

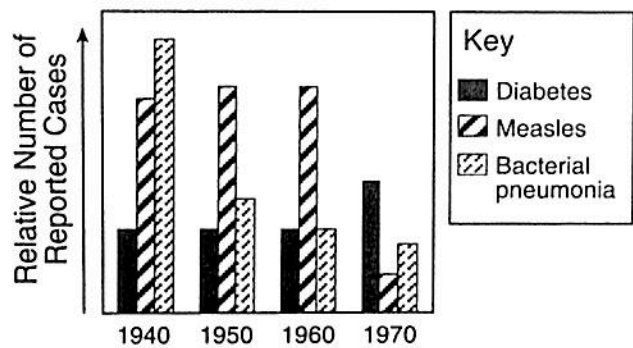
Name: _____

Immune System Review Packet

- To increase chances for a successful organ transplant, the person receiving the organ should be given special medications. The purpose of these medications is to
 - increase the immune response in the person receiving the transplant
 - decrease the immune response in the person receiving the transplant
 - decrease mutations in the person receiving the transplant
 - increase mutations in the person receiving the transplant
- Which statement best describes how a vaccination can help protect the body against disease?
 - Vaccines directly kill the pathogen that causes the disease.
 - Vaccines act as a medicine that cures the disease.
 - Vaccines cause the production of specific molecules that will react with and destroy certain microbes.
 - Vaccines contain white blood cells that engulf harmful germs and prevent them from spreading throughout the body.
- Vaccinations help prepare the body to fight invasions of a specific pathogen by
 - inhibiting antigen production
 - stimulating antibody production
 - inhibiting white blood cell production
 - stimulating red blood cell production
- The purpose of introducing weakened microbes into the body of an organism is to stimulate the
 - production of living microbes that will protect the organism from future attacks
 - production of antigens that will prevent infections from occurring
 - immune system to react and prepare the organism to fight future invasions by these microbes
 - replication of genes that direct the synthesis of hormones that regulate the number of microbes
- The use of a vaccine to stimulate the immune system to act against a specific pathogen is valuable in maintaining homeostasis because
 - once the body produces chemicals to combat one type of virus, it can more easily make antibiotics
 - the body can digest the weakened microbes and use them as food
 - the body will be able to fight invasions by the same type of microbe in the future
 - the more the immune system is challenged, the better it performs
- State *one* specific way white blood cells help to protect the human body from pathogens.

Base your answers to questions 7 and 8 on the graph below and on your knowledge of biology.

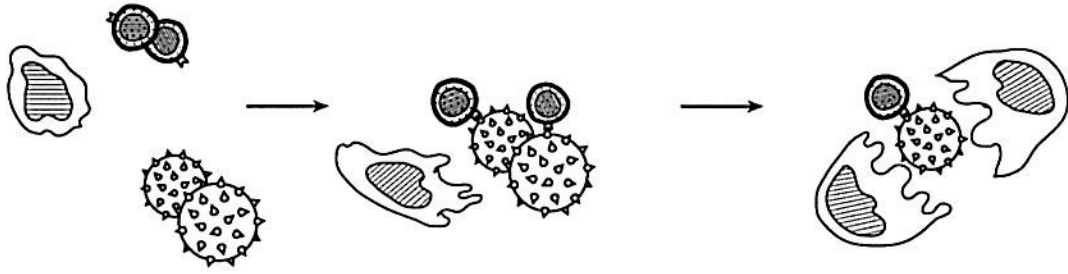
Incidence of Three Human Diseases in Four Different Years



- Which statement provides the best possible reason for the decrease in number of cases of bacterial pneumonia from 1940 to 1970?
 - As a result of genetic engineering, humans became immune to the bacteria.
 - Antibiotics were made available for the treatment of bacterial infections.
 - The bacteria did not respond to medical treatments.
 - As a result of sexual reproduction, the bacteria evolved into a harmless form.
- Which statement best explains a change in the incidence of disease in 1970?
 - Children were vaccinated against measles.
 - New drugs cured diabetes.
 - The bacteria that cause pneumonia developed a resistance to drugs.
 - New technology helped to reduce the incidence of all three diseases.
- Which statement best describes what will most likely happen when an individual receives a vaccination containing a weakened pathogen?
 - The ability to fight disease will increase due to antibodies received from the pathogen.
 - The ability to fight disease caused by the pathogen will increase due to antibody production.
 - The ability to produce antibodies will decrease after the vaccination.
 - The ability to resist most types of diseases will increase.

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10. The diagram below represents what can happen when homeostasis in an organism is threatened.



Which statement provides a possible explanation for these events?

- 1) Antibiotics break down harmful substances by the process of digestion.
 - 2) Some specialized cells mark and other cells engulf microbes during immune reactions.
 - 3) Embryonic development of essential organs occurs during pregnancy.
 - 4) Cloning removes abnormal cells produced during differentiation.
-
11. A part of the Hepatitis B virus is synthesized in the laboratory. This viral particle can be identified by the immune system as a foreign material but the viral particle is not capable of causing disease. Immediately after this viral particle is injected into a human it
- 1) stimulates the production of enzymes that are able to digest the Hepatitis B virus
 - 2) triggers the formation of antibodies that protect against the Hepatitis B virus
 - 3) synthesizes specific hormones that provide immunity against the Hepatitis B virus
 - 4) breaks down key receptor molecules so that the Hepatitis B virus can enter body cells
12. Which activity would stimulate the human immune system to provide protection against an invasion by a microbe?
- 1) receiving antibiotic injections after surgery
 - 2) choosing a well-balanced diet and following it throughout life
 - 3) being vaccinated against chicken pox
 - 4) receiving hormones contained in mother's milk while nursing
13. Blood can be tested to determine the presence of the virus associated with the development of AIDS. This blood test is used directly for
- 1) cure
 - 2) treatment
 - 3) diagnosis
 - 4) prevention
14. Many vaccinations stimulate the immune system by exposing it to
- 1) antibodies
 - 2) enzymes
 - 3) mutated genes
 - 4) weakened microbes

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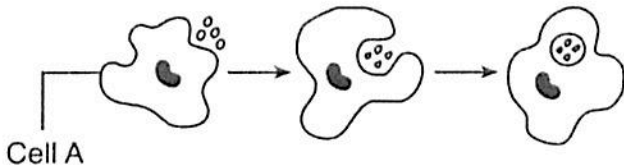
Base your answers to questions 15 and 16 on the table below and on your knowledge of biology.

Volunteer	Injected with Dead Chicken Pox Virus	Injected with Dead Mumps Virus	Injected with Distilled Water
A	X		
B		X	
C			X
D	X	X	

15. Volunteers *A*, *B*, and *D* underwent a procedure known as
 1) cloning 2) vaccination 3) electrophoresis 4) chromatography
16. None of these volunteers ever had chicken pox. After the injection, there would most likely be antibodies to chicken pox in the bloodstream of
 1) volunteers *A* and *D*, only 3) volunteer *C*
 2) volunteers *A*, *B*, and *D* 4) volunteer *D*, only
-
17. Which condition would most likely result in a human body being unable to defend itself against pathogens and cancerous cells?
 1) a genetic tendency toward a disorder such as diabetes
 2) a parasitic infestation of ringworm on the body
 3) the production of antibodies in response to an infection in the body
 4) the presence in the body of the virus that causes AIDS
18. Microbes that enter the body, causing disease, are known as
 1) pathogens 3) enzymes
 2) antibodies 4) hosts
19. People with AIDS are unable to fight multiple infections because the virus that causes AIDS
 1) weakens their immune systems
 2) produces antibodies in their blood
 3) attacks muscle tissue
 4) kills pathogens
20. Which disease damages the human immune system, leaving the body open to certain infectious agents?
 1) flu 3) chicken pox
 2) AIDS 4) pneumonia
21. Which substances may form in the human body due to invaders entering the blood?
 1) nutrients 3) antibodies
 2) vaccines 4) red blood cells
22. Which statement does *not* identify a characteristic of antibodies?
 1) They are produced by the body in response to the presence of foreign substances.
 2) They may be produced in response to an antigen.
 3) They are nonspecific, acting against any foreign substance in the body.
 4) They may be produced by white blood cells.
23. An injection containing weakened forms of a disease-causing organism will usually trigger
 1) absorption of histamines throughout the body
 2) secretion of antigens by lymphocytes
 3) production of temporary resistance to the disease
 4) production of antibodies providing active immunity
24. Newborn infants nursing from their mother receive milk containing antibodies against diseases to which the mother is immune. The infants, however, remain immune to those diseases for only a short time. This situation is an example of
 1) active immunity 3) an oral vaccine
 2) passive immunity 4) a phagocytic activity
25. Which statement best describes an immune response?
 1) It always produces antibiotics.
 2) It usually involves the recognition and destruction of pathogens.
 3) It stimulates asexual reproduction and resistance in pathogens.
 4) It releases red blood cells that destroy parasites.

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26. A person who is given an injection containing only antibodies would most likely develop
- 1) allergies
 - 2) sickle-cell anemia
 - 3) leukemia
 - 4) passive immunity
27. One similarity between cell receptors and antibodies is that both
- 1) are produced by nerve cells
 - 2) are highly specific in their actions
 - 3) slow the rates of chemical reactions
 - 4) are involved in digestion
28. People who receive organ transplants sometimes produce antibodies in response to foreign proteins present in the organ of the donor. This reaction is an example of
- 1) regeneration
 - 2) clotting
 - 3) rejection
 - 4) deamination
29. The diagram below represents an event that occurs in the blood.

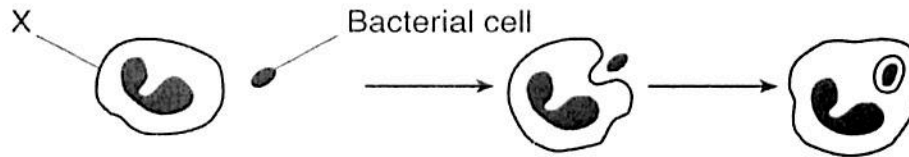


Which statement best describes this event?

- 1) Cell A is a white blood cell releasing antigens to destroy bacteria.
 - 2) Cell A is a cancer cell produced by the immune system and it is helping to prevent disease.
 - 3) Cell A is a white blood cell engulfing disease-causing organisms.
 - 4) Cell A is protecting bacteria so they can reproduce without being destroyed by predators.
30. Some human white blood cells help destroy pathogenic bacteria by
- 1) causing mutations in the bacteria
 - 2) engulfing and digesting the bacteria
 - 3) producing toxins that compete with bacterial toxins
 - 4) inserting part of their DNA into the bacterial cells
31. The immune system of humans may respond to chemicals on the surface of an invading organism by
- 1) releasing hormones that break down these chemicals
 - 2) synthesizing antibodies that mark these organisms to be destroyed
 - 3) secreting antibiotics that attach to these organisms
 - 4) altering a DNA sequence in these organisms

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32. The diagram below shows a cell in the human body engulfing a bacterial cell.



The cell labeled *X* is most likely a

- 1) red blood cell 2) white blood cell 3) liver cell 4) nerve cell
-

33. The list below includes three ways of controlling viral diseases in humans.

- Administering a vaccine containing a dead or weakened virus that stimulates the body to form antibodies against the virus
- Using chemotherapy (chemical agents) to kill viruses similar to the way in which sulfa drugs or antibiotics act against bacteria
- Relying on the action of interferon, which is produced in cells and protects the body against pathogenic viruses

Based on this information, which activity would contribute to the greatest protection against viruses?

- 1) producing a vaccine that is effective against interferon
- 2) developing a method to stimulate the production of interferon in cells
- 3) using interferon to treat a number of diseases caused by bacteria
- 4) synthesizing a sulfa drug that prevents the destruction of bacteria by viruses

34. Vaccinations play a major role in medicine today.

Explain the role of vaccines in the prevention of disease. Your answer must include at least:

a a description of the contents of a vaccine

b a description of how a vaccine protects the body from disease

c one specific reason certain vaccinations are required for students to attend public schools

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Base your answers to questions 35 through 38 on the information below.

Organ Transplants of the Future

While most people take good health for granted, thousands of others desperately need to replace a failing organ with one that is healthy. Most healthy organs come from people who agreed to donate them upon their death, although it is possible to remove some tissue and organs (such as kidneys and bone marrow) from living donors. Unfortunately, organs for transplant are in short supply. As of 1992, over 22,000 Americans were waiting for a transplant.

Although increasingly common, transplants are risky procedures. During the operation, veins and arteries must be blocked to prevent blood loss. This deprives parts of the body of oxygen and nutrients and may result in permanent damage. In addition, the body may recognize the transplanted organ as foreign and mount an immune response in which specialized white blood cells (T cells) attack the transplanted organ.

Drugs called immunosuppressants are given to transplant patients to prevent their immune system from rejecting the transplanted organ. However, these drugs weaken the ability of the body to fight disease and leave the patient less able to fight infection.

Scientists are exploring new technology for producing transplant tissues and organs. Unspecialized cells called stem cells are removed from the patient and then grown in a laboratory. Treating stem cells with the appropriate chemicals causes them to differentiate into various specialized tissues. In the future, scientists hope to develop chemical treatments that will cause stem cells to grow into complete organs needed for transplants. Transplants produced by this process would not be foreign material and, therefore, would not be rejected by the immune system of the patient.

35. Explain why a transplant might be dangerous to the health of a patient.
 36. State *one* reason that transplant patients might take an immunosuppressant drug.
 37. State *one specific disadvantage* of taking an immunosuppressant drug.
 38. Explain why doctors would consider using tissues or organs that have been grown from stem cells.
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Base your answers to questions 39 through 43 on the reading passage below and on your knowledge of biology.

Polio Vaccines

Polio is a disease that results in the destruction of nerve cells. The first vaccine against polio was developed by Jonas Salk and was made from polio viruses that were killed using the chemical formalin. In 1953, Salk tested the vaccine on himself, his wife, and his three sons. The vaccine was found to be safe and seemed to work. In 1954, more than 1.8 million schoolchildren were part of a trial to test the vaccine, and in April 1955, the vaccine was declared to be safe and effective.

Albert Sabin also developed a vaccine against polio. The vaccine developed by Sabin was made from weakened polio viruses. While the Salk vaccine had to be injected, the Sabin vaccine was administered orally on a cube of sugar.

Both vaccines were found to be effective in protecting people against polio because these vaccines stimulate immune responses involving antibody production. However, the Sabin vaccine is effective over a longer period of time and is easier to administer. Together, these vaccines have nearly eliminated polio in many parts of the world.

39. Using one or more complete sentences, explain why the polio virus often causes paralysis of the muscles.
 40. Using one or more complete sentences, state one reason the Sabin vaccine was used more frequently than the Salk vaccine.
 41. Using one or more complete sentences, state how the Salk vaccine was produced.
 42. Using one or more complete sentences, explain how the Salk and Sabin vaccines provide protection against polio.
 43. Which statement about the Salk vaccine is correct?
 - 1) Dead viruses are injected.
 - 2) Antibodies are injected.
 - 3) Antibodies are administered orally.
 - 4) Sugar cubes are administered orally.
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44. Base your answer to the following question on the information below and on your knowledge of biology.

Until the middle of the 20th century, transplanting complex organs, such as kidneys, was rarely successful. The first transplant recipients did not survive. It was not until 1954 that the first successful kidney transplant was performed. Success with transplants increased as research scientists developed techniques such as tissue typing and the use of immunosuppressant drugs. These are drugs that suppress the immune system to prevent the rejection of a transplanted organ. In 2002, there were nearly 15,000 kidney transplants performed in the United States with a greater than 95% success rate.

Describe the relationship of the immune system to organ transplants and the use of immunosuppressant drugs to prevent the rejection of a transplanted organ. In your answer be sure to:

- state *one* way the immune system is involved in the rejection of transplanted organs.
- explain why the best source for a donated kidney would be the identical twin of the recipient.
- explain why immunosuppressant drugs might be needed to prevent rejection of a kidney received from a donor other than an identical twin.
- state *one* reason a person may get sick more easily when taking an immunosuppressant drug.

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Answer Key
[New Exam]

1. 2

2. 3

3. 2

4. 3

5. 3

6. Examples: – by engulfing invaders – by producing antibodies – by marking invaders for killing

7. 2

8. 1

9. 2

10. 2

11. 2

12. 3

13. 3

14. 4

15. 2

16. 1

17. 4

18. 1

19. 1

20. 2

21. 3

22. 3

23. 4

24. 2

25. 2

26. 4

27. 2

28. 3

29. 3

30. 2

31. 2

32. 2

33. 2

34. *Examples:* *a* – A vaccine is a substance that contains dead or weakened bacteria that causes the body to make antibodies.

b – These antibodies will then protect the body if it is exposed to these bacteria in the future.

c – Schoolchildren need vaccinations so that they do not get sick from common illnesses and miss a lot of school.

35. – Veins and arteries may be blocked and tissue damage may result.

– The body may reject the new organ.

36. To prevent rejection of a transplanted organ.

37. – The drug might weaken the ability of the body to fight diseases.

– The drug may leave the patient less able to fight infection.

38. – The organs would not be rejected.

– Organs produced by this process would not be foreign material and would not be attacked by the patient's immune system.

39. The virus attacks nerve cells that control the muscles.

40. The Sabin vaccine is effective over a longer period of time and is easier to give to people.

41. It was produced by killing the polio viruses.

42. These vaccines stimulate the production of antibodies that will offer a defense against the polio virus.

43. 1

44. • *Examples:* — The immune system will reject the organ by producing antibodies. — Antibodies will cause the organ to be rejected by the recipient. — The immune system recognizes the organ as foreign and attacks it.

• *Examples:* — The identical twin of the recipient has the same genetic makeup as the recipient. — Identical twins have the same DNA. — The recipient will not reject the donated kidney. — Twins have the same proteins. — The immune system doesn't recognize the kidney as foreign tissue and will not respond by producing antibodies.

• *Examples:* — to stop the immune system from attacking the donated organ — The drugs will block the production

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Answer Key
[New Exam]

of antibodies. — The donated kidney has different proteins.

- *Examples:* — Immunosuppressant drugs may depress the immune system and make the recipient more susceptible to disease. — weakens the immune system
-