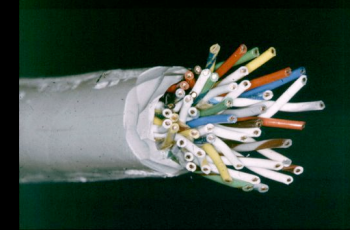


PATHOLOGIE CHIRURGICALE DES NERFS PERIPHERIQUES

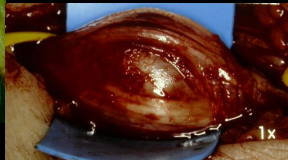
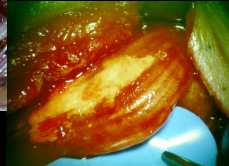
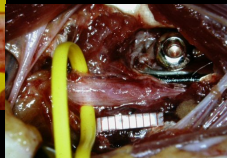
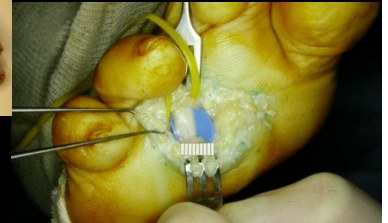
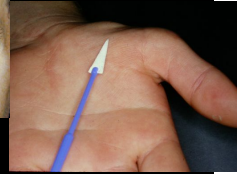
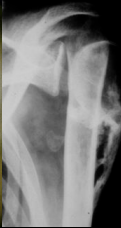
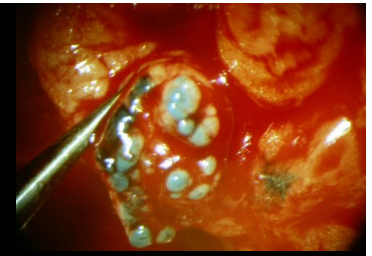


CERTIFICAT INTER-UNIVERSITAIRE
EUROPEEN DE PATHOLOGIE
CHIRURGICALE DE LA MAIN ET
DES NERFS PERIPHERIQUES

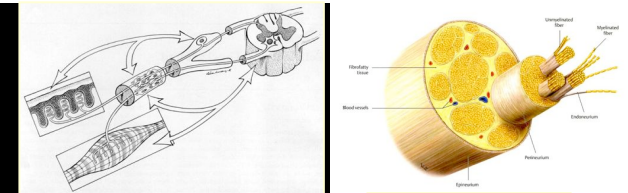
ULg 2008

LUNDBORG MAC KINNON SCHUIND

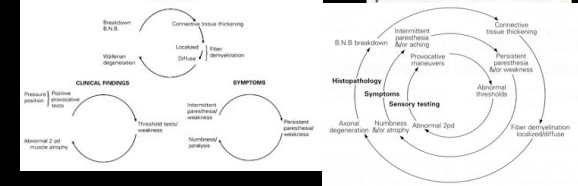
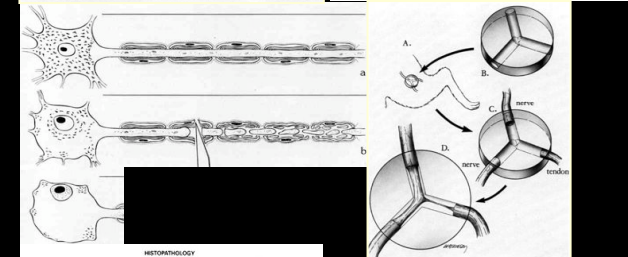
« BEAUCOUP DE NERFS »
« BEAUCOUP DE PATHOLOGIES »
« BEAUCOUP DE TRAITEMENTS »



- **ANATOMIE**



- **LES LESIONS NERVEUSES**
LES ENTRAPMENTS
LES « SECTIONS »



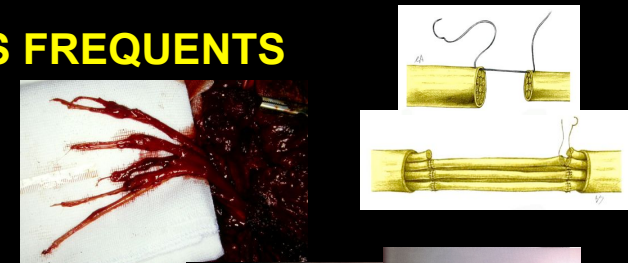
- **L'EXAMEN CLINIQUE**

- **LE TOS**

- **LES ENTRAPMENTS LES PLUS FREQUENTS**

- **LE PLEXUS BRACHIAL**

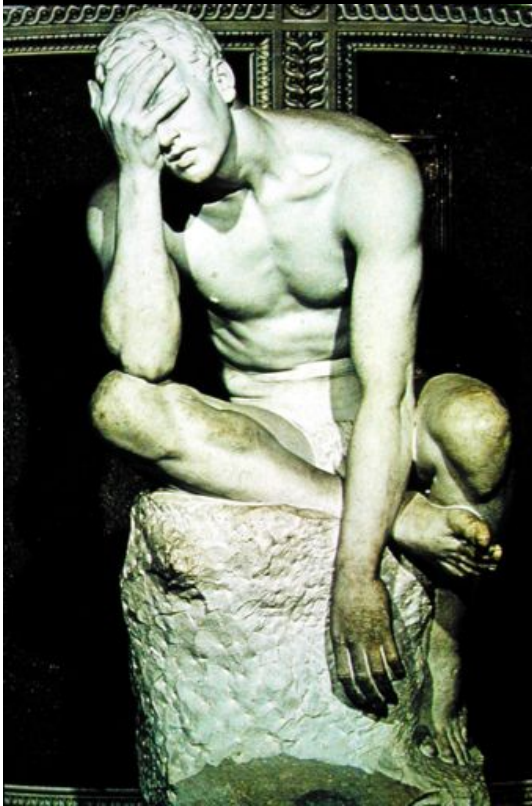
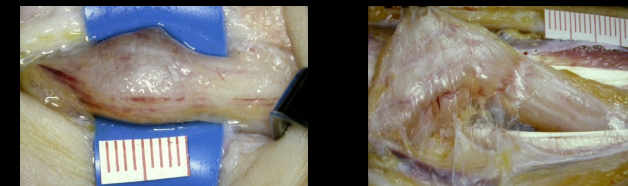
- **LES AUTRES LESIONS**



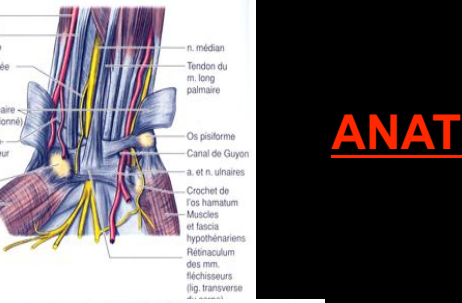
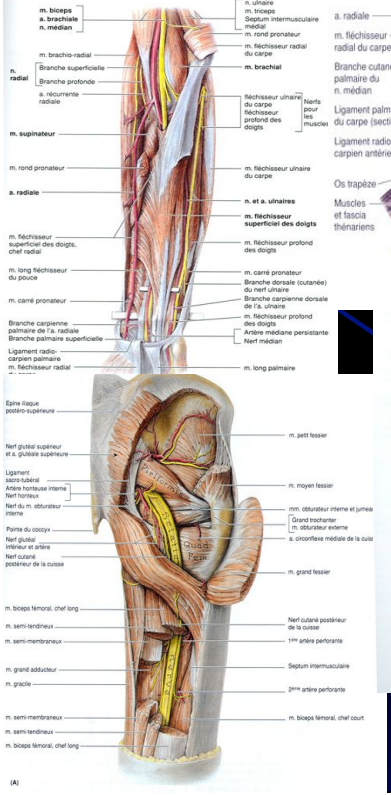
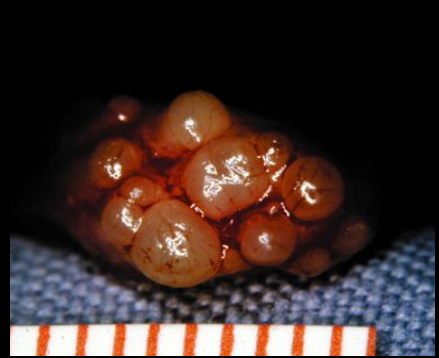
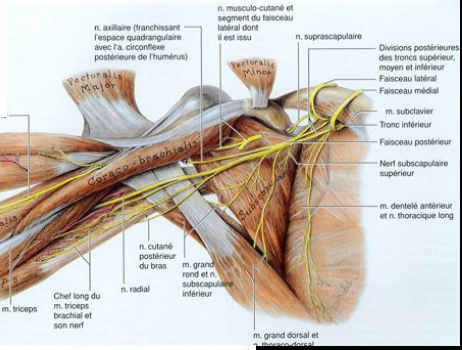
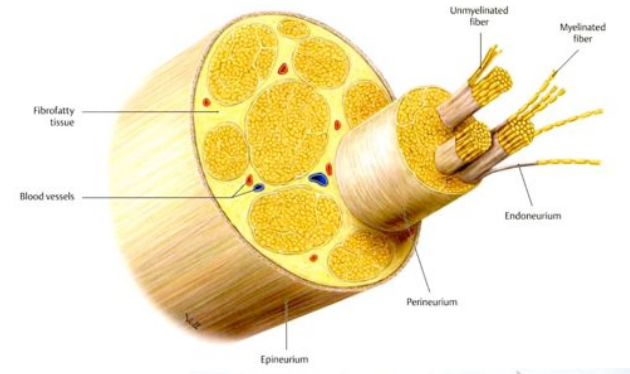
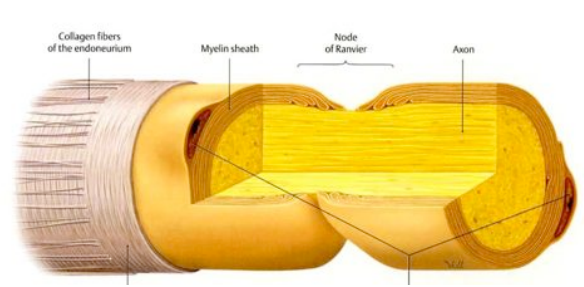
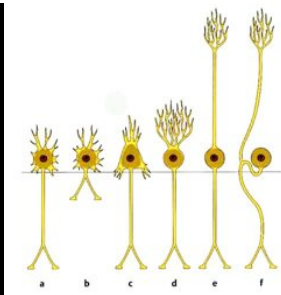
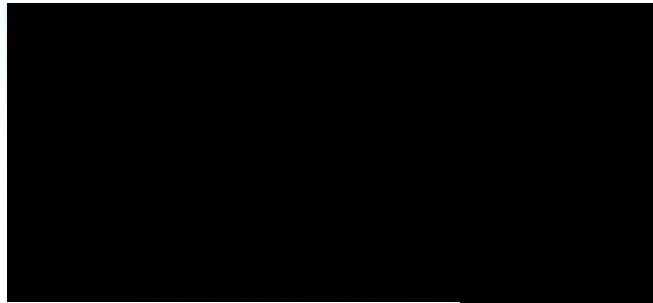
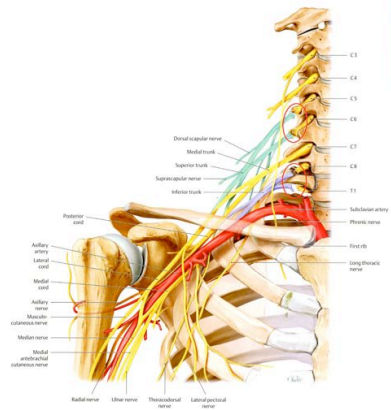
- **LES TUMEURS**



- **LA REEDUCATION**

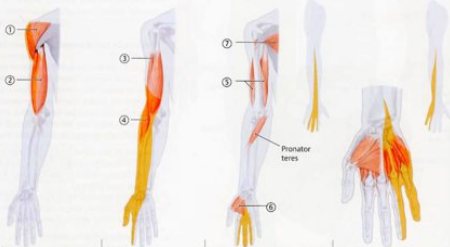
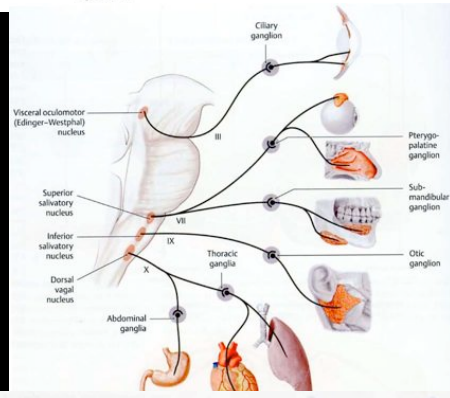


98.01.29 / U.P.H. 2.5 RNS AP OP

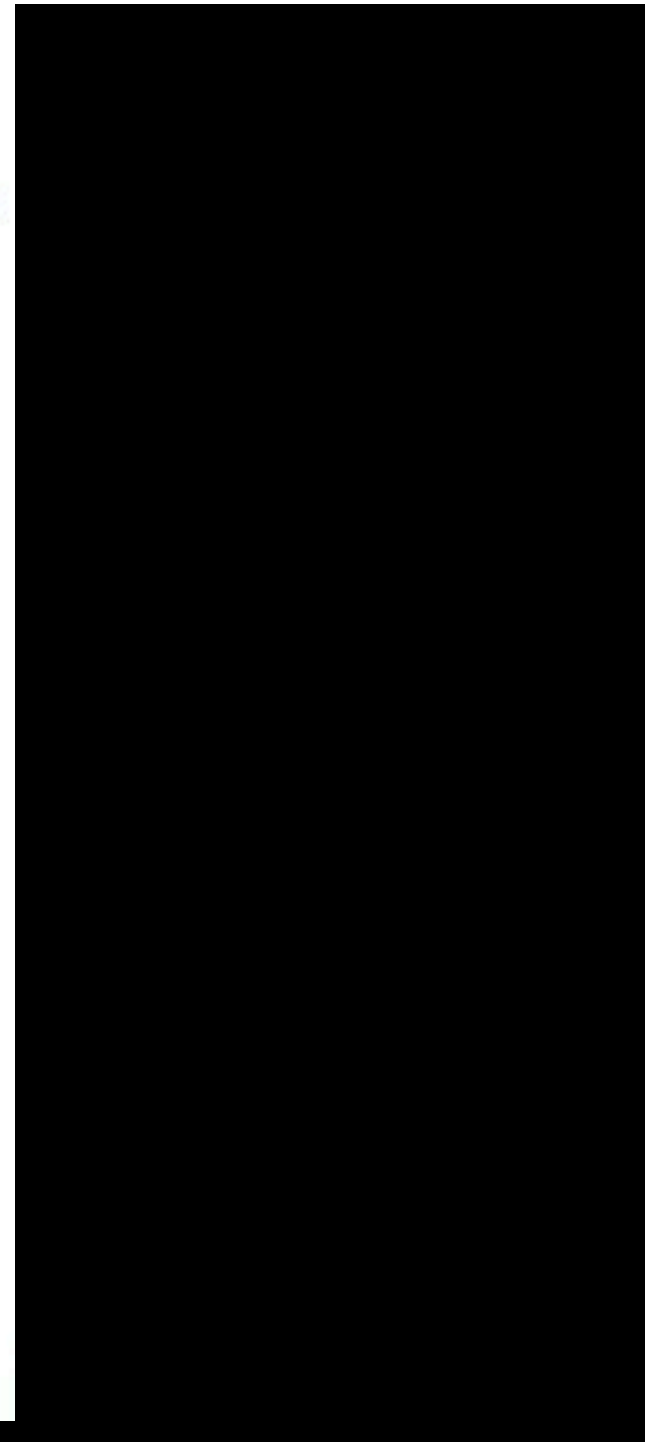
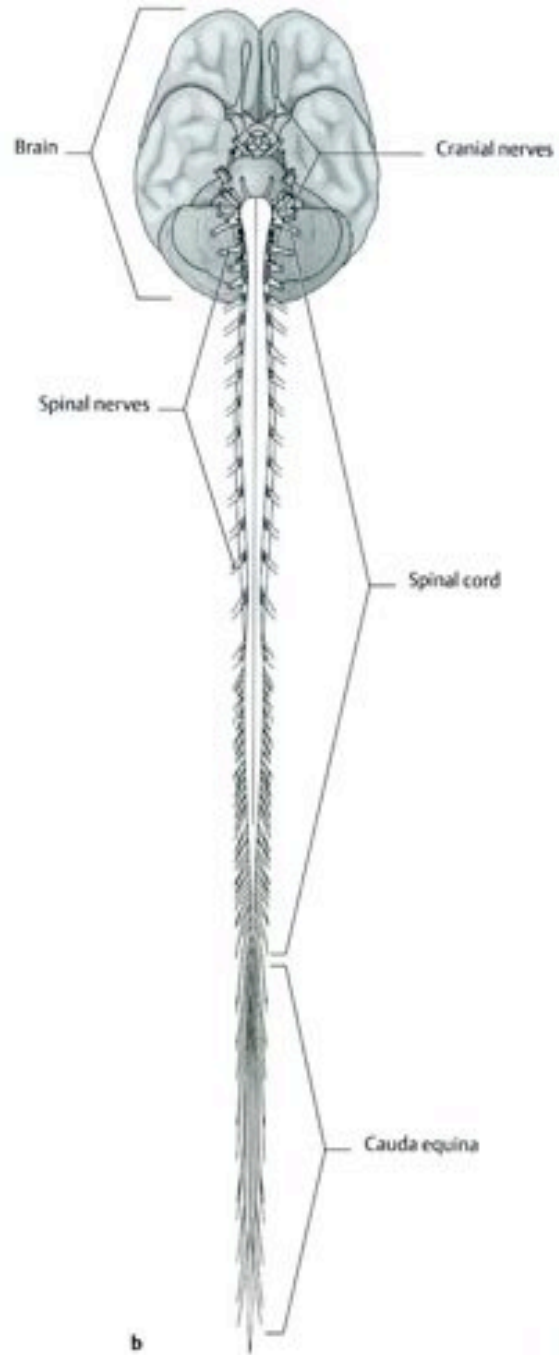


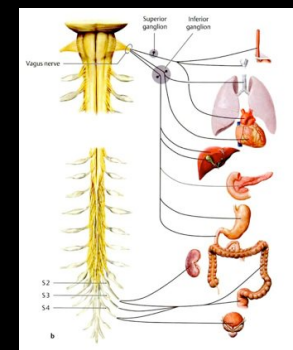
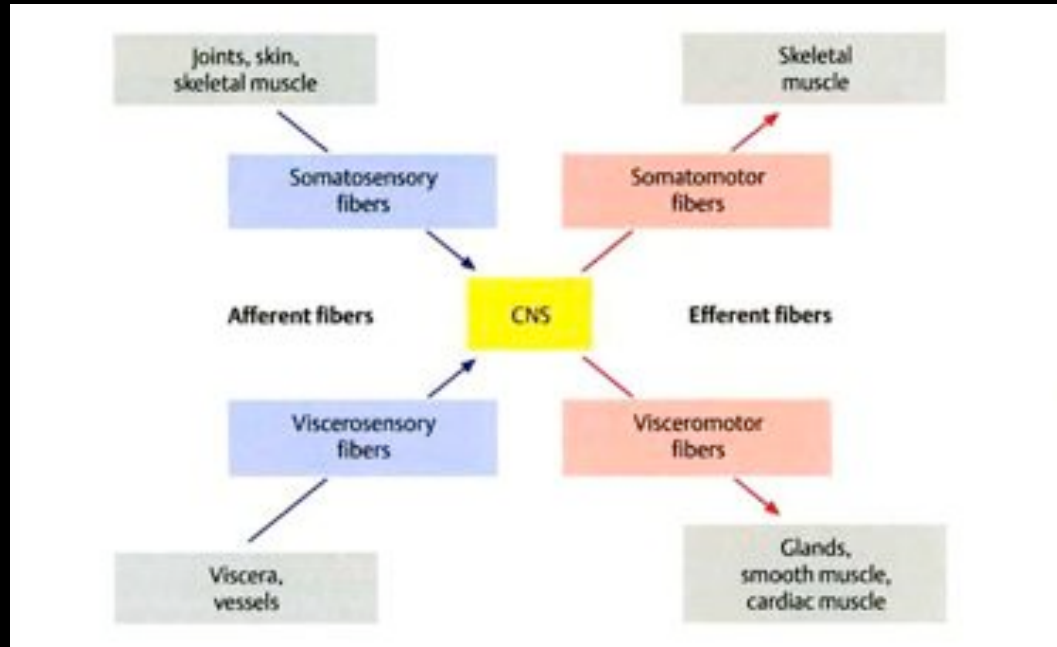
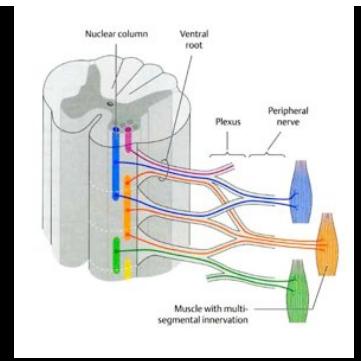
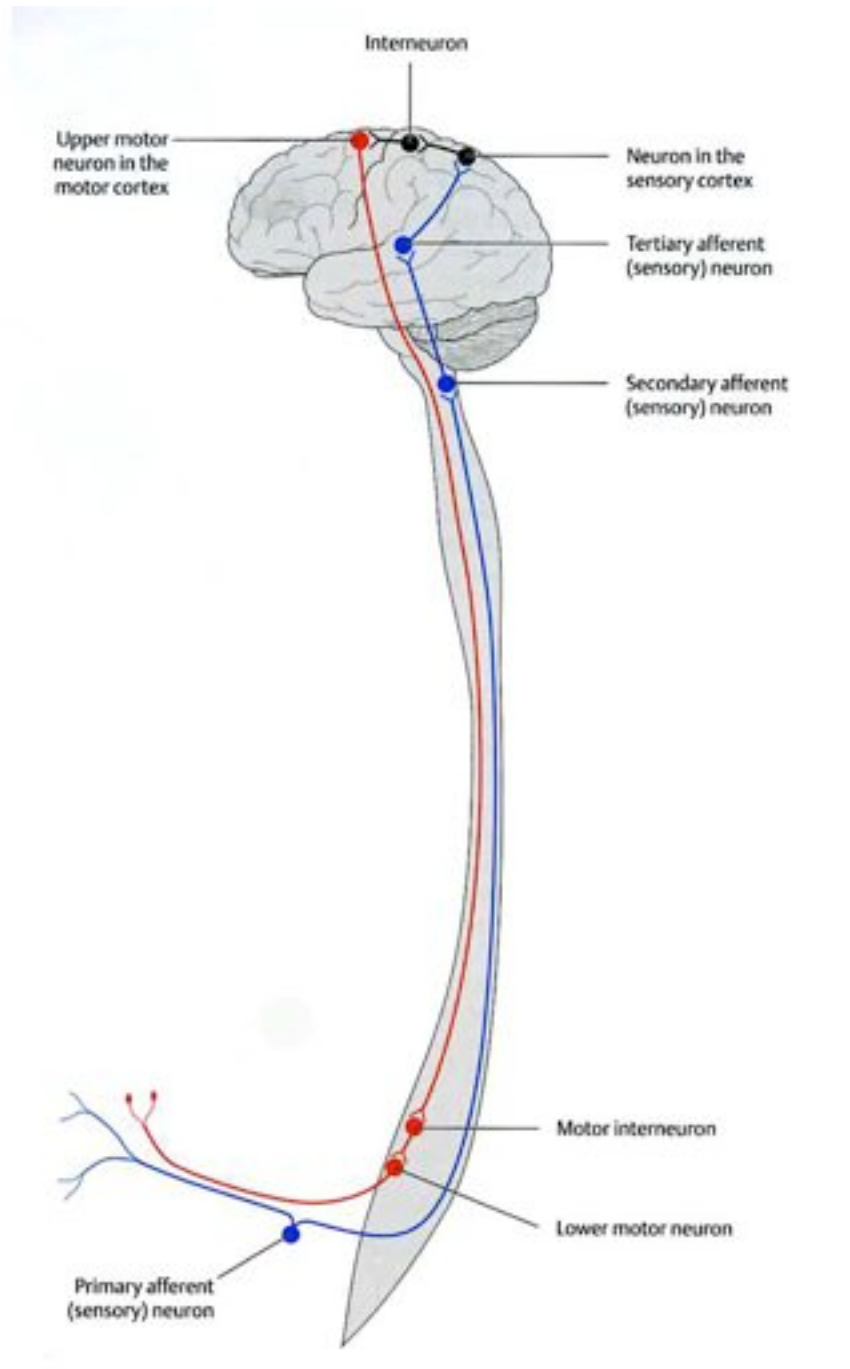
ANATOMIE

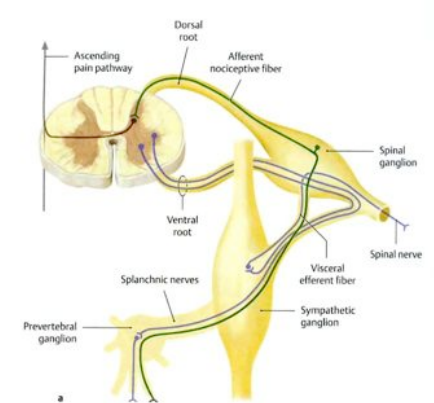
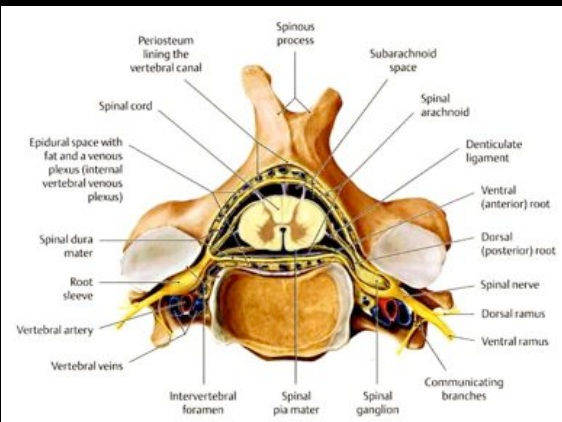
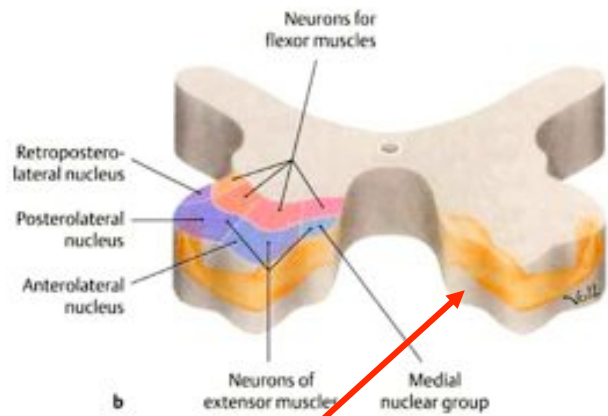
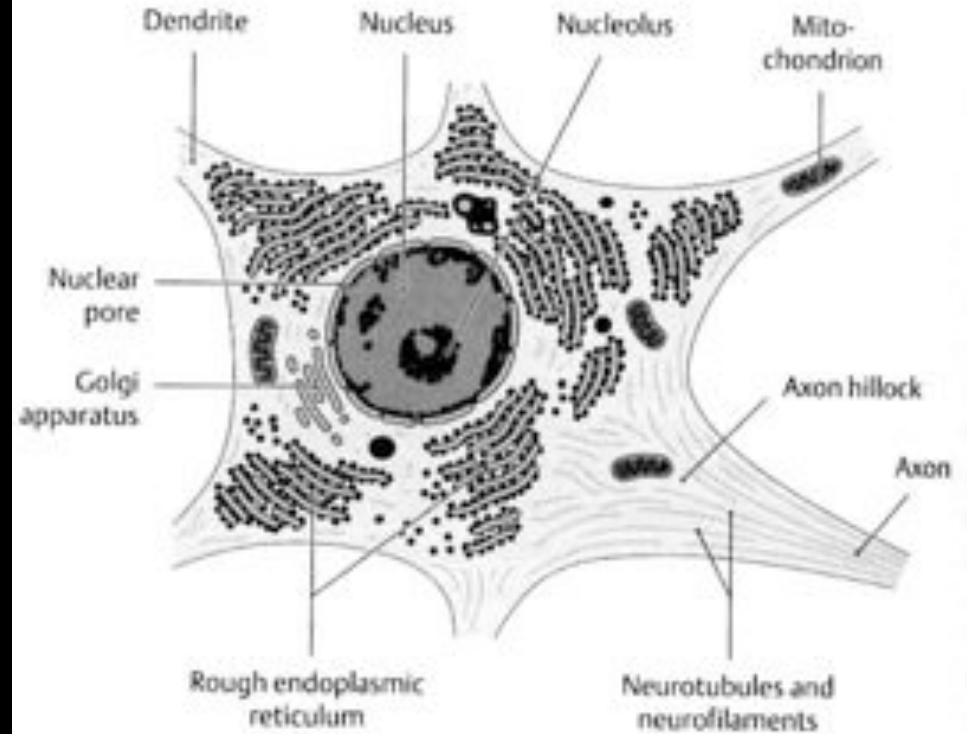
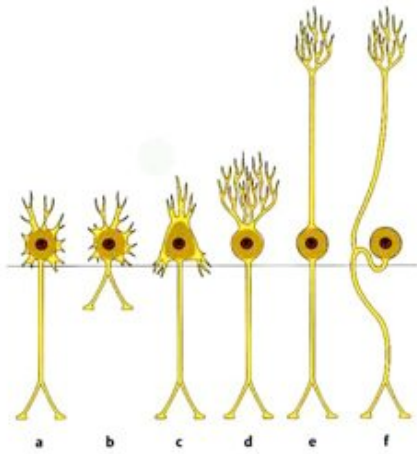
HISTO-ANATOMIE

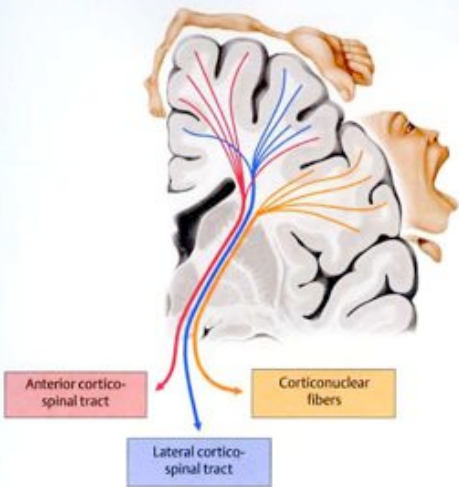


	C5	C6	C7	C8
Location of pain or sensory disturbance	Lateral and posterior side of shoulder; anterolateral side of proximal forearm	Dorsoradial upper arm, radial forearm → thumb	Posterior side of upper arm, extensor side of forearm → second (third/ fourth) finger	Ulnar side of hand extending to small finger and ring finger
Indicator muscle (and other affected muscles)	1) Deltoid 2) (Biceps brachii)	1) Biceps brachii 2) (Brachioradialis)	1) Triceps brachii, hand and digital flexors and extensors 2) (Trapezoid muscles) 3) Pectoralis major (atrophy of sternocostal part)	Hypothenar, ulnar digital flexors (Triceps brachii, pectoralis major – abdominal part)
Reflexes abolished by segmental lesion	Biceps reflex (Brachioradialis reflex)	Biceps reflex (Brachioradialis reflex)	Triceps reflex (Trömmer reflex)	Triceps reflex (Trömmer reflex)

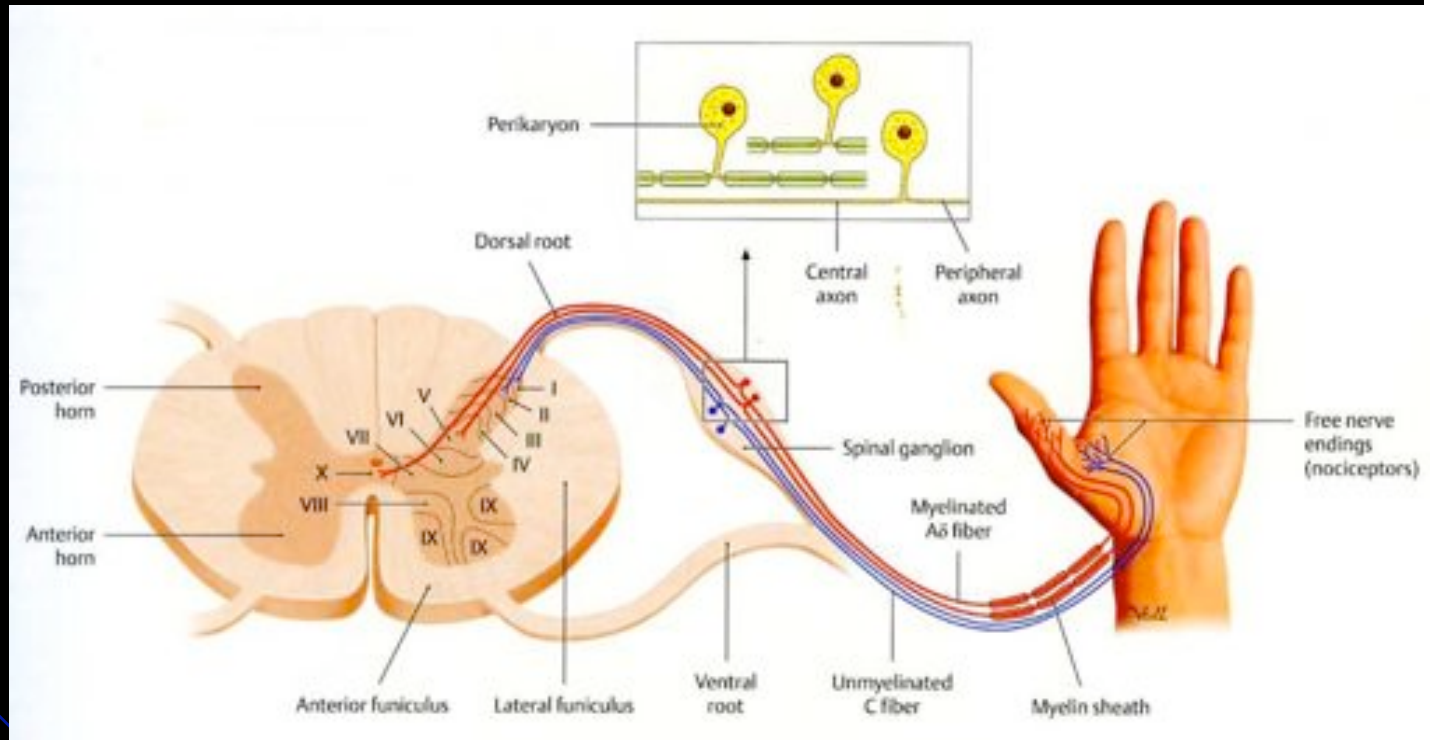
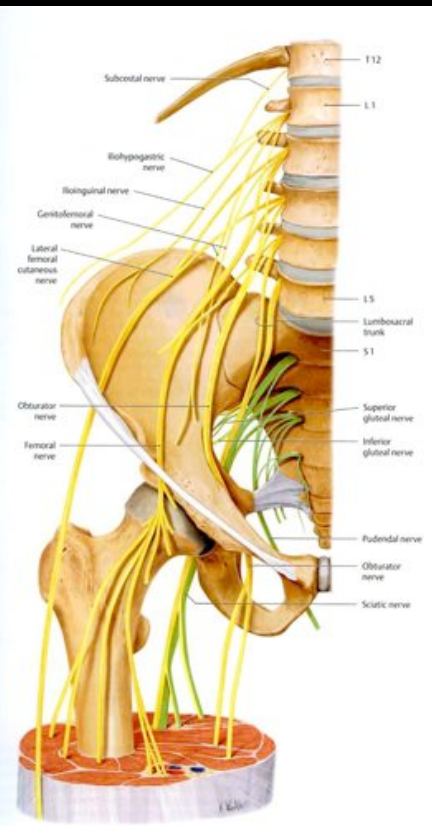




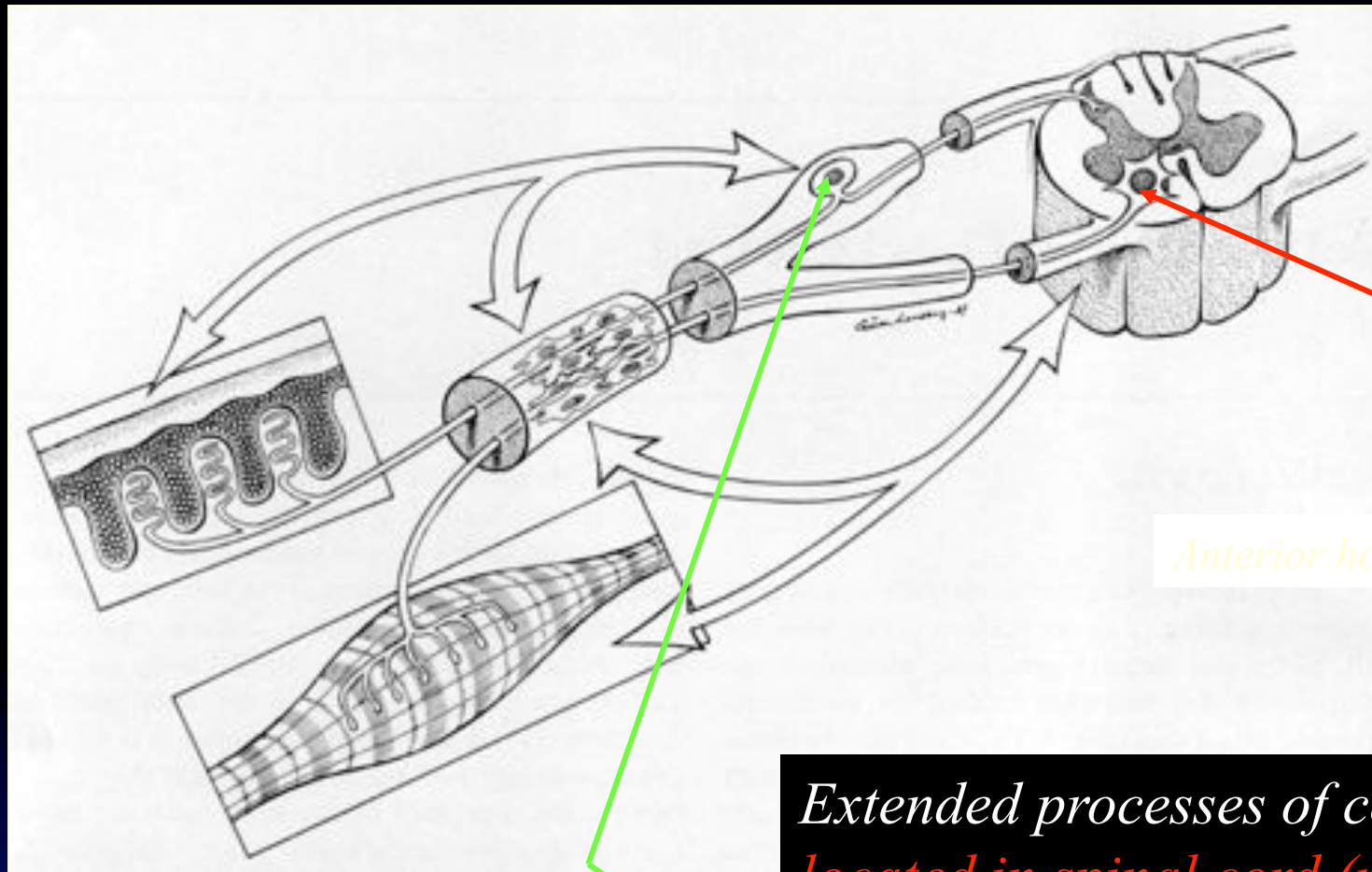




PENFIELD



normal peripheral nerve : axon



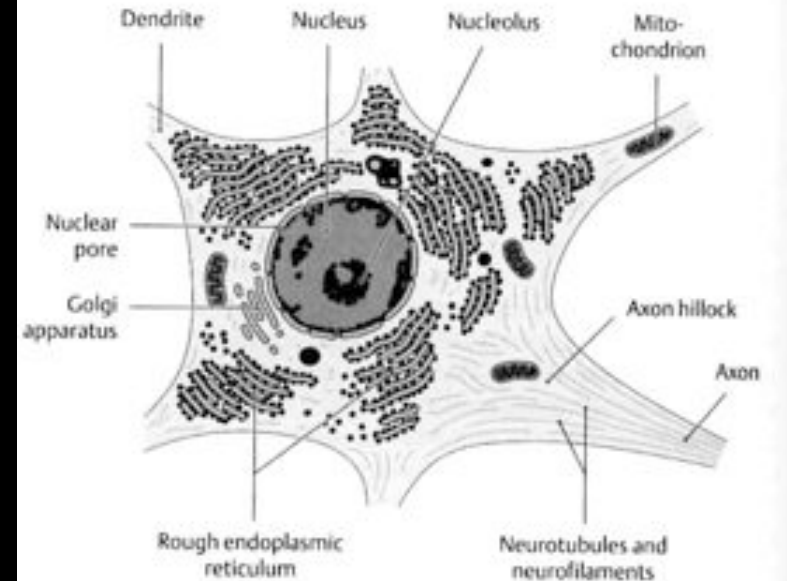
Extended processes of cell bodies located in spinal cord (motor neurons), dorsal root ganglia (sensory neurons), or sympathetic ganglia (sympathetic neurons)

Cell body (or perikaryon) :

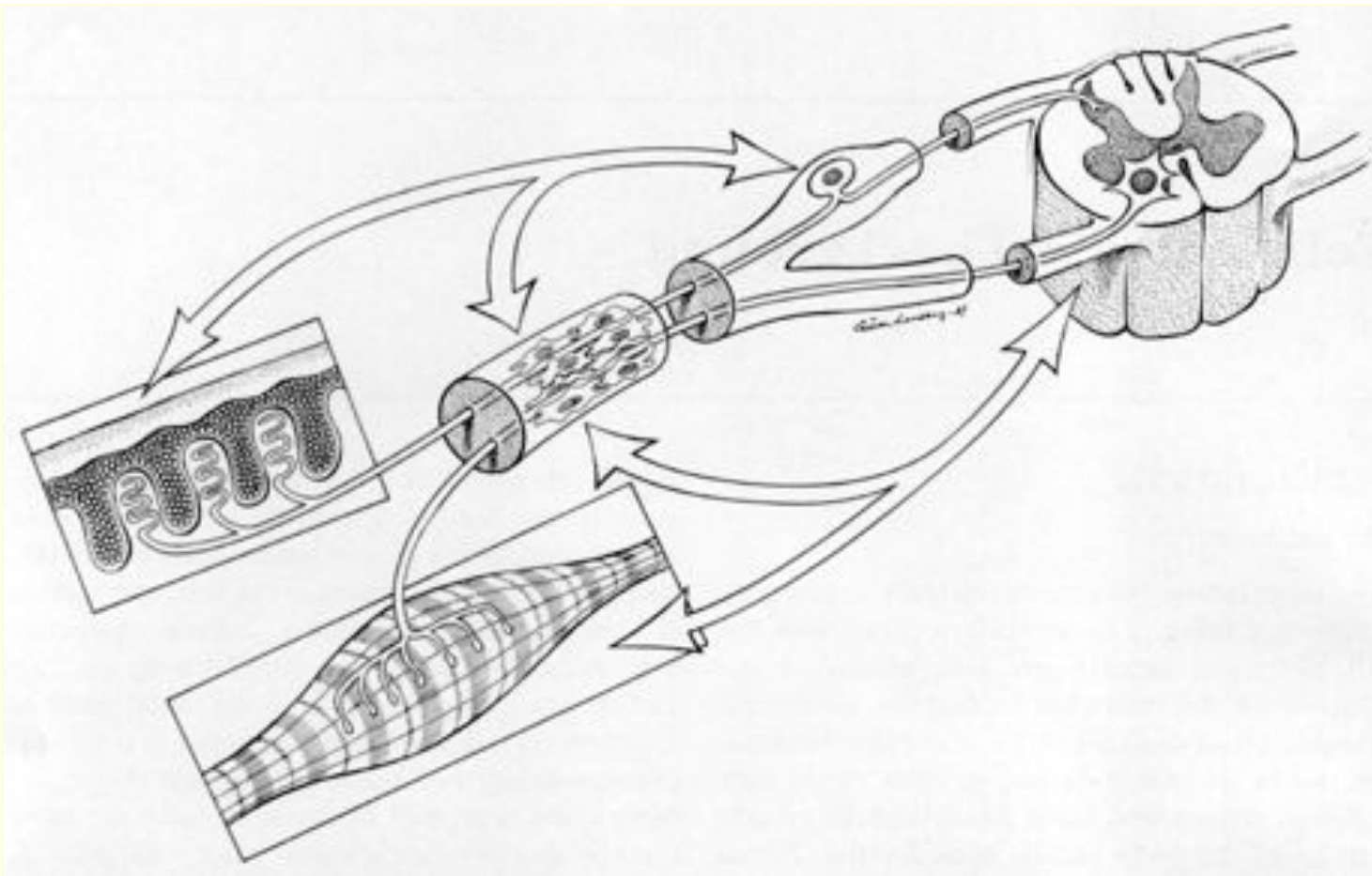
- nucleus (DNA),
- nucleoli (RNA),
- mitochondria,
- ribosomes ...

as in most cells

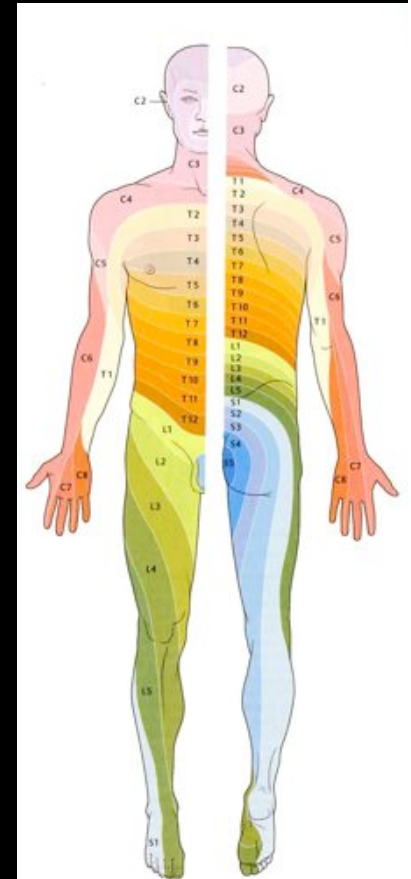
- **Nissl substance :**
combination of endoplasmic reticulum and ribosomes
= **site of protein synthesis (slow axonal transport)**



Dendrites & AXON



*Considerable axon length
> 90% cell cytoplasm in axon
(axoplasm)*



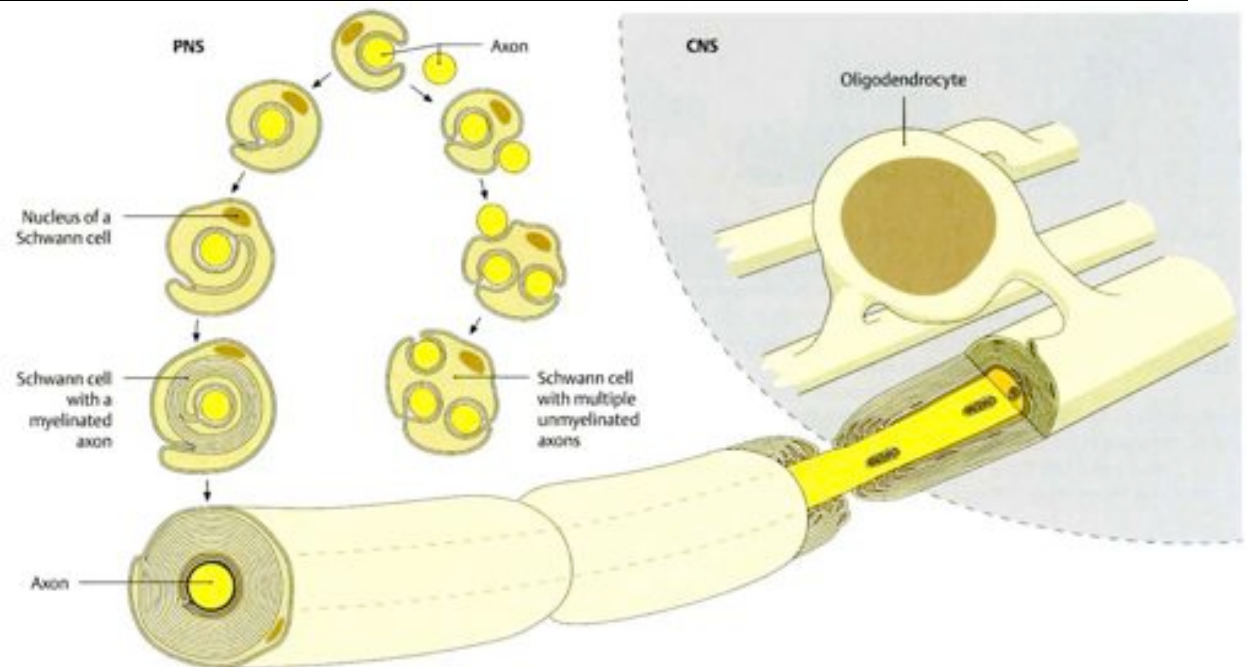


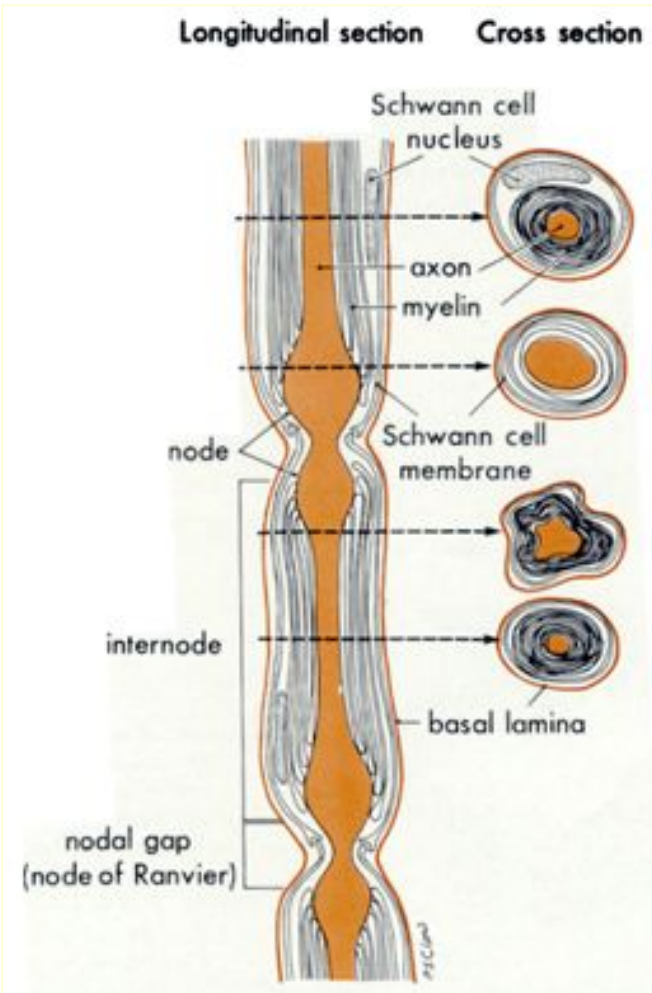
AXONS :

- myelinated (**)
- &
- nonmyelinated (*)

ratio $\frac{1}{4}$

!!! Axons quantities in a nerve





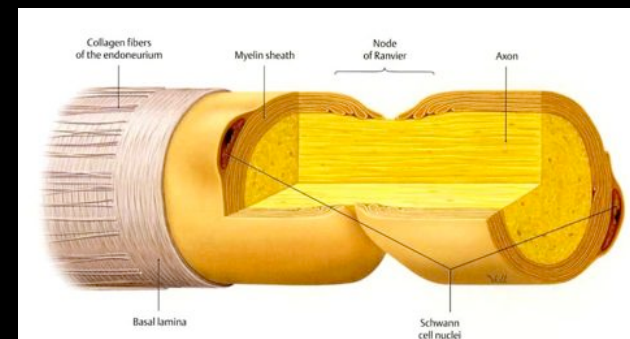
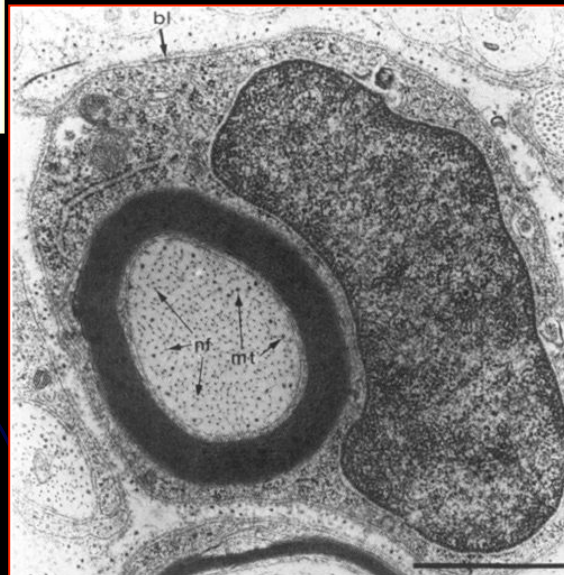
MYELINATED FIBERS :

membrane of Schwann cell is wrapped spirally around the axon

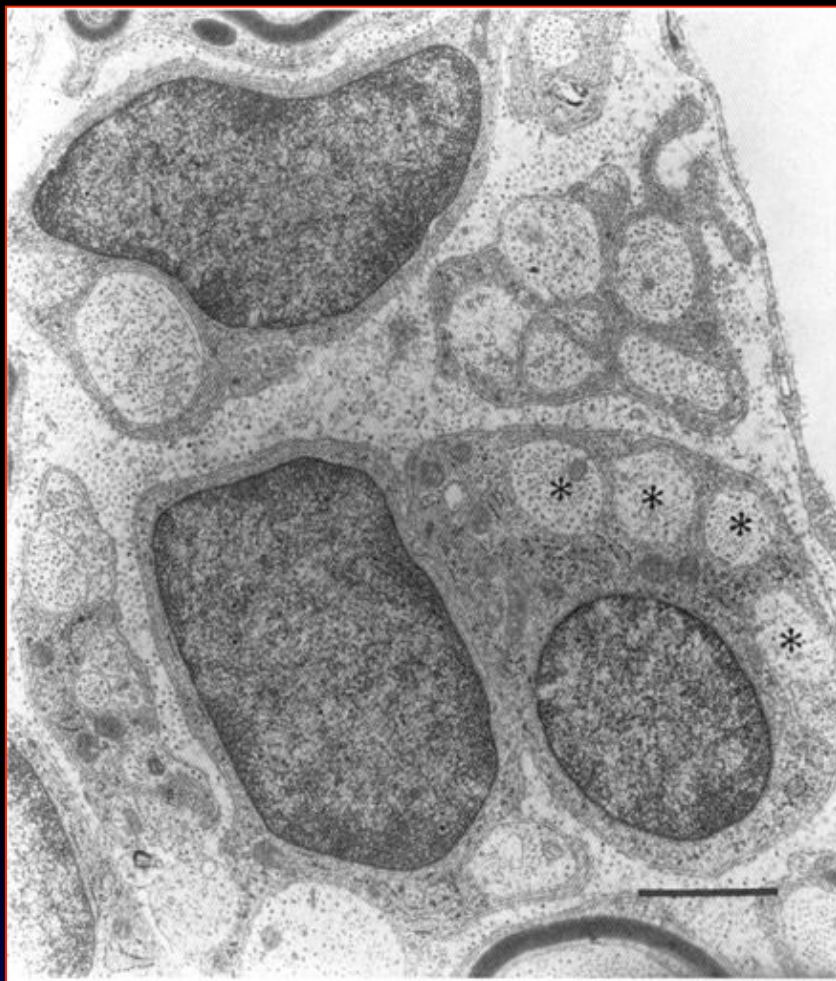
multilaminated sheath

(bl = basal lamina of Schwann cell)

longitudinal arrangement of Schwann cells separated by nodes of Ranvier allowing **quick "saltatory" conduction**



NONMYELINATED FIBERS

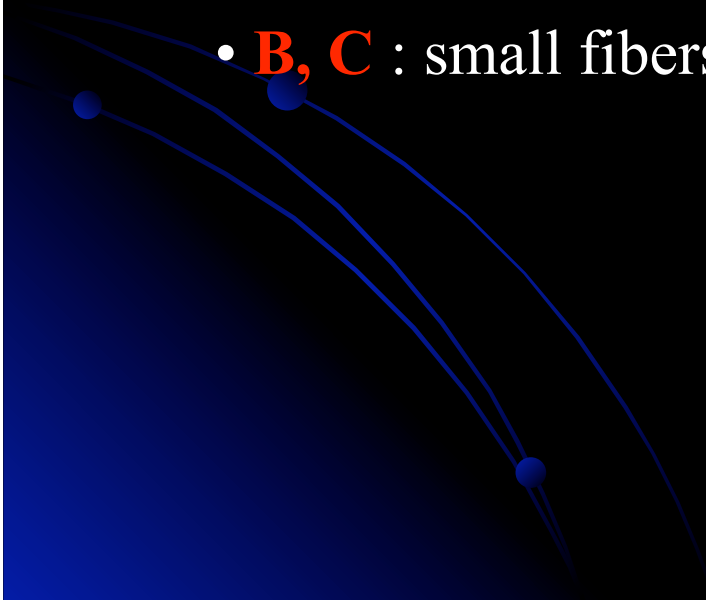


large number of axons
embedded in the cytoplasm
of one Schwann cell (*)

continuous ion exchange
low impulse velocity

Type of nerve fibers (Erlanger and Gasser, 1937) :

- **A**, largest fibers : myelinated somatic afferents and efferents ; further subdivided in :
 - **A-alpha** (15-20 μ - efferent motor fibers),
 - **A-beta** (8-15 μ - touch),
 - **A-delta** (2-5 μ - sharp pain and temperature)
- **B, C** : small fibers, autonomic system and deep pain



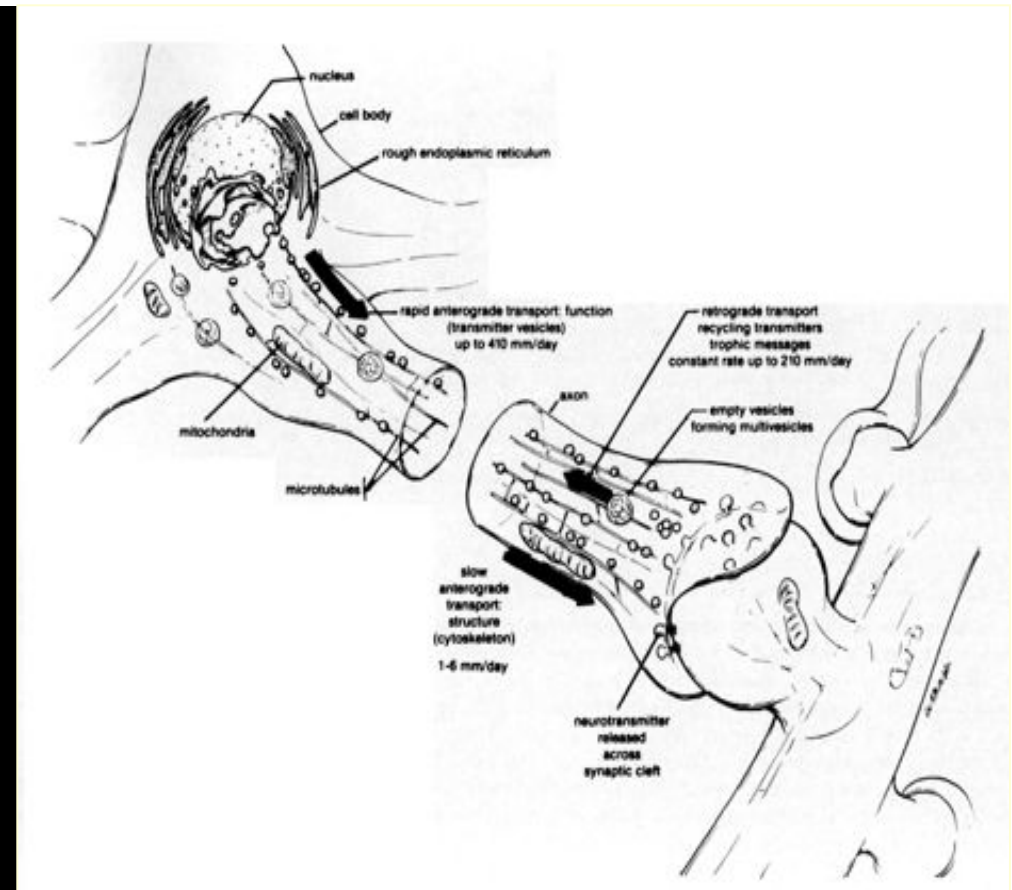
Axonal transports :

Anterograde (cell body to axon):

fast (20 to 410 mm/day, membrane constituents and neurotransmitters)

slow (0.1 to 30 mm/day, cytoskeletal and associated proteins)

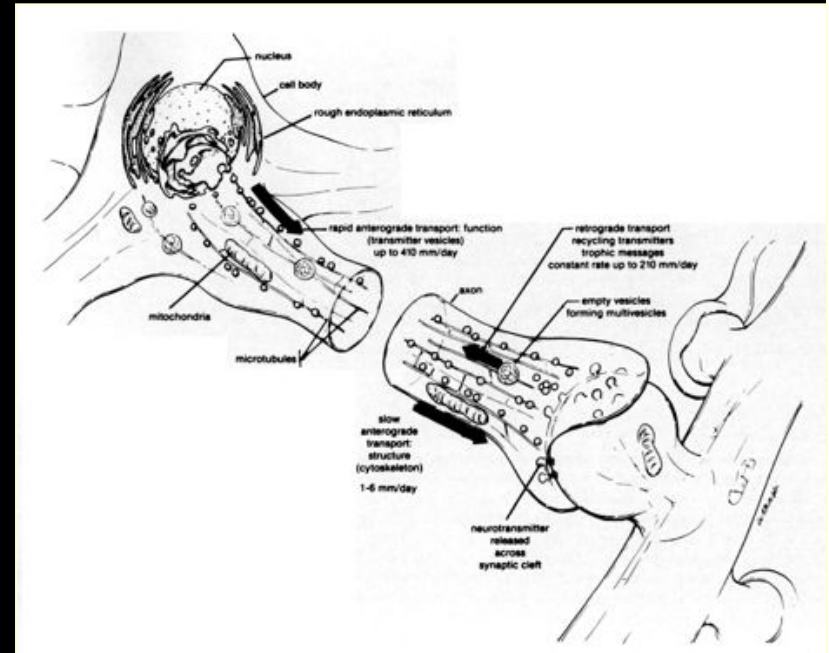
provided by microtubules
energy-requiring process (affected by trauma or ischemia)



Retrograde (periphery to cell body):

fast (up to 300 mm/day)

degradation materials (“recycling process”), and **neurotrophic factors**



N.B.: virus as herpes simplex or polio

Neurotrophic factors :

– proteins providing information on state of axon, terminals, target cells and environment

– three groups based on receptors :

– neurotrophins,

– neuropoietic cytokines (CNTF, Interleukin 6),

– fibroblast growth factors

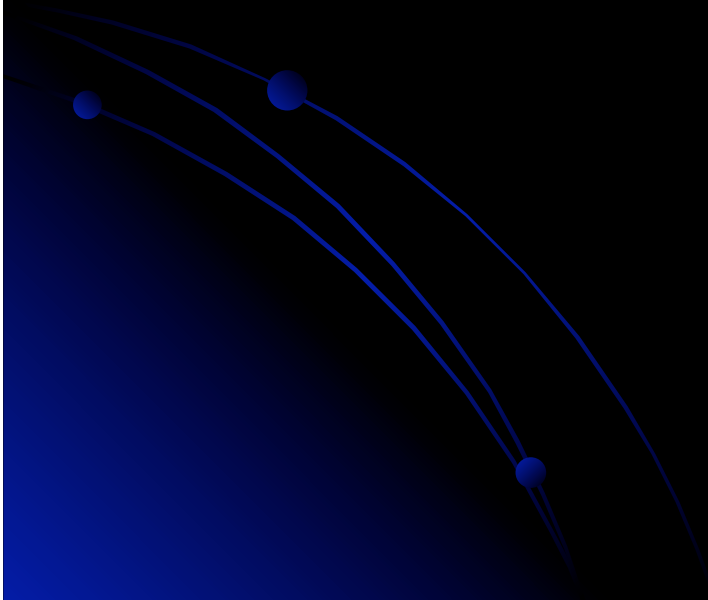
– best known neurotrophic factor : **Nerve Growth Factor (NGF)** :

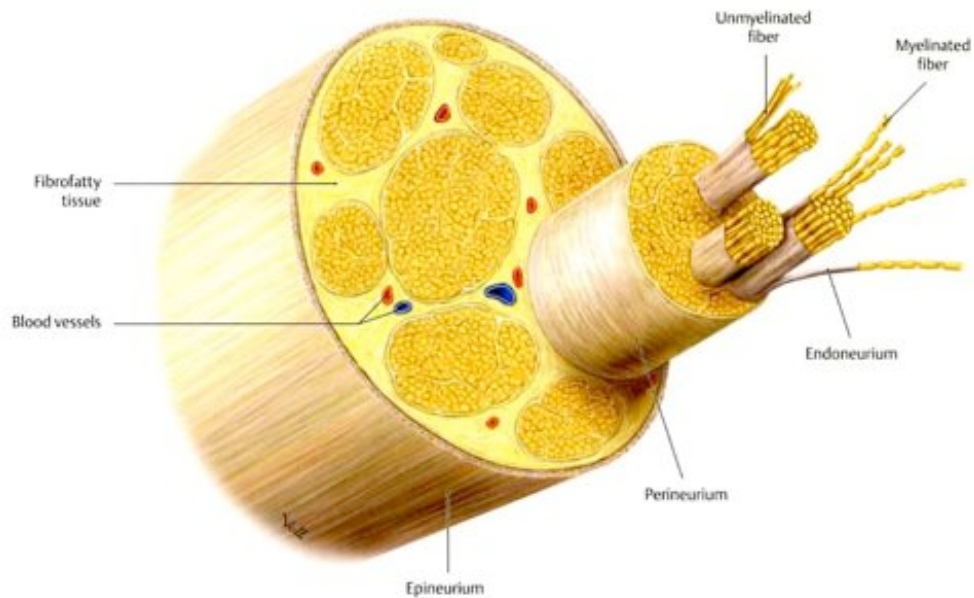
- present in low concentration in normal nerve
- increased in case of injury (role in sensory cell body survival and axonal sprouting)

- Axonal transport :

- can be macroscopically observed

- (swelling proximal and distal to nerve compression - ex carpal tunnel)



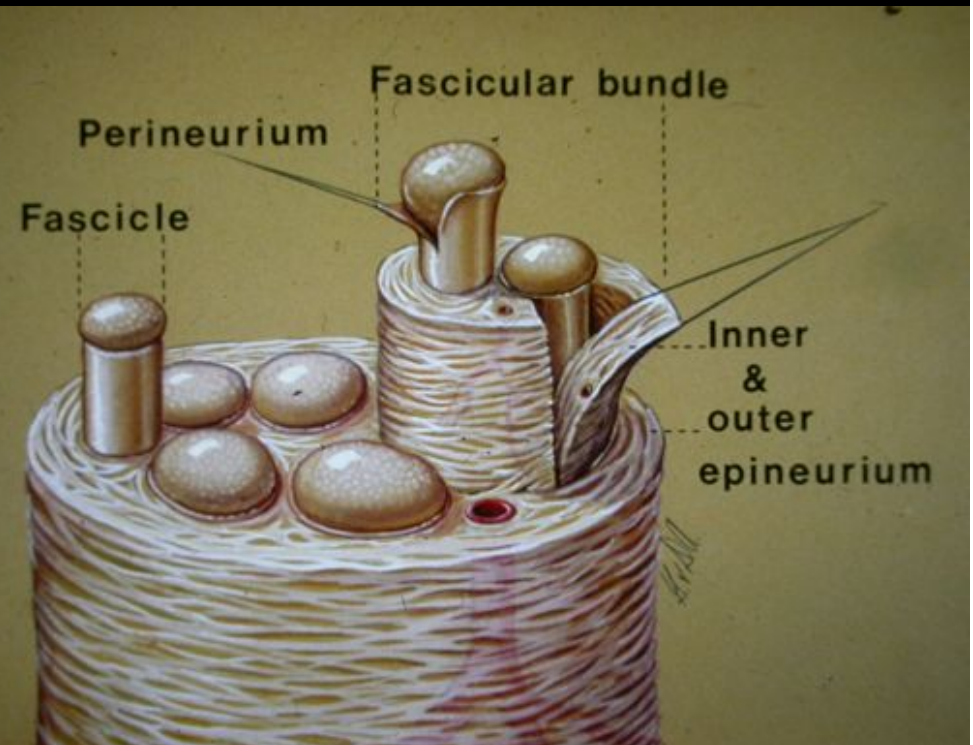


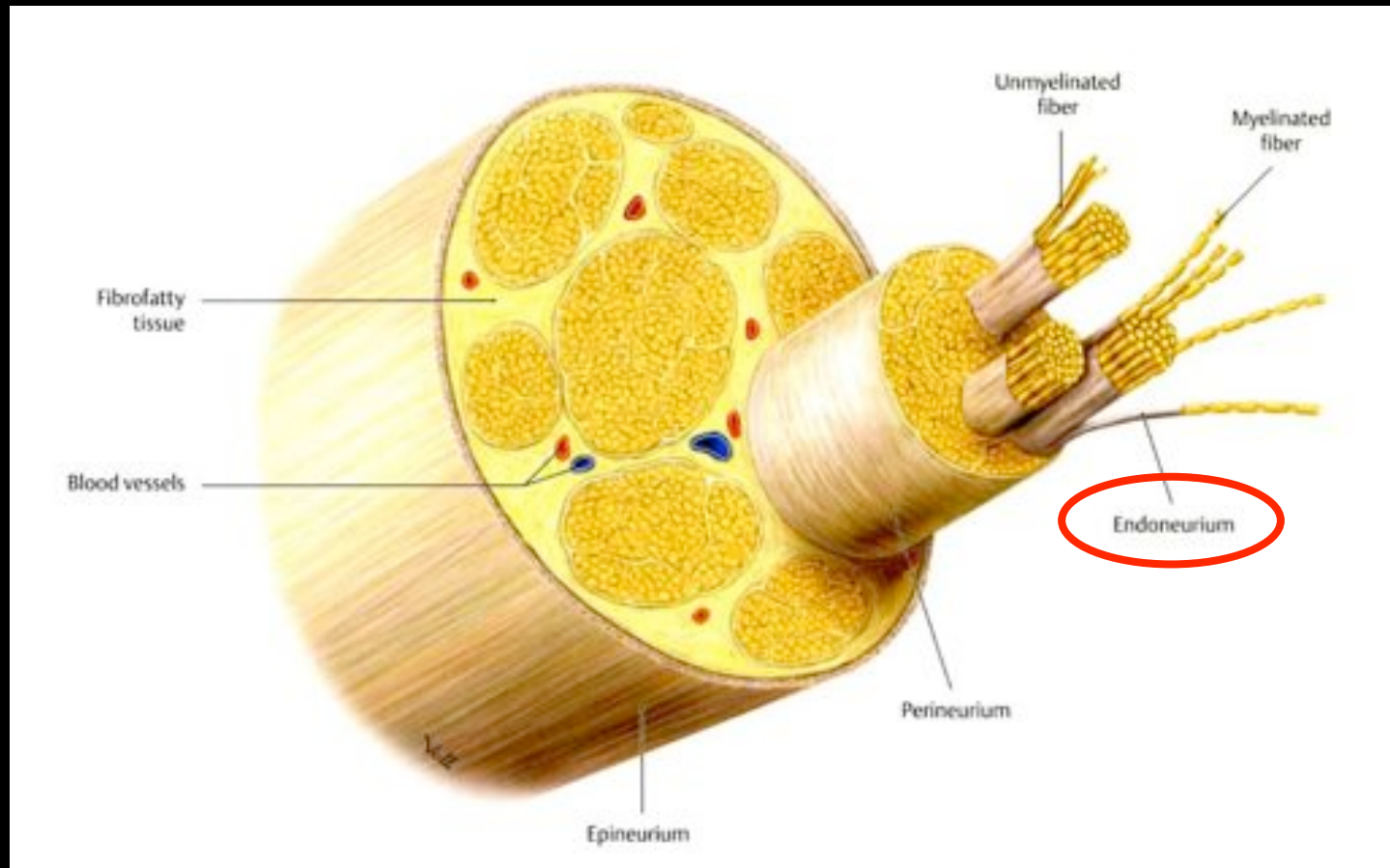
Endoneurium

Perineurium

Epineurium

Fascicules

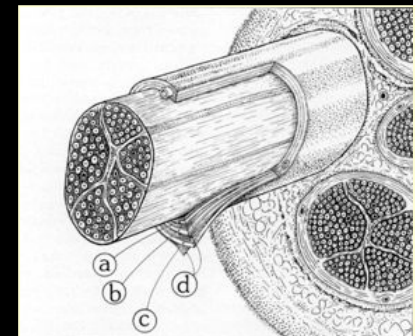




Endoneurium :

loose collagenous matrix with fibroblasts and capillaries, disposed around axons and Schwann cells

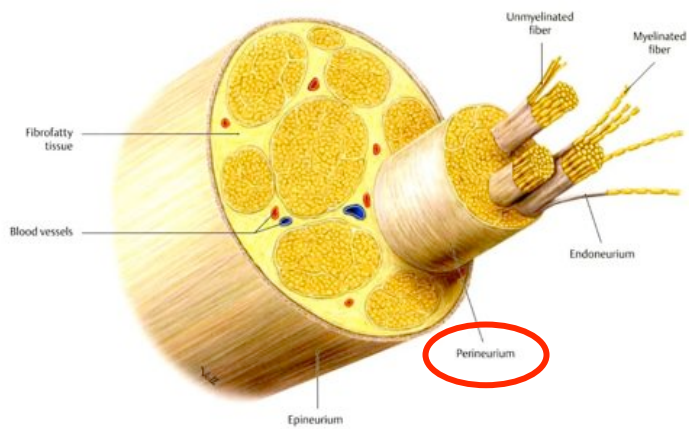
Schwann cell (including basal lamina) + axons = endoneurial tube



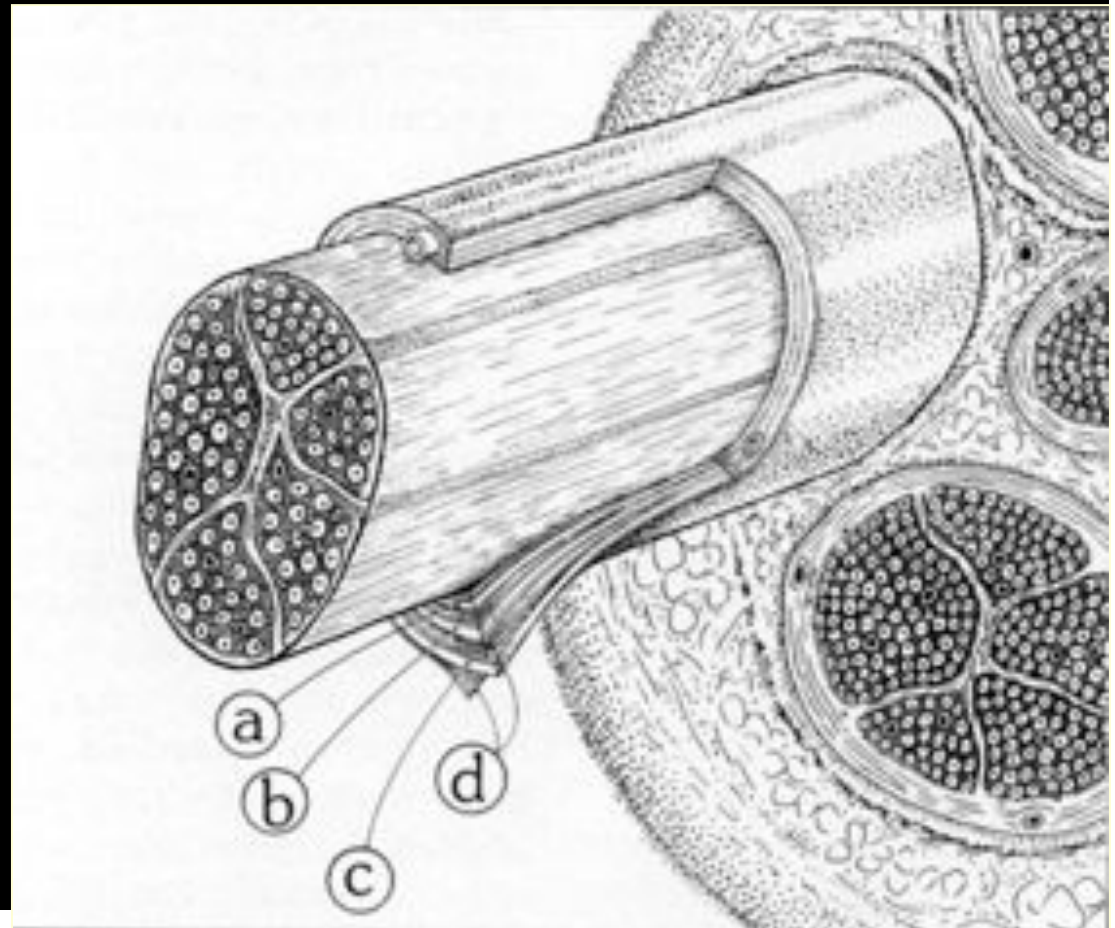
Perineurium :

surrounds each fascicle
up to 15 lamellae of flattened cells + basement membrane

diffusion barrier both sides
barrier to entrance of large proteins
maintain of endoneurial & electrolytic equilibrium
pressure (slightly positive)



edema :
“miniature compartment
syndrome”



Note the existence of another barrier, the **blood-nerve barrier** :

- similar to blood-brain barrier
- tight junction between capillary endothelial cells of endoneurial capillaries (but permeability to glucose ...)

consequences in diabetic neuropathy



Epineurium :

connective tissue protecting fascicles

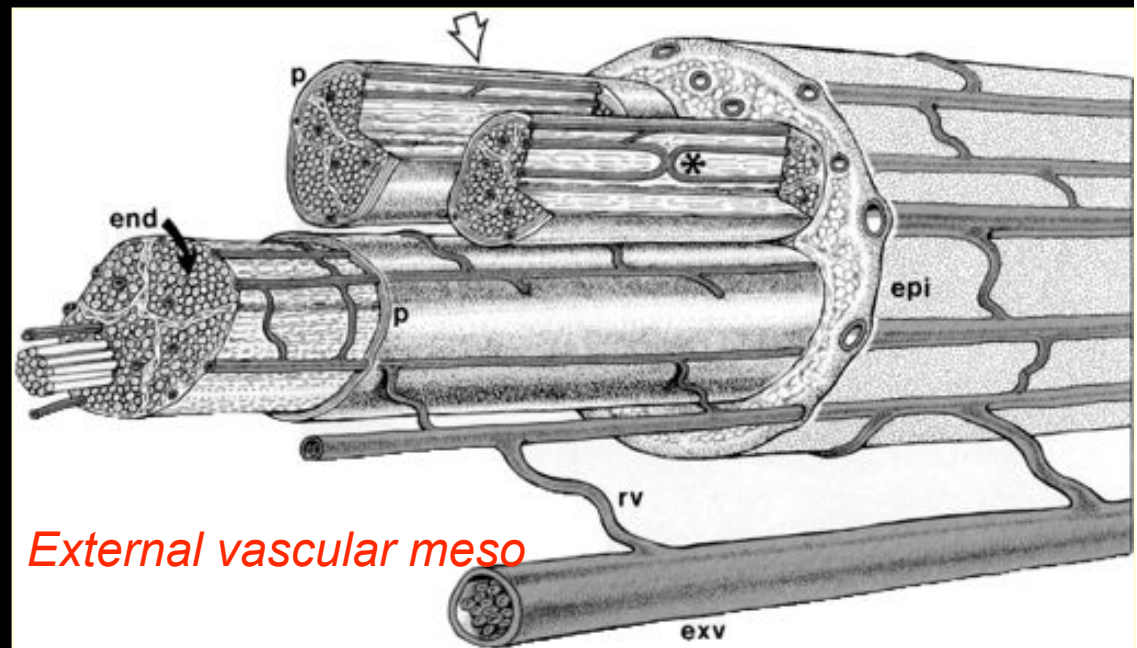
normally 50%

thicker (75%) at joint angulations

longitudinal vessels (obliterated with nerve elongation (complete with 15%))

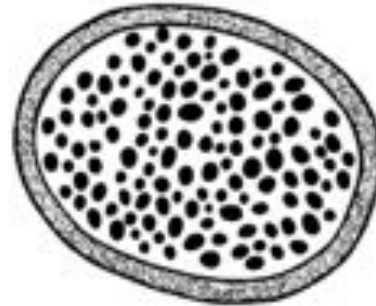
external epineurium :
thick,
allows nerve gliding (brachial plexus
50mm, ulnar nerve at elbow 9.8mm)

internal epineurium

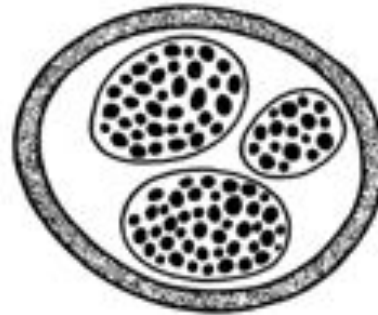


Deleterious effects of nerve elongation :alteration of conduction with >6% stretch

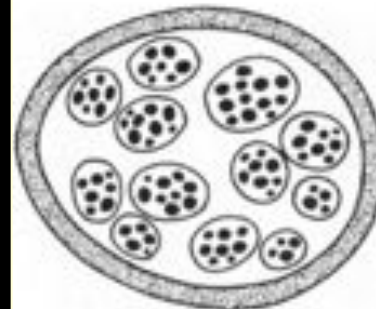
Epineurium determines
types of fascicular
patterns



Monofascicular



Oligofascicular

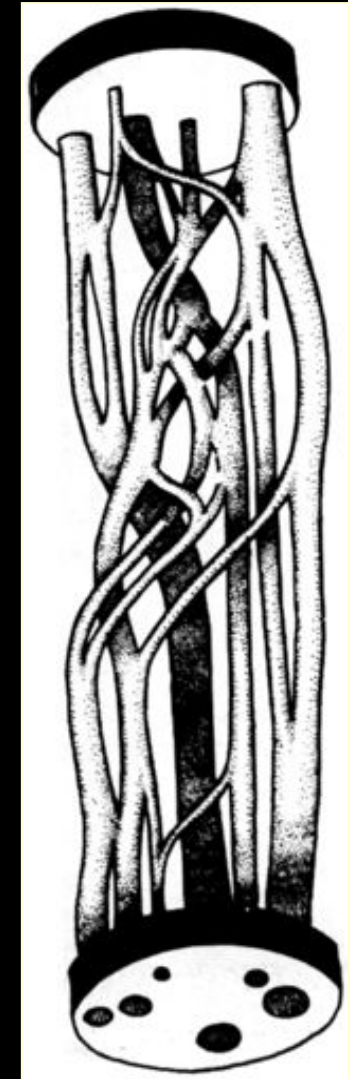
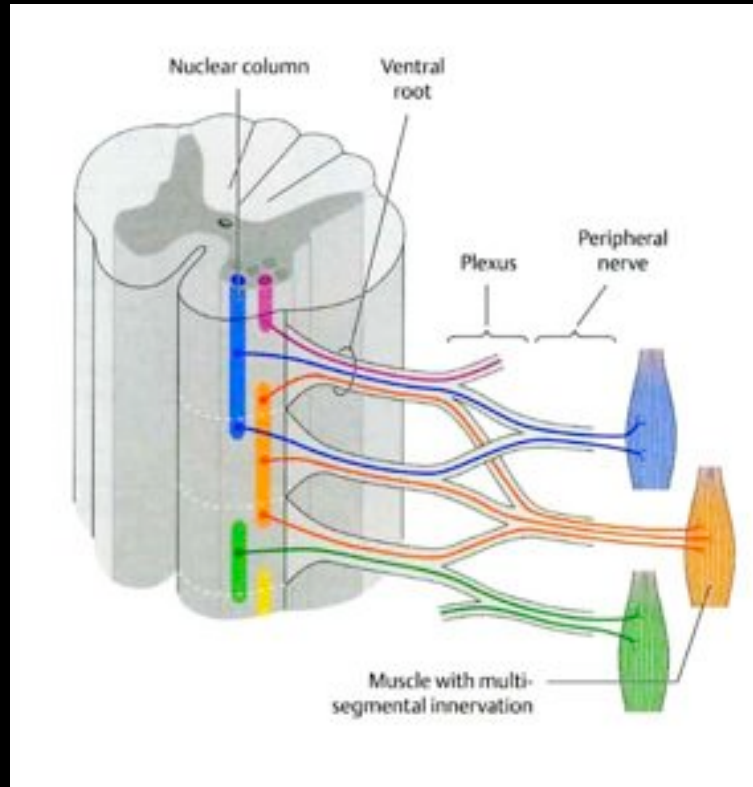


Polyfascicular

Sunderland (1978): longitudinal arrangement of fascicles with constantly changing with plexus formation

no restoration of alignment possible with excision, even limited

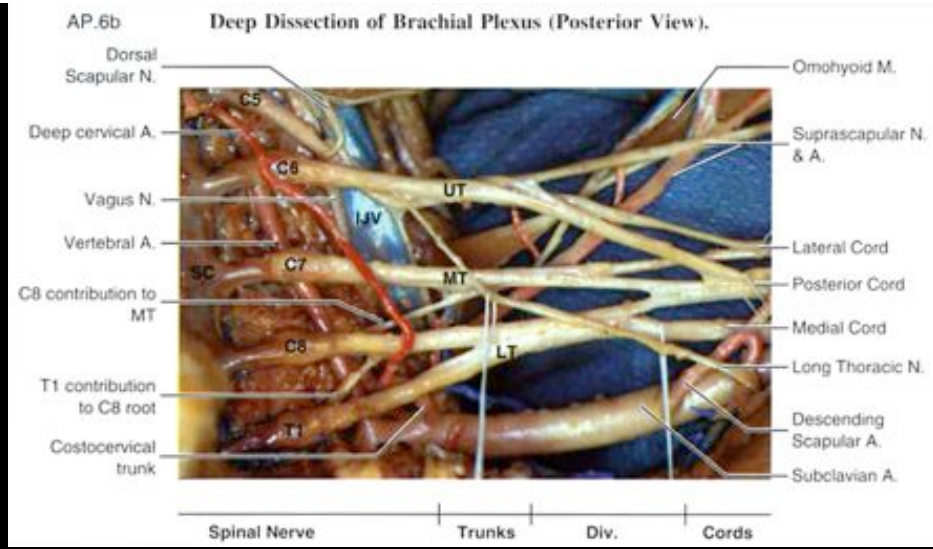
– true for proximal nerve portion



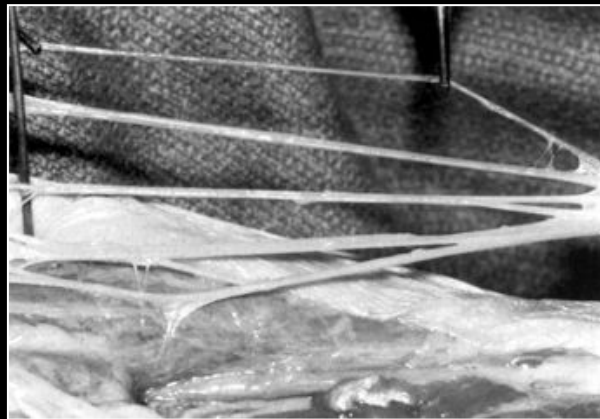
– distally : long fascicular segments (JABELEY)

musculocutaneous nerve

median nerve :



origin

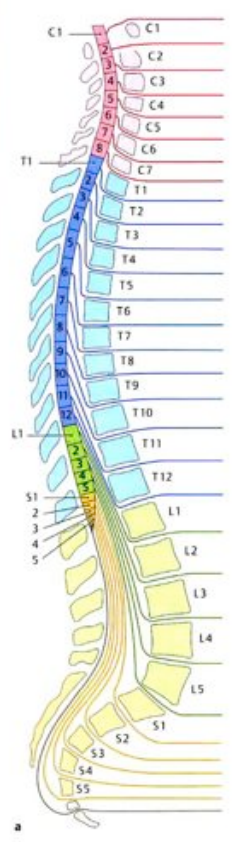
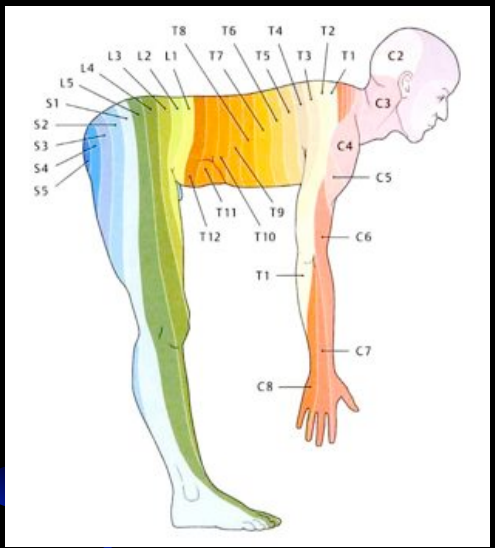
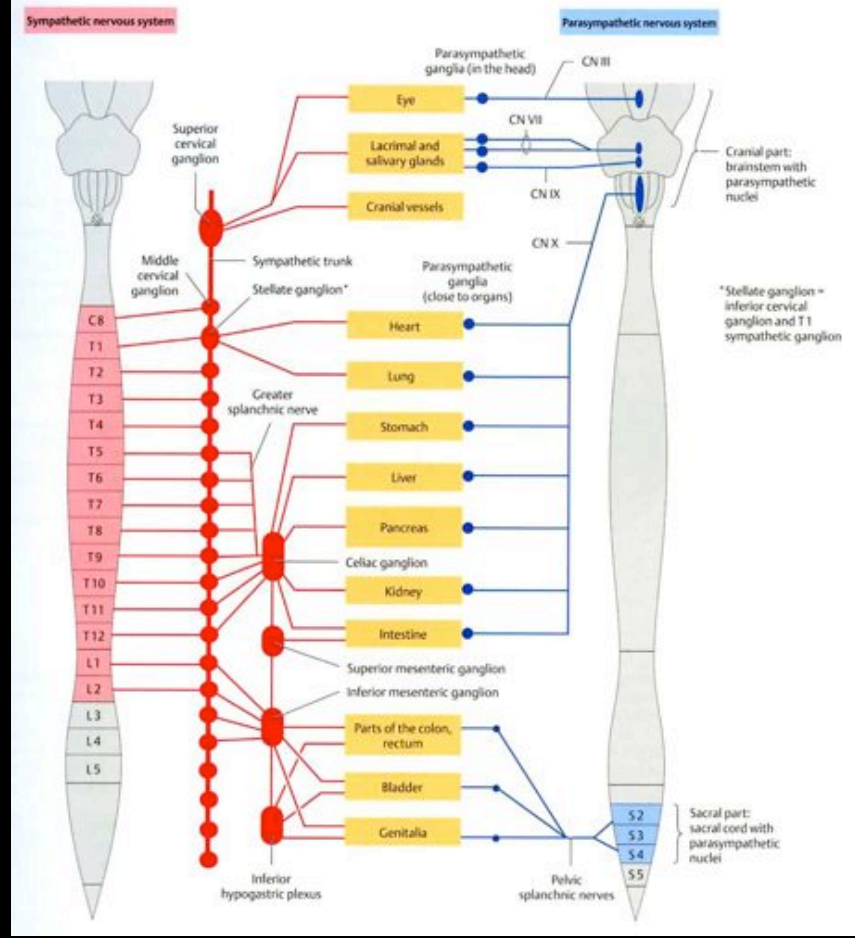


proximal forearm

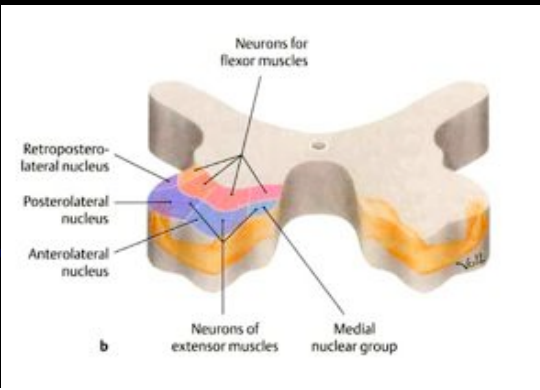
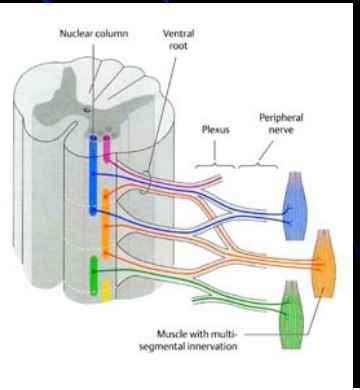


distal forearm

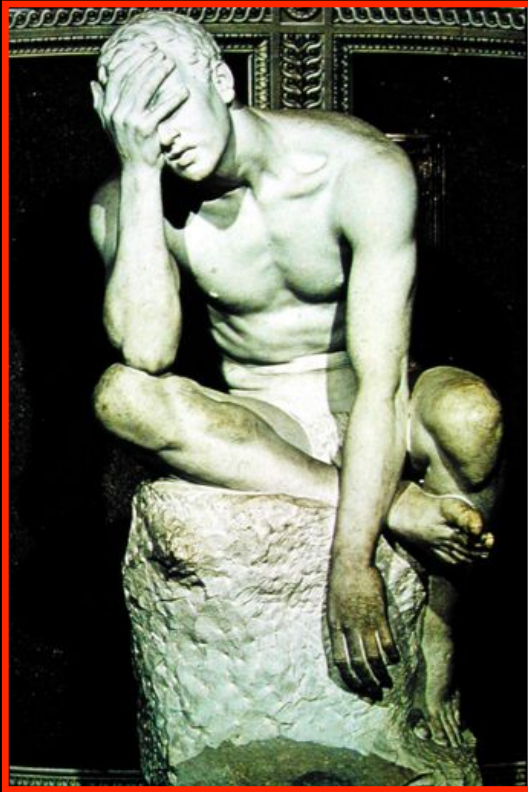
Differences between the somatic & the autonomic nervous systems



Dermatomes Sclerotomes Myotomes



IMPORTANCE FOR THE PAIN REFERRALS



et en cas de lésion ?