BACK MUSCLES

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Muscles of the back

- **I-Extrinsic back muscles;**
  - Orginates embryologically from locations other than the back
  - Innervated by anterior rami of spinal nerves

    A. **Superficial (thoracoappendicular);** related to movements of upper limb (trapezius, latissimus dorsi, levator scapula, rhomboids)
    B. **Intermediate (respiratory);** attaches to the ribs and may serve a respiratory function (serratus posterior superior and inferior)

- **II- Intrinsic back muscles (Deep muscles);**
  - Develop in the back
  - Innervated by posterior rami of spinal nerves
  - Directly related to movements of vertebral column and head and act to maintain posture

    1- The superficial layer; splenius capitis and cervicis (spinotransversales muscles)

    2- The intermediate layer; erector spinae

    3- The deep layer; transversospinales and segmental muscles

- **I-Extrinsic back muscles (continued)**

A. Superficial (thoracoappendicular) muscles

- Trapezius
- Latissimus dorsi muscles
- Levator scapulae muscle
- Rhomboid muscles (minor&major)

- **I-Extrinsic back muscles (continued)**

A. Superficial (thoracoappendicular) muscles

Trapezius

- O: Superior nuchal line, external occipital protuberance, nuchal ligament, spinous processes of the C7 to T12 vertebrae

- I: Lateral third of clavicle (sup), acromion and the spine of scapula (mid)

- I: Accesory nerve (also receives branches from the ventral rami of C3 and C4)

- F: Superior fibers elevate the scapula, middle fibers pull it medially(adduct), inferior fibers depress and lower the shoulder, **superior and inferior fibers act together to superiorly rotate the scapula (help the abduction above 90 degrees)**

- I-**Extrinsic back muscles (continued)**

A. Superficial (thoracoappendicular) muscles

Latissimus dorsi

- O: Spinous processes of inferior six thoracic vertebra, thoracolumbar fascia, iliac crest, inferior 3-4 ribs

- I: Intertubercular groove

- I: Thoracodorsal nerve (br of the posterior cord)

- F: Extends, adducts and medially rotates the humerus (known as the ***climbing muscle) (chin-ups***) (when folding your arms behind your back/ scratching the skin over the opposite scapula)

❖ Lumbar triangle-Triangle of Petit
❖ Triangle of auscultation-Auscultatory triangle

- I-**Extrinsic back muscles (continued)**

A. Superficial (thoracoappendicular) muscles

Levator scapula

- O: Transverse process of the first 3-4 vertebra
- I: Superior part of the medial border of scapula
- I: Dorsal scapular nerve
- F: Elevates the scapula and tilts the glenoid cavity inferiorly

- I-**Extrinsic back muscles (continued)**

A. Superficial (thoracoappendicular) muscles

Rhomboid major and minor

- **Minor**: Nuchal ligament and spinous process of C7 and T1 vertebrae, **Major**: Spinous process of T2-T5 vertebrae

- Medial border of the scapula

- Dorsal scapular nerve

- Pull the scapula medially and rotate it to depress the the glenoid cavity, assists the serratus anterior in fixing the scapula against the thorax

(Used when forcibly lowering the raised upper limbs- when driving a stake with a hammer)

- I-**Extrinsic back muscles (continued)**

B.Intermediate (respiratory) muscles

Serratus posterior superior muscles

-O:Nuchal lig., spinous processes of C7-T3 vertebrae
-I: Superior borders of 2nd-4th ribs
-I: Anterior rami of upper thoracic nerves (2nd-5th)
-F: Proprioception (elevate ribs they attach)

Serratus posterior inferior muscles

-O:Spinous processes of T11-L2 vertebrae
-I: Inferior borders of 8th-12th ribs near their angle
-I: Anterior rami of lower thoracic nerves (T9-T12)
-F: Proprioception (depress ribs they attach)

Serratus is Latin for “notched, toothed or saw-like.” Both get their names from their saw-tooth-like appearance

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    3- The deep layer; transversospinales and segmental muscles

II- Intrinsic back muscles (Deep muscles)

➢ Act to maintain posture and control movements of the vertebral column

➢ Extend from the pelvis to the cranium

➢ Innervated by the dorsal rami of the spinal nerves

➢ Enclosed as a whole by deep fascia;

- ❖ thoracic and lumbar parts of it constitute the thoracolumbar fascia
- ❖ attaches medially nuchal ligament, tips of the spinous processes of vertebrae, the supraspinous ligament and median crest of sacrum
- ❖ laterally to the cervical and lumbar transverse processes and the angles of the ribs and head

Thoracolumbar fascia

The **thoracolumbar fascia** is critical to the overall organization and integrity of the region:

- **Superiorly**, it passes anteriorly to the serratus posterior muscle and is continuous with deep fascia in the neck.

- **In the thoracic region**, it covers the deep muscles and separates them from the muscles in the superficial and intermediate groups.

- It extends **laterally** from the spinous processes and forms a **thin covering over the intrinsic back muscles in the thoracic** region and a **strong thick covering for muscles in the lumbar** region

II- Intrinsic back muscles (Deep muscles)

- **1-The superficial layer;** *the splenius capitis and cervicis* (spinotransversales muscles), (the extensors and rotators of the head and neck)

- **2- The intermediate layer**; the *erector spinae* (the extensors of the vertebral column)

- **3- The deep layer**;

  a) Transversospinales; *Semispinalis, Multifidus, Rotatores* (the extensors and rotators of the vertebral column)

  b) Segmental muscles; *Interspinales, intertransversarii, levatores costarum*

II- Intrinsic back muscles (Deep muscles) (continued)

1- Superficial layer

- ***Splenius capitis and splenius cervicis muscles***

  - Arise from the midline and extend superolaterally to the cervical vertebrae (**splenius cervicis**) and cranium (**splenium capitis**)

  - Cover and hold the deep neck muscles in position

  - Innervated by posterior rami of spinal nerves

II- Intrinsic back muscles (Deep muscles) (continued)

1- Superficial layer

- ***Splenius capitis and splenius cervicis muscles***

  - O: **Splenius capitis**; lower half of nuchal lig., spinous processes of C7-T3 vertebrae, **Splenius cervicis;** spinous processes T3-T6 vertebrae

  - I: **Splenius capitis**; mastoid process, lateral third of superior nuchal line of occipital bone, **Splenius cervicis**; transverse processes of C1-C3

  - Acting alone they laterally bend and rotate the head to the same side
  - Acting together they extend the neck

II- Intrinsic back muscles (Deep muscles) (continued)

2- Intermediate layer

- ***Erector spinae muscles;***
  - ✓ Chief extensors of the vertebral column,
  - ✓ Lie in a groove on each side of vertebral column between the spinous processes medially and the angles of the ribs laterally.
  - ✓ Arranged in three groups (from lateral to medial)

- ❑ **Iliocostalis muscles** (according their superior attachment; lumborum, thoracis and cervicis)
- ❑ **Longissimus muscles** (thoracis, cervicis and capitis)
- ❑ **Spinalis muscles** (thoracis, cervicis and capitis)

II- Intrinsic back muscles (Deep muscles) (continued)

2- Intermediate layer

- ***Erector spinae muscles;***

  - Acting alone they laterally bend the vertebral column
  - Acting together they extend the vertebral column and the head
  - O: **Common origin** of three column: posterior part of **iliac crest, posterior surface of sacrum**, sacro-iliac ligaments, **sacral and inferior lumbar spinous processes and supraspinous liagament**

II- Intrinsic back muscles (Deep muscles) (continued)

2- Intermediate layer

Muscle	Proximal Attachment	Distal Attachment	Nerve Supply	Main Action(s)
Erector spinae **Iliocostalis** **Longissimus** **Spinalis**	Arises by a broad tendon from the posterior part of the iliac crest, posterior surface of the sacrum, sacro-iliac ligaments, sacral and inferior lumbar spinous processes, and supraspinous ligament	*Iliocostalis:* lumborum, thoracis, cervicis; fibers run superiorly to angles of lower ribs and cervical transverse processes *Longissimus:* thoracis, cervicis, capitis; fibers run superiorly to ribs between tubercles and angles to transverse processes in thoracic and cervical regions and to mastoid process of temporal bone *Spinalis:* thoracis, cervicis, capitis; fibers run superiorly to spinous processes in the upper thoracic region and to cranium	Posterior rami of spinal nerves	*Acting bilaterally:* extend vertebral column and head; as back is flexed, control movement via eccentric contraction *Acting unilaterally:* laterally flex vertebral column

II- Intrinsic back muscles (Deep muscles) (continued)

3- Deep layer

a) Transversospinales; *Semispinalis, Multifidus, Rotatores* (the extensors and rotators of the vertebral column)

b) Short segmental muscles; *Interspinales, intertransversarii, levatores costarum*

II- Intrinsic back muscles (Deep muscles) (continued)

3- Deep layer

a) The transversospinales muscles; run obliquely upward and medially from transverse processes to spinous processes, filling the groove between these two vertebral projections. They are deep to the erector spinae.

❖ Arranged in three groups (from superficial to deep);

- *Semisipinalis muscles (capitis, cervicis and thoracis)*
- *Multifidus muscles*
- *Rotatores muscles*

- These muscles function in **extending** the head and the vertebral column, as well as **rotating** the vertebral column to the opposite side

II- Intrinsic back muscles (Deep muscles) (continued)

3- Deep layer

a) The transversospinales muscle

Muscle	Proximal Attachment	Distal Attachment	Nerve Supply	Main Action(s)
Transversospinalis	Transverse processes	Spinous processes of more superior vertebrae	Posterior rami of spinal nerves[a]	Extension
Semispinalis	*Semispinalis:* arises from transverse processes of C4–T12 vertebrae	*Semispinalis:* thoracis, cervicis, capitis; fibers run superomedially to occipital bone and spinous processes in thoracic and cervical regions, spanning 4–6 segments		*Semispinalis:* extends head and thoracic and cervical regions of vertebral column and rotates them contralaterally
Multifidus	*Multifidus:* arises from posterior sacrum, posterior superior iliac spine of the ilium, aponeurosis of erector spinae, sacro-iliac ligaments, mammillary processes of lumbar vertebrae, transverse processes of T1–T3, articular processes of C4–C7	*Multifidus:* thickest in lumbar region; fibers pass obliquely superomedially to entire length of spinous processes, located 2–4 segments superior to proximal attachment		*Multifidus:* stabilizes vertebrae during local movements of vertebral column
Rotatores (brevis and longus)	*Rotatores:* arise from transverse processes of vertebrae; best developed in thoracic region	*Rotatores:* fibers pass superomedially to attach to junction of lamina and transverse process or spinous process of vertebra immediately (brevis) or 2 segments (longus) superior to vertebra of attachment		*Rotatores:* stabilize vertebrae and assist with local extension and rotatory movements of vertebral column; may function as organs of proprioception

II- Intrinsic back muscles (Deep muscles) (continued)

3- Deep layer

b) Short segmental muscles; Interspinales, intertransversarii, levatores costarum

Muscle	Proximal Attachment	Distal Attachment	Nerve Supply	Main Action(s)
Interspinales	Superior surfaces of spinous processes of cervical and lumbar vertebrae	Inferior surfaces of spinous processes of vertebra superior to vertebra of proximal attachment	Posterior rami of spinal nerves	Aid in extension and rotation of vertebral column
Intertransversarii	Transverse processes of cervical and lumbar vertebrae	Transverse processes of adjacent vertebrae	Posterior and anterior rami of spinal nerves[a]	Aid in lateral flexion of vertebral column; acting bilaterally, stabilize vertebral column
Levatores costarum	Tips of transverse processes of C7 and T1–T11 vertebrae	Pass inferolaterally and insert on rib between tubercle and angle	Posterior rami of C8–T11 spinal nerves	Elevate ribs, assisting respiration; assist with lateral flexion of vertebral column

Suboccipital region and the deep muscles of the neck

- **Suboccipital region** lies on the upper part of the posterior aspect of the neck, extending between the **occipital bone and first two cervical vertebra**

Muscles of the suboccipital region

- ***Rectus capitis posterior minor muscle***
  - From the **posterior tubercle of the atlas** to lateral part of the **inferior nuchal line**

- ***Rectus capitis posterior major muscle***
  - From **spinous process of the axis** to lateral part of the **inferior nuchal line**

- ***Obliquus capitis inferior muscle (Inferior oblique muscle of the head)***
  - From the **spinous process of the axis** to the **transverse process of the atlas**

- ***Obliquus capitis superior muscle(Superior oblique muscle of the head)***
  - From the **transverse process of the atlas** to the **upper part of the inferior nuchal line**

➢The above muscles are innervated by the ***suboccipital nerve*** (dorsal ramus of the C1 spinal nerve)

➢These muscles function **in extending or rotating the head**

Suboccipital triangle

Borders

- **Superomedial** – rectus capitis posterior major
- **Superolateral** – obliquus capitis superior muscle
- **Inferolateral** – obliquus capitis inferior muscle
- **Floor** – posterior atlanto_occipital membrane
- **Roof** – semispinalis capitis muscle

Contents

- **Vertebral artery**
- **Suboccipital nerve**

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