Spinal Nerves

- Spinal nerves only exist for a short distance since they now diverge into ventral and dorsal branches called rami.
- **Dorsal ramus** contains the sensory and motor innervation to the skin and muscles of the back.
- **Ventral ramus** supplies the ventro-lateral body surface, body wall and limbs.
- The **rami communicantes** contains the sympathetic motor nerve branches that arise from the thoracic lateral horns.
- Each pair of spinal nerves monitors one **dermatome** (a specific region of the skin).
Spinal Nerves

- **To be more specific, a dermatome** is an area of skin supplied by sensory neurons that arise from a spinal nerve ganglion.

- Along the thorax and abdomen, they are like stacks of discs, each supplied by a different spinal nerve.

- Along the arms and legs, the dermatomes run longitudinally along the limbs. (see next figure)!
  - Symptoms that follow a dermatome (e.g. like pain or a rash) may indicate a pathology that involves the related nerve root.
  - Viruses that lie dormant in nerve ganglia (e.g. chickenpox virus, shingles virus) often cause pains, rashes or both in a certain pattern defined by the dermatome.

Spinal Nerves

- **A myotome**, is group of somatic muscles under the skin supplied the motor neurons that arise from a spinal nerve.

- Each muscle in the body is supplied by a one or more levels or segments of the spinal cord and by their corresponding spinal nerves.

- Dermatome (by sensation) and myotome (by action) testing can be an integral part of neurological examination as each nerve root coming from the spinal cord and thus provide valuable clinical information.
Spinal Nerves of T2-T12 are rather simple as shown in the prior diagrams. They supply the strips of skin and muscles in the back and thoracic-abdominopevic region via dorsal and ventral rami.

The Other spinal nerves form complex interwoven network of nerves: These are called the plexi (plexuses).
Peripheral Nerves and Nerve plexus

Outside the thoracic area, four large plexuses are formed with well defined new branches and nerves with specific functions.

- Cervical plexus
  - for head, neck and shoulders
- Brachial plexus
  - for chest, shoulders, arms, hands
- Lumbar plexus
  - back, abdomen, groin, thighs, knees, and calves
- Sacral plexus
  - pelvis, buttocks, genitals, thighs, calves, and feet

Important note:

The current lab manual is very deficient with respect to the Nerve Plexi. This does not mean that they are not important!

However, the lecture textbook discusses these spinal nerves in far better detail with great diagrams.

Use your textbook pages 440-447 for your study information.
The Cervical Plexus : C1 to C5

The various branches of the cervical plexus involve the roots of spinal nerves C1 through C5.

Innervates muscles, skin of the neck

Major nerves are:

- Lesser occipital (root C2-C3) (skin on posterolateral neck)
- Greater Auricular (root C2-C3) (skin on ear, over parotid gland)
- Transverse cutaneous (root C2-C3) (skin on anterior/lateral neck)
- Supraclavicular (root C3-C4) (skin on shoulder/anterior chest)
- Phrenic nerve (root C3 - C5) controls the diaphragm.

The Branchial Plexus: C5 - T1

The roots combine and diverge to form trunks, divisions, cords and final peripheral nerves

- C5,C6 : form the upper or superior trunk
- C7 forms the middle trunk
- C8, T1 forms the lower or inferior trunk

Each trunk divides into an anterior and posterior Division, which provide the cords:

- Anterior Divisions from superior and middle trunk form the lateral cord
- Medial cord is an extension of the anterior division of the lower trunk
- Posterior cord is made from divisions from posterior divisions from each trunk.
The Branchial Plexus: C5 - T1

**Musculocutaneous** nerve is an extension of the Lateral cord

The **median nerve** is a product of a branch of the lateral and medial cord

The **ulnar nerve** is an extension of the medial cord

The posterior cord has two branches

- **Radial nerve** (located posteriorly) is the major branch
- The **axillary** is a smaller branch

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**The Branchial Plexus : C5 to T1**

**What do these nerves serve?**

**Musculocutaneous**: flexor muscles in anterior brachial aspect of arm; skin on anterolateral forearm

**Median**: flexor muscles in anterior forearm; muscles of palm

**Ulnar**: flexor muscles in forearm; most intrinsic muscles of hand

**Radial**: posterior muscles of the arm, forearm, hand.

**Axillary**: deltoid and teres minor muscles; some skin of shoulder region
The Lumbar Plexus: T12, L1 to L4

Supplies lower abdominopelvic area and lower limbs.

Major nerve is **Femoral Nerve (L2-L4)** and has two branches

- anterior femoral cutaneous branch
  - cutaneous perception on anterior and medial thigh
  - Motor function to quadriceps/sartorius

- saphenous branch.
  - Supplies skin on medial leg and foot

Other nerves from this plexus are

**Obturator Nerve (L2-L4)**
- Motor function to medial thigh muscles such as gracilis, adductor magnus and longus muscles

**Lateral Femoral cutaneous (L2-L3)**
- Skin on lateral thigh
Sacral Plexus: L4 to S4

Supplies buttocks, posterior thigh, lower leg and foot.

Major nerve is **Sciatic Nerve**

Has contributions from L4-L5, S1-S3.

Diverges proximal to the knee into

- **tibial**
  - posterior skin of leg, sole of foot
  - muscles of back of thigh, leg and foot

- **common fibular nerve**
  - skin on anterior leg, dorsum of foot
  - muscles on front and lateral aspect of lower leg

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Other important nerves include

**Posterior Femoral Cutaneous (S1-S3)**
- Posterior thigh and leg and skin over perineum

**Superior gluteal**
- Gluteus medius and gluteus minimus muscle

**Inferior gluteal**
- Gluteus maximus muscle
The Lumbar and Sacral Plexuses