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peer to peer training
Peripheral nerve disease / injury

Increasing the Conformance of Academia towards Rehabilitation Engineering (i-CARE)

Project ref. 586403-EPP-1-2017-1-PS-EPPKA2-CBHE-JP

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Date:29/2/2020

This publication has been produced with the financial support of the Erasmus+ Program of the European Union. The contents of this publication are the sole responsibility of the partners and can in no way be taken to reflect the views of the European Commission.

General Function

Conditions both within and outside the body are constantly changing; the purpose of the nervous system is to respond to these internal and external changes (known as stimuli) and so cause the body to adapt to new conditions.

It is through the nerve impulse sent to the various organs by the nervous system that a person's internal harmony and the balance between the person and the environment are maintained.

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Cells of nervous system and their functions

The two types of cells found in the nervous system are called neurons or nerve cells and neuroglia, which are specialized connective tissue cells.

Neurons conduct impulses, whereas neuroglia supports neurons.

One function of neuroglia cells is to hold the functioning neurons together and protect them.

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Cells of nervous system and their functions

Neurons

Each neuron consists of three parts: a main part called the **neuron cell body**, one or more branching projections called **dendrites**, and one elongated projection known as an **axon.**

Dendrites are the processes or projections that transmit impulses to the neuron cell bodies, **and**

axons are the processes that transmit impulses away from the neuron cell bodies.

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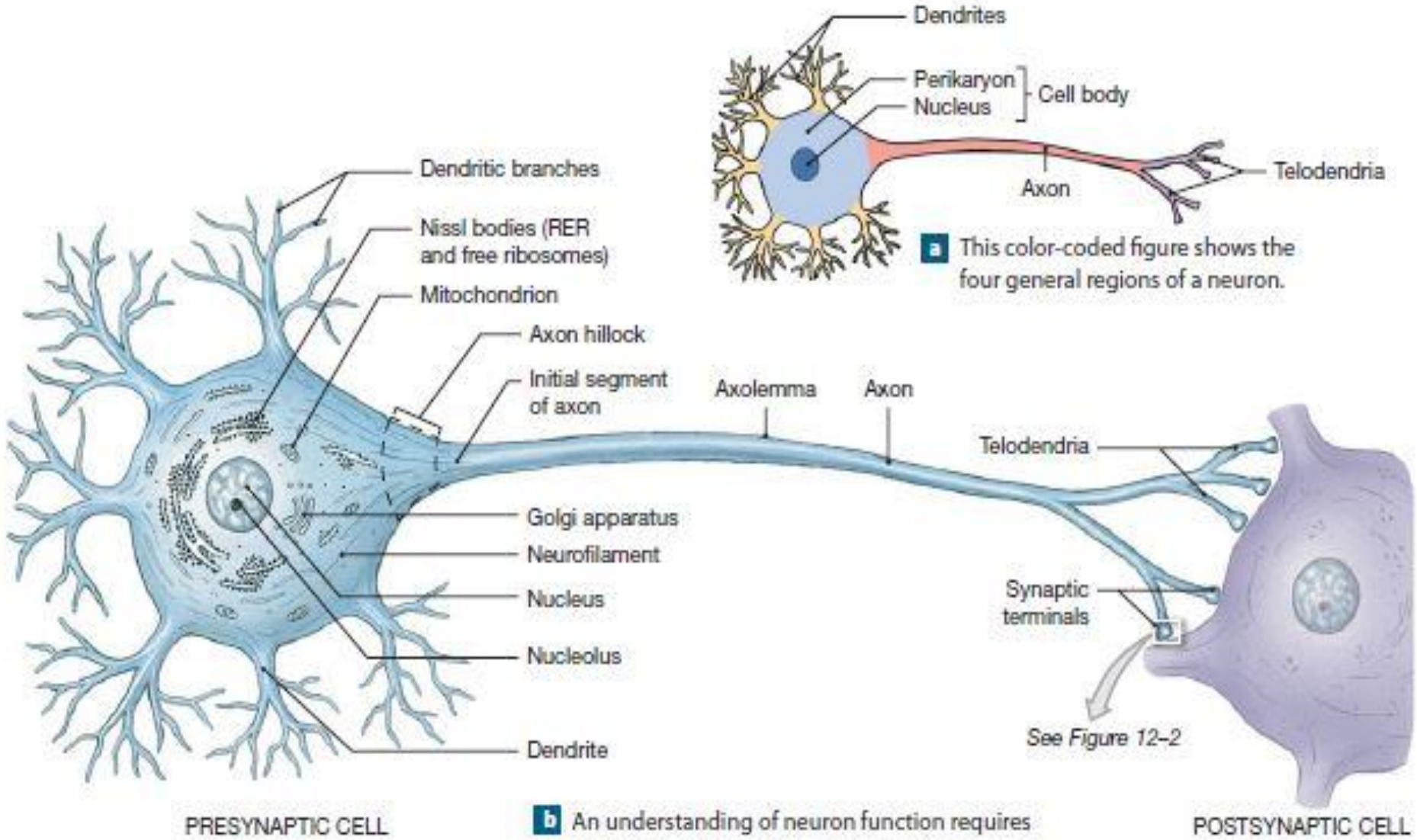
Figure 12–1 The Anatomy of a Multipolar Neuron.



a This color-coded figure shows the four general regions of a neuron.

b An understanding of neuron function requires knowing its structural components.

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Figure 12–6 Schwann Cells and Peripheral Axons.

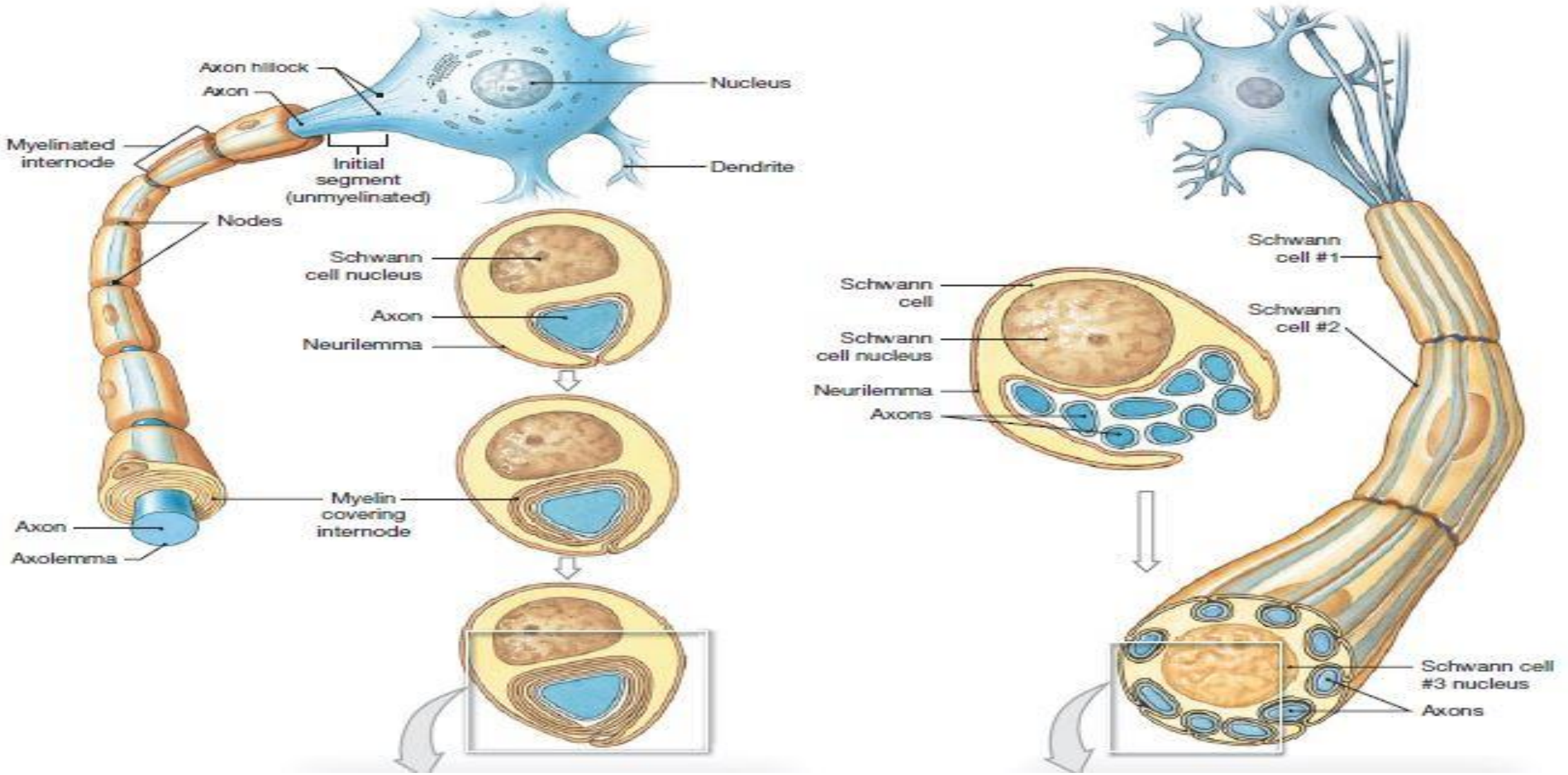

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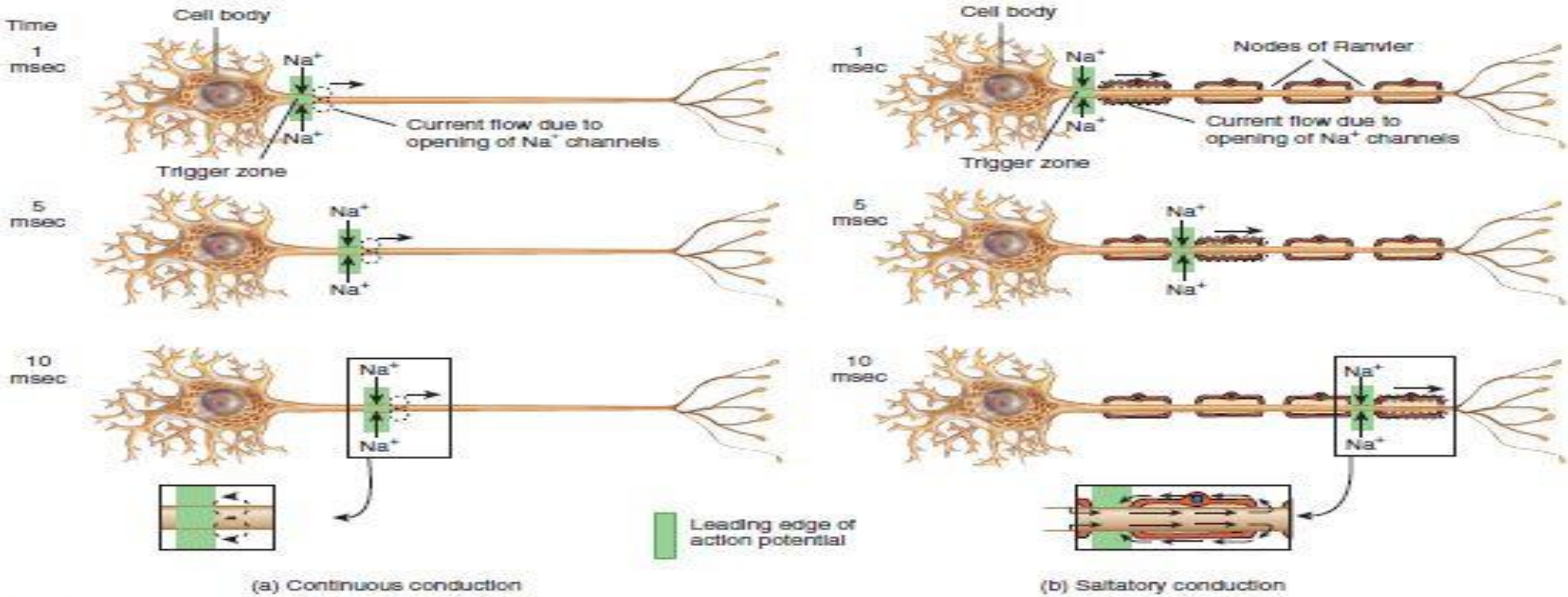
Figure 12.21 **Propagation of an action potential in a neuron after it arises at the trigger zone.** Dotted lines indicate ionic current flow. The insets show the path of current flow. (a) In continuous conduction along an unmyelinated axon, ionic currents flow across each adjacent segment of the membrane. (b) In saltatory conduction along a myelinated axon, the action potential (nerve impulse) at the first node generates ionic currents in the cytosol and interstitial fluid that open voltage-gated Na^+ channels at the second node, and so on at each subsequent node.

Unmyelinated axons exhibit continuous conduction; myelinated axons exhibit saltatory conduction.



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TYPES NEORONES

The three types of functional classification of neurons are according to the direction in which they transmit impulses.

Sensory neurons transmit impulses to the spinal cord and brain from all parts of the body.

Motor neurons transmit impulses in the opposite direction-away from the brain and spinal cord. They do not conduct impulses to all parts of the body but only to two kinds of tissue-muscle and glandular epithelial tissue.

Interneurons conduct impulses from sensory neurons to motor neurons.

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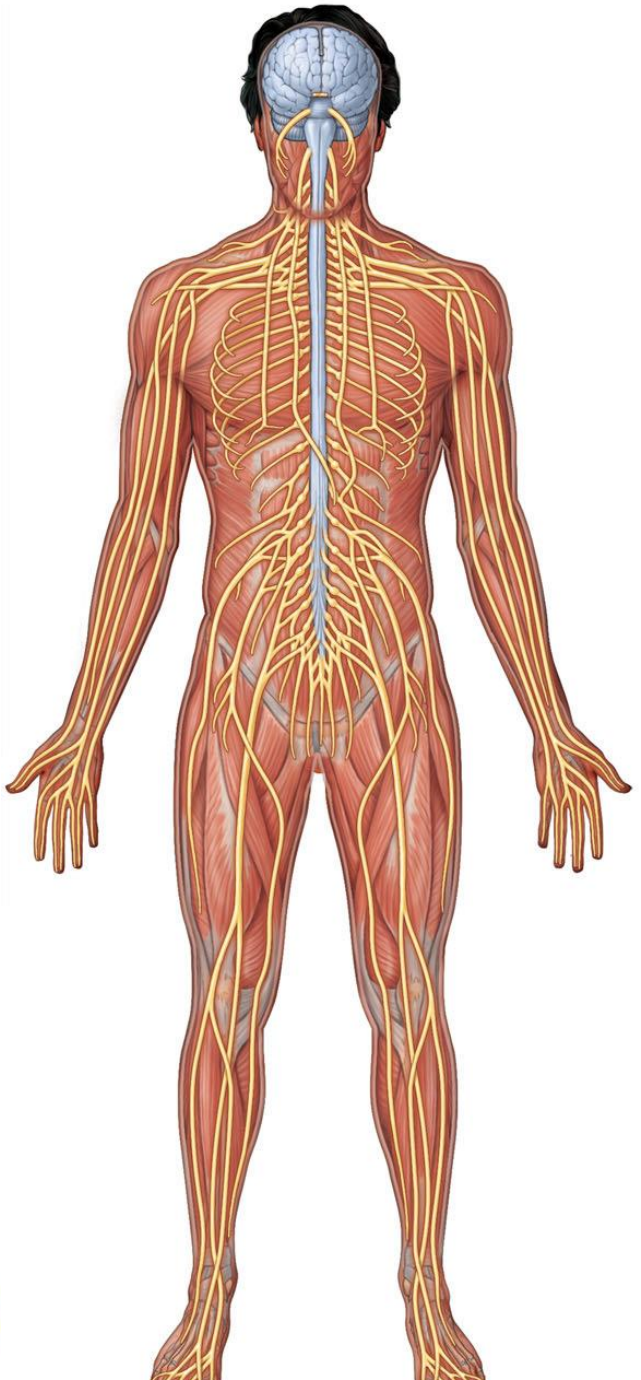
Central and peripheral nervous system



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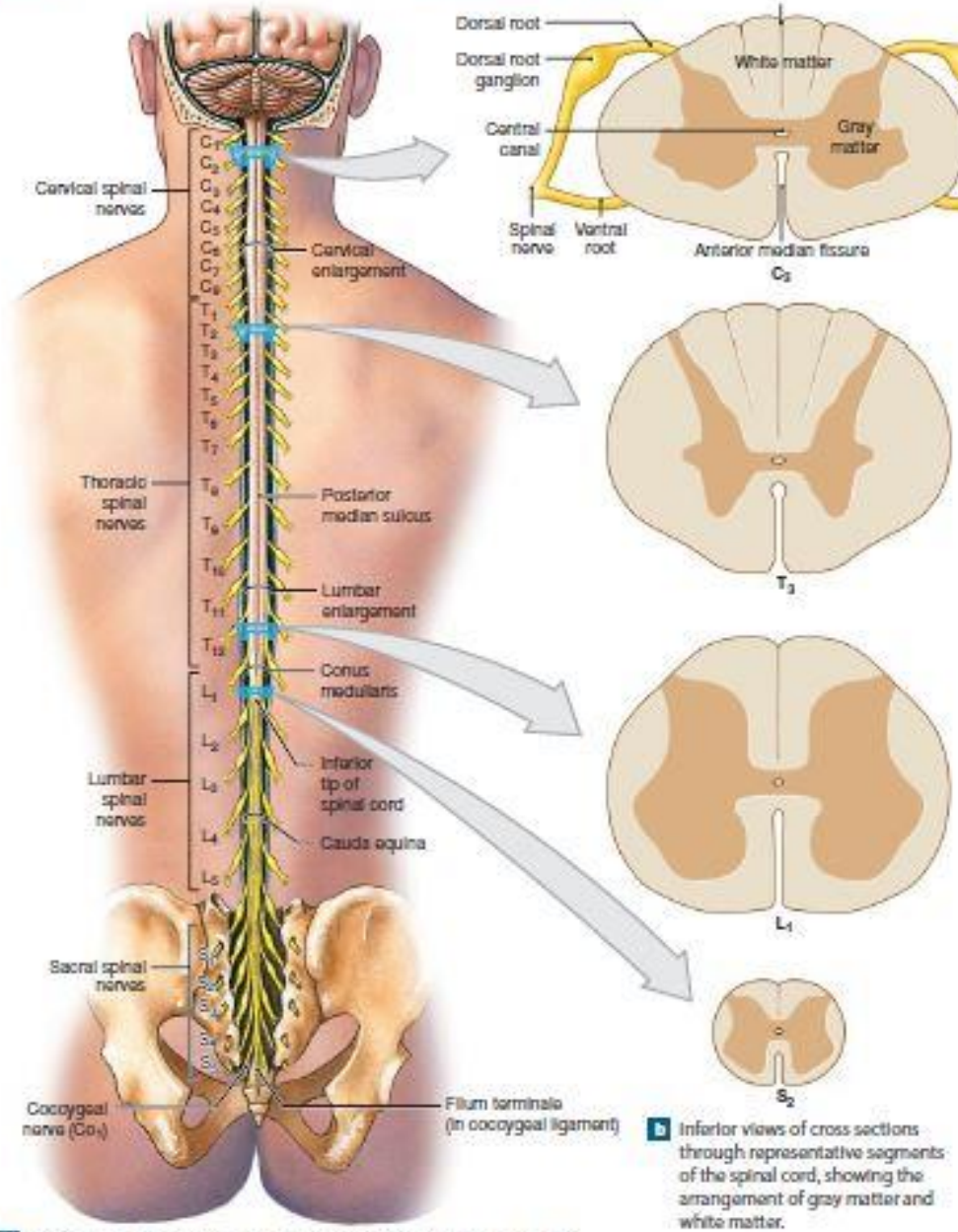
gure 13–2 Gross Anatomy of the Adult Spinal Cord. ATLAS: Plates 2a; 20a,b; 24a–c



a The superficial anatomy and orientation of the adult spinal cord. The numbers to the left identify the spinal nerves and indicate where the nerve roots leave the vertebral canal. The spinal cord extends from the brain only to the level of vertebrae L_1–L_2; the spinal segments found at representative locations are indicated in the cross sections.

b Inferior views of cross sections through representative segments of the spinal cord, showing the arrangement of gray matter and white matter.

13.13 General components of a reflex arc. Arrows show the direction of nerve impulse propagation.

A reflex is a fast, predictable sequence of involuntary actions that occur in response to certain changes in the environment.

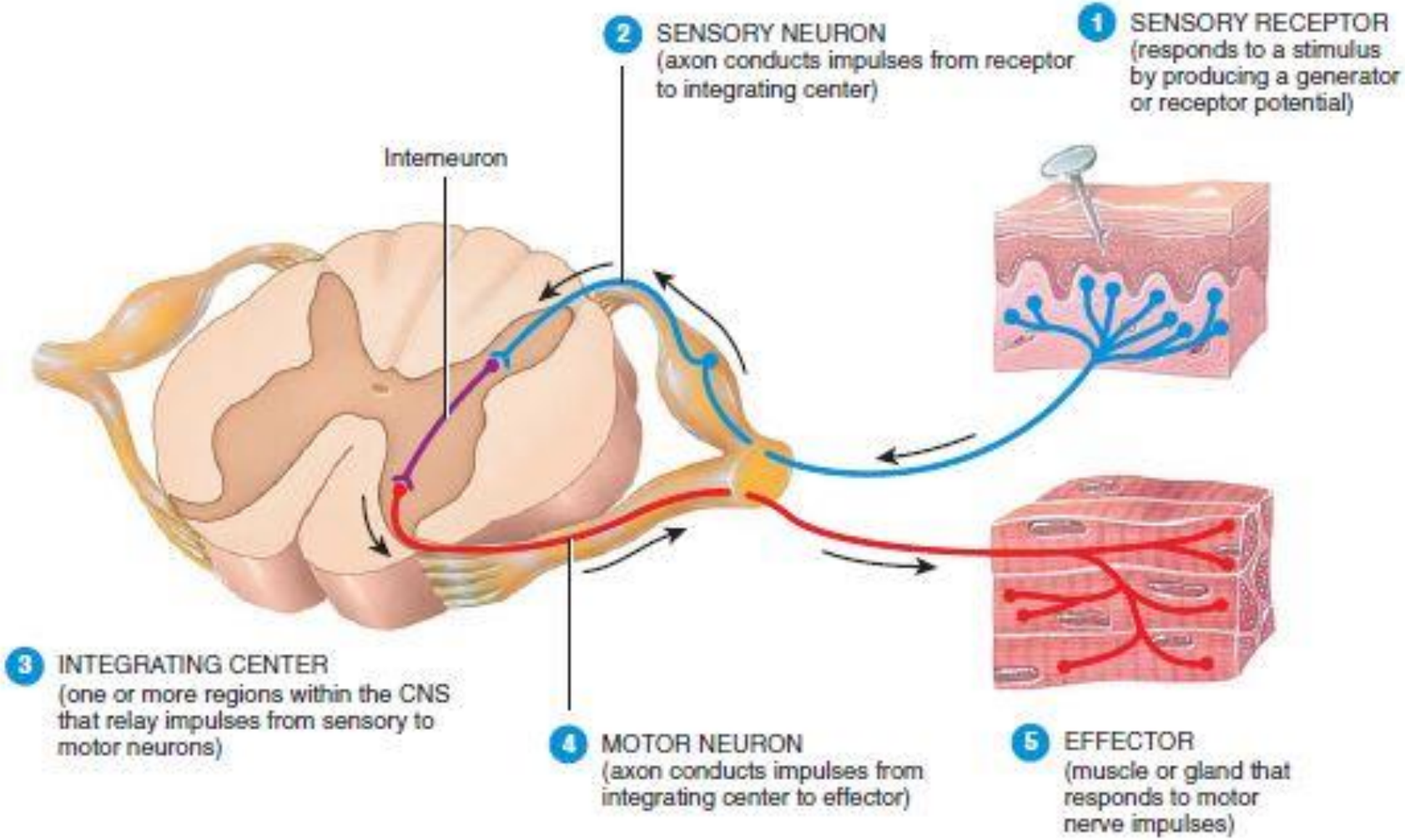


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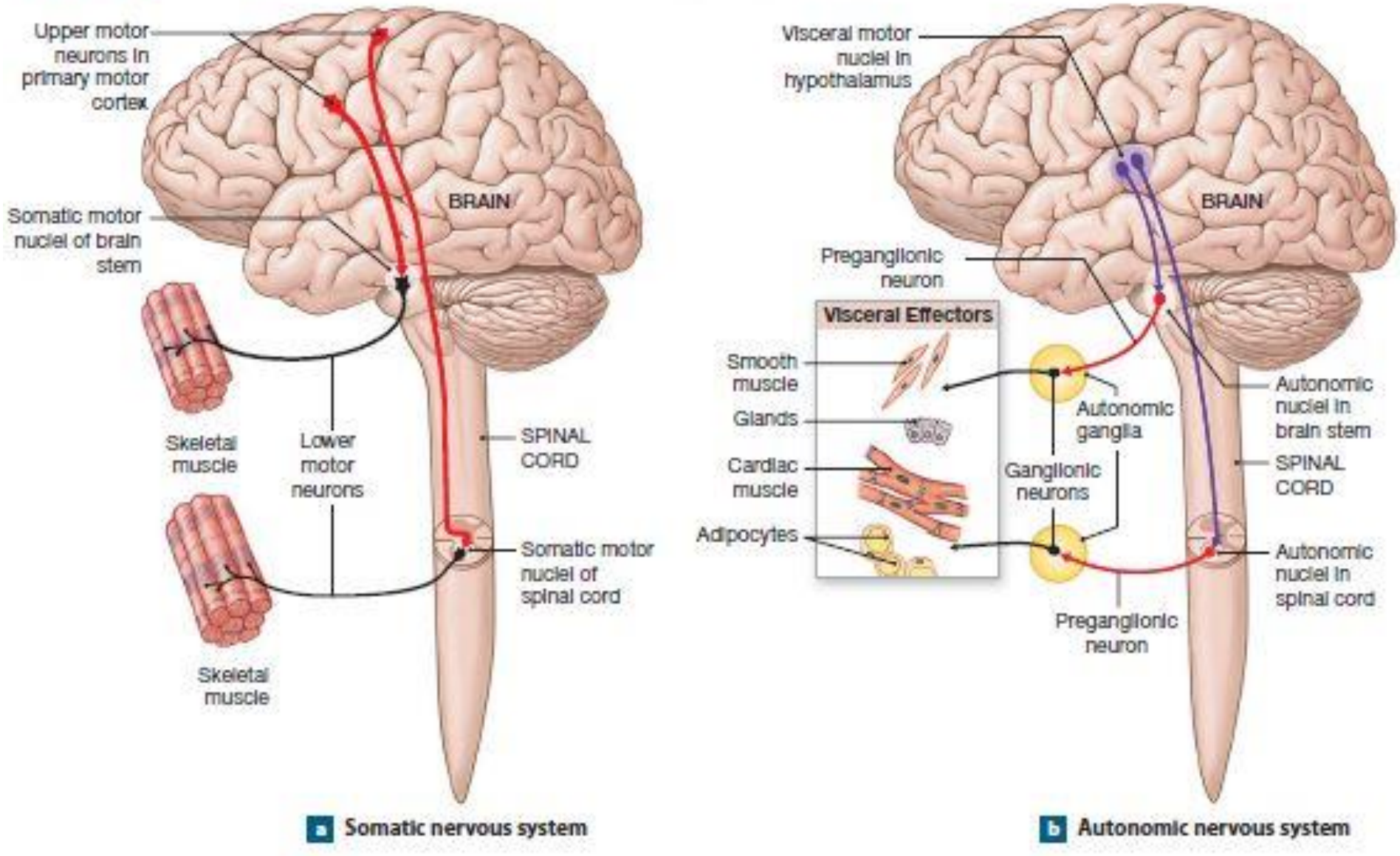
Figure 16–2 The Organization of the Somatic and Autonomic Nervous Systems.



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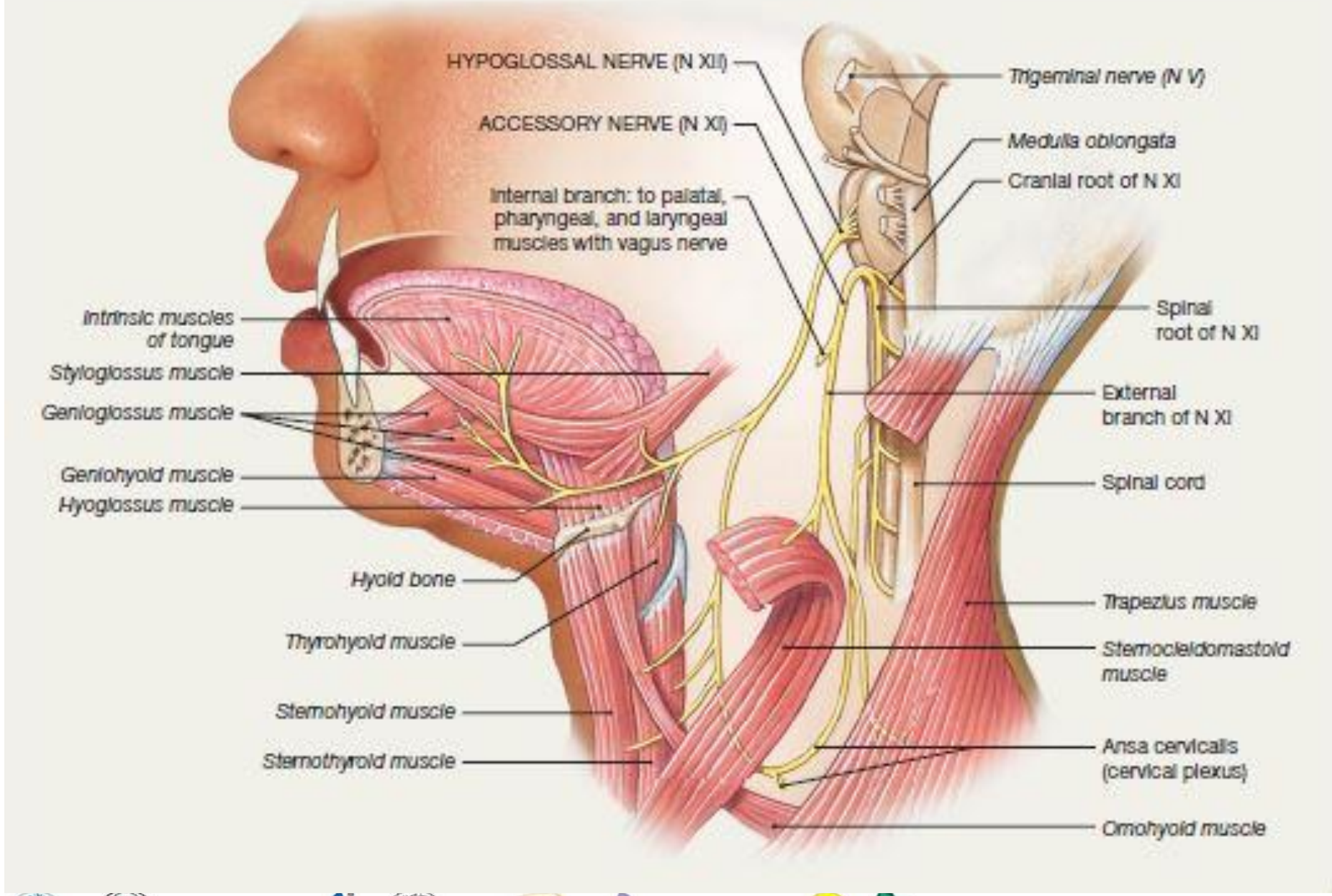
gure 14–27 The Accessory and Hypoglossal Nerves. ATLAS: Plates 18a–c; 25



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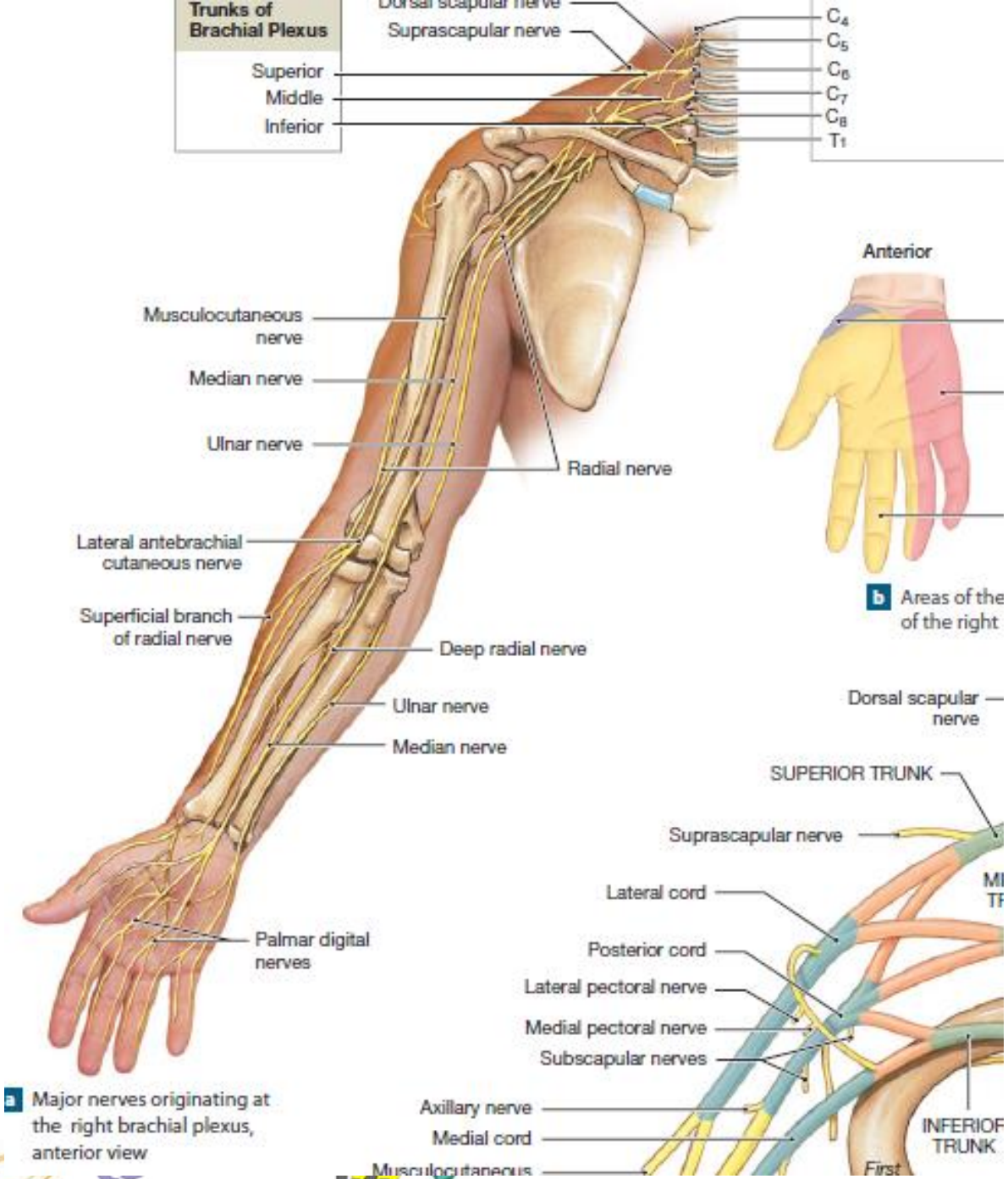

a Major nerves originating at the right brachial plexus, anterior view

b Areas of the of the right

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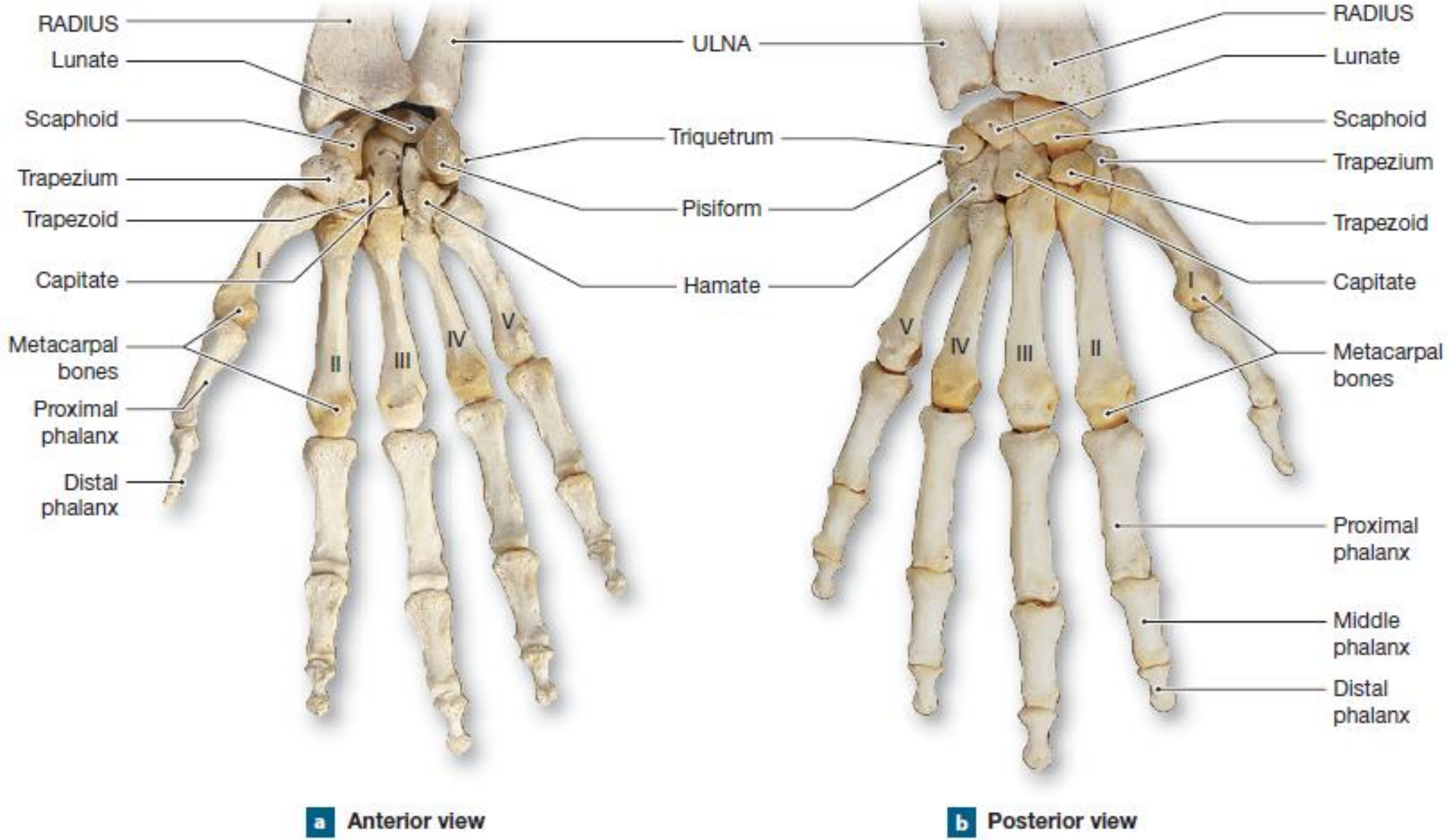
Figure 8–6 Bones of the Right Wrist and Hand. ATLAS: Plate 38a,b



a Anterior view

b Posterior view

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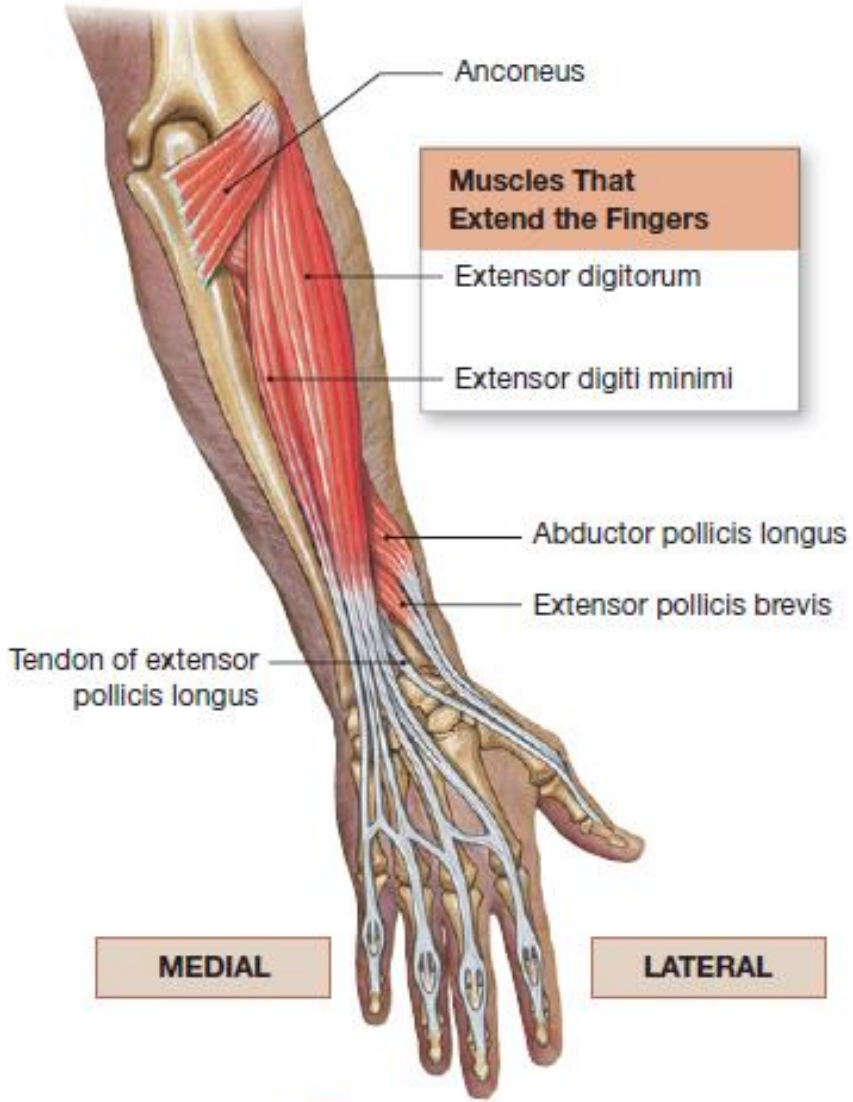
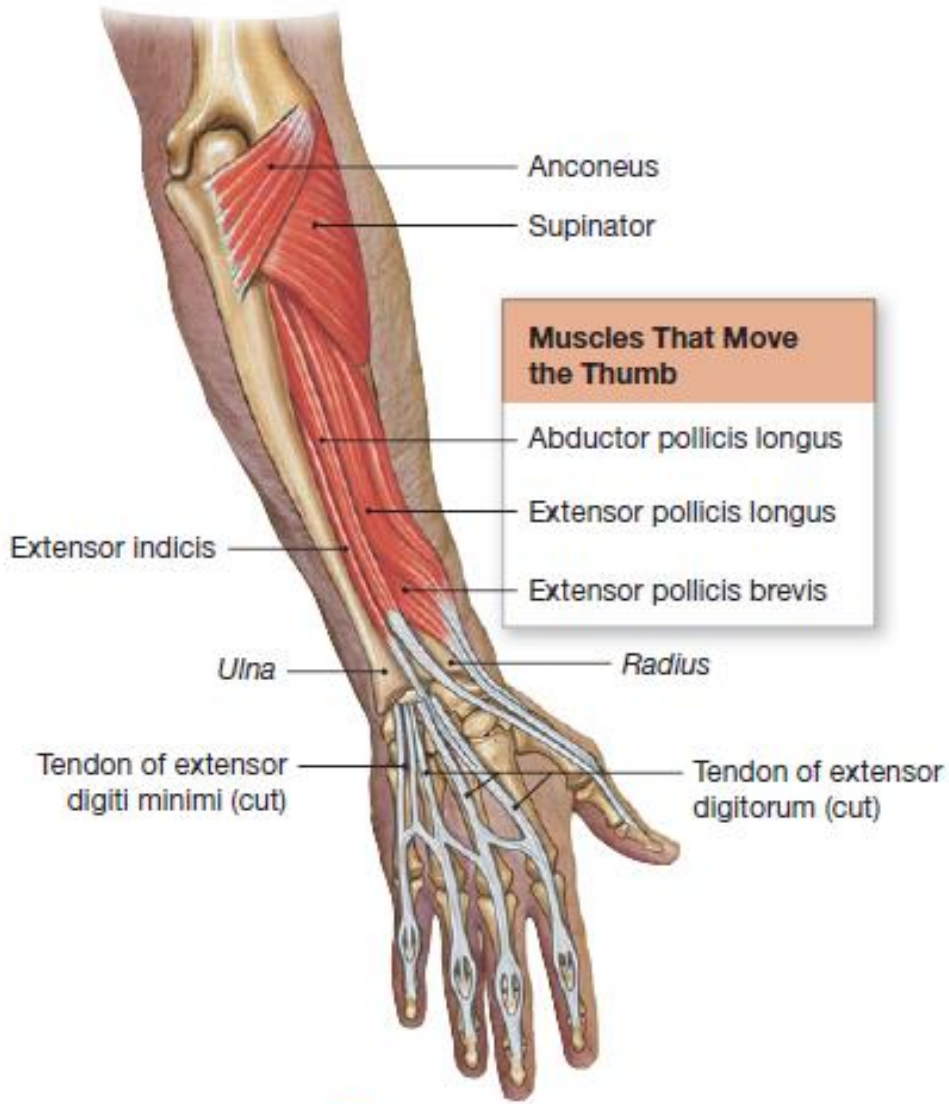


c Posterior view, middle layer



d Posterior view, deepest layer

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Figure 11–16 Muscles That Move the Forearm and Hand. Superficial muscles are shown in posterior and anterior views. Deeper muscles are shown in the sectional views and in *Figure 11–18*. ATLAS: Plates 27a–c; 29a; 30; 33a–d; 37a,b

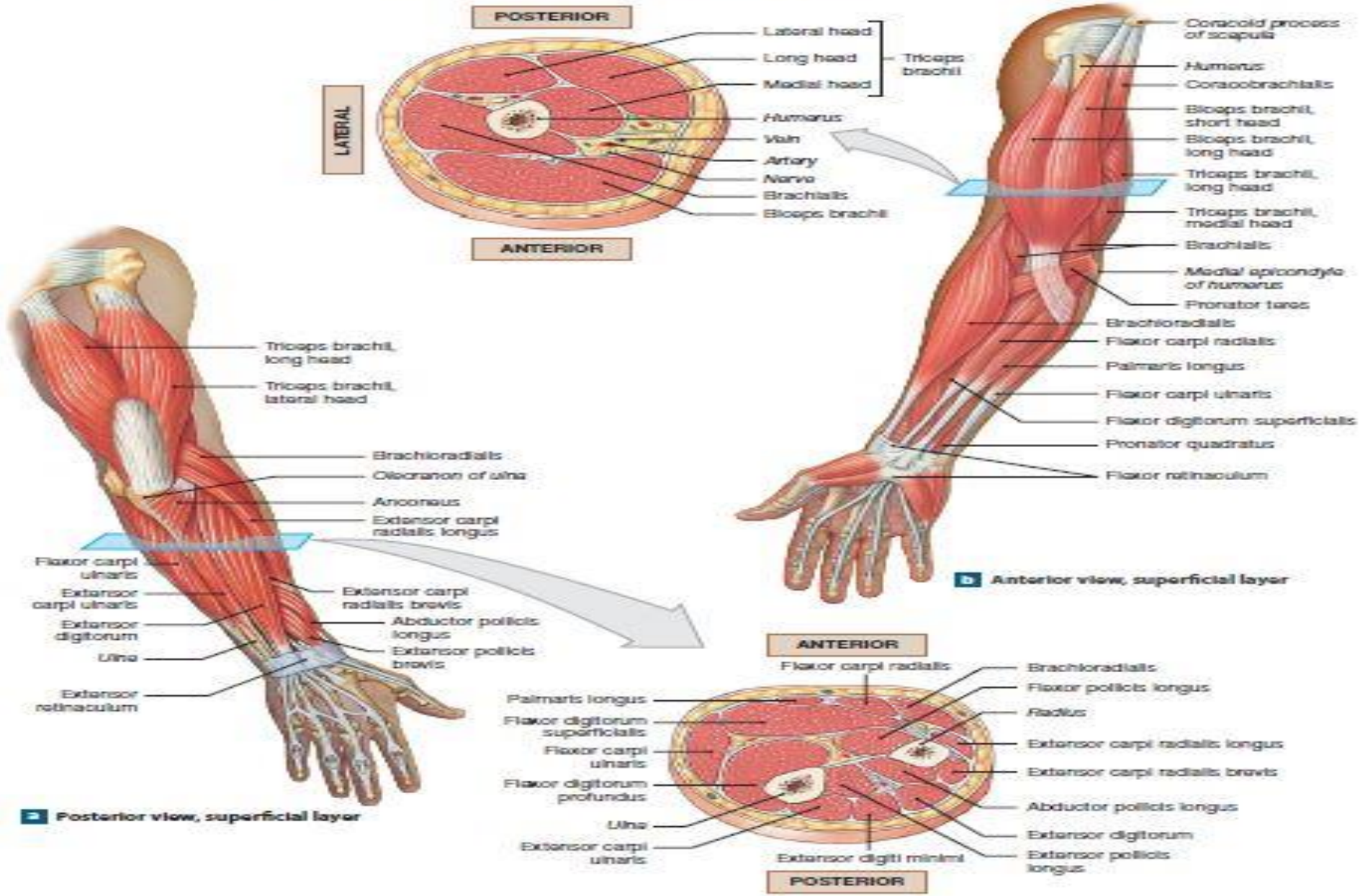

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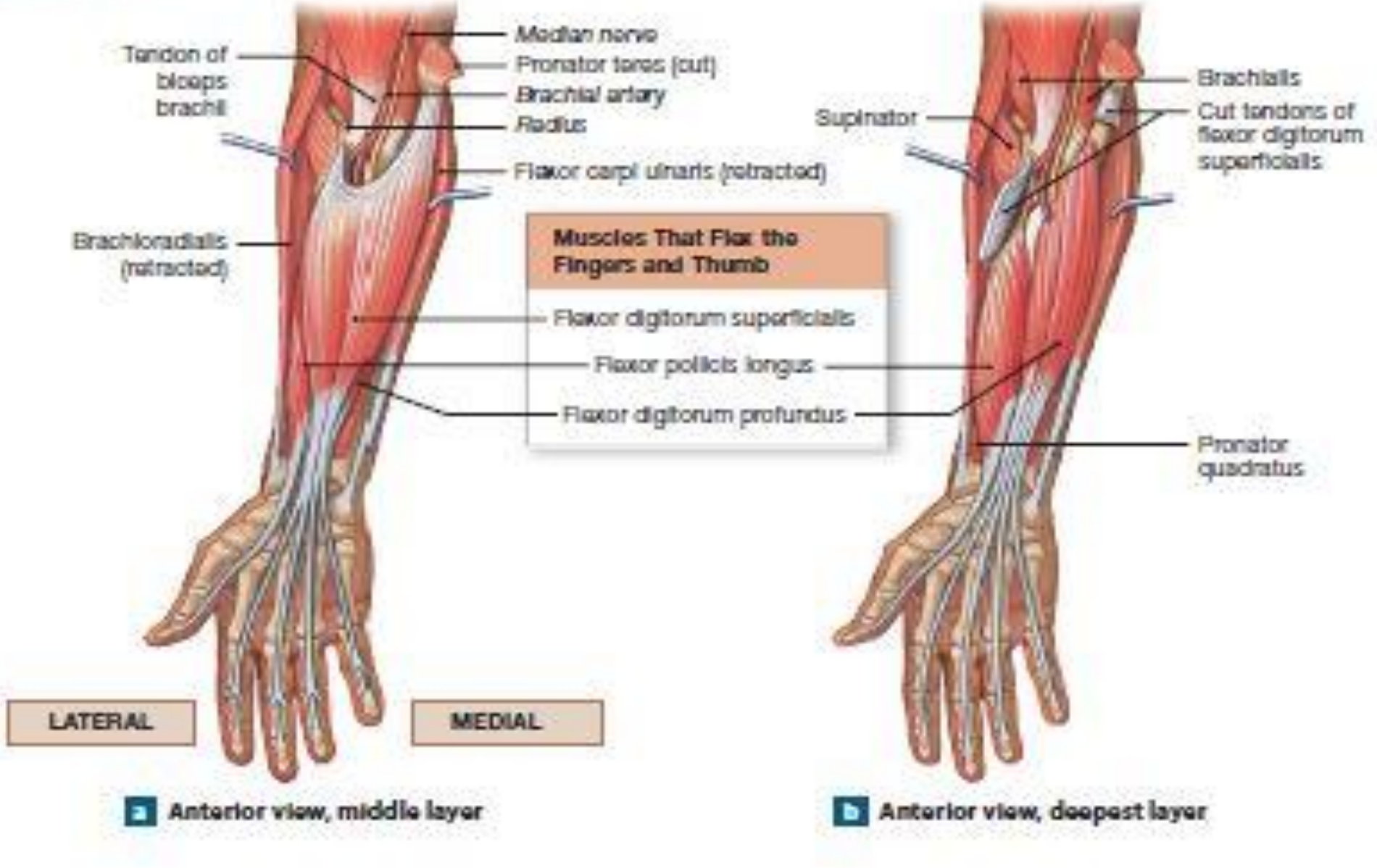
Figure 11–17 Muscles That Move the Hand and Fingers.



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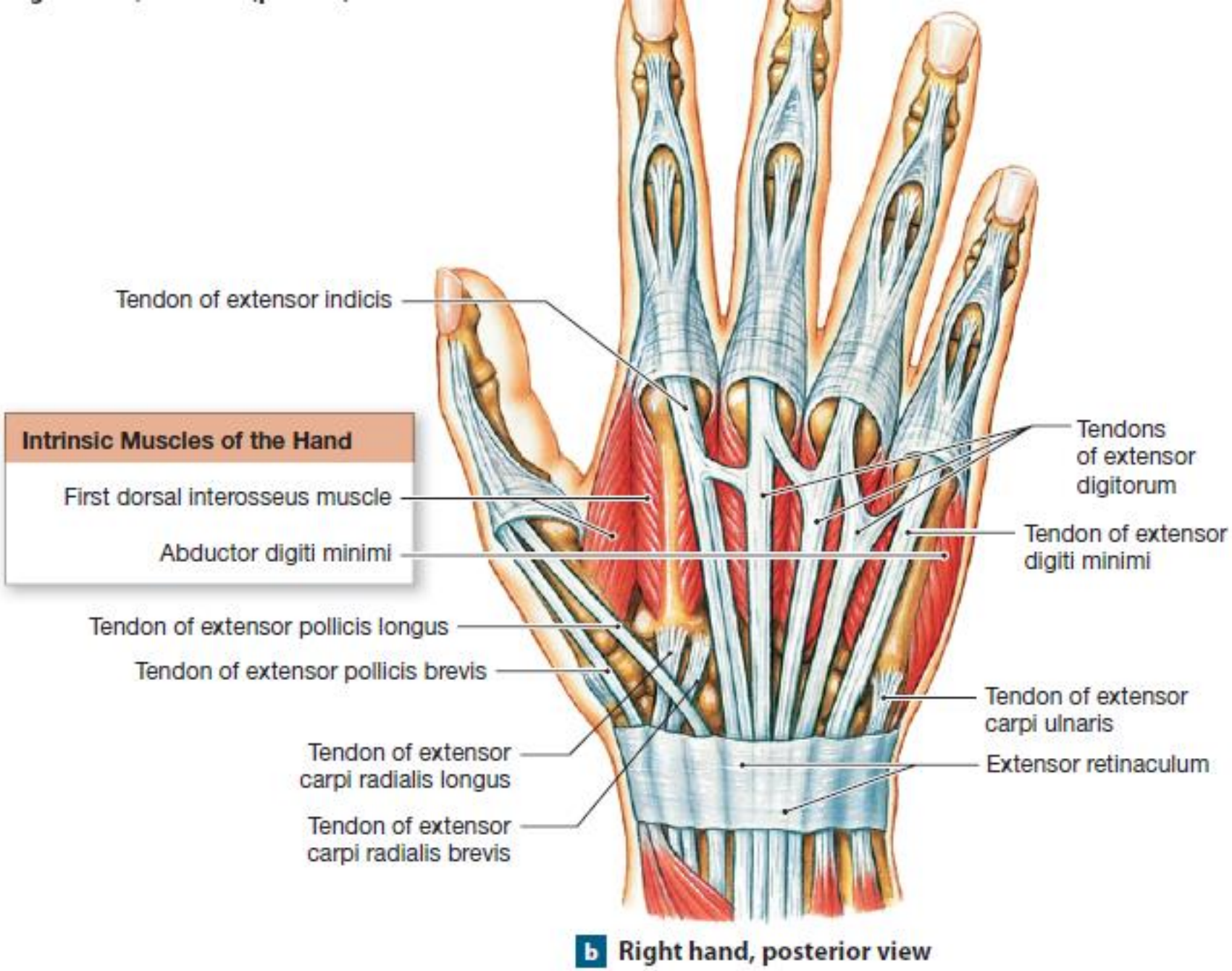

b Right hand, posterior view

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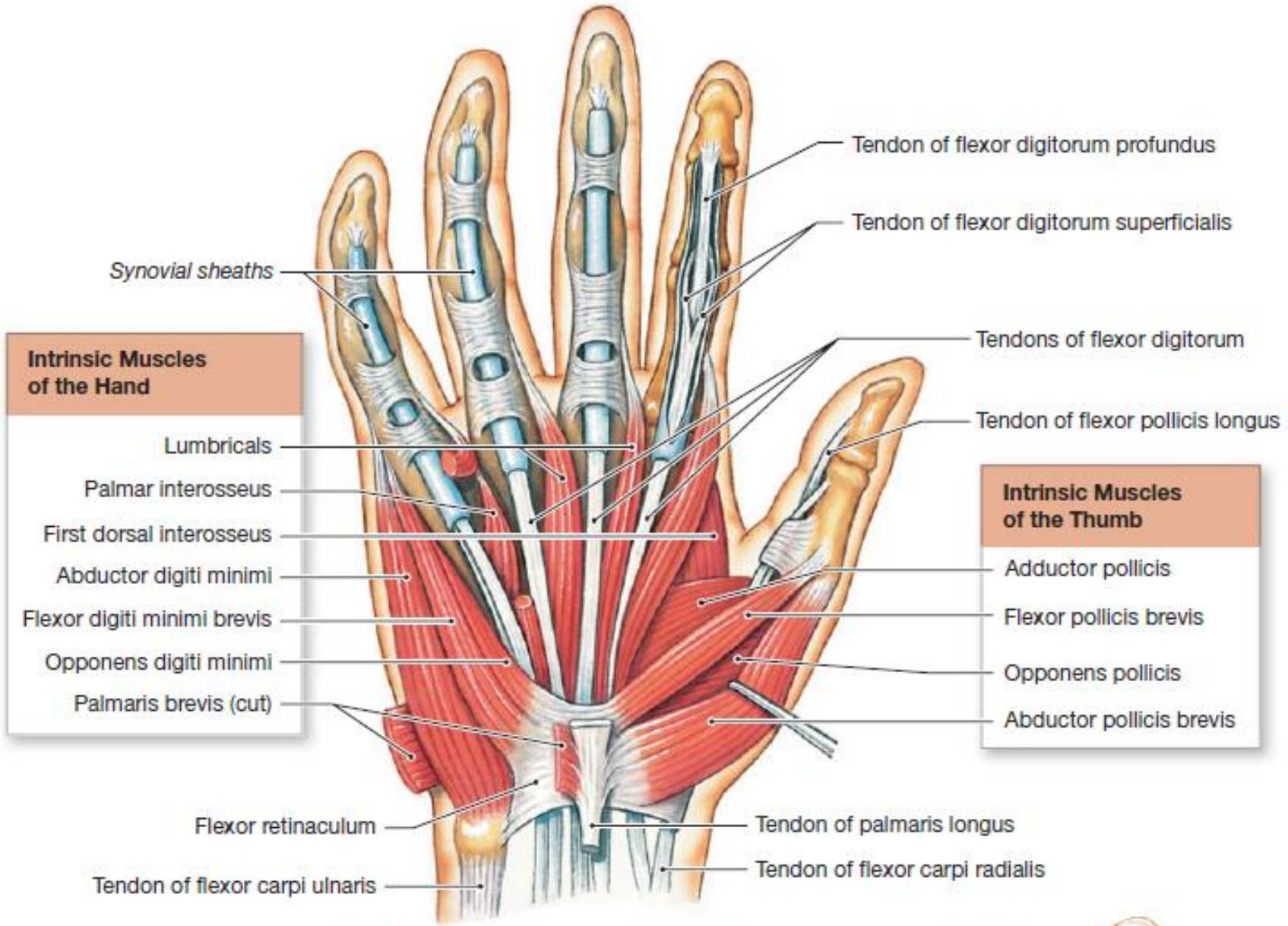
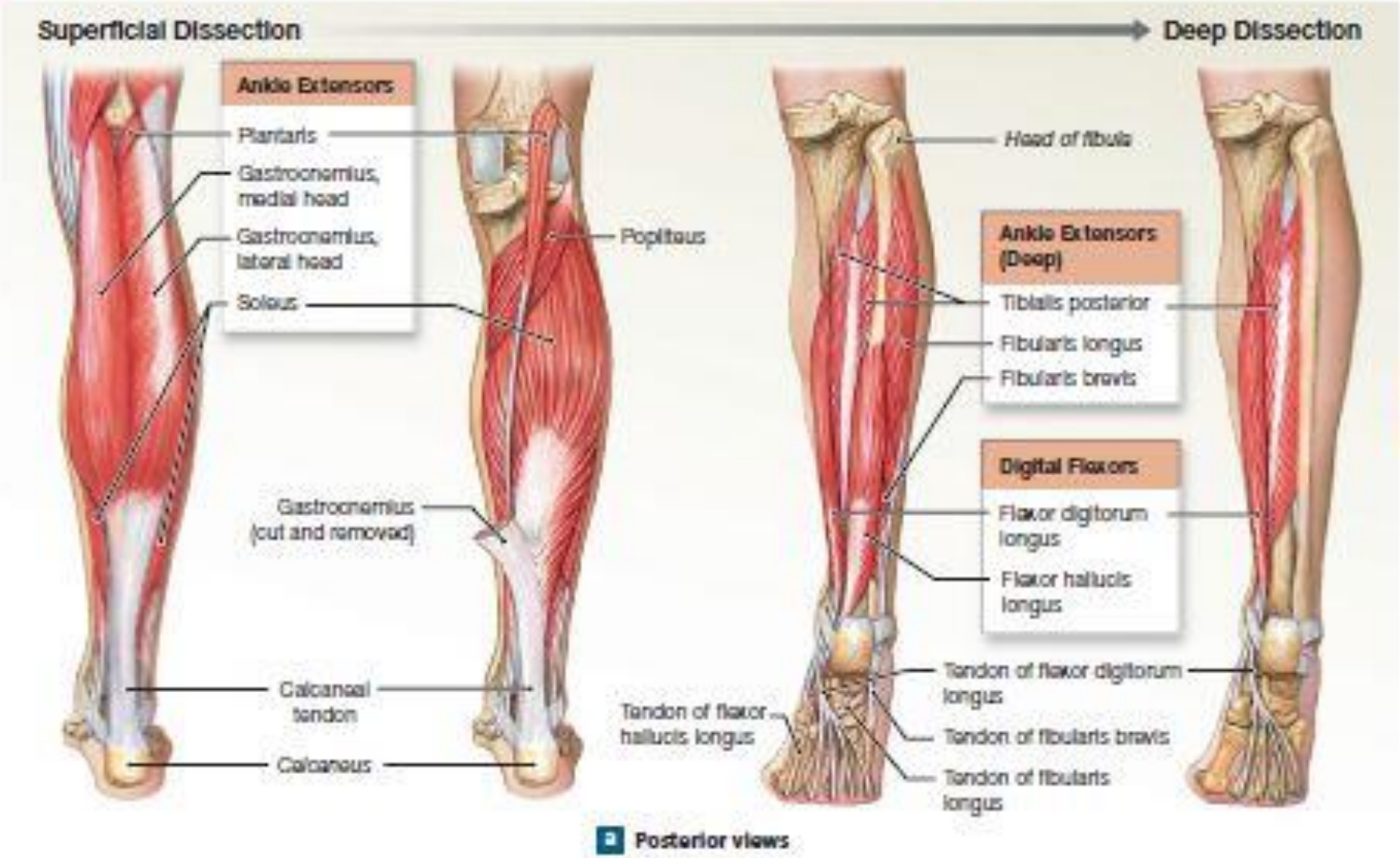
Figure 11–18 Intrinsic Muscles of the Hand. ATLAS: Plates 37b; 38c–f



a Right hand, anterior (palmar) view

Figure 11–21 Extrinsic Muscles That Move the Foot and Toes. ATLAS: Plates 81a,b; 83a,b; 84a,b



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Peripheral Nerve Disease

Mechanisms of damage to peripheral nerves

- **Demyelination**

  Schwann cell damage leads to myelin sheath disruption.

  This causes marked slowing of conduction, seen, for example, in **Guillain–Barré syndrome**

- **Axonal degeneration**

  Axon damage causes the nerve fiber to die back from the periphery.

  A wide range of **toxic and metabolic** disorders damage peripheral nerves,

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Peripheral Nerve Disease

- **Compression**

  Focal demyelination at the point of compression causes disruption of conduction. This typically occurs in entrapment neuropathies, such as **carpal tunnel syndrome**.

- **Infarction**

  Microinfarction of vasa nervorum occurs in diabetes and arteritis, such as **polyarteritis nodosa**

- **Infiltration**

  Infiltration of peripheral nerves occurs by inflammatory cells in **leprosy** and granulomas, such as **sarcoid**, and by neoplastic cells.

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Nerve Entrapment/compression site

- **Median** Carpal tunnel (wrist)
- **Ulnar** Cubital tunnel (elbow)
- **Radial** Spiral groove (of humerus)
- **Posterior interosseous** Supinator muscle (forearm)
- **Lateral cutaneous of thigh** Inguinal ligament
- **Common peroneal** Neck of fibula
- **Posterior tibial** Tarsal tunnel (flexor retinaculum – foot)

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Median nerve /Carpal tunnel (wrist)

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Radial Nerve Palsy

↳ aka Saturday night palsy

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Ulnar nerve palsy/claw hand

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Thank You

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Email: icare@alazhar.edu.ps

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