Chapter 6
Diseases of Immunity:

1. The innate immune system includes the following components EXCEPT
(a) lung surfactant
(b) complement
(c) Natural killer (NK) cells
(d) dendritic cells
(e) B lymphocytes

2. Regarding the immune system
(a) antibodies play a crucial role in the innate immune system
(b) The classical pathway of complement activation is part of adaptive immunity
(c) mannose binding lectins are released by microbes, and are important for complement activation
(d) C reactive protein is a by-product of various adaptive immunity responses
(e) none of the above is true

3. Regarding the immune system
(a) T lymphocytes make up 30% of circulating lymphocytes
(b) humoral immunity is part of the innate immune response
(c) cell mediated immunity provides defence against intracellular organisms
(d) NK cells play a pivotal role in cell mediated immunity
(e) diverse receptors on lymphocytes show that they are inherently specific for a particular microbe

4. T cells
(a) are activated by soluble antigen
(b) have a receptor for antigen (TCR) that is made up of α, β, and γ subunits
(c) CD8 molecules bind to the class II MHC molecules
(d) with the γδTCR recognise peptides and lipids without the need for antigen presentation
(e) receptor recognises a very limited number of peptides

5. The position of immune cells in the spleen is *(old paper 2004)*
(a) T cells in the medullary cords
(b) B cells in the paracortical regions of the white pulp
(c) Macrophages in the paracortical regions of the white pulp
(d) B cells in the perifollicular regions of the white pulp
(e) Neutrophils cells in the medullary cords

6. What immune cell type predominates in the perfollicular regions of the white pulp in the spleen? ***(variation 2004)***
(a) T lymphocytes
(b) B Lymphocytes
(c) Macrophages
(d) Plasma cells
(e) Mast cells

7. What receptor is present on the surface of all naïve B cells
(a) IgM and IgD
(b) IgM and IgG
(c) IgM and IgA
(d) IgG and IgD
(e) IgG and IgE

8. Regarding the proportion of circulating lymphocytes
(a) the B cell make up 50%
(b) the T cell make up 60-70%
(c) neutrophils make up 90%
(d) Plasma cells make up 50%
(e) none of the above figures is correct

9. B lymphocytes
(a) are the most common circulating lymphocyte
(b) are activated independently of T helper cells
(c) are integral to the cell mediated system of immunity
(d) have a receptor for CMV virus
(e) may be activated by protein and non-protein antigens

10. Natural killer cells
(a) are leukocytes
(b) are a predominant cell in adaptive immunity
(c) have the ability to kill a cell without prior sensitisation
(d) unlike other cells of the immune system, do not produce cytokines
(e) kill cells that over-express class I MHC molecules, such as tumour cells

11. Regarding cytokines
(a) They are specific for one cell type
(b) They are often redundant
(c) Their main role is in innate immunity
(d) They act exclusively as stimulators for immune responses
(e) none of the above

The class I major histocompatibility complex (MHC)
(a) is expressed on all cells of the body
(b) is encoded for on the short arm of chromosome 16
(c) has a low level of polymorphism
(d) are encoded for by three loci designated HLA-A, HLA-B and HLA-C
(e) β-microglobulin on the MHC is expressed on the HLA A locus

Mast cells
(a) are bone marrow derived cells
(b) are the primary cell involved in type II hypersensitivity reactions
(c) inhibit platelet activation, but are otherwise inflammatory cells
(d) can phagocytose antigen
(e) none of the above is true

Regarding mast cells, which statement is false
(a) They can degranulate with exposure to morphine
(b) They are activated with cross linking of high affinity IgE Fc receptors
(c) They can degranulate with exposure to C5a
(d) Basophils are similar to mast cells, but are in much higher concentrations in certain tissues (eg the lung)
(e) They can be activated by IL-8

Examples of primary mediators released by Mast cells would be
(a) cytokines
(b) leukotrienes
(c) Platelet activating factor
(d) heparin
(e) Prostaglandin D_2

An example of secondary mediators released by Mast cells would be
(a) histamine
(b) platelet activating factor
(c) heparin
(d) chymase
(e) tryptase

In systemic anaphylaxis
(a) the severity of the response is proportional to the concentration of the antigen
(b) there is widespread oedema, but the larynx is spared
(c) a previous history of some form of allergy is always present
(d) the symptoms usually follow administration of foreign proteins
(e) hives are not a feature

Complement membrane attack complex can be activated by
(a) IgE
(b) IgA
(c) IgD
(d) IgG
(e) none of the above

Regarding hypersensitivity reactions
(a) the presence of antibody-antigen complexes in the circulation implies disease
(b) Type III hypersensitivity is generally due to reactions against endogenous antigens
(c) Pemphigus vulgaris is an example of complement-mediated inflammation
(d) The T_H1-type helper cell promotes the synthesis of IgE in type I hypersensitivity reactions
(e) In type III hypersensitivity, immune complexes are typically deposited in vessel walls

In type III hypersensitivity reaction,
(a) phase 2 begins a week after exposure to antigen
(b) small or intermediate size antigen-antibody complexes are more likely to cause this disease process
(c) wherever the complexes deposit, the tissue damage is similar
(d) phase 3 begins approximately 10 days after exposure to the antigen
(e) all of the above is true

Central tolerance
(a) means that in a normal individual, T cells bearing receptors for autoantigens are never present
(b) prevents immature B cells from reacting to self, as they undergo apoptosis if exposed to membrane bound antigen within the bone marrow
(c) occurs for B cells in the thymus
(d) describes a state of anergy towards antigen presenting cells
(e) none of the above is true

Peripheral tolerance is maintained by all of the following mechanisms except
(a) Anergy
(b) deletion of T-cells that express high affinity for self antigens during maturation in the thymus
(c) clonal deletion by activation-induced cell death
(d) Suppression by regulatory T cells
(e) Antigen sequestration

Antigen sequestration is
(a) the phagocytosis of bacteria by leukocytes
(b) the removal of self recognising lymphocytes from the lymphocyte population
(c) where tissues in which antigens are located do not communicate with blood or lymph
(d) the uptake of antigen by Peyer's patches
(e) the presentation of antigenic products on MHC II molecules

Concerning the mechanisms of autoimmune disease
(a) the actual genes associated with most autoimmune diseases is now known
(b) normal MHC molecules are incapable of presenting self antigens
(c) few autoimmune diseases are associated with preceding infections
(d) molecular mimicry may paly a role in the development
(e) these diseases can spontaneously resolve, a process known as epitope spreading

Transmission of HIV
(a) through needlestick injury is approximately 10%
(b) through needlestick injury can be reduced eightfold when a patient is given antiretroviral therapy
(c) in utero is the most common mode of mother-to-infant transmission
(d) from blood transfusion has been eliminated
(e) can be transmitted by mosquito

HIV
(a) is a double stranded RNA virus
(b) has two viral glycoproteins, gp120 and gp41, which are vital for infection of cells
(c) envelope is lipopolysaccharide
(d) has limited variability expressed in its genome
(e) invades CD4+ cells, but does not invade macrophages

Concerning HIV
(a) accumulation of T tropic virus is a sign of the final rapid phase of disease progression
(b) M-tropic strains use CCR5 chemokine receptor to infect host cells
(c) T-tropic strains use CXCR4 chemokine receptor to infect host cells
(d) M-tropic viruses are the dominant virus type found in newly infected individuals
(e) all of the above is true

Concerning HIV infection
(a) Infected monocytes transport the virus to the brain
(b) The type of virus that infects the microglia is M-tropic
(c) Neurons are infected by HIV
(d) Macrophages are easily destroyed by HIV virus replicating in the phagolysosome
(e) A and B are true

Concerning HIV complications
(a) Invasive candidiasis is common
(b) Atypical pneumonia caused by *Mycoplasma pneumoniae* is one of the sentinel infections
(c) Toxoplasmosis is responsible for 50% of mass lesions in the CNS of HIV patients
(d) 5% of infected individuals will develop a malignancy
(e) Kaposi sarcoma is more common in patients who acquired the disease parenterally

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Answers:

1. The innate immune system includes the following components EXCEPT (p194, fig 6-1)
(a) lung surfactant
(b) complement
(c) Natural killer (NK) cells
(d) dendritic cells
(e) B lymphocytes

2. Regarding the immune system p195
(a) antibodies play a crucial role in the innate immune system ***of the neonate (breast feeding)***
(b) The classical pathway of complement activation is part of adaptive immunity
(c) mannose binding lectins ***are circulating proteins***, and are important for complement activation when bound to bacterial cell wall
(d) ***C reactive protein is produced by the liver***, activates C1q, its role is uncertain, and is usually at <1mg/dL in the blood
(e) none of the above is true ***(wrong)***

3. Regarding the immune system p195-6
(a) T lymphocytes make up ***60-70%*** of circulating lymphocytes
(b) humoral immunity is part of the adaptive immune response
(c) cell mediated immunity provides defence against intracellular organisms
(d) NK cells play a pivotal role ***in innate immunity***
(e) the lymphocyte has great diversity of receptors, compared with the innate immune system, but lymphocytea are not inherently specific for a microbe

4. T cells p197-198
(a) ***B cells are activated by soluble antigen. T cells require presented antigen***
(b) have a receptor for antigen (TCR) that is made up of α, β or $\gamma\delta$ subunits
(c) CD8 molecules bind to the ***class I MHC molecule (cytotoxic), CD4 binds to MHC II (T_H cells)***
(d) with the $\gamma\delta$TCR recognise peptides and lipids without the need for antigen presentation
(e) receptor recognises a ***large number of peptides***

5. The position of immune cells in the spleen is *(old paper 2004)*
(a) ***Plasma cells*** in the medullary cords of lymph nodes
(b) ***T cells*** in the paracortical regions of the white pulp
(c) ***T cells*** in the paracortical (areteriolar) regions of the white pulp
(d) B cells in the perifollicular regions of the white pulp
(e) ***Plasma cells*** in the medullary cords of lymph nodes

6. What immune cell type predominates in the perifollicular regions of the white pulp in the spleen? (p523 Ganong 21st, p198-99). ***(variation 2004)***
(a) T lymphocytes (paracortical)
(b) B Lymphocytes
(c) Macrophages
(d) Plasma cells
(e) Mast cells

7. What receptor is present on the surface of all naïve B cells p198
(a) IgM and IgD
(b) IgM and IgG
(c) IgM and IgA ***IgA is secreted***
(d) IgG and IgD ***IgG is formed as part of the adaptive immunity and is seen as a marker for immunity***
(e) IgG and IgE ***IgE is formed in response to multicellular organism infection***

8. Regarding the proportion of circulating lymphocytes p198-99
(a) the ***B cell make up 10-20%***
(b) the T cell make up 60-70%
(c) neutrophils are not a ***lymphocyte, but make up 90% of the WCC usually***
(d) Plasma cells ***are activated B cells, and hence will be a portion of 20%%***
(e) none of the above figures is correct ***(wrong)***

9. B lymphocytes p199
(a) ***T lymphocytes*** are the most common circulating lymphocyte
(b) ***require help from T helper cells via CD40, which matures the B cell and allows change to IgG production***
(c) are integral to the ***humoral system*** of immunity
(d) have a receptor for ***EBV virus (CD21), and are easily infected by this virus***
(e) may be activated by protein and non-protein antigens

10. Natural killer cells p201-202
(a) are ***lymphocytes (10-15% circulating)***
(b) are a predominant cell in ***innate*** immunity
(c) have the ability to kill a cell without prior sensitisation: virally infected, tumour etc
(d) like other cells of the immune system, ***produce cytokines which activate mϕ, and helps with the differentiation of CD4+ cells***
(e) kill cells that ***under-express class I MHC molecules***, such as tumour cells

11. Regarding cytokines p202
(a) They ***have multiple*** cell type targets
(b) They are often redundant, meaning that their functions overlap
(c) Their role is in ***innate, adaptive immunity and inflammatory responses***
(d) They act as ***stimulators for immune responses, and inhibitory (IL-10, TGF-β)***
(e) none of the above ***(wrong)***
they also stimulate haematopoiesis via CSF's

The class I major histocompatibility complex (MHC I) p203
(a) class I is expressed on all ***nucleated*** cells of the body, and platelets
(b) is encoded for ***on chromosome 6***
(c) has a very ***high level of polymorphism***
(d) are encoded for by three loci designated HLA-A, HLA-B and HLA-C
(e) β-microglobulin ***is not encoded on the MHC***

Mast cells p208
(a) are bone marrow derived cells
(b) are the primary cell involved in ***type I hypersensitivity reactions***
(c) ***release PAF*** and therefore must activate platelets, and are inflammatory cells
(d) ***do not phagocytose antigen***
(e) none of the above is true ***wrong***

Regarding mast cells, which statement is ***false*** p207
(a) They can degranulate with exposure to morphine
(b) They are activated with cross linking of high affinity IgE Fc receptors
(c) They can degranulate with exposure to C5a
(d) Basophils are similar to mast cells, but are in much smaller concentrations, and are circulating: their functions in anaphylaxis have not been well established
(e) They can be activated by IL-8

An example of primary mediators (ones preformed in granules) released by Mast cells would be (p208-9)
(a) cytokines
(b) leukotrienes
(c) Platelet activating factor
(d) Proteoglycans such as heparin, biogenic amines such as histamine, enzymes such as chymase, tryptase,
(e) Prostaglandin D_2

An example of secondary mediators (manufactured on signalling) released by Mast cells would be (p208-9)
(a) histamine
(b) platelet activating factor and see above)
(c) heparin
(d) chymase
(e) tryptase

In systemic anaphylaxis
(a) the severity of the response is proportional to the ***level of sensitivity to the antigen***
(b) there is widespread oedema, with striking ***contraction of the respiratory bronchioles***
(c) a previous history of some form of allergy is usually, ***but not always present***
(d) the symptoms usually follow administration of foreign proteins
(e) *hives, hoarseness (larynx), vomiting, abdominal cramps, etc are a feature*

Complement membrane attack complex is activated by p210
(a) IgE
(b) IgA
(c) IgD
(d) IgG and IgM
(e) none of the above

Regarding hypersensitivity reactions p211
(a) the ***mere presence of antibody-antigen complexes in the circulation does not imply disease***
(b) Type III hypersensitivity is generally due to reactions against ***exogenous*** antigens, but in some cases reactions to endogenous antigens cause diseases such as SLE.
(c) Pemphigus vulgaris is an example of antibody-mediated cellular dysfunction; in this case, against desmosomes, ***which disrupt intercellular junctions in epidermis***
(d) The T_H2-type helper cell promotes the synthesis of IgE in type I hypersensitivity reactions: and it is this helper cell and the presence of increased IgE which helps promote the anaphylactic reactions
(e) In type III hypersensitivity, immune complexes are typically deposited in vessel walls, or extravascular sites where antigen has been deposited previously.

In type III hypersensitivity reaction, (p213)
(a) phase 2 ***(deposition of ab-ag complexes)*** begins a week after exposure to antigen
(b) ***Large complexes formed in great antibody excess are rapidly removed by the phagocyte system, and are harmless.*** The most pathogenic antigen-antibody complexes are of small or intermediate size
(c) wherever the complexes deposit, the tissue damage is similar: complement cascade (chemotaxis, anaphylotoxins> MAC), and nϕ and mϕ through activation of the Fc receptors.
(d) phase 3 begins approximately 10 days after exposure to the antigen
(e) all of the above is true

Peripheral tolerance is maintained by all of the following mechanisms except
(a) Anergy irreversible inactivation of lymphocytes. Recognition of self without extra signals (CD28) leads to inactive lymphocytes. B cells without T cell helper activation also anergise.
(b) deletion of T-cells that express high affinity for self antigens during maturation in the thymus **(central tolerance mechanism)**
(c) clonal deletion by activation-induced cell death, via the Fas-Fas ligand system of activation induced apoptosis
(d) Suppression by regulatory T cells (? Produce IL-10 and TGFβ to inhibit activation)
(e) Antigen sequestration (areas hidden from the immune system: testis, eye and brain, as inflammation would destroy these delicate structures)

Antigen sequestration is p225
(a) the phagocytosis of bacteria by leukocytes
(b) the removal of self recognising lymphocytes from the lymphocyte population
(c) where tissues in which antigens are located do not communicate with blood or lymph, eg brain, testis, eye: immune privileged sites
(d) the uptake of antigen by Peyer's patches
(e) the presentation of antigenic products on MHC II molecules

Concerning the mechanisms of autoimmune disease p227
(a) the actual genes associated with ***most autoimmune diseases are not known, just the general chromosomal area***
(b) normal MHC molecules are ***capable of presenting self antigens***
(c) ***Many*** autoimmune diseases are associated with preceding infections
(d) molecular mimicry may paly a role in the development of disease
(e) epitope spreading is the process by which concealed ***antigens become exposed to the immune system, creating the potential for new self recognition***

Transmission of HIV p246
(a) through needlestick injury is ***approximately 0.3%, Hep B 30%***
(b) through needlestick injury can be reduced eightfold when a patient is given antiretroviral therapy
(c) ***intrapartum, and peripartum*** is the most common mode of mother-to-infant transmission
(d) from blood transfusion has been ***virtually been*** eliminated, *but is still possible (1:2x10^7)*
(e) it is ***virtually impossible to be transmitted by insect*** (thank God!)

HIV p247-8
(a) is a single stranded RNA virus ***(only rotavirus is x2 DNA)***
(b) has two viral glycoproteins, gp120 (binds to T cell CD4, change conformation, and binds to chemokine receptor CCR5/ CXCR4) and gp41, which fuses into the cell membrane, which are vital for infection of cells
(c) envelope is a ***lipid bilayer*** from the host cell
(d) has ***tremendous*** variability expressed in its genome, and it is this variability that prevents a vaccine.
(e) invades ***CD4+ cells, dendritic cells and macrophages***

Concerning HIV p249
(a) accumulation of T tropic virus is a sign of the final rapid phase of disease progression
(b) M-tropic strains use CCR5 chemokine receptor to infect host cells
(c) T-tropic strains use CXCR4 chemokine receptor to infect host cells
(d) M-tropic viruses are the dominant virus type found in newly infected individuals
(e) all of the above is true. M-tropic strains develop into T tropic strains owing to gp120 mutation. T-tropic viruses can infect immature T cells, and T cell precursors, seriously depleting T cell numbers. Latent infection is ceased when the T cell is mobilised and the cDNA of the virus is replicated.

Concerning HIV infection p252-3
(a) Infected monocytes transport the virus to the brain
(b) The type of virus that infects the microglia is M-tropic, pointing to the fact that T cells are excluded from the immune privileged site
(c) Neurons are ***not*** infected by HIV
(d) Macrophages are ***not destroyed*** by HIV virus replicating in the phagolysosome, ***making them a reservoir for virus***
(e) A and B are true

Concerning HIV complications p256

(a) Invasive candidiasis is ***uncommon, and only occurs if there is drug induced neutropaenia, or IDC's***

(b) Atypical pneumonia caused by *Mycoplasma pneumoniae* is ***not*** one of the sentinel infections

(c) Toxoplasmosis is responsible for 50% of mass lesions in the CNS of HIV patients

(d) ***25-40% of infected individuals will develop a malignancy: cervical, anal (HPV), non-Hodgkin's lymphoma (most systemic type 80%), or Kaposi***

(e) Kaposi sarcoma is ***20 times more common*** in patients who acquired the disease sexually