Name _____

Dental Microbiology
Exam #2
Wednesday, October 15, 2008
1:30-3:30 p.m.
Lecture Hall B and Room 386, 3rd Floor, Old Dental School Building

The Temple University School of Dentistry is guided by an Honor Code. All students are expected to abide by the Honor Code published by the Dental Student Handbook and are expected to maintain a high standard of professionalism and ethics as defined by the Ethical Foundation for Professional Education and Behavior.

There are a total of 74 questions on 16 pages in this exam.

Please use your TUID number on the scan sheet.

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

1. A fifteen year old male has a nonproductive cough, fever, and headache, with radiologic and clinical evidence of scattered areas of pneumonia. Penicillin therapy was unsuccessful because the causative agent *Mycoplasma pneumoniae*

   A. can pass through a 450 nm membrane filter.
   B. forms mulberry-like colonies.
   C. incorporates cholesterol into its cell wall.
   D. lacks a cell wall.
   E. possesses a genome one fifth the size of that of *E. coli*

2. *Mycoplasma pneumoniae* infection can be diagnosed by:

   A. demonstration of urease activity.
   B. presence of low titer cold hemagglutinins
   C. rise in serum antibody, detected by complement fixation
   D. the clear distinction of its clinical manifestations relative to those of bacterial and viral infections
   E. the rapid growth of cultures from throat swabs or sputum

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

3. All of the following statements about pneumonia caused by *Mycoplasma pneumoniae* are true, EXCEPT:

   A. Accumulation of metabolites causes cytopathic effects
   B. Can be treated with erythromycin or tetracycline
   C. Is often called "walking pneumonia"
   D. Predilection for older individuals.
   E. The pneumonia is usually less severe than other bacterial pneumonias

4. All of the following can be said about *Ureaplasma urealyticum* and/or *Mycoplasma hominis*, EXCEPT

   A. There is no correlation between colonization and sexual activity for each of these organisms.
   B. Colonization can occur during birth.
   C. Most carriers are asymptomatic
   D. If a male is treated for urethritis with tetracycline and the causal agent turns out to be *Chlamydia* and not *U. urealyticum*, the treatment will be successful
   E. Each of these agents can cause postpartum fever

5. A 40 year old automobile crash victim whose blood type is B, Rh positive is given a transfusion of Type AB, Rh negative blood because of a clerical error. The patient experiences a variety of clinical symptoms including headache, nausea, vomiting and a rise in temperature. Which Ig type is most likely involved in this hypersensitivity reaction?

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

6. Following the administration of a local anesthetic a patient you are treating goes into acute systemic anaphylactic shock. With respect to the antibodies directly involved in mediating this reaction:

   A. IgA is bound to low affinity receptors on eosinophils
   B. IgE is bound to high affinity receptors on mast cells
   C. IgE is bound to high affinity receptors on T-lymphocytes
   D. IgG is bound to low affinity receptors on mast cells
   E. IgM is bound to high affinity receptors on B-lymphocytes

7. Regarding the patient above, which of the following should be administered immediately?

   A. anesthesia
   B. blocking antibody
   C. cortisone
   D. epinephrine
   E. histamine

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

8. How many IgM molecules are required to initiate complement fixation?

A. 1
B. 2
C. 3
D. 4
E. 5

9. Receptors for this complement component are found on macrophages and neutrophils.

A. C1q
B. C2b
C. C3b
D. C4b
E. C7

10. Which complement component is a major chemotactic factor for neutrophils?

A. C1q
B. C2a
C. C3b
D. C4a
E. C5a

11. In Antibody Dependent Cell Cytotoxicity (ADCC) NK cells bind to the Fc of

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

12. Helper T-lymphocytes (Th):

A. differentiate in the bone marrow
B. express both CD4 and CD8 on their surface
C. express CD8 their surface
D. recognize conformational epitopes
E. recognize peptides presented by macrophages

13. Lymph nodes:

A. are secondary lymphoid organs
B. are the site of differentiation for B-lymphocytes
C. are the source of pluripotent stem cells
D. contain B-lymphocytes, but no T-lymphocytes
E. contain T-lymphocytes, but no B-lymphocytes

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

14. Dendritic cells APC

A. express MHC2
B. include Th1, but not Th2 cells
C. include Th2, but not Th1 cells
D. present peptides to B-lymphocytes
E. present whole proteins to CD4+ lymphocytes

15. Lymphocytes are classified as Th1 or Th2 based on:

A. the cytokines they produce
B. the expression of CD3
C. the expression of CD4 or CD8 on their surface
D. the secondary lymphoid organs they are found in
E. whether they recognize antigen presented by MHC1 or MHC2

16. A 28 year old man who is blood type AB, Rh positive would have which of the following antibodies in his blood?

A. IgG anti O
B. IgM anti A
C. IgM anti A and B
D. IgM anti B
E. No antibodies to ABO antigens

17. The naturally occurring antibodies to the A and B blood group antigens

A. bind to receptors on mast cells IgE
B. bind to receptors on NK cells IgG
C. cross the placenta IgG
D. fix complement IgM
E. have a secretory component IgA

18. For a pregnant 27 year old Rh-negative woman who has had two previous miscarriages, you perform an indirect Coomb's test on her blood to determine the risk for the development of Hemolytic Disease of the Newborn (HDNB) in her fetus. This test will detect antibodies to the Rh (D) antigen of which class?

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

19. At birth a child is jaundiced and has a positive Direct Coomb's Test. His blood type is A, Rh-positive. What treatment should be administered to this child immediately?

A. exchange transfusion with type A, Rh positive blood
B. exchange transfusion with type B, Rh negative blood
C. exchange transfusion with type O, Rh negative blood
D. injection with antibodies to D antigen (RhoGam)
E. injection with RhoGam treated RBCs.

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

20. A 27 year old woman receives an injection of influenza vaccine in December. She gives birth to a child the following March. The child would have been born with antibodies to influenza virus which were:

Passive immunity

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

21. A man has been identified whose antibodies are unable to mediate Antibody Dependent Cell Cytotoxicity (ADCC). The most likely reason for this defect would be a mutation in the gene coding for the

A. constant region of the alpha chain
B. constant region of the gamma chain
C. constant region of the mu chain
D. variable region of the gamma chain
E. variable region of the mu chain

22. In humans antibodies are made to an individual's own antibodies. They are directed to which type of determinants?

A. Allergic
B. Allotypic
C. Haplotypic
D. Idiotypic
E. Isotypic

23. A nonimmune 35 year old man displays symptoms of diphtheria. His physician administers diphtheria antitoxin made in a horse. Ten days later the man begins feeling weak and feverish. He notices that he is developing a rash and pain in his joints. The most likely disease state is:

A. Anaphylaxis
B. Arthus reaction
C. Serum sickness
D. Sjogren's syndrome
E. Systemic lupus erythematosus

24. Histamine is involved in which type(s) of hypersensitivity?

A. Type I only
B. Type II only
C. Type III only
D. Type I and II only
E. Types I, II and III

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

25. Systemic lupus erythematosus represents which type of hypersensivity?

A. Type I
B. Type II
C. Type III
D. Type IV CMJ

26. In delayed-type hypersensitivity:

A. activated Th1 cells make IL-4 which self stimulates the cells.
B. activated Th1 cells produce IFN-γ which stimulates macrophage activity.
C. activated Th2 cells make IL-2 which self stimulates the cells.
D. activated Th2 cells produce IFN-γ which stimulates neutrophil activity.
E. activated Th2 cells produce IL-4 which stimulates macrophage activity.

27. Cytotoxic T-lymphocytes:

A. do not require MHC presentation of degraded proteins.
B. recognize intact proteins
C. recognize peptides presented by either MHC1 or MHC2.
D. recognize peptides presented by MHC1.
E. recognize peptides presented by MHC2.

28. With respect to histocompatibility antigens:

A. MHC-1 presents exogenous antigen to CD8 positive cells.
B. MHC-2 is found on all nucleated cells .
C. MHC-2 is only found on cells involved in the immune response.
D. MHC-2 presents endogenous antigen to CD4 positive cells.
E. MHC-2 presents exogenous antigen to CD8 positive cells.

29. With respect to the primary and secondary immune responses:

A. antibody in the secondary response has higher affinity for antigen
B. IgE is the first antibody made in the primary response
C. IgG appears before IgM in the primary response
D. IgG levels are highest in the primary response
E. memory plasma cells mediate the secondary response

30. In the humoral immune response:

A. Antigen binds directly to CD8+ T-lymphocytes which in turn secrete IFN-γ
B. APC's present antigen to B-lymphocytes.
C. APC's present antigen to Th1-lymphocytes which then secrete IL-4
D. APC's present antigen to Th2-lymphocytes which in turn secrete cytokines that activate B-lymphocytes.
E. B-lymphocytes present antigen to dendritic cells

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

31. The cell type which makes and secretes large amounts of antibody is a:

A. macrophage
B. mature B-lymphocyte
C. mature T-lymphocyte
D. memory B-lymphocyte
E. plasma cell

32. Acquired Immunodeficiency Syndrome (AIDS):

A. is a secondary immunodeficiency.
B. is caused by a defect in B-lymphocyte maturation
C. is treated with blood transfusions
D. primarily affects humoral immunity.
E. results from a virus infection of CD8+ lymphocytes.

33. X-linked Hypogammaglobulinemia B cell deficiency

A. is a congenital athymic disease
B. is caused by a stem cell defect which affects B and T-lymphocytes
C. is much more likely to occur in males than females
D. results from a virus infection
E. results in the production of high levels of antibody

34. You notice a scarcity of saliva and extensive caries in a 59 year old female patient. Antibodies to ribonucleoproteins are found in her blood. Which of the following disease states is most likely responsible for these findings?

A. acquired immunodeficiency syndrome (AIDS)
B. Graves disease
C. rheumatoid arthritis
D. Sjogren's syndrome
E. systemic lupus erythematosis

35. B-lymphocyte epitopes:

A. are always conformational.
B. are always linear.
C. are usually hydrophobic.
D. are usually the same epitopes recognized by T-lymphocytes.
E. can be linear or conformational.

36. The predominant immunoglobulin in saliva

A. binds to mast cells
B. crosses the placenta
C. fixes complement via the classical pathway
D. has a secretory component
E. is found on immature B-lymphocytes

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

37. The site of differentiation of B-lymphocytes in humans is the:

A. bone marrow
B. bursa
C. lymph nodes
D. spleen
E. thymus

38. Which of the following occurs only after exposure to antigen?

A. combinatorial diversity of light and heavy chain pairing.
B. deletional recombination of multiple V, D, and J gene segments.
C. increased somatic mutation of variable region genes
D. junctional diversity in recombination.
E. N-region insertion of nucleotides (heavy chain).

39. The ability to make both IgD and IgM antibody in the same cell is a result of

A. deletional recombination of C-region gene segments
B. deletional recombination of multiple V, D, and J gene segments.
C. differential RNA processing (splicing).
D. mutation of V gene segments.
E. N-region insertion of nucleotides (heavy chain).

40. Cytotoxic T-lymphocytes and NK cells kill cells by:

A. attaching to them and down regulating the Fas ligand leading to apoptosis
B. attaching to them and releasing perforin and granzymes which induce apoptosis
C. attaching to them resulting in opsonization
D. phagocytizing them directly
E. triggering the complement fixation cascade which results in cell lysis

41. DiGeorge's Syndrome:

A. is a congenital athymic disease
B. is caused by a stem cell defect which affects B and T-lymphocytes
C. is much more likely to occur in males than females
D. results from a virus infection
E. results in the production of high levels of antibody

42. The tuberculin reaction involves which type of hypersensitivity?

A. Type I
B. Type II
C. Type III
D. Type IV

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

43. The primary allograft rejection reaction is mediated almost entirely by;

A. antibody
B. B-lymphocytes
C. cytototoxic T-lymphocytes
D. helper T-lymphocytes
E. macrophages

44. A secretory IgA molecule has:

A. four identical heavy chains and four identical light chains.
B. four identical heavy chains and two different light chains.
C. ten identical heavy chains and ten identical light chains.
D. two different heavy chains and two identical light chains.
E. two identical heavy chains and two identical light chains.

45. With respect to oral host-parasite relationships, the following statements are correct EXCEPT:

A. *Actinobacillus actinomycetemcomitans* may produce a heat-labile leucotoxin which destroys phagocytic cells.
B. Exotoxins associated with the cell wall of Gram-negative bacteria, such as *Veillonella* and *Vibrio* species, may stimulate release of Ca^{++} and proline from peridontium bone.
C. Normal oral microbial flora serves to help in checking the establishment of high numbers of potential oral pathogens.
D. Oral streptococci species may produce an IgA protease which can inactivate secretory antibody.
E. Proteases of *Bacteroides melaninogenicus*, such as collagenase, may contribute to its capacity to produce gingival disease.

46. With regard to etiology of Nosocomial Infections, which of the following statements is correct?

A. Anaerobes found as part of the normal flora of the oral cavity and intestinal tract are rarely involved.
B. *Enterococci* and *Staphylococcus aureus* are still routinely susceptible to methicillin and vancomycin.
C. Fungi and yeasts, especially *Candida albicans* and other species, are increasingly found in patients with exposure to urinary and vascular catheters and cannulas.
D. Gram-positive cocci such as *Staphylococcus epidermidis* are the most common agents responsible for pneumonia.
E. Normal flora organisms are rarely causative agents of endogenous infections.

DIRECTIONS: *For the following questions, select the **ONE BEST** answer in each case.*

47. With regard to the normal human microflora and activities, all of the following statements are correct EXCEPT:

A. Breast-fed infants have large numbers of lactic acid bacteria in the colon, which helps to prevent the establishment of enteric pathogens.
B. Establishment of the normal flora in the newborn infant does not aid in the development of acquired immunity (immunomodulation).
C. Normal microbial flora operate to produce an exclusionary effect by preventing colonization with and entrance of pathogens.
D. *Staphylococcus epidermidis* is the predominant aerobic skin organism and helps to prevent colonization with more pathogenic species.
E. Vitamin K produced by normal intestinal microflora is an example of an essential nutrient required by the human host.

48. With regard to acute glomerulonephritis vs. acute rheumatic fever (ARF), all of the following statements are true EXCEPT:

A. Acute glomerulonephritis is a disease of childhood and follows either a respiratory or cutaneous (skin) group A streptococcal infection with deposition of soluble antigen-antibody complexes in the basement membrane of the glomerulus.
B. ARF is thought to be primarily an autoimmune disease, because of antigenic similarities between the M protein antigen of group A streptococcus and heart sarcolemma membranes.
C. ARF typically occurs 1-5 weeks following an untreated group A streptococcal pharyngitis and may recur following a subsequent group A infection.
D. Both are non-infectious, post-streptococcal sequelae which follow infection with group A streptococcus (*Streptococcus pyogenes*).
E. Group A streptococci, which cause infections that precede acute glomerulonephritis or ARF, are routinely resistant to treatment with penicillin G.

49. Which of the following is a significant cause of meningitis in older adults?

A. *Staphylococcus aureus*
B. *Staphylococcus epidermidis*
C. *Streptococcus agalactiae*
D. *Streptococcus pneumoniae*
E. *Streptococcus pyogenes*

50. With regard to the ability of staphylococci to produce disease in humans, all of the following statements are true **EXCEPT**:

A. Both *S. epidermidis* and *S. aureus* have peptidoglycan in their cell walls and Protein A, which contributes to virulence by interfering with opsonization.
B. Most strains of *Staphylococcus aureus* produce alpha-toxin, which acts by forming transmembrane pores in mammalian cells and leads to lysis and cell death.
C. Multiple antimicrobial resistance, including resistance to penicillin, is most frequently encountered with *S. aureus*, although many strains of *S. epidermidis* are also penicillin resistant.
D. *Staphylococcus epidermidis* strains, which produce a polysaccharide slime layer (biofilm), have enhanced virulence.
E. *Staphylococcus saprophyticus* is a common uropathogen causing urinary tract infections in young women.

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

51. All of the following statements are true regarding diseases caused by staphylococcal toxins, **EXCEPT**:

A. Scalded skin syndrome in both children and adults results from the production of **exfoliatin** in a staphylococcal lesion.
B. Staphylococcal food poisoning is due to production of an **enterotoxin** preformed in food contaminated with *S. aureus*. It is an intoxication, not an infection.
C. Toxic shock syndrome is due to the production of **TSST-1 toxin** with absorption by the bloodstream at a local site of colonization.
D. All of the above-named toxins have been shown to act, in part, by superantigen-mediated effects.
E. A characteristic of the staphylococcal enterotoxin is its ability to be inactivated by 30 minutes of boiling.

52. A middle-aged drug and alcohol abuser presented with shortness of breath, a productive cough and a fever of 39°C (102°F). He had diffuse bilateral pulmonary lobar infiltrates on x-ray. Multiple cultures of his blood were obtained, and some grew Gram-positive, lancet-shaped diplococci, which produced alpha-hemolysis on blood agar, and was susceptible to optochin (P disc). All of the following statements are true, **EXCEPT**:

A. A vaccine (Pneumovax®), containing the most common capsular polysaccharides from the more than 80 different pneumococcal serotypes, has been found to be relatively effective in protecting the at risk older patient population by stimulating production of circulating anticapsular antibodies.
B. It is not necessary to routinely test for antimicrobial susceptibility of isolates of this organism, since most strains are susceptible to penicillin G.
C. The major virulence factor of this organism is a type-specific polysaccharide capsule which inhibits phagocytosis. A cytotoxic hemolysin (pneumolysin) has also been implicated as a virulence factor.
D. This organism was identified as *Streptococcus pneumoniae*, can be found as part of the normal flora of the oropharynx, and may serve as an endogenous source of infection in immunosuppressed patients.
E. Whereas penicillin G was formerly considered to be a treatment of choice, multiply drug resistant strains of this organism are now being obtained from patients with pneumonia, i.e., resistant to beta-lactam antibiotics and erythromycin.

53. A 70-year-old college professor has been advised that he has mitral valve prolapse with valvular regurgitation and thickened leaflets. He is about to undergo oral surgery. He is not known to have any penicillin-hypersensitivity. Which of the following antibiotics, or combinations, should be given to provide chemoprophylaxis?

A. amoxicillin
B. i.v. vancomycin
C. oral clindamycin
D. parenteral ampicillin plus gentamicin
E. penicillin V

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

54. *Staphylococcus epidermidis* is a Gram-positive bacterium that:

A. is catalase positive and coagulase negative
B. often can be responsible for infective endocarditis in intravenous drug abusers
C. ordinarily forms non-pigmented colonies and doesn't ferment mannitol
D. ordinarily lives on the skin and in sebaceous glands of humans
(E) All of the above are correct.

55. Regarding superantigens, all of the following statements are true, **EXCEPT**::

A. are toxin-like molecules
B. can activate T cells
C. can trigger life-threatening autoimmune responses
(D) include endotoxins from Gram-negative bacteria
E. may include the toxic shock syndrome toxin of *S. aureus*

56. A patient with autoimmune connective tissue disease was diagnosed with bacteremia, peritonitis and septic arthritis. An organism was isolated from blood, peritoneal exudate, and joint fluid. It was a catalase-negative, Gram-positive coccus, which was inhibited by the A disc. All of the characteristics listed below would contribute to the virulence of the organism, **EXCEPT**:

A. beta-hemolysins
B. fibrinolysin (kinase)
C. hyaluronidase
D. M protein
(E) protein A

57. All of the following statements are true regarding Koch's postulates, **EXCEPT**:

A. For a given microbial infection, a single organism is regularly associated with a specific disease.
(B) In mixed infections associated with periodontal disease or dental caries, any combination of the causative organisms may be used to reproduce the disease in experimental animals.
C. The disease must be experimentally reproduced in a susceptible host following inoculation with the pure culture of the organism.
D. The organism(s) is(are) isolated in pure culture from the experimental disease.
E. The same organism must be isolated and grown in pure culture.

58. All of the following statements are true, **EXCEPT**:

A. Pathogenicity of an organism is the ability of that organism to produce an infection or disease in a host animal.
B. The production of a large capsule, usually polysaccharide in nature, is correlated with virulence and inhibits opsonization.
C. Virulence frequently correlates with the invasiveness and/or production of toxins by an organism in a host animal.
D. Virulence is the degree of pathogenicity for a particular organism in a defined host animal.
(E) Virulence of an infectious organism may be enhanced (increased) by continuous culturing in the laboratory over a long period of time.

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

59. Regarding exotoxins and endotoxins, all of the following statements are true, **EXCEPT**:

(A) Both endotoxins and exotoxins can be converted by formaldehyde treatment into toxoids useful as vaccines to stimulate protective antibody formation in susceptible hosts.
B. Endotoxins are produced by Gram-negative bacteria and are heat-stable lipopolysaccharides (Lipid A) associated with the cell wall.
C. Exotoxins are heat-labile proteins and are lethal and/or exert their effects in small amounts when they are secreted by both Gram-positive and Gram-negative bacteria.
D. Many exotoxins consist of A and B subunits. The B unit binds to a host cell and the A unit enters the cell and exerts its effect.
E. The diphtheria exotoxin acts by ADP ribosylation of elongation factor 2 (EF_2) and prevents ribosomal protein synthesis.

60. With regard to etiology of Nosocomial Infections, which of the following statements is correct?

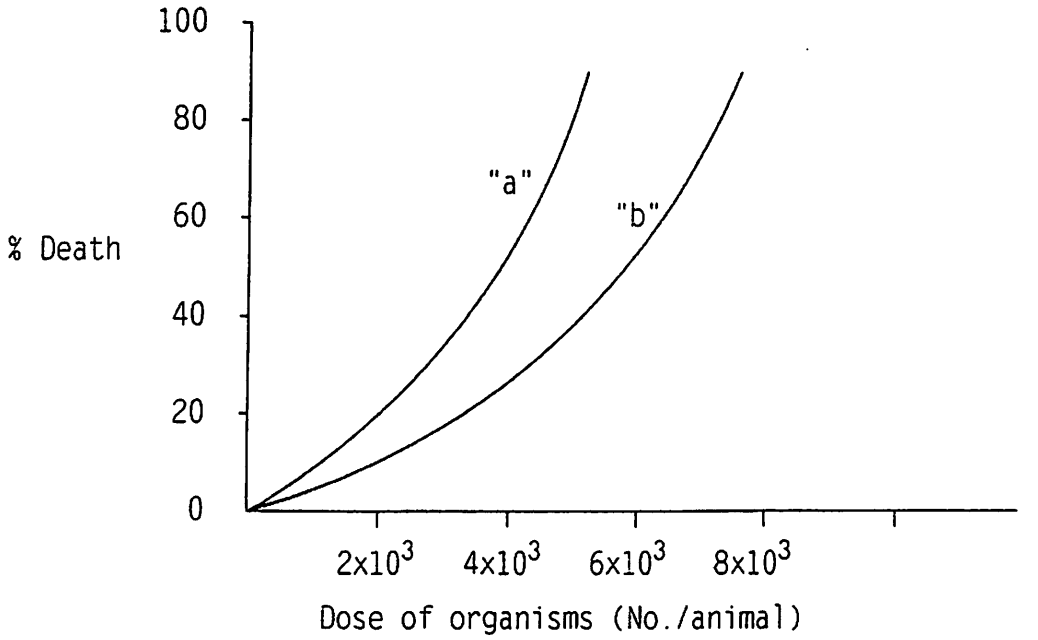
A. Anaerobes found as part of the normal flora of the oral cavity and intestinal tract are rarely involved.
B. *Enterococci* and *Staphylococcus aureus* are still routinely susceptible to methicillin and vancomycin.
(C) Fungi and yeasts, especially *Candida albicans* and other species, are increasingly found in patients with exposure to urinary and vascular catheters and cannulas.
D. Gram-positive cocci such as *Staphylococcus epidermidis* are the most common agents responsible for pneumonia.
E. Normal flora organisms are rarely causative agents of endogenous infections.

61. With regard to the normal human microflora and activities, all of the following statements are correct EXCEPT:

A. Breast-fed infants have large numbers of lactic acid bacteria in the colon, which helps to prevent the establishment of enteric pathogens.
(B) Establishment of the normal flora in the newborn infant does <u>not</u> aid in the development of acquired immunity (immunomodulation).
C. Normal microbial flora operate to produce an exclusionary effect by preventing colonization with and entrance of pathogens.
D. *Staphylococcus epidermidis* is the predominant aerobic skin organism and helps to prevent colonization with more pathogenic species.
E. Vitamin K produced by normal intestinal microflora is an example of an essential nutrient required by the human host.

DIRECTIONS: For the following questions, select the **ONE BEST** answer in each case.

62. In the following graph for determining the LD_{50} of 2 organisms (a and b) injected into animals, all of the statements below are true, **EXCEPT**:



A. Organism "a" is more virulent than organism "b".
B. Organism "b" is more virulent than organism "a".
C. The ID_{50} of the organisms producing toxins "a" and "b" could also be measured.
D. The LD_{50} for organism "b" is $6x10^3$/animal.
E. The LD_{50} of organism "a" is $4x10^3$/animal.

DIRECTIONS: Select the **ONE** lettered word or phrase that best matches the numbered word or phrase. Letters may be used once, more than once, or not at all.

A. *Actinobacillus actinomycetecomitans*
B. *Enterococcus faecalis* (group D enterococcus)
C. non-enterococcal group D streptococcus
D. *Staphylococcus aureus*
E. *Staphylococcus epidermidis*
F. *Staphylococcus saprophyticus*
G. *Streptococcus agalactiae* (group B streptococcus)
H. *Streptococcus pneumoniae* (pneumococcus)
I. *Streptococcus pyogenes* (group A streptococcus)
J. viridans streptococci

For each patient select the microorganism most likely to have caused the illness described.

63. D An infant presents with a severe rash from which areas of skin are beginning to peel off. The physician first suspects child abuse, since the child appears to be suffering from skin burns. But, a sample from a local lesion reveals abundant gram-positive cocci arranged in clusters which produce hemolytic catalase-positive colonies on blood agar.

64. B A 40-year-old injection drug user (IDU) is admitted to the hospital after several weeks of fever and dizziness. He is found to have cellulitis in his right arm, on which a large area is inflamed and oozing. Cardiac evaluation demonstrates an abnormal EKG and systolic murmur. A Gram stain of blood cultures reveals gram-positive cocci in pairs, short chains, or clusters which do not demonstrate hemolysis on blood agar, grow in broth containing 6.5% NaCl and are positive for L-pyrrolidonyl-beta-naphthylamide (PYR) test.

65. H A 67-year-old woman with non-insulin-dependent diabetes mellitus (NIDDM) presents with a two-day history of wheezing and a productive cough. On physical examination she has a rapid pulse and fever. A chest x-ray shows pulmonary infiltration classic of pneumonia. A Gram stain shows gram-positive cocci in pairs and short chains, which were α-hemolytic on blood agar, catalase negative and sensitive to optochin.

66. J A 44-year-old woman was seen in the office for shortness of breath. She had previously been diagnosed with mitral regurgitation (backward blood flow through the mitral valve) but this problem has been stable and she had no symptoms until a few days earlier. Her physician did an echocardiogram which showed worsened mitral regurgitation and some 1 cm vegetations (small lumps often associated with valvular infection) on the anterior valve leaflet. Three sets of blood cultures showed gram-positive cocci in chains, the colonies of which produced alpha (greening) hemolysis.

67. F A 13-year-old female patient presents at her primary care practitioner suffering from a urinary tract infection (UTI). A sample of midstream urine reveals gram-positive non-encapsulated cocci, arranged in clusters, which are catalase positive and coagulase-negative and are resistant to novobiocin in culture.

68. I A 25-year-old intravenous drug abuser was admitted to the hospital with a high fever. Cultures of his blood revealed nonhemolytic colonies of gram-positive cocci which were catalase positive and coagulase negative.

69. G A 3-day-old neonate born prematurely following a difficult delivery developed meningitis and bacteremia. The gram-positive catalase negative coccus isolated from both blood and spinal fluid was also found to be part of the mother's normal vaginal microbial flora when she was cultured.

DIRECTIONS: Select the **ONE** lettered word or phrase that best matches the numbered word or phrase. Letters may be used once, more than once, or not at all.

A. *Actinobacillus actinomycetecomitans*
B. *Enterococcus faecalis* (group D enterococcus)
C. non-enterococcal group D streptococcus
D. *Staphylococcus aureus*
E. *Staphylococcus epidermidis*
F. *Staphylococcus saprophyticus*
G. *Streptococcus agalactiae* (group B streptococcus)
H. *Streptococcus pneumoniae* (pneumococcus)
I. *Streptococcus pyogenes* (group A streptococcus)
J. viridans streptococci

For each statement below, select the microorganism to which it most appropriately applies.

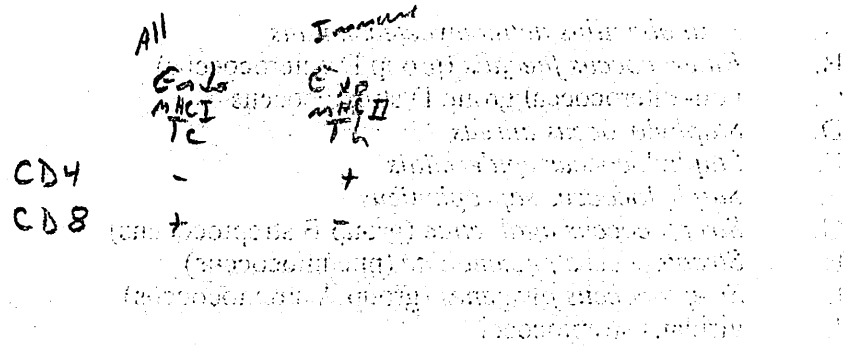
70. I/H Antibodies directed against M-protein fragments of this organism have been shown to cross-react with human heart sarcolemma membranes. This is most accepted as the autoimmune basis for the pathogenesis of acute rheumatic fever following infection with this organism.

71. J These organisms are members of the normal microbial flora of the human oropharynx and can be opportunistic pathogens causing subacute bacterial endocarditis (SBE) in patients with damaged heart valves occurring as a result of transient bacteremia associated with, e.g., extensive oral surgery.

72. B This organism, found present in the normal microbial flora of the human intestinal tract, can be an opportunistic pathogen and cause urinary tract infections in the human. It is catalase negative, and grows in high concentrations of sodium chloride (6.5-7.5%) and in bile salts.

73. D Enterotoxins secreted by some members of this organism are heat stable (resist boiling for 30 minutes) and produce acute gastrointestinal symptoms within 2-5 hours following ingestion of food containing preformed toxin produced by growth of the organism in the food.

74. H A vaccine containing 23 different capsular polysaccharide antigens is available for prophylactic use in preventing disease caused by this organism in persons more susceptible due to age, immunocompromised state or other underlying disease.


All
Class I MHC
Tc
Class II MHC
Th
CD4
CD8
-
+
+