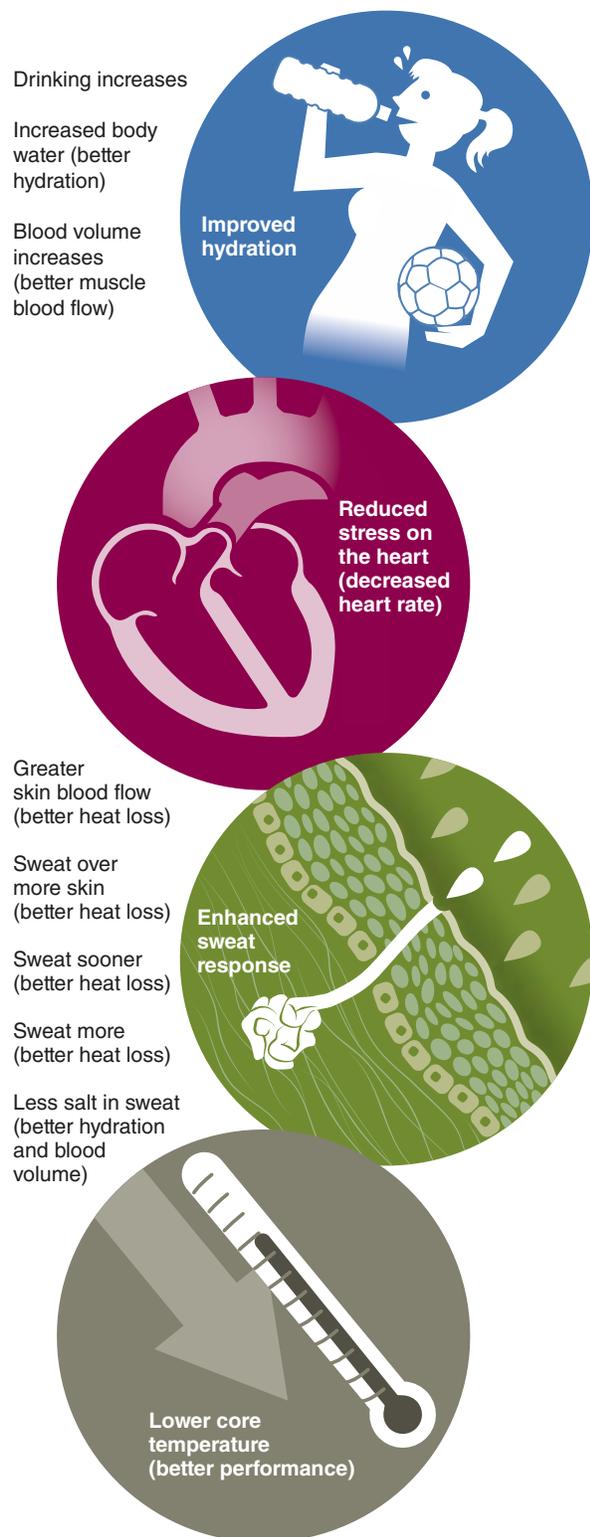


## Training in the Heat Improves Performance in the Heat

How can it be that exercising in the heat impairs performance but training in the heat improves performance? Performance in hot environments is consistently worse than in cooler environments because the body has only so much blood to go around. When blood flow to the skin rises to high levels, as it does during heat exposure, blood flow to muscles cannot rise high enough to sustain peak performance. But training in the heat—becoming *acclimated* to the heat—improves performance in all environments because of the many adaptations that accompany heat acclimation. Those adaptations are shown in figure 10.2 and are why many elite athletes undergo heat-acclimation training to improve all-weather performance.

**Full heat acclimation requires training in a warm environment. Just being exposed to heat at rest is not enough.**

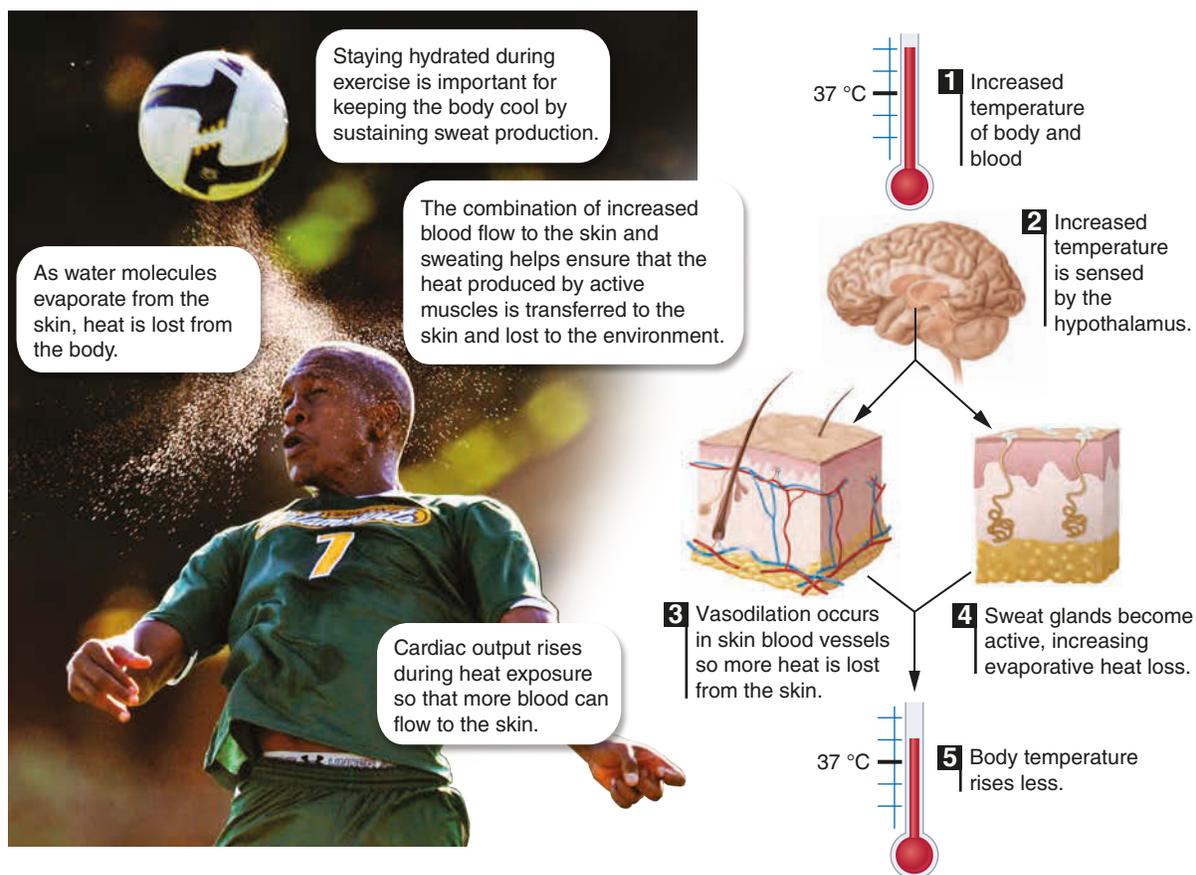


**FIGURE 10.2** Acclimation to the heat occurs by training in warm weather. Gradually increasing the duration and intensity of workouts over the first two weeks of warm-weather training causes the body to undergo a variety of adaptations that improve the capacity to exercise in the heat.

## Sweat Is Cool

You know what it's like to sweat, but few understand the true importance of sweating during physical activity or heat exposure. Whenever core body temperature rises above the *sweat threshold*, sweat glands in the skin begin to produce sweat. You were born with roughly two million sweat glands that enable you to survive hot weather and vigorous physical exercise simply because those glands secrete water onto the surface of the skin. As water molecules evaporate from the skin, heat is lost to the environment. In fact, during intense exercise, 80% of the heat produced by muscles is lost to surroundings by the evaporation of sweat. Sweat that drips off the skin, however, provides no cooling.

Sweating does for humans what panting does for dogs, but sweating does it better. Sweating is an effective way to stay safely cool in hot environments. That simple fact explains why humans are better than most animals at being physically active in the heat for prolonged periods. Animals that do not sweat cannot pant fast enough to keep up with the heat production of exercise. In humans, when body temperature increases slightly above normal resting temperature (98.6 °F, or 37 °C), the hypothalamus in the brain senses the increase in temperature and signals the sympathetic nervous system to dilate blood vessels in the skin and activate sweat glands. (See figure 10.3.)



**FIGURE 10.3** Sweating is a critical part of temperature regulation because sweating during exercise is the primary way in which humans lose heat to the environment and maintain a safe internal body temperature.