

MAHIDOL UNIVERSITY
Wisdom of the Land

DTAN 232 & DTIN 202 Gross Anatomy I

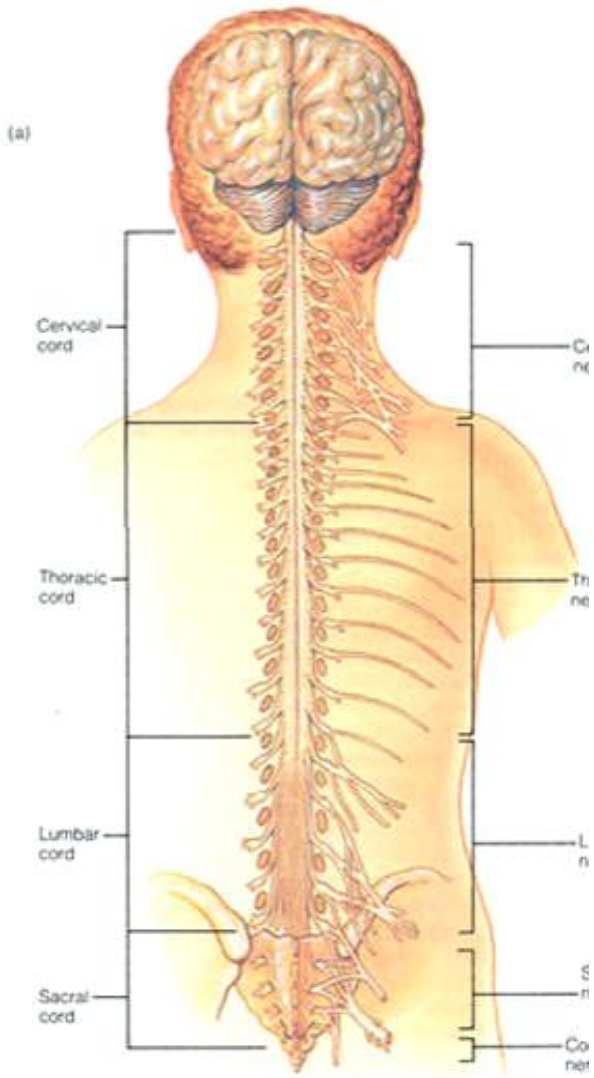
Spinal Nerve

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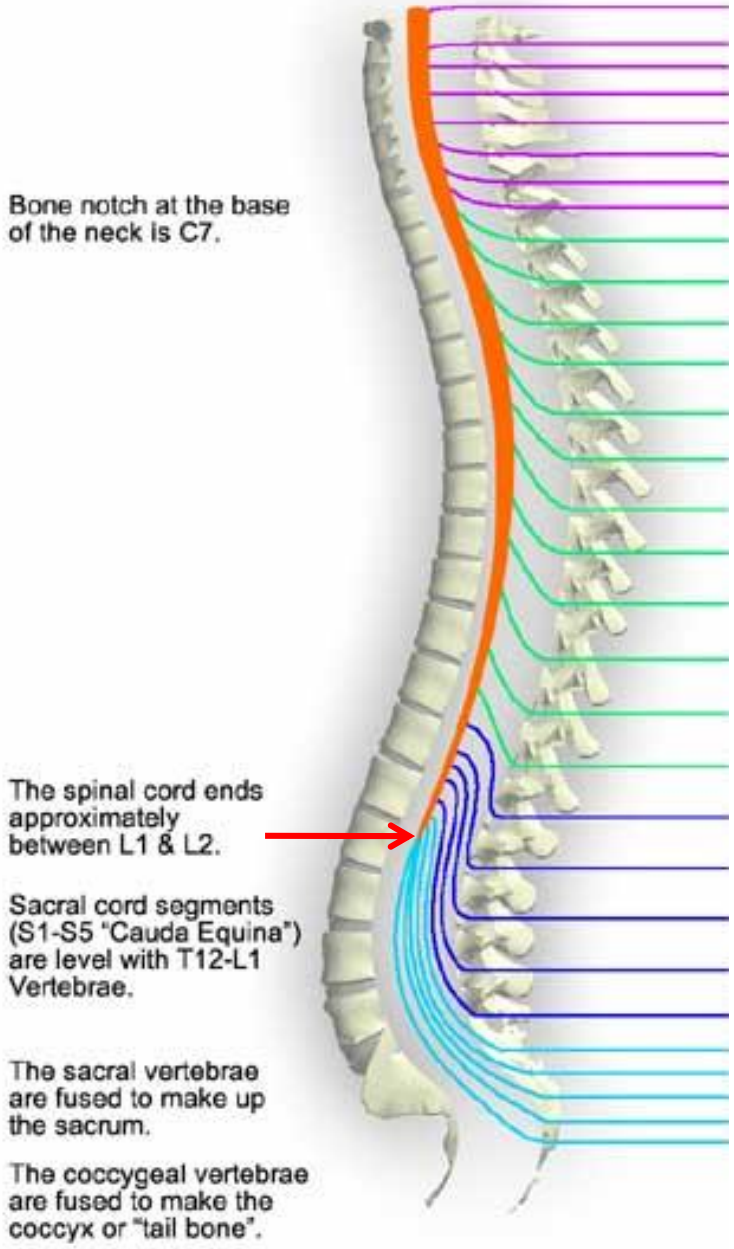
Outline

1. Gross morphology of spinal cord and its inferior limits
2. Names of the spinal nerves
3. Roots and rami of spinal nerves
4. Spinal nerves plexus
5. Functional components of the spinal nerves
6. Dermatomes

Gross Morphology of Spinal Cord & Its Inferior Limits



- Spinal cord begins just below the foramen magnum.
- A continuation of medulla oblongata
- Descend for its entire length within vertebral canal and terminate as conus medullaris.
- Having cervical & lumbosacral enlargements



- During early embryogenesis, spinal cord extends throughout entire length of vertebral canal
- At birth it extends to L2 & L3 vertebrae.
- At final growth, it terminates at lower border of L1 vertebra.

Names of the Spinal Nerves



31 pairs of spinal nerves emerge from the spinal cord.

8 pairs of cervical spinal nerves

12 pairs of thoracic spinal nerves

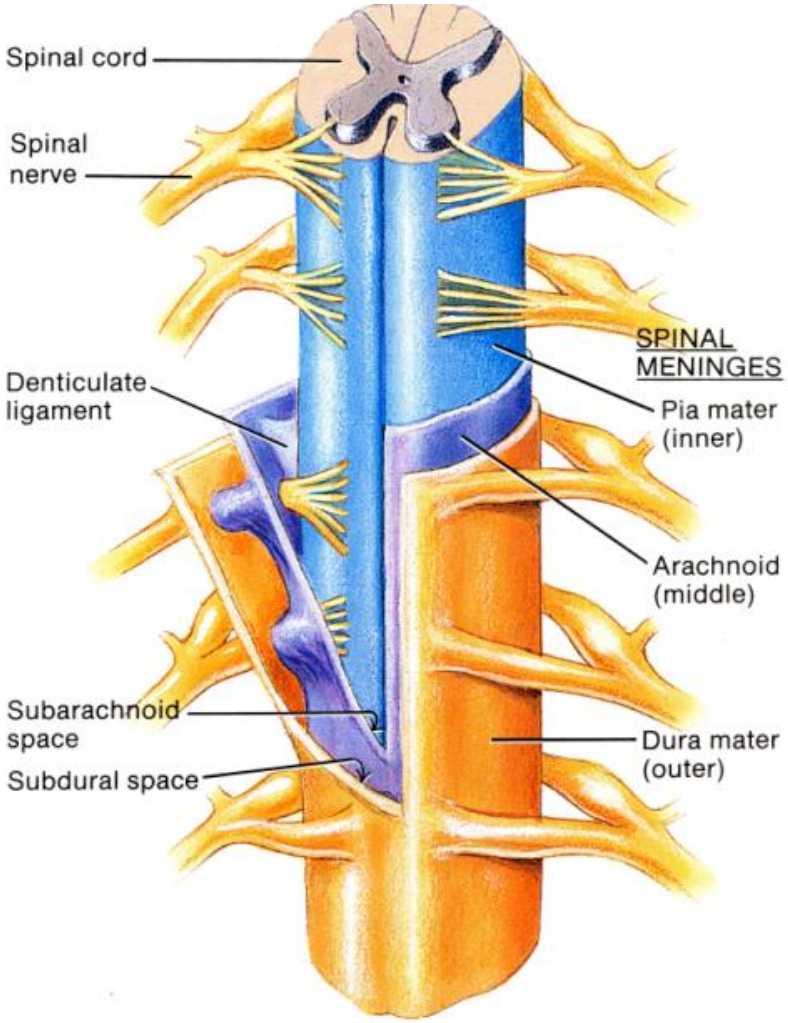
5 pairs of lumbar spinal nerves

5 pairs of sacral spinal nerves

1 pairs of coccygeal spinal nerves

Example of Abbreviation: C1, T7, L5

Roots & Rami of the Spinal Nerves



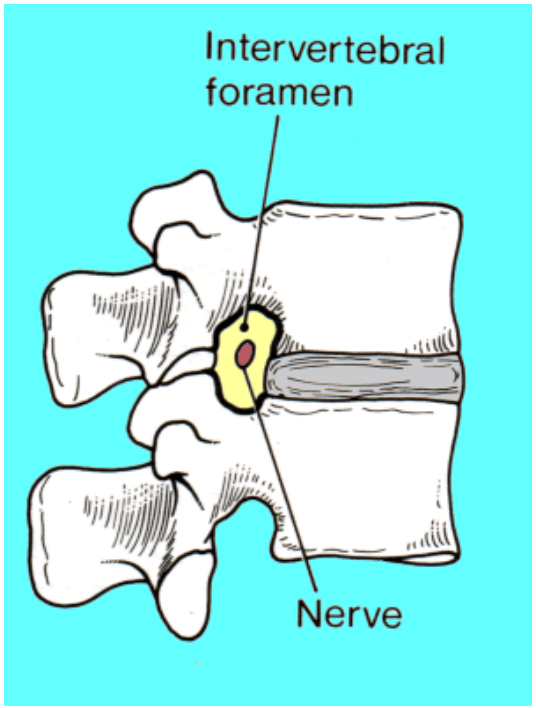
Each spinal nerve begins as a series of anterior (ventral) & posterior (dorsal) rootlets.

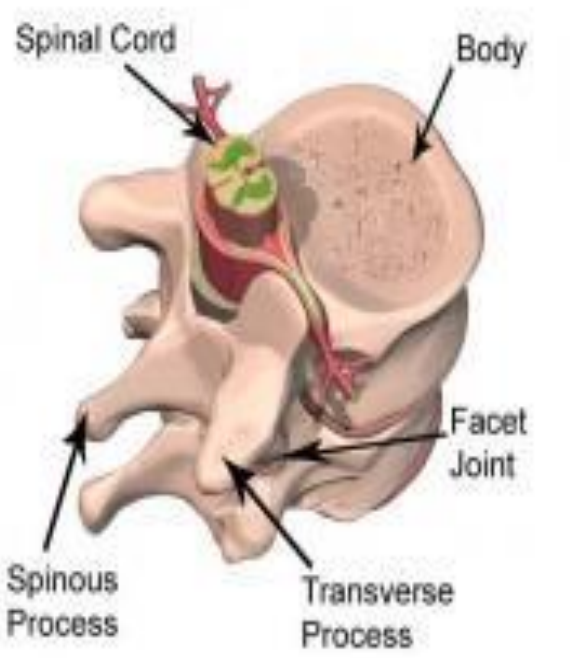
Anterior/posterior rootlets of each spinal level merge with each other to form an anterior (ventral)/posterior (dorsal) root

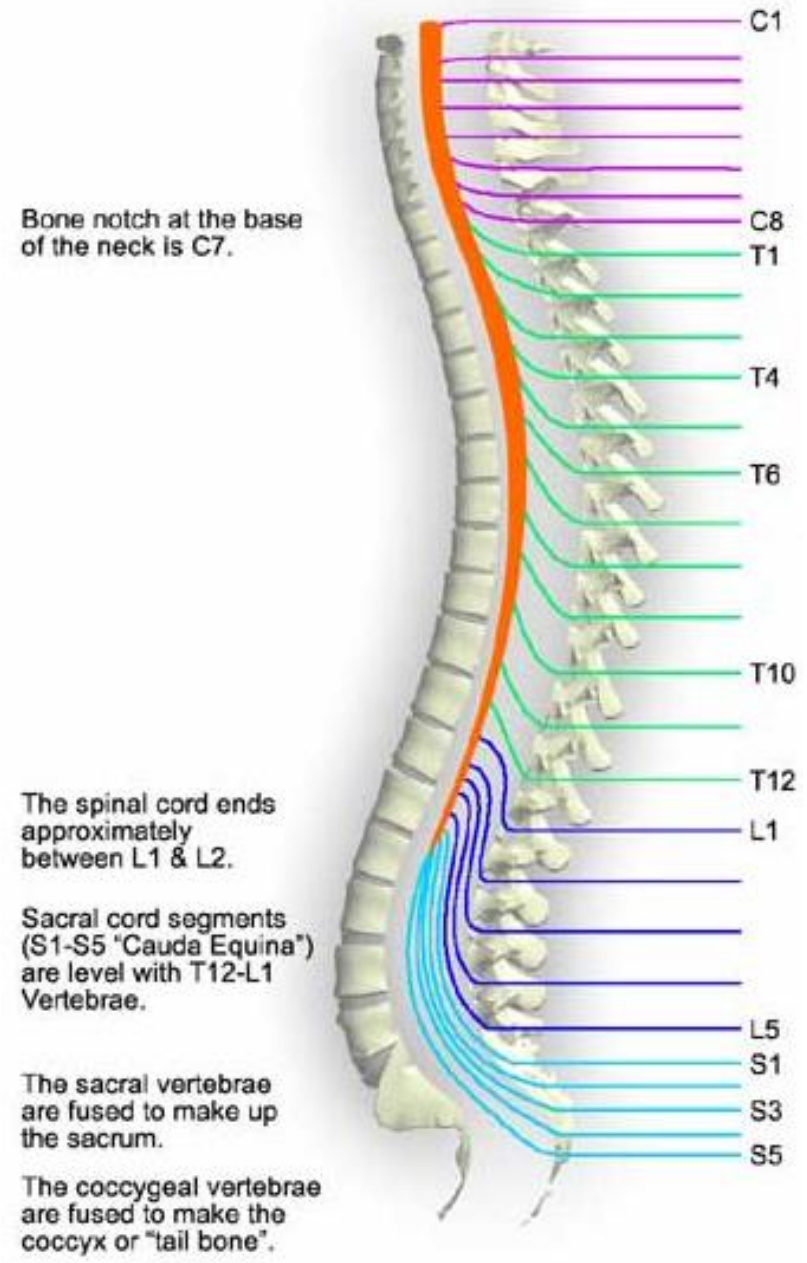




As the roots exit the vertebral canal via an intervertebral foramen, they unite with each other to form a spinal nerve trunk



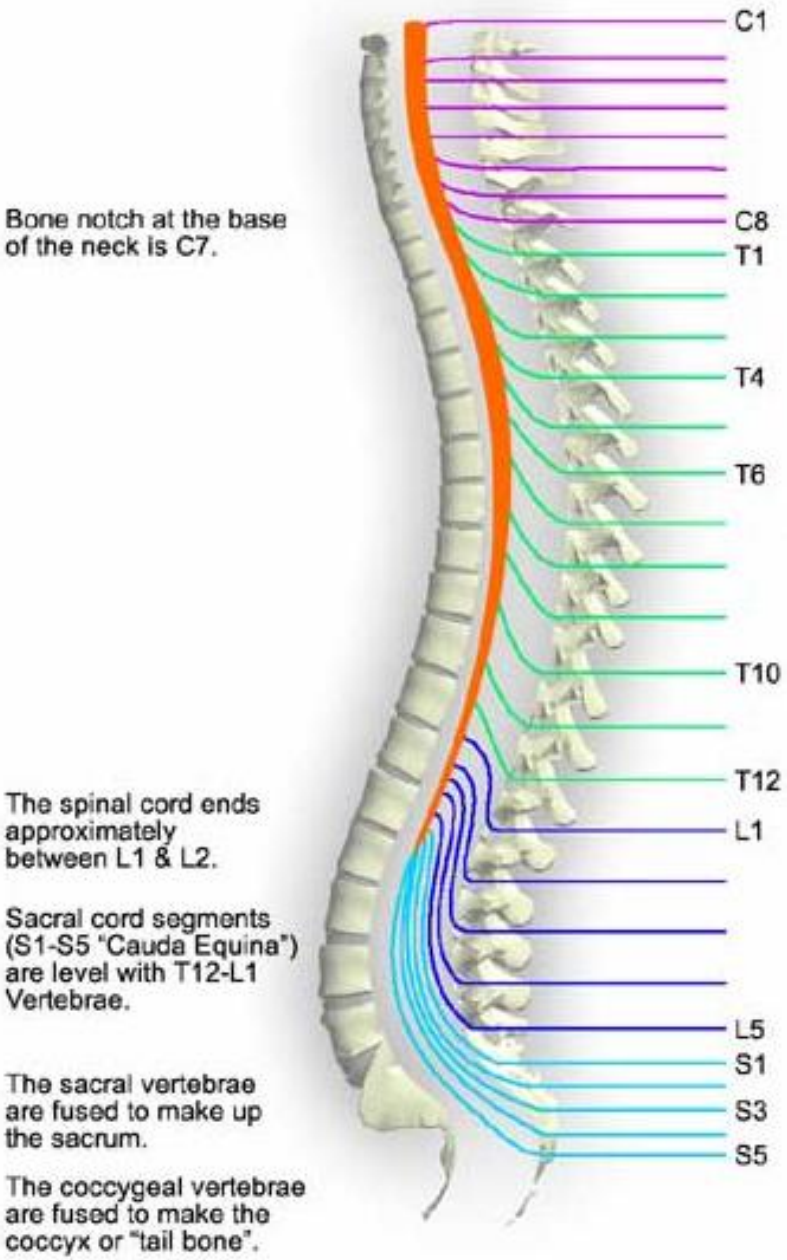




The thoracic, lumbar, sacral & coccygeal spinal nerves each exit the intervertebral foramen immediately below the vertebra of the same name.

The cervical spinal nerves, except for C8, each exit immediately above the vertebra of the same name.

The C8 spinal nerve exits immediately between C7 & T1 vertebrae.

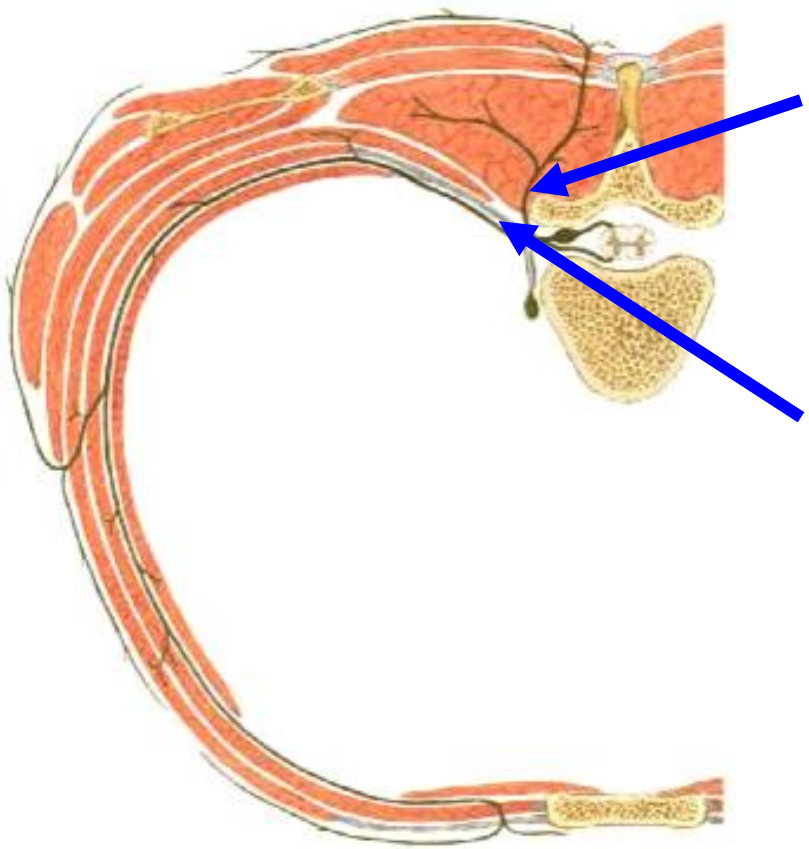


Spinal cord segment is the transverse segment which gives rise to the anterior & posterior rootlets of each pair of spinal nerves

C&T segments → C&T vertebrae

L, S & Coc segments → T11 – L1 vertebrae

L, S & Coc spinal roots form cauda equina

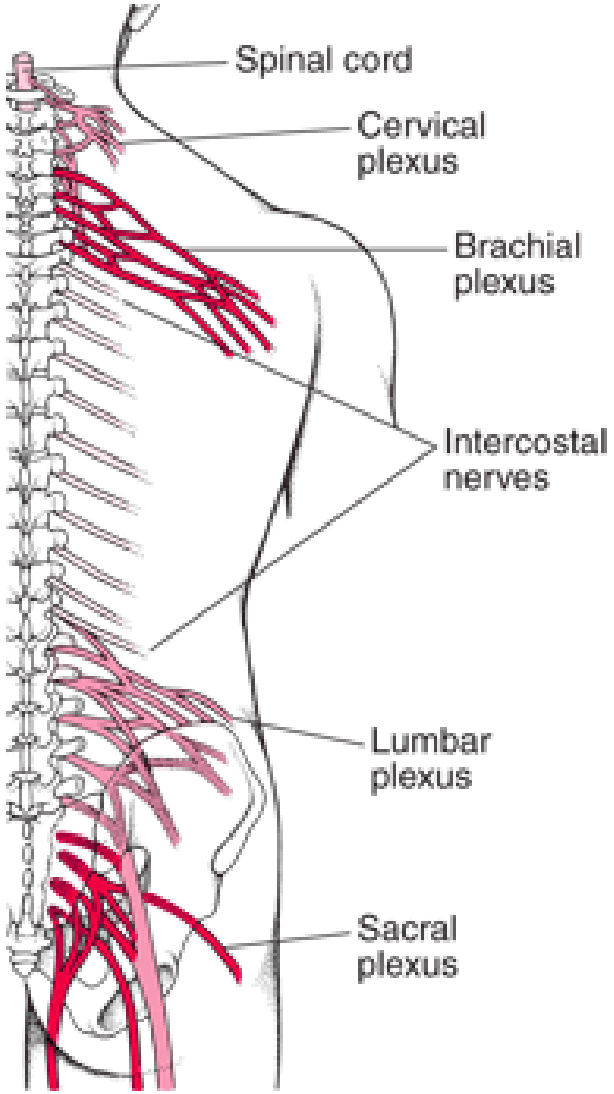


Each spinal nerve gives rise to

- Dorsal (posterior) 1º ramus passes dorsally to supply skin and muscles of the back.

- Ventral (anterior) 1º ramus communicates with sympathetic trunk and passes ventrally to supply muscles. Each nerve gives off a lateral & anterior cutaneous branches.

Spinal Nerves Plexus



Cervical plexus (C1-C4)

provides nerve connections to head, neck & shoulder

Brachial plexus (C5-T1)

provides nerve connections to the chest, shoulders, upper arms, forearms, and hands.

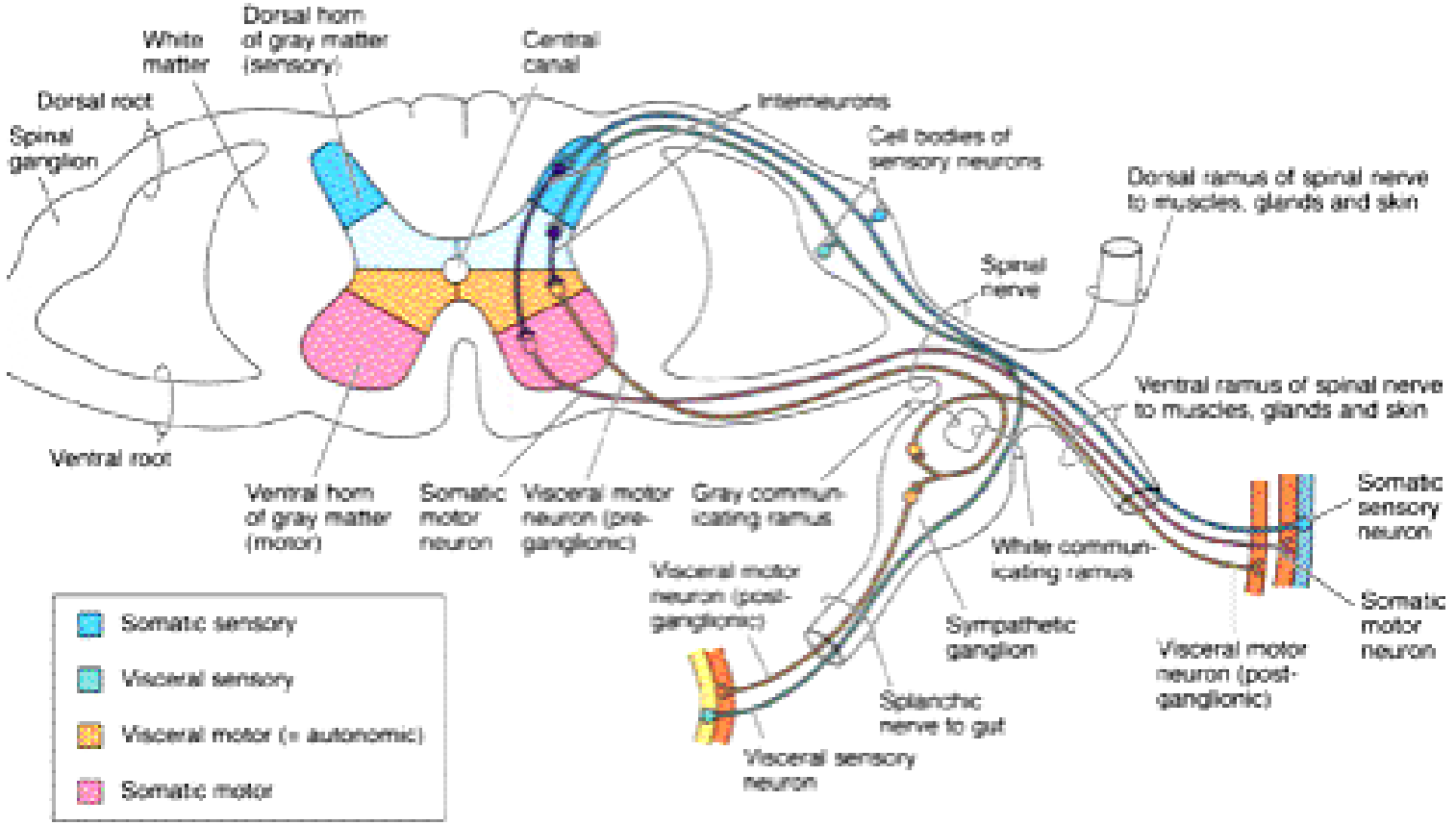
Lumbar plexus (L1-L4)

provides connections to the back, abdomen, groin, thighs, knees, and calves.

Sacral plexus (L4-S4)

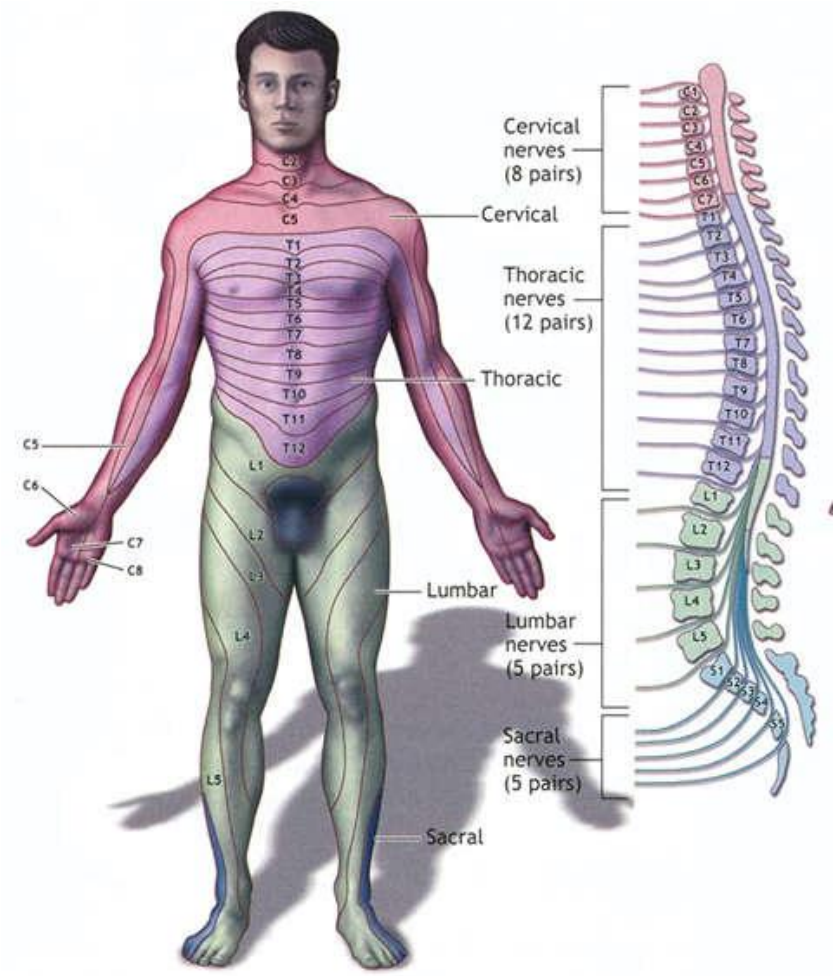
provides connections to the pelvis, buttocks, genitals, thighs, calves, and feet.

Functional Components of the Spinal Nerves



General Somatic Afferent (GSA) General Visceral Afferent (GVA)	Dorsal root
General Somatic Efferent (GSE) General Visceral Efferent (GVE)	Ventral root

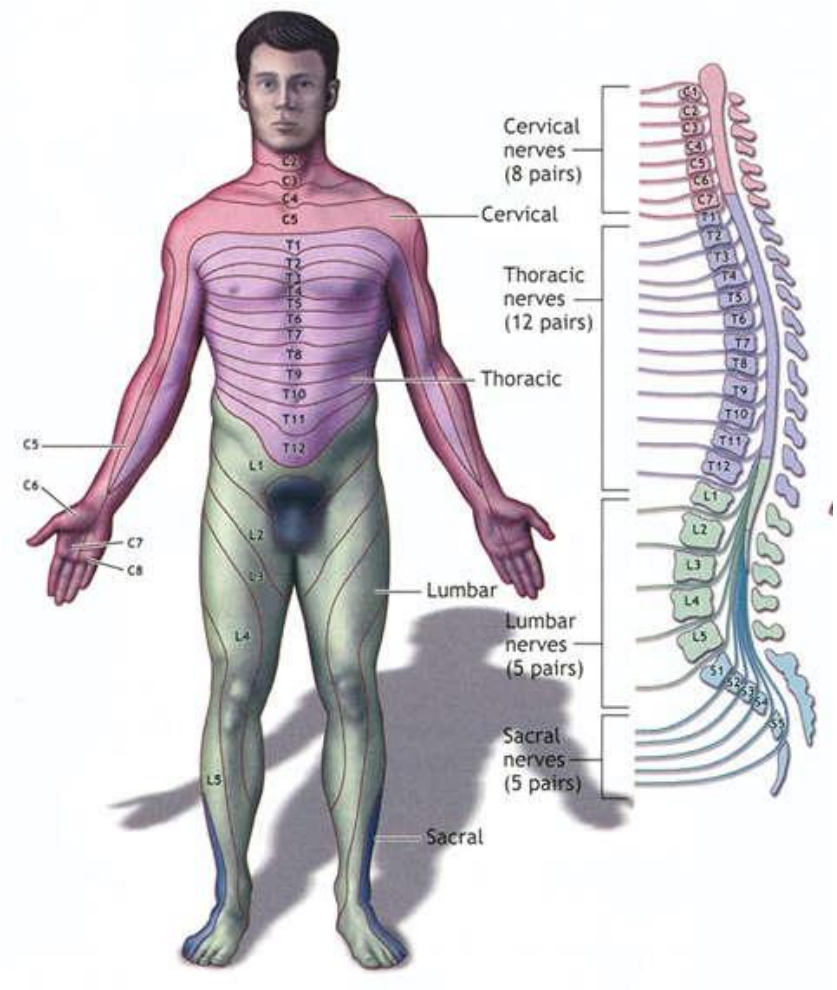
Dermatomes



Dermatome exhibits segmental derivation of spinal nerves innervating the skin.

1. Every spinal nerve pair (except for C1) has a dermatome. Dermatomes cover all body surface except for most of the face.

2. Adjacent dermatomes are generally derived from consecutive spinal nerves.

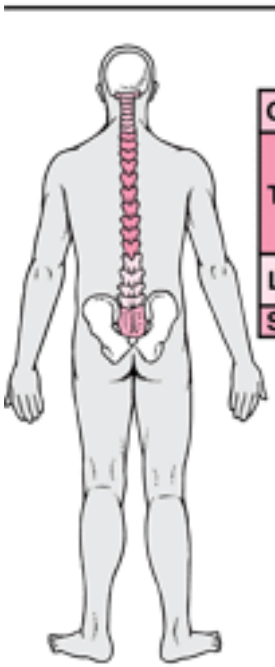


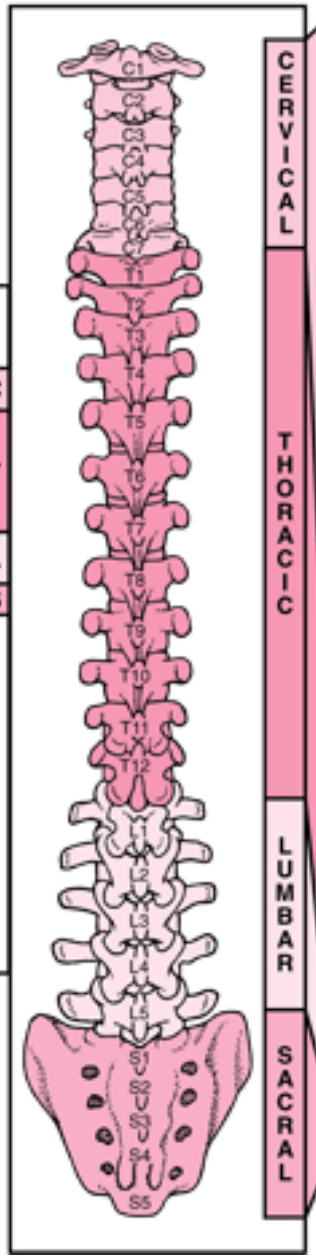
3. There is variable overlap between adjacent dermatomes.

   In general, the extent of overlap is greater on the body trunk than on the limbs.


Thank you

Effects of Spinal Injury





Level of Injury	Effect*
Between C1 and C5	Paralysis of some or all muscles used for breathing and all arm and leg muscles Typically, fatal unless a ventilator is used
Between C5 and C6	Paralysis of the legs, trunk, hand, and wrist Weakness of the muscles that move the shoulder and elbow
Between C6 and C7	Paralysis of the legs, trunk, and part of the wrists and hands Normal movement of the shoulders and elbows
Between C7 and C8	Paralysis of the legs, trunk, and hands
C8 to T1	Paralysis of the legs and trunk Weakness of the muscles that move fingers and hands Horner's syndrome (with a drooping eyelid, a constricted pupil, and reduced sweating on one side of the face) Possibly normal movement of the shoulders and elbows
T2 to T4	Paralysis of the legs and trunk Loss of sensation below the nipples Normal movement of the shoulders and elbows
T5 to T8	Paralysis of the legs and lower trunk Loss of sensation below the rib cage
T9 to T11	Paralysis of the legs Loss of sensation below the navel
T11 to L1	Paralysis of and loss of sensation in the hips and legs
L2 to S2	Various patterns of leg weakness and numbness, depending on the precise level of injury
S3 to S5	Numbness in the perineum

* At any level of the spinal cord, severe injury can cause loss of bladder and bowel control.