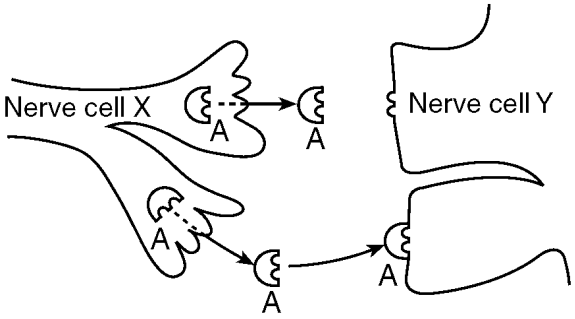
1. A blind student runs his fingers along a page of braille. Another student reads a page printed in a textbook. Both students are able to obtain and process the information most directly as a result of the activities of the

   A) sensory neurons and cerebrum
   B) involuntary muscles and cerebellum
   C) interneurons and spinal cord
   D) smooth muscles and medulla

Base your answers to questions **2** and **3** on the diagram below and on your knowledge of biology.



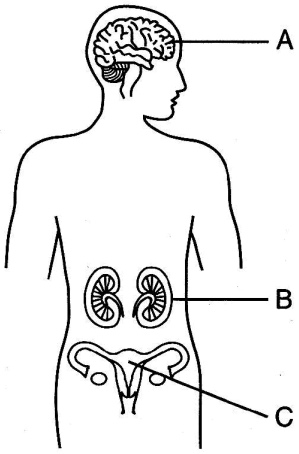
2. The process represented in the diagram best illustrates

   A) cellular communication
   B) muscle contraction
   C) extraction of energy from nutrients
   D) waste disposal

3. A drug is developed that, due to its molecular shape, blocks the action of substance *A*. Which shape would the drug molecule most likely resemble?

   A)  **B)**  C)  D) 

4. Base your answer to the following question on the diagram below and on your knowledge of biology.



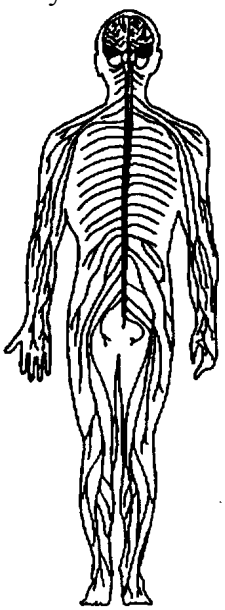
Failure of structure *A* to function properly would most directly disrupt

   A) autotrophic nutrition
   B) chromosome replication
   C) cellular communication
   D) biological evolution

5. Which portion of the central nervous system coordinates motor activities and aids in maintaining balance?

   A) cerebrum **B) cerebellum**
   C) medulla D) spinal cord

6. The diagram below represents a system in a human body.



This body system is most directly involved in

A) production of blood cells
B) stimulation of rapid growth responses
C) elimination of body wastes
D) initiation of muscle contraction

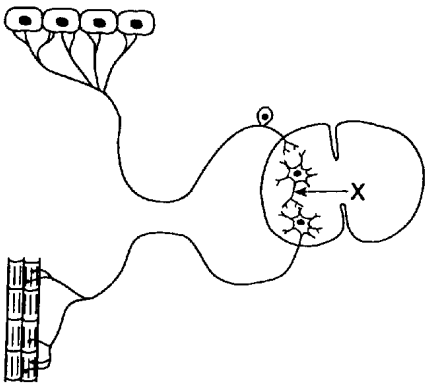
7. The portion of the nervous system that is most closely associated with the contraction of cardiac muscle is the

A) autonomic nervous system
B) somatic nervous system
C) cerebrum
D) hypothalamus

8. If a motor neuron involved in a reflex arc is damaged, which event in that arc is *least* likely to occur?

A) contraction of a muscle
B) stimulation of an interneuron
C) reception of a stronger stimulus by the sense organ
D) secretion of a neurotransmitter by the sensory neuron

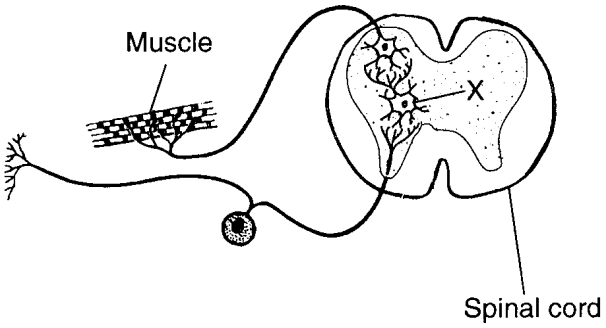
9. The diagram below represents a reflex arc.



The function of the neuron labeled *X* is to

A) transmit impulses from a sensory neuron to a motor neuron
B) direct impulses from the receptor to the spinal cord
C) initiate responses by stimulating the receptor
D) transmit impulses from the effector to the brain

10. A reflex arc is illustrated in the diagram below.



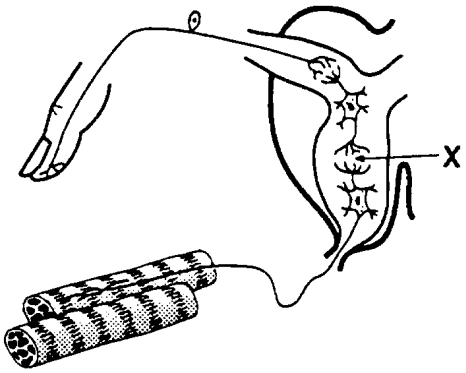
Structure *X* represents

A) an effector
B) a motor neuron
C) an interneuron
D) a receptor

11. Which is a correct route of an impulse in a reflex arc?

A) receptor → sensory neuron →interneuron → motor neuron → effector
B) effector → receptor→ motor neuron →sensory neuron → interneuron
C) sensory neuron → effector → motor neuron → receptor → interneuron
D) motor neuron → sensory neuron →interneuron → effector

12. In the reflex arc represented by the diagram below, which type of substance is normally secreted in the area indicated by letter *X*?

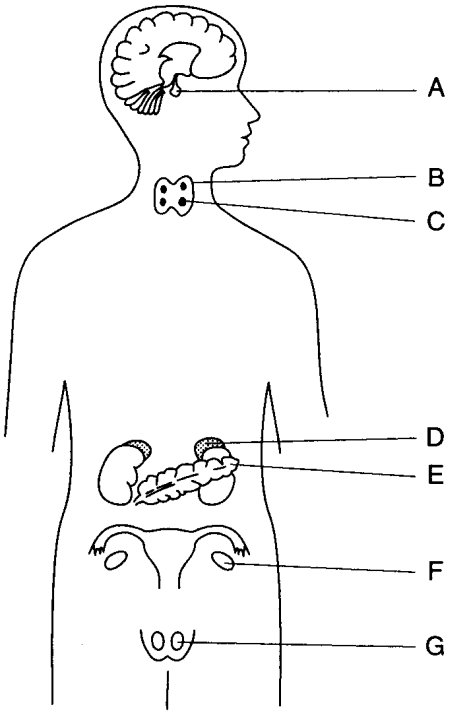


A) an antibody
B) a pigment
C) a neurotransmitter
D) an antigen

13. Which is the first structure stimulated in a reflex arc?

A) interneuron B) motor neuron
C) effector **D) receptor**

14. Base your answer to the following question on the diagram below, which represents endocrine glands of both human sexes.



The secretion of hormones from gland *F* is regulated by hormones secreted from gland

A) *A* B) *B* C) *G* D) *D*

15. Base your answer to the following question on the structures below and on your knowledge of biology. For *each* statement select the structure that is best described by that statement.

Structures

(1) Hypothalamus
(2) Pituitary gland
(3) Thyroid gland
(4) Parathyroid gland
(5) Islets of Langerhans

This region of the brain functions as an endocrine gland by producing hormones that influence the activities of the pituitary gland.

A) 1 B) 2 C) 3 D) 4 E) 5

Base your answers to questions **16** and **17** on the glands below. Choose from the list below, that is best described by that statement.

Glands

(1) Adrenal
(2) Pancreas
(3) Parathyroid
(4) Hypothalamus

16. Groups of cells within this gland secrete hormones that maintain normal levels of simple and complex carbohydrates in the body.

A) 1 **B) 2** C) 3 D) 4

17. Cells within this gland, which is part of the central nervous system, produce several hormones that affect the functioning of the pituitary gland.

A) 1 B) 2 C) 3 **D) 4**

18. Base your answer to the following question on the list below. Select the endocrine gland that is best described by each phrase.

Endocrine Glands

(1) Thyroid
(2) Adrenal
(3) Islets of Langerhans
(4) Parathyroid

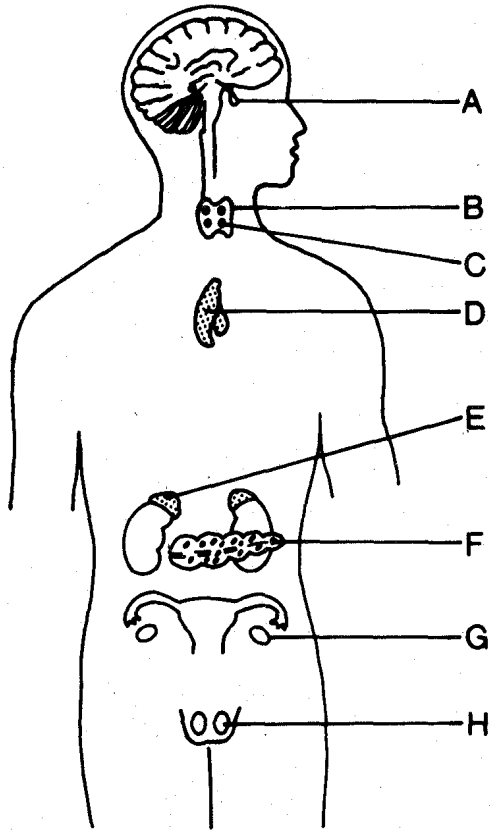
Requires a supply of iodine to synthesize its hormone

A) 1 B) 2 C) 3 D) 4

19. Which hormone stimulates the release of sugar from the liver into the blood?

A) parathormone B) insulin
C) glucagon D) FSH

20. Base your answer to the following question on the diagram below and on your knowledge of biology. Many of the endocrine glands found in humans are represented and labeled in the diagram.



Estrogen is secreted by structure

A) *A* B) *F* **C) *G*** D) *D*

21. In humans, which substance is directly responsible for controlling the calcium levels of the blood?

A) adrenaline B) insulin
C) parathormone D) thyroxin

22. Which structures secrete hormones that influence proper bone structure and development?

A) pituitary and parathyroid
B) thyroid and adrenal cortex
C) ovaries and testes
D) hypothalamus and islets of Langerhans

23. Neurons are to neurotransmitters as endocrine glands are to

A) hormones B) vitamins
C) nucleic acids D) enzymes

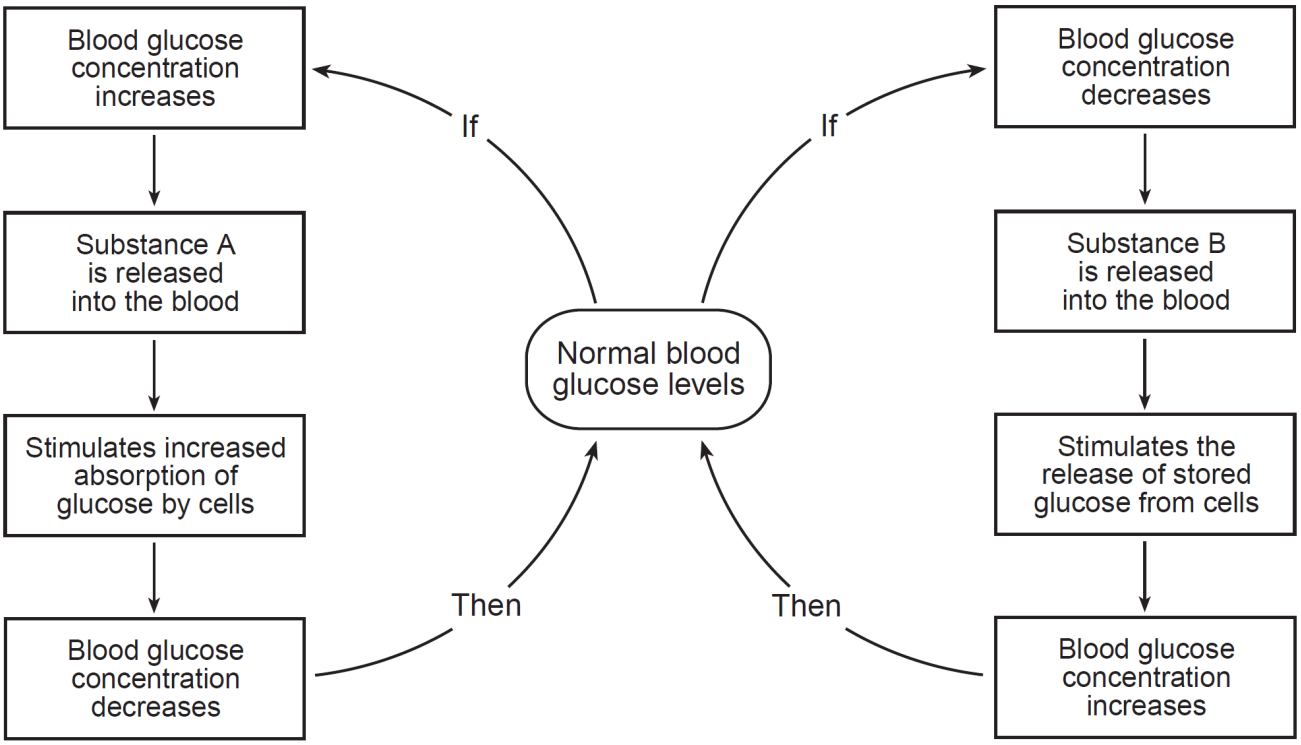
24. Which statement best describes the chemical substances secreted by endocrine glands?

A) They are secreted in one place and most often act at another.
B) They are distributed by the nervous system.
C) They are found only in vertebrates.
D) They are secreted into specialized ducts for transport.

25. In humans, certain glands produce chemicals that are distributed by the circulatory system and influence various target organs. These glands are classified as

A) intestinal glands B) salivary glands
C) gastric glands **D) endocrine glands**

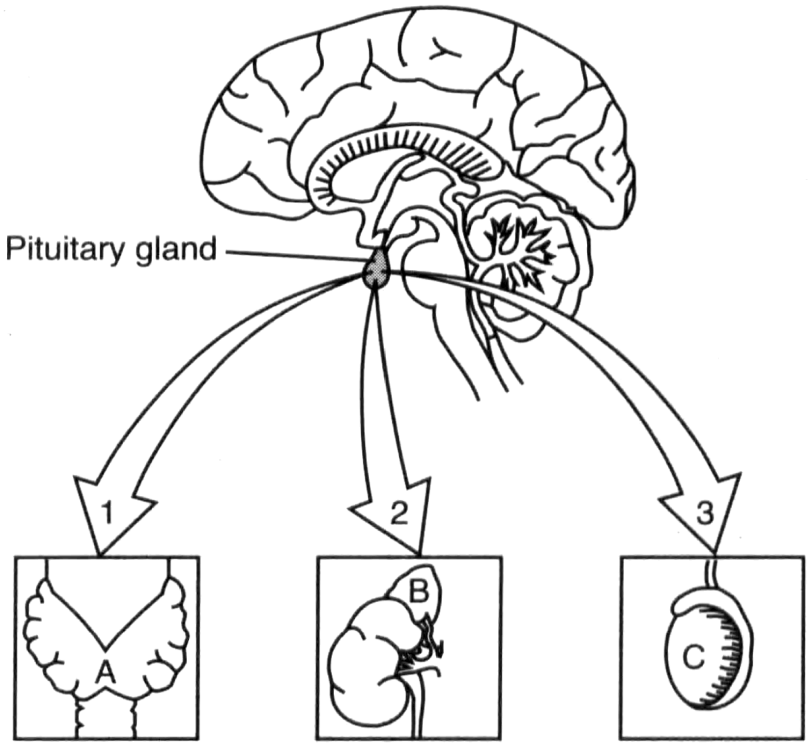
26. Base your answer to the following question on the diagram below and on your knowledge of biology. The diagram represents the effect of two chemical substances, *A* and *B,* in maintaining the level of glucose in the blood in humans.



The interaction of substances *A* and *B* is an example of

A) a genetic mutation
B) homeostatic feedback
C) an immune response
D) active transport

Base your answers to questions **27** and **28** on the diagram below and on your knowledge of biology. Each arrow in the diagram represents a different hormone released by the pituitary gland that stimulates the gland indicated in the diagram. All structures are present in the same organism.



27. Why does hormone 1 influence the action of gland *A* but *not* gland *B* or *C*?

A) Every activity in gland *A* is different from the activities in glands *B* and *C*
B) The cells of glands *B* and *C* contain different receptors than the cells of gland A
C) Each gland contains cells that have different base sequences in their DNA.
D) The distance a chemical can travel is influenced by both pH and temperature.

28. The pituitary gland may release hormone 2 when blood pressure drops. Hormone 2 causes gland *B* to release a different hormone that raises blood pressure which, in turn, stops the secretion of hormone 2. The interaction of these hormones is an example of

A) DNA base substitution
B) manipulation of genetic instructions
C) a feedback mechanism
D) an antigen-antibody reaction

29. Which statement describes a feedback mechanism involving the human pancreas?

A) The production of estrogen stimulates the formation of gametes for sexual reproduction.
B) The level of oxygen in the blood is related to heart rate.
C) The level of sugar in the blood is affected by the amount of insulin in the blood.
D) The production of urine allows for excretion of cell waste.

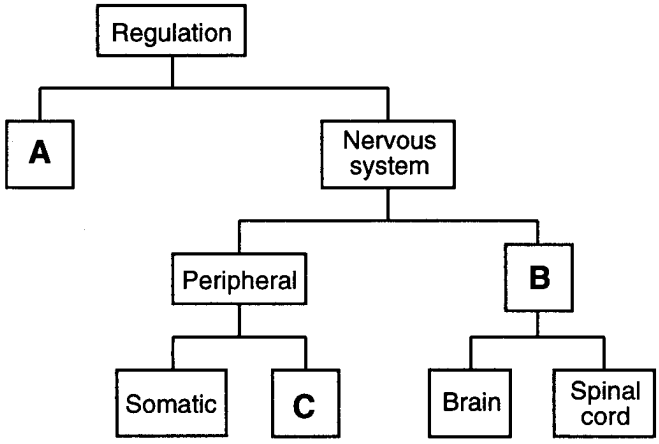
30. An increase in the level of hormone *A* causes an increase in the level of hormone *B*. The increase in the level of hormone *B* then causes a decrease in the level of hormone *A*. This process is an example of

A) a failure to maintain homeostasis
B) the breakdown of chemicals
C) a disruption in cellular coordination
D) a feedback mechanism

31. Feedback mechanisms are best described as processes that help

A) reduce hormone levels to below normal in the blood
B) destroy hormones in the blood
C) directly control muscle contraction in the leg
D) keep body conditions near a normal, steady state

32. Base your answer to the following question on the diagram below, which represents the two systems involved in regulation, and on your knowledge of biology.



Two malfunctions associated with the region of the nervous system indicated by box *B* are

A) diabetes and goiter
B) coronary thrombosis and angina pectoris
C) gout and asthma
D) meningitis and polio

33. A cerebral hemorrhage may result in

A) a stroke B) gout
C) polio D) meningitis

34. Base your answer to the following question on the information below and on your knowledge of biology.

Diabetes is a condition characterized by elevated blood sugar levels. One form of diabetes occurs when insulin fails to properly regulate blood sugar levels. Complications from diabetes can include nerve cell damage and poor blood flow, especially in the feet and legs. In individuals with diabetes, wounds usually take longer than normal to heal.

One reason for the change in wound healing time in a diabetic is that

A) elevated hormone levels block the synthesis of glucose in immune cells
B) nerve damage increases absorption of glucose by healthy cells
C) poor circulation reduces the supply of nutrients and oxygen to the cells
D) decreased enzyme production slows protein synthesis in pancreatic cells

35. The most immediate response to a high level of blood sugar in a human is an increase in the

A) muscle activity in the arms
B) blood flow to the digestive tract
C) activity of all cell organelles
D) release of insulin

Base your answers to questions **36** and **37** on the malfunction, chosen from the list below, that is best described by that phrase.

Malfunctions
(1) Gout
(2) Polio
(3) Goiter
(4) Diabetes
(5) Leukemia

36. A viral disease of the central nervous system preventable through immunization

A) 1 **B) 2** C) 3 D) 4 E) 5

37. An enlargement of the thyroid gland often associated with an iodine deficient diet

A) 1 B) 2 **C) 3** D) 4 E) 5

38. An example of a reaction to a stimulus is

A) a boy smelling a flower
B) eyes blinking due to smoke in the air
C) a person tapping on the shoulder of a friend
D) a loud clap of thunder following lightning

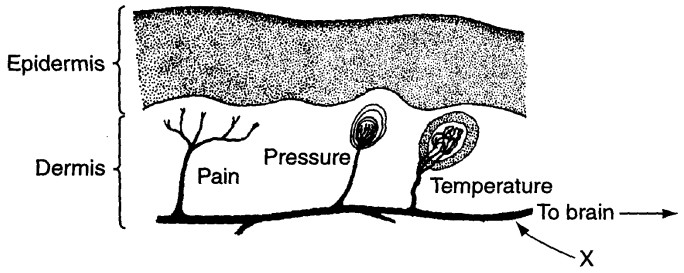
39. When a chemical is added to a slide containing a paramecium, the paramecium moves away from the chemical. This movement is an example of

A) passive transport of chemicals
B) a response to a stimulus
C) a tropic response
D) active transport of water

40. How do cells in the ovary detect a hormone from the brain?

A) The brain sends a nerve impulse to the ovary.
B) White blood cells bring the hormone to the ovary.
C) Receptor molecules on the cells of the ovary bind with the hormone.
D) Vacuoles within the ovary bind with the hormone.

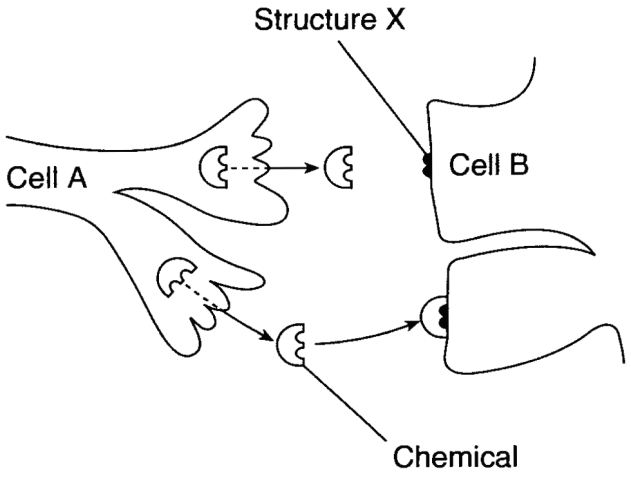
41. Three types of skin receptors are represented in the diagram below.



Structure *X* is most likely

A) a sensory nerve B) an effector
C) a ganglion D) a tympanum

42. The diagram below represents the region between two nerve cells. Cell *A* releases a chemical that travels to and binds with structure *X* on cell *B*.



Structure *X* most likely represents

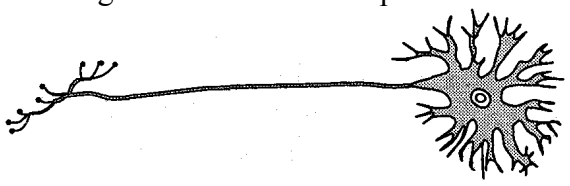
A) a receptor molecule
B) an inorganic substance
C) a ribosome
D) an antibody

43. The diagram below represents part of the human nervous system.

The arrows in the diagram show the

A) movement of a stimulus in a cyton
B) transport of oxygen in a nerve
C) transfer of an impulse from one neuron to another
D) response of an effector to a stimulus

44. The diagram below shows a specialized cell.



This type of cell transmits electrochemical signals known as

A) responses B) stimuli
C) dendrites **D) impulses**

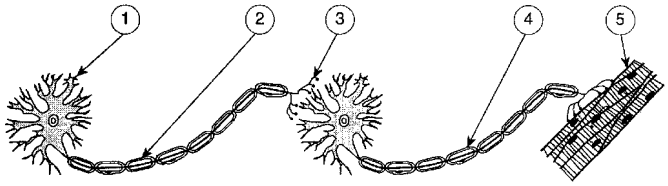
45. An electrochemical message that produces a response in a muscle is

A) a synapse B) an effector
C) an impulse D) a receptor

46. A neurotransmitter is best described as

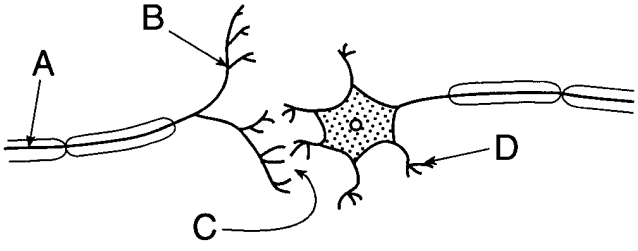
A) a chemical that helps to relay impulses
B) an electrochemical impulse
C) a structure found in a dendrite
D) an external environmental stimulus

47. In the diagram below, as an impulse travels from structure 1 to structure 5, which sequence does*not* include the secretion of a neurotransmitter?



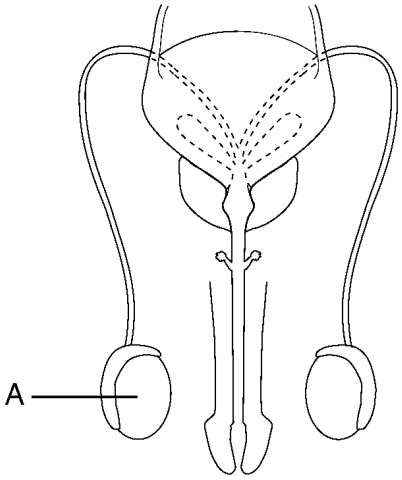
A) 1→4 B) 3→5 C) 3→4 **D) 1→2**

48. Which letter in the diagram below indicates a synapse?



A) *A* B) *B* **C) *C*** D) *D*

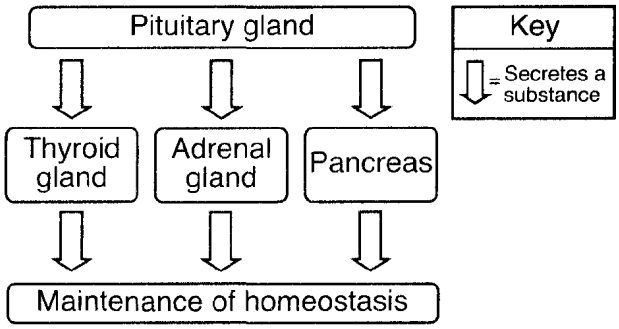
49. The diagram below represents the reproductive system of a mammal.



The hormone produced in structure *A* most directly brings about a change in

A) blood sugar concentration
B) physical characteristics
C) the rate of digestion
D) the ability to carry out respiration

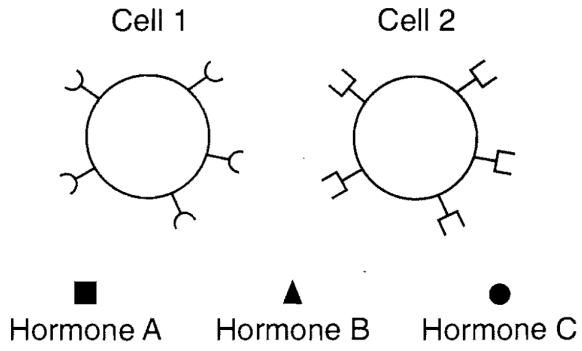
50. The diagram below illustrates some functions of the pituitary gland. The pituitary gland secretes substances that, in turn, cause other glands to secrete different substances. Homeostasis is the maintenance of dynamic equilibrium.



Which statement best describes events shown in the diagram?

A) Secretions provide the energy needed for metabolism.
B) The raw materials for the synthesis of secretions come from nitrogen.
C) The secretions of all glands speed blood circulation in the body.
D) Secretions help the body to respond to changes from the normal state.

51. The diagram below represents cells and hormones present in the human body.



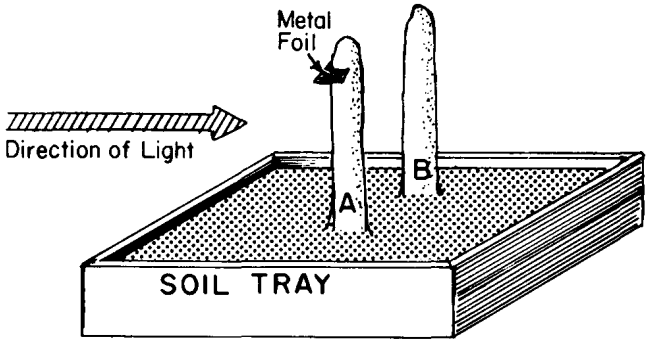
Which statement correctly describes an interaction between the hormones and the cells?

A) Hormone *A* is synthesized by cell 2 and targets cell 1.
B) Hormone *B* bonds with both cell 1 and cell 2.
C) Specific reactions carried out by cell 1 are regulated by hormone *C*.
D) The specialized receptor molecules on cell 1 secrete hormone *B*.

52. In plants, the growth of leaves toward sunlight and the growth of roots toward moisture-rich regions of the soil are controlled by

A) vitamins
B) neurotransmitters
C) hormones
D) antibodies

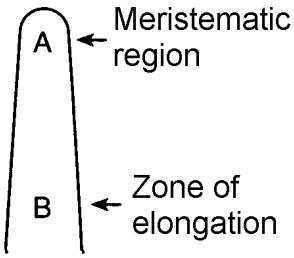
53. The diagram below shows the tips of two oat seedlings exposed to a fixed light source. In seedling *A*, metal foil was inserted partially through the seedling just below the tip, blocking the flow of any chemicals down the side of the stem facing the source of light.



What was most likely observed after 3 days of exposure to the light?

A) Seedling *A* grew away from the light source and seedling *B* grew toward the light source.
B) Seedling *A* grew toward the light source and seedling *B* grew away from the light source.
C) Both seedlings grew away from the light source.
D) Both seedlings grew toward the light source.

54. The diagram below represents the tip of a growing plant stem.



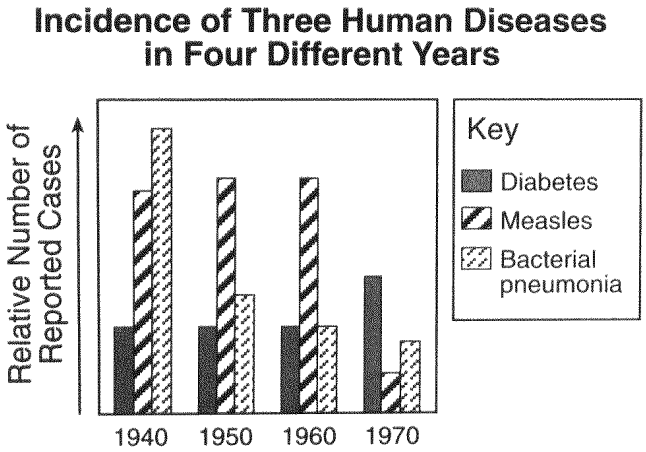
Which statement best describes the hormones in this stem?

A) They are produced at area *A* and only affect area *A*.
B) They are produced at area *B* and only affect area *B*.
C) They are produced at area *A* and transported to area *B*.
D) They are produced at area *B* and transported to area *A*.

55. The purpose of introducing weakened microbes into the body of an organism is to stimulate the

A) production of living microbes that will protect the organism from future attacks
B) production of antigens that will prevent infections from occurring
C) immune system to react and prepare the organism to fight future invasions by these microbes
D) replication of genes that direct the synthesis of hormones that regulate the number of microbes

56. Base your answer to the following question on the graph below.



Which statement provides the best possible reason for the decrease in number of cases of bacterial pneumonia from 1940 to 1970?

A) As a result of genetic engineering, humans became immune to the bacteria.
B) Antibiotics were made available for the treatment of bacterial infections.
C) The bacteria did not respond to medical treatments.
D) As a result of sexual reproduction, the bacteria evolved into a harmless form.

57. The immune system of humans may respond to chemicals on the surface of an invading organism by

A) releasing hormones that break down these chemicals
B) synthesizing antibodies that mark these organisms to be destroyed
C) secreting antibiotics that attach to these organisms
D) altering a DNA sequence in these organisms

58. 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

A) increase the immune response in the person receiving the transplant
B) decrease the immune response in the person receiving the transplant
C) decrease mutations in the person receiving the transplant
D) increase mutations in the person receiving the transplant

Base your answers to questions **59** and **60** on the list of molecules below. Select the immune response, *chosen from the list below*, that is most closely associated with that phrase.

Immune Response
(1) Active immunity
(2) Passive immunity
(3) Allergies
(4) Tissue rejection

59. A vaccine containing a weakened disease-causing organism is injected into the body.

A) 1 B) 2 C) 3 D) 4

60. Chemicals known as histamines are released as a result of antibody production.

A) 1 B) 2 **C) 3** D) 4

61. Base your answer to the following question on the reading passage below and on your knowledge of biology.

Lyme Disease

Thousands of people have been bitten by deer ticks and infected with the bacterial spirochete *Borrelia burgdorferi*, the cause of Lyme disease. About half of these people will not realize that they have been infected. After the initial infection, their immune systems will begin to control the bacterium, but not eliminate it altogether. Up to several years after the tick bite, the victims may develop complications such as crippling arthritis, neurological damage, and cardiac malfunctions. Now, researchers think they have determined one way *B. burgdorferi* manages to elude an activated immune system.

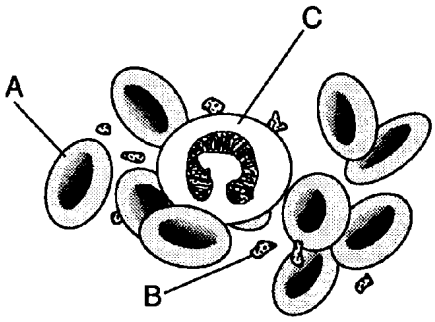
Five white-footed mice were infected with *B. burgdorferi.* The blood of the mice was sampled shortly thereafter, and it was confirmed that the mice were producing large quantities of antibodies that attacked the invading bacteria.

Four months later, *B. burgdorferi* were extracted from the infected mice and mixed with the same type of mouse antibodies. This time the bacteria initiated only a weak response, indicating that the antibodies were less able to recognize the bacteria. Since antibodies recognize a bacterium by binding to specific protein molecules on the bacterial surface, these surface molecules may somehow have changed over time. In this way, the bacteria are better able to escape early recognition by antibodies produced by the human immune system.

Shortly after the initial infection, the mice apparently

A) got rid of the bacteria
B) had no reaction to the infection
C) produced antibodies against the disease
D) suffered permanent neurological damage

62. Which statement correctly describes the activities of the components of human blood shown in the diagram below?



A) Both *A* and *B* function in immune responses, and *C* transports oxygen.
B) *A*, *B*, and *C* are able to synthesize hemoglobin.
C) Both *B* and *C* provide immunity, and *A* transports nutrients.
D) *A* transports oxygen, *B* initiates clots, and *C* functions in immune responses.

Base your answers to questions **63** through **66** 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.

63. Explain why a transplant might be dangerous to the health of a patient.

64. Explain why doctors would consider using tissues or organs that have been grown from stem cells.

65. State *one* specific *disadvantage* of taking an immunosuppressant drug.

66. State *one* reason that transplant patients might take an immunosuppressant drug.

67. 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

A) active immunity
B) passive immunity
C) an oral vaccine
D) a phagocytic activity

Base your answers to questions **68** through **71** 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.

68. Which statement about the Salk vaccine is correct?

A) Dead viruses are injected.
B) Antibodies are injected.
C) Antibodies are administered orally.
D) Sugar cubes are administered orally.

69. Using one or more complete sentences, explain how the Salk and Sabin vaccines provide protection against polio.

70. Using one or more complete sentences , state how the Salk vaccine was produced.

71. Using one or more complete sentences, state one reason the Sabin vaccine was used more frequently than the Salk vaccine.

72. Explain why people with AIDS often develop many other infectious diseases.

73. People with AIDS are unable to fight multiple infections because the virus that causes AIDS

A) weakens their immune systems
B) produces antibodies in their blood
C) attacks muscle tissue
D) kills pathogens

74. Allergic reactions are most closely associated with

A) the action of circulating hormones
B) a low blood sugar level
C) immune responses to usually harmless substances
D) the shape of red blood cells

75. Which activity would stimulate the human immune system to provide protection against an invasion by a microbe?

A) receiving antibiotic injections after surgery
B) choosing a well-balanced diet and following it throughout life
C) being vaccinated against chicken pox
D) receiving hormones contained in mother's milk while nursing

76. Certain microbes, foreign tissues, and some cancerous cells can cause immune responses in the human body because all three contain

A) antigens B) enzymes
C) fats D) cytoplasm

Answer Key
Immune Endo Nerv Review

1. **A**
2. **A**
3. **B**
4. **C**
5. **B**
6. **D**
7. **A**
8. **A**
9. **A**
10. **C**
11. **A**
12. **C**
13. **D**
14. **A**
15. **A**
16. **B**
17. **D**
18. **A**
19. **C**
20. **C**
21. **C**
22. **A**
23. **A**
24. **A**
25. **D**
26. **B**
27. **B**
28. **C**
29. **C**
30. **D**
31. **D**
32. **D**
33. **A**
34. **C**
35. **D**
36. **B**
37. **C**
38. **B**
39. **B**
40. **C**
41. **A**
42. **A**
43. **C**
44. **D**
45. **C**
46. **A**
47. **D**
48. **C**
49. **B**
50. **D**
51. **C**
52. **C**
53. **D**
54. **A**
55. **C**
56. **B**
57. **B**
58. **B**
59. **A**
60. **C**
61. **C**
62. **D**
63. – Veins and arteries may be blocked and tissue damage may result.
– The body may reject the new organ.
64. – 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.
65. – The drug might weaken the ability of the body to fight diseases.
– The drug may leave the patient less able to fight infection.
66. To prevent rejection of a transplanted organ.
67. **B**
68. **A**
69. These vaccines stimulate the production of antibodies that will offer a defense against the polio virus.
70. It was produced by killing the polio viruses.
71. The Sabin vaccine is effective over a longer period of time and is easier to give to people.
72. *Examples:* – The virus that causes AIDS interferes with the functioning of the immune system.
– The virus that causes AIDS interferes with a cell's ability to produce antibodies.
– The immune system in people with AIDS is impaired.
73. **A**
74. **C**
75. **C**
76. **A**