

Experiment HH-3: Exercise, the Electrocardiogram, and Peripheral Circulation

Background

The arterial system functions as a pressure reservoir. Blood enters via the heart and exits through the capillaries. Signals from the autonomic nervous system control the tone of smooth muscle sphincters around the arterioles. In this way, the autonomic nervous system can control the distribution of blood to the various organs in the body. The distribution of blood that flows to a particular organ is influenced by local conditions. If there are cells that require arterial blood, due to a decline in pH or oxygen levels or an increase in carbon dioxide levels, smooth muscle sphincters open to permit blood into particular capillary beds.

At rest, the distribution of blood to a particular organ may be very different from that seen during exercise. For example, the blood flow to the gut decreases during exercise, while blood flow to the skeletal muscles increases dramatically. Furthermore, the amount of blood flowing around the circulatory system may be increased several fold. In this laboratory you will record the electrocardiogram and the finger pulse from a (healthy) subject. These parameters will be recorded when the subject is at rest and immediately after exercise.

Warning: This experiment involves exercise and an elevation of heart rate. It should not be performed by anyone who is not healthy or has a personal or family history of cardiovascular or respiratory problems.