

Human Muscle Chapter

Experiments

Basic Level Difficulty Rating

HM-1: Grip Strength and Electromyogram (EMG) Activity

HM-2: Electromyogram (EMG) Activity in Antagonistic Muscles

HM-3: Oculomotor Muscle Activity (EOG)

HM-5: Flexibility and Range of Motion

HM-7: EMG & Arm Wrestling

Advanced Level Difficulty Rating

HM-4: Stimulus Response, Work, Summation and Tetanus in Human Muscle

HM-6: Stimulation of Antagonistic Muscles

Overview

The electrical activity in the motor units during a muscle contraction can be recorded as bursts of muscle action potentials that are collectively known as an electromyogram (EMG). The duration of the bursts of electrical activity in the muscle is about equal to the duration of the muscle contraction. When the electrical activity in the muscle begins, the muscle fibers begin to contract; when the electrical activity stops, the muscle begins to relax. The strength of a muscle contraction is related to the number of motor units in the muscle that are activated during the contraction, and the strength is directly proportional to the intensity of electrical activity in the muscle.

Muscles are only one component in a system that is responsible for the movement of a body part. In the skeletal system, muscles work together with bones to create a system of levers that move a part of the body. In a lever, the muscle is anchored on a stationary bone at a point known as the origin. The muscle provides the effort or force that moves bone that is the lever. The point of attachment of muscle on the lever is known as the insertion. As the muscle contracts and relaxes, the bone, functioning as the actual lever, rotates around a joint in the skeletal system. The joint is the fixed point that functions as the fulcrum for the lever. The body part being moved is the load on the lever.

Because body parts have different groups of muscle attached to them, the part can be moved in different directions by muscles that act on the same bone from different directions. Muscles that move body parts toward the body are called flexors. Conversely, muscles that move body parts away from the body are called extensors. Flexors and extensors that work on the same lever or body part are known as antagonistic muscles. When performing a function, like throwing a baseball, muscles in various parts of the body relax and contract in a coordinated manner to accelerate and release the ball at the right moment.

Not all muscles use bones as the levers to move body parts. Even though a bone may be involved as a point of origin. Some muscles are attached to skin, such as the muscles that control the facial expressions. Other muscles are attached to organs. The muscles that are attached to the eye control its position and movement without the use of a bone as a lever. The collective activity of the muscles that control the position of the eye is known as an electroculogram (EOG). Even within the eye, there are muscles that control the thickness of the lens that allows control of the eye's focusing.