Brown Medical School

Bio 282
Pathophysiology

Supporting Structures

Final Exam
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Course Leaders

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1. A Tzanck preparation is used to diagnose which type of cutaneous infection?
   
   A. bacterial
   B. herpetic
   C. fungal
   D. rickettsial
   E. spirochetal

2. The primary antigen presenting cells in the skin are known as:

   A. keratinocytes
   B. Langerhans cells
   C. mast cells
   D. melanocytes
   E. Merkel cells

3. Nikolsky’s sign ( extension of a blister when lateral pressure is applied) is positive in:

   A. toxic epidermal necrolysis
   B. pemphigus vulgaris
   C. bullous pemphigoid
   D. A and B
   E. A and C

4. Which of the following is an example of a primary skin lesion?

   A. scale
   B. ulcer
   C. vesicle
   D. crust
   E. fissure
5. Multiple skin cancers are associated with:

A. X-linked ichthyosis
B. xeroderma pigmentosum
C. lamellar ichthyosis
D. Darier’s disease
E. ichthyosis vulgaris

6. The most common type of ichthyosis is?

A. lamellar ichthyosis
B. congenital ichthyosiform erythroderma
C. epidermolytic hyperkeratosis
D. ichthyosis vulgaris
E. X-linked ichthyosis

7. Ectropion and ecbalmium are most frequently seen in:

A. ichthyosis vulgaris
B. lamellar ichthyosis
C. Darier’s disease
D. xeroderma pigmentosum
E. nevoid basal cell carcinoma syndrome

8. The age of onset of atopic dermatitis is most commonly:

A. adolescence
B. menopause
C. prior to age 7
D. middle age
E. after age 65
9. Which of the following is frequently seen in association with atopic dermatitis?
   A. diabetes
   B. Arthritis
   C. Asthma
   D. cardiovascular anomalies
   E. hearing loss

10. Allergic contact dermatitis is an example of:
    A. Type I immediate hypersensitivity reaction
    B. Type II hypersensitivity reaction
    C. Type III hypersensitivity reaction
    D. Type IV delayed hypersensitivity reaction
    E. Type V hypersensitivity reaction

11. The diagnosis of allergic contact dermatitis may be confirmed by:
    A. Tzanck preparation
    B. KOH examination
    C. patch testing
    D. Wood’s lamp examination
    E. Darier’s sign

12. Which of the following clinical variants of psoriasis may be triggered by a streptococcal infection?
    A. chronic plaque-type psoriasis (psoriasis vulgaris)
    B. guttate psoriasis
    C. pustular psoriasis
    D. bullous psoriasis
    E. erythrodermic psoriasis

13. Development of psoriatic lesions at sites of skin trauma is known as:
    A. Koebner response
    B. Nikolsky sign
    C. Auspitz sign
    D. Dennie-Morgan lines
    E. triple response of Lewis
14. The most common type of skin cancer is:

A. melanoma  
B. Merkel cell carcinoma  
C. squamous cell carcinoma  
D. cutaneous T cell lymphoma  
E. basal cell carcinoma

15. Dysplastic nevus is to melanoma as actinic keratosis is to:

A. basal cell carcinoma  
B. sebaceous carcinoma  
C. squamous cell carcinoma  
D. lentigo maligna  
E. Kaposi’s sarcoma

16. Melanoma in females is most frequently located on the:

A. Face  
B. Chest  
C. Arms  
D. lower legs  
E. back

17. Acantholysis is the mechanism of blister formation in:

A. friction blister  
B. bullous pemphigoid  
C. allergic contact dermatitis  
D. pemphigus vulgaris  
E. staph scalded skin syndrome
18. Direct immunofluorescence showing intercellular deposits of IgG and C3 in the epidermis is characteristic of:

A. pemphigus vulgaris  
B. bullous pemphigoid  
C. staph scalded skin syndrome  
D. dermatitis herpetiformis  
E. cicatricial pemphigoid

19. Fever, erythematous rash, hepatitis, lymphadenopathy, and eosinophilia are features of:

A. Sweet’s syndrome  
B. calciphylaxis  
C. anticonvulsant hypersensitivity syndrome  
D. cutaneous small vessel vasculitis  
E. erythema multiforme

20. Which of the following is associated with end stage renal disease?

A. anticonvulsant hypersensitivity syndrome  
B. cutaneous small vessel vasculitis  
C. calciphylaxis  
D. Sweet’s syndrome  
E. Panniculitis

21. All of the following are true regarding the rheumatoid synovium except:

a) Neutrophils accumulate in the joint space and deep in the synovial tissue  

b) The normal 1-3 cell layer proliferates to 8-10 cells thick  

c) Intense inflammatory infiltrate composed of CD4 positive helper T-cells  

d) Organized fibrin covers portions of the synovium and float in the joint space  

e) The inflammatory synovium, the pannus, erodes into the articular cartilage and subchondral bone
22. Risk factors for gout include all of the following except:
   a) Medications including diuretics and cyclosporine.
   b) Premenopausal women.
   c) Renal insufficiency.
   d) Alcohol consumption.
   e) Genetic disorders.

23. The following statements about osteoarthritis are true except:
   a) Osteoarthritis is the most common form of arthritis.
   b) Although osteoarthritis commonly occurs in older individuals, young people with genetic or other predisposing conditions also develop osteoarthritis.
   c) Secondary osteoarthritis can occur due to acromegaly, crystalline arthritis, rheumatoid arthritis, or developmental deformities to joints.
   d) Osteoarthritis pathogenesis does not involve pro-inflammatory cytokines.
   e) Unlike rheumatoid arthritis, which is a systemic disease, osteoarthritis is limited to articular structures.

24. Biologic therapies may be designed to target inflammatory cytokines in rheumatoid arthritis in all of the following ways except:
   a) Monoclonal antibodies vs. TNF alpha.
   b) Soluble receptors to Interleukin-1.
   c) Monoclonal antibodies to Interleukin-1 receptor antagonist.
   d) Recombinant Interleukin-10 and Interleukin-4.
   e) Recombinant soluble tumor necrosis factor alpha receptor protein.
25. All of the following are clinical features of the seronegative spondyloarthropathies except:
   a) photosensitive rash
   b) inflammatory axial arthritis
   c) asymmetric peripheral arthritis
   d) enthesitis
   e) uveitis

26. The following characteristics of articular cartilage are true except:
   a) Hyaline cartilage is avascular, has no nerve supply and no lymphatic drainage.
   b) Early in osteoarthritis, chondrocytes respond by reducing the amount of collagen and proteoglycan they produce.
   c) Type 2 collagen fibers are oriented to resist tensile stress and absorb joint loading.
   d) On a weight basis, water is the largest component of articular cartilage.
   e) Proteoglycans and water provide elasticity and resiliency to cartilage.

27. Acute gouty arthritis is associated with: (single best answer)
   a) Release of neutrophil chemotactic factors.
   b) Can be associated with erosions of cartilage and bone.
   c) Can have very inflammatory synovial fluid cell counts.
   d) Can be self-limited due to neutrophil apoptosis and coating of uric acid crystals by apolipoproteins.
   e) All of the above.

28. The following statements about genetic susceptibility in rheumatoid arthritis are true except:
   a) Rheumatoid arthritis is associated with Class II, MHC antigens.
   b) HLA-DR4 confers a relative risk for rheumatoid arthritis of 3.5 in Caucasians.
   c) The shared epitope is a short segment of amino acids present on the B1 chain of HLA-DR4.
   d) The shared epitope is a specific amino acid sequence found in Caucasian and African American patients with rheumatoid arthritis.
   e) Susceptibility to rheumatoid arthritis and the severity of its manifestations are related to the shared epitope.
29. The following associations of autoantibodies with clinical features are true except:
   a) High titer double stranded DNA and renal disease
   b) SS-A and subacute cutaneous lupus
   c) SS-A and neonatal lupus
   d) Double stranded DNA and chronic cutaneous lupus erythematosus
   e) Antiphospholipid antibodies with thrombocytopenia

30. The pathogenesis of osteoarthritis includes which one of the following:
   a) Damage to cartilage results from an increase in matrix metalloproteinases
      and a decrease in the natural inhibitors of these proteinases, TIMPs.
   b) The water content of articular cartilage decreases early in the pathogenesis of osteoarthritis.
   c) Chondrocytes produce larger than usual proteoglycans in an effort to balance synthesis and degradation.
   d) Prostaglandins induced by cyclo-oxygenase 1 are important mediators of inflammation.
   e) Osteopenia of subchondral bone develops in response to cartilage damage.

31. The following are true regarding Reactive arthritis except:
   a) A male predominance of 9:1
   b) Ocular symptoms include iritis and conjunctivitis
   c) Extra-articular findings include: keratoderma blennorrhagicum, oral ulcers and dystrophic nail changes
   d) Chlamydia, Salmonella and Shigella are common infectious triggers.
   e) Articular symptoms typically occur concurrently with the onset of the venereal infection or gastroenteritis.

32. Purine metabolism results in uric acid as its final product. The following statements are true about purine synthesis except:
   a) There are two pathways in which purines are synthesized, a de novo pathway and a salvage pathway.
   b) A deficiency of HGPRT results in increased synthesis of purines through the de novo pathway.
   c) Unknown enzyme defects results in the majority of primary gout resulting in an over-production and under-secretion of uric acid.
   d) Xanthine oxidase inhibition results in hyperuricemia.
   e) Superactivity of PRPP synthetase results in gout and uric acid kidney stones.
33. With regard to autoantibodies in SLE, the following statements are true except:
   a) ANA is positive in virtually all patients with SLE.
   b) Antibodies to double stranded DNA are specific for lupus
   c) A positive ANA is diagnostic of lupus
   d) Antibodies to smith antigen are specific for lupus
   e) Antibodies bind to DNA, RNA and nuclear proteins

34. The following statements about cytokines and rheumatoid arthritis are true except:
   a) TH1 cells are a class of T-helper cells, which produce proinflammatory molecules such as IL-2 (interleukin-2), interferon gamma, and TNF alpha.
   b) T-cells are important early in the course of rheumatoid arthritis through their interaction with antigen presenting cells.
   c) TNF alpha and IL-1 stimulate chondrocytes to produce matrix metalloproteinases and inhibit the synthesis of proteoglycans.
   d) Rheumatoid factor is an auto-antibody to the FC portion of IgG that up-regulates the expression of adhesion molecules on endothelial cells.
   e) TH1 cells release IL-2 that activates the antigen presenting macrophage to produce more IL-1 and TNF alpha.

35. Tophaceous gout has the following features except:
   a) Usually develops after many years of acute gout attacks.
   b) Tophi occur most commonly over pressure points such as the olecranon bursa, forearm and Achilles tendon.
   c) Heberden’s nodes rarely develop gouty tophi.
   d) Tophi can result in erosion of underlying cartilage and bone.
   e) Destabilization of micro-tophi in the synovium caused by allopurinol can trigger a gout attack.
36. All of the following features of HLA-B27 are true except:
   a) HLA-B27 is an MHC class I allele ✓
   b) The frequency of a spondyloarthropathy is associated with the prevalence of HLA-B27 in an ethnic group ✓
   c) 95% of people who are HLA-B27 + will develop a spondyloarthropathy
   d) There is a stronger association between HLA-B27 and ankylosing spondylitis than with HLA-B27 and psoriatic arthritis
   e) Shared antigenic determinants on the HLA-B27 allele and infectious pathogens provide support for the “molecular mimicry” theory of pathogenesis.

37. Which one of the following serves to distinguish osteoarthritis from rheumatoid arthritis:
   a) The role of matrix metalloproteinases and prostaglandins in joint inflammation and cartilage degradation.
   b) The age of the patient. X
   c) Low titer rheumatoid factor in elderly patients. X
   d) The presence of a joint effusion.
   e) Pattern of joint involvement.

38. Clinical manifestations of SLE include all of the following except:
   a) Dysuria and urinary frequency
   b) Photosensitive skin rash
   c) Pleuritic chest pain
   d) Arthritis
   e) Oral ulcers
39. A 41 year old male presents to a rheumatology office with complaints of low back pain. He reports a history of intermittent back pain for at least 5 years. He feels stiff upon awakening and notes that the pain is worse in the morning and improves after his daily walk. He describes alternating buttock pain at work during the day (he has a sedentary job as an accountant). His physical exam is notable for tenderness over the sacrum with decreased lumbar range of motion on forward flexion. There is no evidence of synovitis and no nail changes.

Which one of the following tests would be most helpful in establishing this patient’s diagnosis?

a) Rheumatoid factor
b) Pelvic x-ray
c) ANA
d) ESR
e) Stool culture

40. SLE is commonly associated with all of the following except:

a) HLA-DR2 and HLA-DR3  
b) Female gender 

Which one of the following cell types is most prevalent in the articular cartilage of the knee:

a) Type I  
b) Type II  
c) Type IX  
d) Type X

Which of the following cell types is responsible for bone production?

a) Osteocyte  
b) Osteoblast  
c) Osteoclast  
d) Precursor marrow cell

43. A 23 yo female stumbled while jogging and twisted her ankle. Two days later she has ankle pain, minimal swelling and no ecchymosis (bruising). What is the most likely type of sprain?

a) Grade 1  
b) Grade 2  
c) Grade 3
44. Which of the following is a cause of osteomalacia?
   a. Vitamin C deficiency.
   b. Renal osteodystrophy.
   c. Old age.
   d. Cast immobilization.

45. Which of the following is the smallest bone unit?
   a. Osteon
   b. Osteocyte
   c. Osteoblast
   d. Haversian canal
46. Oxygen tension is greatest in which zone of the physis of a growing long bone.
   a. Reserve zone
   b. Hypertrophic zone
   c. Metaphysis
   d. Proliferative zone

47. Which of the following tissues has the lowest percentage of water content?
   a. Bone
   b. Articular cartilage
   c. Tendon
   d. Meniscal cartilage

48. A 75 year old female stumbles down her two front steps at home and lands firmly on her right foot with her knee extended. She complains of knee pain and has moderate swelling. Which of the following is the most likely injury?
   a. Anterior cruciate ligament tear
   b. Medial meniscal tear
   c. Medial collateral ligament tear
   d. Tibial plateau fracture

49. Wolff’s law refers to the forces that
   a. Affect bone remodeling
   b. Stimulate growth plate maturation
   c. Determine tendon insertion strength
   d. The biomechanics of ligaments

50. Which of the following conditions results from an abnormality of collagen?
   a. Osteopetrosis
   b. Osteoporosis
   c. Osteogenesis imperfecta
   d. Osteomyelitis

51. Osteoporosis is characterized by which of the following?
   a. Increased bone production.
   b. Decreased bone mineralization.
   c. Normal bone mineralization.
   d. Increased organic matrix.
52. Which cell type is abnormal in osteopetrosis?
   a. Osteoclast  
   b. Osteoblast  
   c. Osteocyte

53. Which of the following statements about the rotator cuff is true?
   a. Avascular tendon.  
   b. Tears heal spontaneously.  
   c. Most tears are atraumatic.  
   d. Tears are most common in the third decade of life.

54. Which of the following statements about the mortality rates after hip fracture in the elderly is true?
   a. Greatest one year after surgery  
   b. Higher for females  
   c. Related to surgical delay  
   d. Greater for community ambulators

55. Approximately, what percentage of hip fracture patients regain their preinjury ambulatory status?
   a. 10%  
   b. 30%  
   c. 50%  
   d. 70%

56. Which of the following physeal fractures in a pediatric patient is most likely to develop a bony bridge that will alter growth and development?
   a. Salter type I  
   b. Salter type II  
   c. Salter type III  
   d. Salter type IV

57. Which of the following primary malignancies does not commonly metastatize to bone
   a. Prostate  
   b. Colon  
   c. Lung  
   d. Thyroid
61. Discuss the outcome and complications of femoral neck fractures in elderly patients.

62. AVN - since bone supply to the head is cut off in a femoral neck fracture, head will not be able to remodel. This is a common complication of femoral neck fractures.

63. Another fracture that may occur after a femoral neck fracture is a hip fracture. This is because of limited blood supply to the head.

64. Which of the following statements about articular cartilage are true?
   a. The matrix is hydrophilic due to its high collagen content.
   b. The chondrocytes are metabolically active.
   c. The matrix has water in it.
   d. None of the above.

65. a. Articular cartilage
   b. Osteoarthritis
   c. Prolotherapy
   d. Radiofrequency ablation

66. Increased calcium intake during adolescence can prevent osteopenia.

67. a. Arthroscopic debridement (chondroplasty)
   b. Abnormal microfracture artroplasty
   c. Amniosal chondrocyte transplantation
   d. None of the above

68. Which of the following arterial cartilage repair techniques produce hyaline-like cartilage?
   a. Arthroscopic debridement (chondroplasty)
   b. Abnormal microfracture artroplasty
   c. Amniosal chondrocyte transplantation
   d. None of the above

69. a. Greater exposure to sunlight.
   b. More weight-bearing exercise during the postmenopausal years.
   c. Increased calcium intake during adolescence.
   d. Routine magnetic field stimulation of the elderly.

70. Deep vein thrombosis is also a risk post-operatively.
1. Anti-nuclear antibodies are diagnostic for the specific disease as listed EXCEPT:
   a) Anti Sm antigen for SLE
   b) Anti-histone for drug-induced SLE
   c) Anti-DNA topoisomerase for diffuse PSS
   d) Anti-double-stranded DNA for SLE
   e) Anti-centromeric proteins for SLE

2. The least likely scenario for immune tolerance underlying auto-immune disease is:
   a) defect in clonal deletion of self-reactive T-cells in the thymus
   b) defect in activation-induced apoptosis of self-reactive T-cells in the periphery
   c) escape of self-reactive T-cells from the thymus
   d) defect of CD4 suppression and abnormal B-cell activation

3. A major aspect of the kidney pathology in PSS is secondary to:
   a) complement deposition in the glomerular basement membrane
   b) tubular necrosis due to toxic injury
   c) crescentic glomerular nephritis
   d) ischemic changes due to fibrosis of the vessel walls of the small arteries and arterioles

4) Both lupus and PSS affect the skin in different ways. Select the single answer that
BEST compares effect on the skin of these two diseases
   a) In SLE, inflammation is concentrated at the dermal epidermal junction,
      whereas in PSS inflammation is throughout the dermis
   b) In SLE, antibody-antigen complex deposition induces epidermal cell necrosis,
      whereas in PSS there is no inflammation
   c) In SLE, cytokines play no role whereas in PSS, cytokines are thought to induce
      fibroblasts to synthesize collagen
   d) In SLE, there is a rash characterized by liquefactive degeneration of the basal
      layer of the epidermis and edema at the epidermal-dermal junction, whereas is
      PSS, there is extensive deposition of collagen in the dermis and virtual
      absence of appendages with thinning of the epidermis.

5) Rheumatoid arthritis and osteoarthritis are different in all the following ways
EXCEPT:
   a) amount of inflammation in the joint ✓
   b) age of onset ✓
   c) incidence in men versus women ✓
   d) loss of cartilage on the articular surface ✓
   e) presence of activated cytokines in the joint
Match the structural abnormality listed on the left with the disease listed on the right.

6. ✓ complement deposition in perimysium  a) Systemic lupus erythematosus
7. ✓ mediated by direct T-cell attack  b) polymyositis
8. ✓ flexion-contraction without joint involvement  c) osteoarthritis
9. ✓ complement deposition in basement membranes  d) Progressive systemic sclerosis
10. ✓ cartilage erosion and eburnated articular surface  e) dermatomyositis

Fill in the blanks (5 pts)

11. List three connective tissue diseases that affect the hands:
   - Rheumatoid arthritis
   - SLE
   - Progressive systemic sclerosis

12. An example of glomerular nephritis in SLE is shown in the Figure below
   - Diffuse proliferative glomerulonephritis (Class IV)
2003 Supporting Structures Exam - Answers

1. B  46. D  1. E
2. B  47. A  2. C
11. C  56. D  11. A
13. A  58. C  (Pathology Section)
14. E  59. C
15. C  60. B