

7) In the recognition phase of the immune response, the body must determine that 7) _____
A) a microorganism is different than what is usually present in the normal flora.
B) the antigen encountered is "non-self."
C) a substance is capable of causing harm.
D) a microorganism is capable of causing actual disease.

Answer: B

8) The first description of inflammation came from ancient Rome and included all the components listed below *except* 8) _____
A) swelling. B) pain. C) pus. D) heat. E) redness.

Answer: C

9) In humans, after the recognition phase of the immune reaction, the response phase consists of 9) _____
A) activation of the adaptive, specific immune components.
B) activation of the innate, nonspecific immune components.
C) both A and B.
D) Cannot tell from this information. It depends on the immunizing agent as to whether A or B is used.

Answer: C

10) The English physician who vaccinated a boy with cowpox to induce immunity to smallpox was 10) _____
A) Robert Koch.
B) Peter Medawar.
C) Louis Pasteur.
D) Edward Jenner.
E) Celsus Galen.

Answer: D

11) Simian immunodeficiency virus (SIV) causes a disease in monkeys similar to AIDS in humans caused by human immunodeficiency virus (HIV). In theory, why would SIV be a candidate organism to be used in a human AIDS vaccine? 11) _____
A) SIV could stimulate a humoral immune response against HIV.
B) SIV could stimulate a cellular immune reaction against HIV.
C) Monkey viruses cause disease in humans.
D) Monkey viruses cannot cause disease in humans.
E) SIV could stimulate an immune response against SIV that cross-reacts with HIV.

Answer: E

12) The person who won the Nobel prize in 1908 for his work in demonstrating phagocytosis by white blood cells is 12) _____
A) Paul Erlich.
B) Elie Metchnikoff.
C) Edward Jenner.
D) Robert Koch.
E) Louis Pasteur.

Answer: B

- 13) The first true vaccine given to a human containing the specific pathogen to which immunity was desired was 13) _____
- A) chicken fowl cholera.
 - B) anthrax.
 - C) tetanus.
 - D) rabies.
 - E) diphtheria.

Answer: D

- 14) The first research identifying the activity of antibodies demonstrated that 14) _____
- A) the immunity could be transferred from one animal to another using the serum component of blood.
 - B) the immunity was produced by B lymphocytes.
 - C) the immunity could be transferred from one animal to another using the cellular component of blood.
 - D) the immunity was produced by T lymphocytes.

Answer: A

- 15) Hyperacute rejection of a solid organ transplant occurs if there is a mismatch of 15) _____
- A) HLA types.
 - B) MHC types.
 - C) ABO blood types.
 - D) tissue types.

Answer: C

- 16) The first successful human kidney transplant was in 1954. Why was it successful? 16) _____
- A) The recipient and the donor had identical tissue types.
 - B) The recipient and the donor were identical twins.
 - C) The recipient and the donor had identical ABO blood groups.
 - D) All of the above.

Answer: D

- 17) How were the cells responsible for cell-mediated immunity first identified as T lymphocytes? 17) _____
- A) Metchnikoff demonstrated phagocytosis of fungal spores by *Daphnia* blood cells.
 - B) Ehrlich demonstrated it using cells isolated from the Bursa of Fabricius in chickens.
 - C) Glick demonstrated it using cells isolated from chicken thymus.
 - D) Landsteiner demonstrated it showing incompatibility between sera of people with different blood groups.

Answer: C

- 18) In early studies of antibodies, which properties were recognized? 18) _____
- A) Ability to cause precipitation reactions.
 - B) Ability to agglutinate particles.
 - C) Antitoxin effects.
 - D) All of the above.

Answer: D

- 19) The selective/clonal selection theory of immune response ultimately proved to be correct, but the instructional theory, while incorrect, seemed logical because 19) _____
- A) if thousands of preformed antibodies were present to antigens that are never encountered, this is excessively wasteful and poor use of the body's resources.
 - B) the immune system was shown to be capable of such a wide variety of substances that it seemed impossible that such a high number of different possibilities would be preformed without any prior exposure.
 - C) if one gene produces one antibody, then it didn't seem that humans had enough DNA to produce thousands of possible antibodies.
 - D) it seemed reasonable that a cell would be "instructed" to react to a specific antigen only when it was encountered.
 - E) All of the above.

Answer: E

- 20) Which breakthrough below is mostly responsible for supporting the clonal selection theory of the immune response? 20) _____
- A) Discovery of the T cell receptor
 - B) Discovery of the genes encoding for different portions of antibody molecule
 - C) Discovery of how monoclonal antibodies can be produced artificially
 - D) Discovery of the chain structure of antibodies

Answer: B

- 21) What is a monoclonal antibody? 21) _____
- A) An antibody produced by a mature, stimulated B cell.
 - B) An antibody produced in response to an antigen with a repeating epitope.
 - C) An antibody produced by a hybridoma cell.
 - D) An antibody produced in response to an antigen with only one epitope.
 - E) An antibody produced by an immature B cell.

Answer: C

- 22) How can hybridoma cells be kept alive for extended periods of time? (Check as many as apply.) 22) _____
- A) They can't. Once removed from the host animal the cells die quickly.
 - B) Growing them at refrigerator temperature.
 - C) Placing them into a susceptible host where they will form a tumor.
 - D) Using the appropriate cell culture techniques.
 - E) Growing them in a field of ionizing radiation.

Answer: C, D

- 23) Which of the cell types listed below needs to have antigen processed before it can be recognized? 23) _____
- A) B lymphocytes
 - B) Neutrophils
 - C) T lymphocytes
 - D) Eosinophils
 - E) Monocytes/macrophages

Answer: C

- 24) Which of the following is *true* regarding immunoglobulins? 24) _____
A) Immunoglobulins exist preformed on the surface of B lymphocytes.
B) They are the major mediator of specific humoral immunity.
C) Immunoglobulins are also called antibodies.
D) All of the above.

Answer: D

- 25) T lymphocytes recognized foreign antigen and discriminate self from non-self using 25) _____
A) the MHC complex.
B) the T cell antigen receptor.
C) ABO antigens.
D) A and B.
E) A and C.

Answer: D

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 26) _____ are responsible for cell-mediated immunity while _____ are responsible for 26) _____
humoral immunity.

Answer: T lymphocytes/B lymphocytes or antibodies

- 27) The study of organ transplantation was vastly improved when the cause of different tissue 27) _____
types, the _____, was discovered by Snell, Dausett, and Benacerraf.

Answer: major histocompatibility complex

- 28) The person who discovered the ABO human blood groups is _____. 28) _____

Answer: Karl Landsteiner.

- 29) Rejection of transplanted organs can be minimized if _____ testing is done to assess 29) _____
tissue compatibility between donors and recipients.

Answer: HLA or histocompatibility testing

- 30) _____ is when one's own tissues are attacked by one's own immune system. 30) _____

Answer: Autoimmunity

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

- 31) The human immune system never responds against human tissues. 31) _____

Answer: True False

- 32) The adaptive arm of the immune system is capable of memory. 32) _____

Answer: True False

- 33) In terms of organism survival, cellular immunity is more important than humoral immunity. 33) _____

Answer: True False

- 34) Antibodies can only be formed against microorganisms or products they produce, such as toxins. 34) _____

Answer: True False

- 35) When serum is divided into fractions by an electrical field, antibodies migrate in the beta fraction. 35) _____
 Answer: True False
- 36) It is believed that the phagocytic cells observed by Metchnikoff were macrophages and polymorphonuclear neutrophils. 36) _____
 Answer: True False
- 37) Louis Pasteur accidentally discovered vaccination using attenuated microorganisms by injecting an old bacterial culture into chickens. 37) _____
 Answer: True False
- 38) Paul Erlich was the first to propose that white blood cells had some structure that could bind to antigens similar to a "lock and key." 38) _____
 Answer: True False
- 39) B lymphocytes can react against unprocessed antigen. 39) _____
 Answer: True False
- 40) T cells recognize antigens by virtue their corresponding receptors on their cell surfaces. 40) _____
 Answer: True False

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

- 41) What was variolation? 41) _____
 Answer: Variolation was a crude vaccination attempt in which crusts from smallpox scabs were introduced into skin scratches or inhaled to try to induce immunity to smallpox. Although it worked in some cases, it was dangerous because if excessive, live smallpox virus was introduced, disease resulted.
- 42) Explain why Jenner was successful in making a boy immune from smallpox by vaccinating him with cowpox. 42) _____
 Answer: Cowpox is a milder disease than smallpox, but it still induces T cell response (cellular immunity) and B cell response (antibodies). The two viruses contain some similar antigens such that the specific immune response against cowpox cross-reacts with smallpox antigens and gives the host immunity to small pox.
- 43) Define attenuation and explain why attenuated organisms are useful for vaccines. 43) _____
 Answer: An organism that is old or otherwise weakened such that it cannot cause disease is said to be attenuated. It should still possess many or most of its antigens that could initiate an immune reaction. Therefore, if the weakened organism were injected into a host, the immune reaction should be specific against the appropriate antigens but the host should not get sick.

44) Briefly outline the clonal selection theory of adaptive immunity.

44) _____

Answer: Immature uncommitted lymphocytes have the genetic material to respond to a large variety of antigens. During the maturation process, lymphocytes differentiate and become committed to a particular antigen. At all times, there are a small number of mature lymphocytes developed that are capable of responding to every possible antigen that the host can genetically react against. When a particular antigen is encountered, the lymphocyte clone(s) capable of responding to that particular antigen is (are) "selected" or stimulated by the antigen to multiply rapidly and activate an immune response.

45) Explain what a hybridoma cell is and what it does.

45) _____

Answer: A hybridoma cell is a fusion of a malignant myeloma cell and an immunized lymphocyte. The malignant nature of the myeloma cell confers upon the hybridoma almost limitless life in cell culture, while the immunized lymphocyte confers the ability to produce an antibody of a particular type. The hybridoma cell, therefore, produces only one antibody type (monoclonal) in massive amounts artificially in cell culture.