function, slow the immune response of the body, and maintain steady glucose levels. Ninety-five percent of the glucocorticoids are cortisone.

The pineal gland, which is in the brain, secretes **melatonin** in response to input from the eyes. The more light that enters, the less melatonin is released. Melatonin is what helps us to sleep; thus, in the darker hours of night and winter, we tend to feel sleepier. When the pineal gland fails, sleep is impaired, and melatonin or barbiturates (see Chapter 13) may be prescribed to correct this disorder. See the Master the Essentials table for descriptions of the most common endocrine system drug classifications.

ENDOCRINE SYSTEM MEDICATIONS

Medications used to treat disorders of the endocrine system can be separated into three categories: medications for thyroid and parathyroid disorders, medications for pancreatic disorders, and medications for adrenal disorders.

Medications for Thyroid and Parathyroid Disorders

The thyroid gland cues individual cells to work. It is an "on" switch for the body. The thyroid gland has an integral role in the body's metabolism. It produces two hormones, **triiodothyronine (T_3)** and **thyroxine (T_4),** which stimulate every tissue in the body to produce proteins and increase the amount of oxygen used by cells. Therefore, when the thyroid gland fails to work properly, the patient has less energy, and every cell in the body is affected. Decreased levels of these two hormones indicate hypothyroidism. Prolonged hypothyroidism can lead to a skin and tissue disorder called **myxedema,** which may be difficult to treat. A decrease of thyroid hormone secretion in utero and early infancy causes **cretinism** (slowed brain growth) in children. Rapid treatment can prevent both mental retardation and growth retardation.

To treat hypothyroidism, patients take oral doses of these hormones. These medications are prepared from natural sources, such as dried porcine thyroid gland, which include thyroid (Armour Thyroid, Bio-Throid) and liothyronine (Cytomel), or they are synthetically manufactured tablets such as levothyroxine (Synthroid, Levoxyl). This is known as **hormone replacement therapy (HRT).** Because a naturally occurring substance is being replaced, this medication is safe for use during pregnancy, although breastfeeding should be discussed with the physician. Caution should be used in elderly patients and those with heart problems or diabetes.

Hyperthyroidism results from an excess of thyroid hormone, leading to **Graves' disease,** characterized by bulging eyes, hyperactive metabolism, **goiter** (enlarged thyroid), and weight loss. **Thyroid storm,** which is a life-threatening condition and includes such symptoms as tachycardia, hyperthermia, chest pain, sweating, weakness, heart failure, anxiety, shortness of breath, and disorientation, can occur if hyperthyroidism is untreated. The thyroid gland can be inhibited from secreting T_3 and T_4 by thyroidectomy or with radioactive sodium iodide I-131 (Iodotope). The sodium iodide I-131 is taken by mouth; it is trapped within the thyroid gland and damages the thyroid's ability to function. Other oral antithyroid drugs, such as propylthiouracil or methimazole (Northyx, Tapazole), can also be used. These medications should be avoided in pregnancy and in breastfeeding mothers.

CRITICAL THINKING

How does removal of the thyroid gland affect calcium in the body?

Medications to Treat Pancreatic Disorders

The pancreas functions properly when it secretes the correct amount of both insulin and glucagon. When this does not happen, the patient may develop one of two serious conditions: hyperglycemia or hypoglycemia. **Hyperglycemia** results from an excess of glucose in the blood. This condition can lead to problems with wound healing, high blood pressure, and nerve damage, among others. **Hypoglycemia** is caused by too little glucose in the blood and can lead to death. If the patient has low blood glucose, energy to fuel the cells is insufficient. Signs and symptoms of hypoglycemia are restlessness, shaky hands, lethargy, seizures, and coma (Fast Tip 15.1). Hypoglycemia is normally treated with a small dose of glucose such as hard candy, but patients may also choose to carry glucose preparations such as