

Saladin 7E
Answer Keys
Chapter 7, Bone Tissue

Testing Your Comprehension

1. Osteocytes adjacent to a central canal communicate by way of their cytoplasmic processes with osteocytes farther away, and transfer nutrients to those other osteocytes by way of these processes.
2. Given that he has gone from a fairly sedentary lifestyle to a very active one, we would expect to see increased density in all weight bearing bones of the appendicular skeleton. In addition to the increased density, we would see increased and modified trabeculae in the spongy bone of his femur, and lumbar vertebrae as the backpack he carries on his hiking trips is heavy.
3. Blood calcium concentration is hormonally regulated within a narrow range of the homeostatic set point (9.2–10.4 mg/dL). If the calcium concentration drops below this range, parathyroid hormone (PTH) secretion rises, osteoclast activity increases, and the blood calcium concentration returns to normal. If the concentration rises above this range, PTH secretion falls and calcitonin secretion rises. The latter hormone lowers the calcium level by stimulating osteoblast activity, especially in children. Thus, in typical negative feedback fashion, the body has a way of sensing variations in blood calcium concentration and hormonally activating effectors (osteoclasts and osteoblasts) that correct the imbalance.
4. The trabeculae of spongy bone are not arranged randomly like the fibers of a kitchen sponge, but rather, are aligned along lines of stress in the bone so they can bear the greatest amount of stress for the least amount of bone mass. Thus, the structural arrangement of spongy bone trabeculae reflects their load-bearing function.
5. If the epidermis blocked all UV radiation from reaching the blood vessels in the dermis, there would be no conversion of 7-dehydrocholesterol to previtamin D₃, the first step in calcitriol synthesis. If no vitamin D were taken orally to compensate for this, then we would expect to see rickets in children or osteomalacia in adults. Both of these diseases result from inadequate bone deposition in the absence or insufficiency of vitamin D.