**Endocrine System**

1. Which gland produces a hormone that directly increases blood supply to skeletal muscles and increases the rate of contraction of heart muscle?
   
   A. Pancreas  
   B. Adrenal gland  
   C. Thyroid gland  
   D. Pituitary gland

2. Which sequence illustrates a mechanism used by the body to control the blood glucose level?
   
   A. Blood glucose increases → release of glucagon increases → conversion of glycogen into glucose decreases → blood glucose decreases  
   B. Blood glucose decreases → release of glucagon decreases → conversion of glycogen into glucose decreases → blood glucose increases  
   C. Blood glucose increases → release of insulin increases → conversion of glucose into glycogen increases → blood glucose decreases  
   D. Blood glucose decreases → release of insulin decreases → conversion of glucose into glycogen increases → blood glucose increases

3. The inhaled spray would likely contain
   
   A. insulin  
   B. glucagon  
   C. aldosterone  
   D. antidiuretic hormone

Use the following information to answer the next two questions

Diabetes insipidus is a disorder of the posterior lobe of the pituitary gland or hypothalamus resulting in decreased secretion of a specific hormone. This disorder is characterized by the excretion of large volumes of urine and subsequent dehydration and thirst.

A person with diabetes insipidus can be treated by inhaling a spray containing the hormone that is deficient. The spray is inhaled several times a day.

Use the following information to answer the next two questions

When the Chernobyl nuclear reactor in Ukraine melted down, clouds of radioactive material including iodine, were released into the atmosphere. Iodine is actively absorbed by a certain gland in the body. Scientists were worried that the radioactive iodine would cause tumors in this gland. In an attempt to avoid this problem, people who lived near the reactor were given large doses of non-radioactive iodine.
4. How would the ingestion of large doses of non-radioactive iodine reduce a person’s chances of getting a tumor in a particular gland?

A. The pituitary would become saturated with non-radioactive iodine and this would limit the absorption of radioactive iodine
B. The thyroid would become saturated with non-radioactive iodine and this would limit the absorption of radioactive iodine
C. Increased levels of iodine would stimulate hormonal production by the pituitary and limit tumor formation
D. Increased levels of iodine would stimulate hormonal production by the thyroid and limit tumor formation

5. If a tumor caused increased secretion of thyroxine, which symptoms would likely be experienced by an affected person?

A. Increased body temperature and increased metabolic rate
B. Increased body temperature and decreased metabolic rate
C. Decreased body temperature and increased metabolic rate
D. Decreased body temperature and decreased metabolic rate

6. The pituitary hormone ACTH regulates the production of aldosterone by the cortex of the adrenal glands. A severe drop in ACTH levels would likely result in

A. decreased sodium ion retention and increased water loss because aldosterone levels would rise
B. decreased sodium ion retention and increased water loss because aldosterone levels would drop
C. increased sodium ion retention and increased water retention because aldosterone levels would rise
D. increased sodium ion retention and increased water retention because aldosterone levels would drop

7. In humans, ADH and oxytocin can have similar effects. Therefore, a correct inference is that an increase in the concentration of ADH in the blood may result in

A. increased urine volume
B. decrease metabolic rate
C. increased contraction of uterine muscle
D. decreased release of milk from the breasts

Use the following information to answer the next three questions

Vegetables such as cabbage, rutabaga, and turnips contain goitrin, a substance that inhibits iodine uptake by the body.

8. A person with a diet high in vegetables containing goitrin may gain weight fairly rapidly. A possible explanation for this weight would be

A. increased protein metabolism
B. decreased blood sugar levels
C. increased glycogen release
D. decreased metabolic rate
9. The function of which gland would be most affected by goitrin?
   A. Anterior pituitary
   B. Adrenal cortex
   C. Pancreas
   D. Thyroid

10. An increase in goitrin consumption would likely cause a person to experience increased
    A. fatigue
    B. heart rate
    C. breathing rate
    D. urine production

11. Emotionally stressful situations may affect more than one system of the body. Another possible
    response produced by telling lies would be
    A. decrease secretion of ADH
    B. increased secretion of insulin
    C. decreased secretion of glucagon
    D. increased secretion of epinephrine

Use the following information to answer the next two questions

On April 26, 1986, a major accident occurred at a nuclear generating station in Chernobyl. The
nuclear explosion dispersed several tons of radioactive iodine, cesium, uranium, and other
elements five kilometers into the air.

Radioactivity is extremely damaging to living cells.
   - from Biosphere 2000: Protecting Our Global Environment

12. As soon as people in Europe realized there had been a nuclear accident, they rushed to buy iodine
tables. What reason would people have for consuming large quantities of iodine?
   A. So that iodine from the tablets, instead of the radioactive iodine, would accumulate in the
      thyroid
   B. Because iodine, by negative feedback, blocks the formation of TSH, therefore protecting
      the thyroid from radioactivity
   C. Because iodine inhibits cell division, thereby reducing the amount of cellular damage
      occurring during exposure to radiation
   D. So that iodine could accumulate in the hypothalamus and block communication between
      the nervous and endocrine systems

13. Which symptoms would be expected among people who did not take iodine tablets?
   A. Pancreatic dysfunction and insufficient insulin production
   B. Metabolic dysfunction resulting in fatigue and weight gain
   C. Increased ACTH secretion and puffiness of face, chest, and abdomen
   D. Pituitary dysfunction resulting in increased HGH secretion and thus gigantism
14. Hormones X and Y, respectively, are
   A. insulin and glucagon
   B. glucagon and insulin
   C. insulin and epinephrine
   D. epinephrine and insulin

15. If Gland 1 is the pituitary gland, the row that identifies Hormone 1, Gland 2, and Hormone 2 is

<table>
<thead>
<tr>
<th>Row</th>
<th>Hormone 1</th>
<th>Gland 2</th>
<th>Hormone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>FSH</td>
<td>Testes</td>
<td>testosterone</td>
</tr>
<tr>
<td>B.</td>
<td>TSH</td>
<td>Thyroid</td>
<td>thyroxine</td>
</tr>
<tr>
<td>C.</td>
<td>FSH</td>
<td>Ovaries</td>
<td>progesterone</td>
</tr>
<tr>
<td>D.</td>
<td>ADH</td>
<td>kidney</td>
<td>aldosterone</td>
</tr>
</tbody>
</table>
16. Normally, inhibition of the pituitary gland would occur if the secretion of hormone X
   A. increased, causing a decrease in the secretion of hormone Y
   B. decreased, causing a decrease in the secretion of hormone Y
   C. increased, causing an increase in the secretion of hormone Y
   D. decreased, causing an increase in the secretion of hormone Y

17. Another stress hormone whose functions mimic those of the sympathetic nervous system is
   A. HCG
   B. insulin
   C. estrogen
   D. norepinephrine

18. Stressful situations trigger the release of hormones such as cortisol. Recent studies have found that some forms of depression cause a similar hormonal response that lasts much longer than the normal stress response. This unregulated release of stress hormones may result in reduced appetite, an unresponsive immune system, inadequate tissue repair, and insomnia.

19. A dog with a malfunctioning pituitary gland received injections of ACTH. Data were collected after the dog’s injections.

   Rate of Cortisol Secretion After the Injection of Varying Amounts of ACTH

   —from Ganong
18. A logical interpretation of the graph is that the
   A. secretion of cortisol is inhibited by increased ACTH
   B. secretion of cortisol is doubled if the secretion of ACTH is doubled
   C. adrenal glands respond more quickly to small amounts of ACTH than to large amounts of ACTH
   D. adrenal glands respond to large amounts of ACTH by having a maximum cortisol secretion rate

Use the following information to answer the next question

In 1947, E. B. Verney published the results of a series of experiments that he had conducted on a number of dogs. He found that if he injected a concentrated salt solution into the bloodstream, hypothalamus, and ventricles of the brain, hormone “X” was released in large amounts.

19. Hormone “X” was most likely
   A. ADH
   B. ACTH
   C. oxytocin
   D. aldosterone

20. The endocrine function of the pancreas was studied in Canada using dogs as experimental animals. The pancreatic cells with an endocrine function are
   A. islet cells
   B. blood cells
   C. Sertoli cells
   D. interstitial cells

Use the following information to answer the next two questions

Bovine somatotropin (BST) is a growth hormone that has been produced using biotechnology since 1970. BST increases milk production by 10% to 20% when injected into milk-producing cows. BST increases nutrient absorption from the bloodstream into the cow’s mammary gland.

21. BST could probably be obtained naturally from which gland in a cow?
   A. Thyroid
   B. Adrenal
   C. Pituitary
   D. Pancreatic

22. In a cow’s mammary gland, BST is most similar in its effect to
   A. estrogen
   B. oxytocin
   C. prolactin
   D. progesterone
23. In humans, when iodine levels are adequate, abnormally high TSH secretion would likely result in

A. nervousness and weight gain
B. nervousness and weight loss
C. sleepiness and weight gain
D. sleepiness and weight loss

Use the following information to answer the next question

Several studies have indicated that sperm counts in humans have declined over the past 25 years. Increased levels of chemicals in the environment that mimic estrogen have been found in substances ranging from detergents to plastic wrappers. These chemicals are a suspected cause of the decline in sperm counts.

- from Stainsby

24. Males exposed to high levels of these estrogen-mimicking chemicals could experience

A. development of breasts
B. development of ovaries
C. increased growth of muscles
D. increased growth of facial hair

Use the following information to answer the next question

The symptoms of Alzheimer’s disease gradually appear as affected individuals age. One symptom of Alzheimer’s disease is a loss of memory. Studies have shown that the administration of the hormone estrogen to female patients with Alzheimer’s disease dramatically improved their memory.

- from Calgary Herald, 1996

25. It appears that the hormone estrogen has an effect on the

A. cerebrum
B. cerebellum
C. hypothalamus
D. medulla oblongata
26. The gland that is directly stimulated by the nervous system to secrete hormones is the structure labeled
   A. 2
   B. 3
   C. 4
   D. 5

27. The structure that produces only hormones is labeled
   A. 1
   B. 2
   C. 5
   D. 6

28. A target organ for aldosterone is the structure labeled
   A. 3
   B. 5
   C. 6
   D. 7

29. A patient is suffering from weight gain, sluggishness, and dry skin. The patient is injected with a tracer, radioactive iodine, to identify the structure responsible for these symptoms. The tracer would most likely accumulate in the structure labeled
   A. 1
   B. 2
   C. 4
   D. 7

30. When the hypothalamus fails to produce ADH, the physiological effect that is most likely is
   A. muscle spasms
   B. loss of memory
   C. decreased breathing rate
   D. increased urine production

Use the following information to answer the next question.
31. If the physiological factor influencing this negative feedback loop were the metabolic rate, then 1, 2, and 3, respectively, would be the

A. hypothalamus, pituitary, and thyroid  
B. thyroid, hypothalamus, and pituitary  
C. pituitary, thyroid, and hypothalamus  
D. pituitary, hypothalamus, and thyroid

32. The response to increased glucose levels in the blood is the conversion of glucose to glycogen. This response is the result of the secretion of

A. insulin by the adrenal medulla  
B. glucagon by the adrenal medulla  
C. insulin by the islets of Langerhans  
D. glucagon by the islets of Langerhans

33. While playing a vigorous game of basketball, a person’s overall rate of metabolism increases. Which two hormone levels rise so that blood glucose levels meet the needs of the increased metabolic rate?

A. Cortisol and ADH  
B. Steroids and HGH  
C. Insulin and acetylcholine  
D. Epinephrine and glucagon

34. In humans, HGH directly stimulates the

A. gonads  
B. adrenal glands  
C. muscles and peripheral nerves  
D. long bones and skeletal muscles

35. Mercury compounds most likely affect the level of the hormone

A. LH  
B. FSH  
C. ADH  
D. ACTH

-HGH is a protein. Biosynthetic HGH is used in the treatment of Turner syndrome, a disorder occurring in females as a result of nondisjunction; the sex chromosome complement is XO instead of the normal XX. Untreated females with Turner syndrome grow only to the height of an average ten-year-old.  
-From Leger, 1994

Mercury poisoning also affects the pituitary gland in such a way that frequent urination results.
36. Which hormone is released as a direct result of sympathetic motor neuron stimulation?

A. HGH  
B. Thyroxine  
C. Aldosterone  
D. Epinephrine

Use the following additional information to answer the next two questions

37. If blood glucose levels change, the pancreas will

A. stop hormone secretions because the target cells are not working  
B. produce a more active form of the hormone that stimulates the target cells  
C. cause other endocrine glands to secrete hormones that stimulate the target cells  
D. increase the secretion of the appropriate hormone that stimulates the target cells

38. The names of hormones X and Y are, respectively,

A. insulin and glucagon  
B. glucagon and insulin  
C. glycogen and insulin  
D. insulin and glycogen
Jan 00,8

39. Damage to which of the following endocrine glands would most affect the reaction of the body to an emergency that stimulates the sympathetic nervous system?

A. thyroid gland
B. adrenal gland
C. anterior pituitary gland
D. posterior pituitary gland

Jan 00,9

Use the following information to answer the next question

Oxytocin and ADH are synthesized by neurosecretory cells in the hypothalamus. These hormones are stored in the posterior pituitary. They can then be released into the bloodstream where they circulate to target cells.

40. In a human female, where are the target cells for ADH and oxytocin?

A. in the kidney tubules and ovaries
B. in the Bowman’s capsule and the ovaries
C. in the kidney tubules and uterine muscles
D. in the Bowman’s capsule and the uterine muscles

Jan 00,10

Use the following information to answer the next question
41. In humans, high levels of GnRF cause the pituitary to release

A. LH and FSH
B. LH and estrogen
C. progesterone and FSH
D. estrogen and progesterone

Jan 00.2

Use the following information to answer the next question

<table>
<thead>
<tr>
<th>Responses Stimulated by Hormones</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Release of thyroxine</td>
</tr>
<tr>
<td>2 Development of bones and muscles</td>
</tr>
<tr>
<td>3 Water reabsorption by kidneys</td>
</tr>
<tr>
<td>4 Development of follicle and sperm</td>
</tr>
<tr>
<td>5 Ovulation and maintenance of the corpus luteum</td>
</tr>
<tr>
<td>6 Milk production</td>
</tr>
</tbody>
</table>

Numerical Response

6. Identify the response, as numbered above, that would be stimulated by each of the hormones given below.

Response: ____________
Hormone: STH (HGH) ____________
LH ____________
TSH ____________
FSH ____________

(Record your four-digit answer in the numerical-response section on the answer sheet.)

Jun 00.6

Use the following information to answer the next two questions

A laboratory technician was asked to set up an experiment to determine the effect of thyroxine on metabolic rate. Four groups of adult male laboratory rats were used. Each group was placed in the same type of cage, which was designed to provide room for physical activity. Each of the four groups was given an adequate supply of water and one of the four diets listed below:

Diet W: rat chow, a preparation of rat food containing all essential nutrients
Diet X: rat chow containing a chemical that counteracts the effect of thyroxine in the body
Diet Y: rat chow containing dried thyroid tissue, which contains thyroxine
Diet Z: rat chow deficient in iodine

The technician was not aware of which diet she was feeding to each group of rats. The following data were obtained:

<table>
<thead>
<tr>
<th>Group</th>
<th>Average Initial Weight (g)</th>
<th>Average Final Weight After Two Weeks (g)</th>
<th>Final Average Oxygen Consumption (mL/kg•min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>323</td>
<td>392</td>
<td>2.5</td>
</tr>
<tr>
<td>II</td>
<td>328</td>
<td>287</td>
<td>10.0</td>
</tr>
<tr>
<td>III</td>
<td>330</td>
<td>400</td>
<td>2.0</td>
</tr>
<tr>
<td>IV</td>
<td>315</td>
<td>320</td>
<td>4.0</td>
</tr>
</tbody>
</table>
42. According to the data table, which group of rats was most likely the control group?

A. I  
B. II  
C. III  
D. IV

43. The row below that correctly identifies two groups of laboratory rats and the diets they were most probably fed is

<table>
<thead>
<tr>
<th>Row</th>
<th>Group</th>
<th>Diet</th>
<th>Group</th>
<th>Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>I</td>
<td>Z</td>
<td>II</td>
<td>W</td>
</tr>
<tr>
<td>B.</td>
<td>I</td>
<td>W</td>
<td>IV</td>
<td>X</td>
</tr>
<tr>
<td>C.</td>
<td>II</td>
<td>Y</td>
<td>III</td>
<td>X</td>
</tr>
<tr>
<td>D.</td>
<td>III</td>
<td>Z</td>
<td>IV</td>
<td>Y</td>
</tr>
</tbody>
</table>

44. In this study, the manipulated variable, responding variable, and a possible fixed (controlled) variable are given in row

<table>
<thead>
<tr>
<th>Row</th>
<th>Manipulated Variable</th>
<th>Responding Variable</th>
<th>Fixed Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>amount of licking by mother rats</td>
<td>amount of ACTH released in adult rats</td>
<td>rat’s cage size</td>
</tr>
<tr>
<td>B.</td>
<td>amount of ACTH released in adult rats</td>
<td>amount of licking by mother rats</td>
<td>age of mother rats</td>
</tr>
<tr>
<td>C.</td>
<td>amount of stress in environment</td>
<td>amount of ACTH released in adult rats</td>
<td>amount of licking by mother rats</td>
</tr>
<tr>
<td>D.</td>
<td>amount of licking by mother rats</td>
<td>heart disease in adult rats</td>
<td>amount of ACTH released in adult rats</td>
</tr>
</tbody>
</table>

Researchers have been studying the connection between maternal care and stress in rats. Those rats that received more licking and grooming as babies release lower levels of ACTH in response to stress as adults. In humans, high levels of stress hormones are linked to an increase in heart disease, diabetes, depression, and alcoholism.

-from Strauss, 1997
45. Humans, as well as rats, release ACTH in response to stress. The row below that identifies the gland that secretes ACTH and the target gland of ACTH in humans is

<table>
<thead>
<tr>
<th>Row</th>
<th>Secreting Gland</th>
<th>Target Gland</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>B.</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>C.</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>D.</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

46. When a person, or a rat, is exposed to stressful situation, the response of the nervous system is the activation of the

A. sympathetic nervous system and the release of epinephrine by post-ganglionic fibres
B. sympathetic nervous system and the release of acetylcholine by post-ganglionic fibres
C. parasympathetic nervous system and the release of epinephrine by post-ganglionic fibres
D. parasympathetic nervous system and the release of acetylcholine by post-ganglionic fibres

47. Low levels of calcium ions in the blood cause

A. decreased secretion of PTH and increased deposition of calcium in the bones
B. decreased secretion of calcitonin and increased deposition of calcium in the bones
C. increased secretion of PTH and movement of calcium from the bones to the blood
D. increased secretion of calcitonin and movement of calcium from the bones to the blood
Jan 02, 2
48. The release of thyroxine from the thyroid is directly regulated by
   A. TSH
   B. TRH
   C. iodine
   D. thyroxine

Jan 02, 3
49. A characteristic symptom of hyperthyroidism, a disorder of the thyroid gland, is
   A. lethargy
   B. weight loss
   C. intolerance to cold
   D. slowed mental processes

Jan 02, 4
50. Which of the following hormones plays a role in returning the salt concentration in the blood to homeostatic levels following heavy exercise?
   A. Cortisol
   B. Thyroxine
   C. Aldosterone
   D. Epinephrine

Jan 02, 5
51. Diuretic chemicals counteract the effect of the hormone
   A. ADH
   B. insulin
   C. cortisol
   D. prolactin

Jan 02, 10
52. The area of the brain that normally initiates the fight-or-flight response is the
   A. pons
   B. cerebrum
   C. cerebellum
   D. hypothalamus