Endocrine System

LEARNING OBJECTIVES

- Define 10 terms relating to the endocrine system.
- Describe the function of the endocrine system.
- Identify at least nine endocrine system structures.
- Identify at least one hormone produced by each of the 10 endocrine glands.
- Describe at least three methods used to assess the function of the endocrine system.
- Describe at least five disorders of the endocrine system.

KEY TERMS

Basal metabolic rate (BAY-sal met-uh-BOL-ik rayt) Minimal energy expended for respiration, circulation, peristalsis, muscle tone, body temperature, and glandular activity of the body at rest

Endocrine (EN-do-krin) Glands that secrete internally into blood or lymph

Exophthalmos (ek-sof-THAL-mus) Abnormal protrusion of eyeball

Gonadotropin (go-NAD-o-trope-in) Any hormone that stimulates the reproductive organs

Hormone (HORE-mone) Chemical substance produced in the body that has specific regulatory effect on the activity of a specific organ

Hyperglycemia (hi-per-glye-SEE-mee-uh) Abnormally high sugar content in the blood

Hypoglycemia (hi-po-glye-SEE-mee-uh) Abnormally low sugar content in the blood

Immunossay (im-yoo-no-AS-say) Quantitative determination of antigenic substances by examination of blood

Polydipsia (pol-ee-DIP-see-uh) Excessive thirst persists for long periods

Polyphagia (pol-ee-FAY-jee-uh) Excessive hunger

Polyuria (pol-ee-YOO-ree-uh) Passage of a large volume of urine in a given time

Prostaglandin (pros-tah-GLAN-din) Lipid molecule that has hormone-like effect; tissue hormone

Puberty (PYOO-ber-tree) Period during which the secondary sexual characteristics begin to develop and the capability of sexual reproduction is attained
The primary function of the endocrine system is to produce hormones that monitor and coordinate body activities (Fig. 18-1). Hormones are chemical messengers secreted by the endocrine glands. Each type of hormone moves through the blood to its own target cells, which react specifically to it. The endocrine glands secrete hormones directly into the bloodstream. Hormones may be proteins, glycoproteins, polypeptides, amino-acid derivatives, or lipids.

Hormones may be divided into two classes on the basis of their composition and the way they influence their target organs:

- Nonsteroid hormones are proteins that work as "first-messengers." They act on cells of the target organ to cause them to produce or release a second messenger molecule.
- Steroid hormones influence the target organ independently.

Hormones may also be divided into categories on the basis of their function:

- Tropic hormones target other endocrine structures to increase their growth and secretions.
- Sex hormones influence reproductive changes.
- Anabolic hormones stimulate the process of building tissues.

Endocrine System Terminology*

An adenoma may be benign or cancerous, like this adenocarcinoma of the intestines. (From Cooke PA, Stewart B: Colour atlas of anatomical pathology, ed 3, Sydney, 2004, Churchill Livingstone.)

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
<th>Prefix</th>
<th>Root</th>
<th>Suffix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acromegaly</td>
<td>Enlargement of the extremities</td>
<td>acro</td>
<td>megaly</td>
<td></td>
</tr>
<tr>
<td>Adenoma</td>
<td>Tumor of a gland</td>
<td>aden</td>
<td>oma</td>
<td></td>
</tr>
<tr>
<td>Adenolipoma</td>
<td>Softening of a gland</td>
<td>aden/o</td>
<td>malacia</td>
<td></td>
</tr>
<tr>
<td>Adrenalectomy</td>
<td>Removal of the adrenal gland</td>
<td>adrenal</td>
<td>ectomy</td>
<td></td>
</tr>
<tr>
<td>Adrenocorticotropin</td>
<td>To secrete inside</td>
<td>advent</td>
<td>cortico</td>
<td>trophi</td>
</tr>
<tr>
<td>Hyperglycemia</td>
<td>Too much sugar in the blood</td>
<td>hyperglycemia</td>
<td>enia</td>
<td></td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>Inflammation of the pancreas</td>
<td>pancreatitis</td>
<td>itis</td>
<td></td>
</tr>
<tr>
<td>Polyp</td>
<td>Excessive hunger</td>
<td>polyphagia</td>
<td>polyphagia</td>
<td></td>
</tr>
<tr>
<td>Polypus</td>
<td>Excessive excoration of urine</td>
<td>polyuria</td>
<td>polyuria</td>
<td></td>
</tr>
<tr>
<td>Thyroidectomy</td>
<td>Removal of the thyroid</td>
<td>thyroidectomy</td>
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</tbody>
</table>

*Most of the endocrine glands secrete more than one hormone with functions not listed here.

Abbreviations of the Endocrine System

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADH</td>
<td>Antidiuretic hormone</td>
</tr>
<tr>
<td>ANS</td>
<td>Autonomic nervous system</td>
</tr>
<tr>
<td>BMR</td>
<td>Basal metabolic rate</td>
</tr>
<tr>
<td>DM</td>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>FSH</td>
<td>Follicle stimulating hormone</td>
</tr>
<tr>
<td>GH</td>
<td>Growth hormone</td>
</tr>
<tr>
<td>SIADH</td>
<td>Syndrome of inappropriate antidiuretic hormone</td>
</tr>
<tr>
<td>TSH</td>
<td>Thyrotropin hormone</td>
</tr>
<tr>
<td>TH</td>
<td>Thyroid hormone</td>
</tr>
<tr>
<td>TSH</td>
<td>Thyroid-stimulating hormone</td>
</tr>
</tbody>
</table>

Structure and Function of the Endocrine System

The pituitary gland is the "master" gland because the hormones that it produces regulate the secretion of other glands (Fig. 18-3). It is located at the base of the brain and is divided into two parts: the anterior and posterior.

The anterior pituitary (adenohypophysis) gland produces seven hormones:

- Thyroid-stimulating hormone (TSH) stimulates the growth and secretion of the thyroid gland.

**TABLE 18-1**

<table>
<thead>
<tr>
<th>Gland</th>
<th>Hormone</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pituitary</td>
<td>Somatotropin (or growth hormone [GH])</td>
<td>Promotes tissue growth and development</td>
</tr>
<tr>
<td>Pineal</td>
<td>Melatonin</td>
<td>Supports the biological clock</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Thyroxine (T4)</td>
<td>Regulates the metabolic rate</td>
</tr>
<tr>
<td>Parathyroid</td>
<td>Parathyroid hormone (PTH)</td>
<td>Regulates calcium and phosphates in the bloodstream and bones</td>
</tr>
<tr>
<td>Thymus</td>
<td>Thymosin</td>
<td>Stimulates development of T cells</td>
</tr>
<tr>
<td>Adrenal</td>
<td>Epinephrine</td>
<td>Regulates autonomic nervous system response</td>
</tr>
<tr>
<td>Pancreatic islets</td>
<td>Insulin</td>
<td>Regulates blood sugar</td>
</tr>
<tr>
<td>Ovaries</td>
<td>Estrogen</td>
<td>Regulates female sexual characteristics</td>
</tr>
<tr>
<td>Testes</td>
<td>Testosterone</td>
<td>Regulates male sexual characteristics</td>
</tr>
</tbody>
</table>

Glads and their Hormones

**Hypothalamus**

The hypothalamus is a structure located above the pituitary gland that translates nervous system impulses into endocrine system messages. It regulates the secretions of the pituitary adenohypophysis by secreting neurohormones that stimulate or inhibit pituitary hormones. For example, the hypothalamus produces a growth hormone-releasing hormone that stimulates the pituitary to release growth hormone.

**Pituitary**

The pituitary gland (hypophysis) is sometimes called the "master" gland because the hormones that it produces regulate the secretion of other glands (Fig. 18-3). It is located at the base of the brain and is divided into two parts: the anterior and posterior.

The anterior pituitary (adenohypophysis) gland produces seven hormones:

- Thyroid-stimulating hormone (TSH) stimulates the growth and secretion of the thyroid gland.
**Brain Byte**

Although the pituitary gland is called the "master gland" because its hormones control other glands, the hypothalamus releases chemicals that stimulate the release of pituitary hormones.

- Luteinizing hormone (LH) stimulates ovulation and the formation of the corpus luteum in the menstrual cycle.
- In males, the LH, called interstitial cell-stimulating hormone, stimulates the secretion of testosterone.
- Lactogenic hormone (prolactin) stimulates the secretion of milk and influences maternal behavior.
- Somatotrophic hormone, also called the growth hormone, accelerates the growth of the body.

The posterior pituitary (neurohypophysis) produces two hormones:
- Antidiuretic hormone (ADH), or vasopressin, maintains water balance by increasing the reabsorption of water by the kidneys.
- Oxytocin (Pitocin) promotes the ejection of milk and stimulates uterine contractions during pregnancy.

**Pineal Body**

The pea-sized pineal body is a gland located deep within the brain. It produces the hormone melatonin. Melatonin regulates the release of substances in the hypothalamus of the brain that influence secretion of the pituitary gonadotropins, or sex hormones. It is believed that melatonin inhibits the activity of the ovaries and LH secretion. Thus, it influences the menstrual cycle and onset of puberty. Melatonin is also believed to be involved in the regulation of the "biological clock," or the body's physiologic reaction to changes in light and dark.

**Thyroid**

The thyroid, a butterfly-shaped gland with two lobes, is located in the neck. The thyroid produces hormones that regulate body metabolism. They are called thyroxine and triiodothyronine. Lactation is required for production of both of these hormones. Calcitonin, another hormone produced by the thyroid, decreases the amount of calcium in the blood.

**Parathyroid**

The parathyroids are actually four tiny glands attached to the back of the thyroid gland. They secrete parathyroid hormone, which also affects the amount of calcium in the blood. This hormone increases the blood's calcium level by breaking the bonds of calcium and phosphorus compounds in the bones. It also increases the rate of phosphorus excretion by the kidneys.

**Thymus**

The thymus is a butterfly-shaped gland located above the heart. It produces the hormone thymosin, which stimulates the lymphoid organs to produce T lymphocytes or antibodies in newborns and young children. The thymus gland provides additional immunity until it disintegrates and is replaced with fatty tissue at the time of puberty.

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Hormonal Changes of Pregnancy

With the onset of pregnancy, many hormonal changes occur that influence the appearance and function of the woman’s body. The placenta, or interfacing organ between the fetal and maternal circulation, produces a hormone called human chorionic gonadotropin (HCG), which stimulates the development and secretion of the ovaries to maintain the uterine lining. HCG can be detected in the urine and is used for pregnancy testing.

**Brain Byte**

Injections of HCG are used as part of a rapid weight loss program called Simons therapy.

The increased estrogen and progesterone from the ovaries are maintained until the placenta begins to produce these hormones for the duration of the pregnancy. Progesterone increases the mobility of the pelvic and lower bones of the back to allow the birthing process and may result in backache. Dilatation of the ureters and renal pelvis may lead to urinary frequency. Progesterone also decreases the mobility and tone of the gastrointestinal tract and causes relaxation of the pyloric sphincter. It may cause heartburn and constipation.

During pregnancy the pituitary and thyroid glands increase in size, resulting in a higher metabolic rate. The adrenal gland secretions increase, especially aldosterone. An increase in the plasma level of insulin may be due to an increase in lipids or fats in the blood. Additionally, the destruction of insulin is faster during pregnancy, which may lead to a condition called “gestational” diabetes in which the woman’s pancreas cannot produce enough insulin. The changes in the hormonal levels during early pregnancy may also be responsible for the nausea and vomiting called “morning sickness.”

Hormonal Changes of Puberty

Puberty is the time during which the body matures sexually. Hormones of the pituitary gland direct the changes that occur during puberty. These stimulate the gonads to secrete the hormones that cause the testes and ovaries to mature. In males the testes enlarge. In females the menstrual cycle (menarche) begins. Both acquire the ability to reproduce. Chapter 21 provides more information about the reproductive system.

The adrenal gland secretes the hormones that begin the development of secondary sexual characteristics, those body features that are different in males and females but do not directly affect reproduction. In the male the voice deepens and facial hair begins to grow. In the female the breasts enlarge and fatty tissue is deposited around the hips. In both males and females, height and weight increase. Emotional changes, which have been attributed to hormonal changes, may also occur during this growing time.

Assessment Techniques

Hormonal disorders except diabetes mellitus (types 1 and 2) and thyroid disease are rare. Thyroid function may be assessed by using the basal metabolic rate and protein-bound iodine studies. However, results of both of these tests can be affected by many other factors. Several newer methods now used for assessment of the endocrine disorders include immunoassays, radioiodine uptake studies, and glucose tolerance testing.

1. Basal metabolic rate is the amount of energy necessary to maintain the functions of a resting body, including circulation, respiration, digestion, and cell metabolism. The basal metabolic rate is measured by a test called indirect calorimetry, which measures the amount of oxygen consumed.

2. Protein-bound iodine is a blood test to measure the amount of proteins attached to thyroxine. Test results may be influenced by cough syrups, iodine used in tests, diuretics, steroids, and pregnancy.

3. Immunoassay is a chemical test in which a blood specimen is mixed with a specific agent. The number of antigens formed indicates the presence of certain hormones.

4. Radiodine uptake involves drinking radioactive iodine and measuring the iodine absorbed by the thyroid with a Geiger counter. The rate that the thyroid removes the iodine from the blood indicates how well it is functioning.

5. The glucose tolerance test assesses the function of the pancreas, using urine and blood specimens. Glucose is given and specimens are compared over time. This measures the efficiency of the insulin production of the pancreas.

**DISORDERS OF THE Endocrine System**

**Acronegaly** (ak-ro-MEG-uh-lee) is an enlargement of the bones of the hands, feet, and jaws (Fig. 18-4). It results from an increased secretion of somatotropic (growth-trophic) hormone, usually caused by a pituitary tumor. Heavy perspiration, oily skin, excess body hair, high blood pressure, and other symptoms may also result. Treatment includes surgical removal of the tumor or radiation to destroy gland tissue.

**Addison’s** (AD-ih-sun) disease is caused by hyposecretion of the hormones produced by the cortex of the adrenal gland. The person with Addison disease experiences excessive skin pigmentation, decreased blood sugar, and decreased blood pressure, which results in muscle weakness, fatigue, gastrointestinal disturbances, and dehydration. Treatment includes administration of cortisone, a decrease in sodium intake, and monitoring the level of potassium and sodium in the blood.

**Cretinism** (KREE-tin-zm) is a condition resulting from a congenital deficiency of thyroid secretion, or hypothyroidism (hi-POI-thoy-rid-zm). The basal metabolic rate and mental and physical growth are decreased. Early indications of hypothyroidism include jaundice, excessive drowsiness, and a hoarse cry. Hypothyroidism can be treated by oral administration of thyroxine, and early treatment can minimize mental and physical damage.

**Cushing’s** (KOOSH-ing) syndrome is a disorder that causes hyperactivity of the adrenal glands, which has been triggered by oversecretion of the pituitary hormone ACTH. The person with Cushing syndrome has a redistribution of fat, giving a distinctive “moon face” and “buffalo hump” appearance (Fig. 18-5). Sexual dys trophy, increased blood pressure, unusual hair growth (hirsutism), and easy bruising also result. Treatment depends on the cause of the hormone imbalance. If the cause is a tumor, it is surgically removed.

**Diabetes insipidus** (da-1-TEE-uh-IN-sip-i-dus) results from an acquired or inherited decrease in the
Diabetes mellitus (die-uh-BEE-tee mel-LIE-tus) is a complex disorder of carbohydrate, fat, and protein metabolism resulting from insufficient insulin production by the pancreas. Its cause is unknown. The person with diabetes mellitus experiences unusual thirst (polydipsia), increased urine output (polyuria), and unusual hunger (polyphagia) (Table 18-2). Hyperglycemia may result, which is a greater-than-normal amount of glucose in the blood, causing nausea, headache, coma, and, if untreated, eventual death.

Two main types of diabetes mellitus exist. Type 1 can occur at any age and results when the pancreas does not produce insulin. Treatment includes injection of insulin to meet this need. Type 2 diabetes is linked with obesity. The pancreas does not produce enough insulin to meet the need of the body. Treatment may include oral hypoglycemic medication and weight loss. Having a blood glucose level that is higher than normal but not high enough to be classified as diabetes is called prediabetes. The Centers for Disease Control and Prevention (CDC) estimate that 57 million Americans were prediabetic in 2007.

### TABLE 18-2 Signs and Symptoms of Diabetes Mellitus

<table>
<thead>
<tr>
<th>Hyperglycemia</th>
<th>Hypoglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased thirst</td>
<td>Weakness</td>
</tr>
<tr>
<td>Increased urination</td>
<td>Trembling</td>
</tr>
<tr>
<td>Weight loss</td>
<td>Drowsiness</td>
</tr>
<tr>
<td>Increased appetite</td>
<td>Headache</td>
</tr>
<tr>
<td>Nausea</td>
<td>Confusion</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Dizziness</td>
</tr>
<tr>
<td>Fatigue</td>
<td>Double vision</td>
</tr>
<tr>
<td>Ketonoadosis</td>
<td>Insulin shock</td>
</tr>
</tbody>
</table>

According to the CDC, people with prediabetes can reduce the onset of type 2 diabetes by 58% with lifestyle changes, including at least 7% weight loss and at least 150 minutes of physical activity per week.

### CASE STUDY 18-1
You are helping admit a patient to the hospital for fatigue and weight loss. He has lost 64 lb in 2 years even though he is eating more. He also complains of being thirsty and irritable all the time. What should you do?

Answers to Case Studies are available on the Evolve website: [http://evolve.elsevier.com/Gardin](http://evolve.elsevier.com/Gardin)

### CASE STUDY 18-2
Your friend who has diabetes tells you she is feeling faint and needs something to eat quickly. What should you do?

Answers to Case Studies are available on the Evolve website: [http://evolve.elsevier.com/Gardin](http://evolve.elsevier.com/Gardin)

### BRAIN BYTE
Dwarfism (DWARF-izm) is usually characterized by a normal trunk and head with shortened extremities. It results from hypossecroption of the growth hormone of the pituitary gland, which has been caused by a tumor, infection, genetic factors, or trauma (Fig. 18-6). If discovered in the development years, dwarfism can be treated with injections of a somatotropic hormone (growth hormone) for 5 years or longer. Dwarfism does not affect intelligence.

**Gigantism** (ji-GAN-tizm), or gigantism (see Fig. 18-6), is an excessive growth of the long bones caused by hypersecretion of the somatotropic hormone. Treatment may include hormones to control growth and perhaps removal or destruction of the pituitary if diagnosed early.

**Carcinoma (kar-sin-o-ma)** is caused by hyperthyroidism (hi-pur-THY-roid-izm) or thyrotoxicosis (the-oh-to-rih-KOS-is). The person with Graves disease experiences nervousness; rapid pulse; weight loss; irritability; sensitivity to heat; increased basal metabolic rate and blood sugar; and sometimes exophthalmos, or protruding eyeballs. Treatment includes removal of part or all of the thyroid and administration of drugs to decrease the thyroxine level. Adults older than 40 years can be given radioactive iodine to destroy thyroid tissue.

**Hyperparathyroidism** (hi-per-par-uh-thuh-THY-roid-izm) causes hypercalcemia (hi-per-kal-see-mee-uh), an increased calcium blood level. It can cause kidney stone formation. The calcium is taken from the bones, which can lead to fractures and deformities. This condition is often caused by an adenoma (ad-uh-NO-ma), a glandular tumor, and treatment requires its removal.

**Hypoglycemia** (hi-poh-glih-see-mee-uh) results from increased insulin production by the pancreas.

Syndrome of inappropriate antidiuretic hormone (SIADH) involves water intoxication and the dilution of intracellular and extracellular body tissues, usually resulting from lung cancer. Antidiuretic hormone production is increased in the pituitary gland. SIADH can lead to convulsions and death. Treatment is removal of the cancer, restriction of fluids, and drug therapy.

**Virilism (VIR-ih-lizm)** results from increased secretion in the adrenal glands. Adrenal virilism may be present at birth due to congenital adrenal hyperplasia. It may also develop later in life due to a tumor. The female may develop male sexual characteristics, including facial hair, broad shoulders, and small
breasts. Treatment focuses on the cause of hypersecretion by the gland.

**Issues and Innovations**

**Diabetes**

According to the CDC, 23.6 million people, or about 8% of the U.S. population, have diabetes. Of the 8%, it is estimated that 5.7 million people have not been diagnosed. In 2007 there were 1.6 million new cases diagnosed in people 20 years or older. In the same population, diabetes was the leading cause of new cases of blindness, kidney failure, and lower-extremity amputations not caused by trauma (Fig. 18-8). In 2006 it was the seventh leading cause of death. The International Diabetes Federation is an umbrella organization of more than 200 national diabetes associations in more than 160 countries. Their statistics indicate that diabetes rates are highest in India, China, and the United States and can be considered an epidemic.

**Figure 18-7** Simple goiter is a painless enlargement of the thyroid gland that may result from inadequate iodine intake in the diet. (From Swartz MH: Textbook of physical diagnosis, ed 6, Philadelphia, 2010, Saunders.)

In 2002 Florida became the first state to offer screening for diabetes mellitus to all newborns. The newborns will be monitored throughout their lifetime. The purpose of this program is to identify newborns with genetic risk for developing type 1 diabetes and refer them to clinical trials and research designed to end the disease.

Another clinical trial in Florida is using infusion of cord stem cells into children with type 1 diabetes. Using the children's own cells, the researchers are comparing this treatment with standard insulin injection. Preliminary results indicate that infusion of cord blood stem cells is safe and may slow the progression of type 1 diabetes in children.

**Steroid Abuse**

Abuse of hormones continues to be a problem, especially by athletes hoping for better performance. In 2008 a National Institute of Drug Abuse survey indicated that 1.4% of eighth and tenth grade students and 2.2% of high school students have tried steroids. Performance-enhancing or "ergogenic" steroids are commonly abused. These include somatotropin, or growth hormone, and androgenic anabolic steroids such as testosterone. The benefit, if any, from use of these hormones in sports training is far less than the health risk imposed. The effects of even a short use of these steroids can be long lasting or permanent.

Synthetic growth hormone was developed to treat children with a deficiency of this pituitary hormone. Some athletes believe that supplementing exercise with growth hormone will improve performance, but such improvement has not been shown scientifically. It is known that an oversupply of the hormone in adults leads to physical changes of acromegaly.

Androgenic anabolic steroids, including synthetic drugs similar to the hormone testosterone, have been banned by most sports organizations. Muscle growth can be increased with use of anabolic steroids, but the risks and complications far exceed the benefits. Effects on men include early baldness, stunted growth, changes in liver structure, liver tumors, decreased sperm production, testicular atrophy, enlarged breasts, and increased risk of cardiovascular disease. Effects on women include menstrual irregularities, complete loss of menstrual cycle (amenorrhea), abnormal hair placement (hirsutism), baldness, and irreversible deepening of the voice. Bad breath, severe acne, headache, dizziness, hypertension, mood swings, and aggressiveness ("roid rages") are commonplace in both sexes.

**Review Questions**

1. Describe the functions of the endocrine system.
2. Describe the location and function of each of the following parts of the endocrine system: adrenal medulla, pituitary gland, pineal body.
3. Describe three tests used to assess the function of the endocrine system.
4. Describe three changes that occur during puberty as a result of hormonal changes.
5. Describe three changes that occur during pregnancy as a result of hormonal changes.
7. Use the following terms in one or more sentences that correctly relate their meaning: endocrine,
hormone, hyperglycemia, polyphagia, and polyuria.

**Critical Thinking**

1. Investigate and compare the cost of at least three tests used to diagnose disorders of the endocrine system.
2. Investigate the function of at least five common medications used in treatment of the endocrine system.
3. List at least five occupations involved in the health care of endocrine system disorders.
4. Compare the difference between the conditions of being a dwarf or midget.
5. Investigate and describe the function of the following exocrine glands: lacrimal, mammary, salivary, and sudoriferous.
6. Use the Internet to research the incidence of steroid abuse in sports and the methods used to combat this problem. Create a pamphlet that describes the issue.
7. Use the Internet to research and review an article regarding a recent development or treatment method relating to the endocrine system.

**Explore the Web**

**Diabetes Success Stories**
CDC

CDC
http://www.cdc.gov/diabetes/

IDF Diabetes Atlas
http://www.diabetesatlas.org/

**Steroid Abuse**
National Institute on Drug Abuse
http://www.drugabuse.gov/students.html

U.S. Department of Justice

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**Nervous System**

**LEARNING OBJECTIVES**

- Define at least 10 terms relating to the nervous system.
- Describe the function of the nervous system.
- Identify at least 10 structures of the nervous system.
- Identify at least three methods used to assess the function of the nervous system.
- Describe at least five disorders of the nervous system.

**KEY TERMS**

- **Cerebrospinal fluid** (seh-re-eo-sproh-SNAL FLOW-id) Fluid contained in the brain’s ventricles, intracranial spaces, and central canal of the spinal cord
- **Dementia** (de-MEN-shoo-uh) Organic loss of intellectual function
- **Epilepsy** (ih-lep-see) Transient disturbances of brain function
- **Impulse** (IM-putz) Sudden pushing force; activity along nerve fibers
- **Intracranial** (in-tra-KRAY-nul) Situated within the cranium
- **Ischemia** (ih-ZHEEM-ee-uh) Insufficient blood to a body part caused by a functional constriction or actual obstruction of a blood vessel
- **Meninges** (me-NING-jeez) Three membranes that surround and protect the brain and spinal cord
- **Myelography** (my-eh-LOG-rah-fee) X-rays of the spinal cord after injection of a contrast medium
- **Neurotransmitter** (noo-ROH-TRANS-mit-er) Chemical messenger, released from the axon of one neuron, that travels to another nearby neuron
- **Polyneuritis** (poh-ua-nee-REE-teez) Inflammation of many nerves at once
- **Reflex** (REEF-leeks) An involuntary action in response to a stimulus
- **Regenerate** (REH-gin-ee) Natural renewal of a structure, as of lost tissue or part
- **Senile** (SEN-uh-lee) Pertaining to or characteristic of old age, especially physical or mental deterioration accompanying aging