**Question 1**

Which hypersensitivity reaction is poststreptococcal glomerulonephritis?

A Type IV HSR

B Type I hypersensitivity reaction (HSR)

C Type III HSR

D Type II HSR

Explanation C

Acute rheumatic fever is a type II HSR: streptococcal cell wall antigen; antibody cross reacts with myocardial antigen.

Poststreptococcal glomerulonephritis is a type III HSR: streptococcal cell wall antigen(s); may be planted in glomerular basement membrane

Mnemonic to remember hypersensitivity reactions: "ACID"

Anaphylactic type: type I

Cytotoxic type: type II

Immune complex disease: type III

Delayed hypersensitivity (cell mediated): type IV

**Question 2**

Type I Diabetes is which if the following hypersensitivity reactions?

A Hypersensitivity reaction 1

B Hypersensitivity reaction 2

C Hypersensitivity reaction 4

D Hypersensitivity reaction 3

Explanation C

IDDM is a type IV hypersensitivity reaction

It is thought that during early life, damage to islet cells leads to exposure of islet cell antigens to CD4+ Th1 cells in peri pancreatic lymph. Activated T cells are then trafficked to the pancreas and cause B cell injury. There is thus a failure of self-tolerance in T cells which may be due to defective clonal deletion or regulatory processes. A role for antibodies has been suspected as most patients have autoantibodies against islet antigens, however it is unclear if the antibodies are involved in causing injury or are produced as a consequence of islet cell damage. Therefore, it is classed as a Type IV hypersensitivity reaction

**Question 3**

Regarding HIV, which of the following statements is correct?

A Results in a polyclonal hypergammaglobulinaemia

B There is an increase in delayed type hypersensitivity

C The decrease in CD8+ T cells is greater than the decrease in CD4+ T cells

D Can mount a normal antibody response to a new antigen

Explanation A

HIV results in a greater loss of CD4+ cells. There is an inversion of the CD4+:CD8+ ratio. HIV causes immunocompromise and the body has a decreased antibody response (inability to mount de novo antibody response to new antigens) with a decreased delayed type hypersensitivity. There is also decreased chemotactic and phagocytic response. Polyclonal B-cell activation leads to hypergammaglobuliaemia and circulating immune complexes.

**Question 4**

Which of the following is NOT an AIDS defining infection?

A Epstein–Barr virus (EBV)

B Coccidioidomycosis

C Toxoplasmosis

D Disseminated salmonella infections

Explanation A

AIDS defining infections include:

Protozoal and helminthic - pneumocytosis, toxoplasmosis, cryptosporidiosis.

Fungal - candida, cryptococcus, disseminated histoplasmosis, coccidioidomycosis.

Bacterial - mycobacterium, disseminated salmonella infections.

Viral - cytomegalovirus (CMV), herpes simplex virus (HSV), varicella zoster virus (VZV).

AIDS defining neoplasms include :Kaposi sarcoma, beta cell non-Hodgkin lymphoma, primary lymphoma of the brain and invasive cancer of the uterine cervix

Note: I have added a reference from Wikipedia better defining what an AIDS defining illness is:

AIDS-defining clinical conditions (a.k.a. AIDS-defining illnesses or AIDS-defining diseases) is the list of diseases published by the centers for disease control and prevention (CDC) that are associated with AIDS, and used worldwide as a guideline for AIDS diagnosis. CDC exclusively uses the term AIDS-defining clinical conditions

According to the CDC definition, a patient has AIDS if they are infected with HIV and have either:

a CD4+ T-cell count below 200 cells/µL

a CD4+ T-cell percentage of total lymphocytes of less than 15%

or one of the defining illnesses.

A patient presenting one of the above conditions but with laboratory evidence against HIV infection is not normally considered to have AIDS

**Question 5**

Which of the following is not a common AIDS defining opportunistic infection?

A Cytomegalovirus (CMV)

B Mycoplasma pneumonia

C Herpes Symplex Virus (HSV)

D Atypical mycobacteria

Explanation B

Common AIDS defining opportunistic infection are

 - Protozoal and helminthic infections: cryptosporidiosis and toxoplasmosis.

 - Fungal infections: pneumocytosis, candidiasis and cryptococcosis.

 - Bacterial infections: mycobacterium and salmonella.

 - Viral infections: cytomegalovirus (CMV), herpes simplex virus (HSV).

**Question 6**

Which of the following statements is correct in relation to hyperacute graft rejection?

A Occurs in 1-4 days

B Spares vascular endothelium

C Decreases with cross matching

D Is cell mediated

Explanation C

Hyperacute graft reaction occurs within minutes to hours. The reaction is decreased with cross matching, however even with HLA class I and II matching, which will improve survival, immunosuppressive therapy is still required - except in identical twins. The reaction is Ag and Ab mediated and these are deposited as complexes in the vessel wall. The rejection occurs too early for the immunosuppressive drugs to be effective.

**Question 7**

Hyperacute transplant rejection is due to which of the following mechanisms?

A Vasculitis

B Fibroblasts

C Fibrosis

D Immunoglobulin deposition

Explanation D

Hyperacute Rejection. This form of rejection occurs within minutes or hours after transplantation. A hyperacutely rejecting kidney rapidly becomes cyanotic, mottled, and flaccid, and may excrete a mere few drops of bloody urine. Immunoglobulin-Antibody (HSRII) and complement are deposited in the vessel wall, causing endothelial injury and fibrin-platelet thrombi. Neutrophils rapidly accumulate within arterioles, glomeruli, and peritubular capillaries. As these changes become diffuse and intense, the glomeruli undergo thrombotic occlusion of the capillaries, and fibrinoid necrosis occurs in arterial walls. The kidney cortex then undergoes outright necrosis (infarction), and such nonfunctioning kidneys have to be removed.

Acute Rejection. This may occur within days of transplantation in the untreated patient or may appear suddenly months to years later, after immunosuppression has been ceased. In any one patient, cellular (HSR IV) or humoral immune mechanisms may predominate. Humoral rejection is associated with vasculitis, whereas cellular rejection is marked by an interstitial mononuclear cell infiltrate.

**Question 8**

Regarding the rhesus blood group system which of the following statements is correct?

A Rh negative refers to blood product being both D and E antigen negative

B Transfusion reactions will not occur if Rh negative people are given antigen

C There are very few spontaneous agglutinins within this system

D 50% of caucasians are Rh Positive

Explanation C

Rh refers to the D antigen, thus RH negative means D negative. However, at the basic level, Rh does refer to C, D and E antigens. Therefore Rh negative means C, D, E negative.

In contrast to the AB0 system, spontaneous agglutinins never occur in the Rh-system. 85% of Caucasians are Rh positive. The first transfusion of Rh+ blood will create anti D titres. The next transfusion, even years later, can cause a transfusion reaction

**Question 9**

In relation to IgM, which of the following statements is correct?

A It is a dimer structure

B It is the largest antibody and the first to develop in the foetus

C It comprises 40% of normal circulating antibodies

D It is antiviral

Explanation B

IgM is a pentamer or a hexamer. IgM levels comprise 120mg/dl circulating antibodies, IgG 1000mg/dl and IgA 200mg/dl. Its primary function is to activate complement.

75% of all circulating Ig is IgG, produced by plasma cells.

**Question 10**

With regard to T lymphocytes, which of the following statements is correct?

A The T cell receptor complex contains CD3 complex proteins

B T cells contribute 40-50% of lymphocytes in the blood

C Are the basis for type 2 hypersensitivity reactions

D Differentiate into antibody producing plasma cells

Explanation A

T lymphocytes develop from precursors in the thymus. Mature T cells are found in the blood, where they constitute 60-70% of blood lymphocytes. The T cell receptor (TCR) plus the CD3 molecular complex (proteins) form the TCR complex through which the T cell recognises the antigen. T cells express this TCR complex in all T Cells (and they are identical). The poteins are involved in the transduction of signals into the T cell after the TCR has bound to the antigen. T cells are the basis for Type IV delayed hypersensitivity. B cells differentiate into antibody producing plasma cells and are activated in the presence of soluble antigens

**Question 11**

In transplant rejection, which of the following options is correct in relation to the hyperacute reaction?

A Cell mediated

B Due to a vasculitis

C Prevented largely by cross-matching blood

D Controlled by immunosuppressive drugs

Explanation D

Hyperacute graft reaction occurs within minutes to hours. The reaction is decreased with cross matching but even with HLA class I and II matching, which will improve survival, you still need immunosuppressive therapy- except in identical twins. The reaction is Ag and Ab mediated and are deposited as complexes in the vessel wall. The rejection occurs too early for the immunosuppressive drugs to be effective.

**Question 12**

All the following are type 1 hypersensitivity primary mast cell mediators, except?

A Histamine

B Eosinophil chemotactic factor (ECF)

C Heparin Your Answer

D Platelet activating factor (PAF)

Explanation d

Platelet activating factor is a secondary mediator. Other examples of secondary mediators include prostaglandin D2, leukotrienes, cytokines (NF, IL 1, 3, 4, 5,6). Other primary mediators include enzymes such as tryptase, chymase and acid hydrolase, eosinophil chemotactic factor, neutrophil chemotactic factor and adenosine

**Question 13**

Which of the following statements is true in relation to type 2 hypersensitivity?

A Involves cell mediated immune responses

B Includes serum sickness as an example

C Involves IgE on mast cells

D Explains many transfusion reactions

Explanation D

Cell mediated immune response is type IV. IgE on mast cells is type I. Serum sickness is type III

**Question 14**

A man with blood type B marries a woman with blood type AB. Which of the following opitons is correct?

A They cannot have a child with type O blood

B none of the above

C They cannot have a child with type AB blood

D They cannot have a child with type A blood

Explanation A

The man could be heterozygous (one B allele and one O allele), or homozygous (two B alleles). The woman must be heterozygous (one A allele and one B allele). The following are the possible genotypes of their child: AB, AO, BO, BB. The potential phenotypes are type AB, type A or type B. They cannot produce a child with type O blood.

**Question 15**

Passive immunity is achieved by administering which of the following?

A Live virus

B Activated T cells

C Attenuated virus

D Adsorbed toxin

Explanation B

The one exception to passive-humoral immunity is the passive transfer of cell mediated immunity, also called adoptive immunisation, which involves the transfer of mature circulating lymphocytes. It is rarely used in humans and requires histocompatible (matched) donors, which are often difficult to find, and carries severe risks of graft versus host disease. This technique has been used in humans to treat certain diseases including some types of cancer and immunodeficiency. However, this specialised form of passive immunity is most often used in a laboratory setting

**Question 16**

The majority of AIDS cases occur in which of the following groups in the USA?

A Homosexual males

B Blood product recipients

C IV drug abusers

D Heterosexual adults

Explanation A

 - Homosexual males 50%,

 - Heterosexual contacts 33%

 - IV drug users 25%,

 - Recipients of blood transfusions 1%

 - Haemophilliacs 0.5%

In the prescribed text: these figures reflect the trend in the USA. Note however that in Africa-especially sub-Saharan, the heterosexual group- is the most rapidly growing group, particulalry women, where the infection rate is estoimated to be about 10000 cases every day

**Question 17**

Which of the following reactions is cell mediated?

A Multiple sclerosis

B Goodpastures syndrome

C Arthus reaction

D Rheumatic fever

Explanation A

Type I- (Immediate hypersensitivity)= anaphylaxis, allergies, bronchial asthma (atopic forms)

Type II- autoimmune haemolytic anaemia, erythroblastosis foetalis, rheumatic fever, goodpastures, grave's disease

Type III- SLE, certain forms of glomerulonephritis, Arthus reaction, serum sickness

Type IV- hypersensitivity reaction (Cell mediated hypersensitivity)= multiple sclerosis, TB, contact dermatitis, type I DM, RA, IBD, graft vs host disease

**Question 18**

All of the following are opportunistic AIDS infections, except?

A Pneumocystis jirovecii

B Mycoplasma pneumonia

C Atypical mycobacterium

D Cytomegalovirus (CMV)

Explanation B

AIDS defining illnesses include infections and neoplasms.

AIDS defining infections include:

Protozoal and helmintic- pneumocytosis, toxoplasmosis, cryptosporidosis.

Fungal-candida, cryptococcus, disseminated histoplasmosis, coccidiodomycosis.

Bacterial- mycobacterium, disseminated salmonella infections.

Viral- cytomegalovirus (CMV), herpes simplex virus (HSV), Varicella zoster virus (VZV).

AIDS defining neoplasms include: Kaposi sarcoma, beta cell non-Hodgkin lymphoma, primary lymphoma of the brain and invasive cancer of the uterine cervix

Note: Pneumocystis carinii pneumonia is now known as Pneumocystis jirovecii

**Question 19**

If both parents have blood group B. What type of blood group cannot appear in their children?

A B

B AB

C OB

D O

Explanation B

The man could be heterozygous (one B allele and one O allele), or homozygous (two B alleles). The woman could be heterozygous (one B allele and one O allele), or homozygous (two B alleles). The following are the possible genotypes of their child: B, OB, O. They cannot produce a child with type AB blood.

Note: similar to another blood group MCQ- but it is good to practice

**Question 20**

Which of the following is true regarding Agammaglobulinemia

A It is a deficiency of cell mediated immunity

B Recurrent respiratory tract infections are the most common presentations

C It is a autosomal dominant inherited disease

D It becomes apparent in the first month of age

Explanation B

X-linked agammaglobulinemia is one of the more common forms of primary immunodeficiency. It is characterised by the failure of B cell precursors to develop into mature B cells. It is a disease of the humoral arm of adaptive immunity. Because it is X linked, it appears almost entirely in males but sporadic cases have occurred in females due to mutations in some other gene that functions in the same pathway. The disease seems to appear only after 6 months of age, as maternal immunoglobulins are depleted. Recurrent bacterial infections of the respiratory tract are the most common and allude to the underlying immune deficiency. Most often the causative organism is H influenza, Sterp pneumoniae and staf aureus. Viral infections also occur because antiboides are important for neutralisin viral infections. Common viral infections include polio, enterovirus, echovirus and coxsackievirus. Treatment involves prophylactic intravenous Ig therapy.

**Question 21**

A 5yr old girl presents to the emergency department with malaise, fever, nausea, oliguria and haematuria. You identify red cell casts in her urine. What is the most likely diagnosis?

A Membranous glomerulopathy

B Minimal change disease

C Post streptococcal glomerulonephritis Correct Answer

D Focal, segmental glomerulonephritis

Explanation C

Poststerptococcal glomerulonephritis usually appears 1-4 weeks after a streptococcal throat or skin infection. It occurs most frequently in ages 6-10yrs, but adults of any age can be affected. The A beta haemolytic streptococci are the causative agents, but only certain strains are nephrogenic. More than 90% of cases being traced to types 12, 4 and 1.

It is an immune mediated disease-type III hypersensitivity reaction.

Clinical picture: abrupt malaise, fever, nausea, oliguria and haematuria 1-2 weeks after recovery form a sore throat. The patients have red cell casts in the urine, mild proteinuria (<1gm/day), periorbital oedema and mild to moderate hypertension. More than 95% of cases eventually recover with only conservative therapy of maintaining a salt and water balance. Few progress to a chronic glomerulonephritis with or without recurrence of an active nephritic picture. Adults present more atypically with the sudden appearance of hypertension., oedema with the elevation of the renal urea and creatinine.

Minimal change disease is associated with children, but it typically does NOT present with haematuria.

Note: 3,10,12,13,17