



**Anatomy Team**  
**MED 439**

Revised & Approved



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**MED439**  
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# The Brachial & Lumbosacral Plexus

CNS Block

Color index:

Content  
Male slides  
Female slides  
Important  
Doctors notes

Extra information, explanation

Don't forget to check the [Editing File](#)

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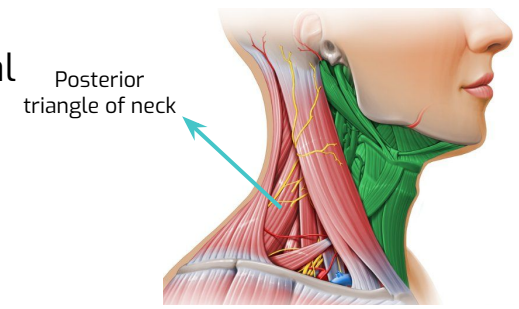
# Objectives

At the end of the lecture, students should be able to:

- Describe the formation of brachial plexus (site, roots)
- List the main branches of brachial plexus.
- Describe the formation of lumbosacral plexus (site, roots)
- List the main branches of lumbosacral plexus.
- Describe some important applied Anatomy related to the brachial & lumbosacral plexuses.

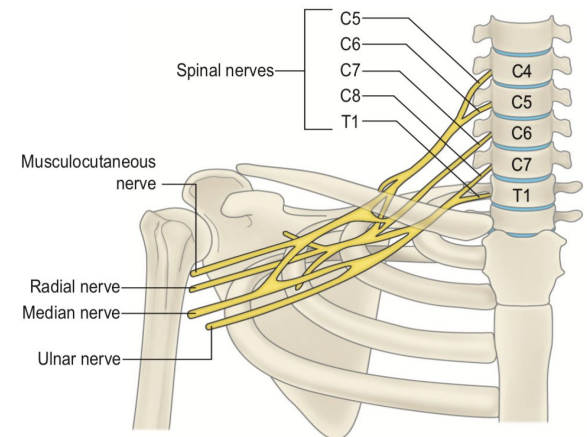
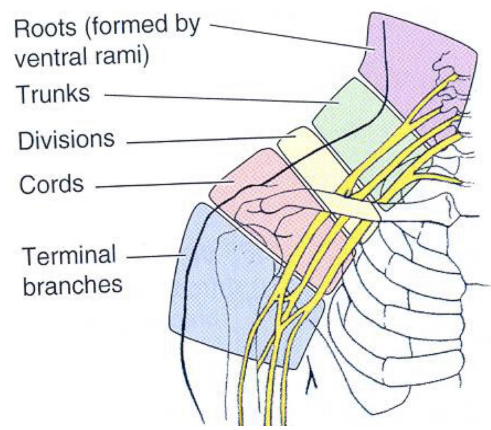
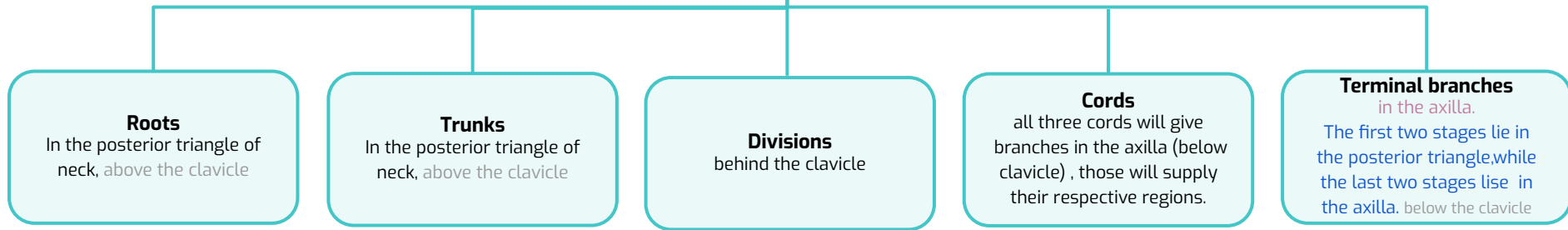
## Formation of Brachial plexuses:

- ❖ It's formed in the posterior triangle of the neck.
- ❖ Formed by the union of the **anterior (ventral) rami** of the following spinal nerves: **C5, C6, C7, C8, T1** (all plexuses arise from anterior rami of spinal nerves)



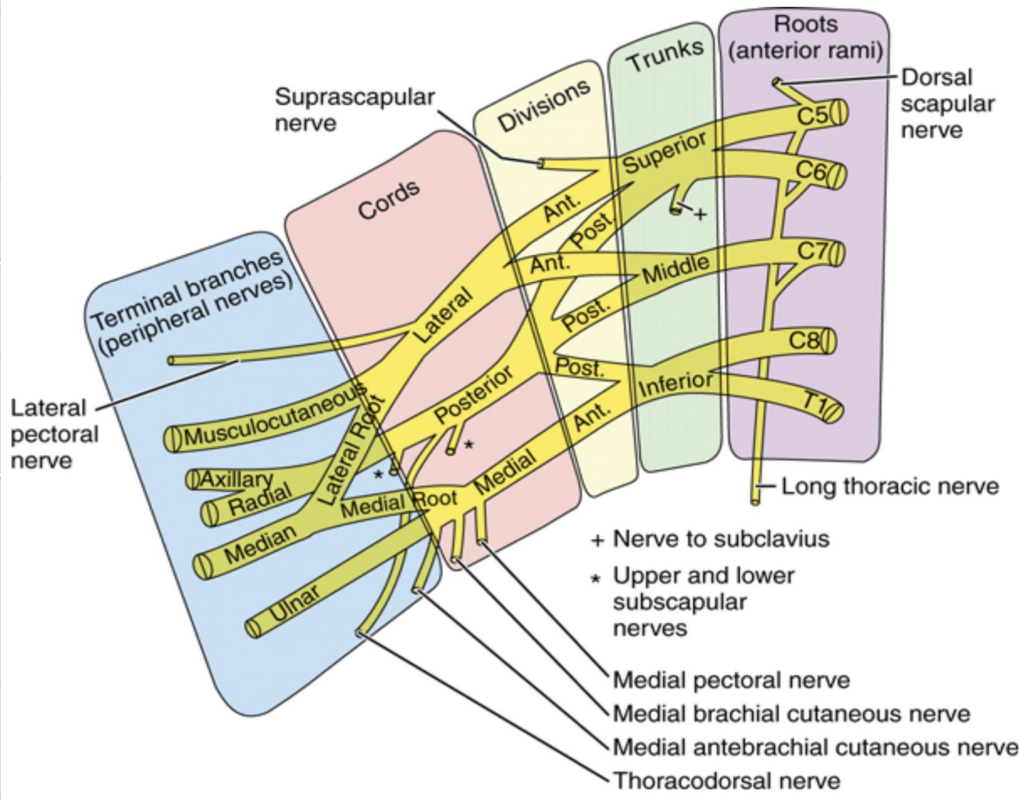
**Divisions (stages) of the plexuses are divided into:**

Mnemonic: Rugby Teams Drink Cold Bear



# Brachial Plexuses Formation

Trunks	
<b>Upper</b>	Union of the roots of C5 & 6
<b>Middle</b>	Continuation of the root of C7
<b>Lower</b>	Union of the roots of C8 & T1
Division	
Each Trunk will divide into anterior and posterior division	
Cords	
<b>Posterior</b>	From the 3 posterior divisions of the 3 trunks
<b>Lateral</b>	From the anterior divisions of the upper and middle trunks.
<b>Medial</b>	It's the continuation of the anterior division of the lower trunk



# Branches of Brachial Plexuses

## Branches

### From the Roots:

- 1- Dorsal Scapular Nerve (C5), (supplies Rhomboid muscles)  
*Contributes in the formation of the phrenic nerve.*
- 2- Long Thoracic Nerve (C5, C6, C7), (supplies Serratus anterior)
- 3- Contribution to phrenic nerve (C3, C4, C5)

### From Upper Trunk:

- 1- Suprascapular Nerve (C5, C6), (supplies Supraspinatus and Infraspinatus)
- 2- Nerve to Subclavius (C5, C6).

### From Lateral Cord: (2LM)

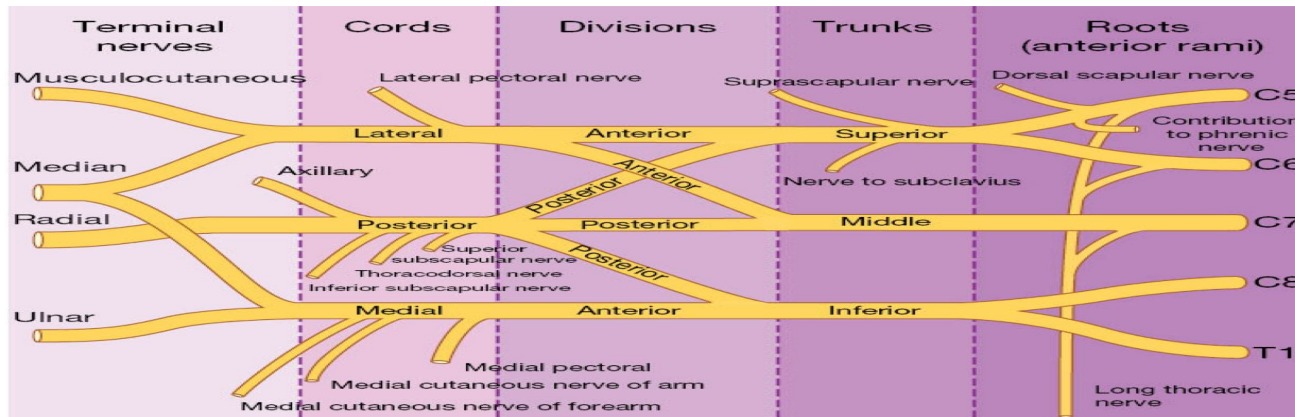
- 1- Lateral Pectoral Nerve
- 2- Lateral root of Median Nerve
- 3- Musculocutaneous Nerve

### From Posterior Cord: (ULTRA)

- 1- Upper Subscapular Nerve
- 2- Lower Subscapular Nerve
- 3- Thoracodorsal Nerve
- 4- Radial Nerve
- 5- Axillary Nerve

### From Medial Cord: (4MU)



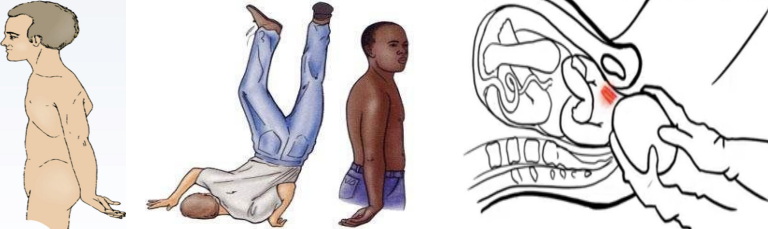


- 1- Medial pectoral Nerve
- 2- Medial root of Median Nerve
- 3- Medial cutaneous Nerve of arm
- 4- Medial cutaneous Nerve of forearm
- 5- Ulnar Nerve



# Important Branches And Their Supply (MSK flashback)

Branched from	Branch name	Supply
Roots	Dorsal Scapular Nerve (C5)	Rhomboids
	Long Thoracic Nerve (C5,C6,C7)	Serratus anterior
Upper Trunk	Suprascapular Nerve (C5, C6)	Supraspinatus, Infraspinatus muscles
Lateral Cord	Lateral pectoral Nerve (C5,C6,C7)	Pectoralis major muscle
	Musculocutaneous (C5,C6,C7)	Anterior compartment of arm (flexors of shoulder and elbow)
Posterior Cord	Upper subscapular Nerve (C5, C6)	Subscapularis muscle
	Lower subscapular Nerve (C5, C6)	Subscapularis and teres major muscles
	Thoracodorsal Nerve (C5,C6,C7)	Latissimus dorsi muscle
	Radial Nerve (C5, C6, C7, C8, T1)	Posterior compartment of arm, forearm and hand (extensor of elbow, wrist and fingers)
	Axillary Nerve (C5, C6)	Deltoid and Teres Minor muscles
Medial Cord	Medial pectoral Nerve (C8, T1)	Pectoralis major and minor
	Ulnar Nerve (C8, T1)	Anterior compartment of forearm and hand (flexors of wrist and fingers)
Medial and Lateral Cord	Median Nerve (C5, C6, C7, C8, T1)	

# Brachial Plexus Injuries

Types	Upper lesion of Brachial Plexus	Lower lesion of Brachial Plexus
<p><b>Called</b></p>	<p><b>Erb-Duchenne Palsy</b> (also called waiter's tip position) The position of the upper limb in this condition has been likened to that of a porter or waiter's tip position <b>or policeman's tip hand</b>.</p>	<p><b>Klumpke Palsy</b></p>
<p><b>Causes</b></p>	<p>Caused by damage to the <b>Upper Trunk (C5, C6)</b> as a result of excessive displacement of head to the opposite side and depression of shoulder on the same side (a blow or fall on shoulder). Dr: "also caused by a difficult delivery in which the baby's <u>head</u> is pulled".</p>	<p>Caused by damage to <b>Lower Trunk (C8, T1)</b> usually by traction injuries caused by a person falling from a height and clutching (grabbing) an object to save himself. The first thoracic nerve is usually torn. (can also occur during delivery when the baby is pulled by the arm)</p>
<p><b>Results in</b></p>	<p>The arm hangs by the side and is rotated medially. The forearm is extended and pronated.</p> 	<p>The nerve fibers from this segment run in the ulnar and median nerves to supply all the small muscles of the hand. The hand has a <b>clawed</b> appearance due to ulnar nerve injury</p> 
<p><b>Appearance</b></p>		
<p><b>Deformity</b></p>	<p style="text-align: center;"><b>APE HAND</b></p> <p style="text-align: center;">Note: injury to the musculocutaneous nerve will result in weak flexion of the arm.</p> 	
<p><b>Cause</b></p>	<p>Median nerve injury. Injury to the radial nerve will cause wrist drop due to paralysis of extensors of wrist and fingers.</p>	



# Lumbar Plexus

## Formation

By ventral rami of L1,L2,L3 and most of L4

## Site

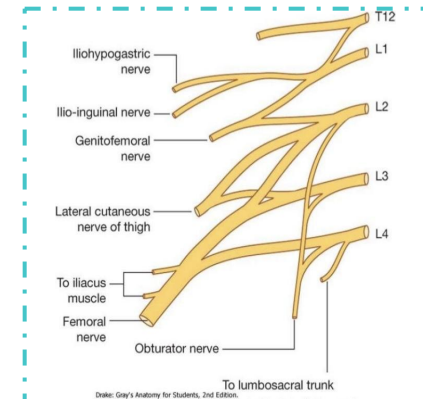
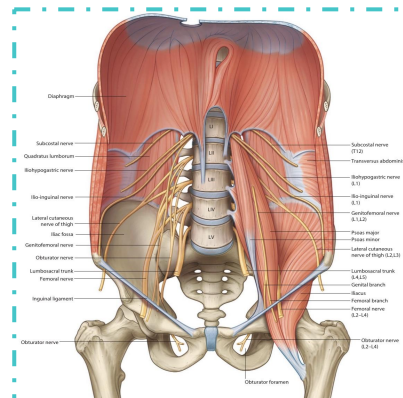
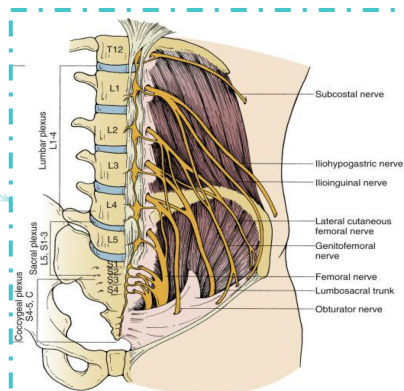
In the substance of psoas major muscle

Note: Position of nerves in psoas major point of view **Obturator nerve: medial side & Femoral nerve: lateral side**

## Branches

- Iliohypogastric & ilioinguinal (L1): to anterior abdominal wall.
- Genitofemoral (L1&L2).
- Lateral cut.n.of thigh (L2&L3)
- **Obturator** (L2,L3&L4): to medial compartment of thigh
- **Femoral** (L2,L3&L4): to anterior compartment of thigh

Lumbar and sacral plexuses





# SACRAL PLEXUS

## Formation

By ventral rami of a part of L4 & L5 (lumbosacral trunk) + S1, 2, 3 and most of the S4

## Site

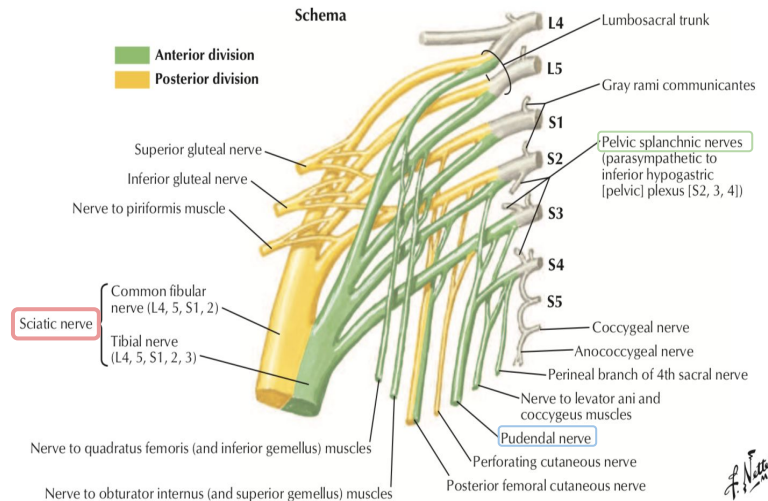
In front of piriformis muscle

## Main Branches

**Pelvic splanchnic** nerve (from sacral S2,S3,S4): preganglionic parasympathetic to pelvic viscera & hindgut

**Pudendal nerve** (from sacral plexus (S1,S2,S3,S4): to perineum

**Sciatic nerve** (From Lumbosacral Plexus (L4&L5+S1,S2,S3) : to lower limb



Team 438: The lumbosacral trunk comprises the whole of the anterior division of the fifth and a part of that of the fourth lumbar nerve.

# FEMORAL NERVE

## Origin:

A branch from lumbar plexus (L2,L3,L4)

## Course:

Descends lateral to **psoas major** & enters the thigh behind the **inguinal ligament**, Passes lateral to femoral artery & divides into terminal branches.

### Cutaneous branches (Extra)

->Anterior cutaneous branches (They supply the skin of the anteromedial thigh)

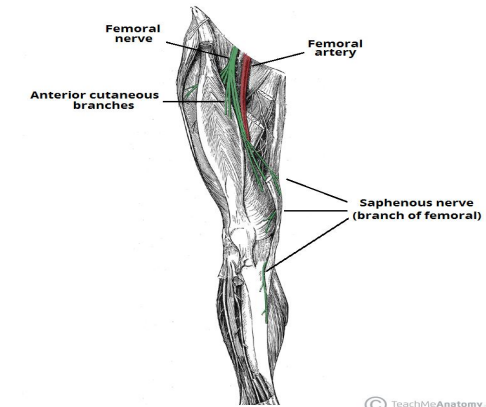
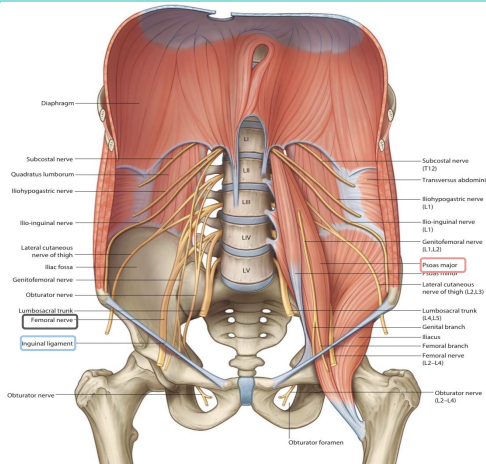
->Saphenous nerve (Posterior)

### Muscular branches

supplies the muscles of the anterior thigh: Hip flexors: Pectineus - adducts and flexes the thigh, assists with medial rotation of the thigh. Iliacus - acts with psoas major and psoas minor (forming iliopsoas) to flex the thigh at the hip joint and stabilise the hip joint.

## Motor effect:

- ❖ Wasting of quadriceps femoris
- ❖ Loss of extension of knee
- ❖ Weak flexion of hip (psoas major is intact ; because it takes supply from other fibers of the lumbar plexus)



## Sensory effect:

loss of sensation over areas supplied antero-medial aspect of thigh & medial side of leg & foot (injury of Saphenous branch of femoral)

Saphenous nerve = sensory to the medial aspect of the lower leg

# SCIATIC NERVE ( The largest nerve of the body )

## Origin:

from sacral plexus (L4, L5, S1, S2, & S3) It is one of the terminal branch of sacral plexus

## Course:

Leaves the pelvis through greater sciatic foramen, below piriformis & passes in the gluteal region (between ischial tuberosity & greater trochanter) then to supply posterior compartment of thigh.

**Divides into** tibial and common peroneal (fibular) nerve

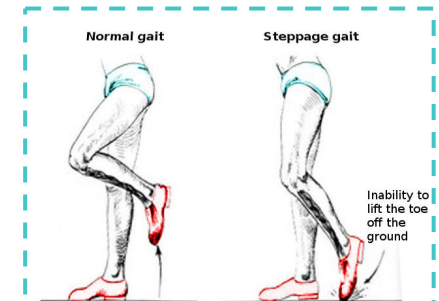
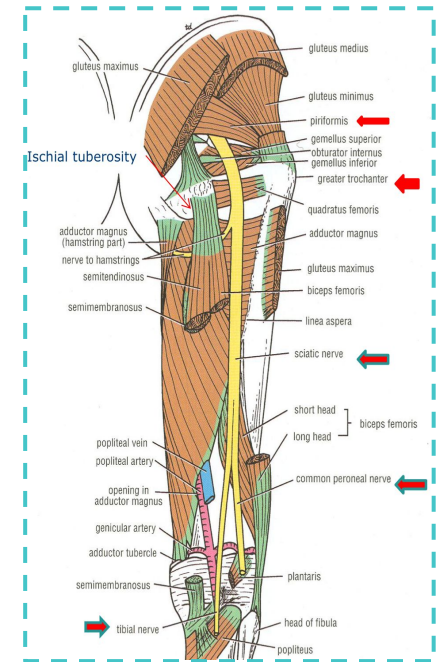
## Its Injury:

will affect the hamstring muscles ;so weak flexion of knee ; weak extension of hip, and affect also all movements of leg & foot.

**Foot drop** (injury of common peroneal N.) is the common manifestation of sciatic nerve injury. => **abnormal steppage gait**

**As well as loss of sensation** of skin of back of leg ; lateral side and dorsum of foot [supplied by sural nerve] (except areas supplied by saphenous branch of femoral nerve).

Team 438: To avoid an injury during an IM injection, it should be given in the upper lateral quadrant of either gluteal regions.



# TIBIAL NERVE And COMMON PERONEAL (FIBULAR) NERVE

## TIBIAL NERVE

### Course:

- Descends through popliteal fossa to posterior compartment of leg, accompanied with posterior tibial vessels
- Passes deep to flexor retinaculum to reach the sole of foot where it divides into 2 terminal branches
- Divides into:
  - ◆ Medial and lateral plantar nerves

### Supplies:(Extra)

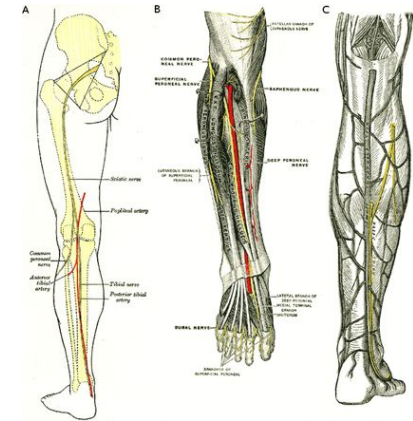
Muscles of posterior compartment of leg & intrinsic muscles of sole Plantar Flexors of ankle, flexors of toes & invertors of foot.

### Course:

- Leaves popliteal fossa & turns around the lateral aspect of neck of fibula. Then divides into:
  1. Superficial peroneal: descends into lateral compartment of leg
  2. Deep peroneal: descends into anterior compartment of leg

### Supplies(Extra)

Muscles of anterior & lateral compartments of leg (Dorsiflexors of ankle, Extensors of toes & evertors of foot.



## COMMON PERONEAL (FIBULAR) NERVE

# SUMMARY

- ❖ **The lumbar plexus** is formed by ventral rami of L1,2,3 and most of L4, in substance of **psoas major muscle**
- ❖ **The sacral plexus** is formed by ventral rami of a part of L4 & whole L5 (lumbosacral trunk) plus the S1,2,3 and most of S4, in front of **piriformis muscle**.
- ❖ **The femoral nerve**, a branch of lumbar plexus (L2,3,4).
  - **Its injury** will affect the flexion of hip & extension of knee as well as loss of sensation of skin of anteromedial aspects of the thigh, medial side of knee, leg and foot (Saphenous br. of femoral).
- ❖ **The sciatic nerve** is a branch of sacral plexus (L4, 5, S1, 2, 3)
  - **Its injury** will affect **the hamstring muscles**; so weak flexion of knee; weak extension of hip, and affect also all movements of leg & foot. (Except areas supplied by saphenous branch of femoral nerve)
  - **Foot drop** (injury of common peroneal N.) is the common manifestation of sciatic nerve injury. As well as loss of sensation of skin of back of leg; lateral side and dorsum of foot (except areas supplied by saphenous branch of femoral nerve).

# MCQ

**Q1: Lesion of the upper trunk of the brachial plexus leads to:**

**A: Klumpke palsy**

**B: Erb-Duchenne palsy**

**C: Drop wrist & hand**

**D: Ape hand.**

**Q2: Which one of the following nerves is a branch of posterior cord of brachial plexus?**

**A: Radial**

**B: Ulnar**

**C: Median**

**D: Medial**

**Q3: The nerve fibers forming the brachial plexuses are formed by the union of?**

**A: Anterior Rami of C6-T1**

**B: Dorsal Rami of C6-T1**

**C: Anterior Rami of C5-T1**

**D: Dorsal Rami of C5-T1**

**Q4: Medial cord of brachial plexus is formed....**

**A: By the union of anterior divisions of middle & lower trunks**

**B: By the union of anterior divisions of middle & upper trunks**

**C: As a continuation of anterior division of middle trunk**

**D: As a continuation of anterior division of lower trunk**

**Q5: Which of the following is a branch that arise from the trunks of brachial plexus?**

**A: Dorsal Scapular nerve**

**B: Suprascapular nerve**

**C: Thoracodorsal nerve**

**D: Upper subscapular nerve**

**Q6: Long thoracic nerve is formed by the union of?**

**A: C5, C6**

**B: C5, C6, C7**

**C: C8, T1**

**D: C5-T1**

Answer key:  
1 (B) , 2 (A) , 3 (C) , 4 (D) , 5 (B) , 6 (B)

**Q7: The femoral nerve supplies?**

**A: Extensors of hip**

**B: Hamstrings**

**C: Extensors of knee**

**D: Skin of dorsum of foot**

**Q8: Injury of femoral nerve leads to?**

**A: Loss of flexion of toes**

**B: Loss of flexion of knee**

**C: Loss of sensation of skin of anteromedial aspect of thigh**

**D: Loss of inversion of foot**

**Q9: A patient came in with their arm hanging by the side, rotated medially and their forearm is extended and pronated. This lesion is called \_\_\_\_ and due to \_\_\_\_?**

**A: Erb-Duchenne palsy | Middle trunk lesion**

**B: Klumpke palsy | Lower trunk lesion**

**C: Pope's hand | Upper trunk lesion**

**D: Waiter's tip hand | Upper trunk lesion**

**Q10: Which of the following is not a branch of the sacral plexus?**

**A: Femoral nerve**

**B: Pelvic splanchnic nerve**

**C: Pudendal nerve**

**D: Sciatic nerve**

**Q11: Site of sacral plexus?**

**A: Behind piriformis**

**B: Lateral to psoas major**

**C: In substance of psoas major**

**D: In front of piriformis**

**Q12: Which one of the following is found in the substance of psoas major muscles?**

**A: Lumbar plexus**

**B: Sacral plexus**

**C: Sciatic nerve**

**D: Tibial nerve**



# SAQ

Q1: What are the main branches of the sacral plexus and their supply?

Q2: The sciatic nerve enters the gluteal region between?

Q3: What are the branches of the medial cord of brachial plexus?

Q4: A person fell from a high place and clutched something, what nerve is usually torn, and what is his clinical manifestation?

## Answers

1 : Pelvic splanchnic nerve (from sacral S2,3): preganglionic parasympathetic to pelvic viscera & hindgut  
Pudendal nerve (from sacral plexus (S2,3,4): to perineum  
Sciatic nerve (From Lumbosacral Plexus (L4&5+S1,2,3) : to lower limb

2 : between the ischial tuberosity and greater trochanter

3 : Medial pectoral nerve, Medial root of median nerve, Medial cutaneous nerve of arm, Medial cutaneous nerve of forearm, Ulnar nerve

4: first thoracic nerve, clawed hand

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## A special thanks to Mohamed Alquhidan

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