PATH 201: GENERAL PATHOLOGY

END OF SEMESTER 1 EXAMINATION

THIS EXAM CONTAINS 2 SECTIONS-Answer all Questions

1. Section A-MULTIPLE CHOICE QUESTIONS-*BEST ANSWER ONLY*

2. Section B-Essay

SECTION A

1. Which one of the listed statements is the best histologic definition of an abscess?

A. A circumscribed collection of neutrophils with necrotic cellular debris
B. A localized defect that results from the sloughing of necrotic inflammatory tissue from the surface of an organ
C. A localized proliferation of fibroblasts and small blood vessels
D. An aggregate of two or more activated macrophages
E. The excessive secretion of mucus from a mucosal surface

2. Evaluation of a pedigree for a certain abnormality reveals the following information: there are skipped generations with male-to-male transmission; females are affected at the same rate as are males; and the disease is produced in the homozygous state, while heterozygous individuals are carriers. What is the inheritance pattern for this disorder?

A. Autosomal dominant
B. Autosomal recessive
C. X-linked dominant
D. X-linked recessive
E. Mitochondrial

3. A 22-year-old female presents with the sudden onset of a high fever, a diffuse erythematous skin rash, and shock. She started menstruating at age 13 and for several years has used tampons. Which one of the following is the most likely diagnosis for this individual's illness?

A. Erysipelas caused by Streptococcus pyogenes
B. Fifth disease caused by human parvovirus B19
C. Scarlet fever caused by S. pyogenes
D. Secondary syphilis caused by Treponema pallidum
E. Toxic shock syndrome caused by Staphylococcus aureus

4. Several days after exploring a cave in eastern Kentucky, a 39-year-old female develops shortness of breath and a low-grade fever. Chest x-rays reveal several irregular areas in both upper lung fields along with enlarged hilar and mediastinal lymph nodes. A biopsy of one of these lymph nodes reveals granulomatous inflammation. Multiple small yeasts surrounded by

clear zones are seen within macrophages. Which one of the following organisms is most likely responsible for this individual's disease?

A. Aspergillus species
B. Blastomyces dermatitidis
C. C. albicans
D. Histoplasma capsulatum
E. Mucor

5. A 38-year-old female presents with intermittent pelvic pain. Physical examination reveals a 3-cm mass in the area of her right ovary. Histologic sections from this ovarian mass reveal a papillary tumor with multiple, scattered small, round, laminated calcifications. These structures are most likely the result of

A. Apoptosis
B. Dystrophic calcification
C. Enzymatic necrosis
D. Hyperparathyroidism
E. Metastatic calcification

6. The degradation of intracellular organelles through the process in which autosomes combine with primary lysosomes to form autophagolysosomes is called

A. Autophagy
B. Heterophagy
C. Heteroplasmy
D. Homophagy
E. Endocytosis

7. Histologic sections of an enlarged tonsil from a 9-year-old female reveal an increased number of reactive follicles containing germinal centers with proliferating B lymphocytes. Which one of the listed terms best describes this pathologic process?

A. B lymphocyte hypertrophy
B. Follicular dysplasia
C. Follicular hyperplasia
D. Germinal center atrophy
E. Germinal center metaplasia

8. A patient presents with a large wound to his right forearm resulting from a chain saw accident. You treat his wound appropriately and follow him in your surgery clinic at routine intervals. Initially, his wound is filled with granulation tissue, which is composed of proliferating fibroblasts and proliferating new blood vessels (angiogenesis). A growth factor that is capable of inducing all the steps necessary for angiogenesis is

a. Epidermal growth factor (EGF)
b. Transforming growth factor α (TGF-α)
c. Platelet-derived growth factor (PDGF)
d. Basic fibroblast growth factor (FGF)
e. Transforming growth factor β (TGF-β)

9. The cardinal sign of inflammation called rubor is mainly the result of

A. Decreased interstitial hydrostatic pressure
B. Decreased vascular permeability of capillaries
C. Increased vascular permeability of venules
D. Vasoconstriction of muscular arteries
E. Vasodilation of arterioles

10. During the early stages of the inflammatory response, histamine-induced increased vascular permeability is most likely to occur in

A. Arteries
B. Pre-capillary arterioles
C. Capillaries
D. Post-capillary venules
E. Veins

11. Which one of the listed statements best describes the process called chemotaxis?

A. Abnormal fusion of phagosomes to primary lysosomes
B. Attachment of chemicals to extracellular material to increase phagocytosis
C. Dilation of blood vessels by chemotherapeutic drugs
D. Movement of cells toward a certain site or source
E. Transmigration of cells from blood vessels into tissue

12. Which one of the listed substances is produced by the action of lipoxygenase on arachidonic acid, is a potent chemotactic factor for neutrophils, and causes aggregation and adhesion of leukocytes?

A. C5a
B. Prostacyclin
C. IL-8
D. Thromboxane A2
E. Leukotriene B4

13. During acute inflammation, histamine-induced increased vascular permeability causes the formation of exudates (inflammatory edema). Which one of the listed cell types is the most likely source of the histamine that causes the increased vascular permeability?

A. Endothelial cells
B. Fibroblasts
C. Lymphocytes
D. Mast cells
E. Neutrophils

14. What type of leukocyte actively participates in acute inflammatory processes and contains myeloperoxidase within its primary (azurophilic) granules and alkaline phosphatase in its secondary (specific) granules?

A. Neutrophils
B. Eosinophils
C. Monocytes
D. Lymphocytes
E. Plasma cells

15. Histologic sections of lung tissue from a 68-year-old female with congestive heart failure and progressive breathing problems reveal numerous hemosiderin-laden cells within the alveoli. Theses “heart failure cells” originate from alveolar

A. Endothelial cells
B. Eosinophils
C. Lymphocytes
D. Macrophages
E. Pneumocytes

16. By definition, granulomas are composed of

A. Cholesterol clefts
B. Collagen
C. Endothelial cells and fibroblasts
D. Epithelioid cells
E. Hemosiderin-laden macrophages

17. A 47-year-old male presents with pain in the midportion of his chest.

The pain is associated with eating and swallowing food. Endoscopic examination reveals an ulcerated area in the lower portion of his esophagus. Histologic sections of tissue taken from this area reveal an ulceration of the esophageal mucosa that is filled with blood, fibrin, proliferating blood vessels, and proliferating fibroblasts. Mitoses are easily found, and most of the cells have prominent nucleoli. Which one of the following correctly describes this ulcerated area?

A. Caseating granulomatous inflammation
B. Dysplastic epithelium
C. Granulation tissue
D. Squamous cell carcinoma
E. Noncaseating granulomatous inflammation

18. Procoagulant factors produced by endothelial cells include

A. Thrombomodulin
B. Prostacyclin
C. von Willebrand factor
D. Thromboxane A2
E. Fibrinogen

19. Which immunoglobulins are characteristically present on mature (virgin) B cells, which are B lymphocytes that have not yet been exposed to the appropriate antigen?

A. IgA and IgE
B. IgD and IgA
C. IgE and IgG
D. IgG and IgM
E. IgM and IgD

20. What type of antibody is produced first against a bacterial infection, is very effective at activating complement, and is too large to cross the placenta?

A. IgG
B. IgM
C. IgD
D. IgE
E. IgA

21. Which cytokine is produced mainly by TH1 cells and stimulates cell-mediated immunity by stimulating cytokine-driven proliferation of CD8+ cytotoxic T cells?

A. α-interferon
B. γ-interferon
C. Interleukin 1
D. Interleukin 2
E. Interleukin 3

22. In antigen recognition by cytotoxic T lymphocytes, the T cell receptor recognizes antigens bound to

A. Class I antigens
B. Class II antigens
C. Class III antigens
D. C3b
E. Fc portion of IgG

23. Ten minutes after being stung by a wasp, a 30-year-old male develops multiple patches of red, irregular skin lesions over his entire body. These lesions (urticaria) are pruritic, and new crops of lesions occur every day.This response is primarily the result of liberation of specific vasoactive substances by the action of

A. Activated T lymphocytes on smooth muscle cells
B. IgA on basophils and mast cells
C. IgA on lymphocytes and eosinophils
D. IgE on basophils and mast cells
E. IgE on lymphocytes and eosinophils

24. After receiving incompatible blood, a patient develops a transfusion reaction in the form of back pain, fever, shortness of breath, and hematuria. This type of immunologic reaction is classified as a

A. Systemic anaphylactic reaction
B. Systemic immune complex reaction
C. Delayed type hypersensitivity reaction
D. Complement-mediated cytotoxicity reaction
E. T cell–mediated cytotoxicity reaction

25. Which one of the following histologic or immunofluorescent findings is most indicative of a delayed type hypersensitivity reaction?

A. A linear immunofluorescence pattern in the wall of the esophagus
B. Caseating granulomas in hilar lymph nodes
C. Councilman (apoptotic) bodies in the liver
D. Fibrinoid necrosis around dermal blood vessels
E. Numerous eosinophils in a nasal polyp

26. An allograft is a graft between

A. A human and an animal
B. Two individuals of different species
C. Two individuals of the same species
D. Two individuals of the same inbred strain
E. Identical twins

27. Minutes after a donor kidney is connected to the recipient's blood vessels, the transplanted kidney turns blue, becomes flaccid, excretes a few drops of bloody urine, and has to be removed. Histologic examination of the kidney reveals neutrophils within arterioles, glomeruli, and peritubular capillaries. Immunoglobulin and complement are found to be deposited in

blood vessel walls. This type of transplant rejection is due primarily to

A. Donor cytotoxic T lymphocytes that are directed against host antigens
B. Host cytotoxic T lymphocytes that are directed against donor antigens
C. Donor natural killer cells that are directed against host antigens
D. Preformed donor antibodies that are directed against host antigens
E. Preformed host antibodies that are directed against donor antigens

28. An autoantibody that reacts to immunoglobulin (e.g., an anti-IgG autoantibody) is most characteristic of

A. Bullous pemphigoid
B. Diabetes mellitus
C. Goodpasture's disease
D. Pemphigus vulgaris
E. Rheumatoid arthritis

29. A 52-year-old male presents with symptoms of gastric pain after eating. During workup, a 3-cm mass is found in the wall of the stomach. This mass is resected and histologic examination reveals a tumor composed of cells having elongated, spindle-shaped nuclei. The tumor does not connect to the overlying epithelium and is found only in the wall of the stomach. This tumor most likely originated from

A. Adipocytes
B. Endothelial cells
C. Glandular epithelial cells
D. Smooth muscle cells
E. Squamous epithelial cells

30. A 35-year-old male presents with the new onset of a “bulge” in his left inguinal area. After performing a physical examination, you diagnose the bulge to be an inguinal hernia. You refer the patient to a surgeon, who repairs the hernia and sends the resected hernia sac to the pathology laboratory along with some adipose tissue, which he calls a “lipoma of the cord.” The pathology resident examines the tissue grossly and microscopically and decides that it is not a neoplastic lipoma, but instead is non-neoplastic normal adipose tissue. Which one of the following features would have been present had the lesion been a lipoma rather than normal adipose tissue?

A. Anaplasia
B. Fibrous capsule
C. Numerous mitoses
D. Prominent nucleoli
E. Uniform population of cells

31. Which one of the listed numbered sequences best illustrates the postulated sequence of events that precedes the formation of an infiltrating squamous cell carcinoma of the cervix?

1 = Carcinoma in situ

2 = Invasive carcinoma

3 = Mild dysplasia

4 = Moderate dysplasia

5 = Severe dysplasia

6 = Squamous metaplasia

A. 3, then 4, then 5, then 1, then 6, then 2
B. 3, then 4, then 5, then 6, then 1, then 2
C. 5, then 4, then 3, then 1, then 6, then 2
D. 6, then 3, then 4, then 5, then 1, then 2
E. 6, then 4, then 3, then 5, then 2, then 1

32. During a routine physical examination, a 49-year-old male is found to have a 2.5-cm “coin lesion” in the upper lobe of his left lung. The lesion is removed surgically, and histologic sections reveal sheets of malignant cells with clear cytoplasm (clear cell carcinoma). This lung lesion is most likely a metastasis from the

A. Appendix
B. Breast
C. Kidney
D. Pancreas
E. Stomach

33. v-oncs are a type of oncogene that are most characteristically found within

A. Acute-transforming viruses
B. Fungi and parasites
C. Gram-negative bacteria
D. Gram-positive bacteria
E. Slow-transforming viruses

34. Point mutations of the oncogene c-ras can result in the inability of the product of this oncogene to bind with

A. GAP
B. p210
C. p53
D. pRb
E. WT1

35. A 4-year-old African boy develops a rapidly enlarging mass that involves the right side of his face. Biopsies of this lesion reveal a prominent “starry sky” pattern produced by proliferating small, noncleaved malignant lymphocytes. Based on this microscopic appearance, the diagnosis of Burkitt’s lymphoma is made. This neoplasm is associated with chromosomal translocations that involve

A. bcl-2
B. c-abl
C. c-myc
D. erb-B
E. N-myc

36. Gastric carcinoma is most common in which one of the listed geographic locations?

A. Canada
B. France
C. Japan
D. United Kingdom
E. United States

37. A 57-year-old male presents with signs of fatigue that are the result of anemia. Workup reveals that his anemia is the result of bleeding from colon cancer located in the sigmoid colon. The lesion is resected and at the time of surgery, no metastatic disease is found. Which of the listed markers would be most useful for future follow-up of this patient for the evaluation of possible metastatic disease from his colon cancer?

A. α fetoprotein (AFP)
B. Carcinoembryonic antigen (CEA)
C. Chloroacetate esterase (CAE)
D. Human chorionic gonadotropin (hCG)
E. Prostate-specific antigen (PSA)

38. Lobar pneumonia is caused predominantly by

A. Klebsiella pneumoniae
B. Staphylococcus pyogenes
C. Haemophilus influenzae
D. Streptococcus pneumoniae
E. Legionella pneumophila

39. A 33-year-old male in an underdeveloped country presents with a markedly edematous right foot that has multiple draining sinuses. A Gram stain from one of these draining sinuses reveals gram-positive filamentous bacteria that are partially acid-fast. The organism causing this abnormality is

A. Actinomyces israelii
B. Corynebacterium diphtheriae
C. Listeria monocytogenes
D. Nocardia asteroides
E. Pneumocystis carinii

40. A 38-year-old male presents with right lower quadrant abdominal pain, fever, and a peripheral neutrophilia. An emergency appendectomy is performed, but the appendix is found to be grossly unremarkable. Instead, the lymph nodes surrounding the appendix are found to be enlarged, inflamed, and matted together. Which one of the listed organisms is the most likely cause of these abnormalities?

A. Enteropathic Escherichia coli
B. Enterobius vermicularis
C. Trichomonas hominis
D. Yersinia enterocolitica
E. Bacillus anthracis

41. A 21-year-old college athlete presents with a nagging cough and a 20-lb weight loss. In addition to the chronic cough and weight loss, his main symptoms consist of fever, night sweats, and chest pains. Examination of his sputum reveals the presence of rare acid-fast organisms. His symptoms are most likely due to an infection with

A. K. pneumoniae
B. L. pneumophila
C. Mycobacterium avium-intracellulare
D. Mycobacterium tuberculosis
E. Mycoplasma pneumoniae

42. A 21-year-old HIV-positive male presents with malaise, fever, and increasing lymph nodes in his right cervical region. A microscopic section from one of the enlarged lymph nodes that is stained with an acid-fast stain reveals the presence of numerous (“too many to count”) acid-fast organisms. Granulomas are not found. What organism is most likely the cause of this patient’s acute illness?

A. M. avium-intracellulare
B. M. marinum
C. M. leprae
D. M. tuberculosis
E. M. kansasi

43. Histologic sections of skin from an area of sunburn would most likely reveal

A. Epidermal edema
B. Intra-epidermal vesicles
C. Full-thickness epithelial necrosis
D. Partial dermal necrosis
E. Necrosis of adnexal structures

44. A Histopathology lab deals with _____

A. Cells
B. Tissues
C. Organs
D. Organ System

45. The cells related to blood are collectively called as

A. osteoblast cells
B. chondrocyte cells
C. hematopoietic cells
D. megakaryocytes

46. All the following cancers have association with smoking except:

A. Urinary bladder.
B. Pancreas.
C. Esophagus.
D. Stomach

47. All of the following vitamin deficiencies are implicated in pathogenesis of squamous cell carcinoma of esophagus except:

A. Vit. A.
B. Vit D.
C. Vit. C.
D. Thiamine.

48. All increase risk of gastric carcinoma except:

A. High intake of salt.
B. High intake of nitrate.
C. High intake of animal fat.
D. High intake of tuberous roots

49. Protein C causes anti-thrombosis by inactivation of:

    A. Factor Va.
    B. Factor VIIIa.
    C. Both.
    D. None of the above

50. Red infarct is seen in all except:

    A. Ovary.
    B. Intestine.
    C. Brain.
    D. Kidney.

51. White infarcts are encountered in all except:

    A. Heart.
    B. Spleen.
    C. Kidney.
    D. Ovary.

52. The exceptional cases where venous thrombosis causes infarction is:

    A. Intestines.
    B. Retina.
    C. Ovary.
    D. Heart.

53. Most common site of occlusive arterial thrombosis is:

    A. Iliac.
    B. Coronary.
    C. Cerebral.
    D. Femoral

54. We remember Rudolf Virchow LEAST for:

    A. being the founder of modern-day pathology

    B. his idea that all cells come from pre-existing cells

    C. his idea that all disease is disease of cells

    D. his focus on disease at the "whole person" level

55. Which is NOT a feature of apoptotic cell death?

A. cutting of the DNA at regular intervals

B. cross-linking of proteins in the cytoplasm

C. destruction of the cytoskeleton

D. liquefaction of the apoptotic remnant

56. 1. What does the word "pathology" mean?

A. teaching about sick events

B. teaching about illness

C. training on pathological conditions

D. teaching about pathological processes

57. What changes are called macro-morphological?

A. which are detected by electron microscopy;

B. which are revealed to the naked eye;

C. which are revealed to the un naked eye;

D. which are revealed by autoradiography.

58. What is the name of the material studied for establishing a clinical diagnosis?

A. canned material;

B. autopsy material;

C. experimental material;

D.biopsy material.

59. Exposure to a pathogenic agent on a cell is initially induced

A. reversible damage;

B. irreversible damage;

C. necrosis;

D. adaptive reactions

60. In what sequence of events is carried out the cell injury?

A. Reversible damage, irreversible damage, adaptive reactions, necrosis;

B. Adaptive reactions, reversible damage, irreversible injury, necrosis;

C. Necrosis, irreversible damage, reversible damage;

D. Irreversible damage, reversible damage, necrosis.

SECTION B (100 MARKS)

ANSWER ALL THE 10 QUESTIONS

1. Describe five different types of immunoglobulins. Explain the role of each type and how they provide an integrated defense against invading pathogens. (10 MARKS)

2. Tuberculosis is a re-emerging disease. Describe the different ways it can be transmitted to humans and which tissues it can involve. Explain the pathological changes which can occur at the macroscopic level in relation to primary pulmonary TB. (10 MARKS)

3. What is pernicious anaemia? Describe the underlying pathological processes which result in this condition. Discuss which tissues could be damaged as a result of this disease. (10 MARKS)

4. How do wounds heal by primary intention? Describe the pathological processes which occur from the initial injury to the complete resolution of the injury. (10 MARKS)

5. What is the complement system? Explain what its role is and the different ways it can be activated. Describe the pathological effects it can trigger in its target tissue. (10 MARKS)

6. What is an autoimmune disease, describe what might be the cause of an autoimmune disease and attempt to explain why this is the case. (10 MARKS)

7. What is the functional and pathological significance of fatty deposition in the vascular system? (10 MARKS)

8. Explain the differences between acute and chronic inflammation. Illustrate your answer with examples of named diseases that affect organ systems such as the skin, joints and respiratory systems. (10 MARKS)

9. What is the functional significance of tumour metastases? (10 MARKS)

10. Describe the 5 types of necrosis. (10 MARKS)