Somatic Reflexes

Copyright (c) The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

Nature of Somatic Reflexes

- **Quick, involuntary, stereotyped reactions of glands or muscle to sensory stimulation**
  - **automatic responses to sensory input that occur without our intent or often even our awareness**

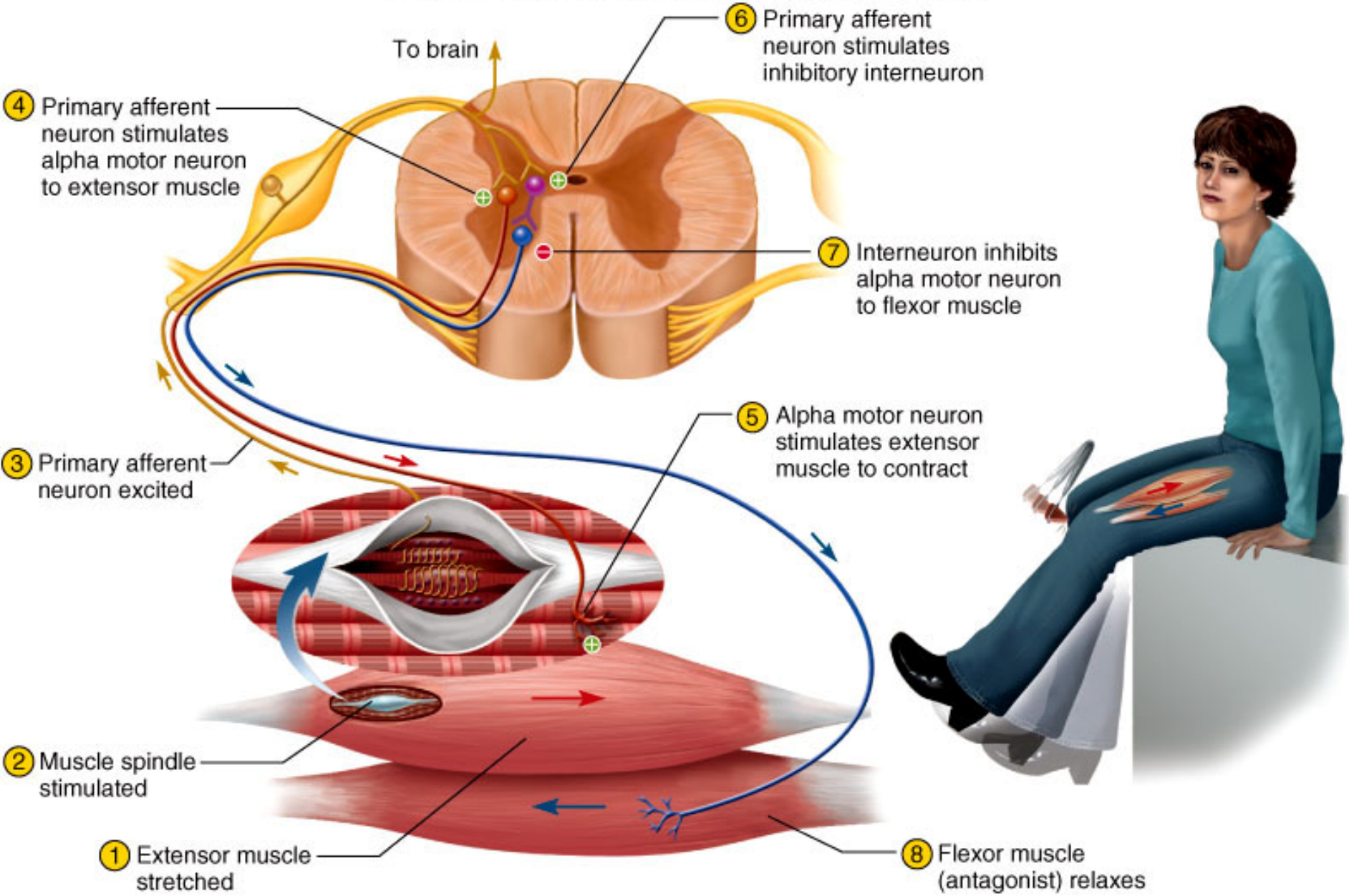
- **Functions by means of a somatic reflex arc**
  - **stimulation of somatic receptors**
  - **afferent fibers carry signal to dorsal horn of spinal cord**
  - **one or more interneurons integrate the information**
  - **efferent fibers carry impulses to skeletal muscles**
  - **skeletal muscles respond**

The Stretch (Myotatic) Reflex

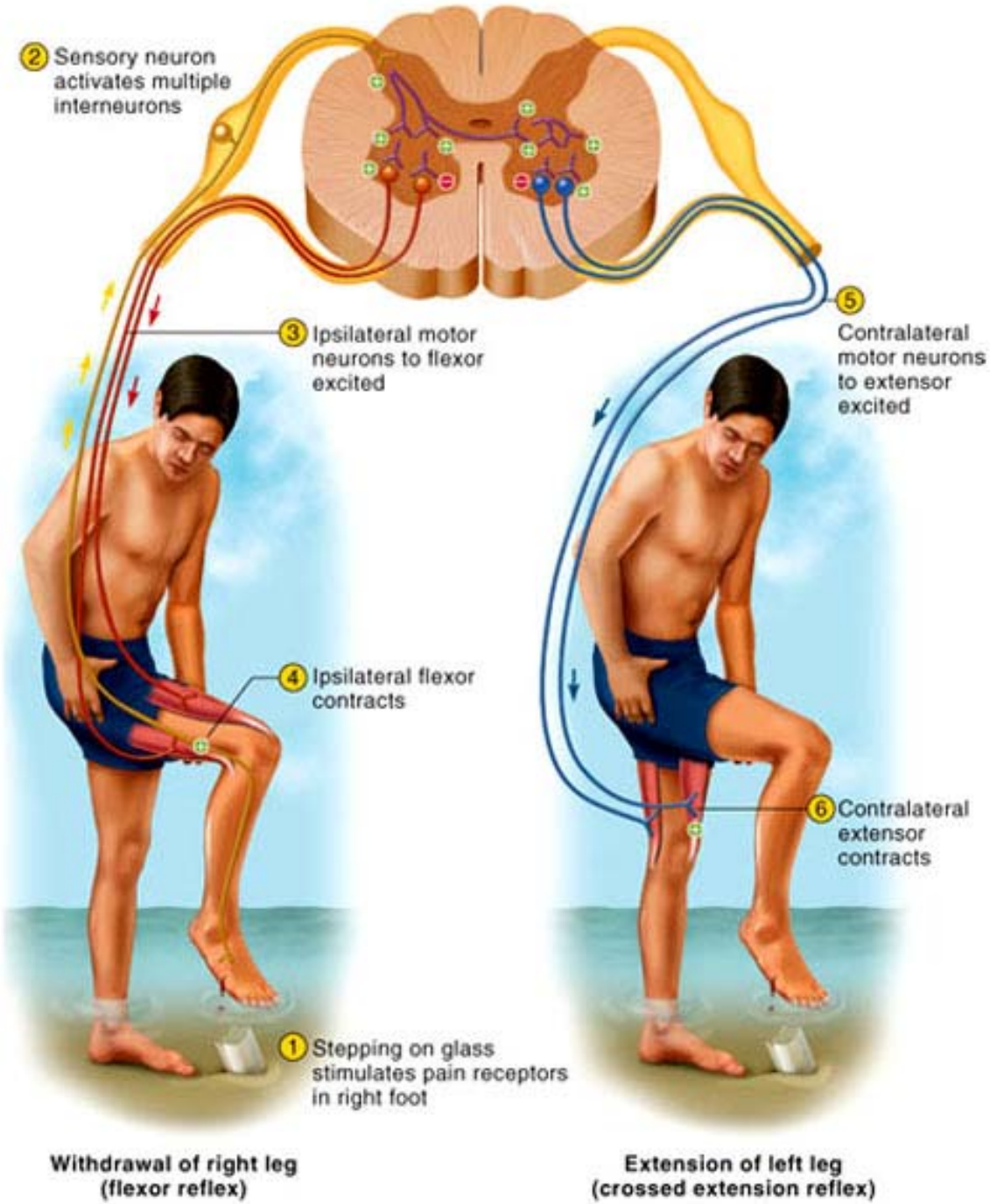
- When a muscle is stretched, it contracts and maintains increased tonus (stretch reflex)
  - helps maintain equilibrium and posture
    - head starts to tip forward as you fall asleep
    - muscles contract to raise the head
  - stabilize joints by balancing tension in extensors and flexors smoothing muscle actions
- Very sudden muscle stretch causes tendon reflex
  - knee-jerk (patellar) reflex is monosynaptic reflex
  - testing somatic reflexes helps diagnose many diseases
- Reciprocal inhibition prevents muscles from working against each other

The Patellar Tendon Reflex Arc

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



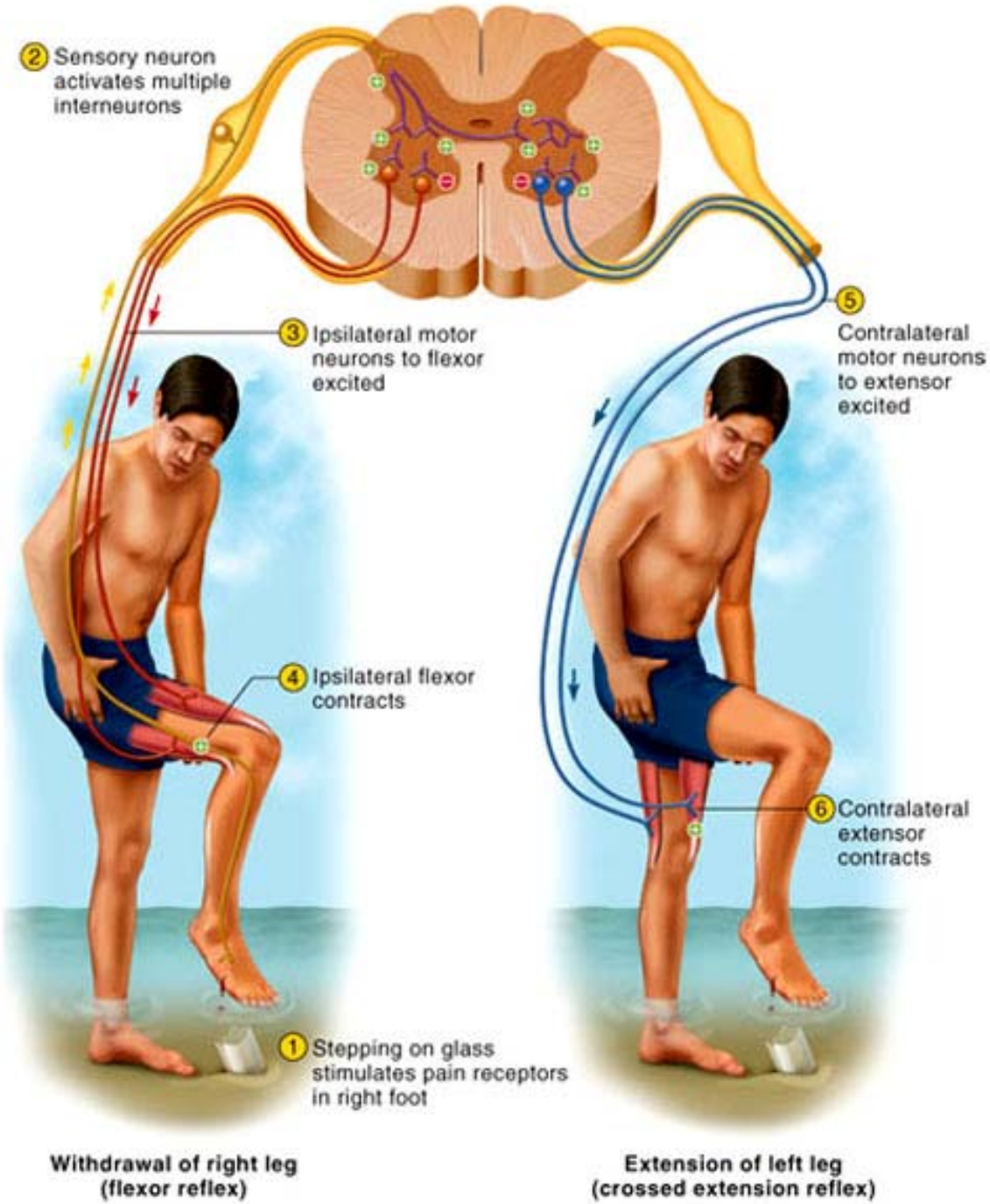
Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.



Flexor Withdrawal Reflexes

- Occurs during withdrawal of foot from pain
- Polysynaptic reflex arc
- Neural circuitry in spinal cord controls sequence and duration of muscle contractions

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

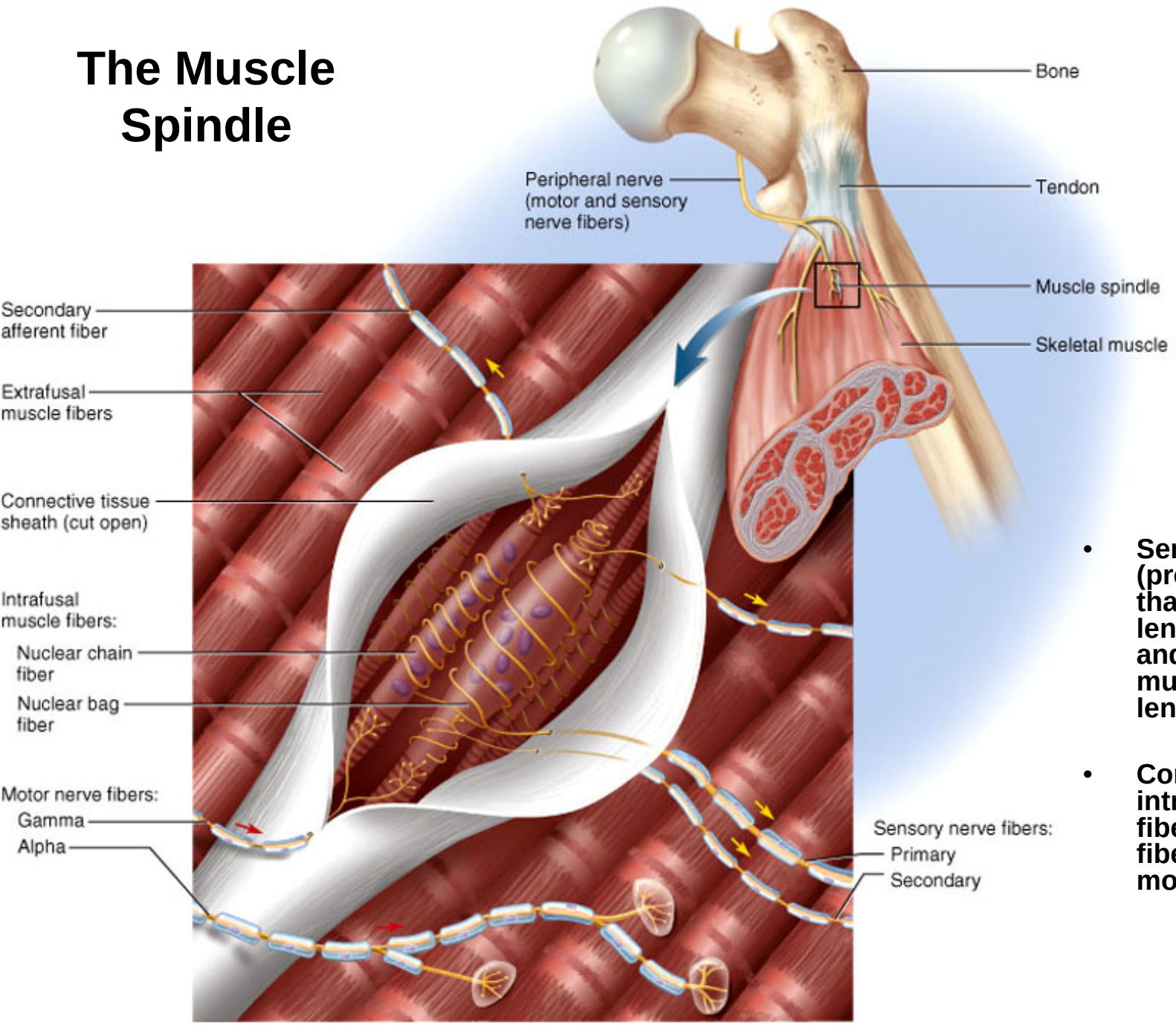


Crossed Extensor Reflexes

- Maintains balance by extending other leg
- Intersegmental reflex extends up and down the spinal cord
- Contralateral reflex arcs explained by pain at one foot causes muscle contraction in other leg

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.

The Muscle Spindle



- **Sense organ (proprioceptor) that monitors length of muscle and how fast muscles change in length**
- **Composed of intrafusal muscle fibers, afferent fibers and gamma motorneurons**

Golgi Tendon Reflex

- Proprioceptors in a tendon near its junction with a muscle -- 1mm long, encapsulated nerve bundle
- Excessive tension on tendon inhibits motor neuron
  - muscle contraction decreased
- Also functions when muscle contracts unevenly

Copyright © The McGraw-Hill Companies, Inc. Permission required for reproduction or display.