Homeostasis during Exercise

Key Idea: The circulatory and respiratory systems are primarily responsible for maintaining homeostasis during exercise.

During exercise, greater metabolic demands are placed on the body, and it must work harder to maintain homeostasis. Maintaining homeostasis during exercise is principally the job of the circulatory and respiratory systems, although the skin, kidneys, and liver are also important.

Increased body temperature
During exercise, the extra heat produced by muscle contraction must be dispersed to prevent overheating. Thermoregulatory mechanisms, such as sweating and increased blood flow to the skin, release excess heat into the surrounding environment and help cool the body.

Increased heart rate
An increased heart rate circulates blood around the body more quickly. This increases the rate at which exchanges can be made between the blood and the working tissues. Oxygen and glucose are delivered and metabolic wastes (e.g. carbon dioxide) are removed.

Increased glucose production
During exercise, working muscles quickly use up freely available blood glucose. Glucose is mobilized from glycogen stores in the liver and supplies the body with fuel to maintain ATP production.

1. The graph (right) compares the change in cardiac output (a measure of total blood flow in liters) during rest and during exercise. The color of the bars indicates the proportion of blood flow in skeletal muscle compared to other body parts.

(a) What percentage of the blood goes to the muscles at rest?

(b) What percentage of the blood goes to the muscles during exercise?

2. (a) What happens to the total blood flow during heavy exercise compared to at rest?

(b) Why does this change occur?