

Multiple Choice Questions

Select True or False or Matched pairs

- 1** Reperfusion cellular injury is caused by
- A T High intracellular concentrations of Calcium
 - B F High intracellular concentrations of Potassium
 - C T Free radical release
 - D F Vitamin E
 - E T Nitric oxide
- Damaged cells cannot regulate calcium flux leading to high intracellular Ca^{++} and activation of various destructive enzymes. Vitamin E is antioxidant
- 2** Apoptosis
- A F Occurs following acute deprivation of blood
 - B T Occurs during embryogenesis
 - C F Leads to damage to neighbouring cells
 - D T Follows activation of caspase 3
 - E T Is triggered when there is irreversible damage to cellular DNA
- 3** Complement products are involved in
- A T Chemotaxis
 - B T Increased vascular permeability
 - C T Neutrophil activation
 - D T Phagocytosis
 - E F Killing of bacteria in the phagocytic vacuole
- 4** Following emigration from blood vessels, leucocyte migration to the site of infection or injury is mediated by
- A F Bradykinin
 - B T Chemokines
 - C T Complement C5a
 - D F Histamine
 - E F Prostaglandins
- Bradykinin, histamine and prostaglandins cause vasodilatation but not chemotaxis
- 5** The anti-inflammatory properties of aspirin affects
- A T Vasodilatation
 - B F Chemotaxis
 - C F Phagocytosis
 - D F Leucocyte emigration
 - E F Release of leukocytes from the bone marrow
- Aspirin opposes prostaglandin synthesis
- 6** Leucocyte emigration from venules is influenced by
- A T Selectins
 - B T Integrins
 - C F Chemokines
 - D F Complement C3a
 - E F Prostaglandins
- Adhesion molecules initiate emigration; the other factors are involved in vasodilatation and/or chemotaxis
- 7** Apoptosis is triggered by
- A F Nitric oxide
 - B F Superoxide dismutase
 - C T Ligation of Fas
 - D F BCL 2
 - E T p53
- 8** Neutrophil polymorphs
- A T Have multilobed nuclei
 - B F Are the predominant cell type in chronic inflammation
 - C F May fuse to form multinucleate giant cells
 - D T Have phagocytic abilities
 - E F Have numerous eosinophilic granules in their cytoplasm
- Eosinophils have eosinophilic granules

- 9** Which cause pain in acute inflammation?
- A** F C3a
B F C5a
C T LTB4
D F PGE
E T Bradykinin
- 10** The following are oxygen-dependent killing mechanisms in neutrophils
- A** T Lysozyme
B T Lactoferrin
C T Myeloperoxidase
D T Cationic proteins
E T Hydrogen peroxidase
- 11** Macrophages
- A** F Have phagocytic but not pinocytotic capabilities
B T Are derived from blood monocytes
C F Have a shorter lifespan than neutrophils
D T Contain neutral proteases
E T Produce interleukin-1
- 12** The following substances are found in the specific cytoplasmic granules of neutrophils
- A** F Myeloperoxidase
B F Cationic proteins
C T Lactoferrin
D F Elastase
E T Lysozyme
- There are two types of granules: specific (or secondary) which are smaller and contain lysozyme, collagenase, gelatinase, lactoferrin, plasminogen activator, histaminase and alk phos; and azurophilic (primary) which contain myeloperoxidase, lysozyme, defensins, acid hydrolases, proteases such as elastase. Both can be released into phagosomes, specific granules are much more readily released extracellularly after cell death.
- 13** During acute inflammation, there is a 'burst' of oxygen consumption (respiratory burst) in neutrophils. This is an essential step for which of the following events?
- A** F Increased neutrophil production in the bone marrow
B F Attachment to the endothelial cells
C F Opsonization of bacteria
D F Phagocytosis of bacteria
E T Generation of microbicidal activity
- The oxidative burst generates the reactive oxygen species (*i.e.* superoxide anion) important in the destruction of engulfed bacteria
- 14** Which of the following chemical mediators are involved in giant cell granulomatous inflammation
- A** F Complement C5a
B T Interferon γ
C F Bradykinin
D F Nitric oxide
E F Prostaglandin
- 15** Langhans giant cells
- A** F Are the antigen presenting cells in the skin
B T Have a peripheral ring of nuclei with central clearing
C T Are characteristically seen in tuberculosis
D F Have nuclei scattered randomly through the cytoplasm
E T Are derived from macrophages
- A. Langerhans cells are APCs in the skin. C. and also in other chronic granulomas. D. Foreign body giant cells have these properties
- 16** A patient with congenital heart disease with a ventricular septal defect presents with fever and headache. CT head scan showed a parietal lobe abscess in the brain. Which of the following accounts for abscess formation?
- A** F Formation of nitric oxide by macrophages
B F Production of interferon γ by T lymphocytes
C F Formation of TGF β by macrophages
D F Generation of prostaglandins by endothelium
E T Release of lysosomal enzymes by neutrophils
- The site of the abscess suggests infected emboli originating in the VSD

- 17** Phagocytes have receptors for
- A F Complement C3a
 - B T PAMPs
 - C T Apoptotic cells
 - D T ICAM1
 - E F NK cells
- 18** Factors that influence the induction of tolerance include
- A T the solubility of the antigen
 - B T the route of administration of antigen
 - C T the dose of antigen
 - D T maturity of immune system
 - E T chimerism
- 19** Central tolerance takes place in
- A T thymus
 - B F lymph nodes
 - C F spleen
 - D F liver
 - E F pancreas
- 20** The following are examples of autoimmune disease
- A T Type 1 insulin dependent diabetes mellitus
 - B T Rheumatoid arthritis
 - C T Multiple sclerosis
 - D F Adrenal hyperplasia
 - E T Systemic lupus erythematosus
- 21** The endogenous pathway of antigen presentation mainly involves
- A F peptides derived from extracellular pathogens
 - B F presentation of antigen to CD4+ T cells
 - C T presentation of antigen to CD8+ T cells
 - D F presentation of antigen to B cells
 - E T presentation of antigen on MHC class I molecules
- 22** MHC class I molecules
- A T are highly polymorphic
 - B F are only expressed on professional antigen presenting cells
 - C T associate preferentially with pathogen derived peptides
 - D F accommodate peptides in an open-ended peptide binding groove
 - E T associate with β 2-microglobulin
- 23** During the induction of type I (immediate) hypersensitivity response, which of the following cells secrete cytokines that stimulate IgE production by B cells, promotes mast cell growth, recruits and activates mast cells.
- A T CD4+ lymphocytes
 - B F Natural killer (NK) cells
 - C F Macrophages
 - D F Dendritic cells
 - E F Neutrophils

- 24** In response to infection with *Mycobacterium tuberculosis*, a granuloma forms in the lung. Within the granuloma are cells expressing class II MHC antigens. These cells elaborate cytokines that promote fibroblastic proliferation. From which of the following peripheral blood cells are these cells derived?
- A F Neutrophil
 - B T Monocyte
 - C F B Cell
 - D F NK cell
 - E F Basophil
- 25** Which of the following apply to CD4+ lymphocytes?
- A T they account for two thirds of peripheral lymphocytes in blood and lymphoid organs.
 - B T they may have regulatory (suppressor) functions
 - C T they secrete IL2
 - D F they may be cytotoxic
 - E F they recognise peptide presented by class I MHC molecules
- 26** Which of the following conditions represents a type II (cytotoxic) hypersensitivity reaction?
- A T haemolytic anaemia
 - B T myasthenia gravis
 - C T transfusion reaction
 - D T Graves disease
 - E F extrinsic allergic alveoli's
- 27** The T cell receptor
- A F is bivalent
 - B T is membrane bound and does not have a secreted component
 - C F undergoes somatic hypermutation
 - D T is a member of the Immunoglobulin superfamily of transmembrane proteins
 - E F is generated in the thymus gland
- 28** IL12
- A T Induces the formation of Th1 lymphocytes
 - B F Induces the formation of Th2 lymphocytes
 - C F Suppresses the formation of Th1 lymphocytes
 - D F Suppresses the formation of Th2 lymphocytes
 - E F Stimulates macrophages a macrophage cytokine
- 29** Type III (immune complex mediated) hypersensitivity reactions cause the tissue lesions in
- A T polyarteritis nodes
 - B T acute poststreptococcal glomerulonephritis
 - C T serum sickness
 - D T systemic lupus erythematosus
 - E F pemphigus
- 30** Which of the following cells originate in the bone marrow?
- A T T lymphocytes
 - B T B lymphocytes
 - C T Macrophages
 - D F follicular dendritic cells
 - E T interdigitating dendritic cells
- 31** Macrophages have Fc receptors for which of the following antibodies?
- A F IgM
 - B T IgG1
 - C T IgA
 - D F IgD
 - E T IgE

- 32** Antibody dependent cell-mediated cytotoxicity (ADCC or “K cell killing”) is mediated by which cells?
- A T NK cells
 B T macrophages
 C T neutrophils
 D T eosinophils
 E F mast cells
- 33** Which membrane proteins belong to the Ig superfamily?
- A T IgM
 B T ICAM 1
 C F LFA1
 D T Fc receptor
 E T MHC Class I
- 34** T helper (Th) cells secrete which cytokines?
- A T IL2
 B T IL4
 C T IL10
 D F IL12
 E T IFN γ
- 35** Which of the following molecules are present on the membrane of T helper (Th) cells and are involved in their co-stimulation?
- A T CD28
 B F B7
 C F LFA1
 D F ICAM1
 E F CD40
- B7 on B cell, macrophages; LFA1 and ICAM1 are adhesion molecules; CD40L is present on T cells not CD40
- 36** NK cells have receptors for which of the following
- A T Fas
 B F FasL
 C T Fc γ III
 D T HLA-E
 E F CD40L
- HLA-E is a class Ib molecule which presents peptides from other class I molecules to NK cells (CD94, a lectin). Not expressed if conventional Class I molecules are downregulated as in viral infections and tumours.
- 37** Which surface molecules are present on cytotoxic T cells?
- A F CD4
 B T FasL
 C F CD40
 D T LFA1
 E T CD2
- CD2 is an immunoglobulin superfamily adhesion receptor for LFA3
- 38** In acute rejection of solid-organ transplants (*e.g.* kidney, liver, heart), graft damage
- A F is due to pre-formed antibody
 B T is caused by recognition of donor peptides by cytotoxic T cells (CD8+)
 C T is caused by release of macrophage cytokines such as IL1 and TNF α
 D F is caused by helper T cells (CD4+)
 E F is caused by transplant atherosclerosis
- 39** Immunoglobulins of M class (IgM)
- A F cross the placenta
 B F are characteristically produced in a secondary immune response
 C F are found as a dimeric form linked by a J chain
 D T can activate complement
 E F are usually found on the surface of mast cells

- 40** T lymphocytes
- A F produce antibodies
 - B T mature in the thymus
 - C F are identified by the presence of surface immunoglobulin
 - D T produce cytokines
 - E T have receptors for MHC molecules
- 41** The classical pathway of complement activation
- A F is activated by lipopolysaccharide bacterial cell wall constituents
 - B T starts with activation of C1q complement
 - C F is activated by IgA immune complexes
 - D T is activated by IgG which has bound to specific antigen
 - E T is activated by IgM which is bound to specific antigen
- 42** The human major histocompatibility complex
- A F is situated on chromosome 4
 - B T is also known as the HLA complex
 - C F codes for blood group antigens
 - D T is involved in transplant rejection
 - E F codes for two classes of antigens which are expressed on all nucleated cells
- 43** Hyperacute rejection of grafts
- A F occurs within 2 -4 days after transplantation
 - B F is a cell-mediated response
 - C T may be minimised by matching of blood groups
 - D T never occurs in autografts
 - E F may be reversed by cyclosporine
- 44** Cortical epithelial cells in the thymus
- A F are of bone marrow origin
 - B T express MHC molecules
 - C T are responsible for positive selection of T cells
 - D F are responsible for negative selection of T cells
 - E T form Hassal's corpuscles in the medulla when they become senescent
- 45** In type III (immune complex mediated) hypersensitivity tissue damage is mediated by
- A F histamine
 - B T neutrophil activation
 - C F macrophage activation
 - D F T cell activation
 - E F NK cell activation
- 46** Pathology of malaria may include
- A T anaemia due to red cell destruction
 - B T red blood cell sequestration
 - C T fever correlated with synchronous parasite release
 - D T recurrent disease due to cryptic infections in the liver
 - E T cerebral inflammation due to over production of TNF α
- 47** Pathology of schistosomiasis may include
- A T swimmer's itch caused by skin penetration by cercariae
 - B T portal hypertension due to fibrosis
 - C T lung eosinophilia due to larval migration
 - D T Katayama fever from reaction to cercarial antigens
 - E T predisposition to bladder cancer

- 48** Humans are the definitive host in which of the following infections?
- A F *Plasmodium falciparum* A - mosquito; B - cat; C - many mammals; D - snails; E - dog
 B F *Toxoplasma gondii*
 C T *Cryptosporidium parvum*
 D T *Schistosoma mansoni*
 E F *Echinococcus granulosus*
- 49** Multiplication of malarial parasites takes place in which human tissues?
- A F salivary glands
 B T hepatocytes
 C T red blood cells
 D F brain
 E F gut epithelium
- 50** Relative resistance to malaria is conferred by which of the following?
- A T Duffy blood group antigen negative
 B T heterozygous beta thalassaemia
 C T G6PD deficiency
 D T HLAB53
 E F HLADR
- 51** Which of the following is true of schistosomiasis?
- A F is a liver fluke
 B T found in the Caribbean
 C F causes rectal cancer
 D T parasites are susceptible to IgE antibody
 E F parasites are hermaphrodite
- 52** Match the statements in A to E with those in F to J
- | | | | | |
|---|---|--------------------------------|--|---|
| A | G | <i>Schistosoma haematobium</i> | immune complex mediated glomerulonephritis | F |
| B | I | <i>Entamoeba histolytica</i> | causes bladder cancer | G |
| C | F | <i>Plasmodium vivax</i> | definitive life cycle in the cat | H |
| D | H | <i>Toxoplasma gondii</i> | infects the large intestine | I |
| E | J | <i>Echinococcus granularis</i> | hydatid cysts | J |
- 53** Infection by *Herpes simplex* virus
- A T occurs via aerosol transmission
 B T results in lifelong latent infection
 C T can be treated with acyclovir
 D F is controlled by mass vaccination
 E F causes glandular fever
- 54** Poliovirus, a picornavirus
- A T contains an RNA genome
 B T is transmitted by the faeco-oral route
 C F infects sensory neurones
 D T is controlled by mass vaccination
 E F cannot be eliminated because there is an animal reservoir
- 55** Live attenuated virus vaccines
- A F are produced by inactivating virus particles using chemical or physical treatments
 B T are used to immunise against measles
 C F are used to immunise against hepatitis B
 D F are used solely to protect the vaccinee from infection
 E F do not induce a cytotoxic T-cell response

56 Epstein Barr virus is associated with

- A T glandular fever
- B T nasopharyngeal carcinoma
- C F gastric carcinoma
- D T Burkitt's lymphoma
- E F the common cold

57 The following are single stranded RNA viruses

- A F smallpox
- B F Herpes simplex
- C F adenovirus
- D F parvovirus
- E F human papilloma virus

58 Hepatitis B virus

- A T is transmitted sexually
- B F is the cause of Burkitt's lymphoma
- C T is the cause of hepatocellular carcinoma
- D T causes immune complex disease
- E F has an animal reservoir

59 Which of the following viruses are associated with tumours?

- A F cytomegalovirus
- B F rubella
- C T human papilloma virus
- D T Marek's disease virus
- E T hepatitis C

60 Which viruses contain reverse transcriptase?

- A F Herpes viruses
- B T Hepatitis B virus
- C F Rotaviruses
- D T Human immunodeficiency virus
- E F Parvovirus

61 Match the following pairs

- A F Myxomatosis virus
- B J Parvovirus
- C I Poliovirus
- D H Rotavirus
- E G Influenza virus

- Double-stranded DNA F
- Negative single-stranded RNA G
- Double-stranded RNA H
- Positive single-stranded RNA I
- Single-stranded DNA J

62 The following are enveloped viruses

- A T Rubella
- B F Human papilloma virus
- C T Feline leukaemia virus
- D T Mumps
- E T Influenza virus

63 Which viruses cause hepatitis?

- A T Hepatitis C
- B T Epstein Barr virus
- C T Yellow fever
- D T Cytomegalovirus
- E F Coxsackie virus

64 The following viruses have a helical capsid

- A F Rabies virus
- B F Rous sarcoma virus
- C F Rubella
- D F Poliovirus
- E F Foot and mouth disease virus

65 Match the following pairs

- | | | | | |
|---|---|---|------------------------|---|
| A | G | Helical capsid | Kaposi's sarcoma | F |
| B | I | Latent virus | Measles virus | G |
| C | F | Human herpes virus 8 | Hepatitis B | H |
| D | H | Double-stranded DNA virus with RNA intermediate | Varicella Zoster virus | I |
| E | J | Down-regulation of Class I MHC expression | Adenovirus | J |

66 The following viruses are acquired by the respiratory route

- A T Rhinovirus
- B T Respiratory syncytial virus
- C F Poliomyelitis
- D T Measles
- E T Varicella Zoster

67 The following viruses cause persistent infection

- A F Poliovirus
- B T Hepatitis B
- C T Human immunodeficiency virus
- D F Herpes simplex virus
- E T Human papilloma virus

68 The following diseases are caused by prions

- A F Alzheimer's disease
- B T Kuru
- C T Creutzfeldt Jacob disease
- D T Familial fatal insomnia
- E F Aleutian disease of Mink

69 Prions are inactivated by the following

- A F heating to 90° C for 30 minutes
- B T heating to 145° C for 18 minutes
- C F DNase treatment
- D F RNase treatment
- E T phenol

70 PrP^c

- A T is a 254 amino acid protein
 - B T is encoded by a cellular gene
 - C T is converted by PrP^{Sc} to a protease-resistant form
 - D F consists of 30% α helix and 43% β sheet
 - E T is resistant to short-wave ultraviolet and to ionizing radiation
- D. PrP^c has no β sheet; PrP^{Sc} consists of 30% α helix and 43% β sheet

71 True or false?

- A F Subacute sclerosing panencephalitis occurs in 10% of cases of measles
- B T Dengue haemorrhagic fever is due mainly to immune-mediated damage of virus infected cells
- C T HIV and other lentiviruses evade immune recognition by infecting monocytes
- D F EBV infection cause at least 4 human tumours: Burkitt's and B cell lymphoma, nasopharyngeal & liver carcinoma
- E T Retroviruses have been used as vectors for gene therapy

72 Match the following pairs

- | | | | | |
|----------|----------|-----------------|--|----------|
| A | I | Adenoviruses | circular double stranded DNA genome | F |
| B | F | Hepadnaviruses | genomes transcribed by cellular RNA polymerase | G |
| C | H | Paramyxoviruses | helical capsid symmetry | H |
| D | J | Poxviruses | downregulation of MHC class I | I |
| E | G | Retroviruses | replicate in the cytoplasm of infected cells | J |

73 True or false?

- | | | |
|----------|----------|--|
| A | T | Most disease states are multifactorial |
| B | T | Inflammation fever, headaches, skin rashes are frequently due to immunopathology |
| C | T | The vast majority of viral infections do not result in disease |
| D | T | All human herpes viruses are highly cytopathic |
| E | F | Viral nucleic acids act as as toxins and poison cells |

74 Match the following organisms with their vaccine

- | | | | | |
|----------|----------|---------------------------------|--------------------------------|----------|
| A | J | Pseudorabies virus (pig herpes) | killed virus | F |
| B | H | Hepatitis B | live attenuated virus | G |
| C | G | Canine distemper | genetically engineered subunit | H |
| D | I | Marek's disease | related live virus | I |
| E | F | Influenza A | engineered deletion mutant | J |

75 Match the following viruses with their mode of transmission

- | | | | | |
|----------|----------|-----------------|-------------------|----------|
| A | H | Myxomatosis | sexual | F |
| B | I | Cytomegalovirus | faecal-oral | G |
| C | F | Hepatitis B | insect vector | H |
| D | J | Marek's disease | salivary transfer | I |
| E | G | Hepatitis A | dust inhalation | J |

76 The following are cytolysins

- | | | |
|----------|----------|---------------------------------------|
| A | F | Cholera toxin |
| B | T | Clostridial α toxin |
| C | T | <i>Strep. pneumoniae</i> pneumolysin |
| D | T | <i>Strep. pyogenes</i> streptolysin O |
| E | F | <i>E. coli</i> enterotoxin |

77 The following are Gram negative rods

- | | | |
|----------|----------|------------------------------------|
| A | T | <i>Escherichia coli</i> |
| B | F | <i>Corynebacterium diphtheriae</i> |
| C | T | <i>Pseudomonas vulgaris</i> |
| D | T | <i>Bordetella pertussis</i> |
| E | F | <i>Neisseria meningitidis</i> |

78 Bacterial exotoxins

- | | | |
|----------|----------|---|
| A | T | are actively secreted by the bacterial cell |
| B | T | are produced by Gram positive and Gram negative bacteria |
| C | T | are proteins |
| D | F | have similar effects on human cells regardless of bacterial species |
| E | F | are components of lipopolysaccharide |

79 Species of *Salmonella*

- | | | |
|----------|----------|--|
| A | T | cause food-borne infections |
| B | F | commonly exert their effects through exotoxins |
| C | T | invade intestinal cells |
| D | T | can resist killing by macrophages |
| E | F | cause peptic ulcers |

- 80** Bacterial virulence genes
- A F are constitutively expressed
 - B T may be grouped on 'pathogenicity islands'
 - C T may be carried on plasmids
 - D T are involved in the establishment and maintenance of infections
 - E F evolve less rapidly than other genes

81 The following bacteria regularly cause meningitis

- A F *Staph. aureus*
- B T *E. coli*
- C T *Strep. pneumoniae*
- D F *Bordetella pertussis*
- E F *Neisseria gonorrhoeae*

82 Match the following pairs

- | | | | | |
|---|---|-------------------------------|-----------------------|---|
| A | G | <i>Helicobacter pylori</i> | Acute bronchitis | F |
| B | H | <i>Staphylococcus aureus</i> | Peptic ulceration | G |
| C | I | <i>Shigella sonnei</i> | Boils | H |
| D | K | <i>Streptococcus pyogenes</i> | Dysentery | I |
| E | F | <i>Haemophilus influenzae</i> | Acute rheumatic fever | J |

83 The following are important nosocomial infections in hospitals in the UK

- A F *Corynebacterium diphtheriae*
- B T *Clostridium difficile*
- C T *Staphylococcus aureus*
- D F *Streptococcus pyogenes*
- E T *Enterococcus faecalis*

84 Match the following pairs

- | | | | | |
|---|---|-----------------------------------|-----------------------------------|---|
| A | H | <i>Mycobacterium tuberculosis</i> | Lung infection in cystic fibrosis | F |
| B | J | <i>Chlamydia trachomatis</i> | Haemolytic-uraemic syndrome | G |
| C | I | <i>Clostridium perfringens</i> | Granulomatous inflammation | H |
| D | F | <i>Pseudomonas aeruginosa</i> | Food poisoning | I |
| E | G | <i>Escherichia coli</i> | Non-specific urethritis | J |

85 Lobar pneumonia

- A T Resolves by crisis after six or seven days
- B F Is usually caused by *Haemophilus influenzae*
- C F Is the result of blood borne infection
- D T May be associated with alcoholism
- E F Is a common complication of chronic bronchitis (smoking related)

86 Match the antibiotics with their target

- | | | | | |
|---|---|-----------------|----------------------------|---|
| A | F | Cephalosporins | Peptidoglycan crosslinking | F |
| B | H | Chloramphenicol | mRNA/ribosome interaction | G |
| C | I | Rifampicin | Peptidyl transferase | H |
| D | J | Trimethoprim | DNA dependent RNAP | I |
| E | G | Aminoglycosides | Dihydrofolate reductase | J |

87 Virulence factors in *H. pylori* infection

- A F IgA peptidase
- B T Vacuolating cytotoxin
- C T Endotoxin
- D F Enterotoxin
- E T Urease

88 Virulence factors in *Vibrio cholerae* infection

- A F invasins
- B F endotoxin
- C F A/B exotoxin which ribosylates EF2
- D F IgA peptidase
- E F capsule

89 Which bacteria can survive inside phagocytes?

- A F *Strep. pneumoniae*
- B T *Mycobacterium tuberculosis*
- C T *Yersinia enterocolitica*
- D T *Salmonella typhi*
- E F *Shigella flexneri*

90 Match the following pairs

- | | | | | |
|---|---|----------------|---|---|
| A | I | Transduction | Synthesis of RNA from DNA | F |
| B | J | Transformation | Synthesis of protein from RNA | G |
| C | G | Translation | Sequences of DNA containing virulence genes | H |
| D | H | Transposon | Transfer of DNA by bacteriophages | I |
| E | F | Transcription | Natural uptake of DNA by bacteria | J |

91 Survival of the host from *Salmonella typhi* infection (typhoid) depends upon:

- A F IgA
- B F Complement
- C T Th1 lymphocytes
- D F Th2 lymphocytes
- E F IgM

92 Virulence factors in *Shigella* infection include:

- A T Receptor-mediated endocytosis
- B T Injection of invasion proteins into enterocytes
- C F Inhibition of phagosome
- D T Resistance to gastric acid
- E F Formation of spores

93 Match the following diseases with their vaccine

- | | | | | |
|---|---|------------------------|---------------------------------|---|
| A | H | Diphtheria | Killed bacteria | F |
| B | I | Pneumococcal pneumonia | Attenuated bacteria | G |
| C | G | Tuberculosis | Toxoid | H |
| D | F | Cholera | Purified polysaccharide | I |
| E | J | Typhoid | Genetically attenuated bacteria | J |

94 Traveller's diarrhoea

- A F Is usually accompanied by marked mucosal inflammation and ulceration of the intestine [E raises]
- B F Is caused by infection with *Salmonella typhimurium*
- C T Is usually transmitted by contaminated water supplies
- D F May cause death from electrolyte imbalance and dehydration
- E F Is caused by a toxin which reduces adenylate cyclase activity

95 *Chlamydia trachomatis* is a cause of

- A T Female infertility [E *C. pneumoniae*]
- B F Female urethritis
- C T Male urethritis
- D T Neonatal blindness
- E F Pneumonia

96 Virulence factors in *Streptococcus pyogenes* infection

- A T Hyaluronic acid capsule
- B T Superantigen
- C T C5a peptidase
- D T M protein
- E T Lipotechoic acid

97 Match the following mechanisms of access of bacteria to cells

- A G Sip proteins (chromosomal) cause ruffling of enterocyte membrane *Shigella sonnei* **F**
- B I Opsonisation and phagocytosis by macrophages *Salmonella typhi* **G**
- C F Secretion of Ipa proteins (plasmid) which cause actin changes in M cell *Listeria monocytogenes* **H**
- D J Invasin binds to β 1 chain integrin on enterocyte *Legionella pneumophila* **I**
- E H Surface internalin protein binds to E-cadherin on enterocyte membrane *Yersinia pseudotuberculosis* **J**

98 Statements about A/B exotoxins

- A T Cholera toxin targets adenylate cyclase.
- B T Tetanus toxin is generated during anaerobic growth and then ingested **Tetanus**
- C F Botulinum toxin cleaves synaptobrevin blocking release of neuro inhibitors **Phage encoded**
- D F Diphtheria toxin is plasmid encoded **Cytolysins not A/B toxins**
- E F May cause lysis of cell membranes

99 Match the following virulence factors with their organism

- A H C5a peptidase *Streptococcus pneumoniae* **F**
- B J Fc binding *Neisseria gonorrhoeae* **G**
- C F Polysaccharide capsule *Streptococcus pyogenes* **H**
- D I Sialic acid capsule *Neisseria meningitidis* **I**
- E G Variable expression of pili *Staphylococcus aureus* **J**

100 Which of the following statements about physical and chemical defences is true?

- A T Lysozyme has potent antibacterial activities **Peptidoglycan**
- B T The skin is an effective barrier to microbial entry into deeper tissues
- C T The high pH of the vagina inhibits microbial growth
- D F The protective effects of mucus are limited to respiratory tract
- E T The sebaceous glands of the skin produce antimicrobial fatty acids

101 Match the subtypes of *E. coli*

- A F Non-invasive, expression of heat-labile enterotoxin **EPEC (enteropathogenic)**
- B J Highly invasive with fever & bloody diarrhoea **EAggEC (enteroaggregative)**
- C I Shiga toxin, haemolytic uraemic syndrome **EHEC (enterohaemorrhagic)**
- D G Accumulation of bacteria in a biofilm causing persistent diarrhoea **EIEC (enteroinvasive)**
- E H Infantile diarrhoea in tropical countries, pedestal formation **ETEC (enterotoxigenic)**

102 Normal flora

- A T Include both bacteria and fungi
- B F Endogenous flora rarely cause opportunist infections
- C F Infants are born with an establish normal flora
- D T Normal flora exhibit tropisms for particular body sites
- E F Normal flora suppress growth of pathogens because of superior competition for nutrients

103 The following are zoonotic infections

- A F Lyme disease is caused by *Borrelia burgdorferi* spread by flea bite **Tick, rodents, deer**
- B T *Yersinia enterocolitica* is acquired by ingestion of infected milk
- C T Salmonellosis is acquired by ingestion of infected food
- D T Rocky mountain spotted fever (*R. rickettsii*) has a reservoir in wild rodents
- E F Anthrax is caused by infection of abrasions by a Gram negative rod (*B. anthracis*)

104 Antibiotic resistance in bacteria

- A F Is always caused by degradation of the drug by bacteria
- B F Is found only in Gram positive bacteria
- C T Can be transferred between bacteria by conjugation
- D F Is only encoded by plasmids
- E F Is not transferred between bacterial species

105 Virulence factors in *Neisseria gonorrhoeae*

- A T IgA protease
- B F Polysaccharide capsule
- C T Highly variable cell surface proteins
- D T Adhesion pili
- E T Prone to transformation

106 Benign neoplasms

- A T may form polyps in the rectum
- B T contain dysplastic cells
- C T may arise in mesenchymal and epithelial tissues
- D F do not progress to malignancy
- E F include sarcomas

107 The following are true

- A T activation of *ras* oncogene usually occurs by point mutation
- B F *myc* oncogene products are located predominantly in the cell membrane
- C T many proto-oncogenes code for tyrosine kinases
- D F all known cellular proto-oncogenes have retroviral homologues
- E T some oncogenes encode cell cycle regulatory proteins such as cyclins

108 Benign rather than malignant tumours are characterised by the following features

- A T increased numbers of mitotic figures
- B F microinvasion
- C T nuclear pleomorphism
- D T well-ordered maturation
- E F ability to metastasize

109 The following mechanisms may cause a qualitative change in the expression of a gene

- A F gene amplification
- B T chromosomal rearrangement
- C T point mutation
- D F promotional insertion
- E F gene deletion

110 The Epstein-Barr virus has a proven positive association with the following conditions

- A F carcinoma of the cervix
- B T infectious mononucleosis
- C F human T cell lymphoma
- D T Burkitt's lymphoma
- E T Undifferentiated nasopharyngeal carcinoma

111 In cell culture, features which characterise transformed cells include

- A T loss of contact inhibition of growth
- B T loss of density inhibition of growth
- C T production of plasminogen activator
- D F diploid chromosomal content
- E F limited life-span of the culture

112 Match the following pairs

A	J	integration of the virus in the vicinity of proto-oncogenes	Epstein-Barr Virus	F
B	G	virus-induced injury to cells followed by extensive regeneration	Hepatitis B Virus	G
C	I	the ability of viral genes to inactivate <i>Rb</i> and <i>p53</i> expression	Human T-cell Lymphoma Virus 1	H
D	H	transactivation of genes encoding cell cycle competence factors in T cells	Human papilloma Virus	I
E	F	8/14 chromosomal translocation	Feline leukaemia virus	J

113 Which of the following statements are true?

A	T	proto-oncogenes can be activated by chromosomal translocation	C/D reversed
B	T	most cancers are the consequence of multiple mutations	
C	F	tumour promoters are mutagenic	
D	F	tumour initiators induce proliferation	
E	T	inability to repair DNA predisposes to the development of cancer	

114 A lymph node biopsy from a 43 year old man with lymph node enlargement shows a malignant tumour of lymphoid cells. Staining shows nuclei positive for *BCL2*. What is the likely mechanism for this lymphoma?

A	F	Increased tyrosine kinase activity
B	T	Lack of apoptosis
C	F	Gene amplifications
D	F	Reduced DNA repair
E	F	Loss of cell cycle inhibition

115 By what mechanism does Human Papilloma Virus cause transformation of human cervical epithelium?

A	T	inactivation of <i>p53</i>
B	F	activation of <i>pRb</i>
C	F	inactivation of <i>Mdm2</i>
D	F	activation of <i>p16</i>
E	F	inactivation of <i>p21</i>

116 Which of the following is true of *p53*?

A	T	an inherited mutation is the basis of Li Fraumeni syndrome	D: inactivated when bound to Mdm2; E: binds to
B	F	an inherited mutation is the basis of retinoblastoma	E6, Rb binds to E7
C	T	is the site of the commonest mutation in human cancers	
D	F	is activated by binding to Mdm2	
E	F	binds to and is inactivated by the early gene product E7 in HPV infection	

117 Which of the following are benign neoplasms?

A	F	hepatoma
B	F	melanoma
C	F	sarcoma
D	T	adenoma
E	T	papilloma

118 The following are tumour suppressor genes

A	T	<i>Rb</i>
B	F	<i>ras</i>
C	F	<i>myc</i>
D	T	<i>BRCA1</i>
E	T	<i>APC</i>

119 A family history of colon carcinoma is elicited from a 32 year old man. He has three colonic polyps, one of which is found to have a focus of adenocarcinoma. Inheritance of which genes is likely to be involved?

A	F	growth factor receptors
B	F	growth factors
C	T	DNA mismatch repair
D	F	cyclins
E	F	inhibitors of apoptosis

- 120** Proto-oncogenes may be rendered overactive by the following mechanisms.
- A T chromosomal translocation
 B T gene amplification
 C T point mutation
 D F nondisjunction (chromosomal loss)
 E T chromosomal inversion
- C: point mutation may lead to a hyperactive protein made in normal amounts
- 121** The following are carcinogenic
- A F infrared radiation
 B T ultraviolet radiation
 C F house dust
 D F nickel
 E T the anticancer drug chlorambucil
- 122** The following molecules are important activators of apoptosis>
- A T caspase 3
 B T cytochrome C
 C F E cadherin
 D F heat shock proteins
 E T fas
- D: help cells survive
- 123** The following are true in human carcinogenesis.
- A T translocations involving *c-myc* are common in Burkitt's lymphoma
 B T *Ki-ras* activation is usually effected by point mutation
 C T *p53* inactivation is frequently associated with aneuploidy
 D F errors in mismatch repair are characteristic of aneuploid tumours
 E T both alleles of *p53* must be altered to produce a phenotype
- 124** True or false
- A F Hyperplasia is an increase in size due to overall increase in cell size
 B T Metaplasia is a change in epithelial cell type in response to altered environment
 C Dysplasia
 D Neoplasia
 E Anaplasia
- 125** True or false?
- A T BCL2 protein blocks release of cytochrome C from mitochondria
 B T mdm2 binds p53 and targets it for destruction
 C F phosphorylated Rb protein binds E2F
 D
 E
- 126** Match the following environmental carcinogens with the human tumours with which they have been linked
- A I Asbestos Lung cancer F
 B G Aflatoxin B1 Liver cancer G
 C J Arsenic Bladder cancer H
 D H Aromatic azo dyes Mesothelioma I
 E F Polycyclic aromatic hydrocarbons Skin cancer J
- 127** Cerebral infarction may follow
- A F pulmonary embolism
 B T internal carotid artery thrombosis
 C T myocardial infarction
 D T left ventricular failure
 E T protein C deficiency

128 The following are major risk factors for the development of atherosclerosis:

- A T cigarette smoking
- B T diabetes mellitus
- C F hypocholesterolaemia
- D T hypertension
- E F female sex

129 Fatty streaks in the aorta

- A F contain lipid which is predominantly extracellular
- B T often appear in the first year of life
- C F contain a proliferation of smooth muscle cells
- D T are rare in Third World populations
- E F are usually greater than 10 mm in diameter

130 Predisposing factors for intravascular thrombosis

- A T myocardial infarction
- B F factor VIII deficiency
- C T bed rest
- D T thrombophilia
- E T heart failure

131 The following conditions may be complicated by hypertension

- A F hypothyroidism
- B F Addison's disease (hypoadrenalism)
- C T phaeochromocytoma
- D T renal artery stenosis
- E F heart failure

132 The following may be complications of myocardial infarction

- A T cerebral infarction
- B T haematuria
- C T myocardial rupture
- D T ventricular fibrillation
- E F hypertension

133 In the development of atheromatous plaques

- A F lipid accumulates in the media
- B T smooth muscle proliferation occurs
- C T endothelial injury may be an important initial event
- D T there is accumulation of connective tissue matrix
- E F calcification rarely occurs

134 The following may cause right heart failure

- A T essential hypertension
- B T chronic lung disease
- C T left heart failure
- D F atherosclerosis
- E T ventricular septal defect