Muscular Innervation Encyclopedia Article

Muscular Innervation

The following sections of this BookRags Literature Study Guide is offprint from Gale's For Students Series: Presenting Analysis, Context, and Criticism on Commonly Studied Works: Introduction, Author Biography, Plot Summary, Characters, Themes, Style, Historical Context, Critical Overview, Criticism and Critical Essays, Media Adaptations, Topics for Further Study, Compare & Contrast, What Do I Read Next?, For Further Study, and Sources.

(c)1998-2002; (c)2002 by Gale. Gale is an imprint of The Gale Group, Inc., a division of Thomson Learning, Inc. Gale and Design and Thomson Learning are trademarks used herein under license.

The following sections, if they exist, are offprint from Beacham's Encyclopedia of Popular Fiction: "Social Concerns", "Thematic Overview", "Techniques", "Literary Precedents", "Key Questions", "Related Titles", "Adaptations", "Related Web Sites". (c)1994-2005, by Walton Beacham.

The following sections, if they exist, are offprint from Beacham's Guide to Literature for Young Adults: "About the Author", "Overview", "Setting", "Literary Qualities", "Social Sensitivity", "Topics for Discussion", "Ideas for Reports and Papers". (c)1994-2005, by Walton Beacham.

All other sections in this Literature Study Guide are owned and copyrighted by BookRags, Inc.

Contents

Muscular Innervation Encyclopedia Article.....1

Contents.....2

Muscular Innervation.....3

Muscular Innervation

The contraction of muscles is controlled by signals from the nervous system. The signals reach the appropriate muscle via nerves that contact the muscle.

Typically, nerves contact muscles by means of what are known as motor end plates. The stimulus to contract passes from the end plate to the muscle fibers. The nerve cells (**neurons**) that function in **muscle contraction** are called motor neurons. The have a cell body at one end, a long filamentous region known as the axon and a branching region at the other end that is called the dendrites. The dendrites form the motor end plate

Each muscle fiber in vertebrate animals has a motor neuron associated with it. This is described as innervation. A single motor neuron can innervate other fibers as well. But each muscle fiber will have a motor neuron connection.

The connection between a muscle fiber and a motor neuron occurs at a specialized region called the neuromuscular junction. This is the area where the motor end plate is found. An endplate is analogous to the **synapse** that is between the axon terminus of one nerve cell and the dendrite branches of an adjacent nerve cell.

The motor end plate almost contacts an area of the muscle fiber called the sarcolemma. As with other nerve cells, a molecule called the neurotransmitter bridges the gap between the nerve cell and the muscle fibers, allowing a signal to flow. When a nerve signal, which is really an electrical **pulse**, reaches the end plate, the sarcolemma becomes depolarized. In other words, the difference in charge between the inside and the outside of the muscle membrane is changed. If the change is great enough, a wave of depolarization spreads outward over the surface of the fiber. This stimulates the fiber, and in fact all the fibers in the muscle, to contract.

The above scenario would be caused by an excitatory neuron. Neurons that inhibit muscular contract (inhibitory neurons) can also innervate muscles. In vertebrates, acetylcholine is an excitatory neurotransmitter and gamma-aminobutryic acid (GABA) is an inhibitory neurotransmitter.

The degree of muscle contraction depends on the number of motor units that are present and signaling. The more units there are, the finer the control can be exerted on muscle contraction. For example, in the arm there are many innervation points. Thus, contraction can range from slow to quick, and from gentle to powerful.