

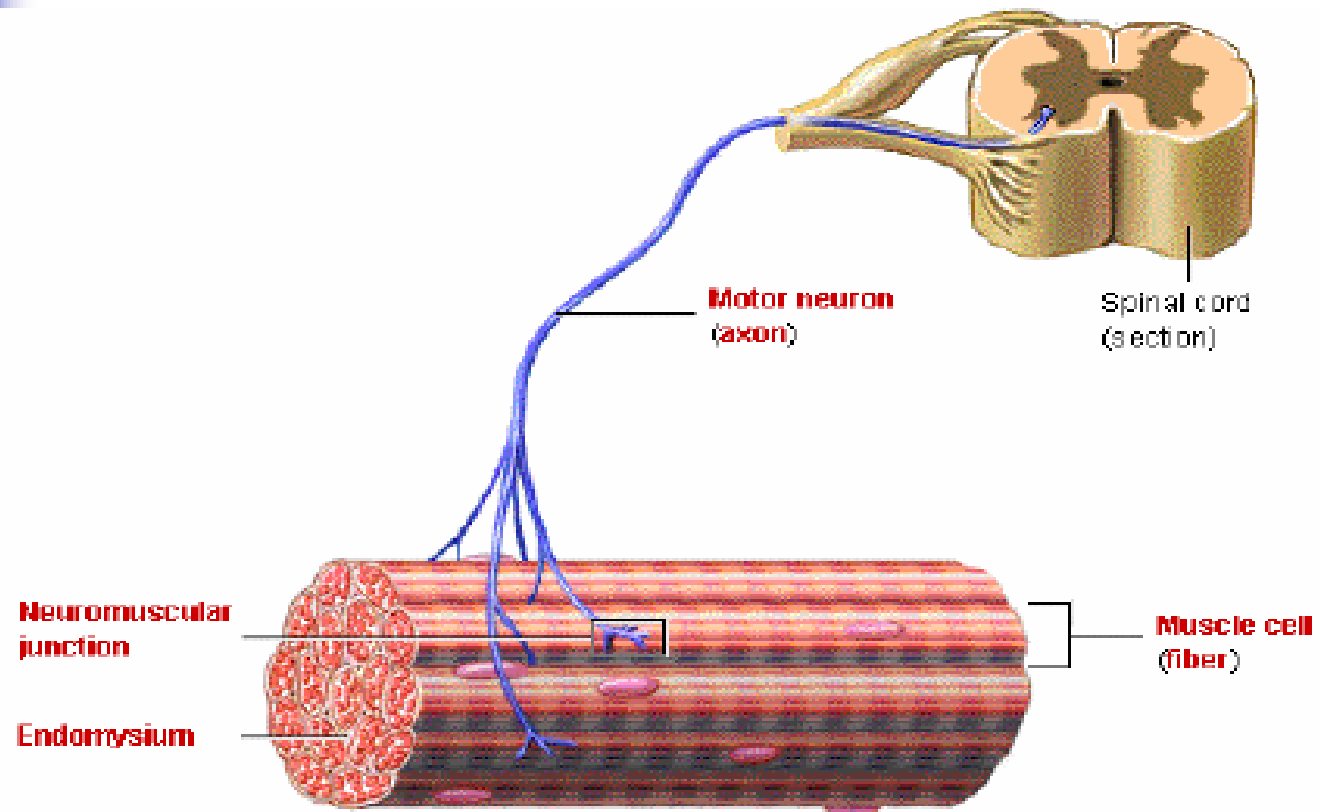
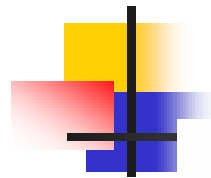
NEUROMUSCULAR JUNCTION

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1/3/2021

Neuromuscular junction

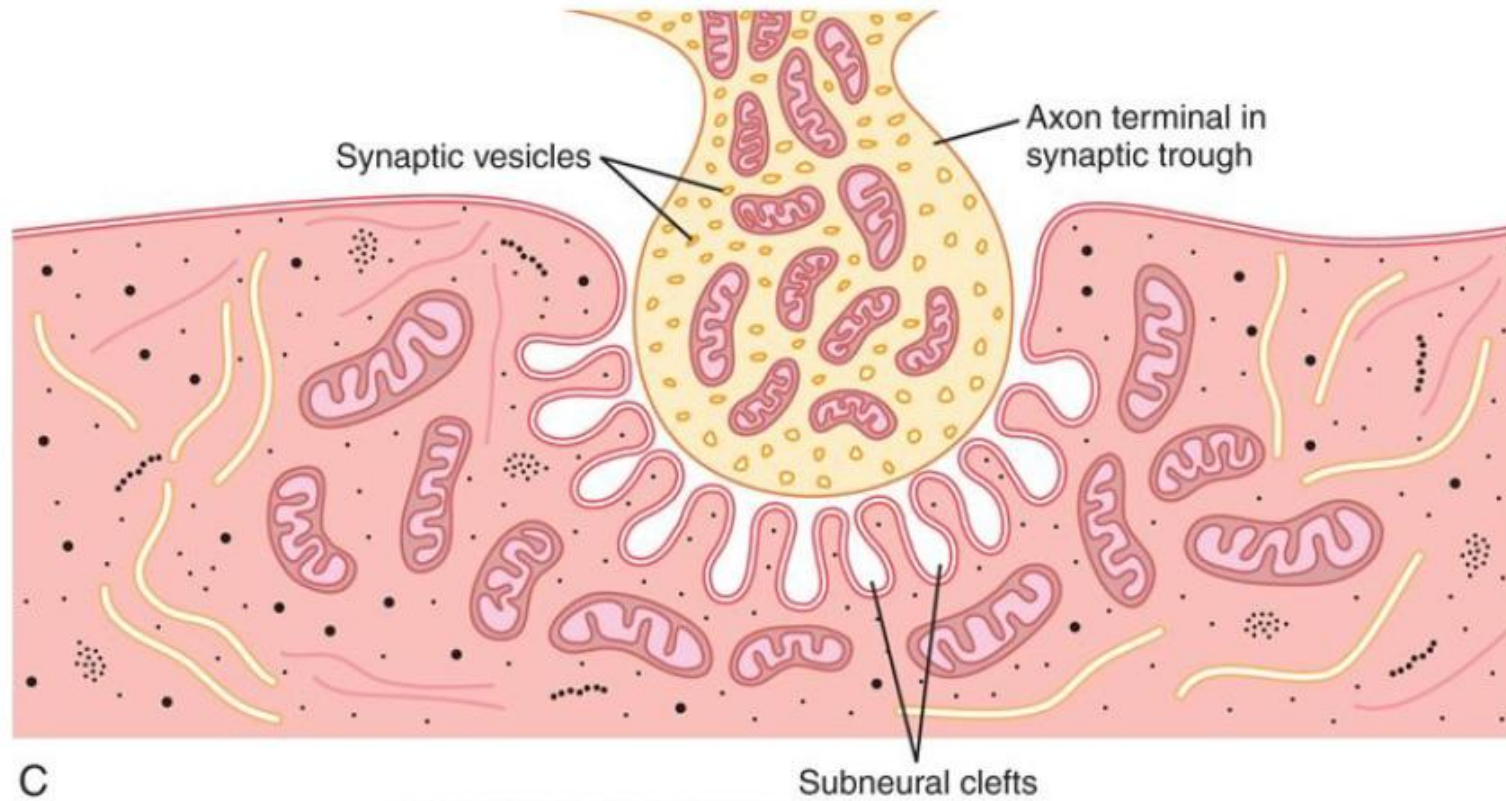
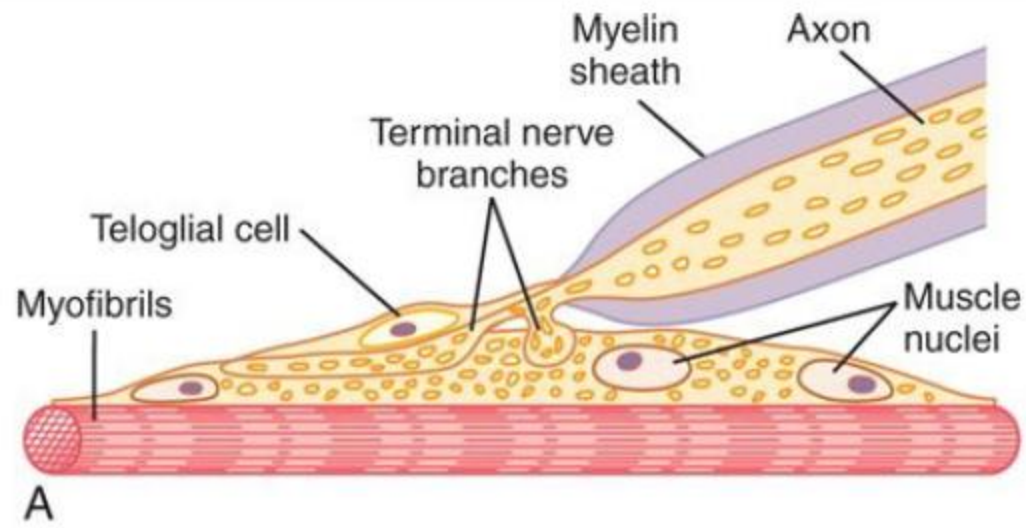
โครงสร้างและการทำงานของ Neuromuscular

junction

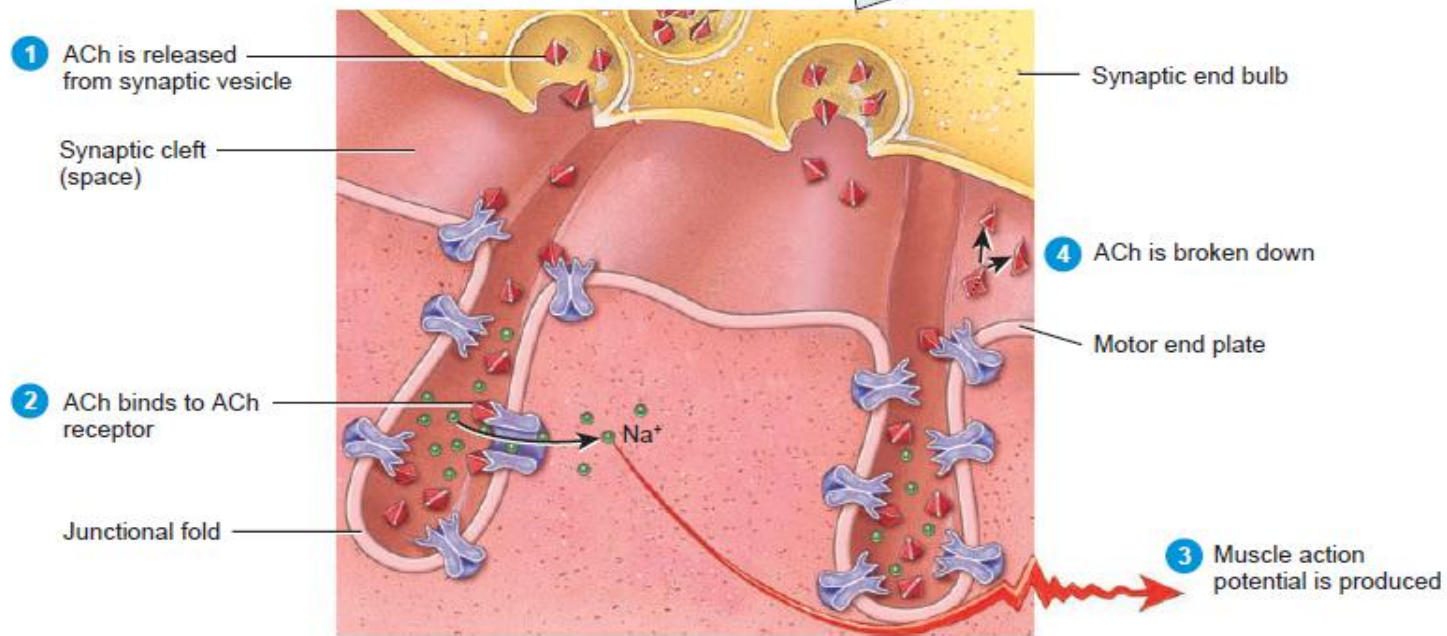
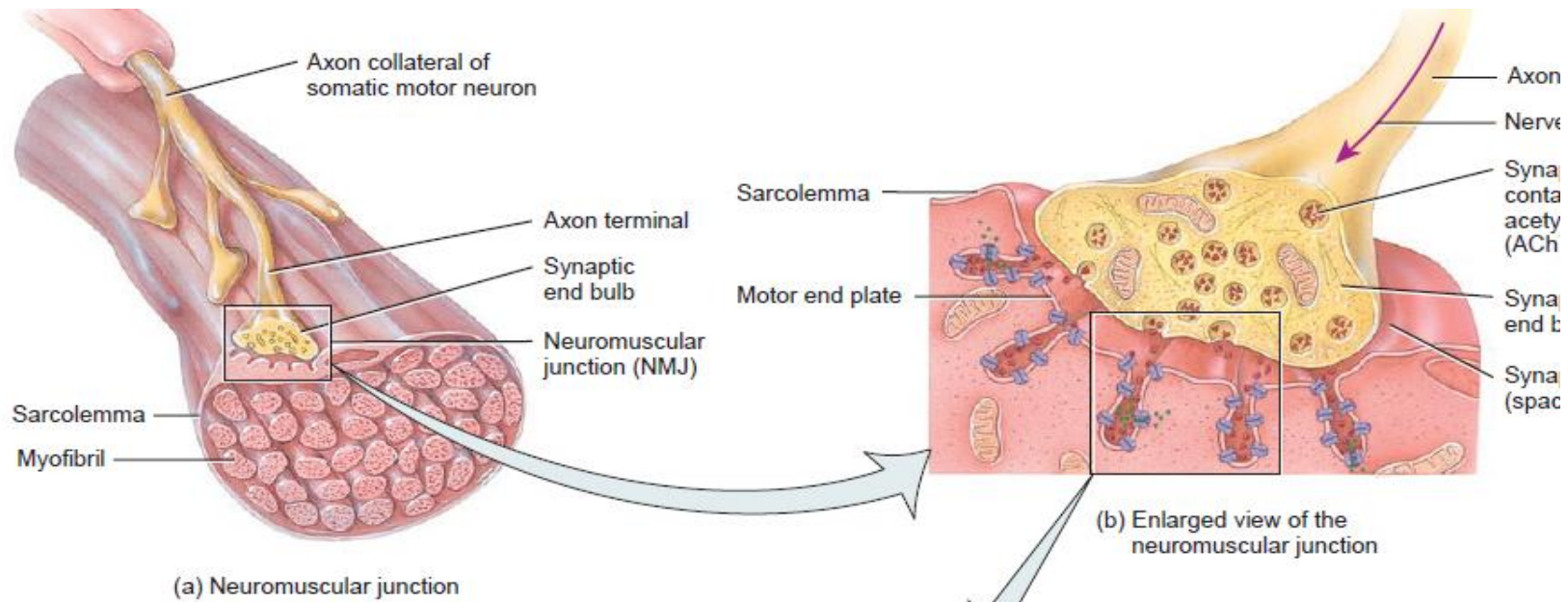


Neuromuscular junction- structure

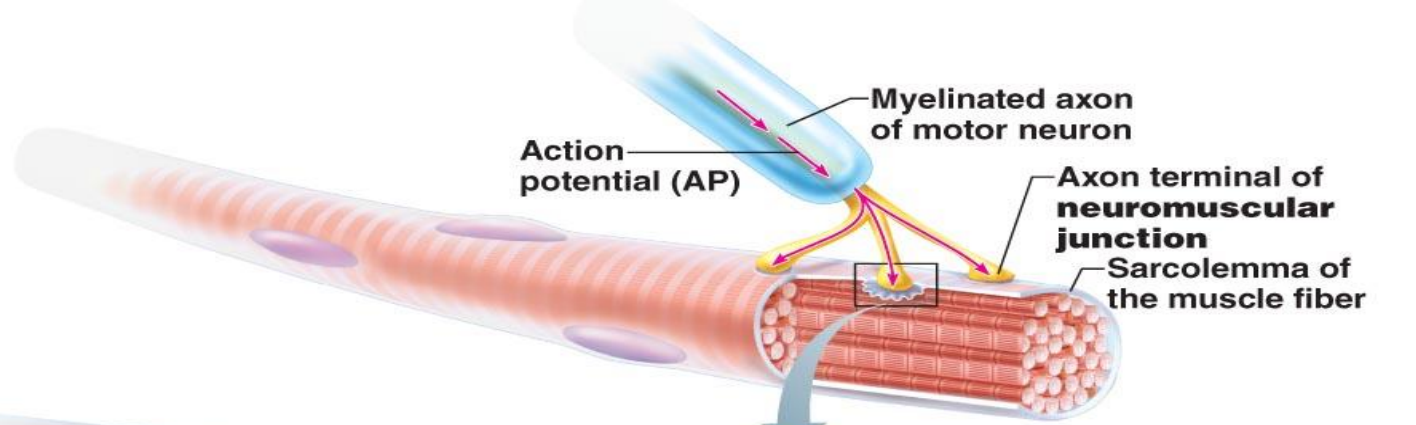
- Junction between nerve membrane and muscle membrane
- Nerve axon terminals ends on muscle fibre membrane
- Nerve axon terminals have synaptic vesicles which contain neurotransmitter (acetylcholine) and mitochondria
- Muscle membrane have receptors for neurotransmitter
- Gap between these two membrane is called synaptic cleft



NEUROMUSCULAR IMPULSE TRANSMISSION



(c) Binding of acetylcholine to ACh receptors in the motor end plate



① Action potential arrives at axon terminal of motor neuron.

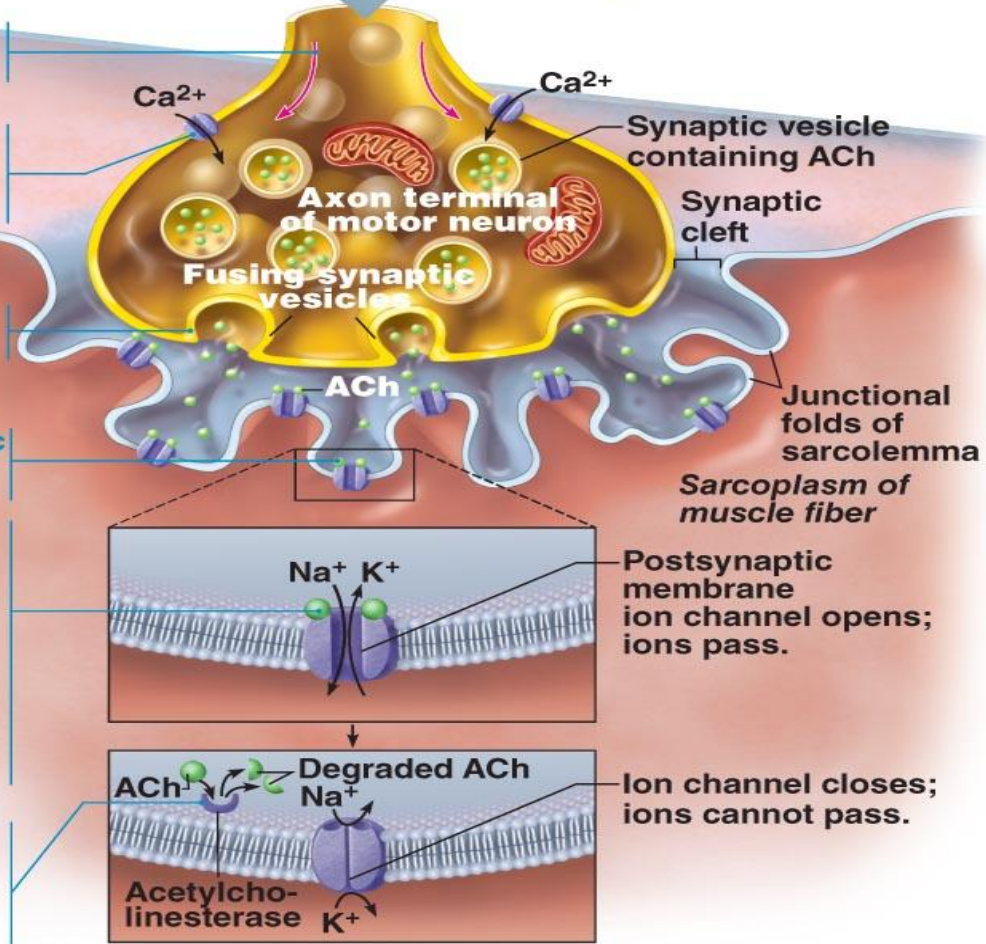
② Voltage-gated Ca^{2+} channels open. Ca^{2+} enters the axon terminal moving down its electrochemical gradient.

③ Ca^{2+} entry causes ACh (a neurotransmitter) to be released by exocytosis.

④ ACh diffuses across the synaptic cleft and binds to its receptors on the sarcolemma.

⑤ ACh binding opens ion channels in the receptors that allow simultaneous passage of Na^+ into the muscle fiber and K^+ out of the muscle fiber. More Na^+ ions enter than K^+ ions exit, which produces a local change in the membrane potential called the end plate potential.

⑥ ACh effects are terminated by its breakdown in the synaptic cleft by acetylcholinesterase and diffusion away from the junction.



Clinical importance of NMJ

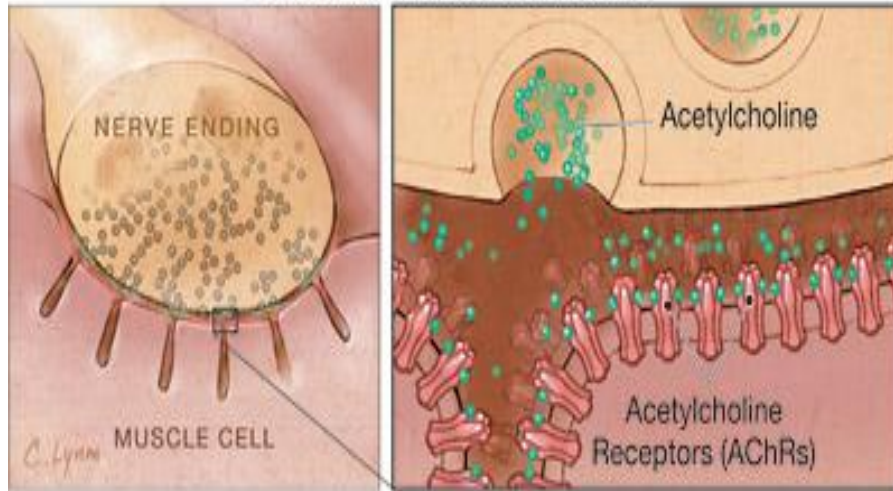
- ❑ Blocking of it produces muscle relaxation so,
 - Helpful during surgery
 - Reduces movements during electroconvulsive therapy
- ❑ Drugs blocking NMJ transmission:
 1. Botulinum toxin
 2. Tubocurarine
 3. Succinyl choline

Applied aspect of NMJ

❖ MYASTHENIA GRAVIS:

- Autoimmune disease caused by antibodies against nicotinic A-ch receptors
- Manifested by rapid onset of fatigue with generalized muscle weakness
- Extra ocular , facial & swallowing muscles affected most commonly
- Death may occur from respiratory muscle paralysis

Normal Neuromuscular Junction



Myasthenia Gravis

