Immunology

Deficiencies in cell-mediated immunity are associated with:

A	Poor outcome from gram positive bacterial infections	(True)
B	Thymic aplasia	(True)
C	Reduced reaction to tuberculin testing	(True)
D	Fatal viral infections in infants	(True)
E	Non-Hodgkin's lymphoma	(True)

Comments:

Since CD4 cells are necessary for good B cell functioning, viral, bacterial and fungal infections all occur. In addition, there is decreased immune surveillance resulting in an increased incidence in tumours. Infections will occur as transferred maternal antibody levels decline.

Early infections: Chronic mucocutaneous candidiasis, chronic rhinitis, otitis media, recurrent pneumonia, diarrhoea.

Specific associations: Di George Syndrome - truncal defects and thymic aplasia (Catch 22 Syndrome), HIV, generalised lymphadenopathy, chronic mucocutanous candidiasis involving particularly the nail beds. Wiskott Aldrich Syndrome with eczema and thrombocytopenia; and ataxia telangiectasia with these 2 symptoms.

Concerning the polymerase chain reaction:

A	It can be used to replicate RNA but not DNA.	(False)
B	It relies of the thermal stability of DNA.	(False)
C	It cannot be used for prenatal diagnosis because of the large amount of template DNA required.	(False)
D	It involves the use of 2 synthetic small strands of DNA on either side of the target sequence for amplification.	(True)
E	It can be used to identify viral infection in host cells.	(True)

Comments:
The polymerase chain reaction (PCR) is a means of enzymatically amplifying a marker sequence of DNA or RNA using specific short, synthetic probes to identify the sequence. If a DNA or RNA sequence is known, the segment between the 2 probes can be amplified rapidly. Heat is used to separate the strands of DNA so that the probes can bind, then the mixture is cooled to allow a thermo-stable DNA preliminaries to work. The sequence is then repeated. A single strand of DNA can be multiplied very rapidly and specifically. It is used extensively in prenatal diagnosis and microbiology laboratories because of its sensitivity.

Childhood immunisation with pertussis is absolutely contraindicated in:

A	Immunocompromised patients	(False)
B	Down Syndrome	(False)
C	Cerebral palsy	(False)
D	Family history of convulsion	(False)
E	Rectal temperature of 38.5°C	(False)

Comments:

Killed vaccine.

Contraindications:
Relative: acute illness. Severe local - use acellular vaccine.
Absolute: Severe generalised reaction (fever >39.5 within 48 hours), bronchospasm, laryngeal oedema, collapse, prolonged unresponsiveness, prolonged inconsolable crying for more than 4 hours, convulsions/encephalopathy within 72 hours.

Concerning the polymerase chain reaction

A	It can be used to replicate RNA but not DNA.	(False)
B	It relies of the thermal stability of DNA.	(False)
C	It cannot be used for prenatal diagnosis because of the large amount of template DNA required.	(False)
D	It involves the use of 2 synthetic small strands of DNA on either side of the target sequence for amplification.	(True)
E	It can be used to identify viral infection in host cells.	(True)

Comments:
The polymerase chain reaction (PCR) is a means of enzymatically amplifying a marker sequence of DNA or RNA using specific short, synthetic probes to identify the sequence. If a DNA or RNA sequence is known, the segment between the 2 probes can be amplified rapidly. Heat is used to separate the strands of DNA so that the probes can bind, then the mixture is cooled to allow a thermo-stable DNA preliminaries to work. The sequence is then repeated. A single strand of DNA can be multiplied very rapidly and specifically. It is used extensively in prenatal diagnosis and microbiology laboratories because of its sensitivity.

The following may indicate underlying severe combined immunodeficiency:

A	Platelet count of 40	(False)

B	Absolute lymphocyte count of 0.8 x 10^9/L	(True)
C	Generalised lymphadenopathy	(False)
D	Conjunctival telangiectasia	(False)
E	Failure to thrive	(True)

Comments:

Severe combined immune deficiency is a clinical syndrome, with a vast number of underlying potential causes. Other clinical categories include combined immune deficiency, and T cell defects, where a secondary problem with immunoglobulin formation is almost inevitable, given the regulatory role of the CD4 cells and the cytokines they produce. In severe combined immune deficiency, the immune deficiency involves the absence of T and B cell function from birth.

Examples of each category include:

- Severe: Adenosime Deaminase Deficiency (ADA), X-SCID 1L2y deficiency, T+B+SCID, NK+ SCID.
- Less Severe: Wiskott-Aldrich Syndrome, MHC class I and II deficiency, Omenn's Syndrome, ataxia telangiectasia, Hyper-IgE Syndrome, and purine nucleoside phosphorylase deficiency (PNP deficiency).
- SCID: Clinical spectrum of great genetic diversity where ID involves absence of T & B cell function from birth.

Interferon Gamma:

A	Is a synthetic antiviral agent.	(False)
B	Enhances the expression of the major histocompatibility complex (MHC).	(True)
C	Contributes to fever and myalgia in many viral infections.	(True)
D	Is used therapeutically to secure destruction of cells infected by certain viruses.	(False)
E	Suppresses viral replication.	(False)

Comments:

Interferon alpha and beta inhibit via a replication and cell proliferation. They activate NK cells and MHC class 1 expression. Interferon gamma activates macrophages and NK cells, and leads to an increase in expression of MHC class 1 and 2, and to a decrease in IgE production. Interferon gamma levels increase in septic shock.

Therapeutically, interferon gamma has been used in chronic granulomatous disease and Omenn Syndrome. Interferon alpha has been used in massive cavernous haemangiomata. Interferon alpha is produced by many cell types, while interferon beta is produced by fibroblasts and interferon gamma by T cells.

Leukotrienes:

A	Generally increase vascular permeability.	(True)
B	Leukotriene C4 and leukotriene D4 are important components with slow-reacting substance A.	(True)
C	Cause bronchodilation.	(False)
D	Act on intracellular receptors.	(False)
E	Are derived from palmitic acid.	(False)

Comments:

Leukotrines are produced, like prostaglandins, from arachidonic acid but via the lipo-oxygenase pathway, while prostaglandins are produced via the cyclo-oxygenase pathway. Levels are increased in ARDS. Leukotrine E4 causes capillary leak in mevalonic aciduria. Leukotrine B4 activates polymorphoneuclearlymphocytes, and C4 is responsible for allergic sensitisation. D4 inhibitors are useful in asthma. C4, D4 and E4 levels are increased in asthma causing bronchus constriction and oedema.

Concerning anti-neutrophil cytoplasmic antibody:

A	It is only present in Wegener's granulomatosis when there is renal involvement.	(False)
B	It has been recognised in cases of Crohn's Disease.	(False)
C	It occurs in polyarteritis nodosum.	(True)
D	It causes neutropenia in systemic lupus erythramtosis.	(False)
E	Cytoplasmic and perinuclear forms are recognised.	(True)

Comments:
ANCA reacts with neutrophil granules, and is detected by immunoflourescence. Two types are recognised, perinuclear (p-ANCA), or diffuse (c-ANCA). c-ANCA is associated with Wegener's granulomatosis, and vasculitides such as Kawasaki Disease. p-ANCA is rather more non-specific and is associated with glomerulonephritis, ulcerative colitis, congenital adrenal hyperplasia, Henoch Schonlein Purpura. Both can occur in HIV.

The following may indicate an underlying specific immunoglobulin deficiency:

A	Recurrent oral thrush	(False)
B	Recurrent tonsillitis	(True)
C	Recurrent viral gastroenteritis	(True)
D	Recurrent conjunctivitis	(False)

E Severe aphthous ulceration (False)

Comments:
Oral thrush suggests cell-mediated defect. IgA deficiency or IgG sub-class deficiency may result in recurrent tonsillitis and viral gastroenteritis. In addition to abscesses and lymphadenopathy, mucus membrane infections such as conjunctivitis, rhinitis and stomatitis have been reported in chronic granulomatous disease.

Oral ulceration may be:

- Common: aphthos, traumatic, hand, foot and mouth disease, herpangina, chemical burns (alkali, acid, aspirin).
- Uncommon: neutrophil defects (agranulocytosis, leukaemia, cyclical neutropenia), SLE, Behcet Syndrome, necrotising ulcerative gingivostomatitis, syphilis, Crohn's Disease, histoplasmosis.

Conjunctivitis is common, since the conjunctivae react to a wide range of bacterial and viral agents, allergens, irritants, toxins, and they are inflamed in systemic diseases.

The following statements are true concerning angio-oedema:

A Hereditary angio-oedema is due to a deficiency of C1-esterase. (False)

B Symptoms of hereditary angio-oedema vary with the menstrual cycle. (True)

C Urticaria may be non-allergic. (True)

D Hereditary angio-oedema is autosomal dominant. (True)

E Abdominal pain may be mistaken for appendicitis. (True)

Comments:
Hereditary angio-oedema is an autosomal dominant deficiency of C1 esterase inhibitor. Symptoms vary with trauma, exercise, stress and menstruation. Urticaria is rare and swelling is non-pruritic. It can be treated with Danazol. Acquired angioneurotic oedema may be immune or non-immune in origin. The former is usually related to food, and the urticaria that results shows dermographism. The non-immune form is usually due to exercise. Acquired angio-oedema tends to involve the deeper layers of the skin and sub-mucosa especially the upper respiratory and GI tract, as opposed to urticaria which involves the skin's surface. Antigen is bound to mast cells or basophils via bound IgE, and antigen receptor combination results in histamine release.
