Nerve Conduction Velocity Experiment

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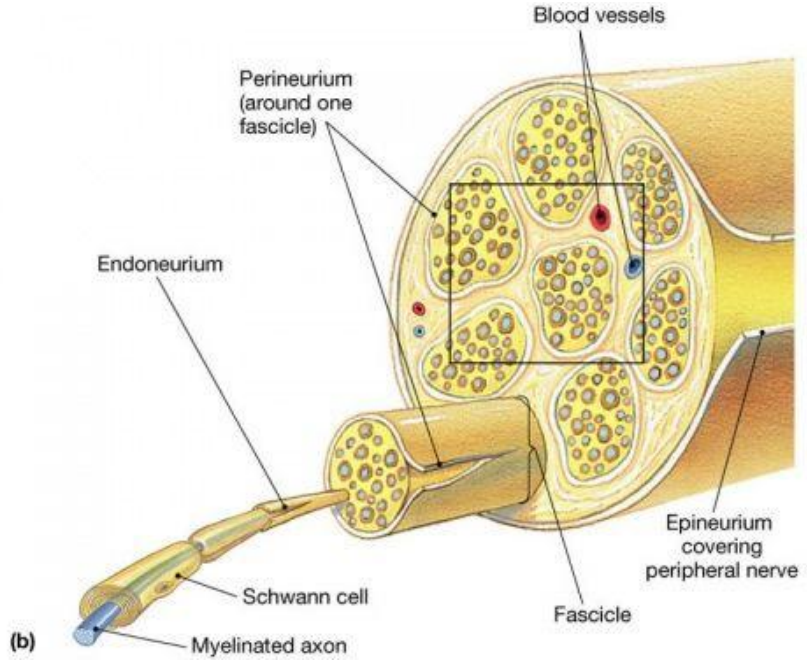
Peripheral Nerve Fibers

- The axons are bundled together into groups called fascicles, and each fascicle is wrapped in perineurium

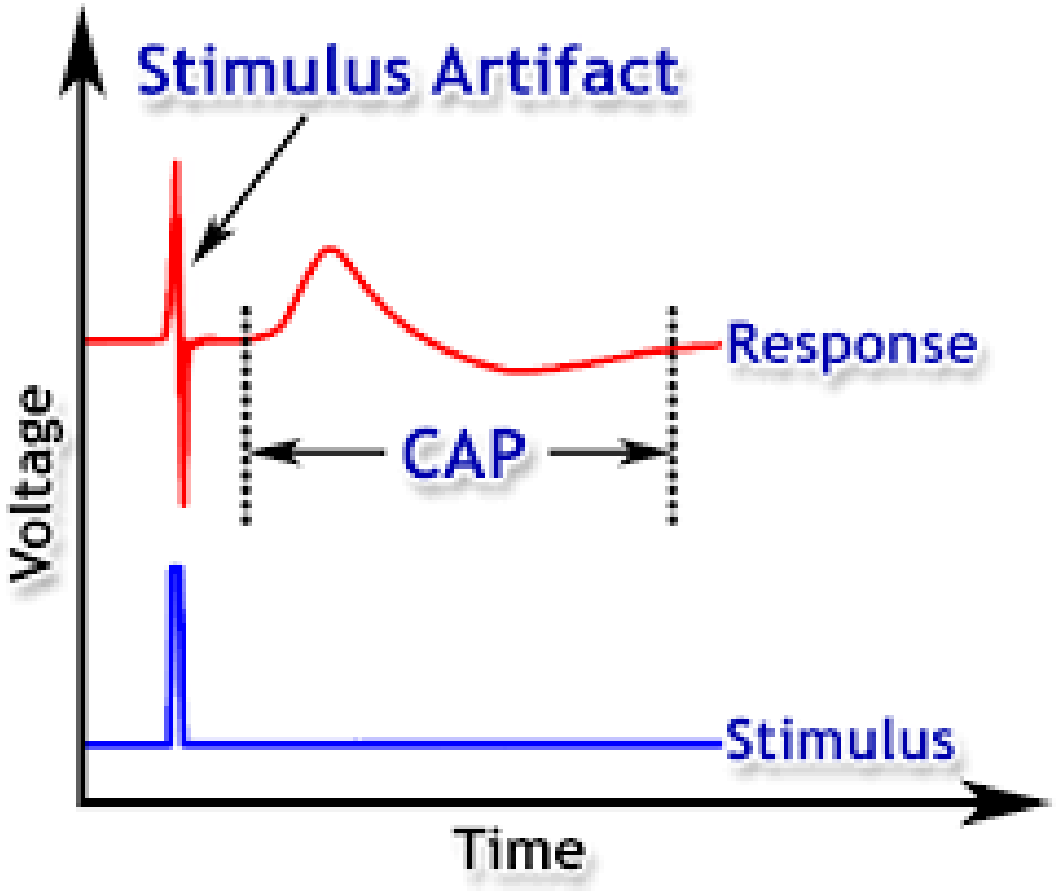
- Axons have different threshold and conduction velocity



Nerve Fiber Types

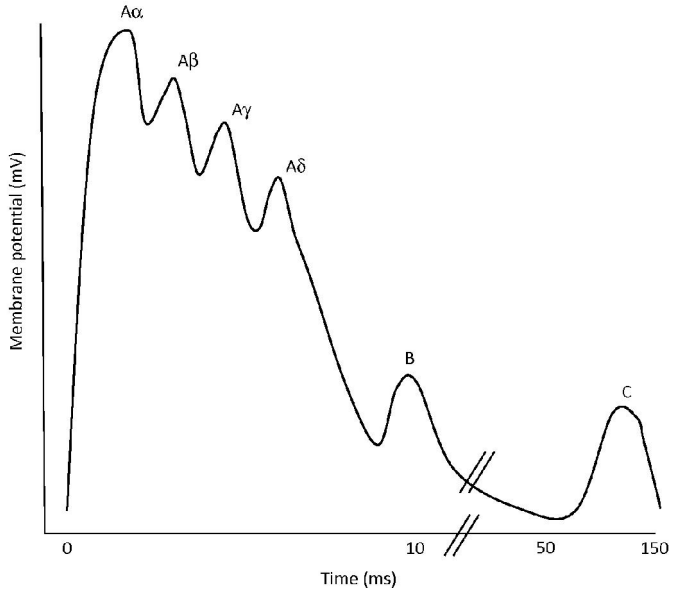
Fiber Type	Function	Diameter (microns)	Mystification	Conduction Velocity (m/s)
Type A				
Alpha (α)	Proprioception, motor	12-20	Heavy	70-120
Beta (β)	Touch, pressure	5-12	Heavy	30-70
Gamma (γ)	Muscle spindles	3-6	Heavy	15-30
Delta (δ)	Pain, temperature	2-5	Heavy	12-30
Type B	Preganglionic autonomic	<3	Light	3-15
Type C				
Dorsal root	Pain	0.4-12	None	0.5-2.3
Sympathetic	Postganglionic	0.3-1.3	None	0.7-2.3

Stimulation of a Peripheral Nerve Fiber



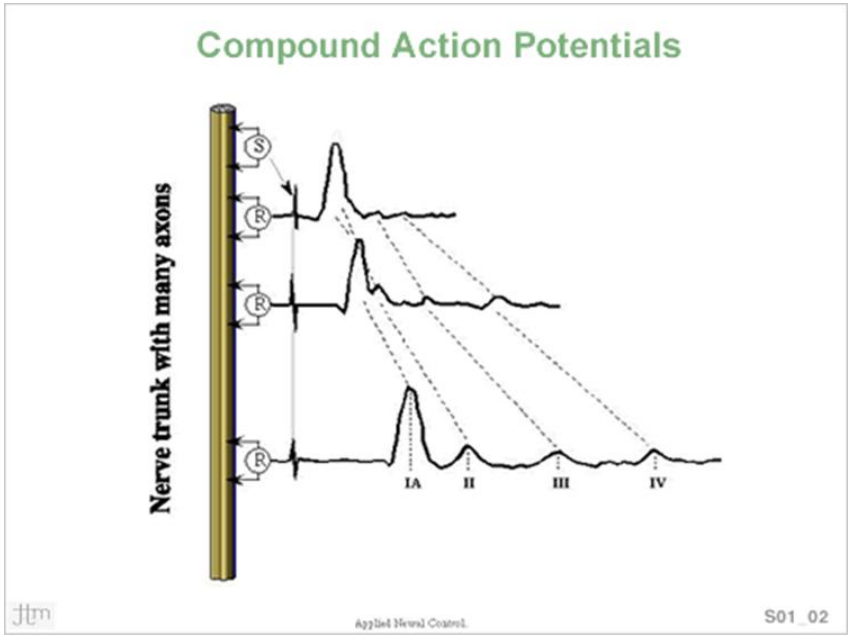
Compound Action Potential (CAP)

- An action potential having more than one peak/spike
  - A nerve trunk contains many nerve fibres differing widely in their excitability and different speeds of conduction of action potential.
  - Multiple peaks are recorded, fastest conducting nerve fibre first followed by the slower ones



Compound Action Potential (CAP)

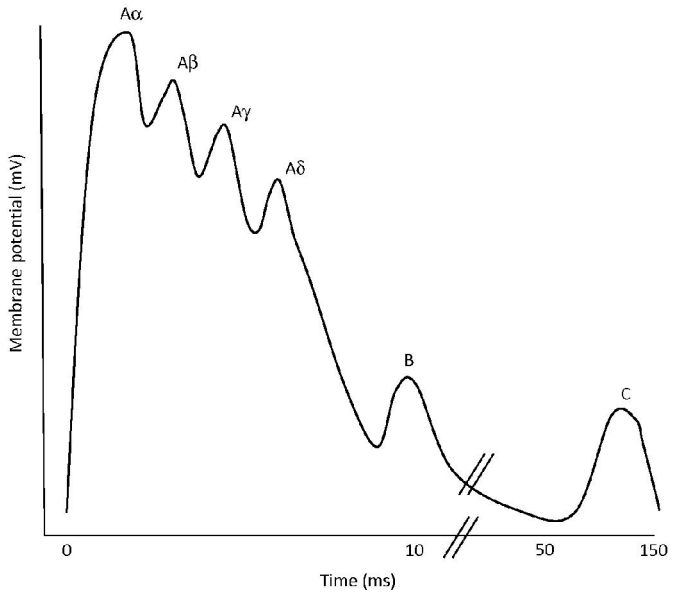
- The number of peaks observed in the CAP increases as the recording electrodes move away from stimulation site
  - First the fastest neuron



Compound Action Potential (CAP)

- The number and size of the peaks depend on the types of fibers contained in the nerve being studied.

- If the stimulus intensity is not large enough to stimulate all fibers, the shape of the compound action potential recorded varies with the types of fibers induced.



Nerve Conduction Velocity

- **Velocity** is a vector expression of the displacement that an object or particle undergoes with respect to time

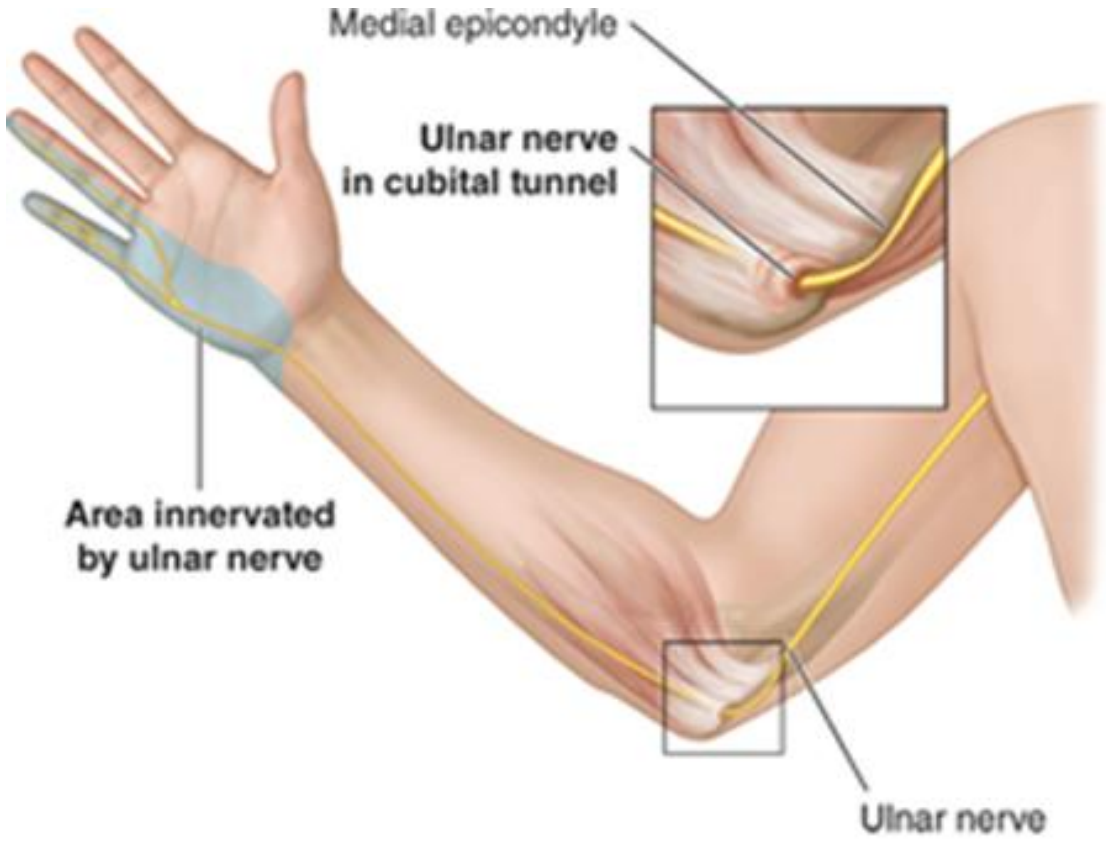
- The standard unit of **velocity** magnitude (also known as speed) is the meter per second (m/s)

MNCV = Motor nerve conduction velocity

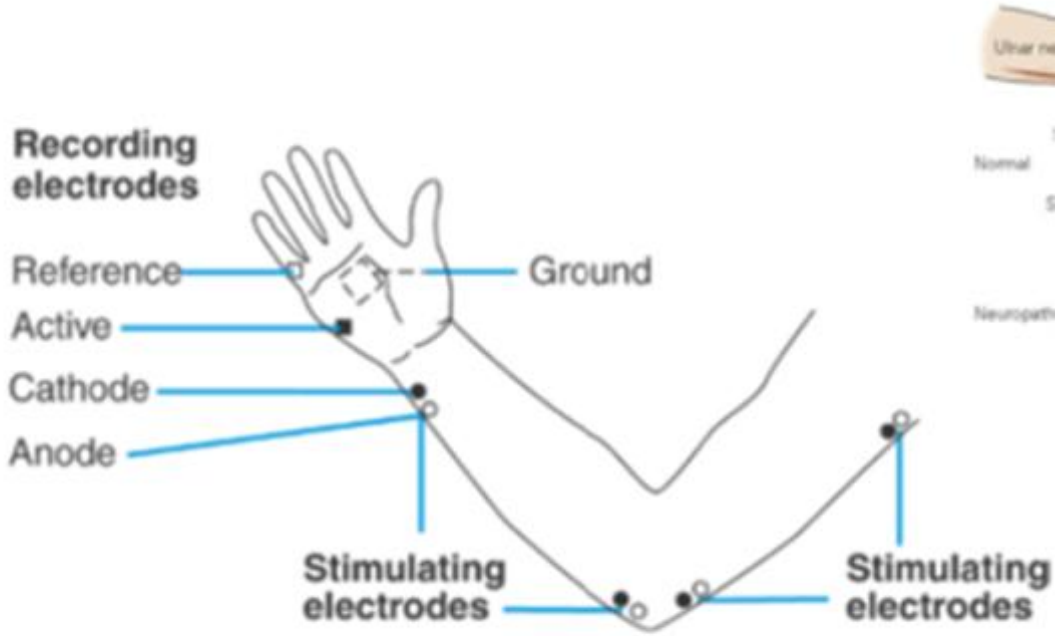
MNCV case example:

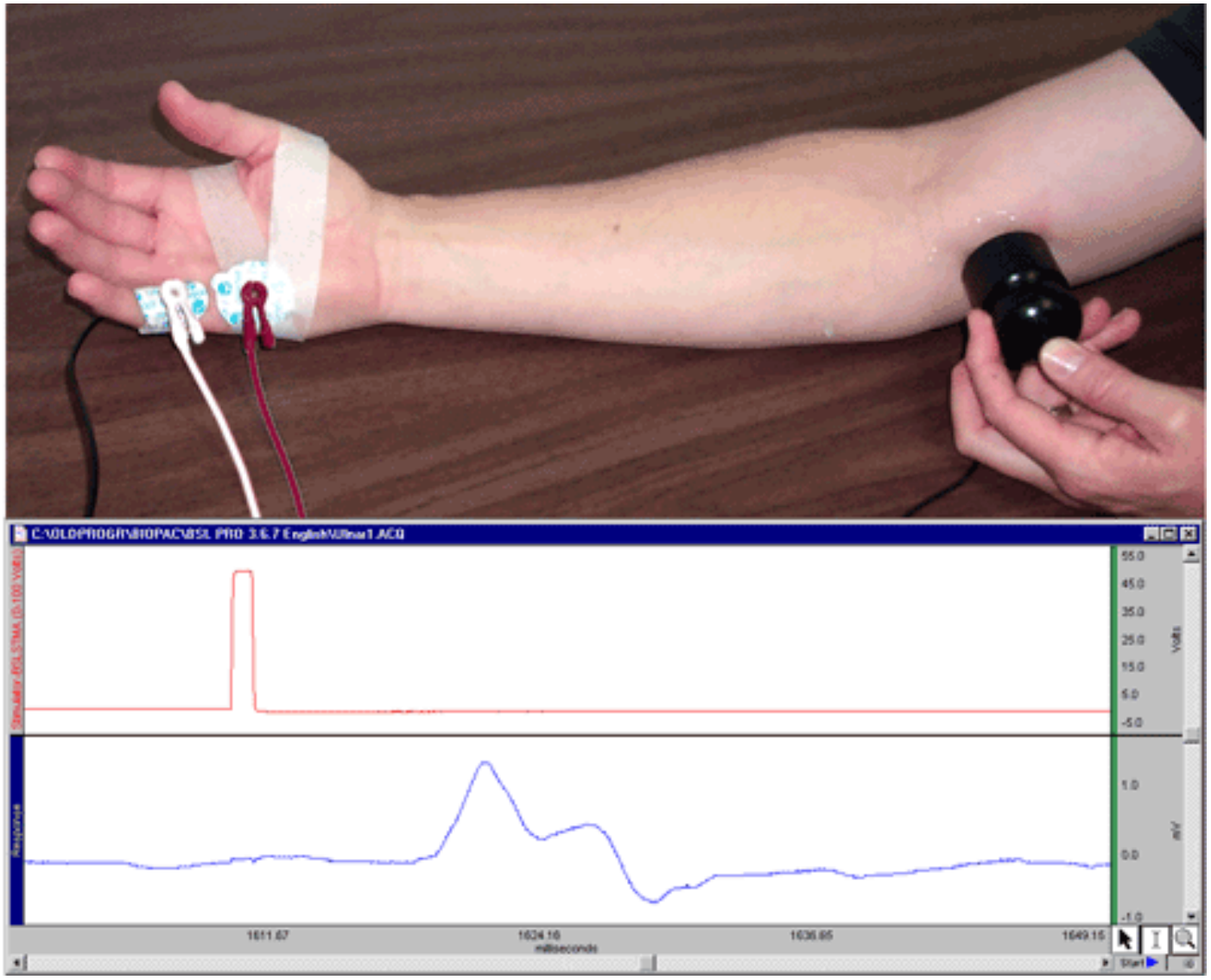
$$\text{MNCV} = \frac{\text{Distance (A–B)}}{\text{Time (A–B)}} = \frac{340 - 40 \text{ mm}}{10 - 4 \text{ ms}} = \frac{300 \text{ mm}}{6 \text{ ms}}$$

MNCV = 50 m/s for median nerve segment S1–S2


Medial epicondyle
Ulnar nerve
in cubital tunnel
Area innervated
by ulnar nerve
Ulnar nerve

Nerve Conduction Velocity Experiment

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55.0
45.0
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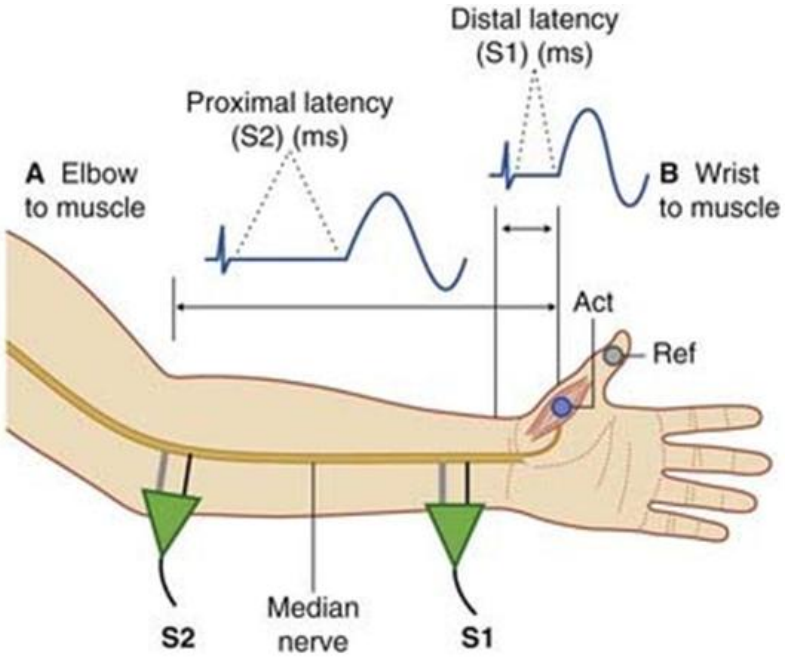
milliseconds



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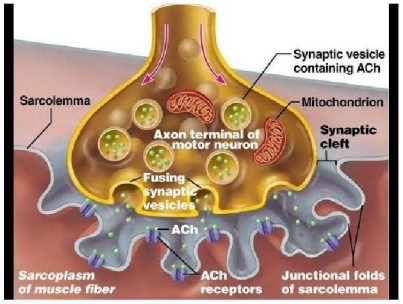
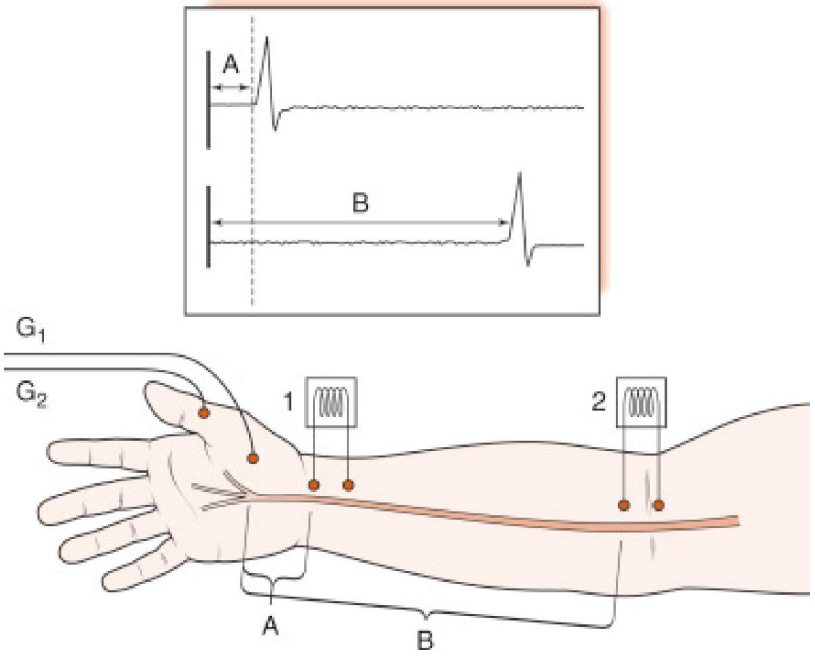
Why do we record from two sites?

- Synaptic delay at neuromuscular junction