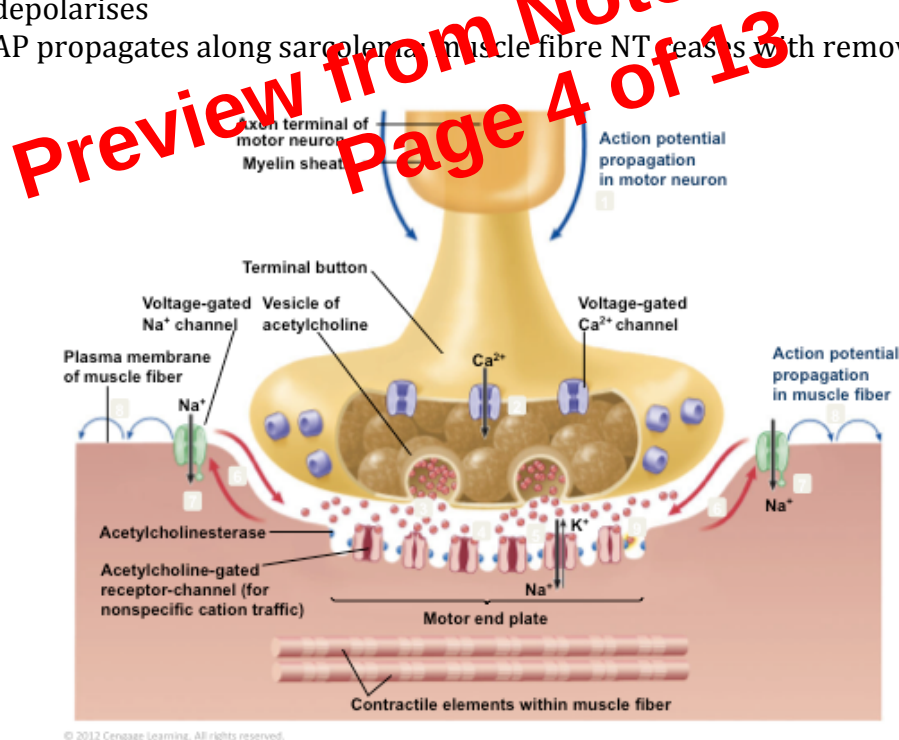


2. γ gamma MN – control intrafusal muscle fibre contractions important for maintaining appropriate sensitivity to muscle spindles that detect muscle stretch (changes in muscle length to prevent damage/tearing).

A **motor unit** is one LMN as well as all muscle fibres that it innervates. Somatic motor neurons innervate skeletal muscle. Each muscle fibre is innervated by only one motor neuron, but 1 motor neuron can innervate many muscle fibres. Motor units can be differentiated and recruited based on size and firing properties. Size refers to how many muscle fibres the MN innervates. Large motor units develop large forces quickly but with less control/precision and fatigue quickly. Small motor units develop small increases in force slowly but are more precise and fatigue resistant. In a movement, you utilise small units first so that ATP is not used up into lactic acid and muscles are not fatigued quickly. Firing properties of motor units can be **tonic or phasic**; some LMN receive continuous inputs from UMN that keeps them active continuously, important for maintaining muscle tone and posture (tonic), whilst other LMN fire in bursts and are necessary for movement. The reticular spinal tract is important for maintaining muscle tone. Extra-pyramidal motor tract descending from reticular formation to trunk and proximal limb muscles is relevant for postural control and muscle tone.

* Neuromuscular Junction

1. Axon potential of MN travels to axon terminal
2. Ca^{2+} channels open and ions diffuse into terminal
3. Ca^{2+} entry causes synaptic vesicles to release acetylcholine via exocytosis
4. Acetylcholine diffuses across synaptic cleft and binds to receptors which contain ligand gated cation channels.
5. Cation channels open (Na^+)
6. Na^+ ions enter the muscle fibre and K^+ ions exit muscle fibre and membrane potential depolarises
7. AP propagates along sarcolemma; muscle fibre NT ceases with removal of acetylcholine.



Chemical agents and disease affect neuromuscular junctions:

- black widow spider venom causes excess release of Ach (rigidity)
- botulinum toxin blocks Ach release (paralysis)
- curare blocks Ach receptor function (paralysis)

changes, as well as controlling necessary instantaneous interplay between agonist and antagonist muscle groups. The cerebellum also plays a role in motor learning. Located posterior to the brainstem, attached to the rest of the brain via cerebellar peduncles. It has 3 lobes: the anterior lobe (spinocerebellum) responsible for regulation of muscle tone and skilled voluntary movements, posterior lobe (cerebrocerebellum) responsible for planning and initiation of voluntary activity, storage of procedural memories, and flocculonodula lobe (vestibulocerebellum) responsible for maintenance of balance and control of eye movements. The vermis controls muscle contractions within the proximal part of the body whereas the para-vermis area controls distal limbs. The cytoarchitecture of the cerebellar cortex is divided into 3 layers; the molecular layer, the Purkinje cell layer, and the granular layer.

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