



**FIGURE 12-2:** Thyroid and parathyroid glands. Parathyroid hormone (PTH) and calcitonin help keep calcium in the body in balance. (A) The parathyroid glands secrete PTH, which pulls calcium from the bones into the bloodstream. (B) The thyroid gland secretes calcitonin, which puts calcium into the bones.

Conversely, the parathyroid gland secretes parathyroid hormone, which increases the amount of calcium in the blood and leads to a loss of calcium in the bones. Both glands work together to keep calcium levels in balance. If these glands do not function appropriately, abnormal calcium levels may lead to bone abnormalities. Calcium also assists in muscle contraction and nerve impulses, so abnormalities can lead to altered muscle functioning. Other minerals (magnesium and potassium) stored in the bones also affect musculoskeletal functioning (see the Master the Essentials table for descriptions of the most common musculoskeletal system drugs).

Medications used for musculoskeletal disorders can be placed into two categories: those to treat muscular disorders and those to treat bone disorders. Disorders include conditions causing impaired movement, pain, and damage to muscles, bones, and/or joints.

## ■ MEDICATIONS USED TO TREAT MUSCULAR DISORDERS

Muscle disorders comprise a range of ailments. Some originate in the brain (e.g., cerebral palsy, stroke, and multiple sclerosis), and some arise in the muscle tissue itself. Muscle spasms can develop from these disorders or from the use of psychotropic drugs. Certain conditions (e.g., injury to a muscle in the back, muscular dystrophy) cause the patient's muscles to move in uncoordinated, or spastic, ways. Other patients have **dystonia**, which is abnormal tension in one area of the body, such as the limbs, neck, face, eyes, or spine. Medications used to treat some of the muscular problems found in these disorders include muscle relaxants such as Flexeril (cyclobenzaprine) and **antispasmodics** such as Skelaxin (metaxalone); these drugs relax muscles and relieve muscle spasms. Both types of medications work with the central nervous system (CNS) to inhibit the neurological activity that causes the spasms or rigidity. Sometimes the antispasmodics or muscle relaxants are classified as benzodiazepines (Valium [diazepam]) or have CNS effects to maximize effectiveness. One of the newer drugs on the market, Cymbalta (duloxetine), which is used for chronic low back pain, is an antidepressant. This drug may decrease the stress felt with chronic pain and help patients live more productive, mobile lives.

Other antispasmodics focus on the muscle itself. Botulinum toxin type A (Botox and Botox Cosmetic [onabotulinumtoxin A]) is a toxic substance derived from the bacterium *Clostridium botulinum*, which, in high doses, causes food poisoning (botulism). However, researchers have found that in lower doses