Part I. Clinical Applications

1. Pete is very short for his chronological age of 8. What hormone levels should be checked to determine if he has pituitary dwarfism?

2. Mrs. Jackson claims she is not menstruating and reports that her breasts are producing milk although she has never been pregnant. What hormone is being hypersecreted?

3. The recommended daily allowance (RDA) for iodine is 150 mg/day. Even though only a small quantity is needed each day what symptoms appear if the intake of this mineral is insufficient or there is a complete lack of it in the diet?

4. A friend of yours just found out he has diabetes. Being the caring inquisitive person that you are, you ask what type of diabetes he has. He is not sure and didn’t realize that there are different types of the disorder. Explain the different types of diabetes.
Part II
Complete the following statements by choosing answers from the key choices. Record the answers in the answer blanks.

**Key Choices**

A. Cardiovascular system
B. Hormones
C. More rapid
D. Nerve impulses
E. Nervous system
F. Slower and more prolonged

1. The endocrine system is a major controlling system in the body. Its means of control, however, is much _ (1)_ than that of the _ (2)_ the other major body system that acts to maintain homeostasis. Perhaps the reason for this is that the endocrine system uses chemical messengers, called _ (3)_ instead of _ (4)_ . These chemical messengers enter the blood and are carried throughout the body by the activity of the _ (5)_ .

Part III
Complete the following statements by choosing answers from the key choices. Record the answers in the answer blanks.

**Key Choices**

A. Altering activity
B. pituitary
C. Hormonal
D. Humoral
E. Hypothalamus
F. Negative feedback
G. Neural
H. Neuroendocrine
I. Receptors
J. Releasing hormones
K. Steroid or amino acid–based
L. Stimulating new or unusual activities
M. Sugar or protein
N. Target cell(s)

1. All cells do not respond to endocrine system stimulation. Only those that have the proper _ (1)_ on their cell membranes are activated by the chemical messengers. These responsive cells are called the _ (2)_ of the various endocrine glands. Hormones promote homeostasis by _ (3)_ of body cells rather than by _ (4)_ . Most hormones are _ (5)_ molecules.

2. The various endocrine glands are prodded to release their hormones by nerve fibers (a _ (6)_ stimulus), by other hormones (a _ (7)_ stimulus), or by the presence of increased or decreased levels of various other substances in the blood (a _ (8)_ stimulus). The secretion of most hormones is regulated by a _ (9)_ system, in which increasing levels of that particular hormone “turn off” its stimulus. The _ (10)_ is called the master endocrine gland because it regulates so many other endocrine organs. However, it is in turn controlled by _ (11)_ secreted by the _ (12)_ . The structure identified as #12 is also part of the brain, so it is appropriately called a _ (13)_ organ.
Part IV

Figure depicts the anatomical relationships between the hypothalamus and the anterior and posterior lobes of the pituitary in a highly simplified way. First, identify each of the structures listed below by color coding and coloring them on the diagram. Then, on the appropriate lines write in the names of the hormones that influence each of the target organs shown at the bottom of the diagram. Color the target organ diagrams as you like.

- Hypothalamus
- Anterior pituitary
- Turk's saddle of the sphenoid bone
- Posterior pituitary

For each of the following hormones, indicate the organ (or organ part) producing or releasing the hormone by inserting the appropriate letters from the list above.

- 7. ACTH
- 8. ADH
- 9. Aldosterone
- 10. Cortisol
- 11. Epinephrine
- 12. Estrogen
- 13. FSH
- 14. Glucagon
- 15. Insulin
- 16. LH
- 17. Melatonin
- 18. Oxytocin
- 19. Progesterone
- 20. Prolactin
- 21. PTH
- 22. Growth hormone
- 23. Testosterone
- 24. Thyroxine
- 25. Calcitonin
- 26. TSH
Part V

Match the seven anterior pituitary hormones with descriptions below. Two answers will be used twice.

<table>
<thead>
<tr>
<th>ACTH. Adrenocorticotropic hormone</th>
<th>MSH. Melanocyte-stimulating hormone</th>
</tr>
</thead>
<tbody>
<tr>
<td>FSH. Follicle-stimulating hormone</td>
<td>PRL. Prolactin</td>
</tr>
<tr>
<td>hGH. Human growth hormone</td>
<td>TSH. Thyroid-stimulating hormone</td>
</tr>
<tr>
<td>LH. Luteinizing hormone</td>
<td></td>
</tr>
</tbody>
</table>

1. Stimulates ovaries to secrete estrogens and develop future eggs; stimulates sperm production in testes
2. In females, stimulates ovaries to release secondary oocytes (ovulation) and to form corpus luteum, which then releases both estradiol and progesterone
3. In males, stimulates testes to secrete testosterone
4. Stimulates secretion of thyroid hormones
5. Stimulates secretion of hormones from the adrenal cortex
6. Excessive amounts cause skin to darken
7. Stimulates milk production by mammary glands in breast
8. Stress (including physical trauma or interleukin-1) triggers release of this hormone

Answer these questions about posterior pituitary hormones.

9. Stretching (distension) of the uterus during labor ________-creases synthesis of oxytocin (OT). OT then ________-creases uterine contractions, which then ________-creases release of more OT. This is an example of a (positive? negative?) feedback control mechanism. Oxytocin is also known clinically as ________.

10. Oxytocin causes (formation of milk in? ejection or let-down of milk from?) mammary glands. Suckling (stimulates? inhibits?) release of OT and milk.

11. On a day when your body becomes dehydrated by loss of sweat, your ADH production is likely to ________-crease. As a result, your body with ________-creases urinary output, thereby ________-creasing blood volume. This (positive? negative?) feedback mechanism attempts to bring body fluid level back to normal.

12. ADH is also known as vaso-_______, indicating the effect of this hormone to (in? de?)-crease blood pressure by (dilating? constricting?) blood vessels (and therefore blood flow) leading to specific body tissues.

13. Alcohol (stimulates? inhibits?) ADH secretion, which contributes to ________-creased urinary output. For extra review of other factors affecting ADH production, refer to page 323 in the text.

Thyroid and parathyroid glands

14. Identify the location of your own thyroid gland in this exercise. Place the tip of your index finger on the front of your throat. Now swallow. The part that moves up is your “Adam’s apple,” also known as your thyroid cartilage. It is visible in Figure 13.7, on page 324 in your text. The thyroid gland lies just (anterior? posterior?) and (superior? inferior?) to the thyroid cartilage. The thyroid gland is shaped much like a(n) ________.

15. Describe the hormone secretion of the thyroid gland in this exercise.

16. The thyroid is composed of two types of glandular cells. (Follicular? Parafollicular?) cells produce the two hormones ________ and ________. Parafollicular cells manufacture the hormone ________.

17. The ion (Cl⁻? I⁻? Br⁻?) is highly concentrated in the thyroid because it is an essential component of T₁ and T₄. Each molecule of thyroxine (T₄) contains four of the I⁻ ions, whereas T₃ contains ______ ions of I⁻.
Describe functions of thyroid hormone in this Checkpoint.

17. Like growth hormone, thyroid hormones tend to ______-crease protein synthesis. Thyroid hormone especially affects growth of the nervous tissue, so ______-crease of thyroid hormones during fetal development may lead to mental retardation.

Do this exercise on Type II diabetes.

18. This disorder is more likely to occur in persons who are: (circle all correct answers)
   A. Underweight   B. Obese   C. Active   D. Sedentary

19. In type II diabetes, blood levels of insulin are (higher? lower?) than normal (exactly opposite to insulin levels in type I diabetes). The problem is that (insulin is not produced by the pancreas? body cells do not respond to insulin?), a condition known as insulin ____________ .

20. People with type II diabetes tend to have more fat around the (waist? hips?). This “visceral fat” leads to (elevated? low?) levels of triglycerides and LDL’s with ______-creased risk for arteriosclerosis and (high? low?) blood pressure.

21. Write three health tips that can reduce risk for type 2 diabetes.

22. Name the two principal hormones secreted by the adrenal medulla.

   ____________

   Circle the one that accounts for 80 percent of adrenal medulla secretions.

23. Figure . is a diagram of the various endocrine organs of the body. Next to each letter on the diagram, write the name of the endocrine-producing organ (or area). Then select different colors for each and color the corresponding organs in the illustration.
Where necessary, complete statements by inserting the missing words in the answer blanks.

1. For this journey, you will be miniaturized and injected into a vein of your host. Throughout the journey, you will be traveling in the bloodstream. Your instructions are to record changes in blood composition as you float along and to form some conclusions as to why they are occurring (that is, which hormone is being released).

2. Bobbing gently along in the slowly moving blood, you realize that there is a sugary taste to your environment; however, the sweetness begins to decrease quite rapidly. As the glucose levels of the blood have just decreased, obviously \_(1)\_ has been released by the \_(2)\_ so that the cells can take up glucose.

3. A short while later you notice that the depth of the blood in the vein in which you are traveling has diminished substantially. To remedy this potentially serious situation, the \_(3)\_ will have to release more \_(4)\_ so the kidney tubules will reabsorb more water. Within a few minutes the blood becomes much deeper; you wonder if the body is psychic as well as wise.

4. As you circulate past the bones, you notice charged particles shooting pell-mell out of the bone matrix and jumping into the blood. You conclude that the \_(5)\_ glands have just released PTH because the \_(6)\_ levels have increased in the blood. As you continue to move in the bloodstream, the blood suddenly becomes sticky sweet, indicating that your host must be nervous about something. Obviously, his \_(7)\_ has released \_(8)\_ to cause this sudden increase in blood glucose.

5. Sometime later, you become conscious of a humming activity around you, and you sense that the cells are very busy. Your host's \_(9)\_ levels appear to be sufficient because his cells are certainly not sluggish in their metabolic activities. You record this observation and prepare to end this journey.

10. The gonadotropins FSH, LH, and PRL exert their hormonal effects in the:
   a. reproductive system of the male and female
   b. excretory system of the male and female
   c. circulatory system of the male and female
   d. integumentary system of the male and female

11. The hormonal effect(s) produced by adrenal epinephrine is (are):
   a. increased cardiac activity
   b. increased blood glucose levels
   c. increased glycogen breakdown
   d. a, b, and c are correct
12. Which hormones are *not* secreted by the adrenal cortex?
   a. aldosterone and other mineralocorticoids
   b. sex steroids: weak androgens and some estrogens
   c. hydrocortisone and other glucocorticoids
   d. epinephrine and some norepinephrine catecholamines
   e. All of these are secreted by the adrenal cortex.

13. Which statement about glucagon is false?
   a. It is a hormone secreted by the alpha cells within the islets of Langerhans of the pancreas.
   b. It is a hormone that is secreted when blood glucose levels are low.
   c. As a hormone it stimulates both glycogen breakdown (glycogenolysis) and fat breakdown (lipolysis.)
   d. It is a hormone that is secreted during times of fasting (not eating.)
   e. All of these statements regarding glucagon are true.

14. Which statement about diabetes mellitus is false?
   a. It is characterized by fasting hyperglycemia and the presence of glucose in the urine.
   b. Type I, or insulin-dependent diabetes is the more common form.
   c. Type II, or non-insulin-dependent diabetes is caused by decreased tissue sensitivity to insulin so that more is required for normal effect.
   d. Type I diabetes is caused by the destruction of beta cells that produce insulin.
   e. Both types of diabetes mellitus are associated with abnormally high levels of glucagon secretion from the alpha cells of the islets of Langerhans.

15. The hormone, insulin
   a. is secreted by the alpha cells of the pancreas
   b. promotes the entry of glucose and amino acids into tissue cells
   c. promotes the breakdown of glycogen (glycogenolysis) and fat (lipolysis)
   d. levels fall immediately after a meal is eaten

16. The pituitary hormone associated with dwarfism, gigantism, pituitary cachexia, and acromegaly is
   a. FSH
   b. GH
   c. ACTH
   d. TSH
   e. LH
1. The most notable effect of ADH produced in the neurohypophysis of the pituitary gland is to:
   a. increase the amount of water lost at the kidneys
   b. decrease the amount of water lost at the kidneys
   c. stimulate the contraction of uterine muscles
   d. increase or decrease calcium ion concentrations in body fluids

2. Stimulation of contractile cells in mammary tissue and uterine muscles in the female is initiated by secretion of:
   a. oxytocin from the posterior pituitary
   b. melatonin from the pineal gland
   c. oxytocin from the adenohypophysis
   d. melatonin from the neurohypophysis

3. The pituitary gland is connected to the hypothalamus by a slender, funnel-shaped structure called the:
   a. hypophysis
   b. sella turcica
   c. adenohypophysis
   d. infundibulum

4. The hormonal effect(s) of ADH produced by the neurohypophysis is (are):
   a. reabsorption of water
   b. elevation of blood volume
   c. elevation of blood pressure
   d. a, b, and c are correct

5. When the posterior lobe of the pituitary gland no longer releases adequate amounts of A DI, the result is development of:
   a. hypergonadism
   b. diabetes insipidus
   c. decreased urine production
   d. decreased blood glucose levels

6. The adrenal cortex consists of a:
   a. posterior, anterior, and lateral lobe
   b. zona glomerulosa, zona fasciculata, zona reticularis
   c. pars tuberalis, pars distalis, pars intermedia
   d. C cell population, chief cells, oxiphils

7. The net result of parathyroid hormone (PTH) secretion is:
   a. it inhibits the reabsorption of Ca²⁺ at the kidneys
   b. it increases the rate of calcium deposition in bone
   c. it increases Ca²⁺ concentration in body fluids
   d. it increases the urinary output and losses

8. The pinealocytes of the pineal gland produce the hormone melatonin, which is believed to:

9. Which gland is responsible for the secretion of thyroid-stimulating hormone?
   A. thyroid
   B. hypothalamus
   C. anterior pituitary
   D. posterior pituitary
   E. A and D are correct

10. Exocrine glands release their secretions into a duct or onto a surface, whereas endocrine glands secrete into
    A. muscle tissue
    B. open cavities
    C. closed cavities
    D. extracellular space around the secretory cells
    E. none of the above are correct

11. Antidiuretic hormone and oxytocin are produced by the
    A. anterior pituitary
    B. posterior pituitary
    C. parathyroid glands
    D. hypothalamus
    E. A and D are correct

12. Giantism is associated with hypersecretion of a hormone from the
    A. anterior pituitary
    B. thyroid
    C. adrenals
    D. posterior pituitary
    E. testes

13. Thyroxine production is dependent upon adequate dietary intake of which ion?
    A. calcium
    B. potassium
    C. iodine
    D. magnesium
    E. sodium

14. If an individual has type 1 diabetes mellitus, which pancreatic cells are involved with this disorder?
    A. delta
    B. alpha
    C. beta
    D. F-cells
    E. none of the above are correct

15. Which of the following is a gonadotropin?
    A. ACTH
    B. FSH
    C. PRL
    D. MSH
    E. hGH