

Saladin 7E
Answer Key
Chapter 3, Cellular Form and Function

Testing Your Comprehension

1. If a saltwater fish were placed in a freshwater aquarium, its cells would rapidly absorb water and rupture. Marine fish are adapted to have body fluids isotonic to seawater. They would be hypertonic to freshwater, so water would move by osmosis into the fish's cells. Conversely, if a freshwater fish were put in a saltwater aquarium, its cells would be hypotonic to the saltwater. They would lose water and shrivel. Either fish would soon die.
2. In crush injuries of this sort, blood potassium level rises. Potassium is normally more concentrated in the intracellular fluid than in the extracellular fluids, and the injury breaks up cells and releases potassium into the extracellular fluids.
3. Because of the low level of blood albumin, such children have abnormally low blood osmolarity. The bloodstream osmotically retains less fluid than normal, so the water content and volume of the blood drop.
4. Mitochondria do not create energy, but only transfer it from one molecule to another. What they do make is the high-energy compound ATP, but the energy content of the ATP they produce is less than the energy content of the pyruvate molecules they used to do so.
5. Without dynein arms, cilia and flagella cannot move. If flagella are immobile, then sperm cannot move, since the sperm tail is composed mainly of a flagellum. Lacking sperm motility, a man with Kartagener's syndrome is sterile. He also suffers severe respiratory congestion because the cilia of the respiratory tract are unable to move and propel mucus. Mucus continues to be secreted, but accumulates in the airway.