

# THE BODY.

Excitation signals from the motor neuron are the only way to functionally activate muscle fibers to contract.

*How it works internally –*

Nerve Impulses (action potentials) travel from the brain/spinal cord to trigger muscles.

The junction consists of the points of contact between axon terminals of a motor neuron and the motor endplate of a skeletal muscle fiber.

## ► Step 1

An action potential travels down a motor neuron and excites a skeletal muscle fiber.

## ► Step 2

Voltage-gated calcium channels open and calcium ions diffuse into the terminal.

## ► Step 3

Calcium ion entry causes synaptic vesicles to release acetylcholine via exocytosis.

## ► Step 4

Acetylcholine diffuses across the synaptic cleft and binds to acetylcholine receptors which contain ligand-gated cation channels. The ligand-gated channels open.

## ► Step 5

Sodium ions enter the muscle fiber and potassium ions exit the muscle fiber.

## ► Step 6

Once the membrane potential reaches the threshold value an action potential travels along the sarcolemma.

## ► Step 7

Neural transmission to a muscle fiber ceases when acetylcholine is removed from the synaptic cleft. Acetylcholine diffuses from the synapse. Acetylcholine is broken down by the enzyme acetylcholinesterase to acidic acid and choline is transported to the axon terminal for the resynthesis of acetylcholine.

## KEY-WORD DIFFERENCES BETWEEN

The Body	An Airport
Brain.....	Point A
Muscle.....	Point B
Action Potentials.....	Airplane
Motor Neuron.....	Flight Route
Skeletal Muscle Fiber.....	Airport
Axon Terminals.....	Runway to Jetbridge
Motor End Plate.....	Jetbridge
V-G Calcium Ions.....	Jetbridge Walkway
Calcium Ions.....	Gate Agents
Synaptic Vesicles.....	Airplane Doors
Acetylcholine.....	Flight Attendants+Pilots
Exocytosis.....	Exiting the Plane
L-G Cation Channels.....	Gates
Acetylcholine Receptors.....	TSA
Sodium.....	Arrival Passengers
Potassium.....	Departure Passengers
Membrane Potential.....	MBR (Mishandled Bag Report %)
Neural Transmission.....	Picking up Trash
Muscle Fiber.....	Wiping down Seats
Synapse.....	Bagwell
Sarcolemma.....	Terminal
Synaptic Cleft.....	Fleet (Cabin Cleaners)
Acetylcholinesterase.....	Rampers
Acetic Acid.....	Bags at their Final Destination.
Choline.....	Bags that are traveling to the next destination.

## step-by-step video:

[https://www.youtube.com/watch?v=eTYe1CtjJRE&feature=emb\\_logo](https://www.youtube.com/watch?v=eTYe1CtjJRE&feature=emb_logo)