Chapter 8: Control of Movement

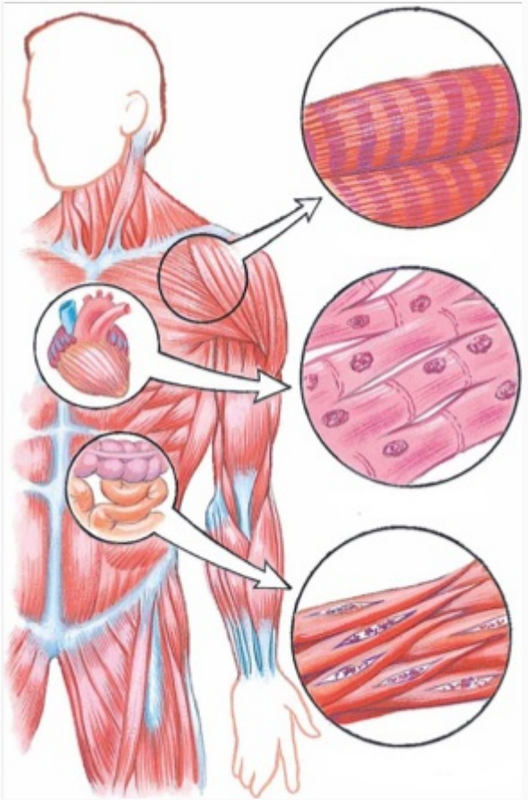
General Principles of Motor Behavior

Skeletal Muscle Anatomy and Physiology

Proprioception and Reflexes

Control of Movement by the Brain

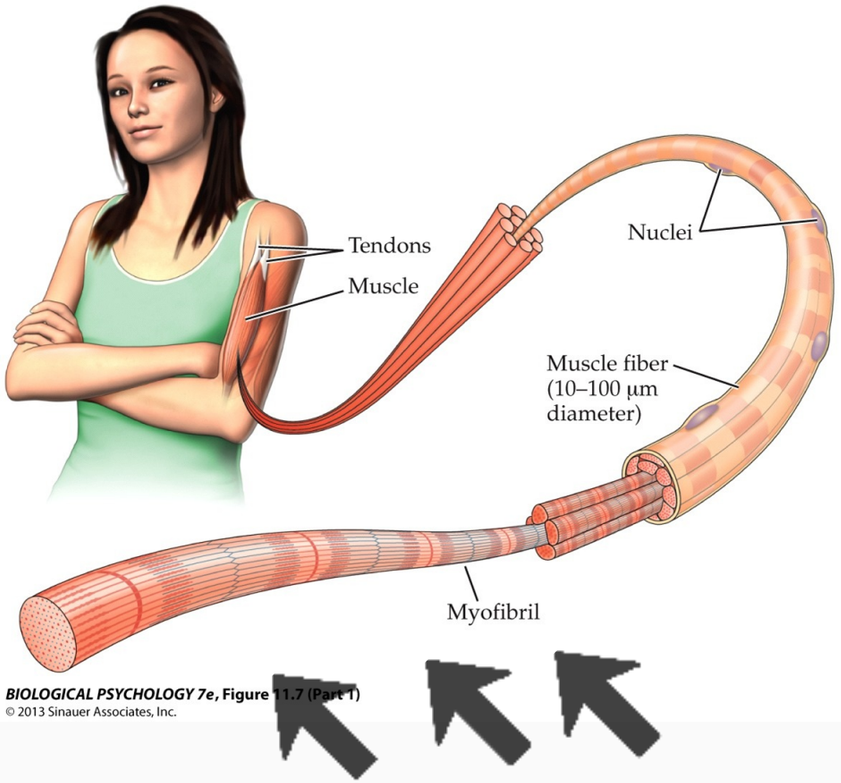
Movement Disorders



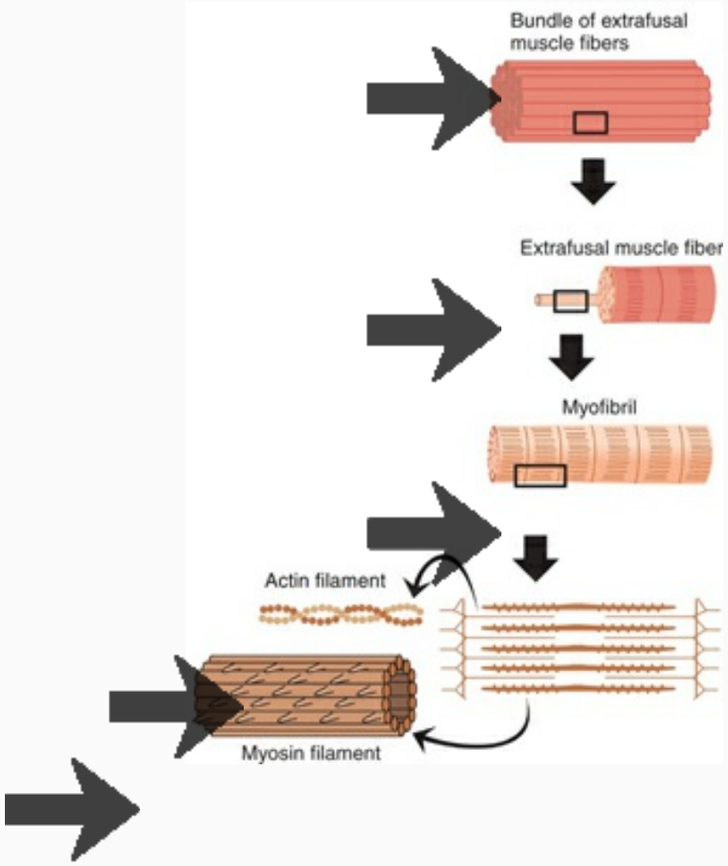
Skeletal Muscle Anatomy and Physiology

Basic Components of Muscles.

- skeletal muscle composed of many myofibers
- each myofiber composed of many myofibrils
- myofibrils composed of actin and myosin filaments
- actin and myosin in repeating sarcomeres



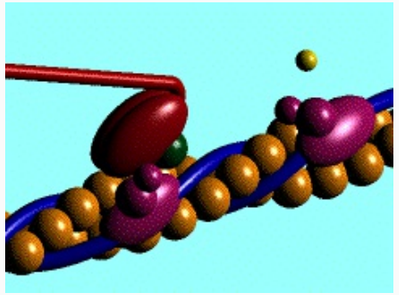
BIOLOGICAL PSYCHOLOGY 7e, Figure 11.7 (Part 1)



Skeletal Muscle Anatomy and Physiology

Basic Components of Muscles.

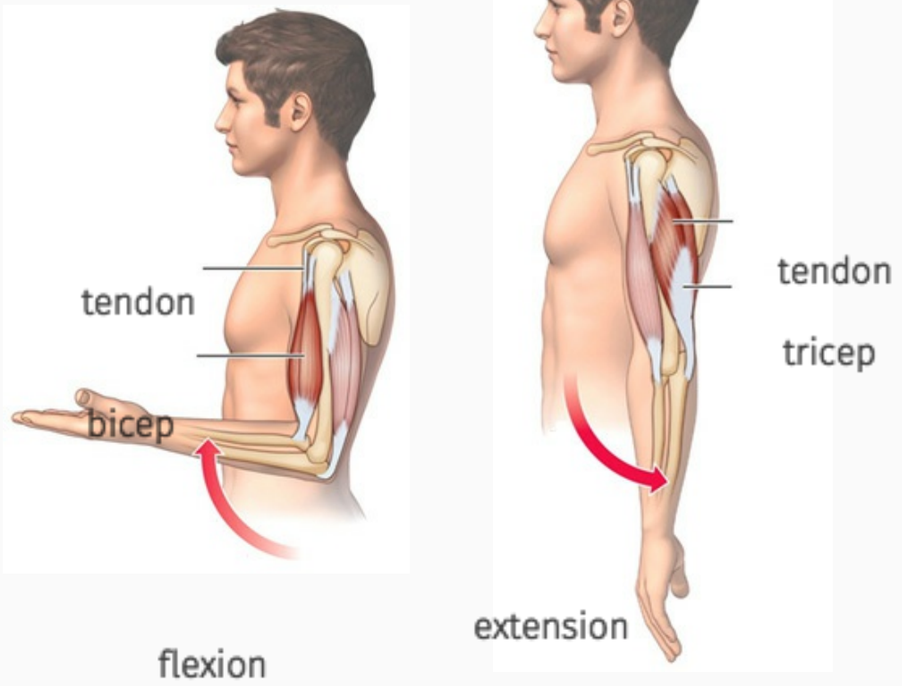
- myosin “cross bridges “row” against the actin filaments to contract the muscle by reducing the length of the sarcomere



Skeletal Muscle Anatomy and Physiology

Antagonistic Muscle Pairs.

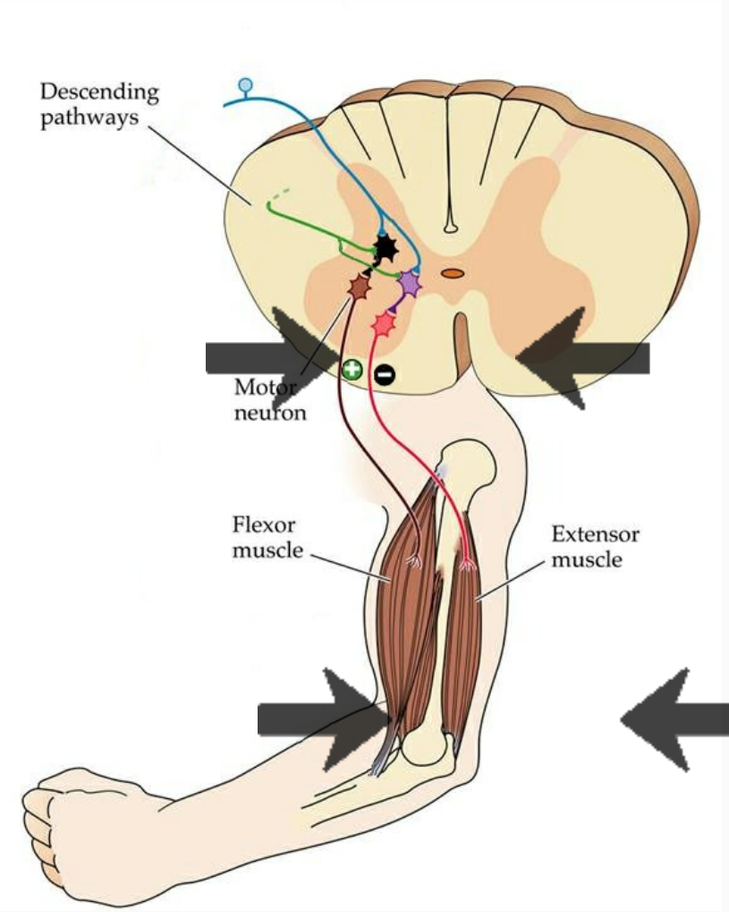
- skeletal muscles arranged in opposing pairs
- contraction of flexor muscle produces limb flexion
- contraction of extensor muscle produces limb extension
- e.g.
  - bicep = flexor
  - tricep = extensor



Skeletal Muscle Anatomy and Physiology

Antagonistic Muscle Pairs.

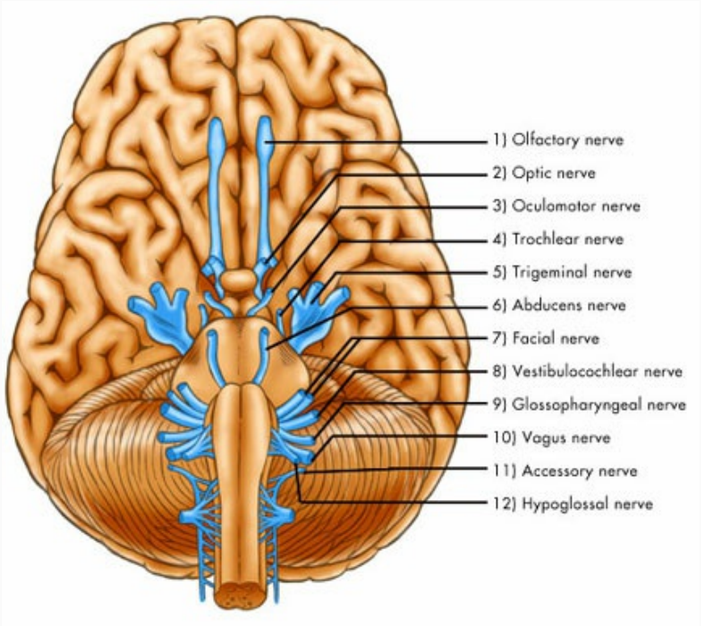
- reciprocal innervation
- excitation of flexor/inhibition of extensor
- excitation of extensor/inhibition of flexor
- coordinates sequences such as waving, walking

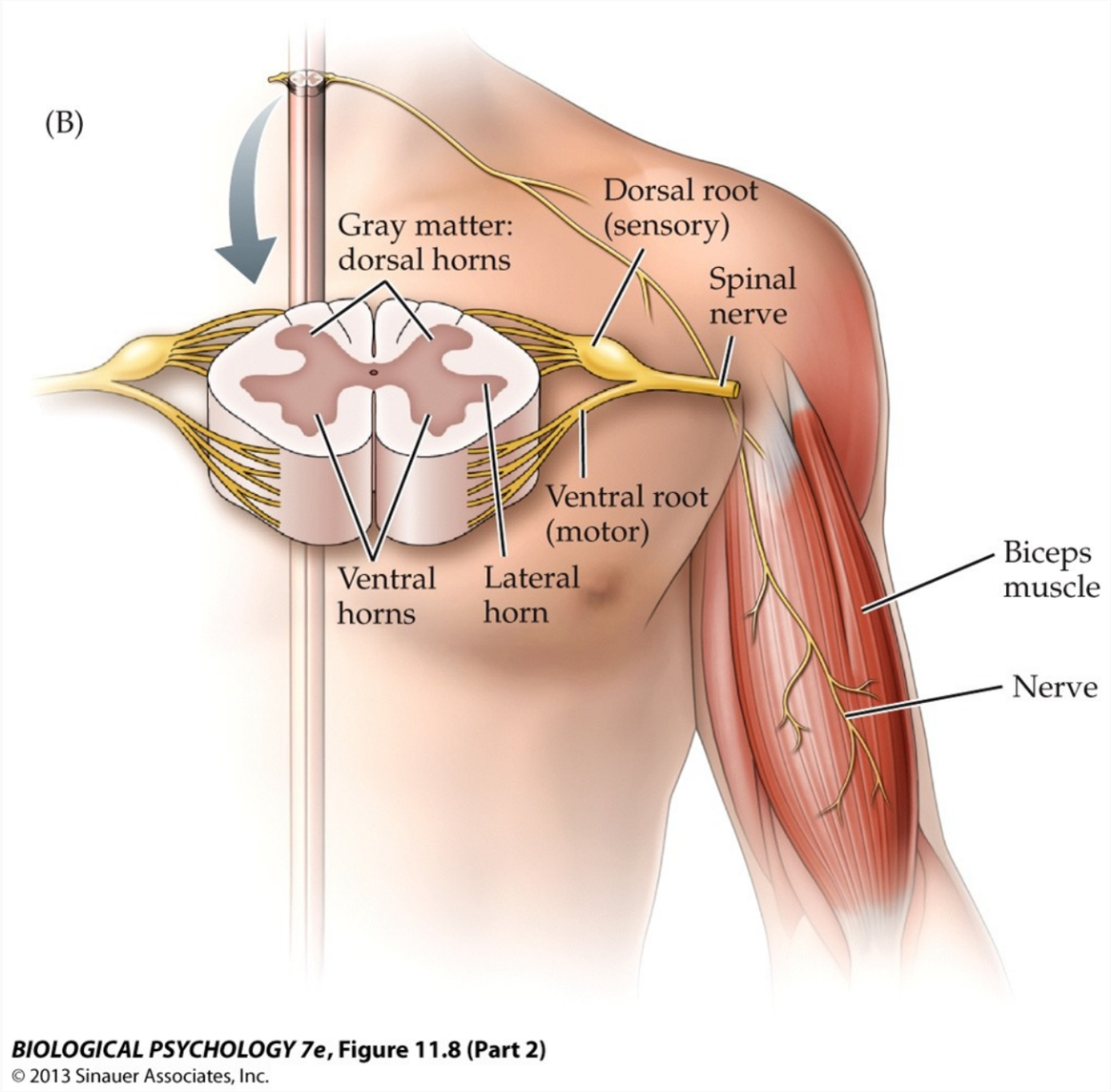


Skeletal Muscle Anatomy and Physiology

The Motor Unit and the Motor Pool.

- cranial and spinal motor neurons receive thousands of synapses
- axons exit at brainstem or ventral roots, splitting near muscle to make many axon terminals



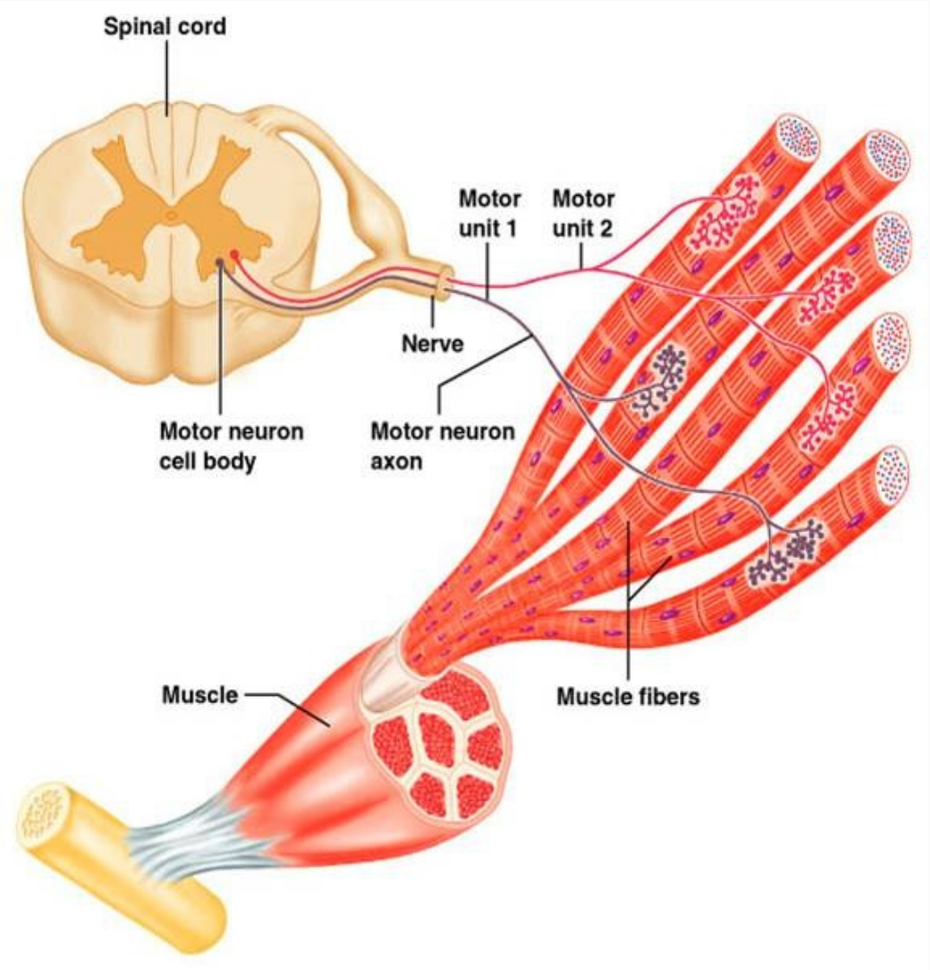


***BIOLOGICAL PSYCHOLOGY 7e*, Figure 11.8 (Part 2)**

Skeletal Muscle Anatomy and Physiology

The Motor Unit and the Motor Pool.

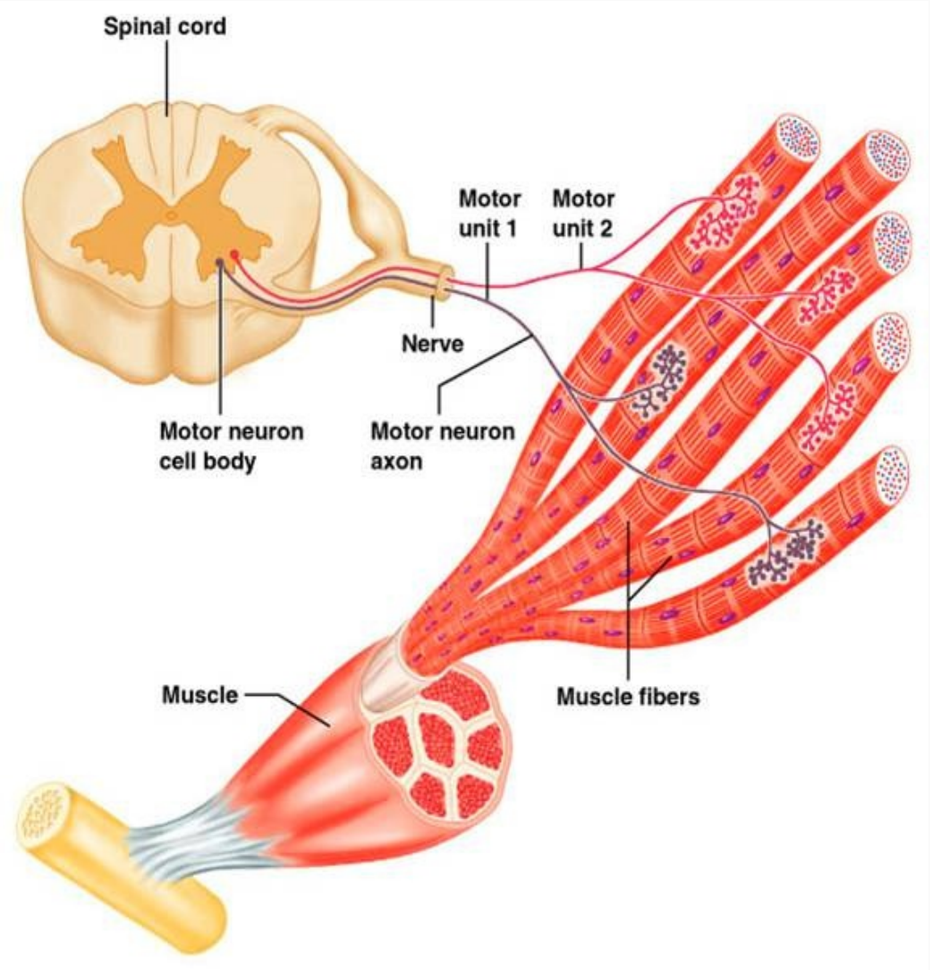
- each axon terminal innervates single muscle fiber



Skeletal Muscle Anatomy and Physiology

The Motor Unit and the Motor Pool.

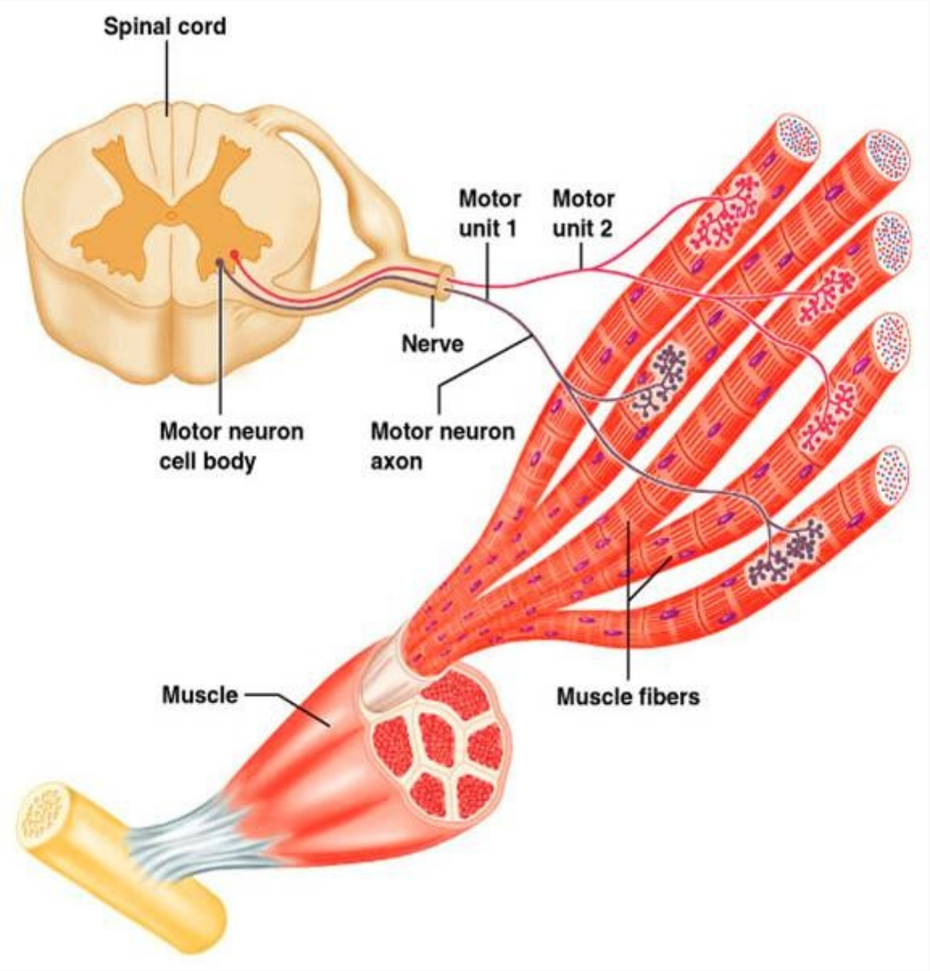
- all fibers innervated by single axon = motor unit
- motor unit = smallest unit of motor activity
- when axon fires, all myofibers contract together
- fewer fibers per axon = more precise control
- eye muscles, approx. 1 axon per 3 myofibers
- biceps, 1 axon for more than 100 myofibers



Skeletal Muscle Anatomy and Physiology

The Motor Unit and the Motor Pool.

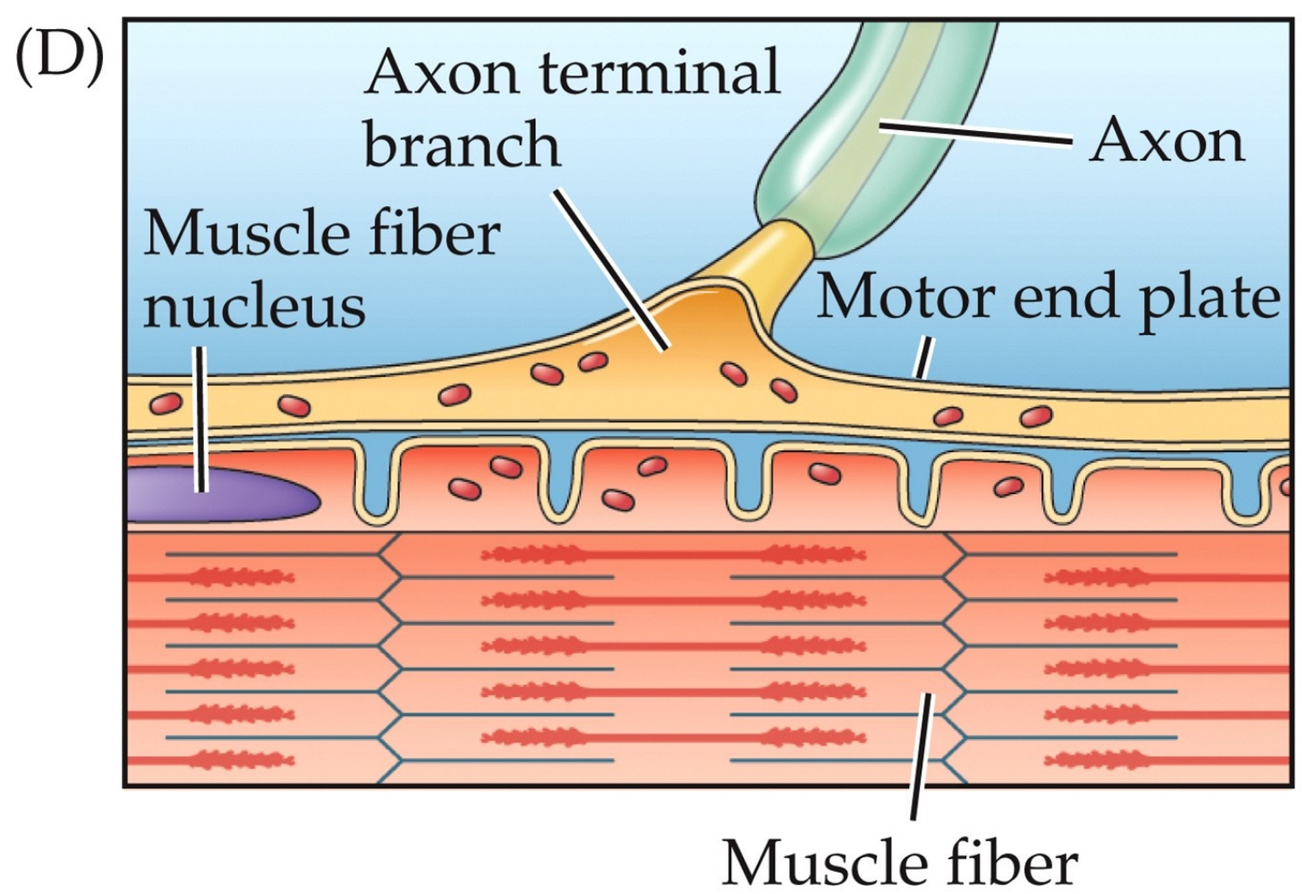
- all innervation of muscle = motor pool
- slow motor units = used in continuous effort
- fast motor units = 2 subtypes, used in fast movements



Skeletal Muscle Anatomy and Physiology

The Neuromuscular Junction.

- synapse between motor neuron terminal and myofiber
- motor end plate = site of synapse on myofiber

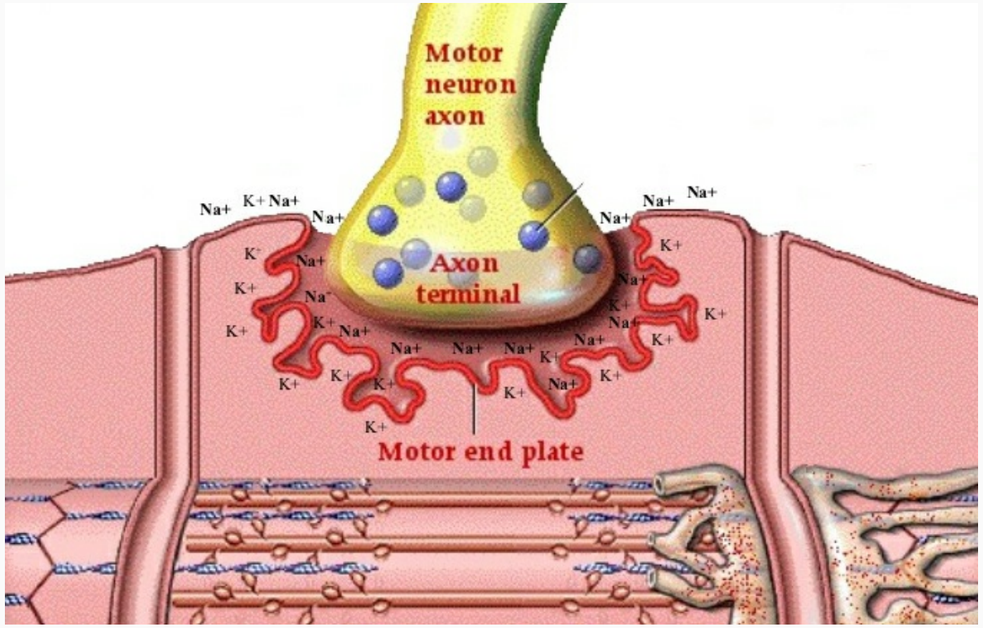


***BIOLOGICAL PSYCHOLOGY 7e*, Figure 11.8 (Part 4)**

Skeletal Muscle Anatomy and Physiology

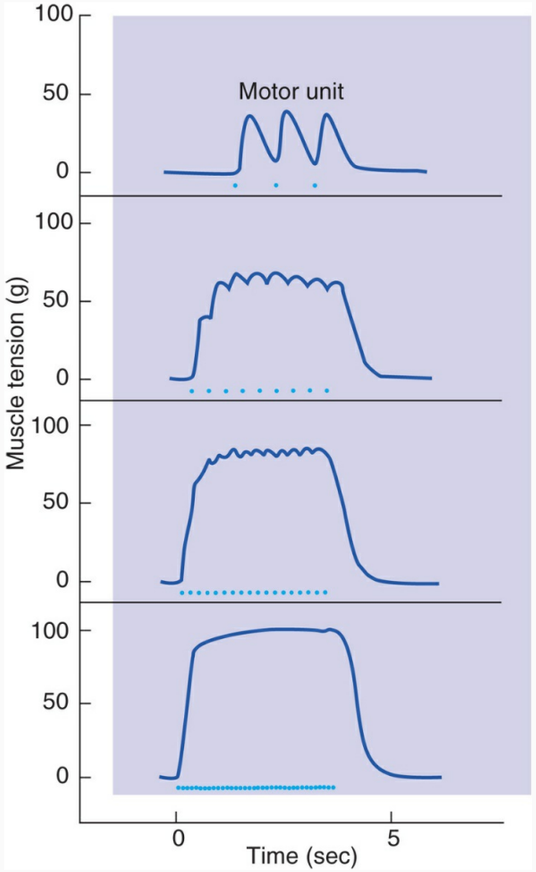
The Neuromuscular Junction.

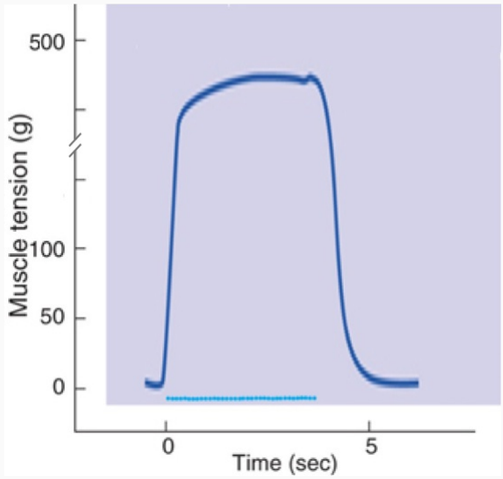
- end plate potential
- single action potential in motor neuron produces very large depolarization of end plate (>>> typical EPSP)
- reliably initiates action potential in myofiber
- AP propagated along myofiber in both directions



Skeletal Muscle Anatomy and Physiology

Action Potentials and Myofiber Contraction.





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