

Neuromuscular Junction



The synapse b/w a somatic Motor Neuron and skeletal Muscle fiber.

- The Neurons that stimulate skeletal muscle to contract are called Somatic Motor Neurons



Has a thread like Axon that extended from brain (or) spinal cord to group of skeletal muscle fibers

— A Muscle fiber contracts in response to one (or) more muscle Action potential travelling along its sarcolemma and through T tubules

Muscle Action potentials Arise of Neuromuscular Junction (NMJ)

- In NMT - A synapse is a region where communication occurs b/w two Neuron (or) between Neuron and a Target cell.



In NMT b/w somatic Motor Neuron and a Muscle Fiber.

- At most synapses a small gap called synaptic cleft



separates the two cells (do not physically touch)



The action potential cannot jump the gap.

first cell communicates a second by releasing a chemical

called a Neurotransmitter

- At NMT - The end of Motor Neuron called Axon terminal divides into a cluster of synaptic end bulbs.

- Within each synaptic end bulbs, there are hundreds of membrane enclosed sacs called synaptic vesicles.



Inside each synaptic vesicles - thousands of Molecules (Neurotransmitter) of Acetylcholine Ach.

- The region of Sarcolemma opposite the synaptic end bulbs called Motor end plate (muscle fibre part of NMT)



Has 30 to 40 million Acetylcholine receptors

A Nerve impulse elicits a Muscle Action potential in following way:-

(1) Release of Acetylcholine:-

As Nerve impulse Arrived at synaptic end bulbs.

Causes many synaptic vesicles to undergo Exocytosis



liberating Ach into synaptic cell.

Now Ach diffuses Across synaptic cleft b/w motor Neuron and motor end plate.

(2) Activation of ACh receptors:-

Binding of two molecules of ACh to receptor



open an ion channel → small cations (Na^+)

(3) production of muscle Action potential:-

flow across the membrane

The inflow of Na^+ makes inside of muscle fiber more +vely charged



This triggers a muscle action potential

- This muscle action potential then propagates along the sarcolemma into the T-tubule system



This causes sarcoplasmic reticulum to release stored Ca^{2+} into sarcoplasm & muscle fiber subsequently contracts.

(4) Termination of ACh activity:-

- ACh is rapidly broken down by an enzyme called Acetylcholinesterase (AChE)

- AChE breaks down ACh into Acetylcholine



That cannot activate ACh receptor.

If another nerve impulse release more ACh step 2 & 3 repeat