PNS

Last updated: April 20, 2019

[Anatomy 1](#_Toc6655367)

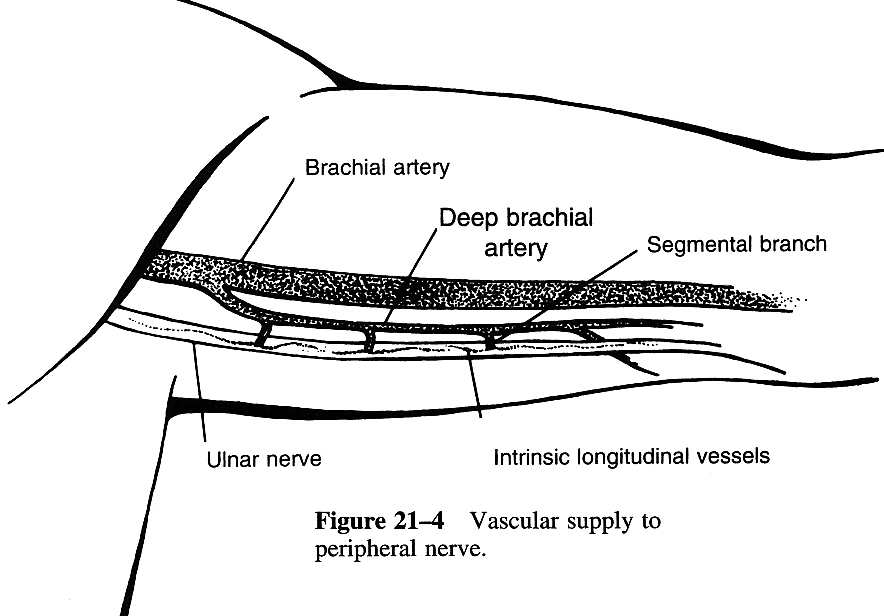
[Histology 2](#_Toc6655368)

[Physiology 3](#_Toc6655369)

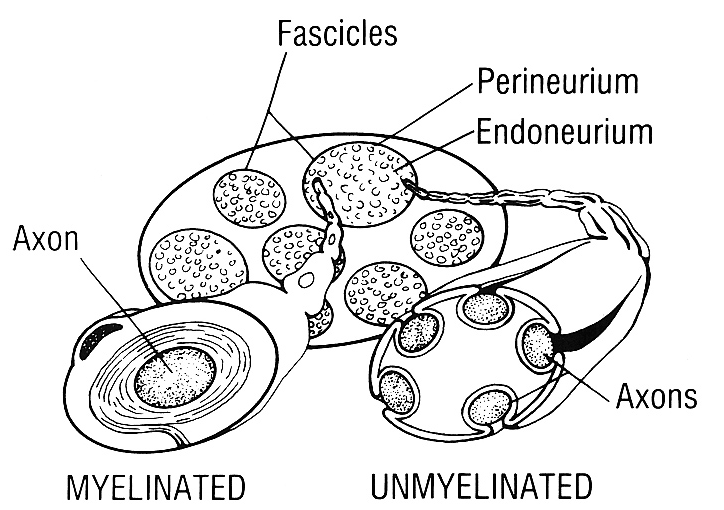
[Axoplasmic Transport 3](#_Toc6655370)

Anatomy

1. Blood vessels

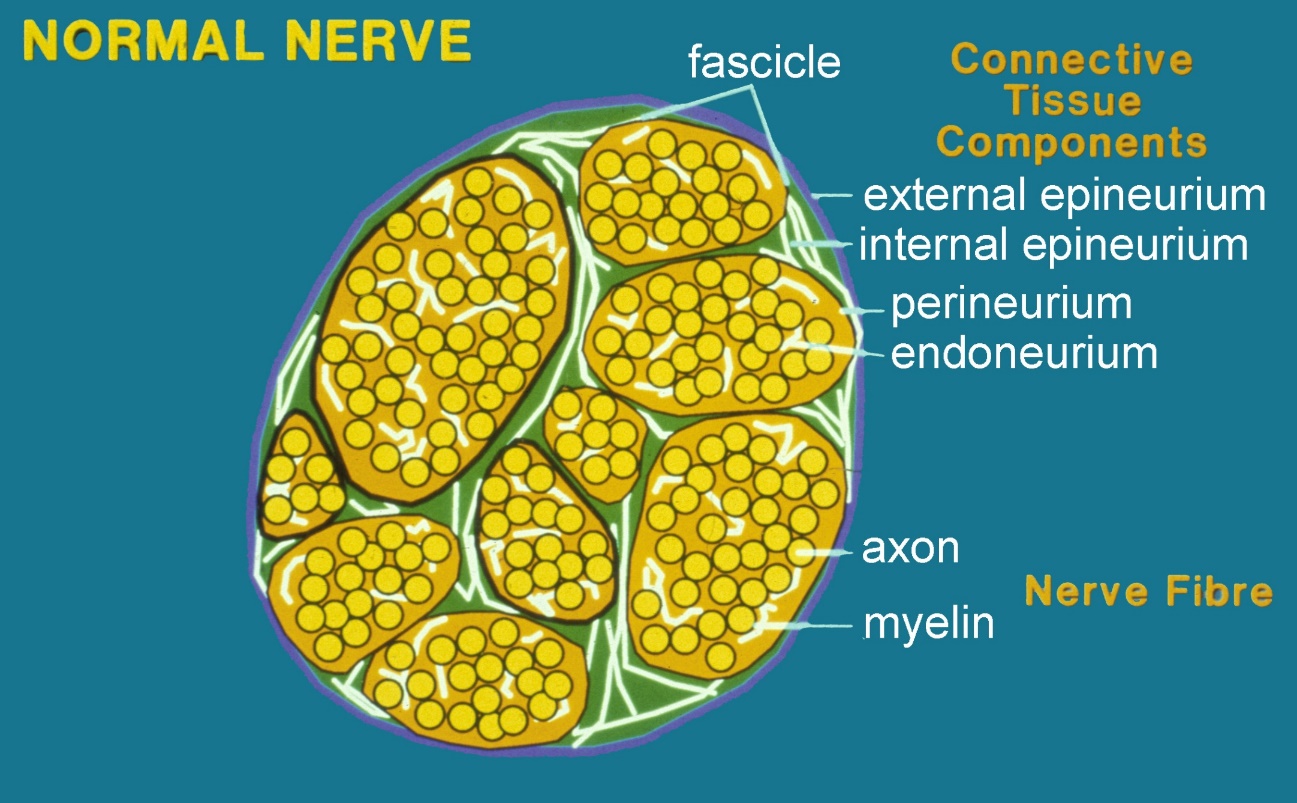


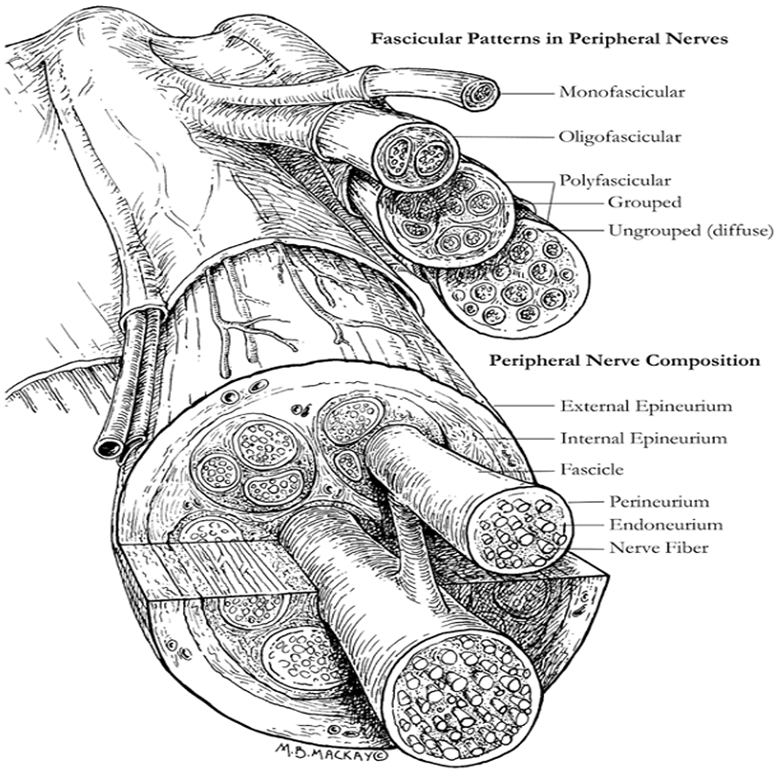
1. Three levels of connective tissue (within which fibers and vessels lie)
   1. **Epineurium**
      * 1. **external epineurium** – tough, surrounds periphery of nerve.
        2. **internal epineurium** – loose, occupies space between fascicles.
      * represents up to 50% of cross-sectional area of nerve trunk.
      * thicker where nerve crosses joint.
      * well-developed ***vascular plexus*** runs within epineurium.
   2. **Perineurium** – surrounds each fascicle.
      * thin, dense, multilayered connective tissue.
      * **blood-nerve barrier**: tight basement membranes within perineurium protect endoneurial space.
      * tensile strength of perineurium maintains intrafascicular pressures.
      * ***vascular structures*** traverse perineurium obliquely to enter endoneurial space.
   3. **Endoneurium** – surrounds individual myelinated nerve fiber or group of unmyelinated nerve fibers.
      * delicate collagenous matrix with fibroblasts, mast cells, and ***capillary network***

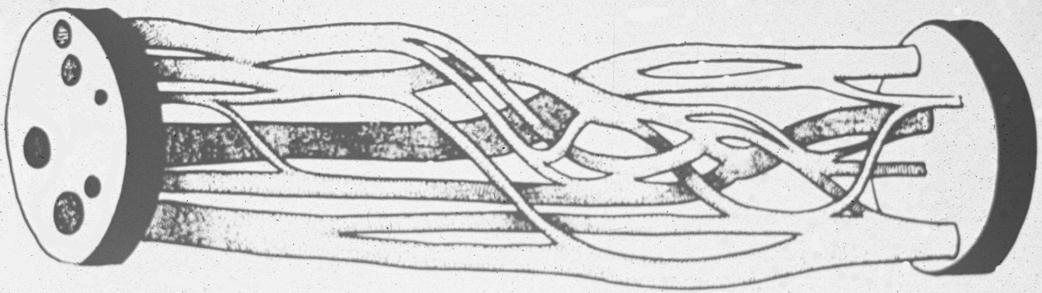


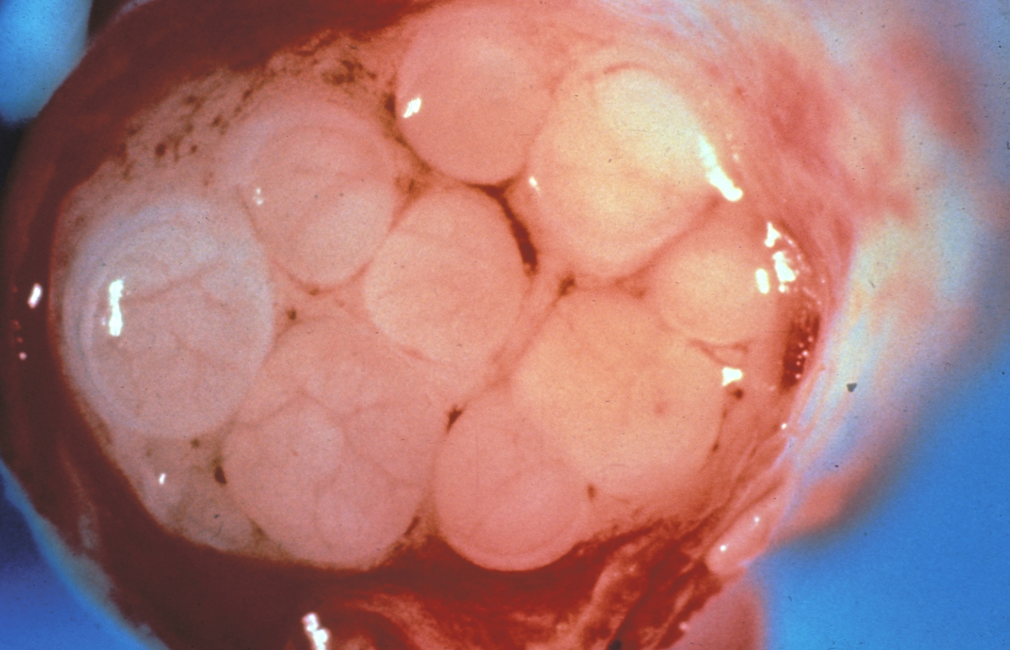
1. Nerve fibers
   * + all axons are bundled together into **fascicles**:

* fascicles are located within **internal epineurium**.
* bounded by **perineurium**.
  + - fascicles are often grouped together into **grouped fascicles**.
* can be easily divided along internal epineurial planes.
* major peripheral nerves contain many grouped fascicles.
* there is constant *redistribution of fascicular organization along peripheral nerve (interfascicular* plexuses allow for interconnections).
  + - fascicles are more numerous and smaller where nerve crosses joint.
* smaller fascicles and more internal epineurium between them allows for increased protection of nerve fibers.





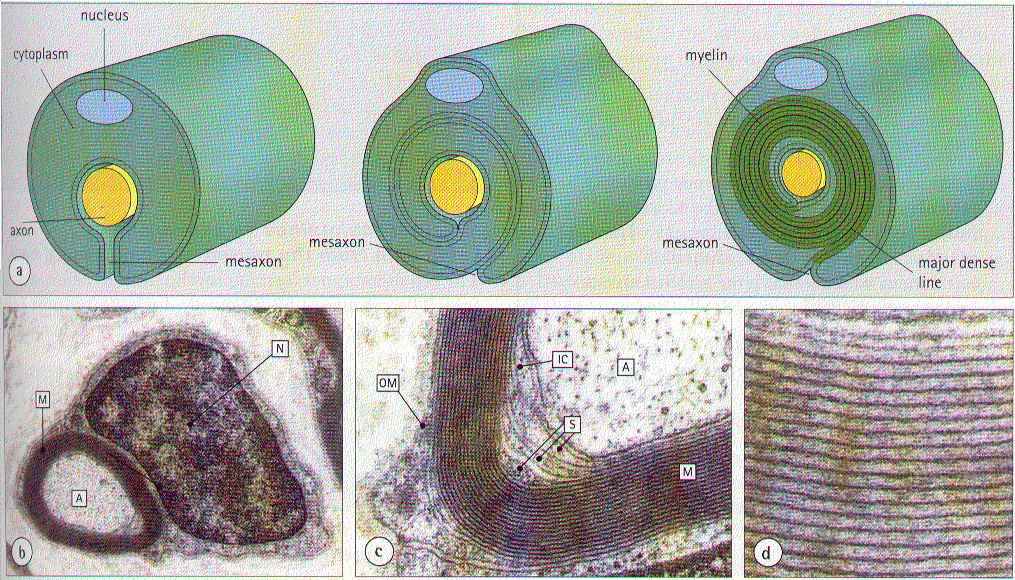




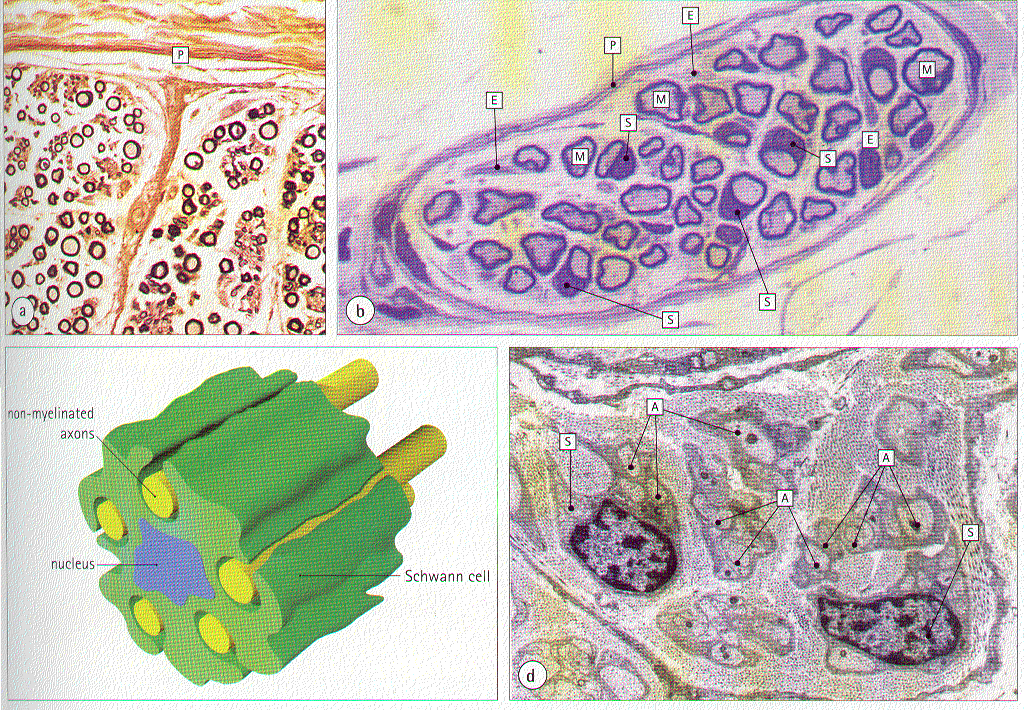
Histology

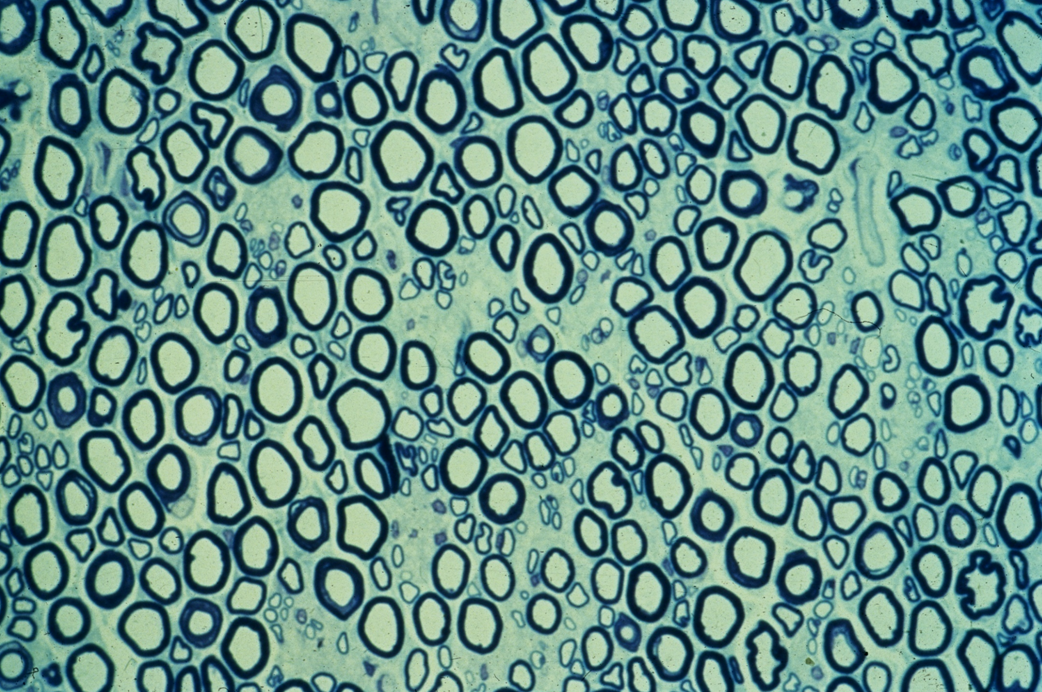
* up to 500 Schwann cells may myelinate single axon.
* peripheral nerves contain both ***myelinated*** and ***unmyelinated*** fibers (in average 4:1) traveling within each fascicle.

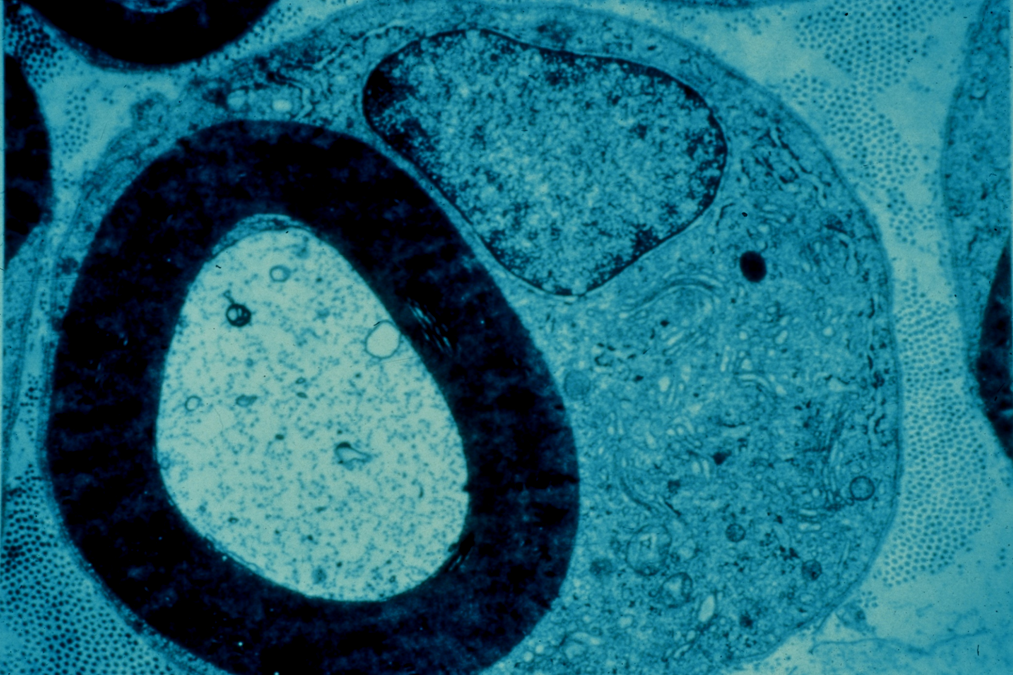
Myelination process:



Unmyelinated fibers:







Physiology

Axoplasmic Transport

- multiple transport mechanisms:

* 1. **Anterograde transport**:
     1. **fast**
     2. **slow** – speed is high but frequent prolonged stops (average speed is slow)
* all cellular *proteins* and *neurotransmitters* are produced in cell body; cell body may be at significant distance from terminal axon.
  1. **Retrograde fast transport** (removes *breakdown products* from distal axon back to cell body).

Bibliography for ch. “PNS” → follow this [link >>](http://www.neurosurgeryresident.net/A.%20Neuroscience%20Basics\A.%20Bibliography.pdf)

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