

Spinal Cord and Spinal Nerves

Explain spinal cord anatomy, including gray and white matter and meninges (give the general functions of this organ).

Discuss the structure and functions of the spinal nerves and plexuses.

Describe the structural components of reflexes.







Gray matter expanded to incorporate more sensory input from limbs and more cell bodies for motor control of limbs

Spinal Meninges

Three membranes surround all of CNS

1) Dura mater - "tough mother", strong

2) Arachnoid meninx spidery looking, carries blood vessels, etc.

Subarachnoid space

3) Pia mater - "delicate mother", adheres tightly to surface of spinal cord

(c) Posterior view

capicipes, estil

2) Arachnoid

3) Pia mater

1) Dura mater

Inferior End of Spinal Cord

Conus medullaris - inferior end of spinal cord proper

Cauda equina - individual spinal nerves within spinal canal

Filum terminale - filamentous end of meninges, "tie-down"





For clinical examination of CSF or administration of radiopaque dyes, drugs and sometimes anesthetics

However: mostly "epidurals" for anesthetics



Organization of Cord Cross Section

Gray matter - interior horns

posterior - somatic and visceral sensory nuclei anterior (and lateral) gray horns – somatic and visceral motor control gray commissures - axons carrying information from side to side

Fig 14-5

White matter - tracts or columns

posterior white column anterior white column lateral white column anterior white commissure

functions

ascending tracts - sensory toward brain descending tracts - motor from brain

Peripheral Nerves

Definition: bundles of axons. AKA tracts in CNS

Organization – coverings: Epineurium wraps entire nerve

Perineurium wraps fascicles of tracts

Endoneurium wraps individual axons



Anatomy of a Peripheral nerve

Function: sensory - afferent motor - efferent mixed - contains axons of both

Blood vessels — Perineurium — (around one fascicululs)

Endoneurium

Myelinated axon



Organization of Spinal Nerves:

Root – inside vertebral canal a. dorsal sensory root with a ganglion b. ventral motor ^{1.}

2. Mixed spinal nerve



3. Rami

a. dorsal - mixed to skin and muscles of back
b. ventral - mixed "spinal nerve" to ventrolateral body surfaces and limbs
c. white ramus communicans motor ANS
d. gray ramus communicans motor ANS

Dermatomes

Sensory innervations by specific spinal nerves ⇒ Each pair of spinal nerves monitors specific region of body surface.

Clinical significance ?



4 Principal Plexuses

Braids of ventral rami of **cervical**, **thoracic**, **lumbar** or **sacral** spinal nerves

Cervical Plexus

Phrenic nerve - innervates diaphragm





Reflexes

Fast, stereotypical, inborn, protective actions

Occur at spinal cord or brainstem levels

May be either monosynaptic or polysynaptic

All require a. stimulus at receptor b. sensory information relay c. processing at CNS level d. activation of motor response e. response of peripheral effector



Examples?

Shingles

Varicella-zoster virus (of the herpes family)

- In dorsal root ganglia and cranial nerves
- Initial infection: chicken pox

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