NAME: _____

Pathology 621: Exam #1
Monday, September 21, 1998

DIRECTIONS (Questions 1-72): Choose the single BEST answer. (1 point each)

Cruse
1 photo, 1 question
1. In this flow cytometric dot plot, side scatter (y axis) indicates:
   A. channel number
   B. fluorescence intensity
   C. granularity
   D. shape
   E. size

Geiss
2 photos, 1 question
2. The photos represent autopsy findings in a 54 year old who died of heart disease. What is the etiology of the changes shown?
   A. bacterial infection
   B. fungal infection
   C. ischemia
   D. lipid accumulation
   E. release of proteolytic enzymes

Geiss
2 photos, 1 question
3. A 75 year old is admitted to UMC with a 2 day history of shortness of breath, which eventuates in respiratory failure and death. Based on the autopsy findings shown, the patient's death was most likely due to:
   A. an exudate
   B. an infarct
   C. granulomatous inflammation
   D. hydropic change
   E. liquefactive necrosis

Cruse
2 photos, 1 question
4. The patient whose blood serum contained the autoantibodies shown in slide 2 (stained with anti-
   IgG) most likely had a diagnosis of:
   A. Grave's disease
   B. Hashimoto's autoimmune thyroiditis
   C. mixed connective tissue disease

D. progressive systemic sclerosis
E. Sjögren's syndrome

[GO ON TO THE NEXT PAGE]

Geiss
2 photos, 1 question
5. The type of cell shown:
A. characterizes acute inflammation
B. characterizes granulomatous inflammation
C. secretes immunoglobulins
D. secretes monokines
E. none of the above

Geiss
1 photo, 2 questions
This glomerulus is from a patient with systemic lupus erythematosus. With regard to the eosinophilic material at 11 and 2 o'clock:

6. This material may be described as:
A. anthracotic
B. calcified
C. dysplastic
D. hyaline
E. karyolytic

7. This type of necrosis is:
A. caseous
B. coagulative
C. fibrinoid
D. gangrenous
E. liquefactive

Cruse
2 photos, 1 question
8. The pathological changes shown in these Congo red-stained slides (right frame on slide 2 is

polarized) suggest the deposition of:

A. amyloid
B. collagen
C. fibrillin
D. fibrin
E. immunoglobulin multimers

Geiss
1 photo, 1 question

9. The type of tissue shown is a key factor in the process of:

A. apoptosis
B. granulomatous inflammation
C. regeneration
D. repair
E. resolution

[GO ON TO THE NEXT PAGE]

Cruse
1 photo, 1 question

10. Immunofluorescence examination of this biopsy of sun-exposed skin revealed the same findings shown here in the anti-igG, anti-IgM, anti-IgM, anti-IgA, anti-C1q and anti-C3 stained sections. The most likely diagnosis is:

A. bullous pemphigoid
B. dermatitis herpetiformis
C. lupus erythematosus
D. pemphigus vulgaris
E. porphyria cutanea tarda

Cruse
2 photos, 1 question

11. This child presented with a history of congenital heart defects and severe hypocalcemia (due to hypoparathyroidism). He also had recurrent and chronic viral, bacterial, fungal and protozoal infections. This child most likely has a diagnosis of:

A. Bruton's hypogammaglobulinemia
B. Hyper-IgE syndrome
C. DiGeorge syndrome

D. severe combined immunodeficiency
E. Wiskott-Aldrich syndrome

Geiss
1 photo, 1 question
12. This photograph of subcutaneous tissue is best characterized as illustrating:
A. abscess
B. acute inflammation
C. chronic inflammation
D. coagulation necrosis
E. granulomatous inflammation

Cruse
1 photo, 1 question
13. The type of renal allograft rejection shown in this slide is:
A. accelerated
B. acute cellular
C. chronic
D. hyperacute
E. second-set

Cruse
2 photos, 1 question
14. The condition represented by these two slides (slide 2 stained for IgG) is mediated by which of the
followings type of hypersensitivity?
A. type I
B. type II
C. type III
D. type IV
E. type V

[GO ON TO THE NEXT PAGE]

Geiss
1 photo 1 question
15. This 63 year old man died 21 hours after surgery for obstruction of the sigmoid colon.
Past history included a high alcohol intake, chronic lung disease, suspected chronic pancreatitis, and (recently) congestive heart failure. The disease process which best
characterizes this slide is:
A. enzymatic fat necrosis

B. fatty change
C. fatty infiltration
D. normal
E. scar

Cruse
1 photo, 1 question
16. This nuclear staining pattern with anti IgG represents the morphological equivalent of:
A. anti-double stranded DNA autoantibodies
B. anti-histone antibodies
C. anti-Jo-1 autoantibodies
D. anti-Scl-70 autoantibodies
E. anti-Sm (Smith antigen) autoantibodies

Cruse
1 photo, 1 question
17. The etiology of the patient's disease depicted in this slide is most likely:
A. adenosine deaminase deficiency
B. B cell deficiency
C. NADPH oxidase defect
D. stem cell defect
E. T cell deficiency

Geiss
1 photo, 1 question
18. A 55-year-old lawyer suddenly collapses and dies on the street. The county coroner (appropriately)
refers the decedent to the pathologist who holds the county contract for performing medicolegal
autopsies (you). This slide is from that autopsy (necropsy). It shows:
A. acute inflammation
B. chronic inflammation
C. coagulative necrosis
D. liquefactive necrosis
E. normal myocardium

Geiss
1 photo, 1 question
19. The statement shown is:
A. true
B. false

[GO ON TO THE NEXT PAGE]

Cruse

20. Chronic allograft rejection is characterized by all of the following, EXCEPT:
    A. arterial and arteriolar intimal thickening causing stenosis or obstruction
    B. interstitial fibrosis
    C. preformed antigraft antibodies
    D. thick glomerular capillary walls
    E. tubular atrophy

Rock

21. All of the following may affect the reference range for a laboratory test, EXCEPT:
    A. age of population
    B. diversity of the race groups in the population
    C. female to male ratio of the population
    D. one test result
    E. 1000 test results

Geiss

22. Stable cells usually reside in which phase of the cell cycle?
    A. G_0
    B. G_1
    C. G_2
    D. M
    E. S

Geiss

23. Of the conditions listed below, the most common cause of delayed wound healing is:
    A. foreign body reaction to sutures
    B. infection
    C. ischemia
    D. malnutrition
    E. vitamin C deficiency

Cruse

24. The following are true of HIV infection, EXCEPT:
    A. During the latent phase, the vast majority of infected cells do not replicate the virus.
    B. HIV-1 contains reverse transcriptase.
    C. HIV infection becomes AIDS when the absolute CD4+ count falls below 200

cells/cu mm blood (reference range = 500-3140 cells/cu mm blood).
D. In AIDS, there is global perturbation of immune function.
E. The specific receptor for HIV-1 is the CD45 molecule.

Rock

25. All of the following describe the accuracy of a test result, EXCEPT:
A. correctness
B. exactness
C. fact
D. fiction
E. truth

[GO ON TO THE NEXT PAGE]

Cruse

26. In rheumatoid arthritis, rheumatoid factor is:
A. a Gm determinant
B. ordinarily an IgM that reacts with the infectious agent that initiates the disease
C. the cause of rheumatoid arthritis
D. totally unlike the RF recognized in systemic lupus erythematosus
E. usually an IgM that uses IgG as its antigen

Cruse

27. Persons with this type of immunodeficiency are asymptomatic or present with respiratory or gastrointestinal infections of varying severity. There is also a strong predisposition for allergies and connective tissue disease. It is the most common immunodeficiency syndrome, occurring in 1 in every 700 persons. It is
A. acquired immune deficiency syndrome
B. common variable immunodeficiency
C. congenital X-linked infantile hypogammaglobulinemia
D. DiGeorge syndrome
E. selective IgA deficiency

Geiss

28. Hemosiderosis and hemochromatosis are best distinguished from one another on the basis of:
A. organelles in which iron is deposited
B. presence or absence of organ damage
C. types of cells in which iron is deposited
D. underlying cause of the iron overload
E. whether or not silica is deposited along with the iron

Cruse

29. A 55 year old Caucasian female presents to her physician complaining of dry eyes, dry mouth and morning stiffness in the interphalangeal joints of her fingers. On examination the parotid gland and lacrimal gland regions are swollen. Which of the following anti-nuclear antibody tests would likely be positive in 60 to 95% of patients with the disease affecting this woman?

A. anti-double stranded DNA antibody
B. anti-histone antibody
C. anti-Sm antibody
D. Scl-70 antibody
E. SS-A (Ro) antibody and SS-B (La) antibody

Geiss

30. Which one of the following is LEAST likely to regenerate?

A. bone
B. cardiac muscle
C. endothelium
D. hepatocytes
E. renal tubular epithelium

[GO ON TO THE NEXT PAGE]

Cruse

31. Type II hypersensitivity reactions include all of the following, EXCEPT:

A. antibody-complement mediated lysis of cell membranes
B. antibody-dependent cell-mediated cytotoxicity (ADCC)
C. anti-receptor antibody inhibition of acetylcholine-receptor interaction
D. autoimmune hemolysis in patients with autoimmune hemolytic anemia
E. immune complex-mediated tissue injury

Rock

32. The laboratory test you ordered on your patient is positive. When the prevalence of the disease for which the test is diagnostic is high in your community of patients, the laboratory test result has:

A. high false positive rate
B. high negative rate
C. high predictive value

D. low predictive value
E. low specificity

Cruse

33. Hyperacute rejection is characterized by all of the following, EXCEPT:
A. fibrin-platelet thrombi in capillaries
B. interstitial edema and neutrophilic infiltrates
C. mononuclear cell-mediated cytotoxicity
D. neutrophil vasculitis with fibrinoid necrosis
E. vascular congestion

Geiss

34. The tensile strength of a healing or healed wound is largely contributed by:
A. angioblasts
B. collagen
C. fibroblasts
D. macrophages

Cruse

35. The DNA index is defined by dividing the:
A. mean channel number of the aneuploid peak by the mean channel number of the diploid peak
B. mean channel number of the aneuploid peak by the mean channel number of the haploid peak
C. mean channel number of the diploid peak by the mean channel number of the aneuploid peak
D. mean channel number of the diploid peak by the mean channel number of the haploid peak
E. mean channel number of the haploid peak by the mean channel number of the diploid peak

[GO ON TO THE NEXT PAGE]

Geiss

36. Deposition of calcium salts in vital tissues of hypercalcemic patients is known as:
A. dystrophic calcification
B. enzymatic fat necrosis
C. hypercalcemic metaplasia
D. metastatic calcification

Rock

37. DRG (diagnostic related groups) is a frequently used abbreviation. Which of the

following is NOT associated with DRGs?
A. deals with hospital reimbursement
B. is an important source of income in most hospitals
C. is related to Medicare patients
D. is used in budgeting and planning
E. is the same system in every state

Geiss

38. Causes of fever in inflammation include:
A. interleukin-1
B. prostaglandins
C. both
D. neither

Geiss

39. Ten days following an abdominal operation, a 77 year-old man is found to have a white blood count of 20,000/cu mm (reference range = 4,000-11,000), a serum creatine kinase (CK) of 350 U/L (reference range = 55-170), and an abnormal electrocardiogram. The myocardium is likely to exhibit:
A. inflammation
B. necrosis
C. both
D. neither

Cruse

40. All of the following statements are true, EXCEPT:
A. Eosinophils have a higher side scatter than do neutrophils.
B. Lymphocytes have a lower forward scatter than do neutrophils.
C. Monocytes have a higher side scatter than do eosinophils.
D. S-phase fraction (SPF) has independent predictive power.
E. S-phase fraction (SPF) indicates the aggressiveness of a tumor.

Rock

41. Whose responsibility is it to provide ICD-9 codes defining medical necessity for laboratory tests requested from a non-hospital laboratory before the test can be billed?
A. hospital administrator
B. laboratory
C. nurse
D. patient
E. physician

[GO ON TO THE NEXT PAGE]

Geiss

42. In ischemic cell injury there is an:
    A. efflux of K^+ and Na^+
    B. influx of K^+ and Ca^{++}
    C. influx of K^+ and H_2O
    D. influx of Na^+ and Ca^{++}
    E. influx of Na^+ and K^+

Cruse

43. All of the following are true, EXCEPT:
    A. CLA (common leukocyte antigen) (CD45) stain is positive in tumors of T and B cell origin.
    B. A positive desmin stain identifies cells of muscle origin and their associated tumors, i.e., leiomyosarcoma.
    C. A positive keratin stain identifies cells of epithelial origin and their associated tumors, e.g., carcinoma
    D. A positive S-100 stain identifies cells of the central and peripheral nervous systems and is positive for the associated tumors, e.g., schwannoma
    E. A positive vimentin stain identifies cells of epithelial origin and their associated tumors, e.g., carcinoma.

Geiss

44. Which part of the microcirculation is most consistently involved in the permeability changes and exudation of acute inflammation?
    A. arterioles
    B. capillaries
    C. small arteries
    D. veins
    E. venules

Rock

45. The benefit of medical management using the critical pathway as a treatment rationale is that it should result in all of the following, EXCEPT:
    A. good medicine
    B. greater patient satisfaction
    C. improved timeliness of health care delivery
    D. outcome the same but less morbidity
    E. reduction in costs

Cruse

46. Chemotactic, vasoactive and spasmogenic compounds that mediate type I hypersensitivity reactions include all of the following, EXCEPT:
    A. eosinophil chemotactic factor of anaphylaxis
    B. histamine

C. interleukin-2
D. leukotrienes
E. prostaglandins

[GO ON TO THE NEXT PAGE]

Geiss
47. Which type of necrosis is most typically associated with pyogenic infection?
A. caseous
B. coagulation
C. enzymatic fat
D. fibrinoid
E. liquefaction

Cruse
48. Postulated mechanisms by which autoimmunity develops include all of the following, EXCEPT:
A. decreased NK cell function
B. diminished suppressor cell function
C. increased helper cell function
D. polyclonal B cell activation
E. release of sequestered antigens

Geiss
49. Which of the following types of exudate would have the lowest protein content?
A. fibrinous
B. purulent
C. sanguineous
D. serosanguineous
E. serous

Cruse
50. Secondary mediators of anaphylactic-type hypersensitivity include all of the following, EXCEPT:
A. biogenic amines
B. leukotrienes
C. platelet-activating factor (PAF)
D. prostaglandin D_2
E. TGFβ

Cruse
51. Amyloid, which has an amorphous, eosinophilic, hyaline fibrillar appearance, accumulates

progressively in an extracellular location where it encroaches on and produces pressure atrophy of adjacent cells. All of the following statements are true of amyloid, EXCEPT:

A. AF is the type of amyloid associated with renal hemodialysis.
B. Amyloid deposition may cause conduction defects in the heart.
C. The AA (amyloid associated) type may follow chronic inflammatory conditions.
D. The AL type is associated with multiple myeloma.

Geiss

52. Which of the following serves to protect injured cells?
A. cytokines
B. heat-shock proteins
C. integrins
D. nitric oxide
E. prostaglandins

[GO ON TO THE NEXT PAGE]

Cruse

53. Wegener's granulomatosis most frequently develop:
A. anti-centromere autoantibodies
B. antihistone autoantibodies
C. anti-neutrophil cytoplasmic antibodies
D. anti-Scl-70 autoantibodies
E. anti-SS-B autoantibodies

Cruse

54. Immunologic processes with type III hypersensitivity mechanisms include all of the following,
EXCEPT:
A. autoimmune hemolytic anemia
B. immune complex mediated tissue injury
C. rheumatoid arthritis
D. polyarteritis nodosa
E. systemic lupus erythematosus

Geiss

55. Which of the following growth factors is a growth inhibitor?
A. epidermal growth factor (EGF)
B. fibroblast growth factor (FGF)
C. platelet-derived growth factor (PDGF)
D. transforming growth factor-alpha (TGF-α)
E. transforming growth factor-beta (TGF-β)

Rock

56. What is the probability that a test profile will have an abnormal test result if 24 tests are ordered? Please assume the reference range includes 95% of healthy subjects. (Clue: 0.95^{24} = 0.30)

A. 0.40
B. 0.50
C. 0.60
D. 0.70
E. 0.80

Cruse

57. All of the following are true of contact hypersensitivity of the skin to poison ivy or poison oak,
EXCEPT:

A. It is a type III hypersensitivity reaction.
B. It is an epidermal reaction.
C. It is CD4+ T cell-mediated.
D. It is induced by urushiols in poison ivy plants.
E. Maximal reactivity occurs 48 to 72 hr. after exposure in a sensitive subject.

Cruse

58. Chronic granulomatous disease is characterized by all of the following, EXCEPT:

A. increased nitroblue tetrazolium (NBT) reduction
B. ineffective bacterial killing of neutrophils
C. symptoms of pneumonia, lymphadenitis, or splenomegaly
D. usually afflicts males
E. usually manifests in the first two years of life

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Cruse

59. All of the following are either receptors for, or facilitate entry into host cells of, HIV-1 virus,
EXCEPT:

A. CCR-5
B. CD4
C. CD34
D. CXCR-4
E. fusin

Geiss

60. Identification of a granulomatous reaction depends on the presence of:

A. fibroblasts and lymphocytes
B. Langhans type giant cells
C. masses of epithelioid macrophages
D. necrosis

E. the identification of the causative agent

Cruse

61. All of the following infections usually signify a compromised host immune response,
EXCEPT:
A. cytomegalovirus (CMV) infection of lungs
B. esophageal candidiasis (thrush)
C. *Mycobacterium avium-intracellulare* infection of lungs
D. *Pneumocystis carinii* pneumonia
E. *Streptococcus pyogenes* infection

Cruse

62. A one year old Caucasian male is brought to the physician with a chief complaint of skin rash and repeated sinopulmonary infections. The history reveals that there was a problem with cord bleeding noticed at birth. On examination, petechiae are noted on the face in addition to eczema. Laboratory analysis reveals thrombocytopenia and lymphocytopenia. IgM levels in serum are low, IgG is normal, and IgA and IgE levels are elevated. Although the child responded normally to the protein antigens tetanus and diphtheria toxoid, he responds poorly to microorganisms containing polysaccharide antigens. The most likely diagnosis is:
A. Bruton's X-linked agammaglobulinemia
B. common variable immunodeficiency
C. DiGeorge's syndrome
D. IgA deficiency
E. Wiskott-Aldrich syndrome

Cruse

63. Self antigens that are sequestered and likely to be viewed by immune system cells as foreign if introduced into the blood circulation include all the following, EXCEPT:

A. lens crystallin
B. myelin basic protein
C. spermatozoa
D. testicular tissue antigens
E. thyroglobulin

[GO ON TO THE NEXT PAGE]

Geiss

64. Each of the following is a major chemical mediator involved in acute inflammation, EXCEPT:
A. bradykinin

B. complement
C. histamine
D. lymphokine

Rock

65. You are designing a new test for evaluating calcium metabolism in patients over the age of 70 years. Which pair of features is the optimum goal for the development of this new test?

A. low sensitivity high specificity
B. high reproducibility
C. high sensitivity and high specificity
D. high specificity and low sensitivity
E. high sensitivity and low specificity

Cruse

66. The principal pathologic changes in graft-versus-host disease in severely immunodeficient patients transfused with bone marrow or blood products containing HLA incompatible lymphocytes include all of the following, EXCEPT:

A. "exploding" crypt of Lieberkuhn cells
B. granulomatous interstitial pneumonitis
C. skin basal layer cell destruction by donor T cells
D. cholestatic hepatitis with ballooning degeneration of hepatocytes
E. lymphoid system pathology

Cruse

67. Antibodies most commonly associated with polymyositis are:

A. anti-double stranded DNA antibodies
B. anti-histone antibodies
C. anti-Scl-70 antibodies to DNA topoisomerase I
D. Jo-1 antibodies against histidyl-tRNA synthetase
E. SS-A(Ro) and SS-B(La) antibodies against ribonucleoprotein

Cruse

68. Which of the following molecules is several thousand times more active than histamine in increasing vascular permeability and causing bronchial muscle contraction in type I hypersensitivity reactions? A. C3a anaphylatoxin

B. eosinophil chemotactic factors of anaphylaxis (ECFA)
C. heparin
D. leukotriene C_4
E. platelet activating factor (PAF)

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Cruse

69. Hypersensitivity pneumonitis known as "farmer's lung" represents:
    A. combined type I and type II hypersensitivity
    B. combined type I and type IV hypersensitivity
    C. combined type III and type IV hypersensitivity
    D. type II hypersensitivity only
    E. type III hypersensitivity only

Cruse

70. Acquired immune deficiency syndrome (AIDS) can include all of the following, EXCEPT:
    A. a selective increase in cell-mediated immunity
    B. dementia
    C. fever, weight loss, and lymphadenopathy
    D. *Pneumocystis carinii* pneumonia
    E. up to 10 billion virus particles in circulating blood in symptomatic patients

Cruse

71. A deficiency of C1 esterase inhibitor may be found in patients with:
    A. anaphylactic shock
    B. hereditary angioneurotic edema
    C. hyperacute allograft rejection
    D. progressive systemic sclerosis
    E. systemic lupus erythematosus

Geiss

72. Which of the following inflammatory mediators exists as a free radical?
    A. bradykinin
    B. interleukin-1
    C. myeloperoxidase
    D. nitric oxide
    E. serotonin

MATCHING (Questions 74-97): For each NUMBERED item, choose the LETTER of the most closely related item. Each lettered item may be used once, more than once, or not at all. (1 point each)

Geiss

A. factitious
B. iatrogenic
C. idiopathic

D. idiotic
E. nosocomial

73. arising from actions or words of health care worker
74. acquired from hospital environment
75. of unknown etiology

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Geiss

A. fibronectin
B. integrin
C. intercellular adhesion molecule 1 (ICAM-1)
D. laminin
E. selectin

76. firm leukocyte adhesion
77. component of basement membranes
78. leukocyte rolling

Cruse

A. DNA aneuploidy
B. forward scatter
C. immunophenotyping
D. 90 degree scatter
E. green

____79. surface markers
___ 80. two peaks
___ 81. F.I.T.C.

Geiss

A. atrophy
B. dysplasia
C. hyperplasia
D. hypertrophy
E. metaplasia

___82. increase in size of cells
___83. replacement of one adult cell type by another

___84. increase in number of cells

Geiss

A histamine.
B. interleukin-1
C. leukotriene B_4
D. prostaglandins

_____85. chemotaxis
_____86. increased vascular permeability
_____87. pain

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Cruse

A. adenosine deaminase deficiency
B. decreased chemotaxis
C. heterograft
D. homograft
E. pre-B cell defect

_____ 88. lazy leukocyte
_____ 89. Bruton's hypogammaglobulinemia
_____90. severe combined immunodeficiency
_____91. xenograft

Cruse

A. anti-basement membrane antibodies
B. anticentromere autoantibodies
C. antihistone autoantibodies
D. antiphospholipid antibodies
E. disseminated intravascular coagulation

_____ 92. generalized Shwartzman reaction
_____ 93. limited scleroderma - CREST
_____ 94. lupus anticoagulant

_____ 95. drug-induced lupus erythematosus

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NAME: _____

Geiss

96. List three (3) differences between wound healing by primary union (first intention) and wound healing by secondary union (second intention) [3 points].

97. List two (2) objectives of autopsy (necropsy) examination. [2 points]

[THIS IS THE END OF THE EXAM]

1998-1999 Pathology Exam 1 Answers

1 c
2 c
3 a
4 b
5 c
6 d
7 c
8 a
9 d
10 c
11 c
12 c
13 b
14 b
15 b
16 a
17 c
18 e
19 ?
20 c
21 d
22 a
23 b
24 e
25 d
26 e
27 e
28 b
29 e
30 b
31 e
32 c
33 c
34 b
35 a
36 d
37 e
38 c
39 c
40 c
41 e
42 d
43 e
44 e
45 d
46 c
47 e
48 a
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68 d
69 c
70 a
71 b
72 d
73 b
74 e
75 c
76 b
77 d
78 e
79 c
80 a
81 e
82 d
83 b
84 c
85 c
86 a
87 d
88 b
89 e
90 a
91 c
92 e
93 b
94 d
95 c