Lab 7: Power Lab 2

Reflex Physiology and Reaction

Objectives of the Lab

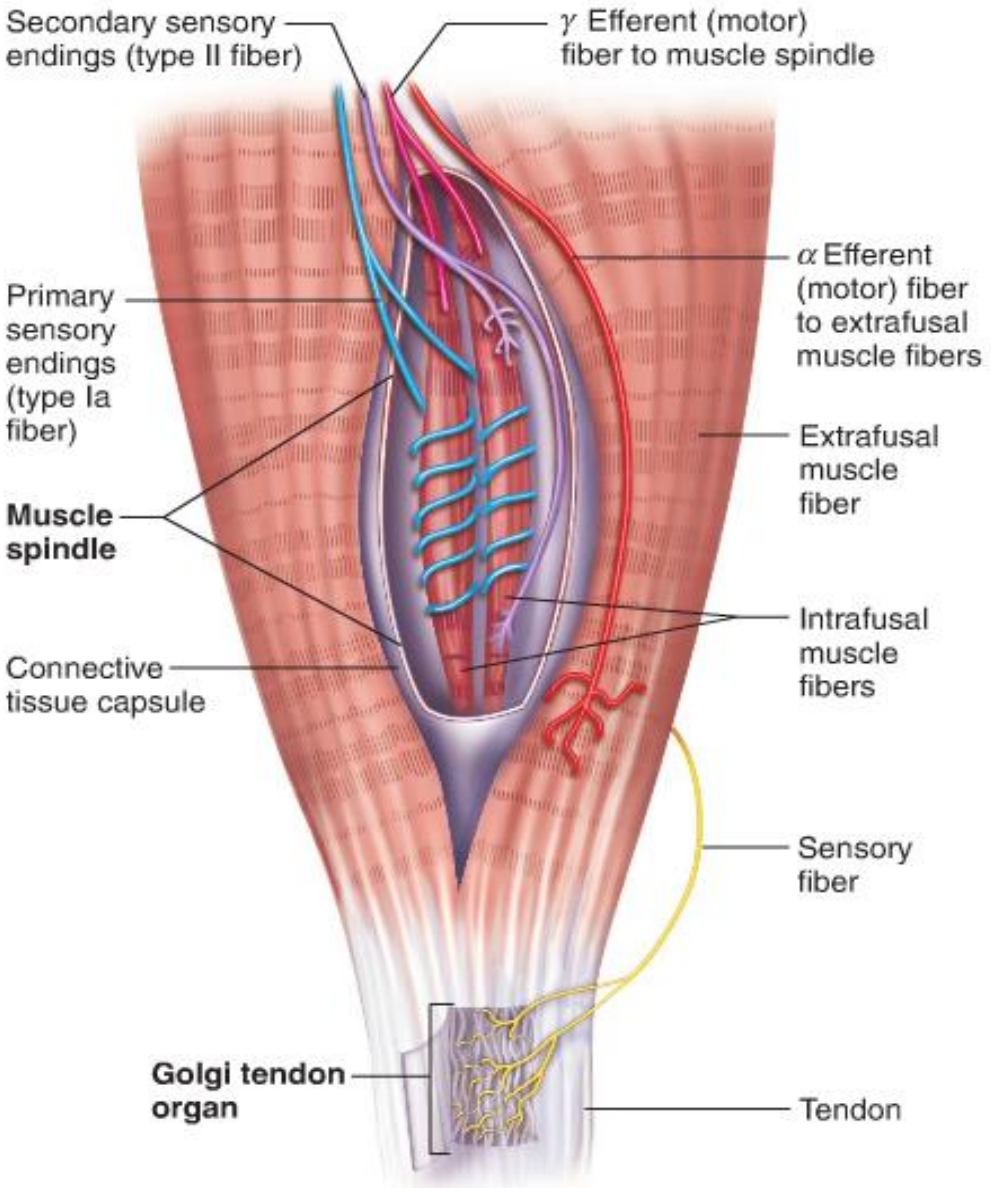
Reflex Physiology

- Types of reflexes and the reflex arc
- Physiology of Stretch reflex
- Patellar (Knee-jerk reflex)
- Achilles tendon reflex (ankle jerk reflex)

Reaction Time

- Difference between reflex and reaction
- Reaction time to different cues (visual, auditory, etc.)
- Reaction time due to distraction

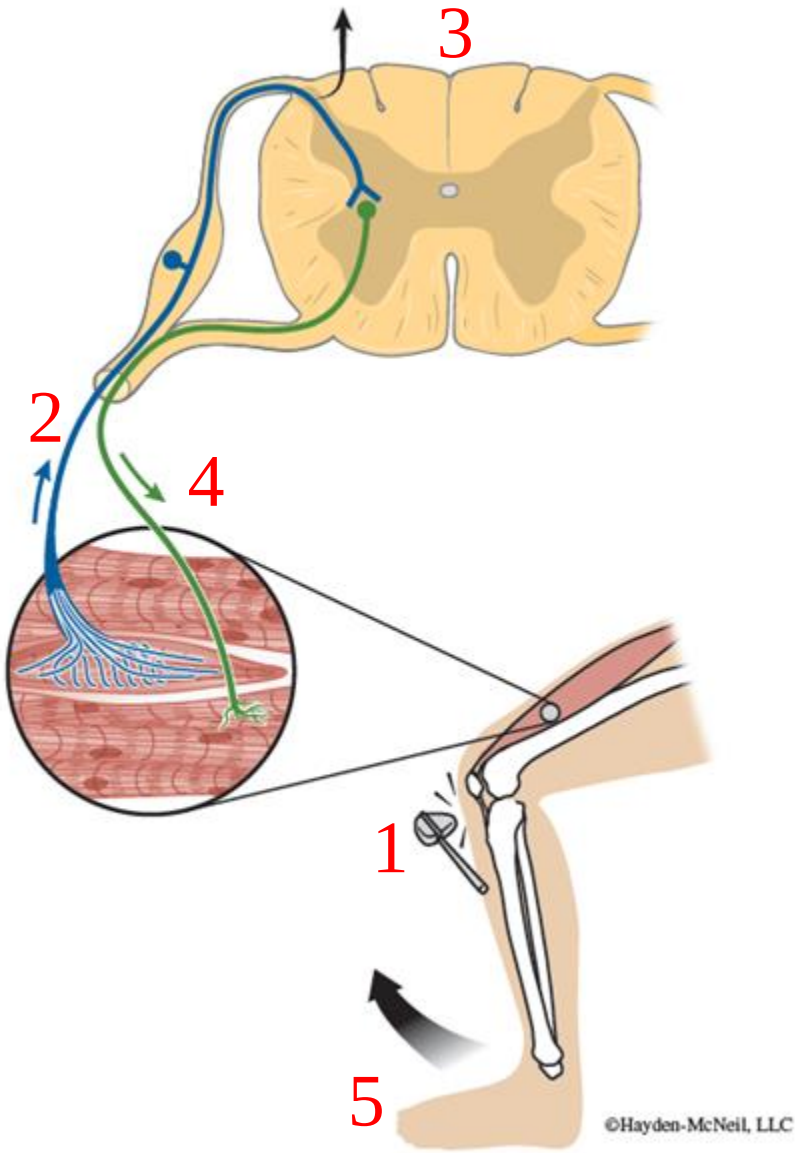
Muscle Spindles



Muscle spindles – supply information about length of muscle

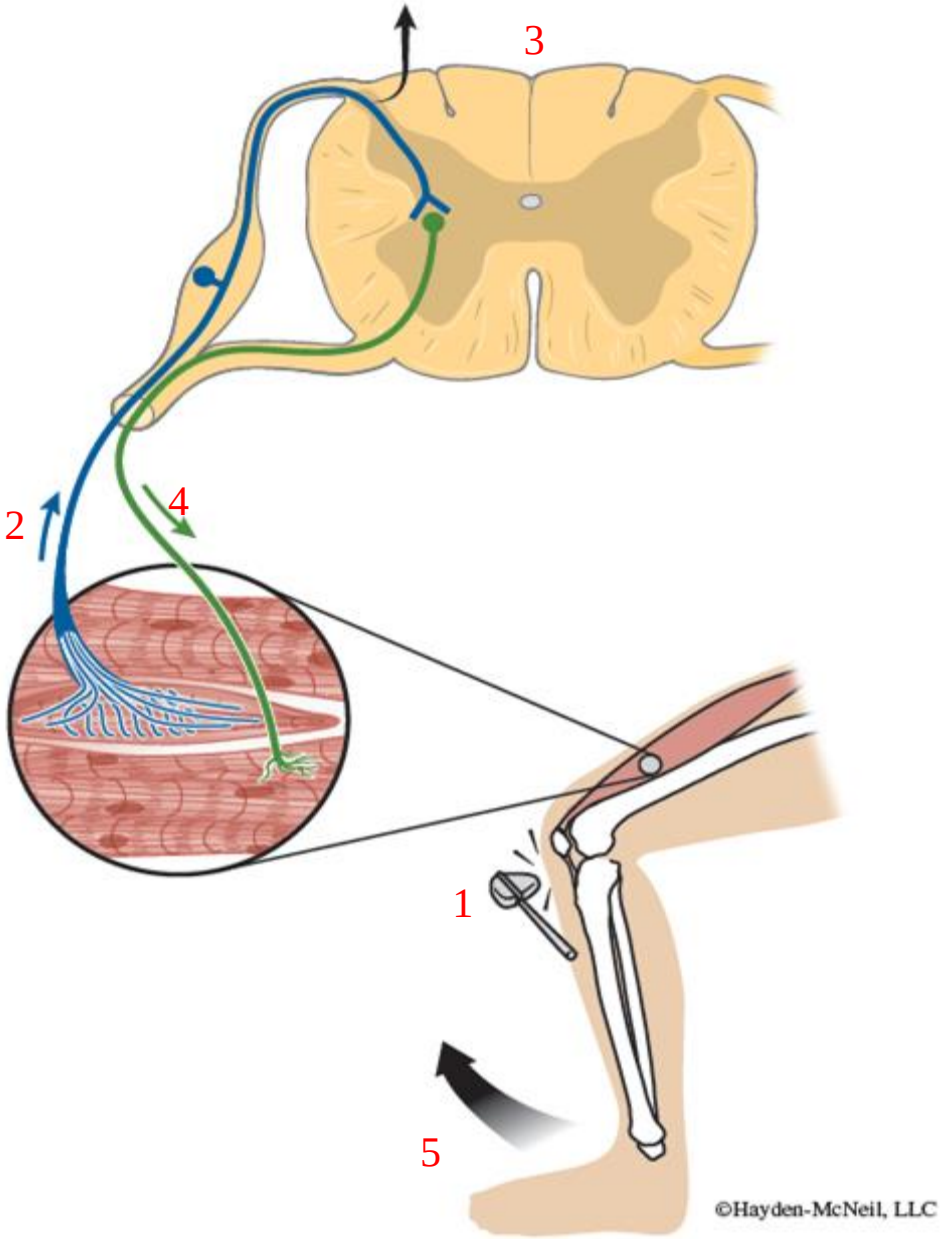
Intrafusal fibers – specialized muscle fibers, connected to tendons/extrafusal fibers

The Reflex Arc

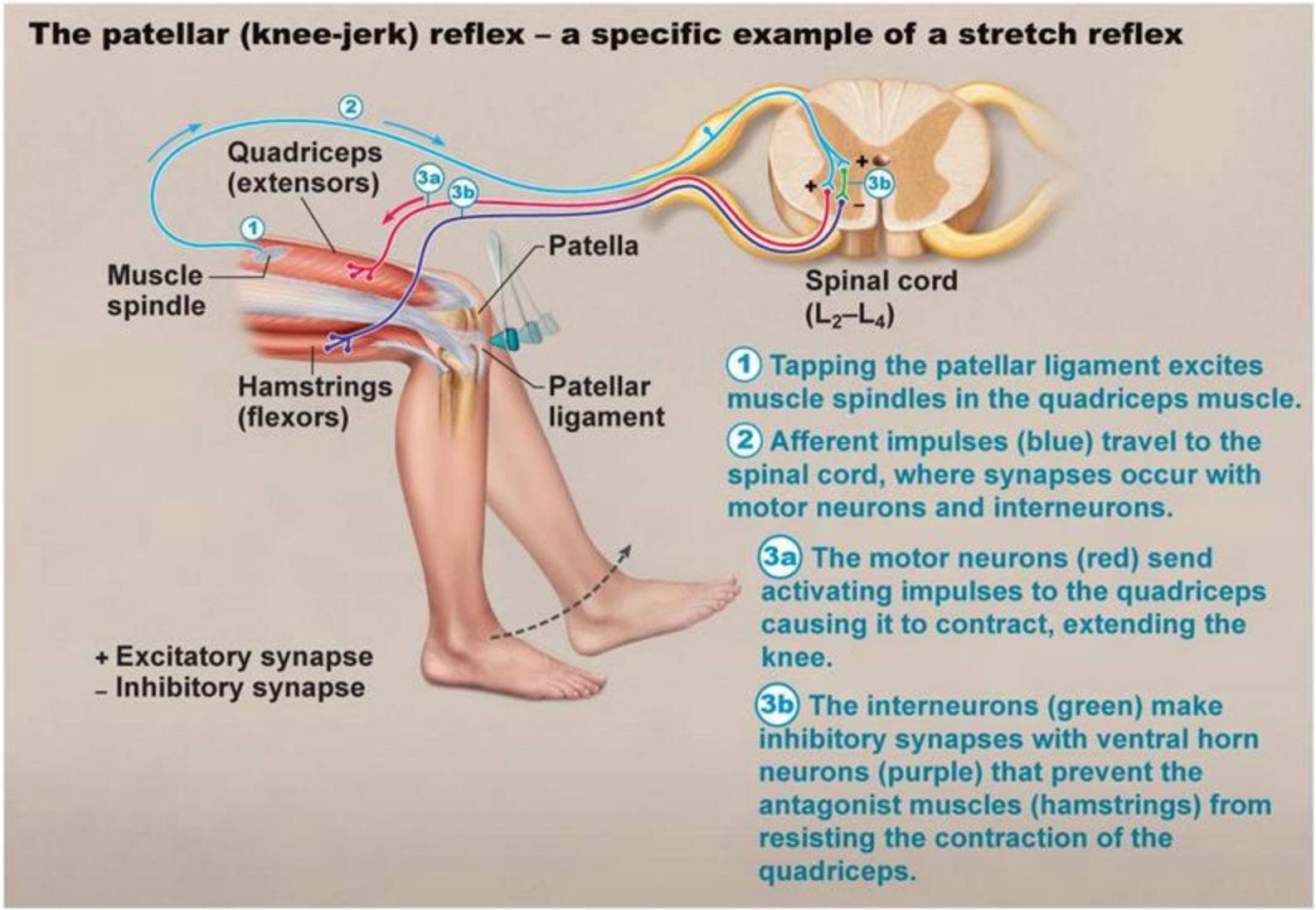


The Reflex Arc

1. Receptor
2. Sensory Neuron
3. Integration Center
   a. monosynaptic
   b. polysynaptic
4. Motor Neuron
5. Effector

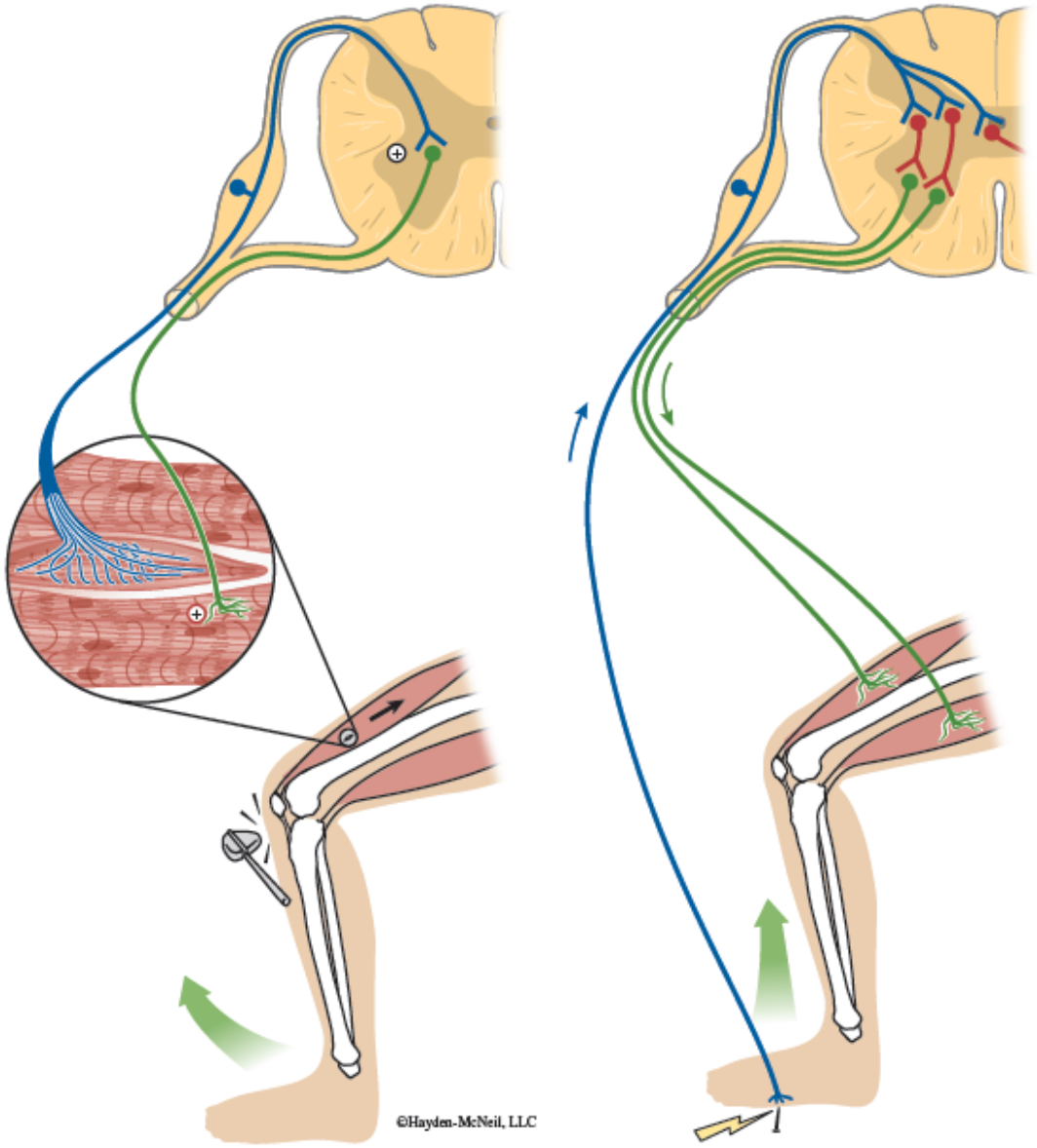


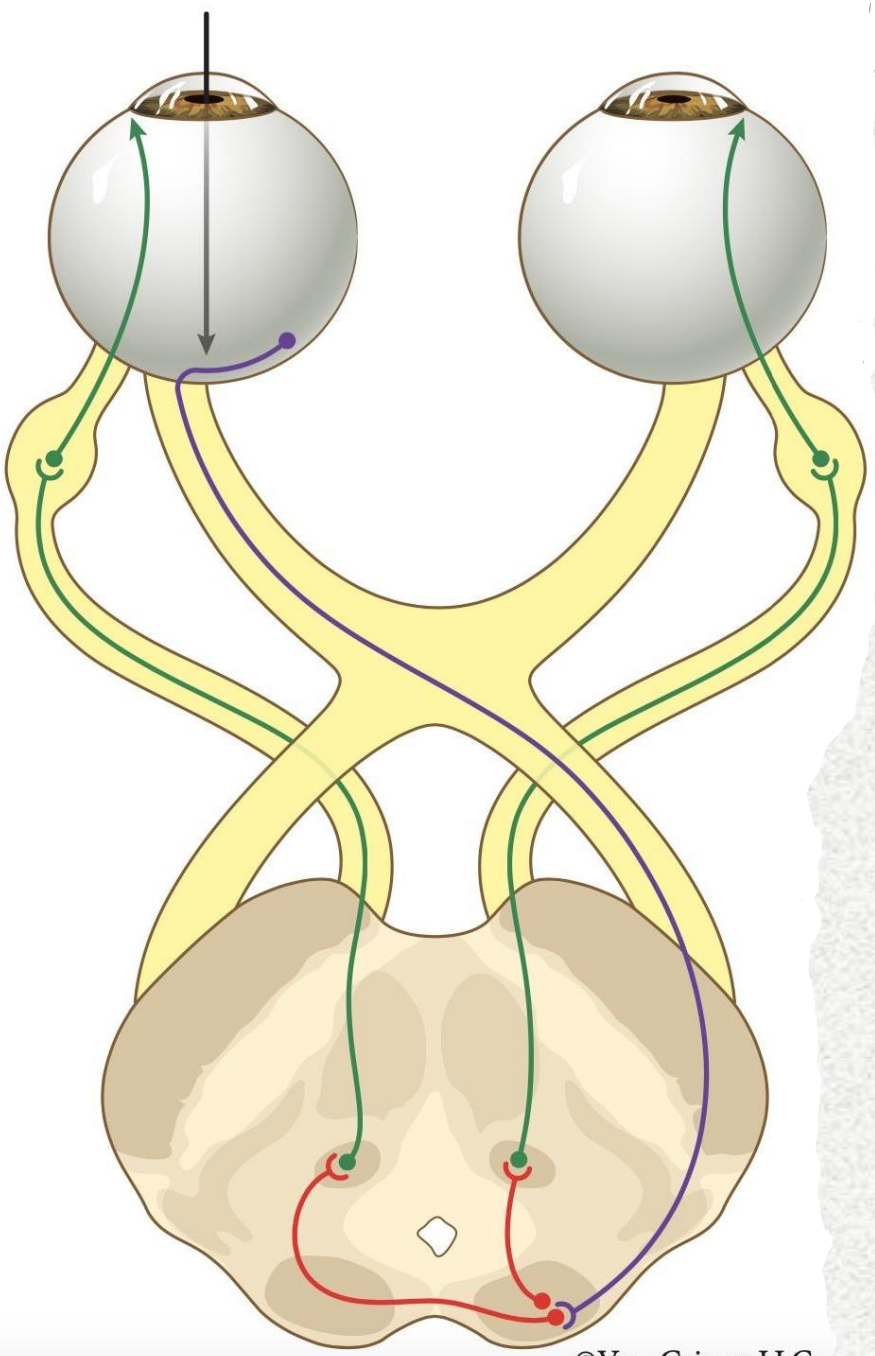
Stretch (Myotatic) Reflex



Types of Reflexes

- Stretch reflex
- Golgi tendon reflex
- Withdrawal reflex
  - Crossed extensor reflex





Direct (Pupillary) & Consensual Light Reflexes

There are two cranial nerves involved in this pathway: Optic nerve II (sensory) and Oculomotor nerve III (motor).

Where is Optic nerve II in this pathway? (purple)

Where is Oculomotor nerve III in this pathway?(green)

What structure is the signal from Optic nerve II being carried to?Midbrain (the integration center for this reflex)

Stretch (Myotatic) Reflex

Knee-jerk reflex: volunteer sits on the table and gets hit just below the patella.

Observe the amplitude (a.k.a. magnitude/intensity) of the reflex.

Jendrassik maneuver: Contracting upper body muscles

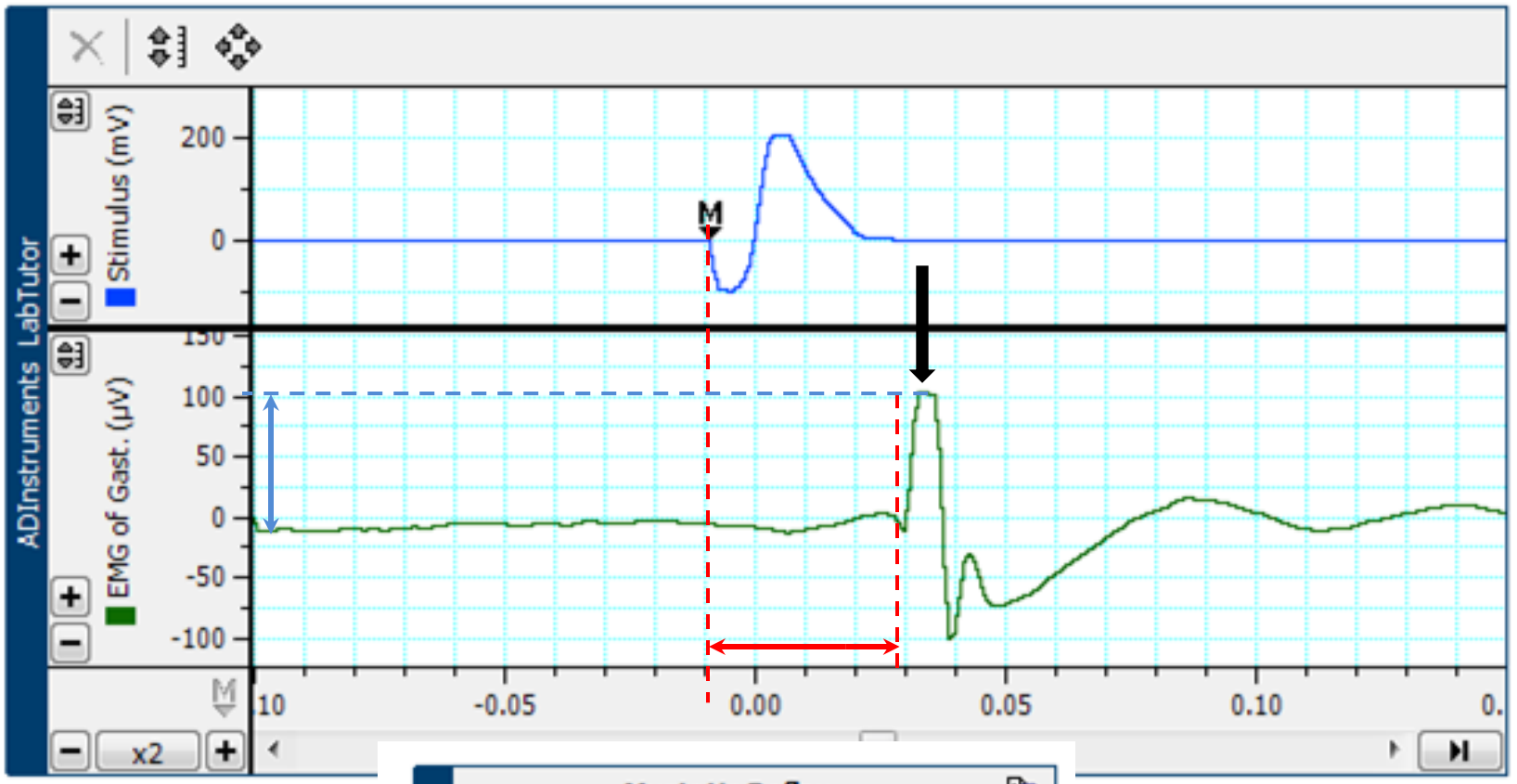
Observe the change in magnitude of the reflex.

Ankle jerk reflex: EMG recordings

- Attach electrodes (black and white leads) to the belly of the gastrocnemius.
- Attach the ground (green lead) to the lateral malleolus.

Hit the achilles tendon and observe the EMG trace on the computer screen.

Stretch (Myotatic) Reflex

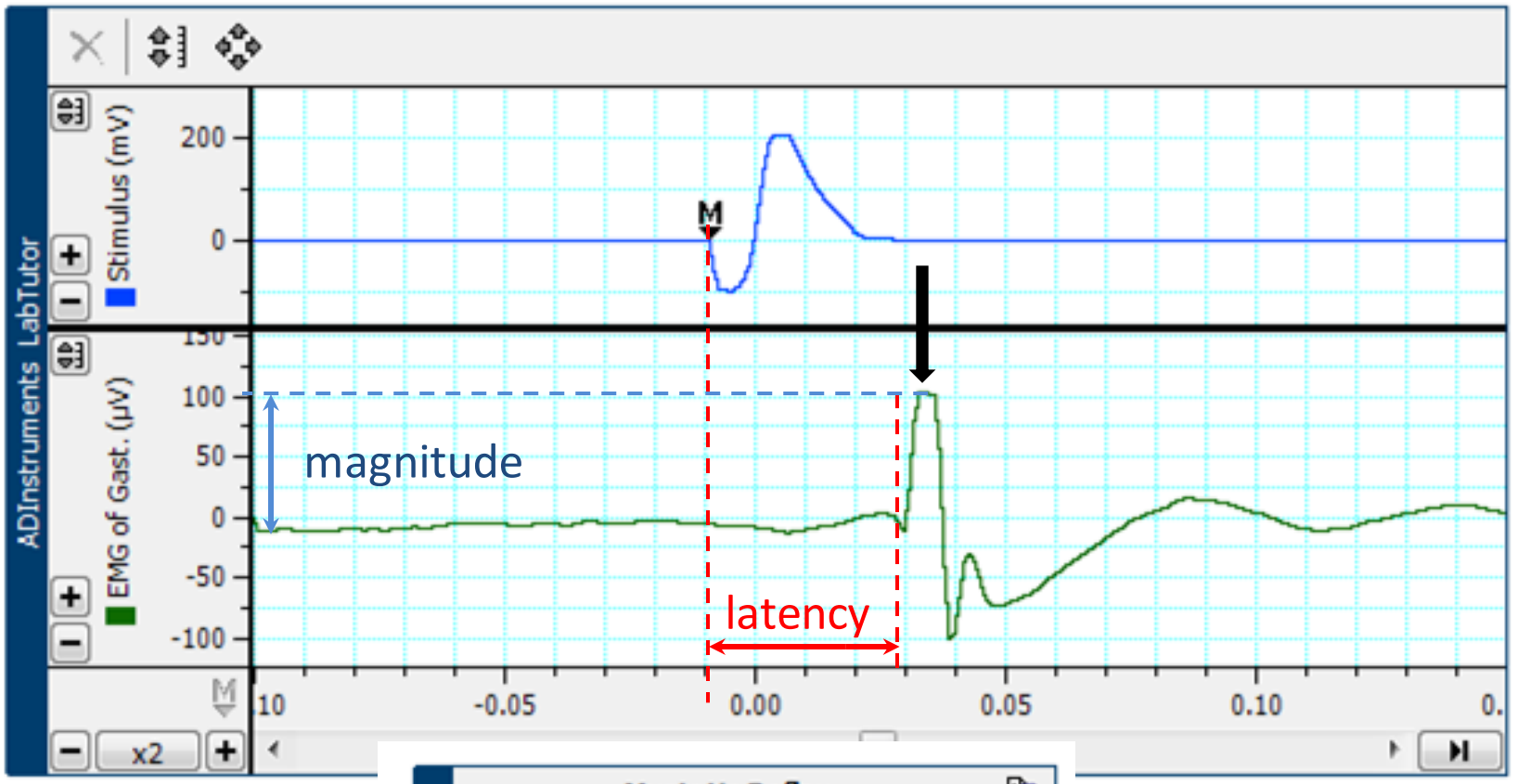


Table

Myotatic Reflex

Procedure	Latency (ms)	Magnitiude (m
Light tap	0.052	58.63
Moderate tap	0.048	88.18
strong tap	0.044	102.34
Mean	0.048	83.05

Stretch (Myotatic) Reflex



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Reaction Time

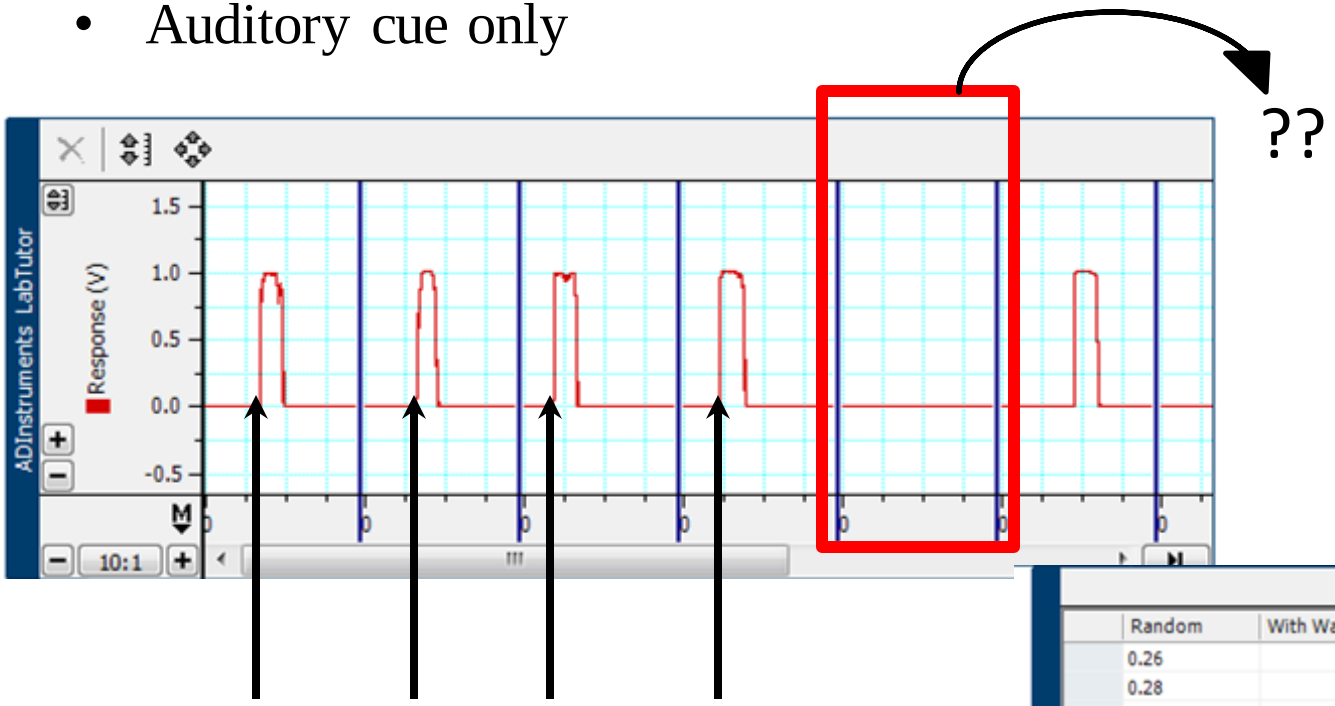
- Reaction/response – involves conscious analysis of stimulus, use neural structures of brain

How is this different from a reflex?

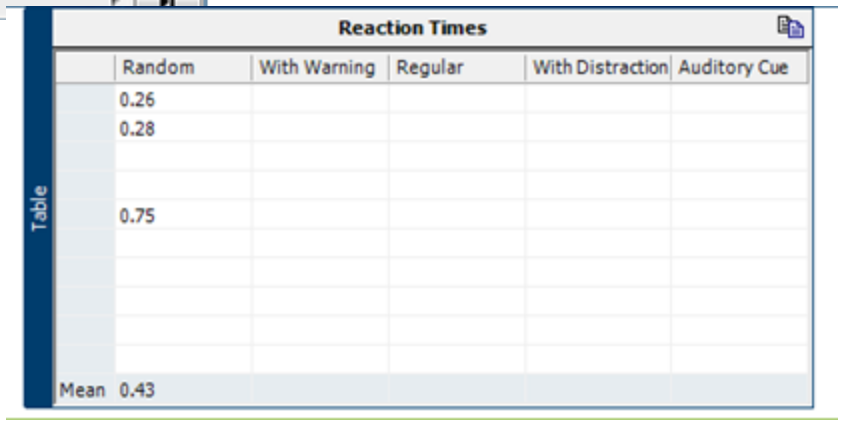
- Factors affecting reaction time
  - Different stimuli (visual vs auditory)
  - Distraction, warning, practice
    - Table 1 (pg 152)

Testing Your Reaction Time

- Random interval
- With warning
- Regular interval (i.e. every 2 seconds)
- With distraction (count backwards from 100 by 7)
- Auditory cue only



- Channel 1 = responder
- Channel 2 = signaler



Reflex Lab Activities

- Pupillary "direct light" and consensual light reflexes
- Grip force activity (muscle fatigue) pg 200
- Powerlab 3 Questions pg 202 -
  - Conduction velocity

$$= \frac{\text{Measured length of reflex pathway} \times 2}{(\text{Average reflex latency} - 0.002\ \text{s})}$$

- Don't forget to include units!