NEUROMUSCULAR JUNCTION

Sliding Filament Model of Muscle Contraction

thin filaments slide past thick ones during muscle contraction

this movement shortens sarcomere

Physiology of a Skeletal Muscle Fiber

Neuromuscular Junction: Each muscle has several neurons that serve it. These neurons come from branches of spinal nerve from the spinal cord. Once each neuron reaches the muscle, its numerous neuron axons branch so much that each muscle fiber has ONE neuromuscular junction.

The hundreds/thousands of myofibrils within each muscle fiber receive electrical stimulation thanks to T Tubules.

Action Potentials: Electrical signal that, once started, shoots down from the neuron body all the way to the end (axon terminal). AKA nerve impulse

Once the AP reaches the axonal terminal, Acetylcholine is released from **synaptic vesicles** into the **synaptic cleft**.

The ACh diffuses across the synaptic cleft and binds to ACh receptors on the muscle fiber. This allows Na+ to rush rapidly into the muscle fiber; the membrane becomes **positively charged (depolarized).** This "action potential" is then **propagated** down the length of the whole muscle fiber; T Tubules ensure that each myofibril depolarizes.

Depolarization leads to contraction of each sarcomere in the muscle fiber.

Excitation-Contraction Coupling

Action Potential triggers release of calcium from the **sarcoplasmic reticulum**.

Calcium allows myosin heads to attach to actin

this occurs because at rest, myosin is blocked from actin

CONTRACTION: myosin moves along actin in a "ratchet" fashion.

This movement can only occur in the presence of ATP.

Cell rests—calcium is pumped back into the SR.