
D. PDGF
E. Factor V

16. Firm adhesion is mediated by which of the following:
A. VCAM-1
B. PECAM-1
C. P-Selectin
D. β2 Integrins (with ICAM-1; Pg. 110-111 PBVD)
E. β1 Integrins

17. Which of the following is not a preformed inflammatory protein:
A. Tachykinin
B. NO (Pg. 122 PBVD)
C. Histamine
D. Serotonin
E. Bradykinin

18. Which of the following does NOT activate the alternate pathway of complement:
A. LPS
B. Fungal wall polysaccharides
C. Venoms (Pg. 124 PBVD)
D. Plasmin
E. Activated Factor XII

19. Major leukocyte transmigration occurs in which of the following:
A. Postcapillary venules
B. Capillaries
C. Arterioles
D. Veins
E. A and B (Pg. 110 PBVD)

20. Which of the following cytokines was shown to be associated with more severe disease involving cutaneous leishmaniasis:
A. IL-2
B. IL-4 (VP 42:166-175(2005))
C. IL-13
D. TNF-X
E. INF Gamma

21. All of the following are endogenous PAMP ligands EXCEPT:
A. Heparan sulfate
B. Heat shock protein 60
C. Mannose (PBVD p. 134, table 3-10)
D. Fibrinogen
E. Fibronectin

22. Which of the following is classified as a CX3C chemokine?
A. Lymphotactin
B. Fractalkine (R&C p. 62)
C. Eotaxin
D. RANTES
E. Monocyte chemoattractant protein (MCP-1)

23. Which of the following are NOT an execution caspases?
i. Caspase 6
ii. Caspase 9
iii. Caspase 10
iv. Caspase 8
v. Caspase 3

A. i, iv
B. ii, iv
C. ii, iii, iv (R&C p. 30)
D. i, v
E. i, ii, iii

24. All of the following are anti-apoptotic except:
i. Bcl-2
ii. Bax
iii. Cytochrome c
iv. Bcl-x
v. Mcl-1

A. i
B. ii
C. iii, iv, v
D. i, ii
E. ii, iii (R&C p. 28)

25. All of the following are functions of fibroblast growth factor (FGF) except:
A. Wound repair
B. Angiogenesis
C. Hematopoiesis
D. Lung maturation
E. All of the above are functions of FGF (R&C p. 88)

26. Which of the following molecules is upregulated in canine distemper and may represent a putative receptor for the virus:
A. SLAM – CD150 (VP 44:943-948(2007)
B. ICAM – 1
C. CD18
D. CD95
E. CD31

27. Which of the following adhesion molecules is expressed on endothelium and stored in Weibel-Palade bodies:
A. PSGL-1
B. E-Selectin
C. P-Selectin (Pg. 112 PBVD)
D. L-Selectin
E. VLA-4

28. Which of the following is involved in Natural Killer cell growth:
A. STAT-1
B. STAT-2
C. STAT-3

D. STAT-4
E. STAT-5 (Pg. 130 PBVD)
F. STAT-6

29. Which of the following acute phase proteins decrease with inflammation?
A. Fibrinogen
B. Mannose binding protein
C. Prealbumin (Pg. 137 PBVD)
D. Haptoglobin
E. α1-antitrypsin

30. MiRNA (MicroRNA) inadvertently contributes to the formation of tumors by:
A. Decreased expression of tumor suppressor genes through overexpression of microRNA activity (R+C, pp. 307-308)
B. Increased expression of oncogenes through significantly increased quantity or function of microRNA
C. MiRNA family activity targets cyclins for inactivation
D. MiRNA family activity targets BCL-2 for inactivation
E. MiRNA codes for proteins that act as hyperactivated signal transduction pathways

31. The genetic defect in the Birt-Hogg-Dubé gene resulting in hereditary multifocal renal cystadenocarcinomas and nodular dermatofibrosis of German Shepherds is the result of a(an):
A. Deletion
B. Amplification
C. Missense mutation (c. Pg 284 PBVD)
D. Histone acetylation
E. Gene conversion

32. Which of the following statements regarding epigenetic modification is true:
A. Epigenetic modifications are non-heritable changes in gene expression
B. Epigenetic modifications are often due to DNA mutations
C. DNA adenine nucleotide methylation is a common epigenetic modification
D. Epigenetic modifications only increase gene expression
E. Epigenetic modification mediates X chromosome inactivation (Robbins CH5 p180-1 and CH7 p306)

33. Which of the following statements regarding genetic transcription is true:
A. Hydroxylation of histone tails causes decreased gene transcription
B. Increased methylation of CpG islands causes increased gene transcription
C. Demethylation of histones within a maternal or paternal allele is a phenomenon called genomic imprinting

D. Acetylation of histone tails causes increased gene transcription (Robbins Ch5 p180-1 and CH7 p 306)

E. Phosphorylation of histone tails causes compaction of DNA into heterochromatin

34. Which cyclin-dependent kinase (CDK) and cyclin pair is correctly matched with the part of the cell cycle it reulates:

A. CDK1/Cyclin D : S phase

B. CDK2/Cyclin B : M/G1 checkpoint

C. CDK4/Cyclin E : G1/S checkpoint

D. CDK2/Cyclin B : G2/M checkpoint

E. CDK4/Cyclin D : G1 restriction point (Robbins, CH7, p 285-6)

35. In a normal cell cycle, which is the correct restriction point:

A. G0/G1 checkpoint

B. M/G1 checkpoint

C. G1/G2 checkpoint

D. G1/S checkpoint (D – Robbins CH3, p 86)

E. S/G2 checkpoint

36. Which repair process is used for large defects in DNA:

A. Mismatch repair

B. Non-homologous end joining (Robbins CH9 p 425)

C. Direct reversal

D. Nucleotide excision repair

E. Base excision repair

37. Which is the major mediator of tumor angiogenesis:

A. VEGF-A (Robbins CH3 p 100, CH7 p298 or NEJM 2008, 358, p2039-49)

B. PDGF

C. VEGF-C

D. Angiopoietin-1

E. Angiotstatin

38. Which of the following mediates vascular maturation:

A. VEGF-A

B. Delta-like ligand 4

C. Angiopoietin-1 (Robbins CH3 p 101 or NEJM 2008, 358, 2039-49)

D. VEGF-C

E. Angiostatin

39. Which of the following factors is the major mediator of lymphangiogenesis:

A. VEGF-A

B. VEGF-B

C. VEGF-C (McGavin CH4 p 187)

D. VEGF-D

E. Delta-like ligand 4

40. What is down-regulated in the transition of epithelial cells to mesenchymal cells:

A. FOXC2

B. E-cadherin (Robbins CH7, p.302)
C. Beta-catenin
D. NF-kB
E. Snail

41. Myocardial reperfusion injury is mediated by:
A. Nitric oxide
B. IL-1 (Vet Path 2008 vol 45 no 5 p. 698-706)
C. IL-10
D. IL-17
E. IL-23

42. Osteogenesis imperfecta affects which type of collagen:
A. Type I (Robbins CH3, p95)
B. Type III
C. Type IV
D. Type V
E. Type IX

43. Which type of collagen predominates in basement membrane:
A. Type I
B. Type III
C. Type IV (Robbins, CH3, p95)
D. Type V
E. Type IX

44. Th1 cells are activated by which of the following:
A. IL-4
B. IL-5
C. IL-12 (Robbins CH6, p 195)
D. IL-13
E. IL-17

45. What facilitates T cell signaling after antigen binding:
A. Binding of CD3 on the T cell to CD28 on the antigen presenting cell
B. Binding of CD28 on the T cell to CD3 on the antigen presenting cell
C. Binding of CD80 or CD86 on the T cell to CD28 on the antigen presenting cell
D. Binding of CD28 on the T cell to CD80 or CD86 on the antigen presenting cell
(Robbins, CH6, p 195)
E. None of the above

46. Which of the following is the correct order of events in ischemia:

A. Increased glycolysis → increased pH → decreased oxidative phosphorylation and ATP → influx of calcium → activation of lysosomal enzymes

B. Influx of calcium → decreased oxidative phosphorylation and ATP → increased pH → chromatin clumping → activation of lysosomal enzymes

C. Decreased pH → decreased oxidative phosphorylation and ATP → increased glycolysis → decreased protein synthesis → clumping of nuclear chromatin

D. Decreased oxidative phosphorylation and ATP → increased glycolysis → decreased pH → chromatin clumping → activation of lysosomal enzymes (Robbins CH1 p 18)

E. Decreased oxidative phosphorylation and ATP → decreased glycolysis → decreased pH → activation of lysossomal enzymes

47. Which of the following is a mechanism by which infectious agents evade the immune system:

A. Molecular mimicry (Robbins CH6 p 213)

B. Antigen masking
C. Imprinting
D. Receptor editing
E. Central tolerance

48. The Fenton reaction produces which of the following:

A. Hydroxyl radical (Robbins CH1 p 21)

B. Water and oxygen
C. Hydrogen peroxide
D. Superoxide anion
E. Reduced glutathione

49. Cyclooxgenase (COX) produces all of the following except:

A. Prostacyclin
B. Thromboxane A2
C. Prostaglandin E2

D. Leukotriene D4 (Robbins CH2 p 58)

E. Prostaglandin D2

50. Which of the following is true regarding tumor development:

A. Initiated cells contain a reversible genetic change

B. Promotion increases proliferation of an initiated cell (McGavin CH 6 p265-6)

C. Promoters are often mutagenic
D. Effects of promoters are usually irreversible
E. Initiation involves conveys metastatic potential to a malignant cell

Large Animal Miniboard Exam 2010

1. With Borna disease in horses, pathognomonic Joest-Degen inclusion bodies are located mainly in:
A. Neuronal nuclei of the cerebral cortex
B. Neuronal nuclei of the hippocampus
C. Neuronal nuclei of spinal cord grey matter
D. Neuronal nuclei of the hippocampus (VP 2007, pp. 57-63)
E. Neuronal perikaryon of the cerebral cortex

2. What organ serves as the primary site of Porcine circovirus-2 replication in fetal pigs?
A. Cerebrum
B. Heart (JVDI 2007, pp. 368-375 AND JVDI 2007, pg. 602)
C. Kidney
D. Lung
E. Liver

3. All of the following findings are associated with Porcine circovirus infection in the kidney EXCEPT:
A. Membranoproliferative glomerulonephritis (VP 2008, pp. 12-18)
B. Regenerative tubular epithelium
C. Lymphoplasmacytic interstitial nephritis
D. Granulomatous interstitial nephritis
E. Necrosis of tubular epithelium

4. All of the following histologic features are associated with rupture of abdominal artery aneurysm in dairy cattle EXCEPT:
A. A thin tunica media
B. Fragmented and coiled elastin
C. Granulation tissue and hemorrhage at site of rupture
D. A thin tunica intima with thinning of underlying smooth muscle proximal and distal to site of rupture (JVDI 2007, pp. 273-278)
E. Mucinous change and mineralization of the tunica media proximal and distal to site of rupture

5. Copper deficiency in pigs causes:
A. Osteopetrosis
B. Osteosclerosis
C. Cortical hyperostosis
D. Osteoporosis (JKP pg. 73 vol 1)
E. Osteochondromatosis

6. Sheep with which of the following alleles are most susceptible to infection with scrapie:
A. ARQ
B. ARR
C. AHQ
D. VRQ (Vet Path 2009: Volume 46, number 1, page 39)
E. ARH

7. All of the following belong to the genus pestivirus, EXCEPT:

1. Bovine viral diarrhea virus
2. Porcine respiratory and reproductive syndrome virus
3. Border disease virus

4. Classical swine fever virus
5. Foot and mouth disease virus

A. 1, 3, and 5 only
B. 2 and 5 only (Vet Path 2009: Volume 46, number 1, page 45)
C. 1, 3, and 5 only
D. 1, 2, and 4 only
E. 2, 3, and 5 only

8. Which of the following tissues is the primary location for zygomycotic granulomatous lymphadenitis in feedlot cattle:
A. Mediastinal lymph node
B. Submandibular lymph node
C. Mesenteric lymph node (***Vet Pathol*** 2010 47: 108)
D. Cervical lymph node
E. None of the above

9. In caprine abortions and stillbirths due to infection with bovine viral diarrhea virus (BVDV), BVDV antigen is detected in all of the following tissues, EXCEPT:
A. Heart
B. Thymus
C. Spleen (Vet Path 2009: Volme 46, number 1, page 54)
D. Placenta
E. Brain

10. The most consistent gross lesion with inherited rickets in Corriedale sheep is:

A. Persistent island of cartilage in femoral metaphyses

B. Focal to segmental thickening of the distal radial physis (***J. Comp. Path***. 2009, Vol. 141, 147-155)

C. Metaphyseal hemorrhage

D. Asymmetrical physeal growth

E. Scapular supraglenoid tubercle exostoses

11. The primary target organs of *Clostridium perfringens* Type D enterotoxemia in cattle are:
1. Small intestine
2. Brain
3. Lungs
4. Colon

A. 1 and 4 only
B. 1, 2, and 3 only
C. 2 and 3 only (Vet Path 2009, number 6, page 1213 and 1219)
D. 1 and 3 only
E. 2, 3, and 4 only

12. Which of the following is the main histopathologic finding in Somatic Cell Nuclear Transfer (SCNT) placentae of ruminants is:

A. Reduced vascular development (***Vet Pathol*** 2008 45: 865-880)
B. Hypoplasia of trophoblastic epithelium
C. Reduced numbers of trophoblastic binucelate cells
D. Marked increase in placental binucleate cells
E. Enlarged placentomes

13. The neurologic lesions of equine trypanosomiasis due by *Trypanosoma evansi* are most severe in:
A. The white matter of the spinal cord
B. The gray matter of the cerebrum
C. The white matter of the cerebellum
D. The white matter of the cerebrum (Vet Path2009: Volume 46, number 2, page 251)
E. The Purkinje cells of the cerebellum

14. What is the most important histopathologic feature in the diagnosis of epitheliod variants of hemangiosarcoma in horses?
A. Formation of branching tubules and micropapillae with vascular lumenae
B. Lumenal papilliferous projections of endothelial cells
C. Plump endothelial cells that form prominent (hobnail) luminal projections
D. Intracytoplasmic vacuoles that displace the nucleus and contain a single erythrocyte (Vet Pathol 2007 44: 15)
E. Solid growth pattern with small vasoformative structures

15. In cattle, histologic lesions of intoxication with Sida carpinifolia (Malvaceae) manifest in all of the following, EXCEPT:
A. Thyroid follicular epithelium
B. Cerebellar Purkinje cells
C. Pancreatic islet cells (Vet Path 2009: Volume 46, number 2, page 343-344)
D. Pancreatic acinar cells
E. Trigeminal ganglion neurons

16. The target organs of Tetrapterys multiglandulosa (Malpighiaceae) intoxication in aborted fetuses and newborn lambs include:

1. Kidney
2. Liver
3. Heart
4. Brain

A. 1 only
B. 1 and 2 only
C. 3 only
D. 3 and 4 only (Vet Path 2009: Volume 46, number 5, page 960)
E. 1, 2 and 4 only

17. The characteristic microscopic lesion in the intestine in bovine viral diarrhea is:
A. Syncytia
B. Villar blunting and fusion
C. Destruction of crypt epithelium (JKP vol 2 p. 142)
D. Surface epithelial degeneration and necrosis

E. Eoinsophilic intranuclear inclusions within epithelium

18. Eastern equine encephalitis virus in horses causes:
A. Leukoencephalomalacia
B. Nigopallidal encephalomalacia
C. Necrosis and inflammation in the cortical gray matter (JKP p.424 vol 1)
D. Nonsuppurative necrotizing vasculitis of the brain stem and spinal cord
E. Nonsuppurative encephalomyelitis in the brain stem and thoracolumbar spinal cord

19. Repetitive exposure to pyrrolizidine alkaloids in ruminants causes:
A. Megalocytosis
B. Centrilobular necrosis
C. Individualization of hepatocytes
D. Hepatocellular atrophy with regenerative nodules
E. A & D (JKP vol 2 page 374)

20. The cause of jowl abscesses in swine is:
A. Mycoplasma suis
B. Streptococcus suis
C. Mycobacterium avium
D. Streptococcus porcinus (JKP vol 3 p. 297)
E. Erysipelothrix rhusiopathiae

21. Which of the following are NOT characteristics of Clostridium perfringens type D enterotoxemia in goats:
i. Perivascular proteinaceous edema of brain (microangiopathy)
ii. Fibrinohemorrhagic colitis
iii. Herniation of the cerebellar vermis
iv. Focal symmetrical encephalomalacia of cerebellar peduncles
v. Pulpy kidney

A. i
B. i, ii (Diagnosis of Clostridium perfringens intestinal infections in sheep and goats; JVDI 20: 253-265 (2008))
C. i, ii, iii
D. i, ii, iii, iv
E. i, ii, iii, iv, v

22. Which of the following is the only gross lesion induced by ingestion of Ipomoea carnea subsp fistulosa in goats:
A. Muscle atrophy and pallor (VP 2007 p170 (abstract), p 181 left column, first sentence)
B. Dilatative cardiomegaly
C. Hypertophied cardiomegly
D. Cardiac Infarction
E. Aortic necrosis

23. Which of the following species is Clostridium difficile a significant pathogen in neonates:
A. Pigs (VP 2007 November, p814 (abstract))

B. Hamsters
C. Cattle
D. Goats
E. Dogs

24. Ingestion of avocado tree leaves in the goat causes:
    i. Endocardial hemorrhage
    ii. Cirrhosis
    iii. Scrotal edema
    iv. Swollen edematous mammary glands

A. i, ii
B. ii, iii
C. ii, iv
D. iii, iv
E. i, iv (JKP vol 3, pp. 36)

25. A majority of cases of Equine Polysaccharide storage myopathy (PSSM) are due to a mutation in what gene:
A. AMP kinase
B. Glycogen synthase 1 (VP 2009, pp. 1281-1291)
C. Phosphofructokinase
D. Phosphoglycerate mutase
E. Myophosphorylase

Miniboard Exam 2010- Small Animal

1. Which of the following showed the highest level of RAD51 protein expression in dogs:
A. Cytoplasmic expression in lymph node metastases of mammary carcinoma
B. Nuclear expression in primary mammary carcinomas (*Vet Pathol,* 2010 47: 98)
C. Nuclear expression in mammary adenomas
D. Cytoplasmic expression in primary mammary carcinomas
E. Nuclear expression in non-neoplastic mammary tissue

2. Which of the following regions in the lungs of brachycephalic dogs is most affected by bronchial collapse:
A. Right middle bronchus
B. Right accessory bronchus
C. Left caudal lobe bronchus
D. Left subsegmental bronchus (JAVMA, October 1, 2009, 835-840)
E. Left principal bronchus

3. Which of the following feline epulides is the most common:
A. Giant cell
B. Fibromatous (***Vet Pathol*** 44:161-169(2007))
C. Acanthomatous
D. Ossifying
E. None of above

4. Which of the following is true concerning pancreatitis in cats:
A. Ductal mucinous hyperplasia is a consistent feature
B. Numerous lymphocytes and plasma cells are a prominent feature
C. Fibrosis and inflammation was invariable associated with acinar cell atrophy and zymogen depletion
D. Fibrosis is a prominent feature in chronic pancreatitis (VP 2007 January, p42 right column, 2nd paragraph)
E. Is more common in the right limb of the pancreas in cats with GI related disease

5. Rat terrier dogs with mutations in the thyroid peroxidase gene have gross lesions of white matter loss in the following areas, EXCEPT:
A. Corpus callosum
B. Periventricular white matter
C. Terminal corona radiate
D. Cerebellar folia
E. Crus of the fornix (VP 2007 January, p52 right column, 3rd paragraph to p54)

6. The most consistent lesion in cats with highly pathogenic avian influenza virus infection is:
A. Diffuse suppurative bronchopneumonia
B. Fibrinosuppurative pleuropneumoniae
C. Suppurative interstitial pneumonia
D. Random, sharply demarcated areas of hepatic necrosis (VP 2007 May, p261 abstract, p263 right column, paragraph 2, 3)
E. Marked bronchial associated lymphoid tissue (BALT) hyperplasia

7. All of the following are histologic features of canine congenital hepatic fibrosis, EXCEPT:
A. Portal bridging fibrosis
B. Nodular hepatocellular regeneration (Vet Path 2010, number 1, page 102 and 103)
C. Portal arteriolar reduplication

D. Portal vein hypoplasia
E. Biliary hyperplasia

8. What region of the spinal cord is most severely affected in Degenerative Myelopathy of Pembroke Welsh Corgis:
A. Fasciculus gracilis
B. Medial tectospinal tract
C. Ventral spinocerebellar tract
D. Dorsolateral fasciculus (Vet Path 2009, number 2, page 241)
E. Medial tectospinal tract

9. Which of the following lesions is associated with long-term feeding of gamma-irradiated dry diets to cats:
A. Myocardial degeneration and necrosis
B. Bone marrow hypoplasia
C. Leukoencephalomyelopathy (Vet Path 2009, number 6, page 1258)
D. Epidermal necrosis
E. Mesenteric fat necrosis

10. All of the following are characteristics of copper-associated hepatitis in Labrador retrievers, EXCEPT:
A. Centrilobular hepatitis
B. Portal fibrosis (Vet Path 2009, number 3, page 484-485)
C. Centrilobular fibrosis
D. Pseudolobule formation
E. Intrahepatic cholestasis

11. All of the following are characteristics of neuroaxonal dystrophy in Papillon dogs, EXCEPT:
A. Accumulation of α–synuclein occurs in dystrophic axons
B. Spheroids are positive for iron (Vet Path 2009, number 3, page 474-475)
C. Spheroid formation is the prominent histologic feature
D. Spheroids are immunopositive for calretinin and calbidin
E. Dystrophic axons are most prominent in the nuclei of the medulla oblongata

12. The characteristic histological lesion in Fanconi syndrome in dogs is:
A. Neutrophilic tubulitis
B. Glomerular amyloidosis
C. **Karyomegaly of tubular cells** (JKP vol 2 p. 474)
D. Membranoproliferative glomerluonephritis
E. Eosinophilic intranuclear inclusions within tubular epithelium

13. The histological lesion of alopecia areata in dogs is:
A. Miniaturization of hair follicles
B. Peribulbar lymphocytic folliculitis (JKP 662 vol 1)
C. Granulomatous inflammation targeted on sebaceous glands
D. Follicular atrophy with abundant tricholemmal keratinization
E. Follicular atrophy with distension of follicular infundibula with keratin

14. Which ocular tissue is most frequently affected in canine leishmaniasis:
A. Ciliary body
B. Iris
C. Cornea
D. Conjunctiva (J Comp Path 138: 32-39 (2008))
E. Sclera

15. All of the following are common histopathologic findings in melamine associated renal failure (MARF) in dogs and cats EXCEPT:
A. Tubular degeneration and necrosis
B. Interstitial nephritis and fibrosis
C. Proximal tubules containing polarizable round, green crystals with striations (JAVMA 233(5): 729-737 (2008))
D. Neutrophilic tubulitis and tubular rupture
E. Tubular epithelial regeneration

16. Which of the following is NOT characteristic of canine granulocytic anaplasmosis:
A. Self-limiting
B. *Anaplasma phagocytophilum* infects neutrophils
C. *A. phagocytophilum* infects eosinophils
D. Organisms cause increased neutrophil apoptosis (JVIM 23: 1129-1141 (2009))
E. Thrombocytopenia

17. Which of the following is proapoptotic and whose deletion is associated with canine hemangiosarcoma:
A. PIP3
B. PI3K
C. AKT
D. PTEN (VP 42, 618-632, 2005)
E. VEGF

18. Lesions of hypertensive encephalopathy in cats with renal disease/failure are most commonly found in the:
A. Cerebral white matter (VP 2005, pp. 642-649)
B. Cerebellar white matter
C. Cerebral grey matter
D. Cerebellar grey matter
E. Brain stem nuclei

19. Which of the below histologic findings is observed in Golden Retrievers with Nonepidermolytic Ichthyosis:
A. Moderate parakeratotic hyperkeratosis
B. Moderate epidermal hyperplasia
C. Moderate dermal inflammation
D. Vacuolated keratinocytes in the stratum granulosum/spinosum (VP 2008, pp. 174-180)
E. Moderate numbers of transmigrating lymphocytes in epidermis

20. Gastrointestinal Stromal Tumors (GISTs) in dogs tend to develop in the:

i. Stomach
ii. Small intestine
iii. Large intestine
iv. Cecum

A. i, ii
B. i, iii
C. ii, iii
D. ii, iv
E. iii, iv (JAVMA 2007, pp. 1329-1333)

21. Interstitial lung disease in West Highland White Terriers is associated with increased:
A. Type II collagen
B. Type III collagen (VP 2005, pp. 35-41)
C. Type IV collagen
D. Type VI collagen
E. Elastin

22. The following lesions are noted in the lungs of a dog: pyogranulomatous and eosinophilic pneumonia with arterial thrombi and intravascular nematodes with small amounts of coelomyarian musculature, a large gastrointestinal tract; and uteri containing eggs. What is the most likely diagnosis:
A. *Pneumonyssoides caninum*
B. *Dirofilaria immitis*
C. *Angiostrongylus vasorum* (JVDI 2008, pp. 11-20)
D. *Linguatula serrata*
E. *Eucoleus aerophilus*

23. Mucopolysaccharidosis IIIa in dogs is due to deficient activity of which enzyme:
A. Hexosaminidase
B. Heparin-N-Sulfatase (Vet Path 2007 29-35)
C. Beta1- Galactosidase
D. Alpha-Neuraminidase
E. Glucocerebrosidase

24. The 2 most common diagnoses in the amputated digits of felines are:
i. Squamous Cell Carcinoma
ii. Osteosarcoma
iii. Mast cell tumor
iv. Fibrosarcoma

A. i, ii
B. i, iii
C. i, iv (Vet Path 2007, 362-365)
D. ii, iii
E. ii, iv

25. Polymyositis/Degenerative polymyopathy in cats is due to:
A. Hypernatremia
B. Hyperphosphatemia
C. Hyperkalemia
D. Hypophosphatemia
E. Hypokalemia (JKP vol 1, pp.249 and 257)

Lab Animal Miniboard Exam 2010- Answer Key

1. The most common site of AA amyloid in the common marmoset is:
A. Small intestine (VP 2005, pp. 117-124)
B. Spleen
C. Renal Interstitium
D. Stomach
E. Colon

2. By EM, the eosinophilic material (collagen and complex carbohydrate) in the nasal septum of the mouse is often found within which organelle:
A. Golgi apparatus
B. Rough endoplasmic reticulum (VP 2007, pp. 796-802)
C. Smooth endoplasmic reticulum
D. Secretory granules
E. Lysosomes

3. In eosinophilic crystalline pneumonia in mice, YM1 granules are secreted by activated macrophages and neutrophils in response to:
1. IL-1
2. IL-4
3. IL-2
4. IL-13
5. IL-12

A. 3 and 5
B. 1 and 5
C. 2 and 4 (VP 2006, pp. 682-688)
D. 2 and 5
E. 2 and 3

4. Which of the following is true of hereditary hyrdrocephalus in laboratory reared Golden Hamsters:
A. Affects lateral and third ventricles
B. Affects lateral ventricles only (VP 2006, pp. 523-529)
C. Associated with marked subependymal gliosis
D. Associated with moderate subependymal necrosis
E. Associated with moderate necrosis

5. All of the following pituitary adenomas are diagnosed in cynomolgus macaques EXCEPT:
1. Prolactin adenoma
2. Corticotroph adenoma
3. Thyrotroph adenoma
4. Gonadotroph adenoma
5. Somatotroph adenoma

A. 1 and 4
B. 1 and 2
C. 3 and 4 (VP 2006, pp. 484-493)
D. 2 and 4
E. 2 and 5

6. The following are seen in Tyzzer's disease in gerbils EXCEPT:
A. Megaloileitis (p. 208 P&B)

B. Lymphoid necrosis
C. Myocardial necrosis
D. Necrotizing enteritis
E. Suppurative encephalitis

7. The most common site(s) of lymphoma in the rabbit is (are):
A. Spleen
B. Kidney
C. Thymus
D. Stomach
E. **B & D** (p. 306 P&B)

8. Parvovirus in hamsters causes all of the following EXCEPT:
A. Domed calvaria
B. Testicular necrosis
C. Enamel hypoplasia
D. Cerebellar hypoplasia (p. 181 P&B)
E. Cerebral mineralization

9. All of the following are true regarding large granular lymphocytic leukemia in rats EXCEPT:
A. Arises in the spleen
B. Retrovirus associated (p. 169 P&B)
C. Most common in F344 rats
D. Concurrent thrombocytopenia
E. Concurrent immune mediated hemolytic anemia

10. The primary pathologic finding associated with pheochromocytoma in new world primates is:
A. Cerebral laminar cortical necrosis
B. Pulmonary infarction
C. Pancreatic islet cell tumor
D. Parathyroid adenoma
E. Myocardial degeneration and fibrosis (Vet Path 2009: Volume 46, number 6, page 1221)

11. Spontaneous aortitis is a common incidental histologic finding in which of the following strains of laboratory mice:
A.B6C3F1
B. Balb/c (Vet Path 2009: Volume 46, number 6, page 1311 and Tox Path volume 37, 667)
C. C57BL/6
D. 129
E. C3H/He

12. Which of the following lesions is common to both the Dpcd/Poll and Nme7 mouse models of Situs Inversus:
A. Hydrocephalus (Vet Path 2010: Volume 47, number 1, page 120 ("B" is incorrect because SI is defined as left to right transposition of the organs))
B. Right to left transposition of the thoracic and visceral organs
C. Sinusitis
D. Nasal exudation
E. Seminiferous tubule atrophy

13. In *Gnptab*$^{-/-}$ and *Gnptg*$^{-/-}$ mice, murine models for Mucolipidosis Types II and IIIc, histologic lesions are present in all of the following, EXCEPT:

A. Exocrine pancreas
B. Skeletal muscle (Vet Path 2009: Volume 46, number 2, page 313)
C. Lacrimal gland
D. Parotid salivary gland
E. Bulbourethral gland

14. In the C57BL/6 mouse model of chronic oral arsenic toxicosis, the primary lesion occurs in:
A. The bone marrow
B. The blood vessel walls (Vet Path 2009: Volume 46, number 2, page, 361 and Tox Path: Volume 36, number 6, page 805)
C. The vascular endothelium
D. The articular cartilage
E. The retina

15. The histopathologic finding that best characterizes the pulmonary lesion of Rat Respiratory Virus is:
A. Suppurative bronchopneumonia
B. Lymphohistiocytic bronchointerstitial pneumonia
C. Histiocytic bronchopneumonia
D. Lymphohistiocytic interstitial pneumonia (Vet Path 2009: Volume 46, number 5, page 992)
E. Granulomatous pneumonia

16. The granulated metrial gland (GMG) cells in the metrial glands of pregnant mice and rats are derived from:
A. Placental trophoblastic epithelium
B. Bone marrow origin macrophages
C. Endometrial stroma
D. Bone marrow origin natural killer cells (Vet Path 2009: Volume 46, number 5, page, 1019 and Tox Path: Volume 37, page 474)
E. Endometrial glandular epithelium

17. In the male Lewis Rat which of the following best describes the primary histologic lesion of short-term low-dose administration of rotenone:
A. Articular cartilage degeneration and necrosis
B. Degeneration, necrosis, and mineralization of ameloblasts
C. Submassive hepatic necrosis
D. Fibrinoid vascular necrosis in the brain (Vet Path 2009: Volume 46, number 4, page 776)
E. Necrosis of the proximal renal tubules

18. Which of the following is true concerning spontaneous hepatocellular carcinomas in captive lemurs and lorises:
A. Metastatic lesions are most common in the lungs and mediastinum. (VP 2010, pp. 306-311)
B. Tumors are associated with hepadnavirus infection.
C. Tumors are associated with excessive hepatic iron.
D. Tumors are associated with excessive hepatic copper.
E. Tumors are associated with hepatitis C infection.

19. The lesions of *Citrobacter rodentium* infection in mice immunodeficient due to murine acquired immunodeficiency syndrome are primarily restricted to the:
A. Pancreas
B. Small intestine
C. Cecum
D. Colon (VP 2010, pp. 312-317)
E. Stomach

20. Which of the following is characteristic of Simian Parvovirus?
i. Anemia
ii. Infection associated with immunosuppression
iii. Usually clinically silent infection
iv. Virus uses globoside (erythrocyte P antigen) as a receptor

A. i
B. i, ii
C. i, ii, iii
D. ii, ii, iv
E. i, ii, iii, iv (Comp Med 58(1): 47-50 (2008))

21. Which of the following is NOT characteristic of *Baccharis pteronioides* in hamsters?
A. Multiple hemorrhagic infarcts in liver and kidney
B. Cardiac necrosis (*Baccharis pteronioides* toxicity in livestock and hamsters; JVDI 21(2): 208-213 (2009))
C. Severe hemorrhagic enteritis
D. Lymphoid necrosis
E. Necrotizing vasculitis and vascular thrombosis spleen and mesenteric lymph nodes

22. Which of the following organs is least affected with Nipah viral infection in Guinea pigs?
A. Kidney (Histopathologic and Immunohistochemical Characterization of Nipah Virus Infection in the Guinea Pig: ***Vet Pathol,*** 2008 45: 576)
B. Uterus
C. Brain
D. Urinary bladder
E. Spleen

23. Which of the following are upregulated in mice that develop auricular chondritis following ear tagging:
A. Metallothionein (MT) – 1 (VP 2007 November, p461 left column, 2nd and 3rd paragraphs)
B. IL – 4
C. IL – 5
D. IL- 10
E. IL - 12

24. In Slc24a5-/- mice which ocular structure shows the most severe hypopigmentation?
A. Anterior layer of the iris pigment epithelium (IPE) (Ocular Albinism and Hypopigmentation Defects in Slc24a5[illegible]I[illegible]Mice: ***Vet Pathol,*** 2008 45: 264)
B. Anterior iridial stroma
C. Choroidal melanocytes
D. Posterior iridial pigmented epithelium
E. None of the above

25. What is the most common pathogen isolated in juvenile rabbits with the enteritis complex:
A. *Clostridium perfringens* Type E
B. *Clostridium perfringens* Type D
C. *Clostridium perfringens* Type C
D. *Clostridium difficile*
E. *Clostridium spiroforme* (P&B pp. 269)

Miniboard Exam 2010- Clinical Pathology Answer Key

1. All of the following findings are noted in cats with hyperthyroidism EXCEPT:
A. Anemia (D+P pg 289)
B. Increased creatinine
C. Hyperglycemia
D. Elevated ALP (bone isoenzyme)
E. Elevated ALP (liver isoenzyme)

2. One notes the following findings in an equine endometrial cytologic preparation: Many squamous epithelial cells and few eosinophils. What is the most likely diagnosis?
A. Chronic endometritis
B. Hypersensitivity reaction of the endometrium to sperm
C. Pneumouterus
D. Vaginal contamination with concurrent pneumovagina (D+P pg 329)
E. A normal mare endometrium in estrus

3. The following data is collected on the effectiveness of a diagnostic test
True positives: 540
False negatives: 60
False positives: 280
True negatives: 1,120

What is the Predictive value of a positive test result (PV+):
A. 95%
B. 72%
C. 66% (Stockham pp. 40-41)
D. 33%
E. 10%

4. What best defines the diagnostic **sensitivity** of a test for detecting a disease:
A. The frequency with which a test is negative in patients that do not have the disease
B. The frequency with which a test is positive in patients that do have the disease (Stockham pp. 38-39)
C. The frequency with which a test correctly classifies an animal as having or not having the disease
D. The probability that a positive test result indicates that the animal has the disease
E. The probability that a negative test result indicates that the animal does not have the disease

5. In cats with nasopharyngeal lymphoma, which of the following findings is NOT present:
A. Hypercalcemia (VP 2007, pp. 885-892)
B. Panhypoproteinemia
C. Hypocholesterolemia
D. Moderate lymphopenia
E. Mature neutrophilia
6. Which of the following can cause an increased anion gap?
A. Hypoalbuminemia
B. Hypercalcemia
C. Hyperphosphatemia (Stockham 537-8)
D. Multiple myeloma
E. Hypermagnesemia

7. All of the following statements regarding hepcidin are true EXCEPT:
A. Binds iron exporting protein, ferroportin
B. Inhibits absorption of dietary iron

C. Increases import of iron into macrophages (VCP 38, 1: 13-19; 2009)
D. Expression increases in response to inflammation
E. Expression decreases in response to iron deficiency

8. A leukemoid reaction is characterized by all of the following EXCEPT:
A. Neutrophilia
B. Marked left shift
C. Early myeloid precursors
D. Reactive lymphocytes
E. Normoblastemia (Duncan and Prasse p 67)

9. Which of the following ALP fractions is resistant to heat or levamisole:
A. L-ALP
B. Total ALP
C. C-ALP (Duncan and Prasse p198)
D. B-ALP
E. P-ALP

10. With canine corticosteroid hepatopathy, all are expected to be abnormal EXCEPT:
A. Alanine aminotransferase
B. Alkaline phosphatase, heat resistant isoenzyme
C. Alkaline phosphatase, levamisole resistant isoenzyme
D. Ammonia (DP p211)
E. Aspartate aminotransferase

11. Which of the following is an accurate assessment of erythrocyte regenerative capacity in birds:
A. Ring form reticulocytes (AJVR 69, p 1067-72 2008)
B. Metarubricytes
C. Aggregate reticulocytes
D. Erythroplastids
E. Punctate reticulocytes

12. Which is the most likely diagnosis given the following values in a dog:

Hematology		Reference Range
Hct (%)	34	37-55
Hgb (g/dl)	15	12-18
RBC ($x10^6$/ul)	4.0	5.5-8.5
MCV (fl)	85	60-72
MCHC (g/dl)	30	34-38
Retics (/ul)	20	<60

A. Copper deficiency anemia
B. Iron deficiency anemia
C. Folate deficiency
D. Erythrocyte agglutination (Duncan and Prasse 12-15. Stockham p 130. *** Copper and iron deficiencies cause microcytosis not macrocytosis. To pick rbc agglutination – need to know there will be a concurrent decrease in RBC count (machine counts agglutinated groups as a single rbc, thus RBC decreases and MCV increases). Hct and MCHC are calculated values (from RBC and MCV), thus, they are also affected. The Hgb is a true value. It

can help to look for discrepancies in Hct and Hgb (Hgb = 1/3rd of hct, if not, there is likely an artifact affecting machine calculations).
E. Regenerative anemia

13. Which is the most appropriate next step given the following case in an adult dog with impaired platlet function:

Hematology		Reference Range
Nucleated cell count (/ul)	24200	6000 - 17000
Neutrophils (/ul)	11000	3000-11500
Bands (/ul)	100	0-300
Lymphocytes (/ul)	12000	1000-4800
Monocytes (/ul)	1000	200-1400
Eosinophils (/ul)	100	100-1200

A. Begin treatment for lymphoma
B. Bone marrow aspirate
C. Urine culture
D. Ehrlichia canis titer (Vet Clin of North Amer 2007, p267-82. Determining the significance of persistent lymphocytosis and D+P p113)
E. Endotracheal wash

14. Which of the following is the most reliable test/value to diagnose DIC in the dog:
A. Thromboelastography
B. PTT
C. FDP
D. D-dimer (VCP march 2009, 78-82 and D+P p. 132)
E. Protein C

15. A 10 year old canine with prolonged PT, normal PTT, normal platelet count, and normal bleeding time most likely has which of the following:
A. Hemophilia A
B. Early rodenticide poisoning (Duncan and Prasse p 130)
C. Glanzmann's thrombasthenia
D. DIC
E. Dysfibrinogenemia

16. A urine sample with many ammonium urate crystals may prompt evaluation for which of the following:
A. Portosystemic shunt (Duncan and Prasse p 246)
B. Ampicillin treatment
C. Ethylene glycol toxicity
D. Alkaline urine
E. Hyperthyroidism

17. Urinary calculi from guinea pigs are most often composed of:
A. Calcium oxalate
B. Dried blood
C. Struvite
D. Calcium carbonate (JAVMA 2009, 234, 2, 214-20)

E. Apatite

18. Which is the most likely diagnosis in a 2 year old mare with the following data:

TEST	RESULT	REF INTERVAL
Sodium	133	133-145 mEq/L
Chloride	120	100-111 mEq/L
Potassium	2.1	2.2-4.6 mEq/L
TCO2	10	24-34 mEq/L
Urea	22	14-27 mg/dL
Creatinine	1.5	1-2 mg/dL

A. Liver failure
B. Small intestinal obstruction
C. Renal tubular acidosis (Stockham p.522-3)
D. Ethylene glycol toxicity
E. Grain overload

19. 10 year old female spayed DSH. What is the most likely diagnosis given the following data:

TEST	RESULT	REF INTERVAL
Sodium	155	150-160 mEq/L
Chloride	123	118-128 mEq/L
Potassium	3.3	4-5.8 mEq/L
Urea	28	14-31 mg/dL
Creatinine	1.8	1-2 mg/dL

A. Hyperaldosteronism (Duncan and Prasse p. 150-2, Stockham p. 518)
B. Renal failure
C. Metabolic acidosis
D. Aortic thromboembolism with tissue ischemia
E. Urinary tract obstruction

20. 3 year old Holstein cow. What is the most likely diagnosis given the following data:

TEST	RESULT	REF INTERVAL
Sodium	115	133-145 mEq/L
Chloride	50	100-111 mEq/L
Potassium	2.2	2.2-4.6 mEq/L
TCO2	39	24-34 mEq/L
Calcium	13	11-13.7 mg/dL
Phosphorus	3	1.9-4.1 mg/dL
Urea	161	14-27 mg/dL
Total Protein	8.2	5.8-7.6 g/dL

Albumin	3.9	2.7-3.7 g/dL

A. Grain overload
B. Esophageal obstruction
C. Bovine renal failure (Duncan and Prasse p. 156 , Stockham p. 529-31)
D. Selenium deficicncy
E. Massive tissue necrosis

21. 10 year old mare. What is the most likely diagnosis given the following data:

TEST	RESULT	REF INTERVAL
Sodium	135	133-145 mEq/L
Chloride	103	100-111 mEq/L
Potassium	2.2	2.2-4.6 mEq/L
TCO2	26	24-34 mEq/L
Calcium	7	11-13.7 mg/dL
Phosphorus	4.2	1.9-4.1 mg/dL
Magnesium	1.2	2-4 mg/dl
Urea	30	14-27 mg/dL
Creatinine	2.1	1-2 mg/dL
Urine specific grav	1.006	1.020-1.030

A. Hyperparathyroidism
B. Renal failure
C. Ruptured bladder
D. Hypervitaminosis D
E. Blister beetle poisoning (Duncan and Prasse p. 277 , Stockham p. 609 and 625)

22. Which of the following test results can be used to diagnose diabetes mellitus in cats:
A. Decreased fructosamine
B. Increased TLI
C. Increased PLI
D. Increased glycated albumin (JVDI 2009, 21, 112-6)
E. None of the above

23. 12 year old MC Arabian horse. Choose the best primary diagnosis based on the following data.

TEST	RESULT	REF INTERVAL
Sodium	132	138-148 mEq/L
Chloride	93	101-111 mEq/L
Potassium	4.2	3.2-4.6 mEq/L
TCO2	28	24-34 mEq/L
Glucose	264	65-100 mg/dL
Urea	20	14-27 mg/dL
Creatinine	1	1-2 mg/dL
Urine specific grav	1.016	1.020-1.030

Cortisol pre-dex	120	36-81 nmol/L
Dexamethasone suppression test - 4 hr post	134	<30 nmol/L
Dexaemthasone suppression test - 24 hr post	145	< 30 nmol/L

A. Hyperadrenocorticism (Stockham p. 822)
B. Diabetes mellitus
C. Diabetes insipidus
D. Hypopituitarism
E. Hyperthyroidism

24. Choose the best interpretation of the following data in a 10 year old MC canine.
(tT4 = total thyroxinc ; fT4 = free thyroxine ; TSH = thyroid stimulating hormone concentration; TgAA = thyroglobulin autoantibody)

TEST	**RESULT**
tT4	Decreased
fT4	Increased
TSH	Increased
TgAA	Negative

A. Primary autoimmune hypothyroidism
B. Secondary hypothyroidism
C. Sick euthyroidism (Duncan and Prasse p. 283-5, Stockham p. 789-94)
D. Healthy dog
E. Tertiary hypothyroidism

25. Which is the most likely xenobiotic-induced finding in the following investigative toxicology study in rats. Control rats were administered vehicle and the high dose rats were administered a high dose of a xenobiotic for 7 days (data from rats at other dosage levels is not included here).

Dose Group	**Animal**	**Weight (g)**	**BUN mg/dl**	**Creat mg/dl**	**Tbili mg/dl**	**ALP IU/I**	**GGT IU/I**	**ALT IU/I**	**AST IU/I**	**CK IU/I**
Control (C)	C1	350	16.2	0.48	0.09	330	2.9	56.0	124	977
	C2	400	15.0	0.5	0.09	332	2.9	57.0	111	688
	C3	300	18.5	0.55	0.09	328	2.9	48.0	91	643
	C4	325	17.3	0.55	0.09	442	2.9	45.0	91	592
	C5	375	15.0	0.55	0.09	218	2.9	42.0	74	161
High Dose (D)	**Mean**	**350**	**16.4**	**0.53**	**0.09**	**330**	**2.9**	**49.6**	**98.2**	**612**
	D1	250	18.4	0.49	0.09	210	2.9	45.0	101	592
	D2	300	31.3	0.37	0.09	265	2.9	50.5	110	600
	D3	200	16.2	0.49	0.09	155	2.9	48.0	93	584
	D4	235	15.5	0.49	0.09	213	2.9	42.0	86	277
	D5	275	11.6	0.49	0.09	207	2.9	39.5	116	903
	Mean	**250**	**18.6**	**0.47**	**0.09**	**210**	**2.9**	**45.0**	**101**	**592**

A. Hepatoxocity
B. Muscle necrosis
C. Cholestasis
D. Renal insufficiency
E. Anorexia