Chapter 20, The Circulatory System: Blood Vessels and Circulation

"Apply What You Know" Answers

p. 753—The large arteries have an abundance of elastic sheets and fibers in the tunica media. These sheets and fibers give the large arteries their ability to stretch and recoil.

p. 754—The flow will increase by a factor of r^4 (r = radius). If the flow were 3 mL/min at r = 1 mm, then at r = 5 mm the flow would increase by a factor of 5^4, or 625-fold; thus the new flow would be (625)(3 mL/min) = 1,875 mL/min.

p. 757—Renin catalyzes the first step in the synthesis of angiotensin II, a potent vasoconstrictor. A renin inhibitor blocks angiotensin II synthesis, allowing blood vessels to relax and lowering the blood pressure.

p. 764—Venous pooling results from gravity (the weight of the blood) drawing blood to the lower regions of the body, especially the lower limbs. The skeletal muscle pump serves to counteract the influence of gravity. But when one is sleeping (assuming one sleeps lying down), gravity does not pull the blood into the lower limbs. The heart is on the same level as the limbs, and gravity and venous pooling are not significant factors.

p. 766—Cyanosis.

p. 776— The pulmonary arteries serve only to pick up (load) oxygen from the pulmonary alveoli, so this blood leaves the lungs enriched with oxygen. The bronchial arteries, however, are systemic arteries that serve to release (unload) oxygen to other lung tissues such as the bronchi, so this blood leaves the lungs with less oxygen than it carried on arrival.

p. 776—The posterior intercostal arteries supply the breasts, so they enlarge in lactating women to deliver the nutrients needed for breast milk synthesis and meet other metabolic demands of lactation.

p. 794—The deep and superficial palmar arches in the hand correspond to the arcuate artery and deep plantar arch of the foot, insofar as they give off a series of arteries to the fingers and toes, respectively.