Department of Anatomy, Faculty of Dentistry, Mahidol University

DTAN 211: Gross Anatomy of Head and Neck in Dentistry

The Back







IG: all.nupong
Email: Anupong.son@mahidol.ac.th

ANS

Assistant Professor Dr. Anupong Thongklam Songsaad
B.Sc. (Biology, 1st Class Honors), Ph.D. (Anatomy and Structural Biology)

Outline

Part I: Back

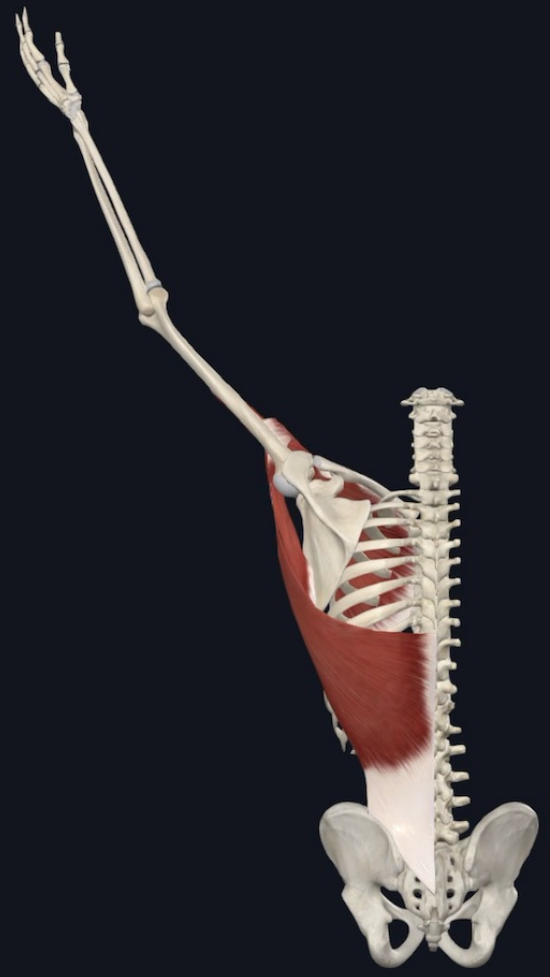
1. Surface landmarks (bone)
2. Muscles of the back
    - A. Superficial group
    - B. Intermediate group
    - C. Deep group
3. Nerve innervation of the back

Part II: Suboccipital region

1. Surface landmarks (bone)
2. Muscles of suboccipital region
3. Suboccipital triangle
    - A. Boundaries
    - B. Contents

Learning objectives

1. Explain the surface landmarks and attachment sites of muscles.
2. Explain the nerve innervation of the muscle of back and suboccipital region.
3. Describe the action of muscles.



(Latissimus dorsi; Shoulder adduction)

Part I: Concepts of the back

1. Surface landmarks (bone)
2. Muscles of the back (Origin & Insertion) ---> Actions
    A. Superficial group = 4X
    B. Intermediate group = 2X
    C. Deep group = 3 subgroups
3. Nerve innervation of the back
    A. Motor innervation (control movement of muscle)
    B. Sensory innervation (receive sensation of skin)
        - Upper back
        - Lower back

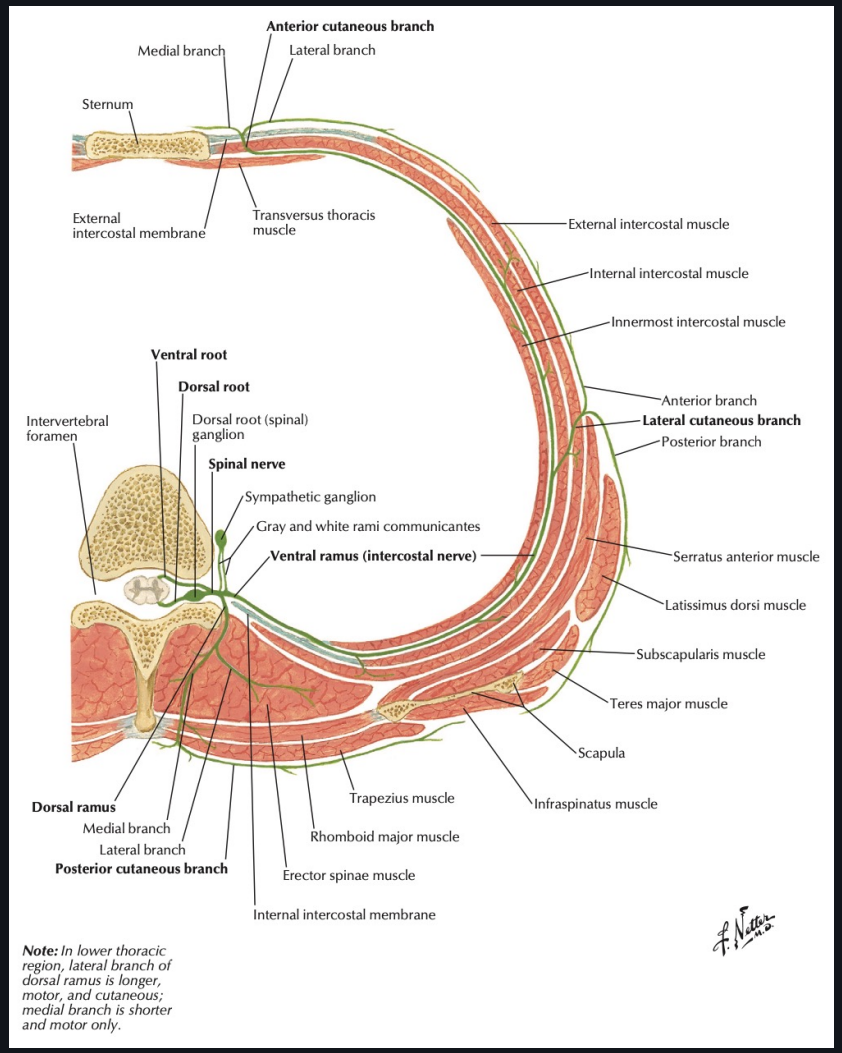
The origin is the attachment site that doesn't move during contraction,
The insertion is the attachment site that does move when the muscle contracts
"insertion to origin ---> actions of muscle" innervated by nerve

Recommendation



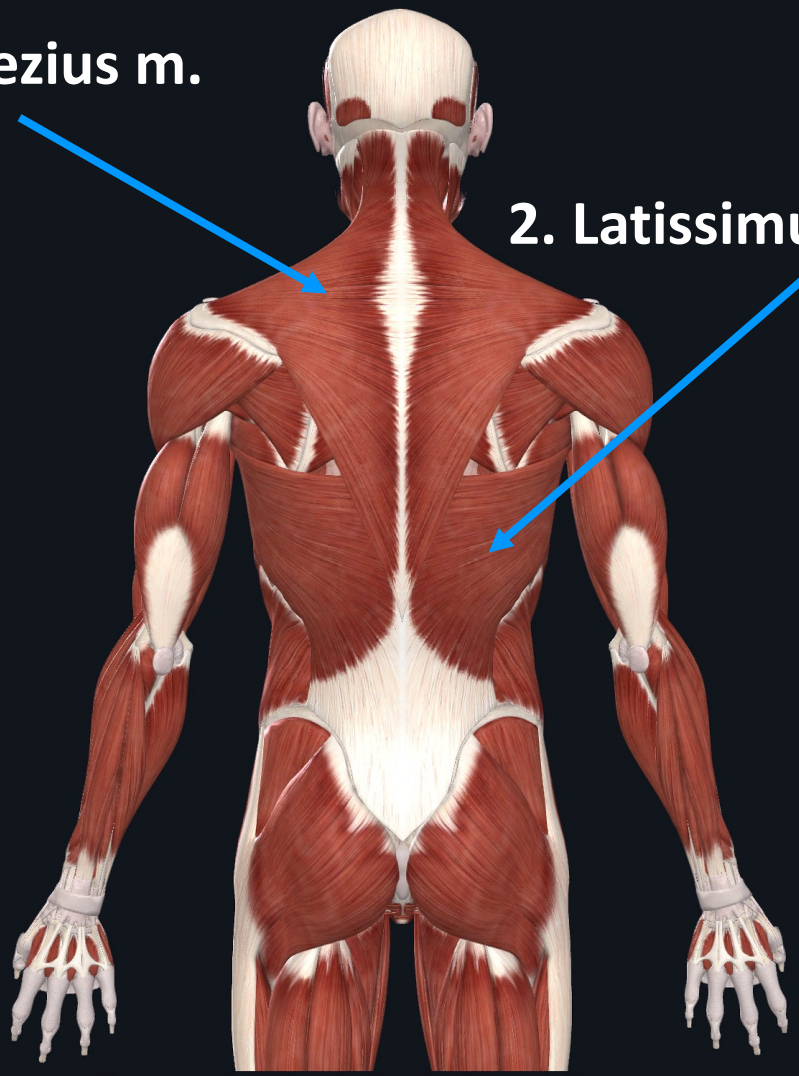
(Posterior view)

- Skeleton
  - Skull (occipital bone, temporal bone)
  - Vertebra (Atlas, Axis, C, T, L)
  - Scapula
  - Clavicle
  - Humerus

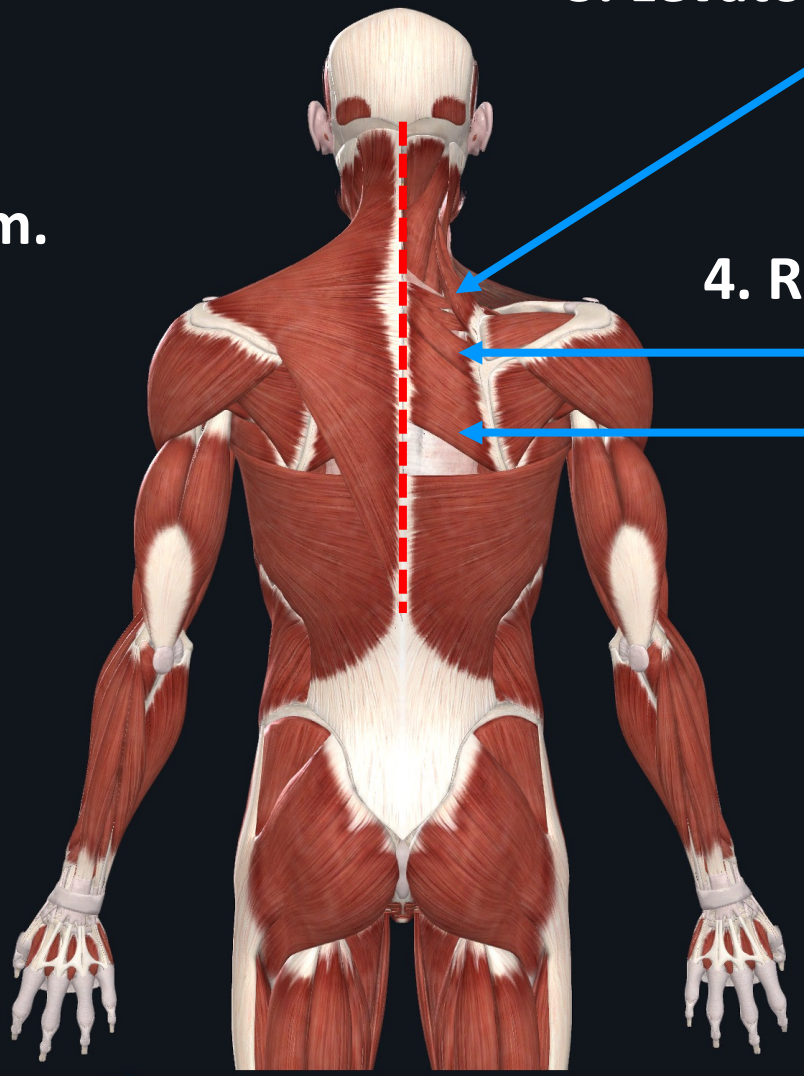


- Spinal cord
  - Anterior (ventral) primary ramus spinal nerve
  - Posterior (dorsal) primary ramus spinal nerve
    - Medial branch
    - Lateral branch

A: Superficial group of the back



(Posterior view)



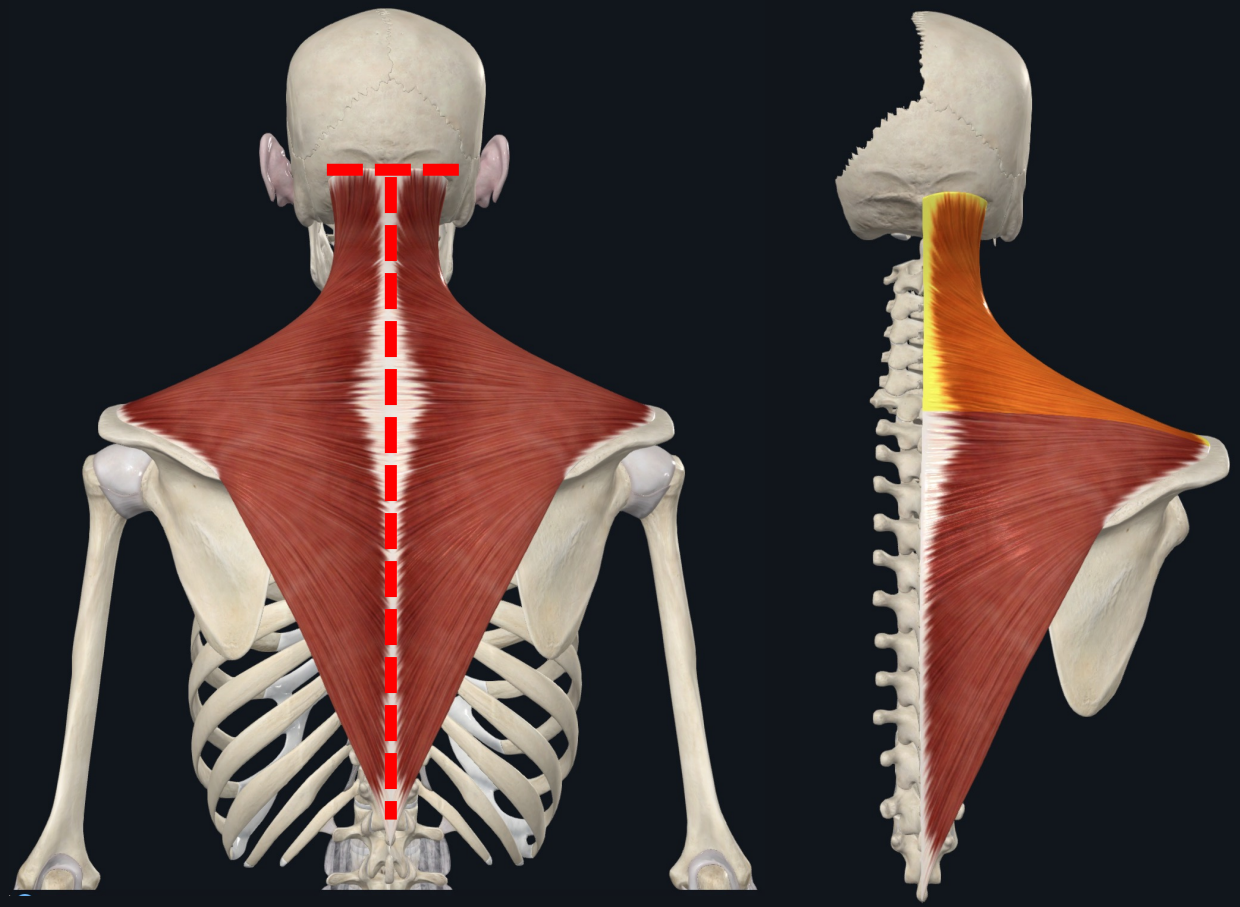
(Dissected of right trapezius m.)

A1. Trapezius m.

Origin: External occipital protuberance
Medial 1/3 of superior nuchal line
Ligamentum nuchae
Spinous process of C7-T12 vertebrae

Insertion: Superior fiber; Posterior aspect of lateral 1/3 of clavicle
Middle fibers; Acromine & spine of scapula
Inferior fibers; Crest of scapula

Innervation: Spinal root of accessory nerve (CN XI)
Anterior primary rami of C3, C4 spinal nerves



(Posterior view)



(Lateral view)

A1. Trapezius m.

Origin

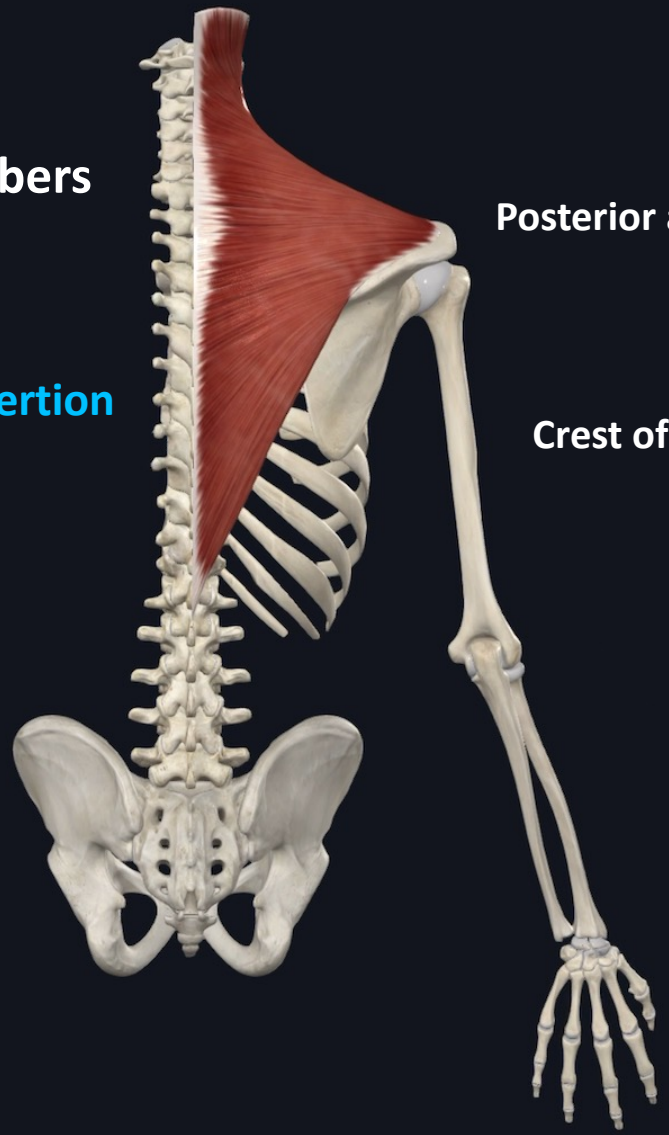
Superior fibers

Insertion

Insertion

Inferior fibers

Origin

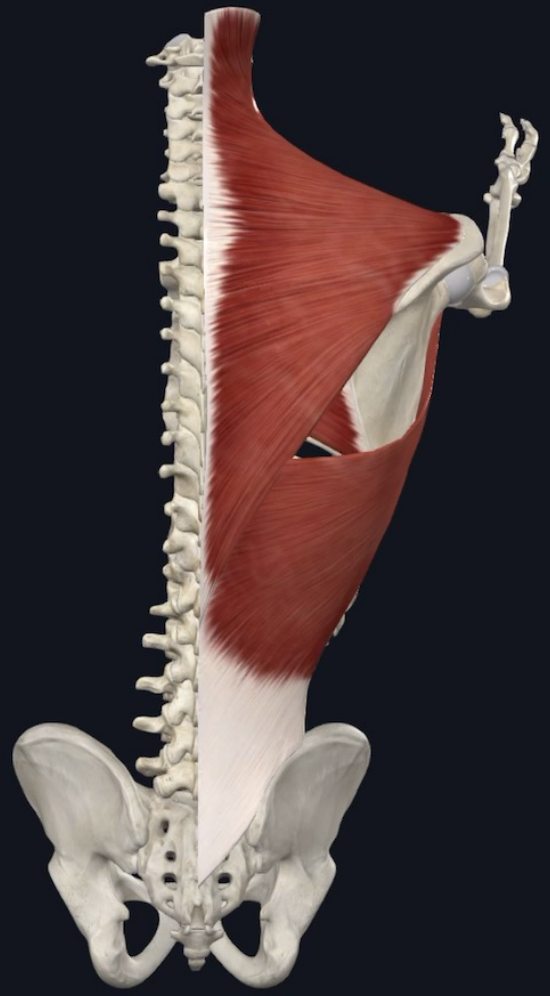


Posterior aspect of lateral 1/3 of clavicle

Crest of scapula

Middle fibers

Origin ← Insertion



Acromine
& spine of scapula

Action: Superior fibers; Shoulder (scapula) elevation

Inferior fibers; Shoulder (scapula) depression

Middle fibers; Shoulder (scapula) retraction

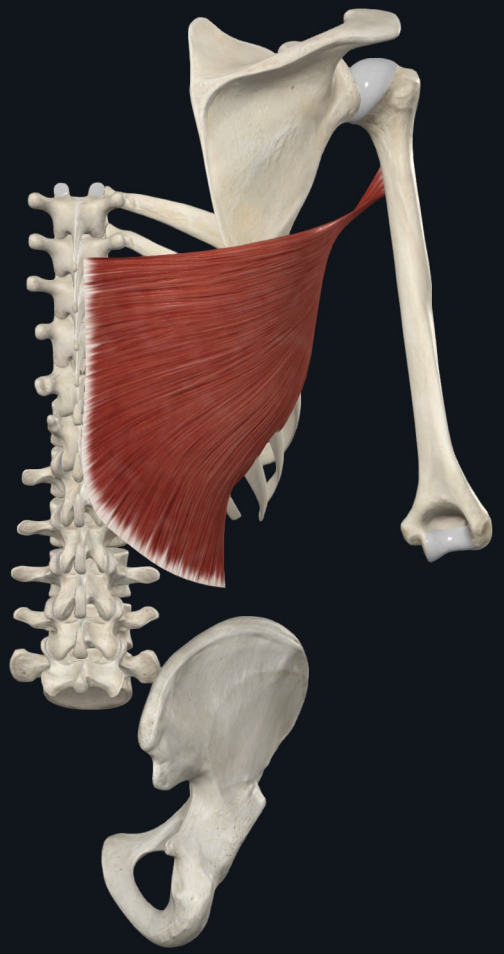
A2. Latissimus dorsi m.

Lesser tubercle Greater tubercle

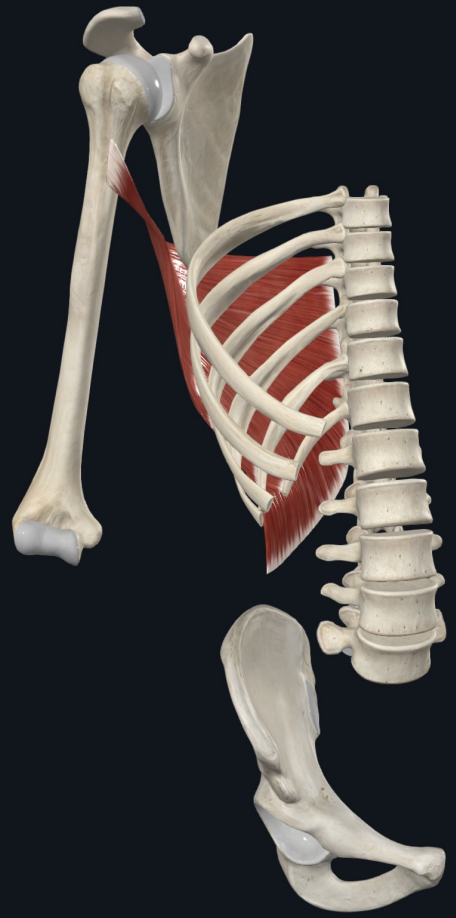
Origin: Spinous process of T7-T12 vertebrae
Thoracolumbar fascia
9th-12th ribs
iliac crest

Insertion: Floor of intertubercular groove of humerus

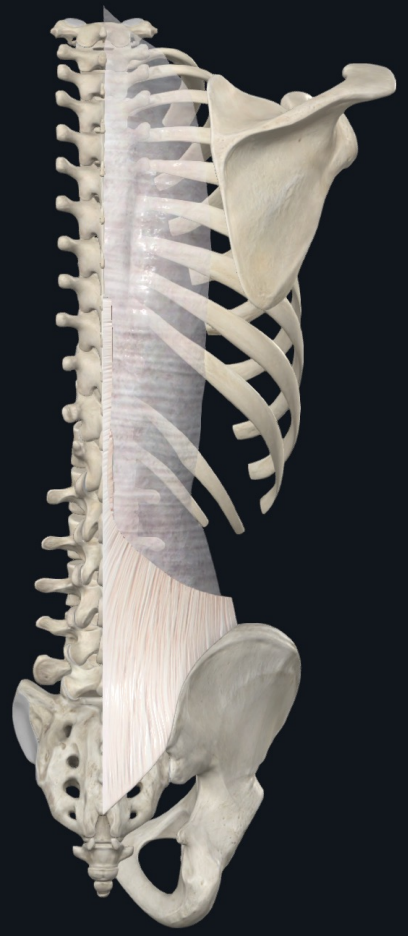
Innervation: Thoracodorsal nerve (C6-C8 spinal nerves)



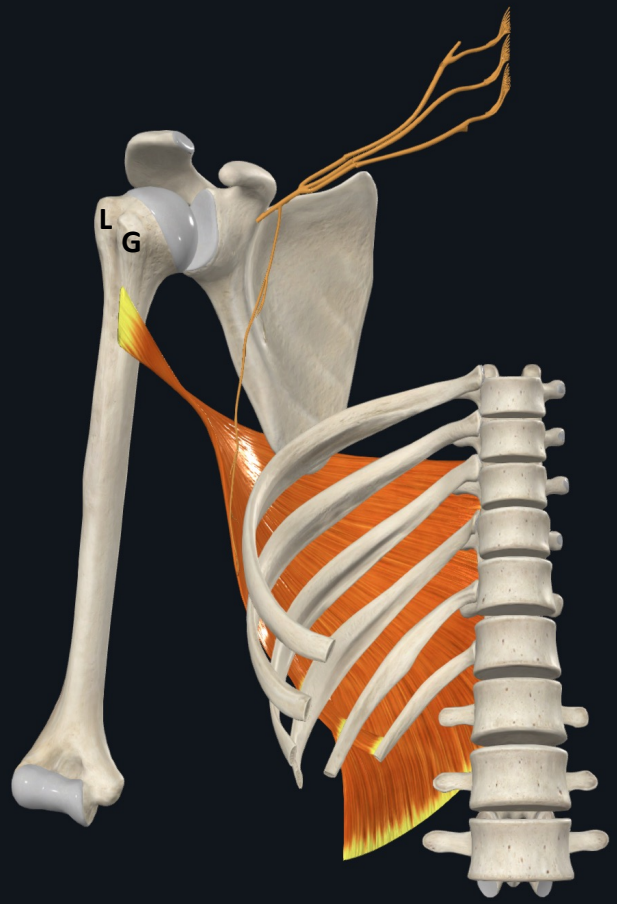
(Posterior view)



(Anterior view)

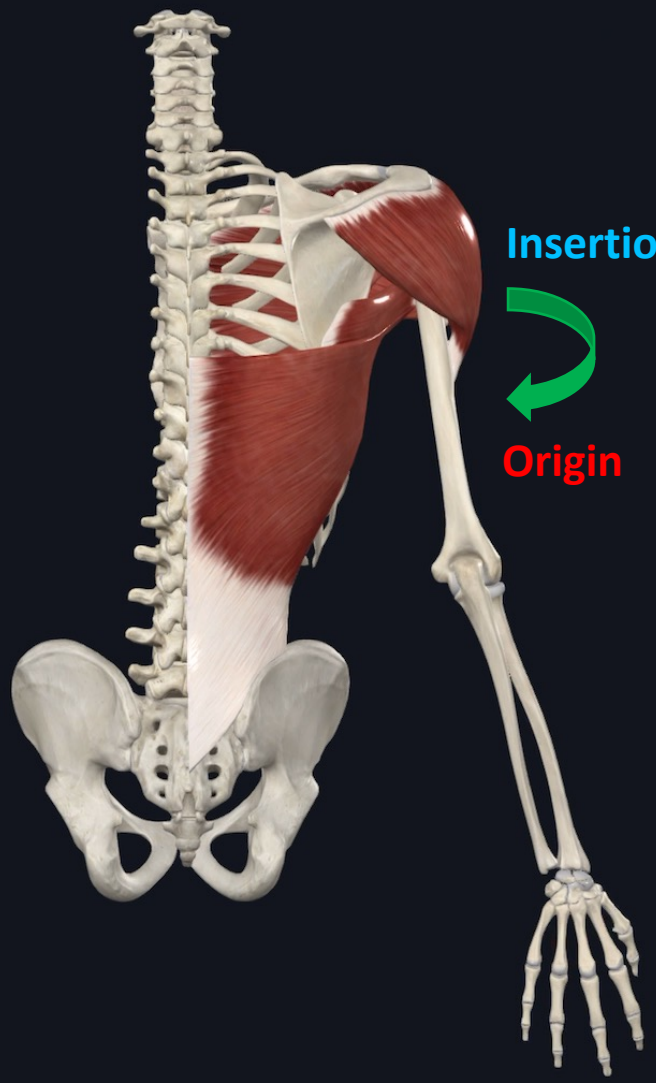


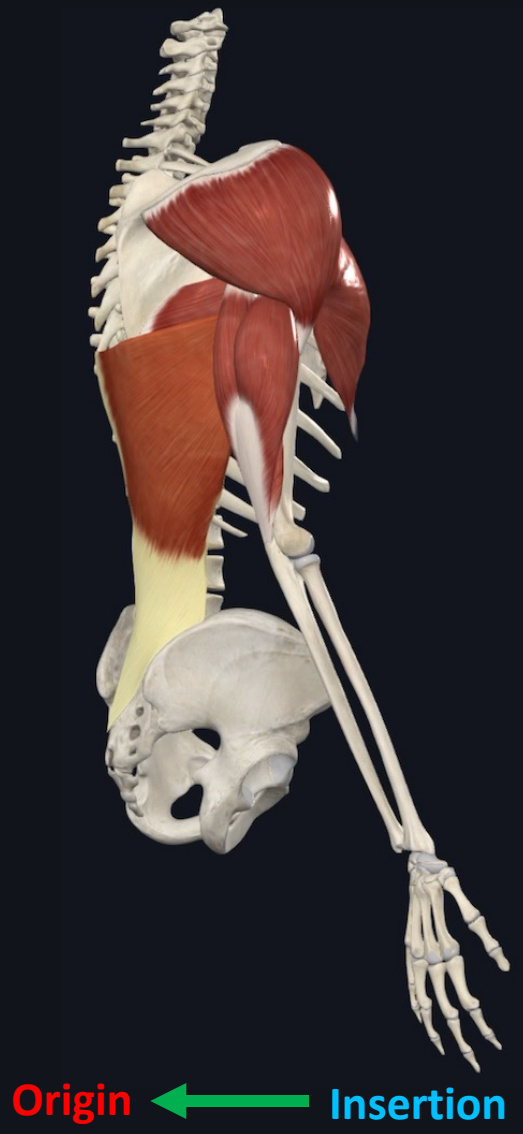
(Thoracolumbar fascia)

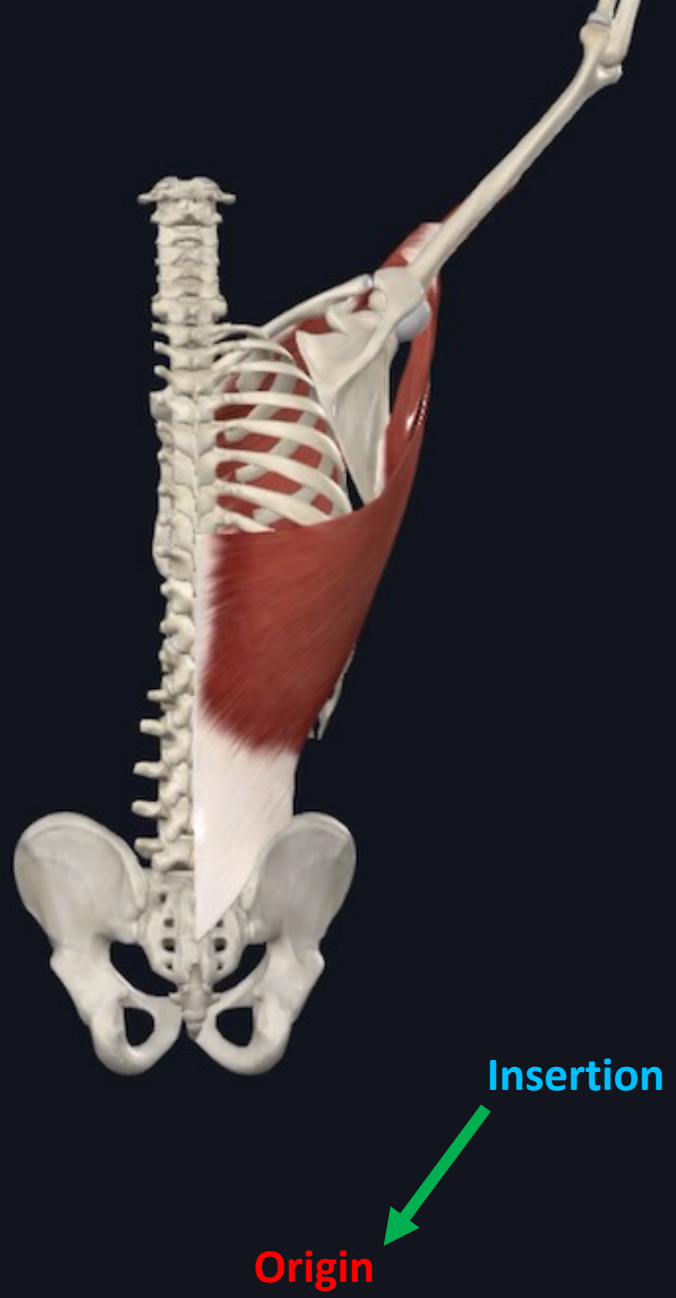


(Thoracodorsal nerve)

A2. Latissimus dorsi m.







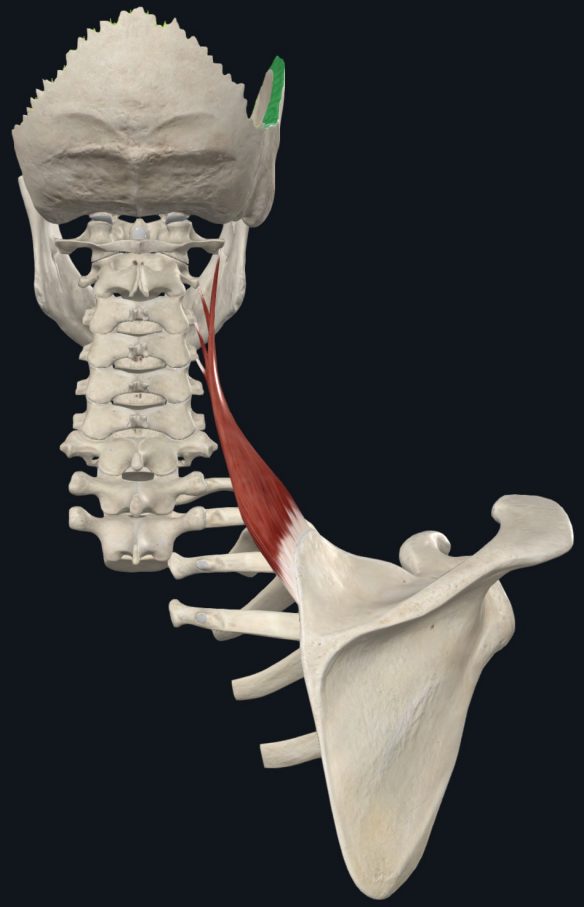
Actions: Medial rotation of humerus

Shoulder extension

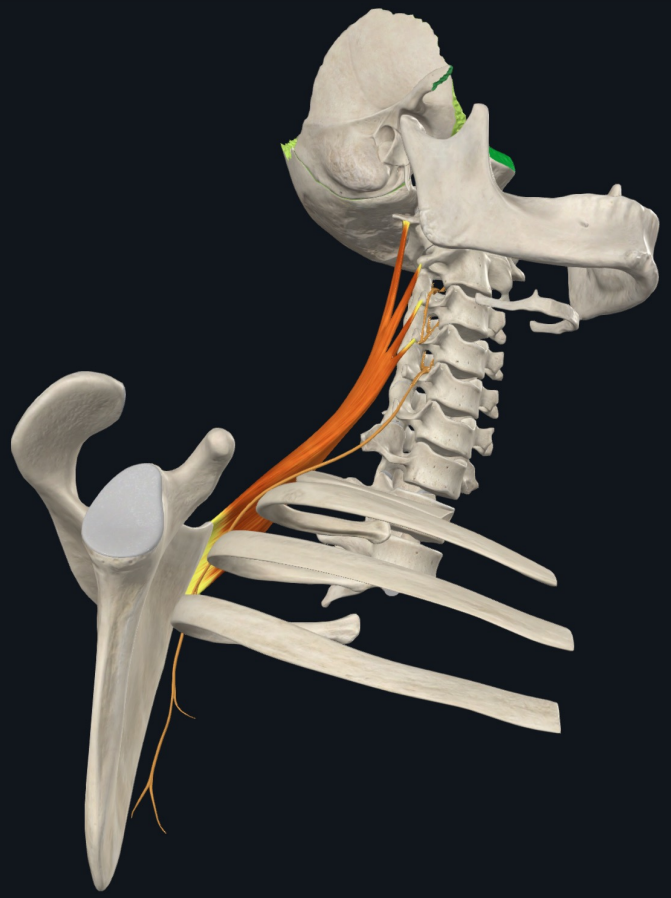
Shoulder adduction

A3. Levator scapulae m.

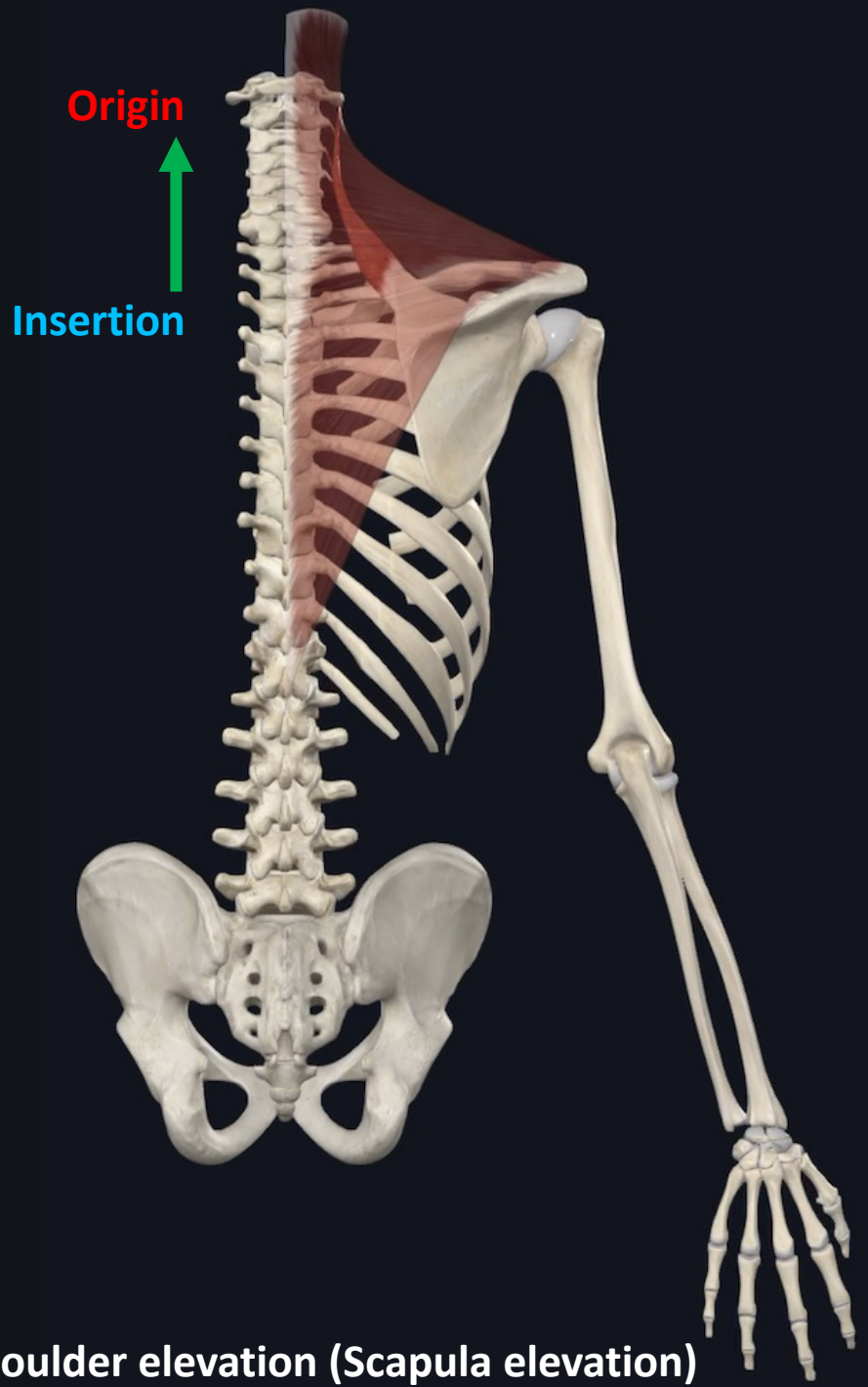
Origin: Transverse process of C1-C4 vertebrae
Insertion: Superior angle of scapula
Innervation: Anterior primary rami of C3, C4 spinal nerves
Dorsal scapular nerve (C5 spinal nerve)



(Posterior view)



(Lateral view)



Action: Shoulder elevation (Scapula elevation)

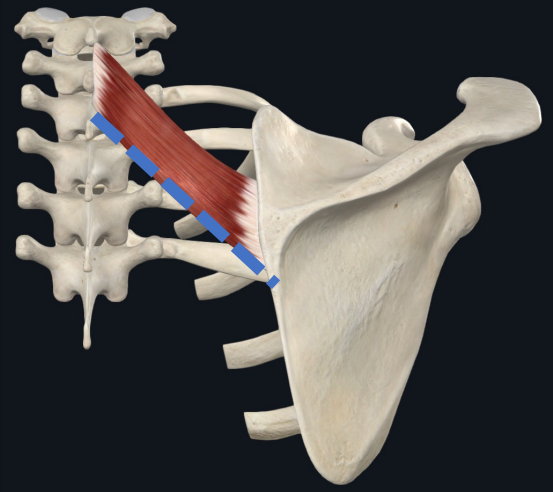
A4. Rhomboid m.

A4.1 Rhomboid minor m.

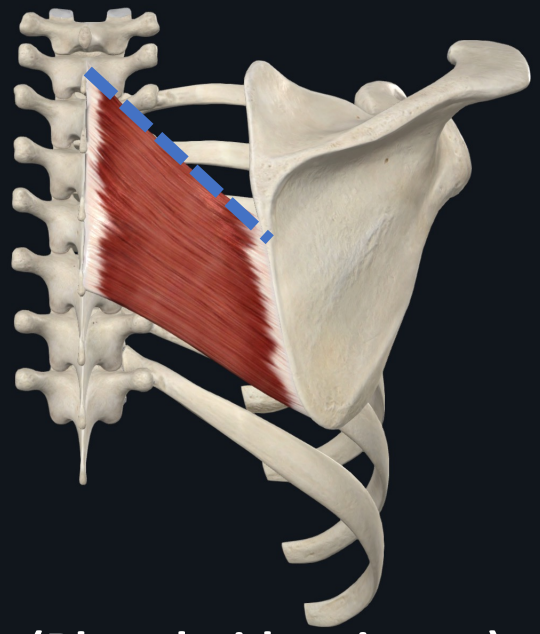
Origin: Spinous process of C7-T1 vertebrae
Insertion: Medial border of scapula (adjacent to spine)
Innervation: Dorsal scapular nerve (C5 spinal nerve)

A4.2 Rhomboid major m.

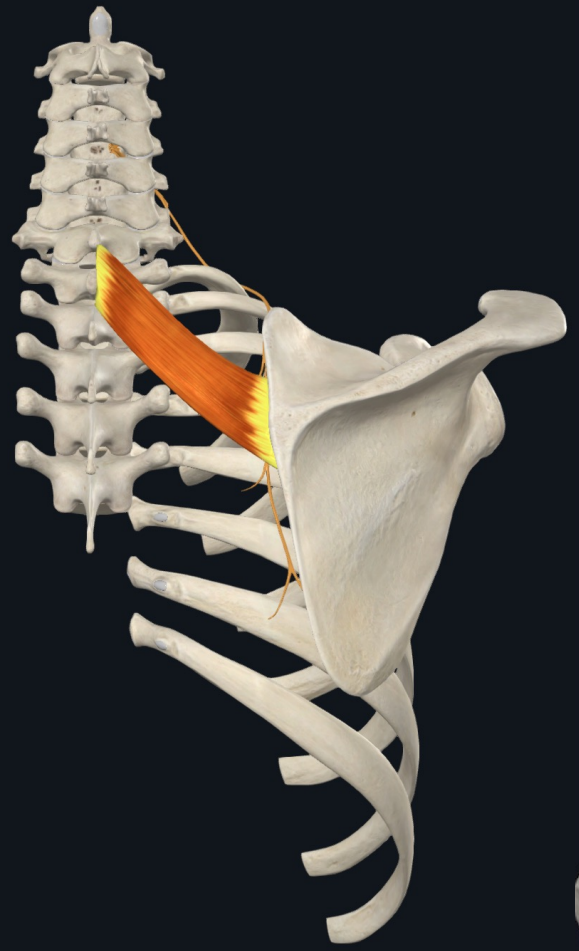
Origin: Spinous process of T2-T5 vertebrae
Insertion: Medial border of scapula (inferior to spine)
Innervation: Dorsal scapular nerve (C5 spinal nerve)



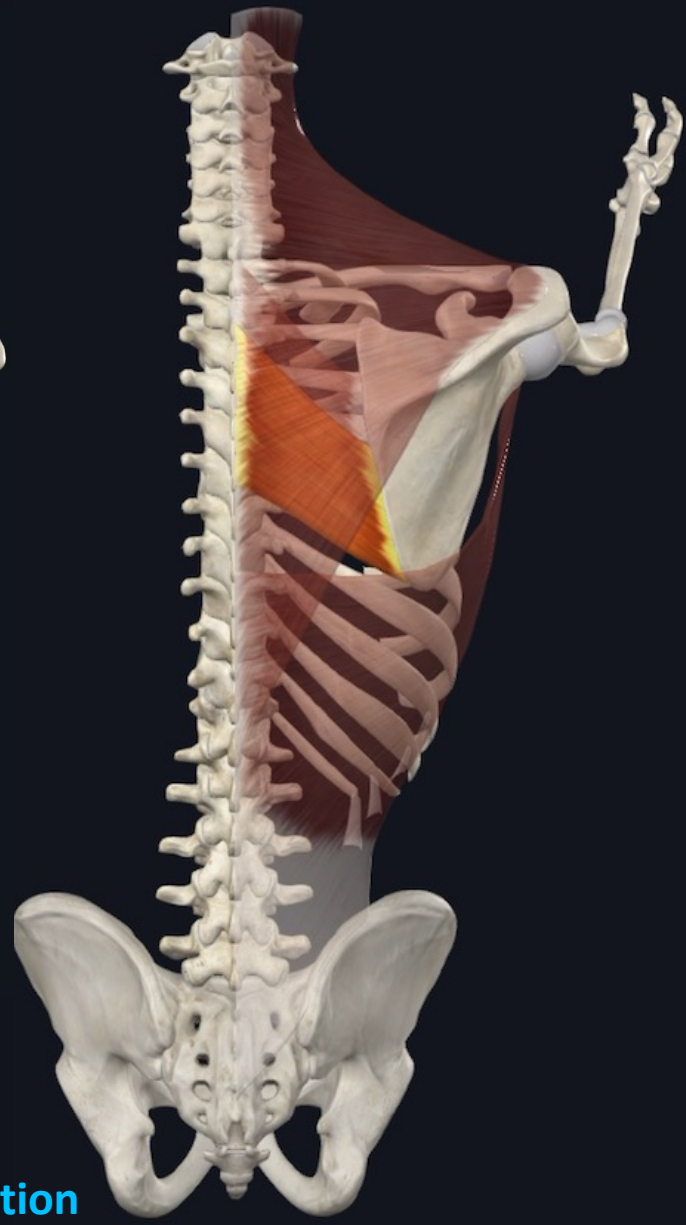
(Rhomboid minor m.)



(Rhomboid major m.)

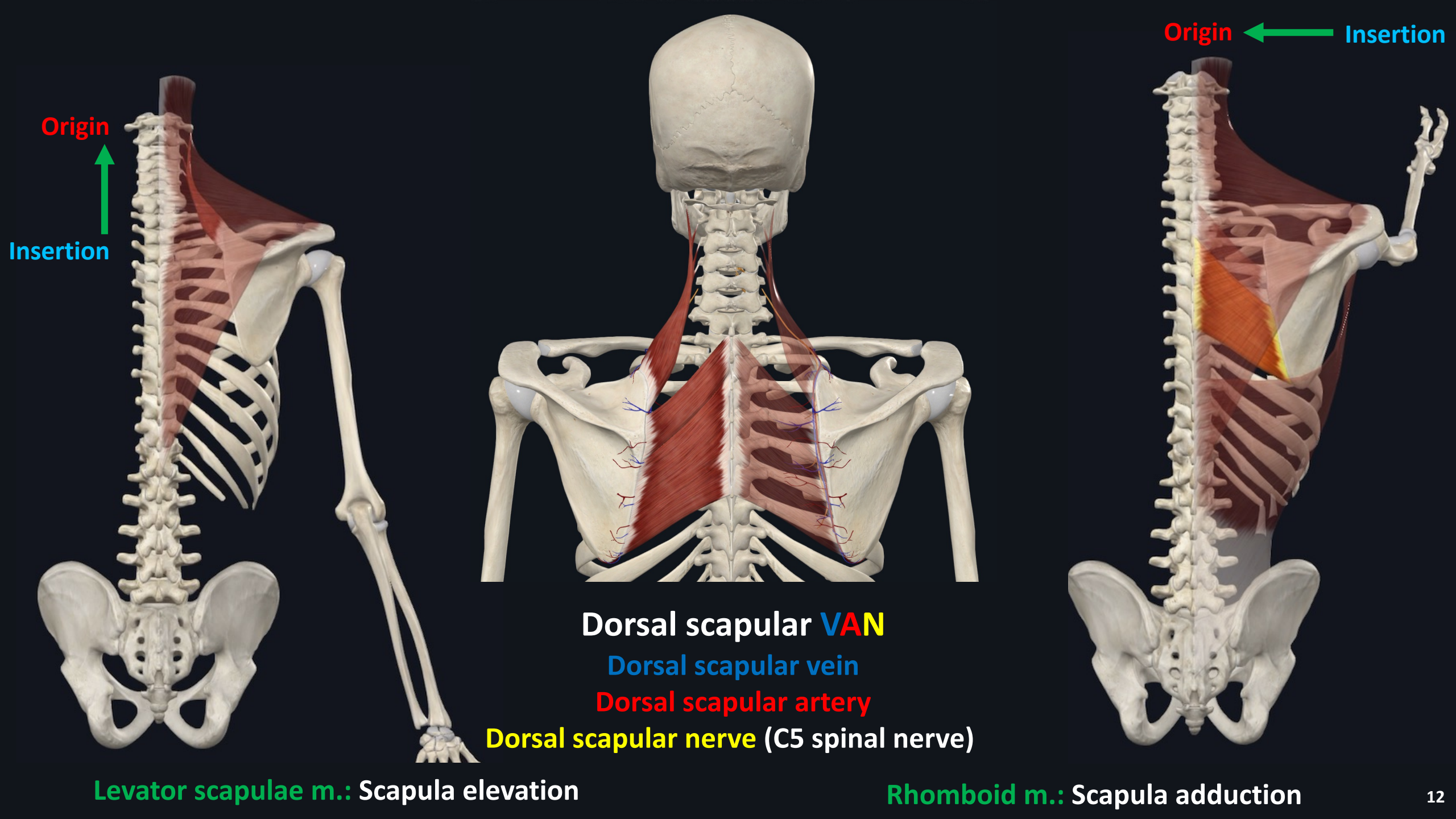


(Dorsal scapular n.)



Origin ← Insertion

Action: Shoulder retraction (Scapula adduction)


Origin
Insertion
Origin
Insertion
Dorsal scapular VAN
Dorsal scapular vein
Dorsal scapular artery
Dorsal scapular nerve (C5 spinal nerve)
Levator scapulae m.: Scapula elevation
Rhomboid m.: Scapula adduction

Triangle of Auscultation

Bounderies

1. Lateral border of Trapezius m.
2. Superior border of Latissimus dorsi m.
3. Inferior border of Rhomboid major m.

Clinical importance

= Auscultation

Triangle of Lumbar

Boundaries

1. Lateral border of Latissimus dorsi m.
2. Lateral border of external abdominal oblique m.

Clinical importance

= Herniation occasionally occur (Petit's hernia)



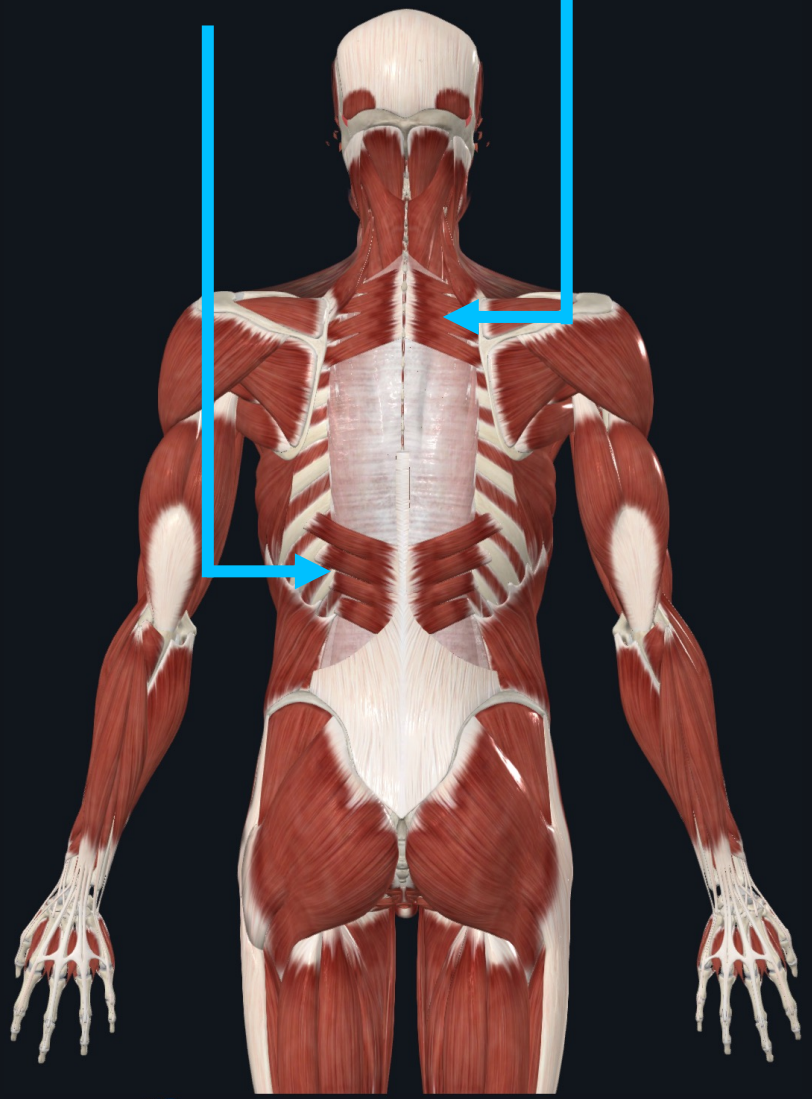
B: Intermediate group of the back

1. Serratus posterior superior m.

2. Serratus posterior inferior m.





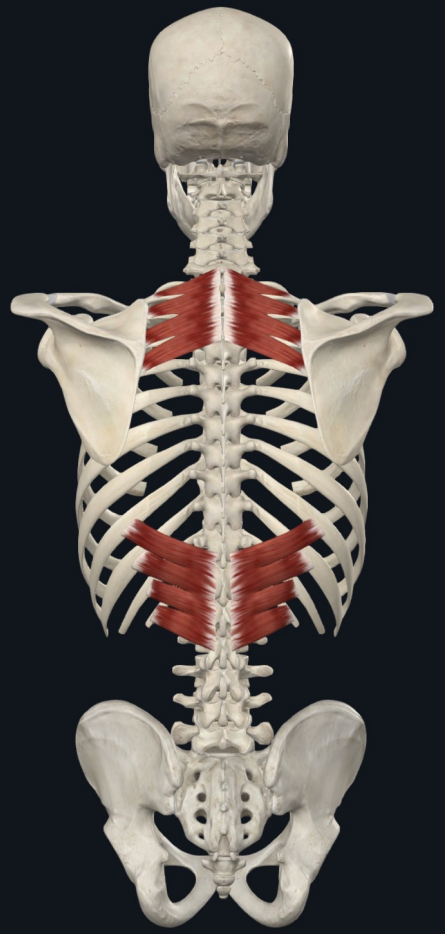


(Superficial group of the back)

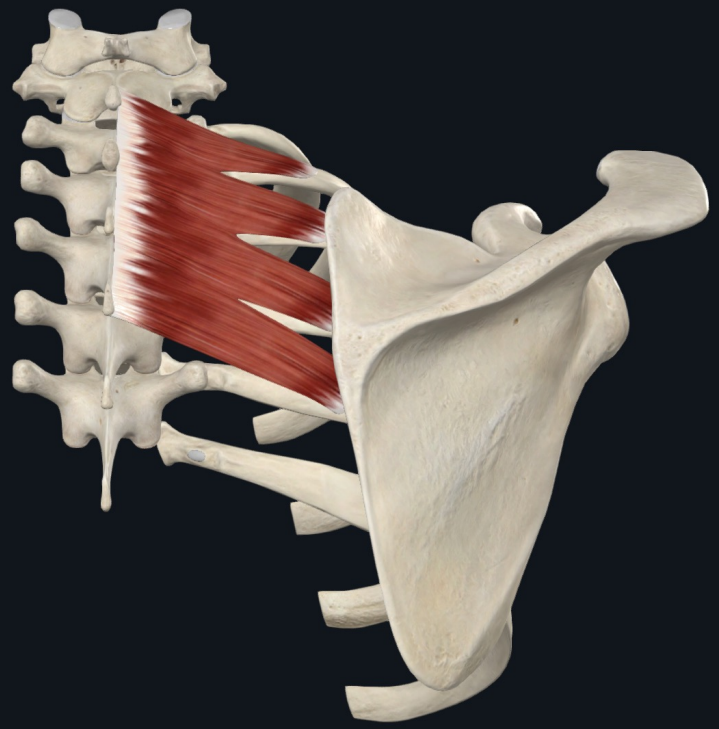
(Intermediate group)

B1. Serratus posterior superior m.

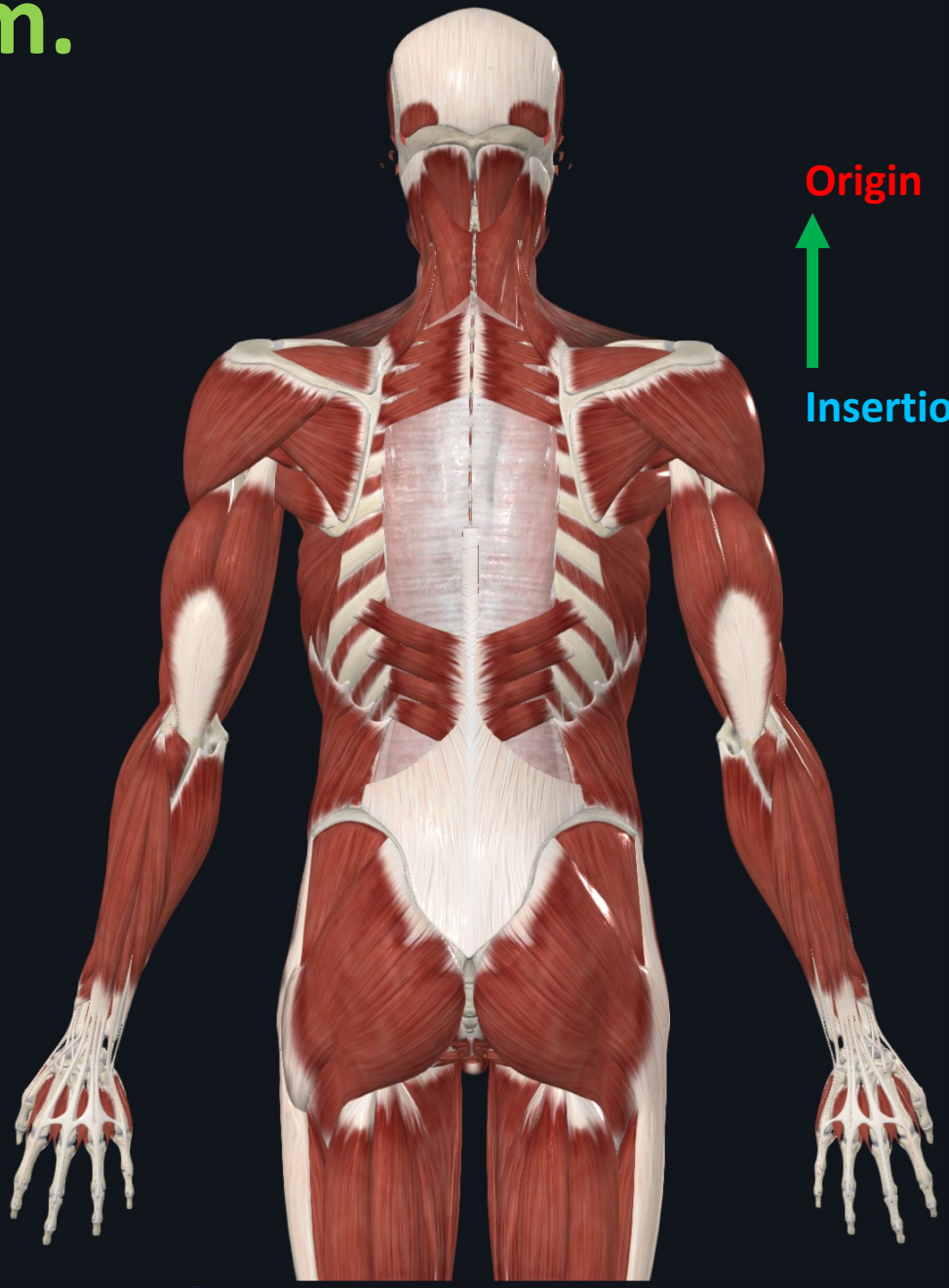
Origin: Spinous process of C7-T3 vertebrae
Insertion: External surface of 2nd-5th ribs
Action: Ribs elevation for inspiration
Innervation: Anterior primary rami of T2-T5 spinal nerves



(Posterior view)

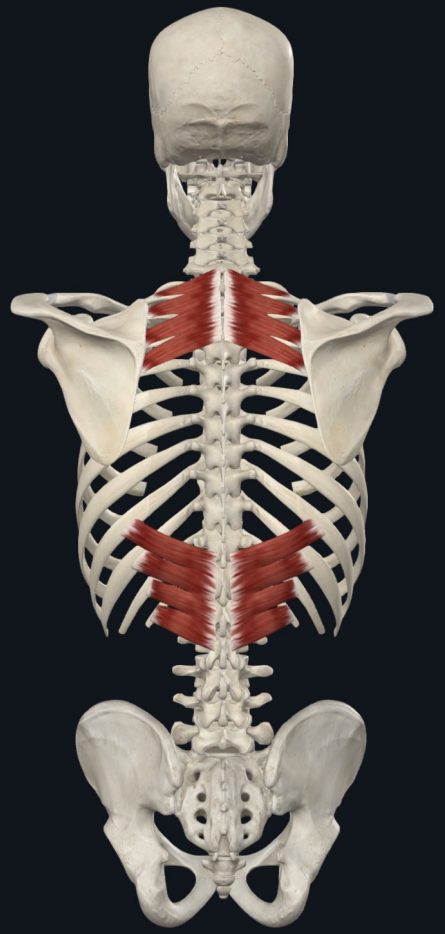


(Posterior view)

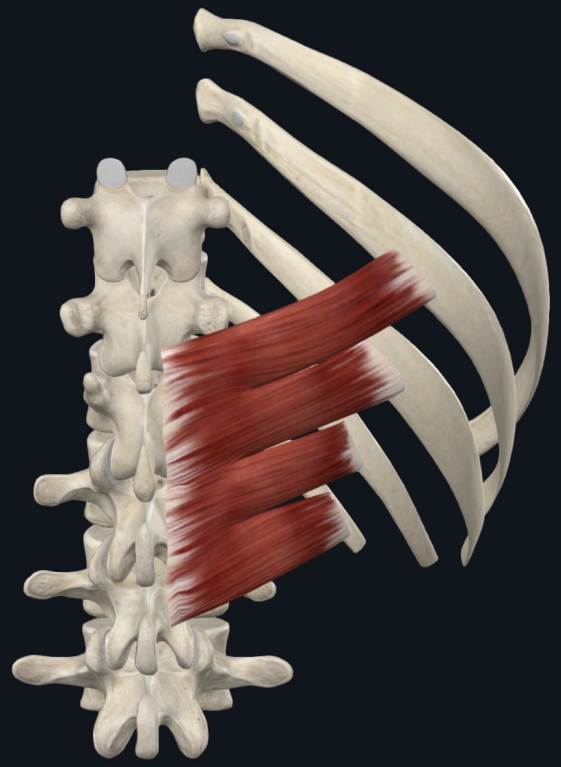


B2. Serratus posterior inferior m.

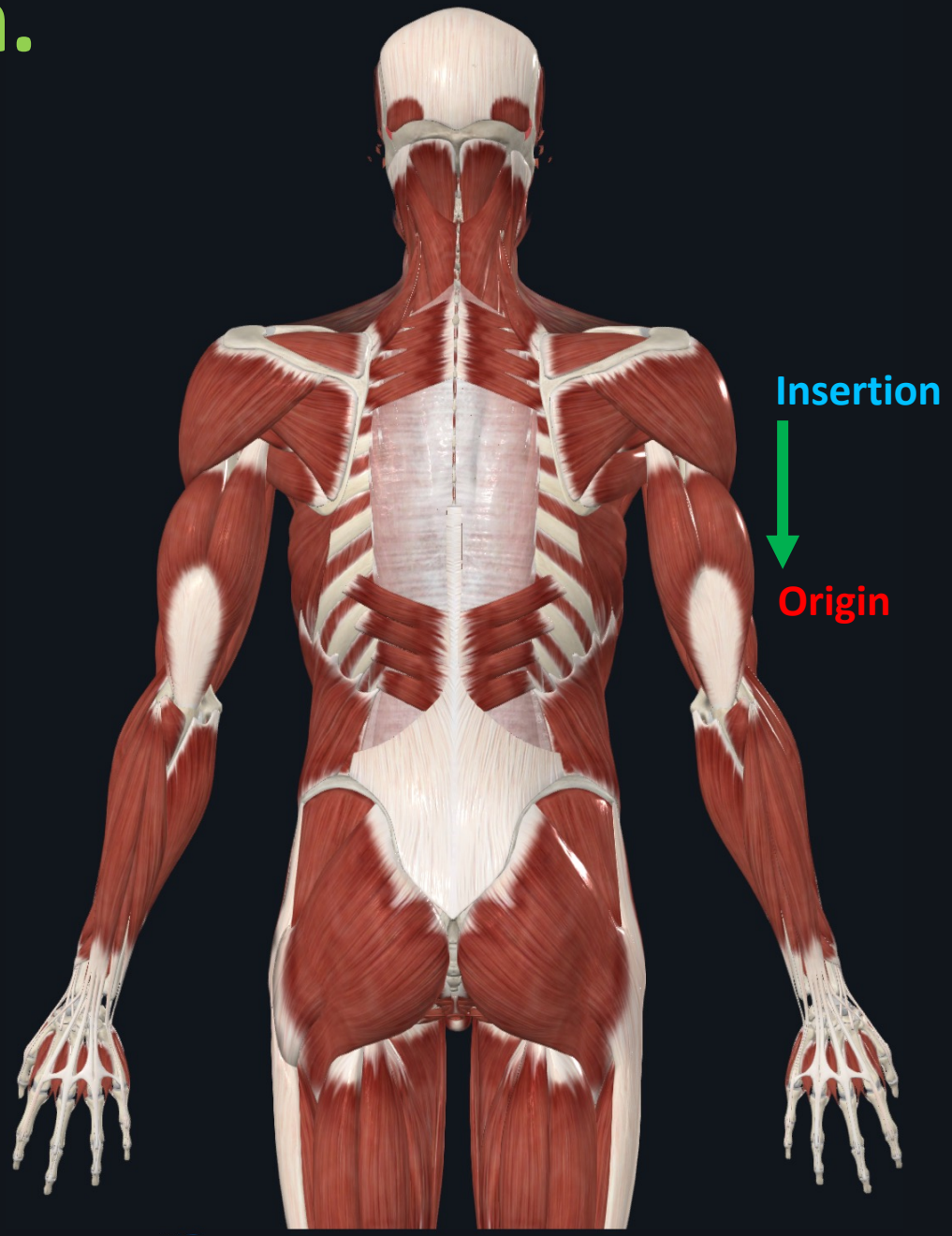
Origin: Spinous process of T11-L2 vertebrae
Insertion: External surface of 9th-12th ribs
Action: Ribs depression for inspiration
Innervation: Anterior primary rami of T9-T12 spinal nerves



(Posterior view)

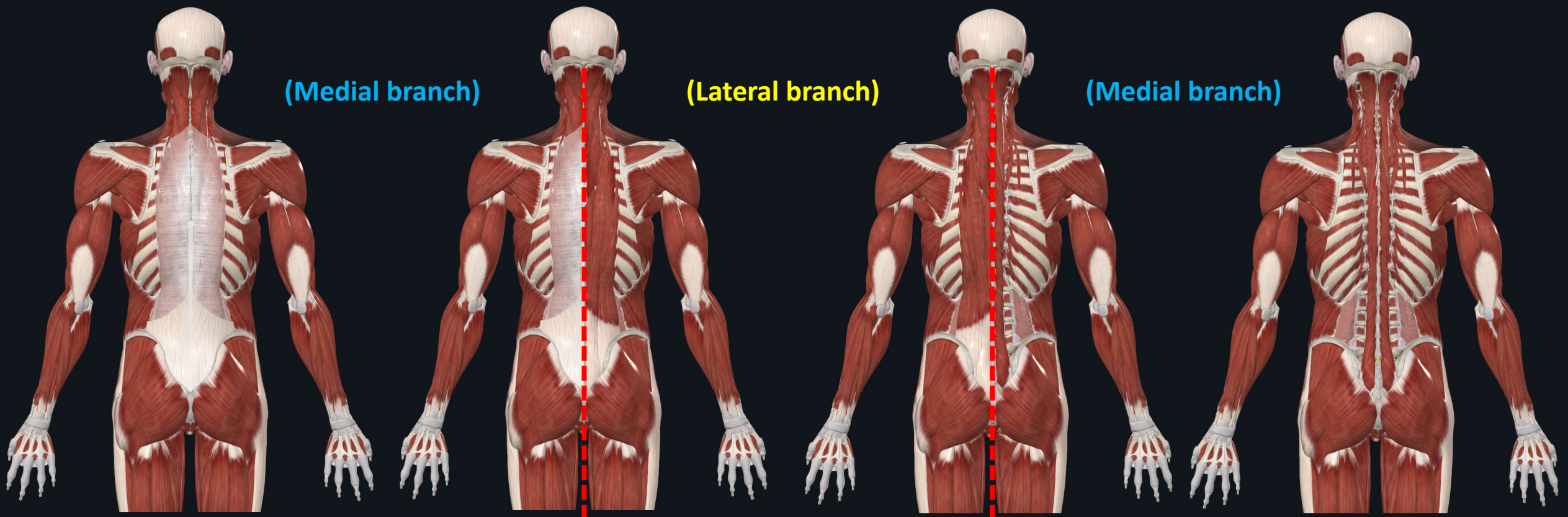


(Posterior view)



C: Deep group of the back

Innervation: Posterior primary rami of spinal nerves



Superficial layer of deep group (Splenius)

1. Splenius capitis
2. Splenius cervicis

Intermediate layer of deep group (Sacrospinalis/erector spinae)

1. Medial column = Spinalis
2. Int' column = Longissimus
3. Lateral column = iliocostalis

Deep layer of deep group (Transversospinalis)

1. Semispinalis
2. Multifidus
3. Rotatores

C: Deep group of the back

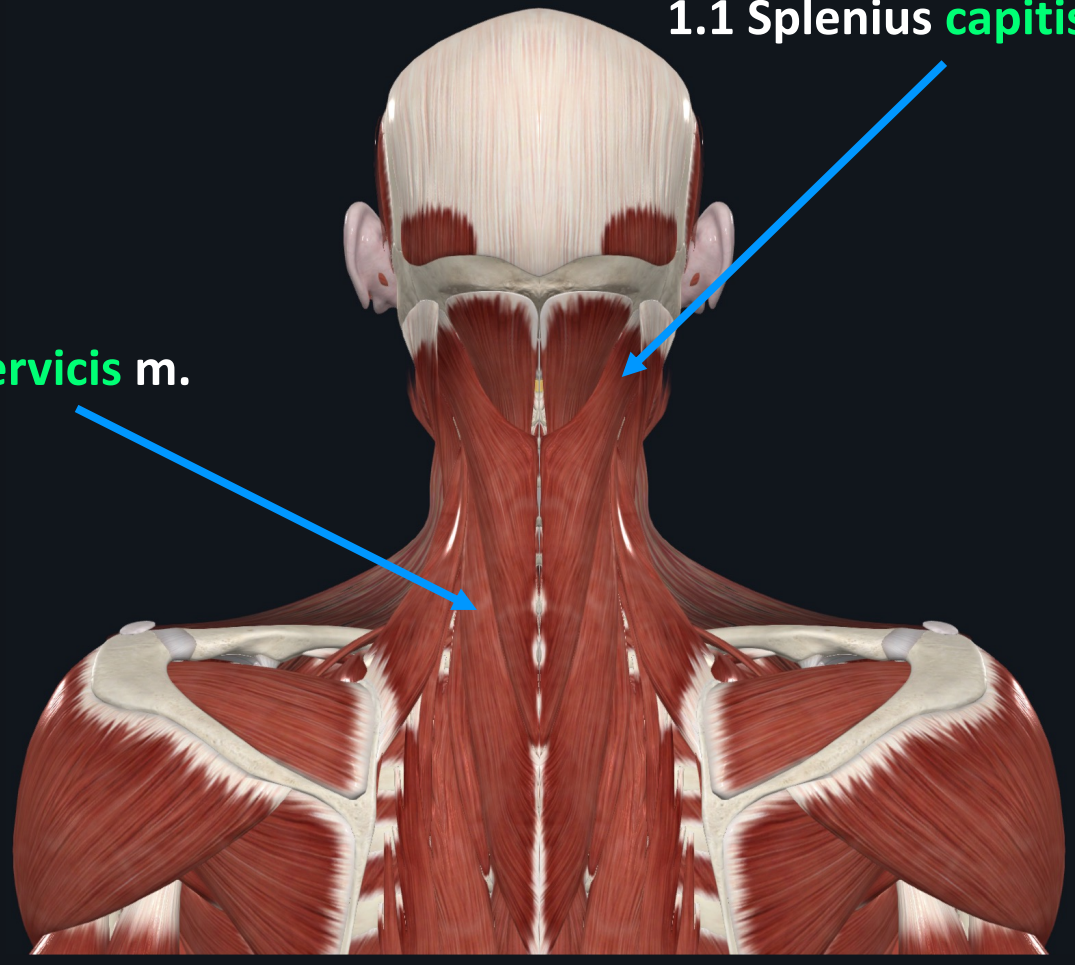
C1. Superficial layer of deep group (Splenius)

1.1 Splenius capitis m.

1.2 Splenius cervicis m.



(Dissected of right serratus posterior superior m.)



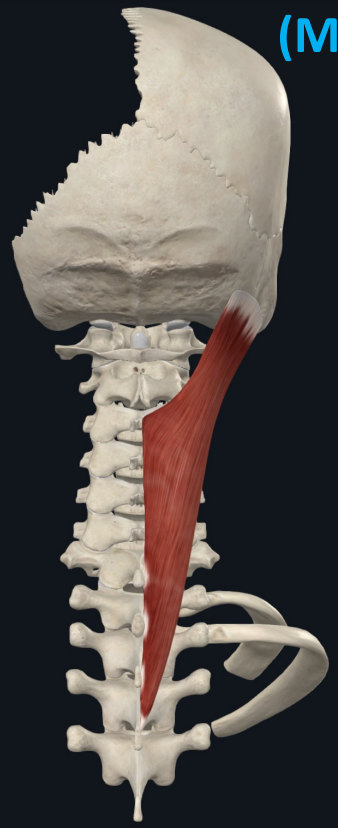
C1. Superficial layer of deep group = Splenius muscle

C1.1 Splenius capitis m.

Origin: Nuchal ligament
Spinous processes of C7-T3 vertebrae

Insertion: Mastoid process of temporal bone
Lateral 1/3 of superior nuchal line

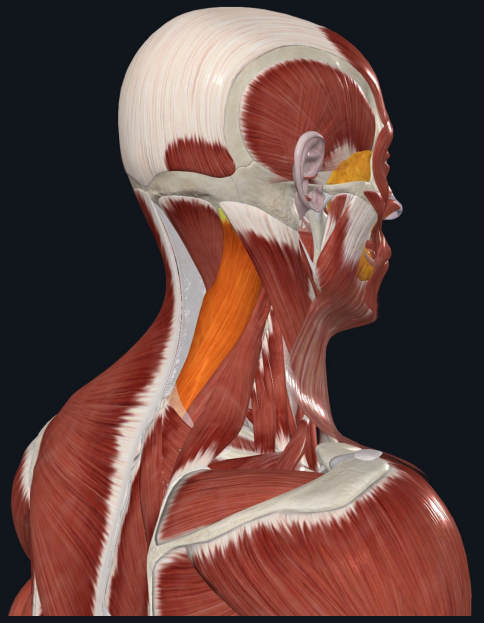
Innervation: Posterior primary rami of C2-C3 spinal nerves
(Medial branch)



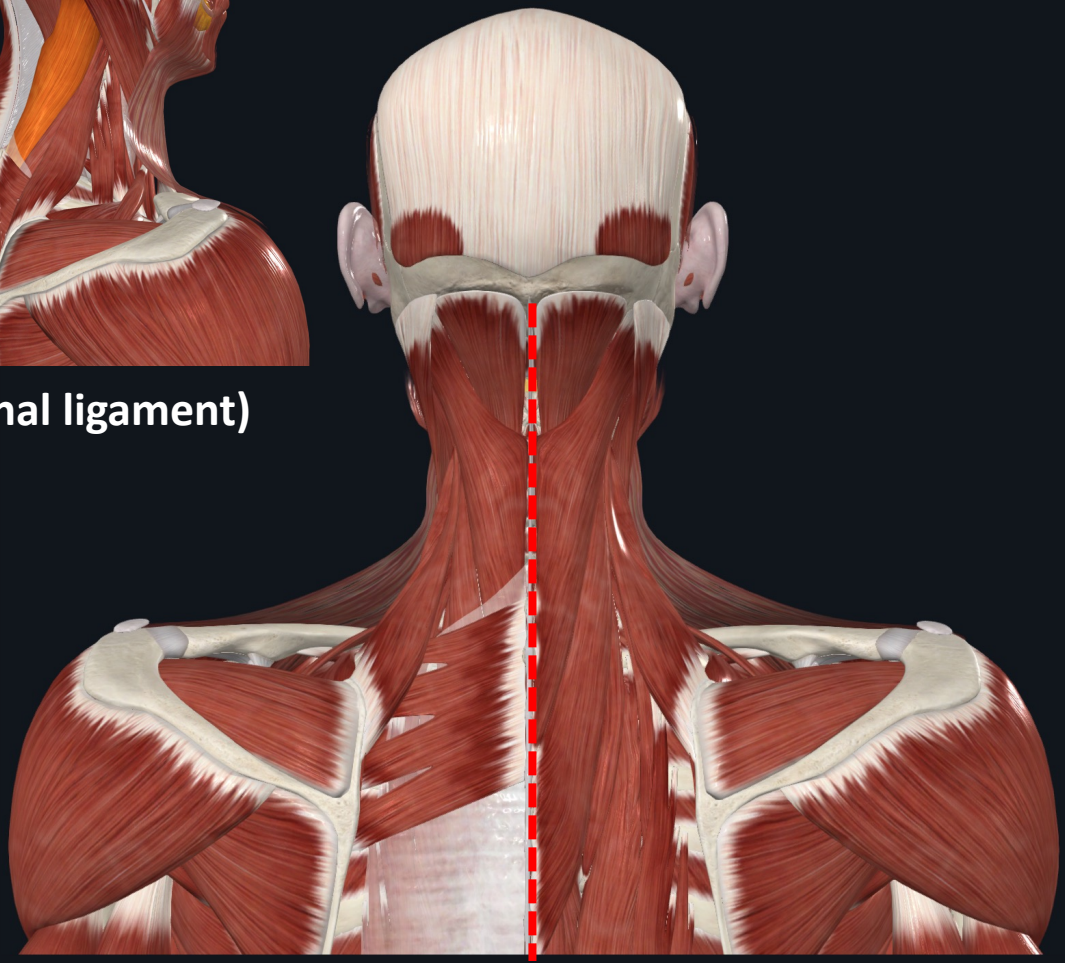
(Posterior view)



(Lateral view)



(Nuchal ligament)



(Dissected of right intermediate group m.)

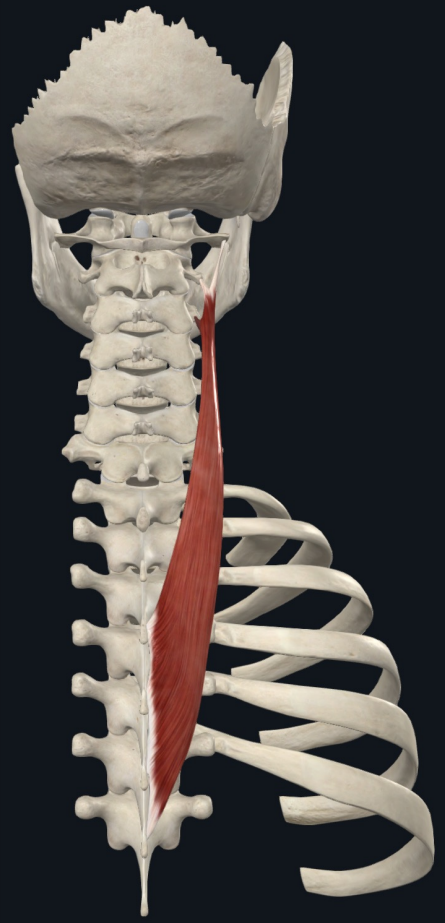
C1. Superficial layer of deep group = Splenius muscle

C1.2 Splenius cervicis m.

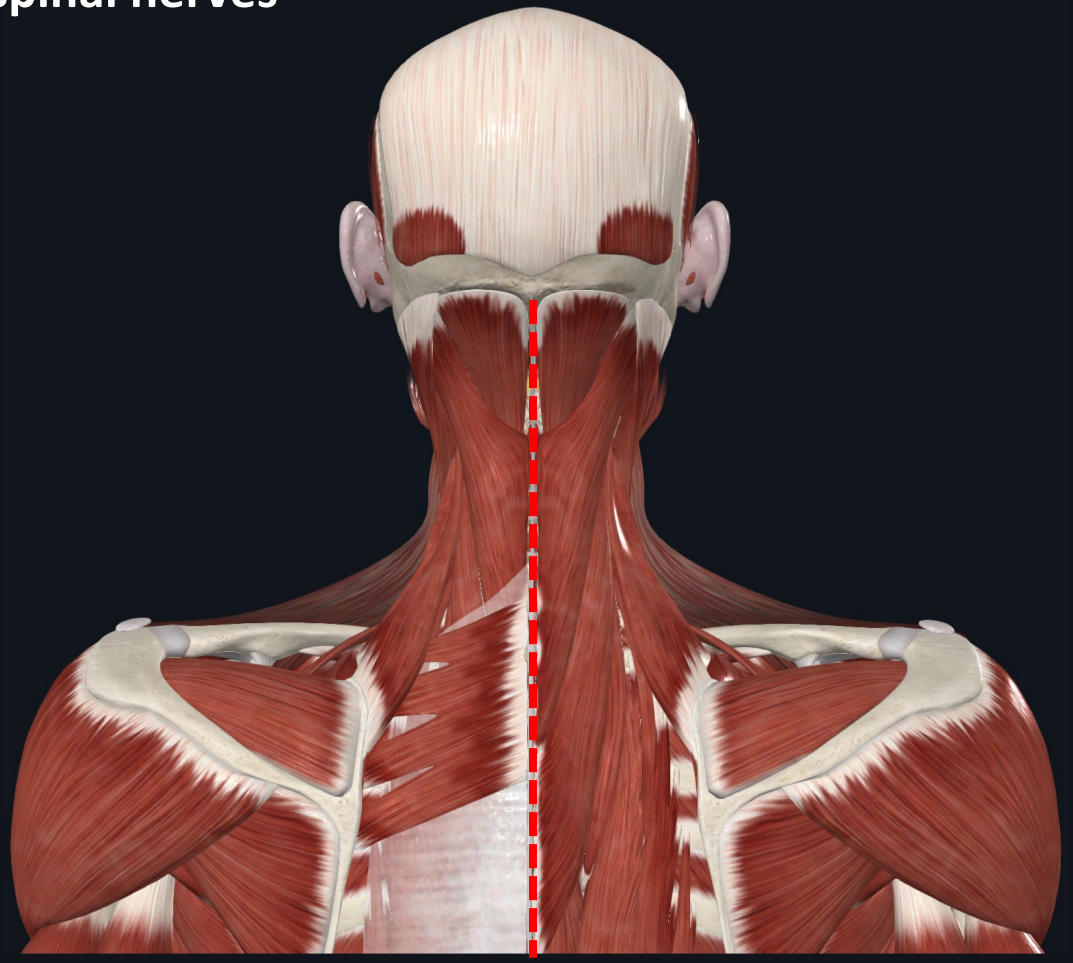
Origin: Spinous processes of T3-T6 vertebrae

Insertion: Transverses processes of C1-C4 vertebrae

Innervation: (Medial branch) Posterior primary rami of C5-C8 spinal nerves

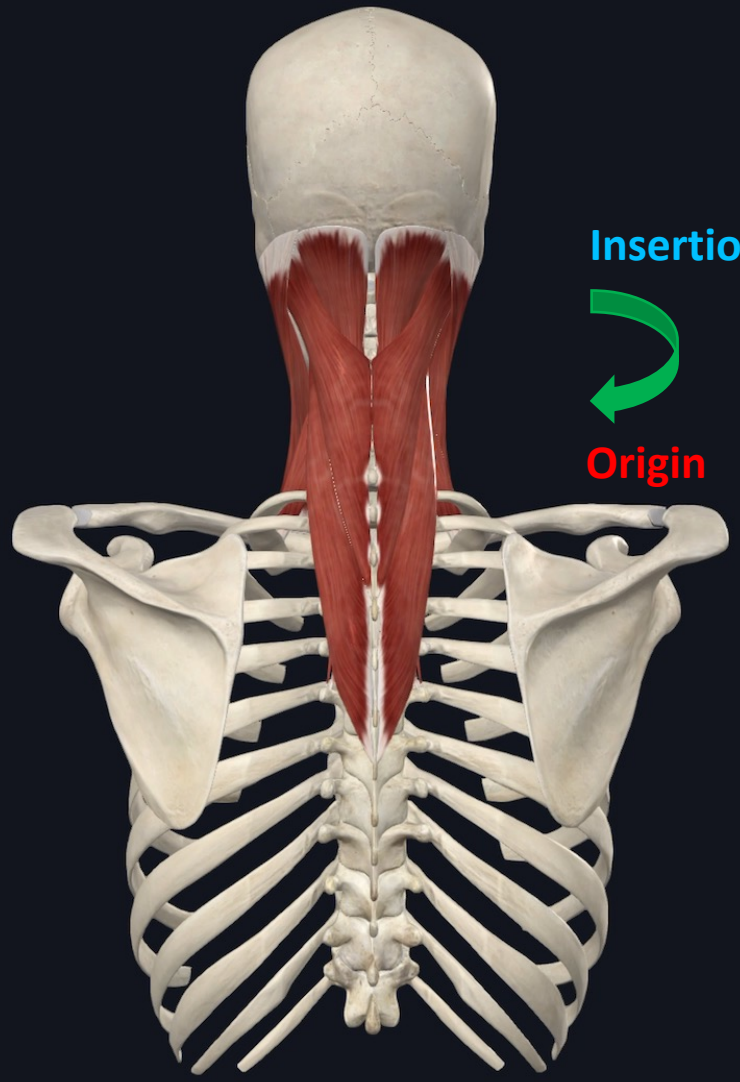


(Posterior view)

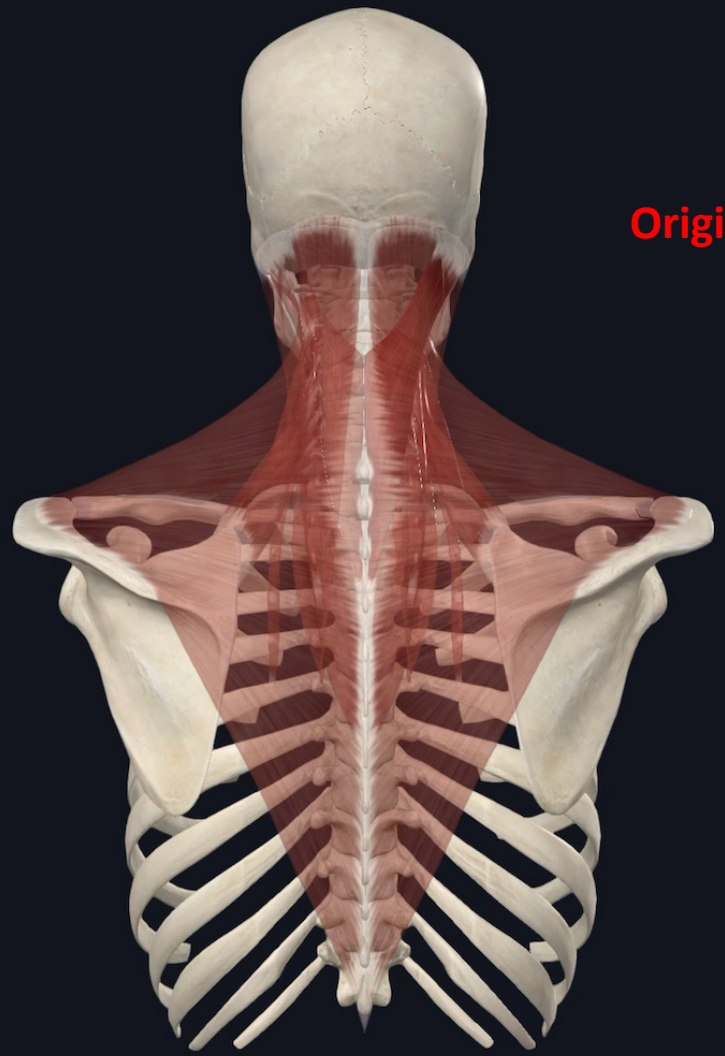


(Dissected of right intermediate group m.)

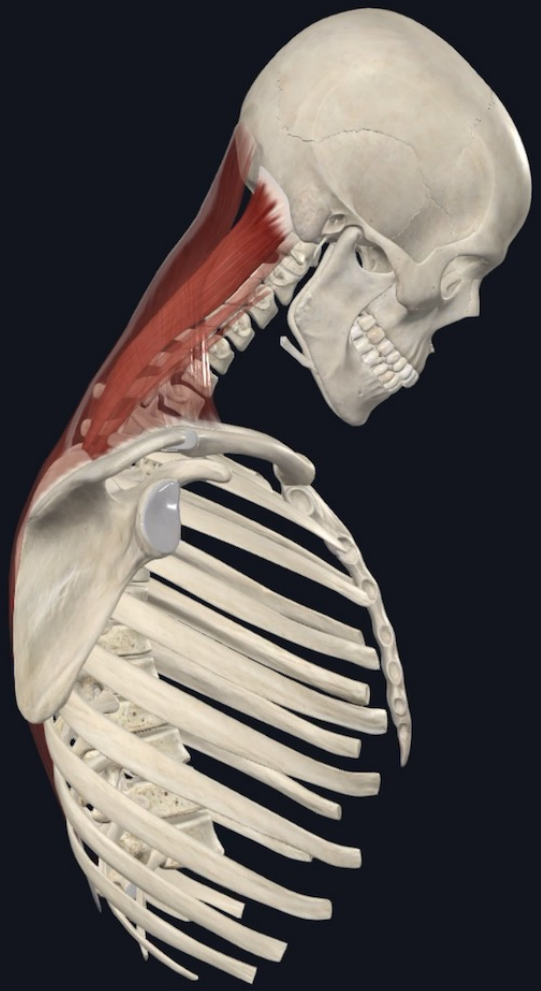
C1. Superficial layer of deep group = Splenius muscle



Actions:
1 site = Ipsilateral rotation of **head**



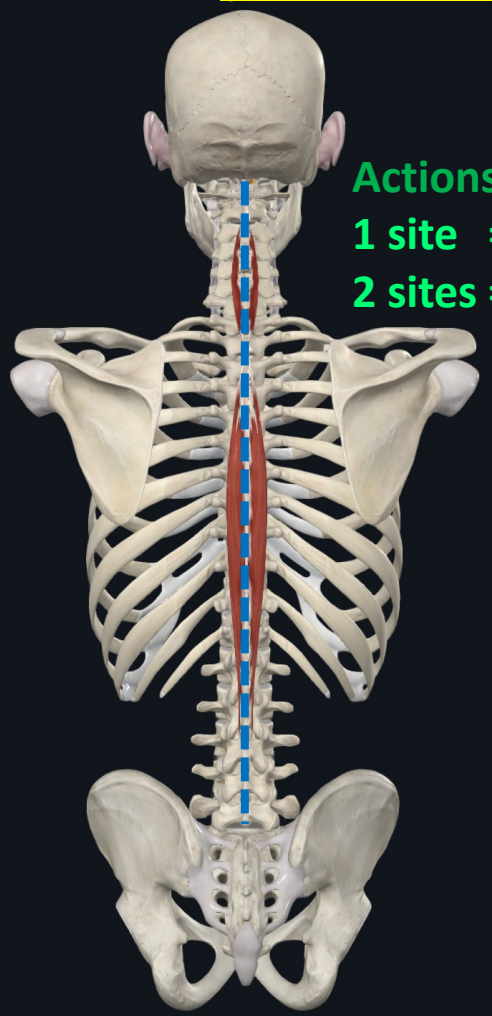
Actions:
1 site = Ipsilateral flexion of **head**



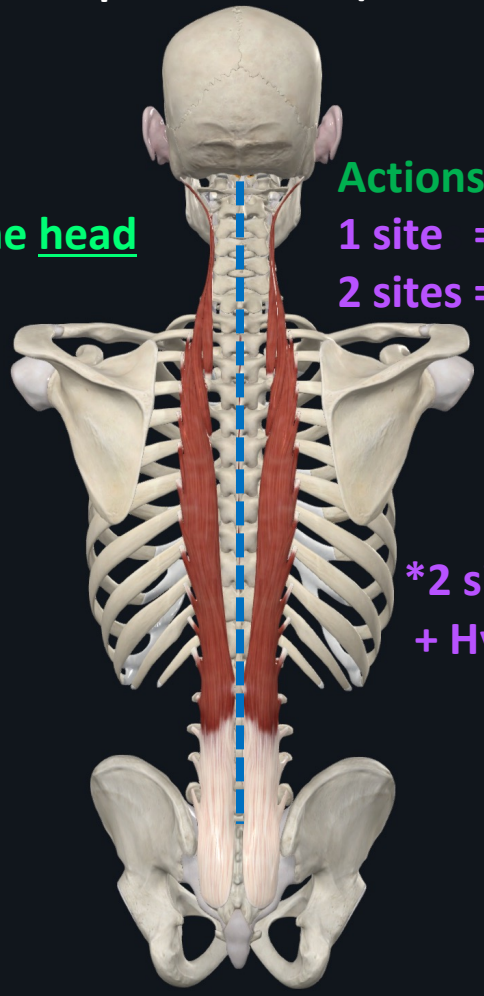
Actions:
2 sites = Extension of **head**
Hyperextension of head

C2. Intermediate layer of deep group = Sacrospinalis/erector spinae

Innervation: (Lateral branch) Posterior primary rami of spinal nerves (lower cervical, thoracic, lumbar)

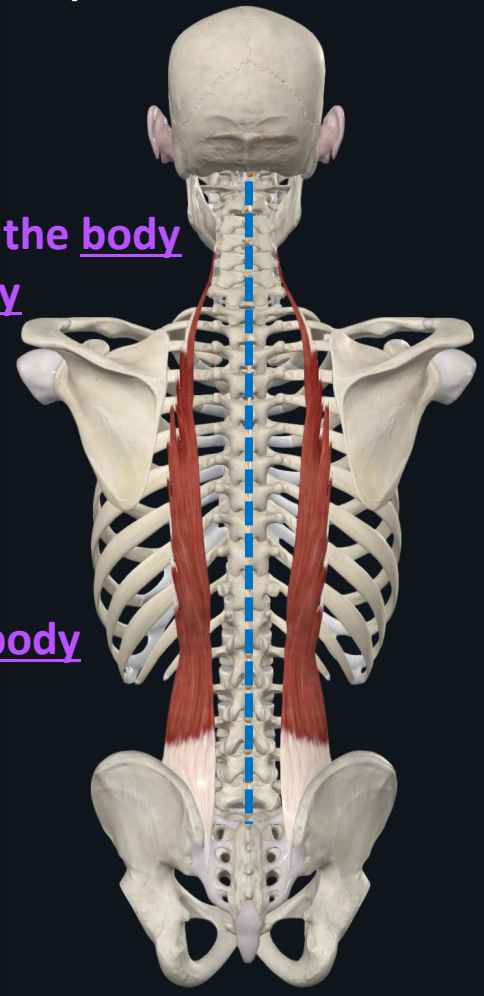


Actions:
1 site = Ipsillateral flexion of the head
2 sites = Extension of the head



Actions:
1 site = Ipsillateral flexion of the body
2 sites = Extension of the body

***2 sites =**
+ Hyperextension of the body



2.1 Medial column = Spinalis
- **2.1.1 Spinalis capitis m.**
- **2.1.2 Spinalis cervicis m.**
- **2.1.3 Spinalis thoracis m.**

2.2 Intermadiate column = Longissimus
- **2.2.1 Longissimus capitis m.**
- **2.2.2 Longissimus cervicis m.**
- **2.2.3 Longissimus thoracis m.***

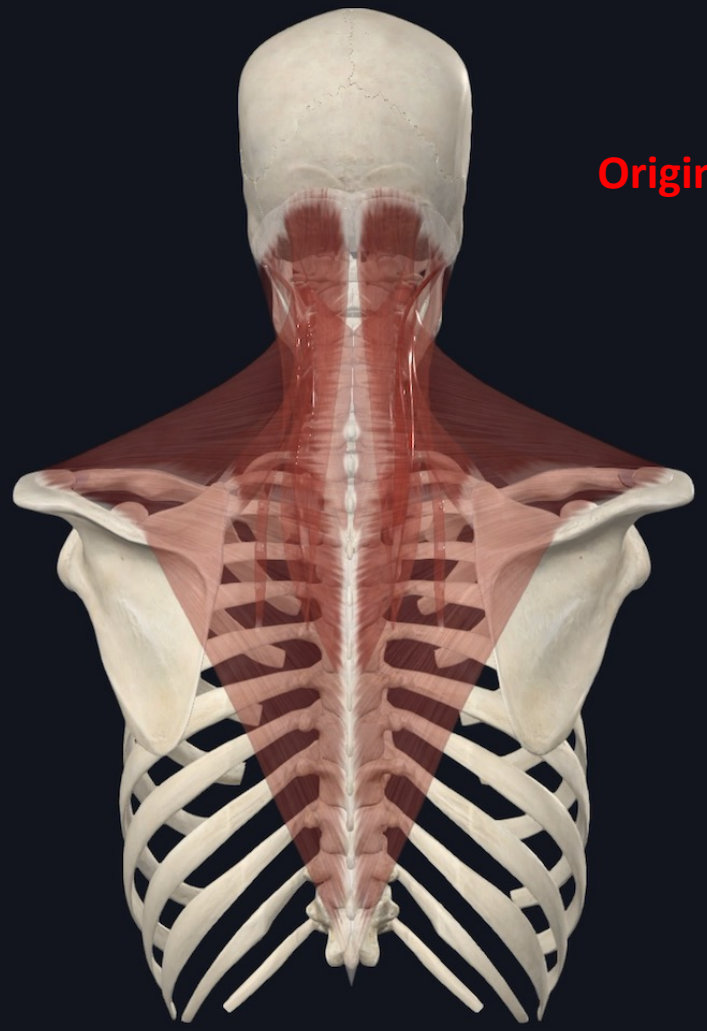
2.3 Lateral column = iliocostalis
- **2.3.1 iliocostalis cervicis m.**
- **2.3.2 iliocostalis thoracis m.***
- **2.3.3 iliocostalis lumborum m.***

C2. Intermediate layer of deep group = Sacrospinalis/erector spinae

2.1 Medial column = Spinalis
- 2.1.1 Spinalis capitis m.
- 2.1.2 Spinalis cervicis m.
- 2.1.3 Spinalis thoracis m.

2.2 Intermadiate column = Longissimus
- 2.2.1 Longissimus capitis m.
- 2.2.2 Longissimus cervicis m.
- 2.2.3 Longissimus thoracis m.*

2.3 Lateral column = iliocostalis
- 2.3.1 iliocostalis cervicis m.
- 2.3.2 iliocostalis thoracis m.*
- 2.3.3 iliocostalis lumborum m.*



Insertion

Origin



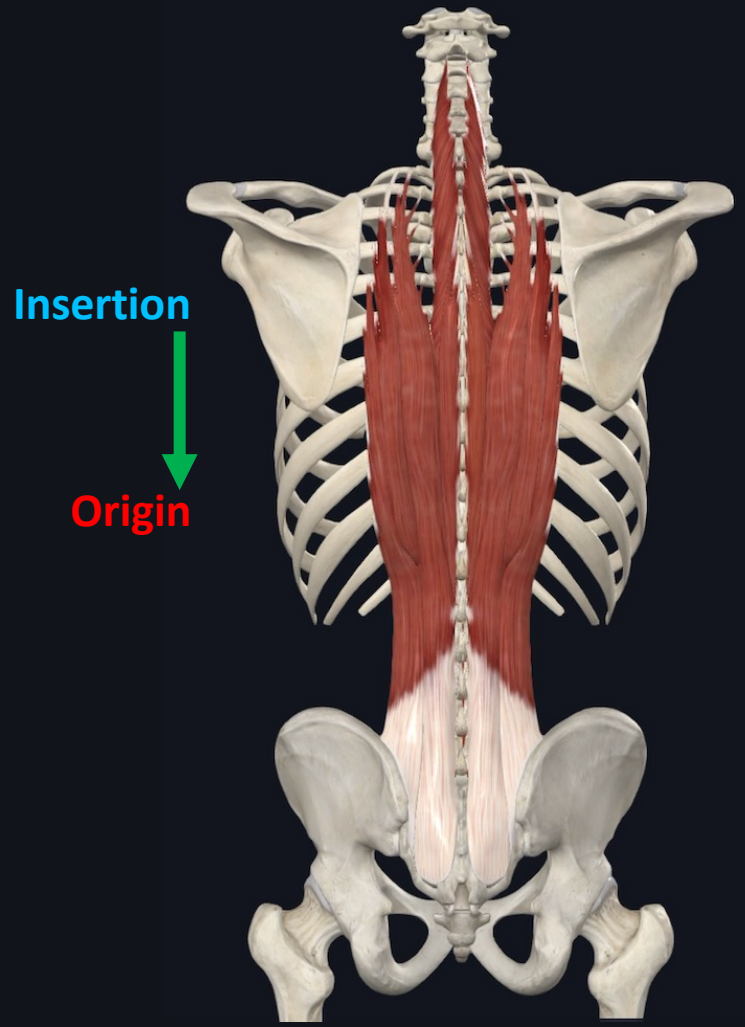
Actions:
1 site = Ipsillateral flexion of head

Actions:
2 sites = Extension of head
Hyperextension of head

C2. Intermediate layer of deep group = Sacrospinalis/erector spinae

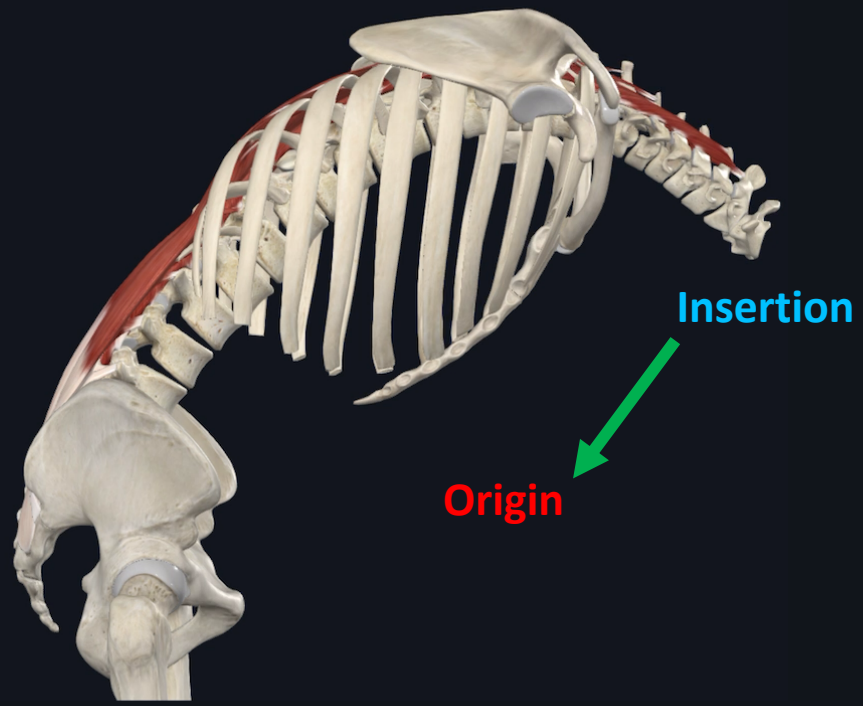
2.1 Medial column = Spinalis

- 2.1.1 Spinalis capitis m.
- 2.1.2 Spinalis cervicis m.
- 2.1.3 Spinalis thoracis m.



Actions:

1 site = Ipsilateral flexion of the body



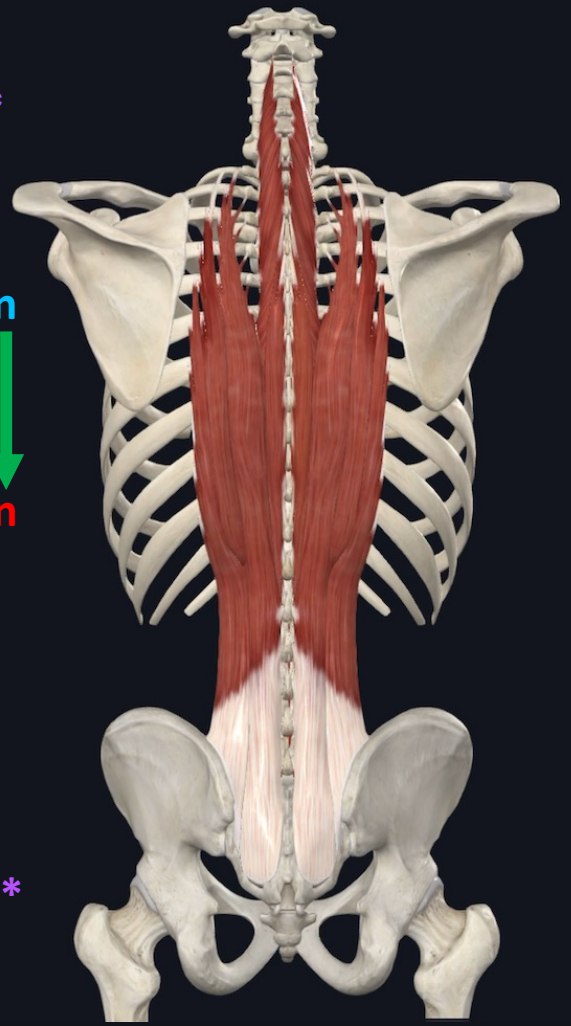
Actions:

2 sites = Extension of the body

C2. Intermediate layer of deep group = Sacrospinalis/erector spinae

2.2 Intermadiate column = Longissimus

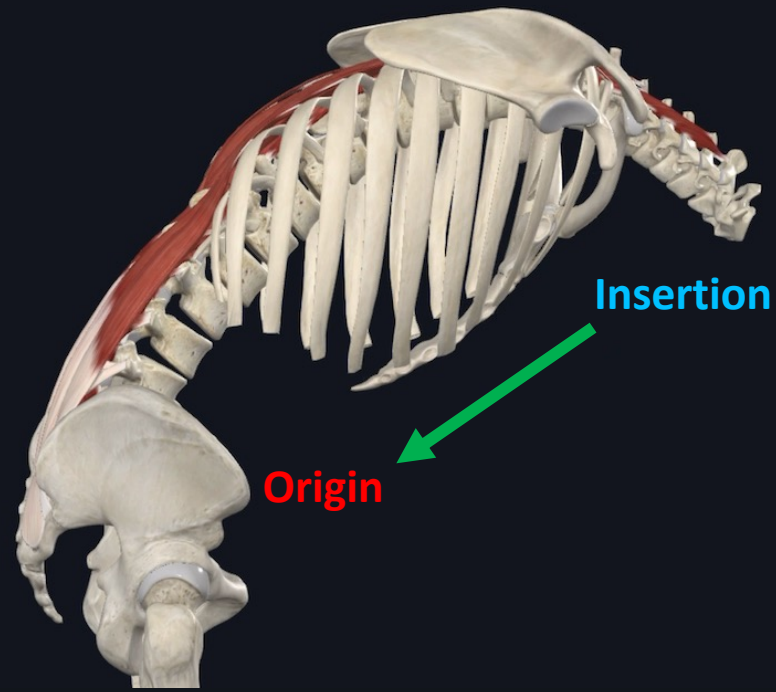
- 2.2.1 Longissimus capitis m.
- 2.2.2 Longissimus cervicis m.
- 2.2.3 Longissimus thoracis m.*



2.3 Lateral column = iliocostalis

- 2.3.1 iliocostalis cervicis m.
- 2.3.2 iliocostalis thoracis m.*
- 2.3.3 iliocostalis lumborum m.*

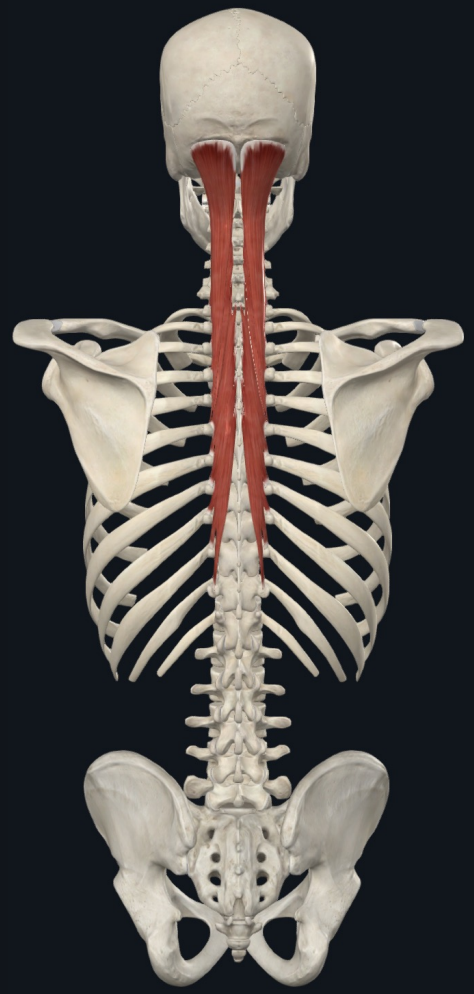
Actions:
1 site = Ipsilateral flexion of the body

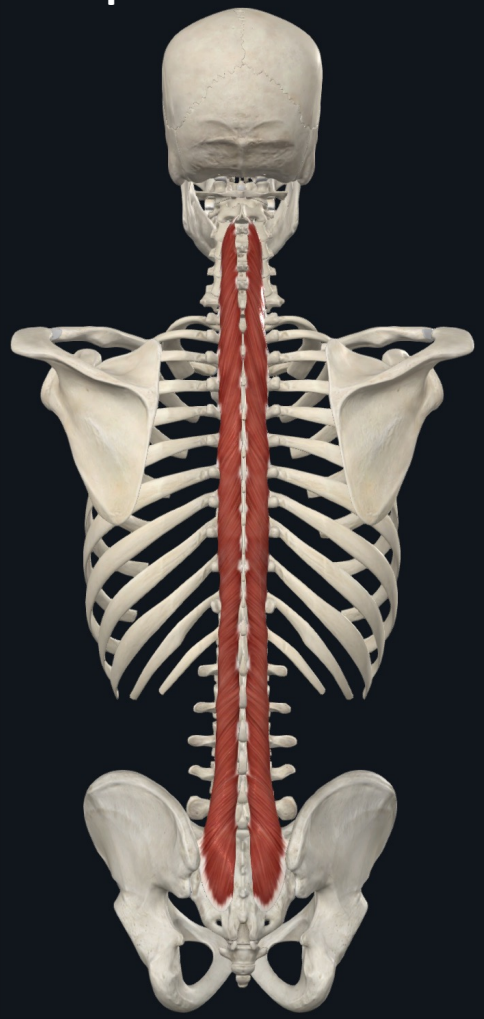


Actions:
2 sites = Extension of the body
Hyperextension of the body*

C3: Deep layer of deep group = Transversospinalis

Innervation: (Medial branch) Posterior primary rami of spinal nerves







3.1 Semispinalis

- **3.1.1 Semispinalis capitis m.**
- **3.1.2 Semispinalis cervicis m.**
- **3.1.3 Semispinalis thoracis m.**

3.2 Multifidus

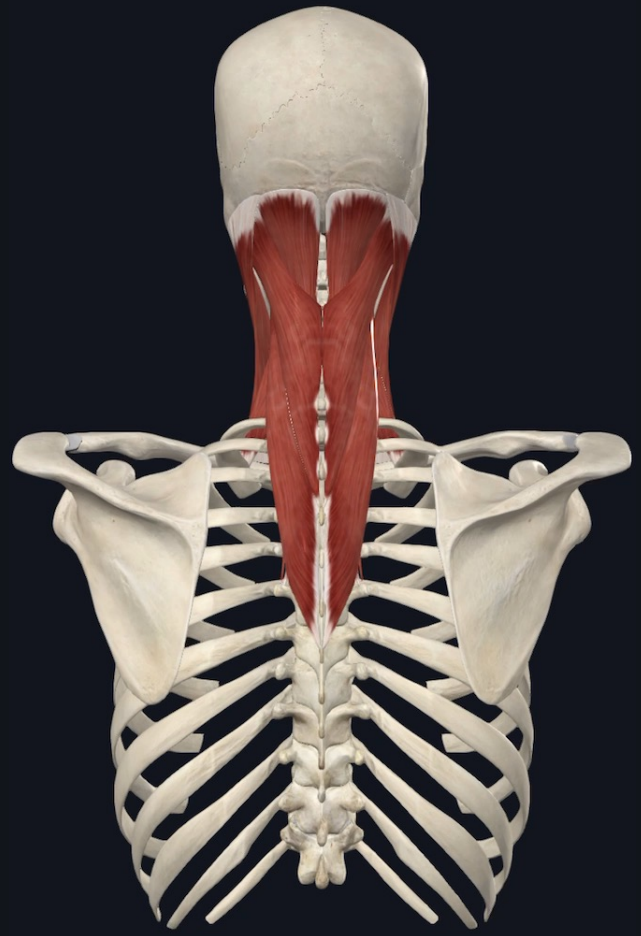
3.3 Rotatores

C3: Deep layer of deep group = Transversospinalis

3.1 Semispinalis

3.1.1 Semispinalis capitis m.







Actions:

1 site = Ipsilateral flexion of head

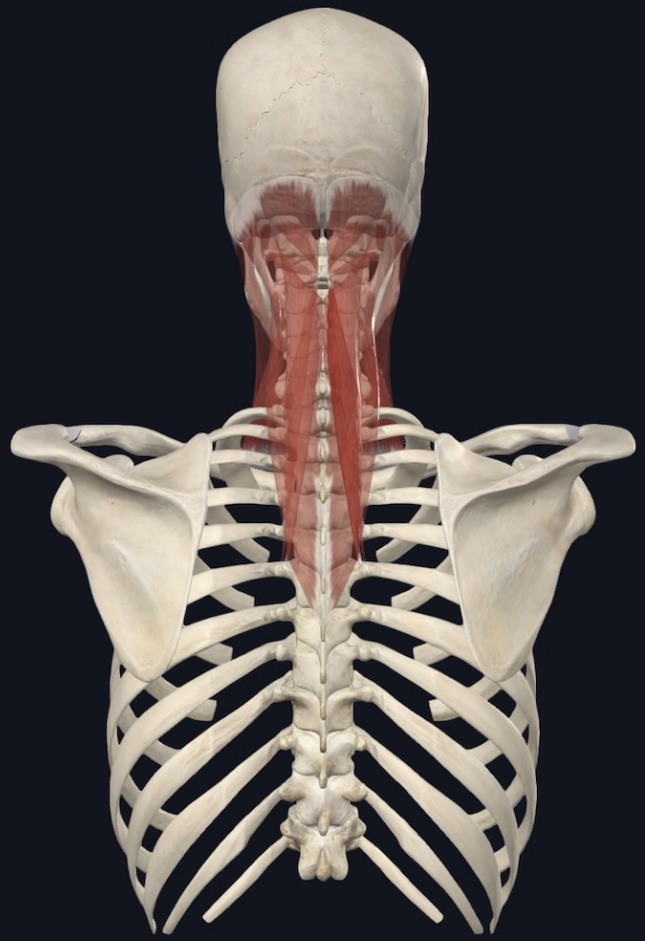
1 site = Contralateral rotation of head

2 sites = Extension of head
Hyperextension of head

C3: Deep layer of deep group = Transversospinalis

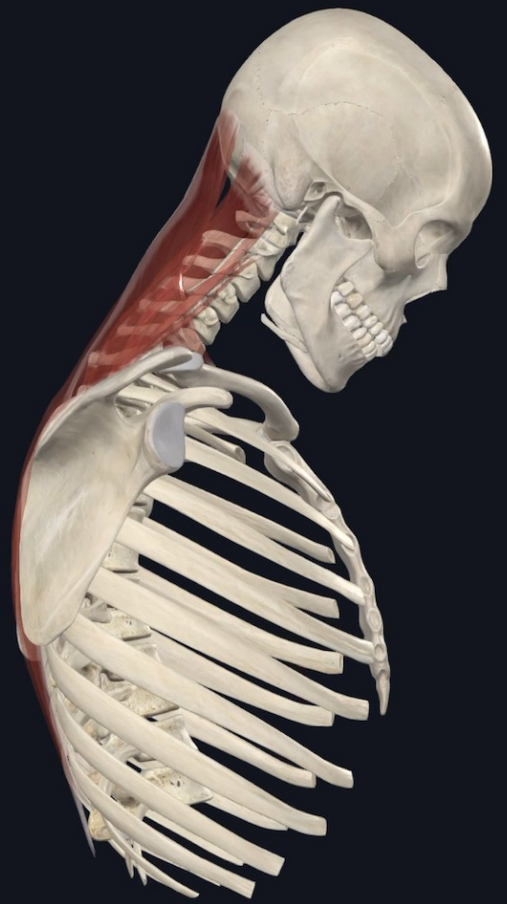
3.1 Semispinalis

3.1.2 Semispinalis cervicis m.



Action:

1 site = Contralateral rotation of head



Actions:

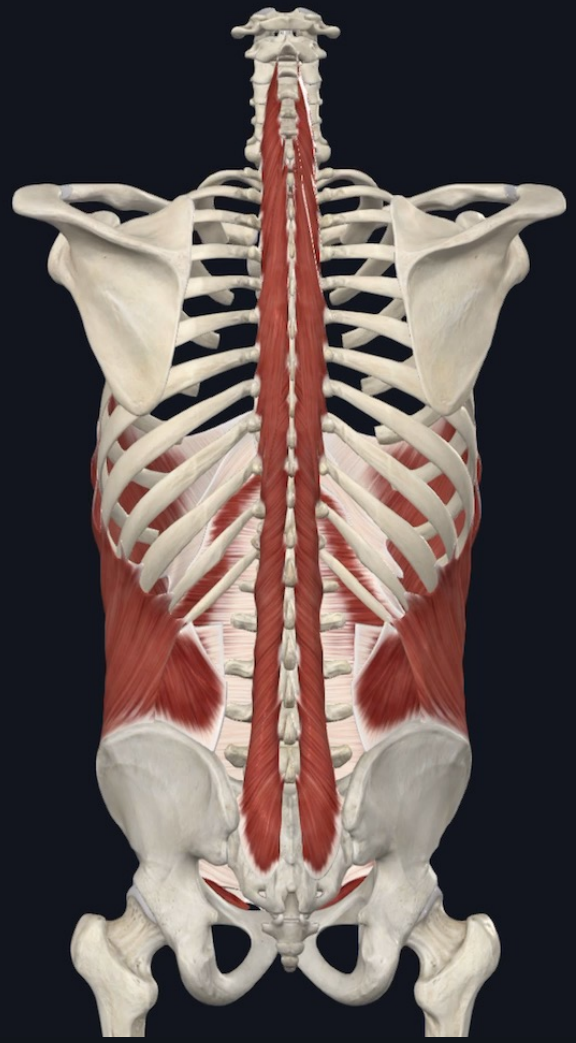
2 sites = Extension of head

Hyperextension of head

C3: Deep layer of deep group = Transversospinalis

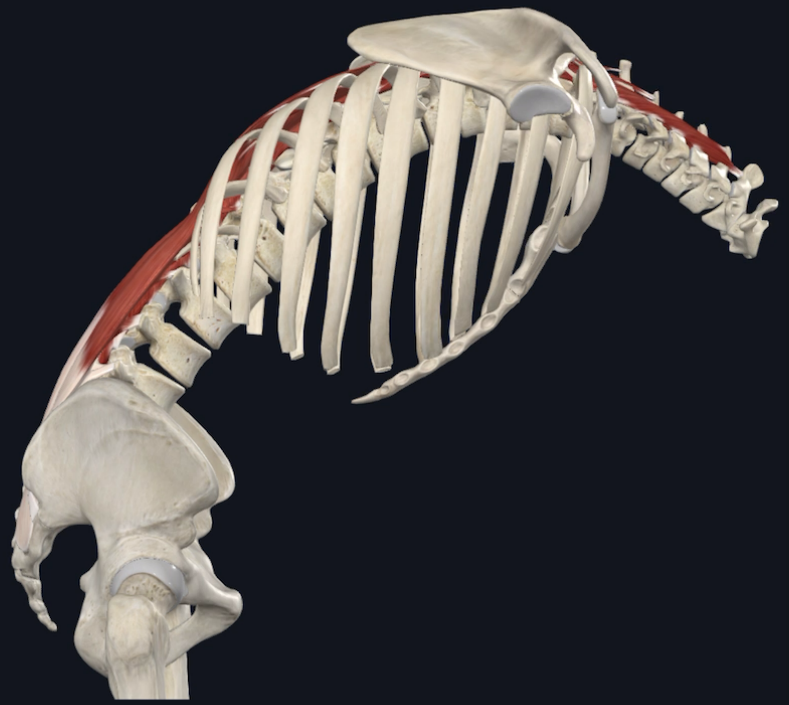
3.1 Semispinalis

3.1.3 Semispinalis thoracis m.



Actions:

1 site = Ipsilateral rotation of the body

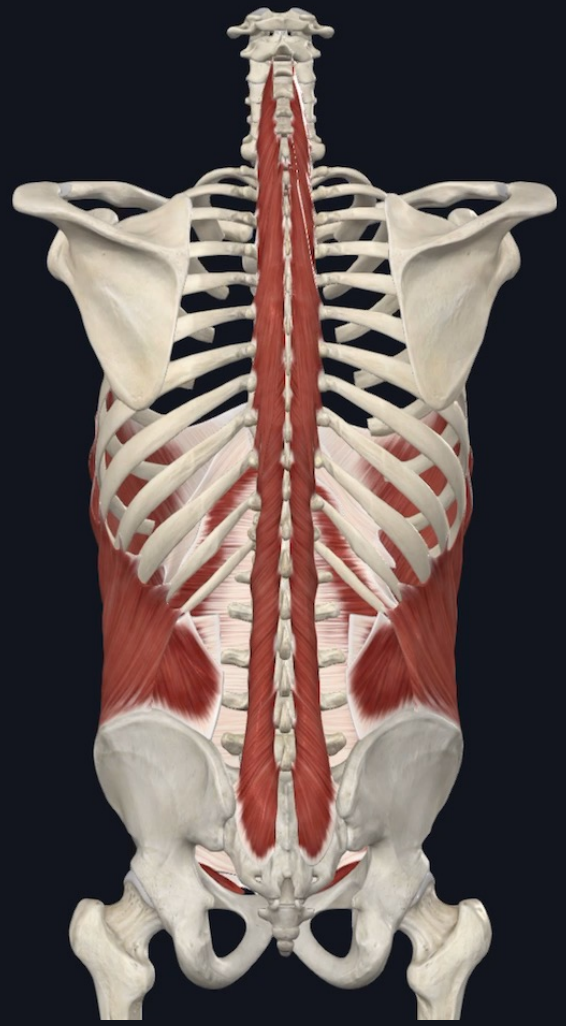


Actions:

2 sites = Extension of the body

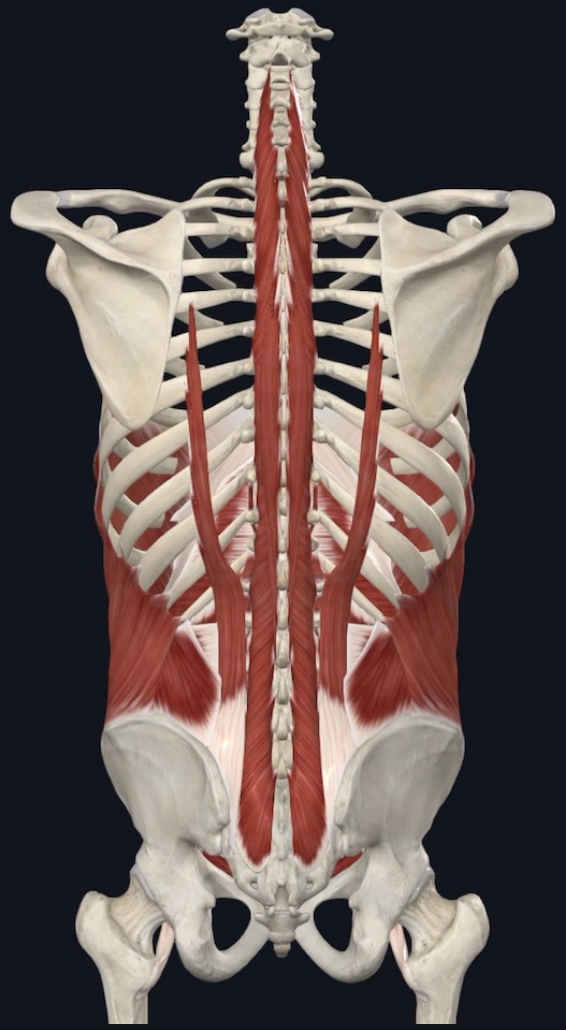
C3: Deep layer of deep group = Transversospinalis

3.2 Multifidus



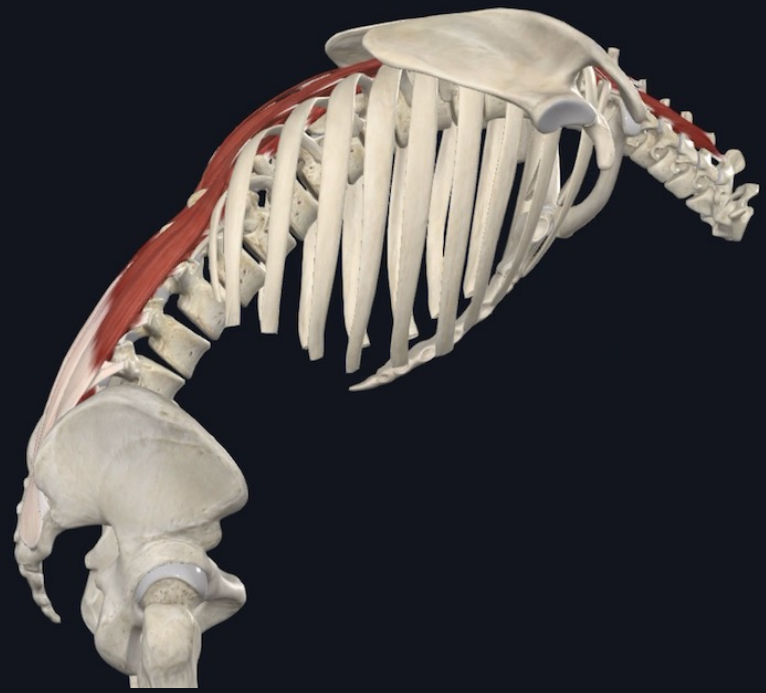
Actions:

1 site = Ipsilateral rotation of the body



Actions:

1 site = Ipsilateral flexion of the body



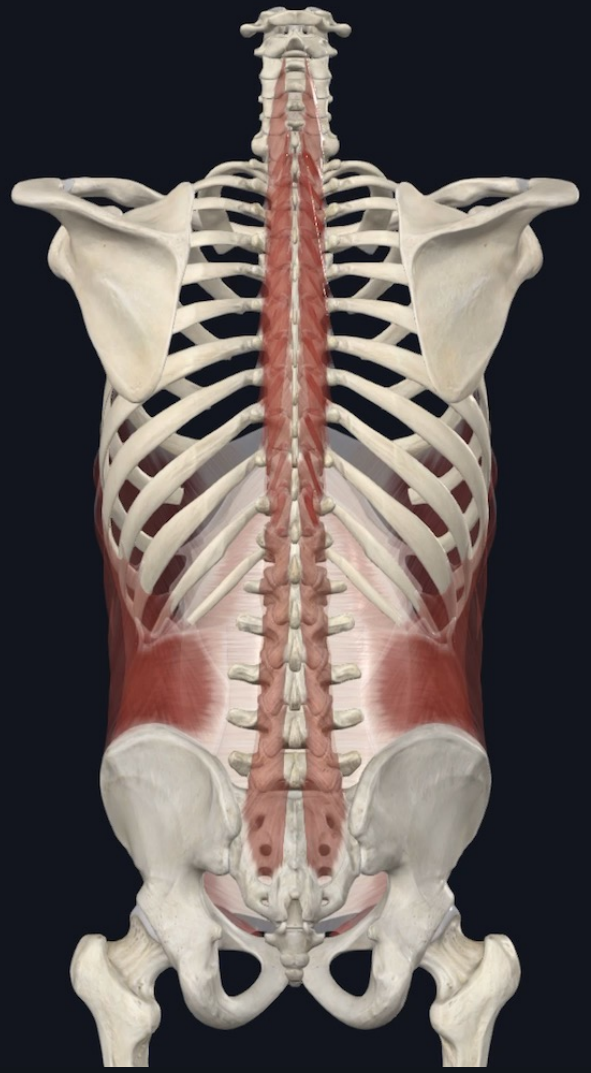
Actions:

2 sites = Extension of the body

Hyperextension of the body

C3: Deep layer of deep group = Transversospinalis

3.3 Rotatores



Action:

1 site = Ipsilateral rotation of the body

Nerve innervation of the back



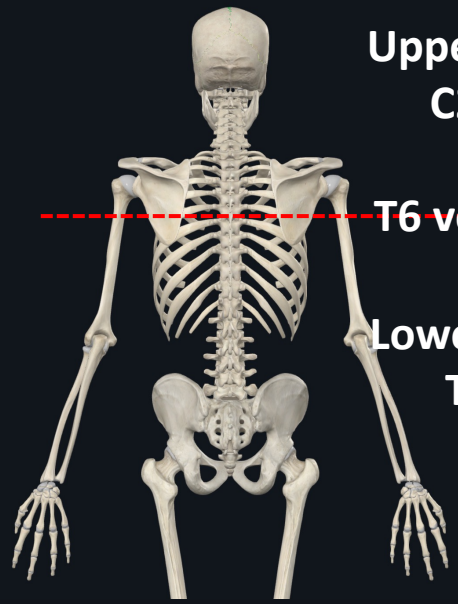
(Superficial group)



(Intermediate group)



(Deep group)



(Bony landmark)

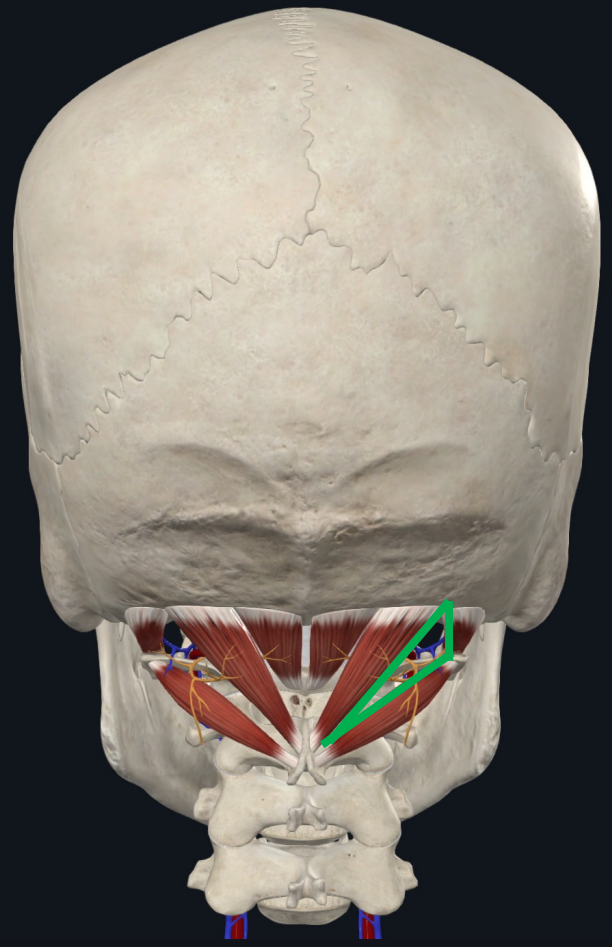


(Skin)

Motor innervation

Sensory innervation





Suboccipital region

Part II: Concepts of the suboccipital region

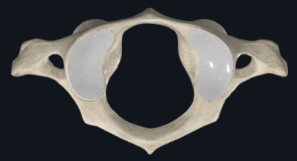
1. Surface landmarks (bone)
2. Muscles of suboccipital region (Origin & Insertion)
   - A. Rectus capitis posterior minor m.
   - B. Rectus capitis posterior major m.
   - C. Obliquus capitis superior m.
   - D. Obliquus capitis inferior m.
3. Suboccipital triangle
   - A. Boundaries
   - B. Contents
     - Vertebral artery
     - Vertebral vein
     - Suboccipital nerve (C1 spinal nerve)

The origin is the attachment site that doesn't move during contraction,
The insertion is the attachment site that does move when the muscle contracts
"insertion to origin ---> actions of muscle" innervated by nerve

1. Surface landmarks



1. Occipital bone
   - Inferior nuchal line
   - Posterior aspect
2. Atlas (C1)
   - Posterior arch
   - Transverse process
3. Axis (C2)
   - Spinous process (Bification)

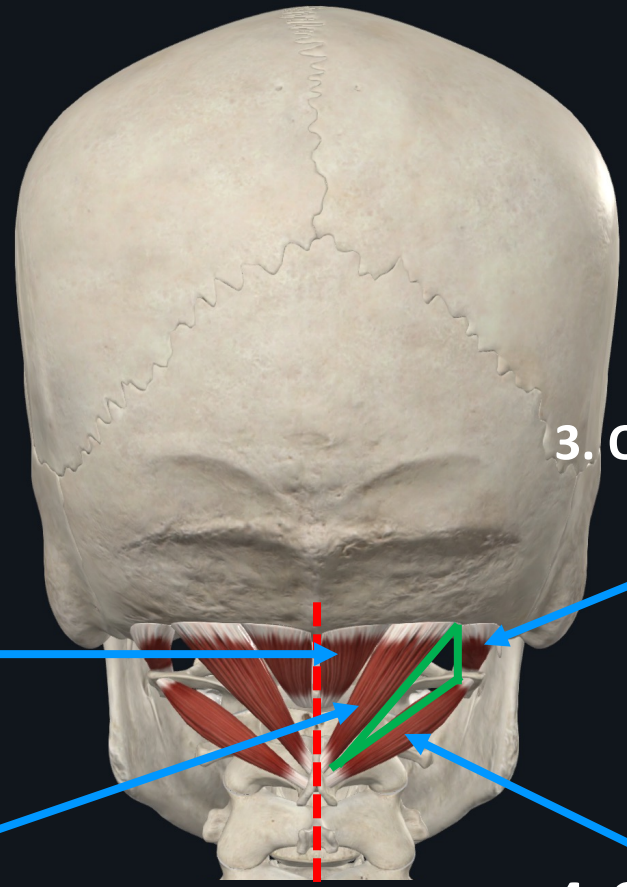


(Superior view; Atlas)



(Posterior view; Axis)

2. Muscles of the suboccipital region



1. Rectus capitis posterior minor m.
2. Rectus capitis posterior major m.
3. Obliquus capitis superior m.
4. Obliquus capitis inferior m.

Suboccipital triangle

Muscles of the Suboccipital region

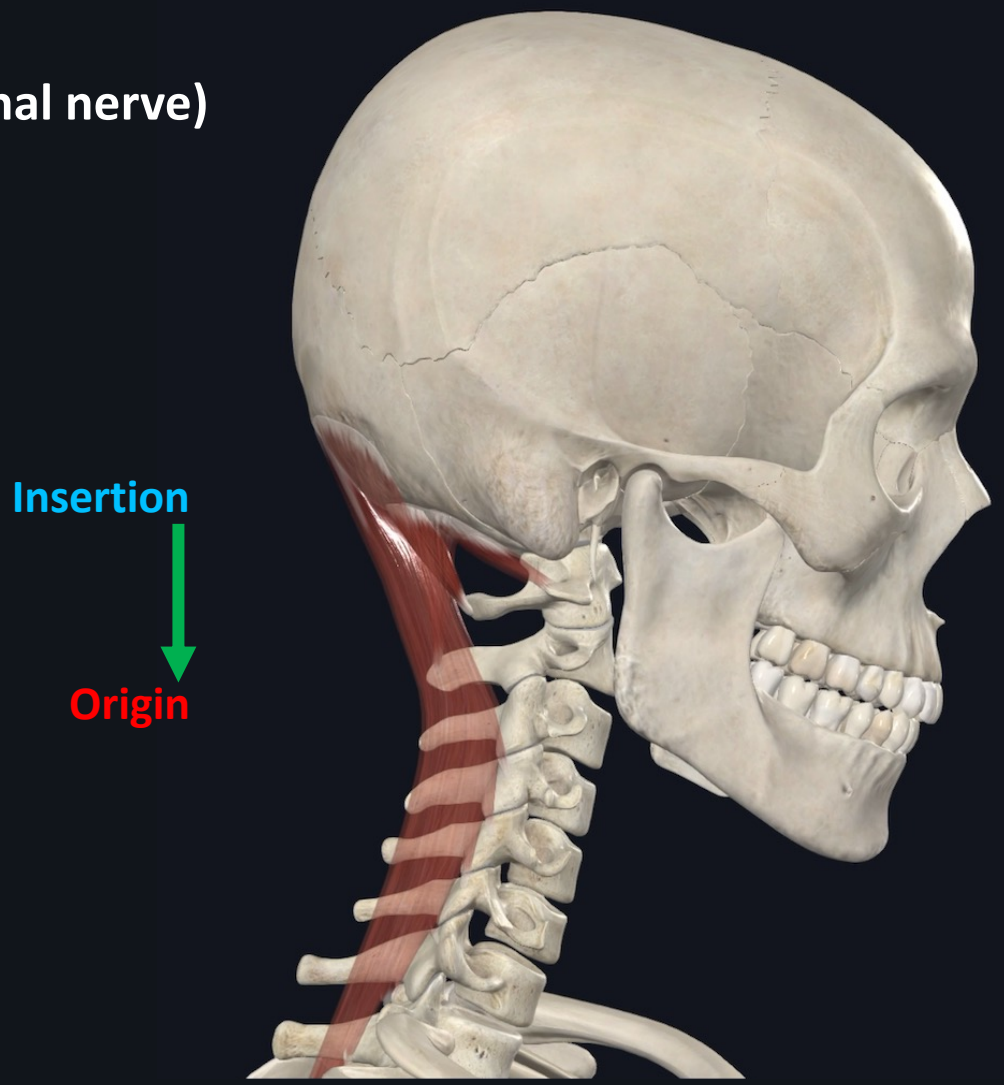
1. Rectus capitis posterior minor m.
2. Rectus capitis posterior major m.
3. Obliquus capitis superior m.
4. Obliquus capitis inferior m.

2.1 Rectus capitis posterior minor m.

Origin: Posterior arch of Atlas (C1)
Insertion: Inferior nuchal line of ocipital bone
Innervation: Suboccipital nerve (posterior primary ramus of C1 spinal nerve)



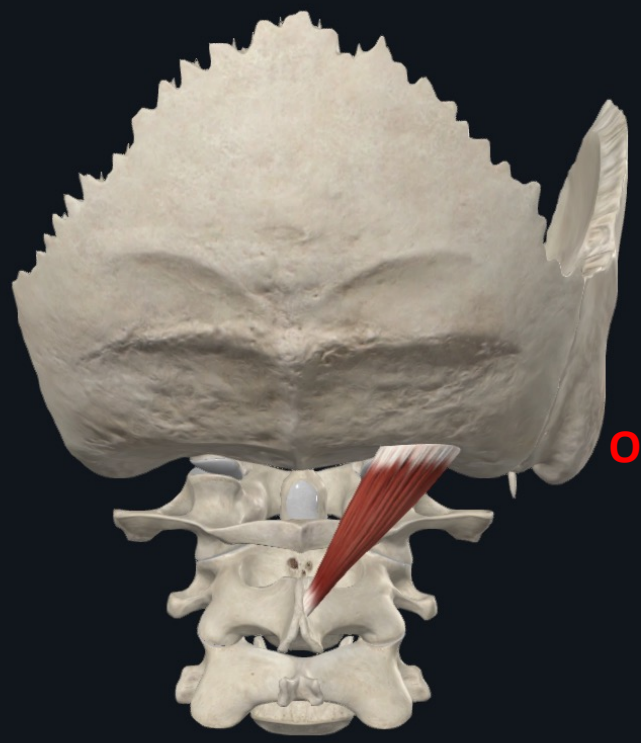
(Posterior view)



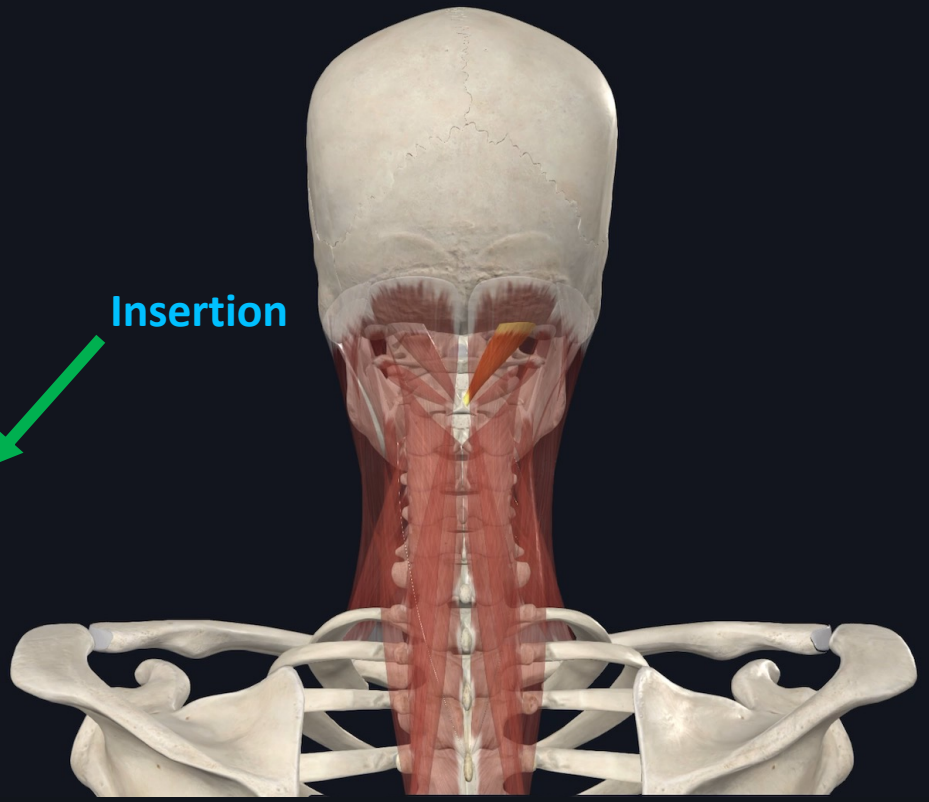
Action:
2 sites = Head extension & hyperextension

2.2 Rectus capitis posterior major m.

Origin: Spinous process of Axis (C2)
Insertion: Inferior nuchal line of ocipital bone
Innervation: Suboccipital nerve (posterior ramus of C1 spinal nerve)



(Posterior view)



Action:
1 site = Ipsilateral rotation of head



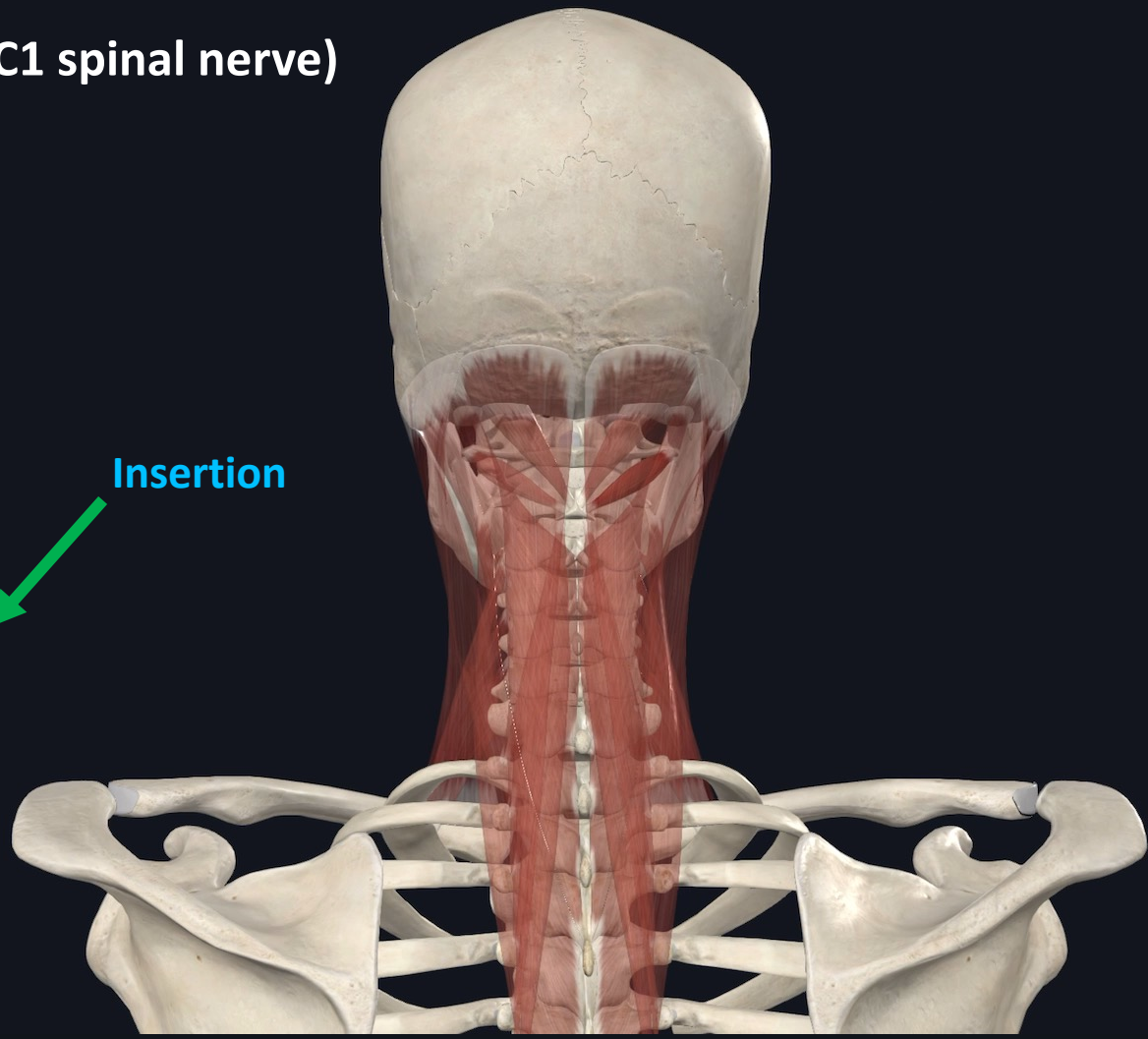
Action:
2 sites = Head extension & hyperextension

2.3 Obliquus inferior capitis m.

Origin: Spinous process of Axis (C2)
Insertion: Transverse process of Atlas (C1)
Innervation: Suboccipital nerve (posterior primary ramus of C1 spinal nerve)



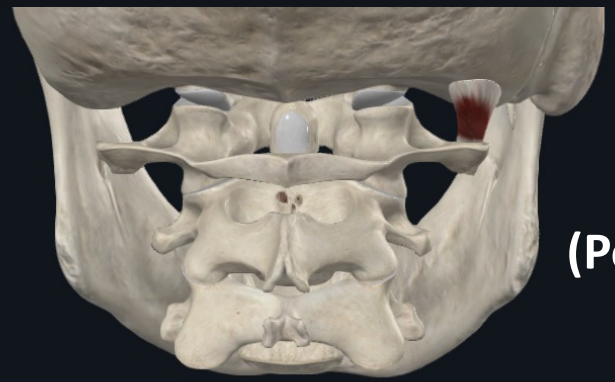
(Posterior view)



Action:
1 site = Ipsilateral rotation of head

2.4 Obliquus superior capitis m.

Origin: Transverse process of Atlas (C1)
Insertion: Posterior aspect of occipital bone
Innervation: Suboccipital nerve
(posterior primary ramus of C1 spinal nerve)



(Posterior view)



Action:
1 site = Ipsilateral flexion of head

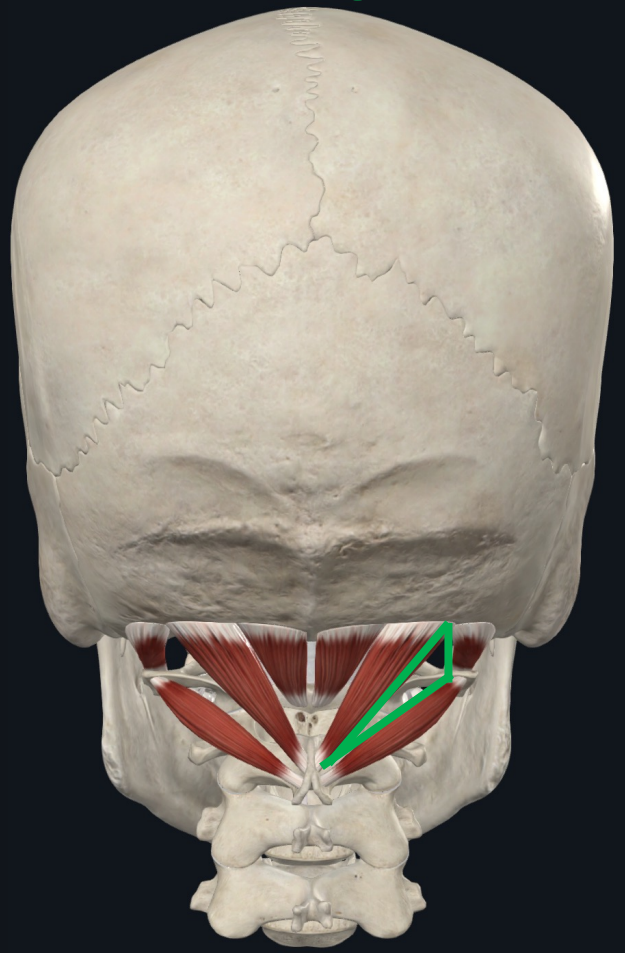


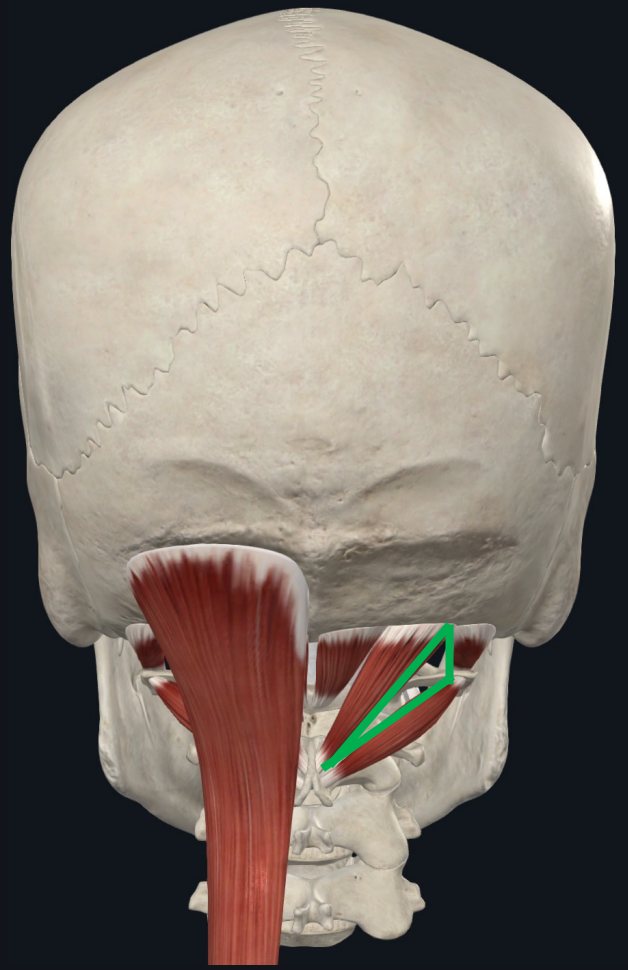
Action:
1 site = Ipsilateral rotation of head

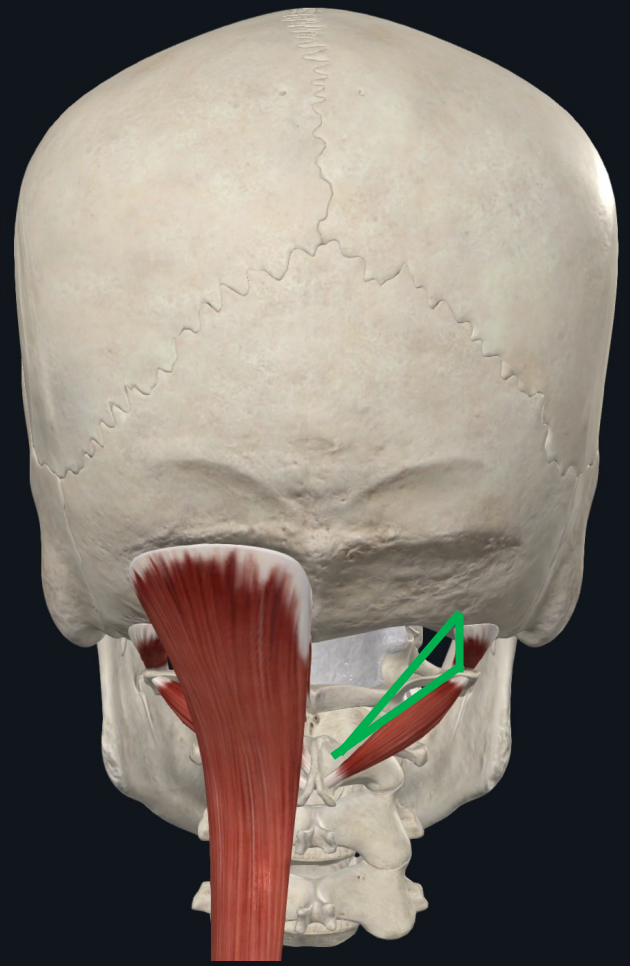


Action:
2 sites = Head extension & hyperextension

3. Suboccipital triangle: Boundaries







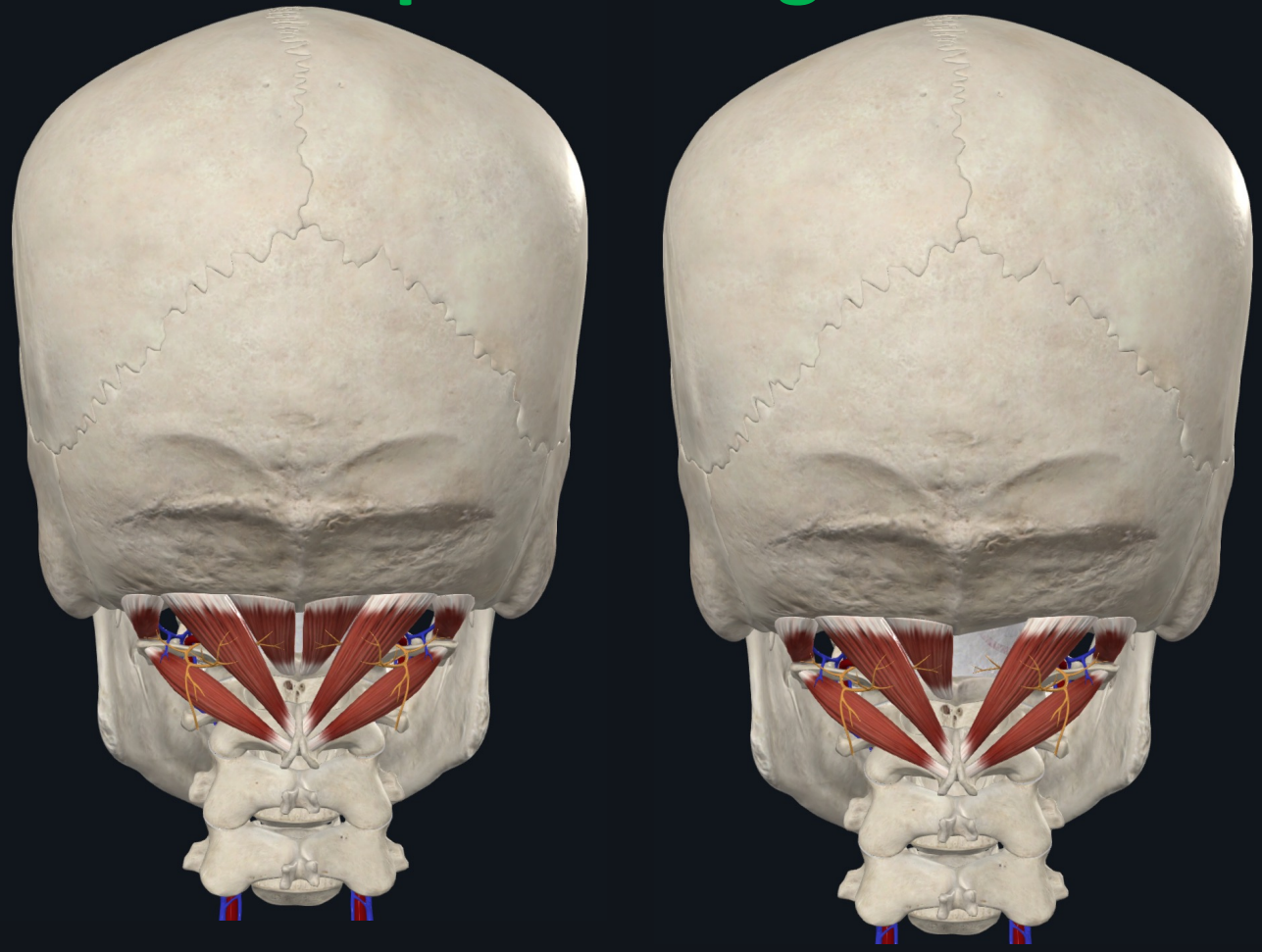
Muscles of the Suboccipital region

1. Rectus capitis posterior minor m.
2. Rectus capitis posterior major m.
3. Obliquus capitis superior m.
4. Obliquus capitis inferior m.

Boundaries of suboccipital triangle

Roof: Semispinalis capitis m.
Superior + medial: Rectus capitis posterior major m.
Superior + lateral: Obliquus capitis superior m.
Inferior + lateral: Obliquus capitis inferior m.
Floor: Posterior atlanto-occipital membrane, posterior arch of atlas

3. Suboccipital triangle: contents

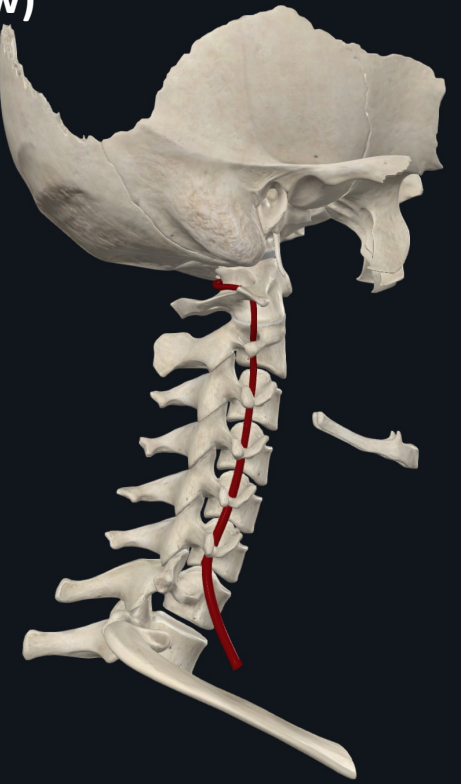




(Superior view)



(Posterior view)

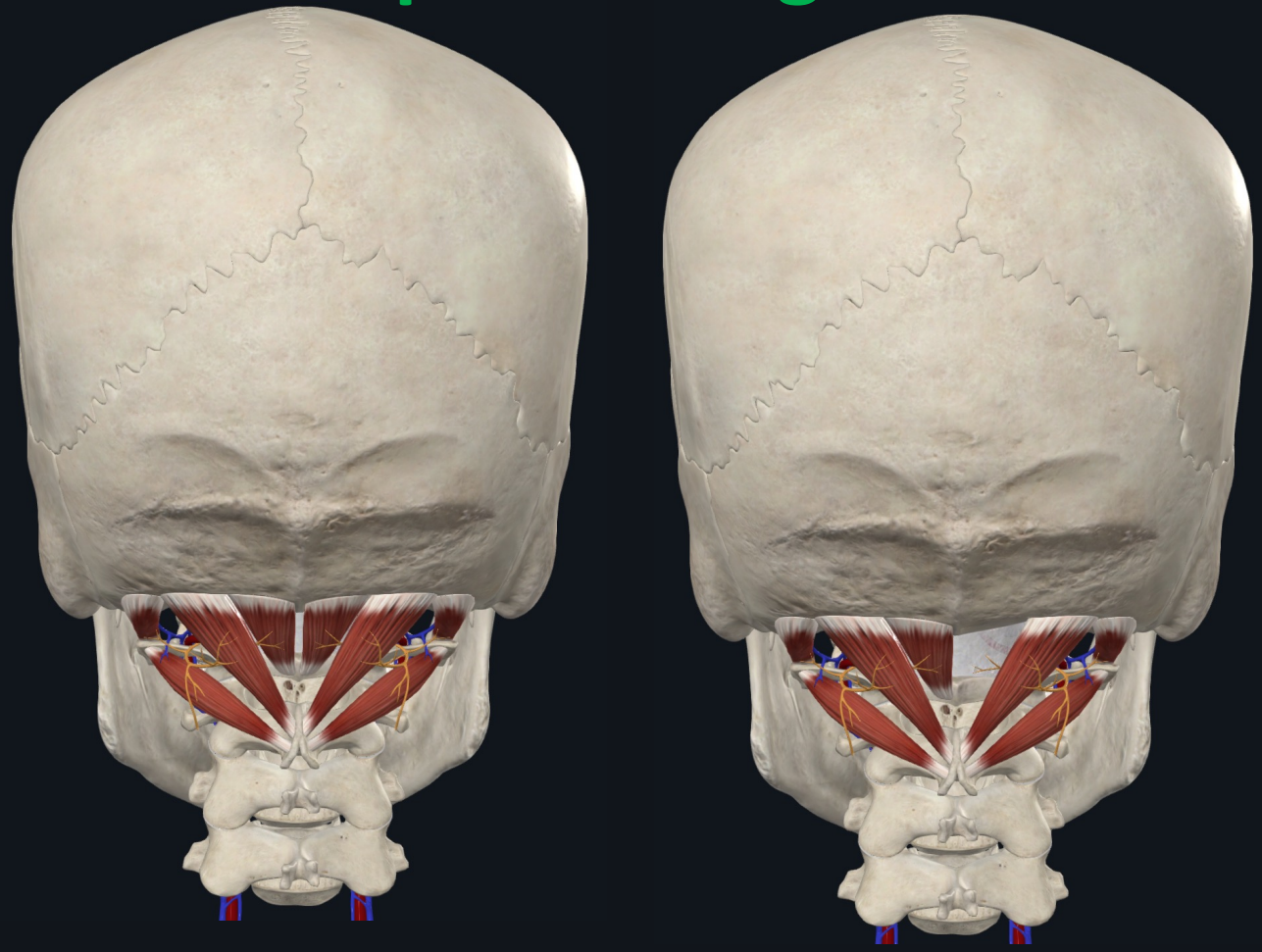


(Lateral view)

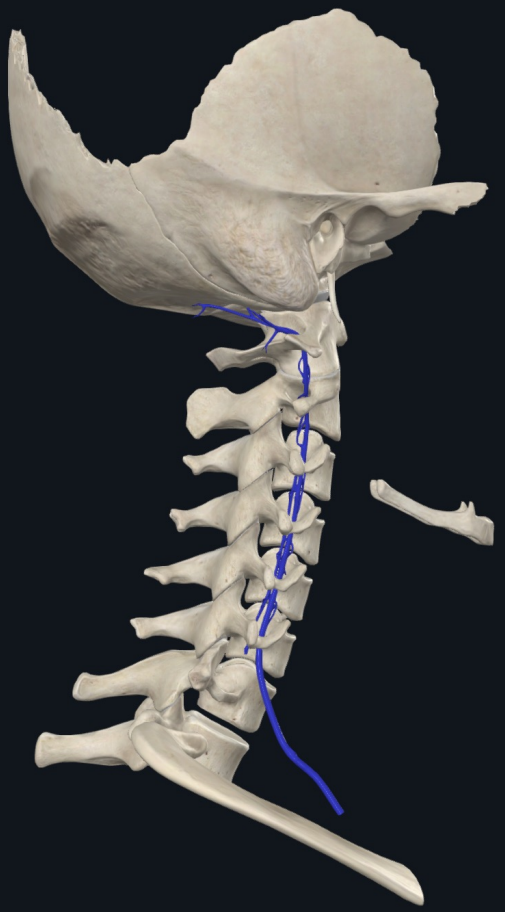
1. Vertebral artery <--- Subclavian artery

(Foramen transversarium of atlas --> Foramen magnum of skull)

3. Suboccipital triangle: contents







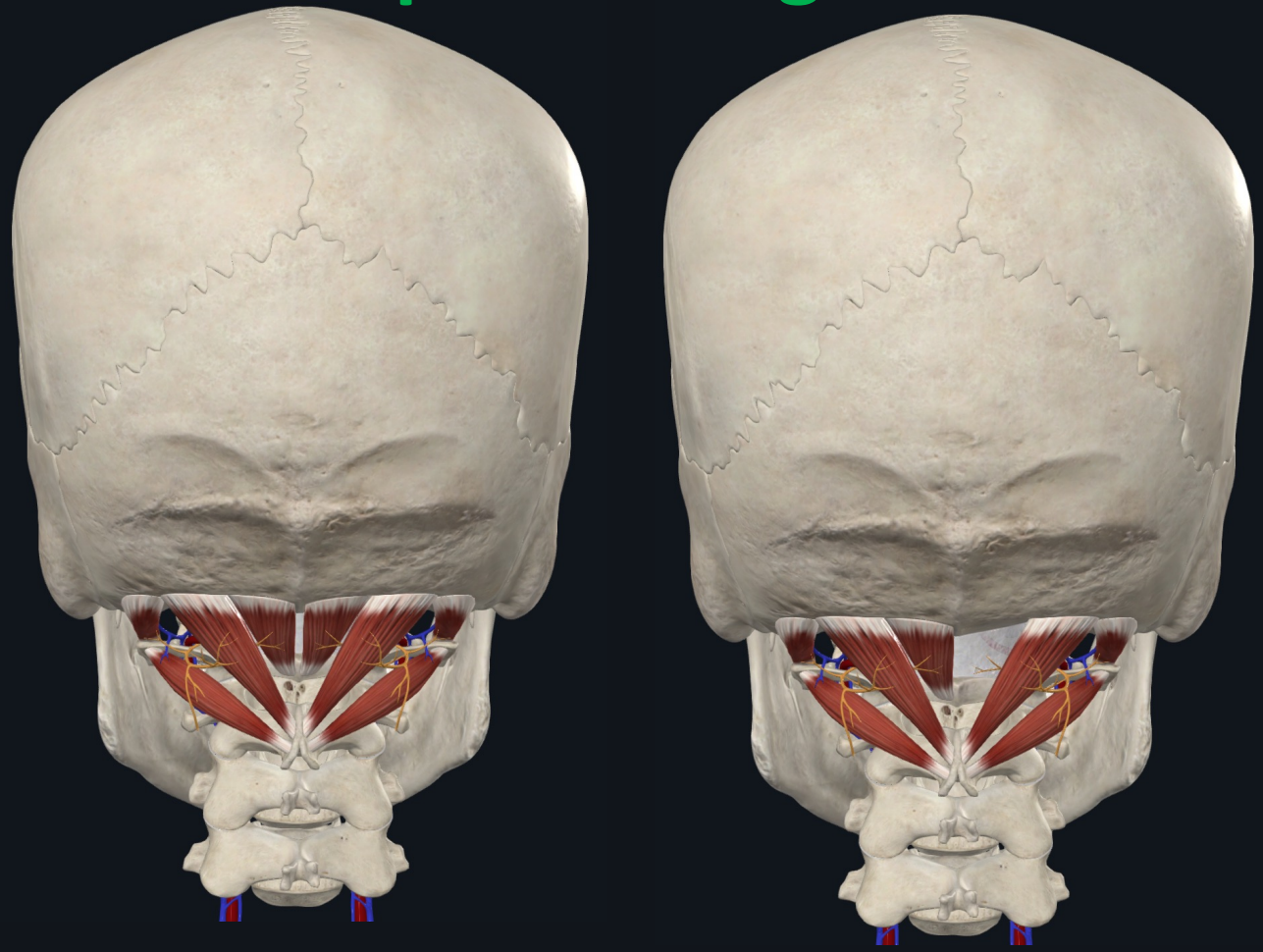
2. Vertebral vein <--- the venous plexus in the suboccipital triangle

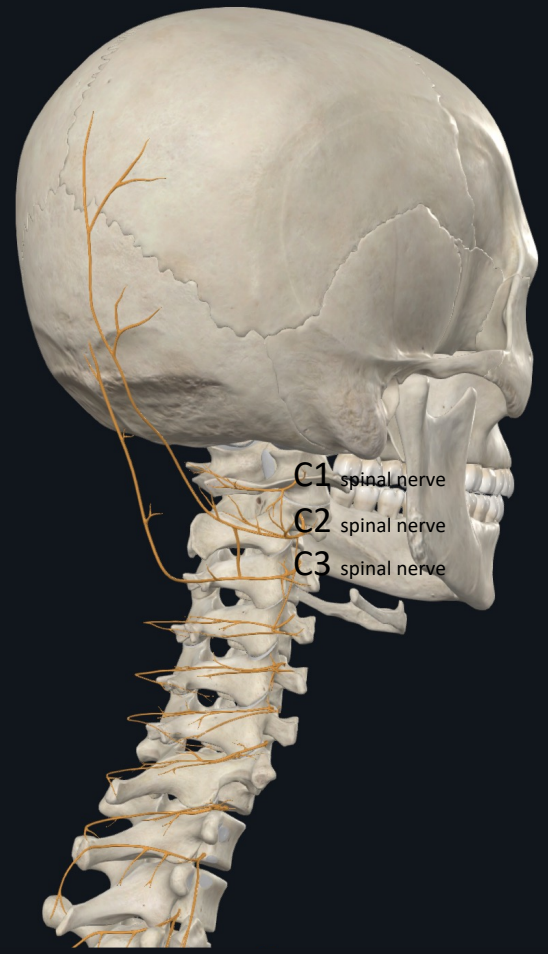
Drainage: suboccipital region and vertebral column

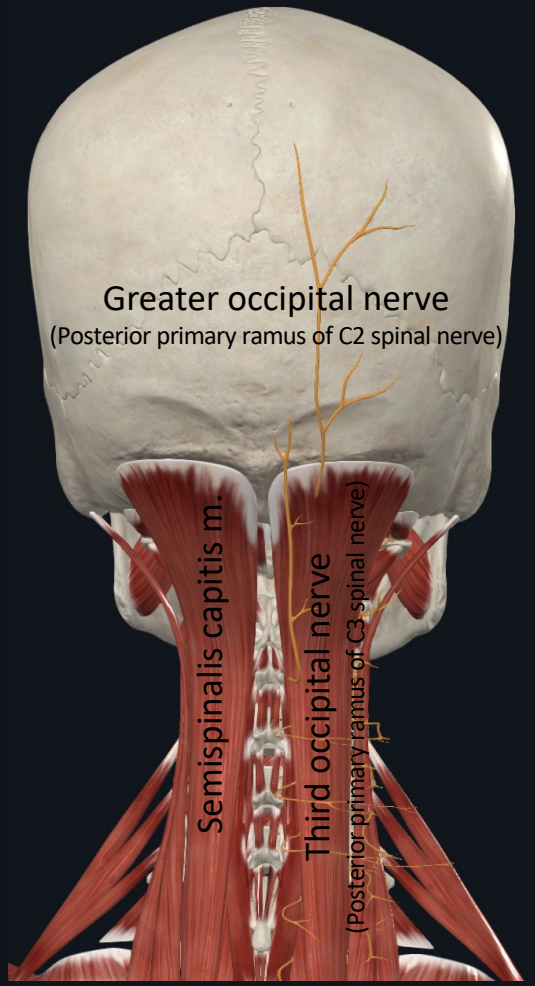
(Posterior view)

(Lateral view)

3. Suboccipital triangle: contents





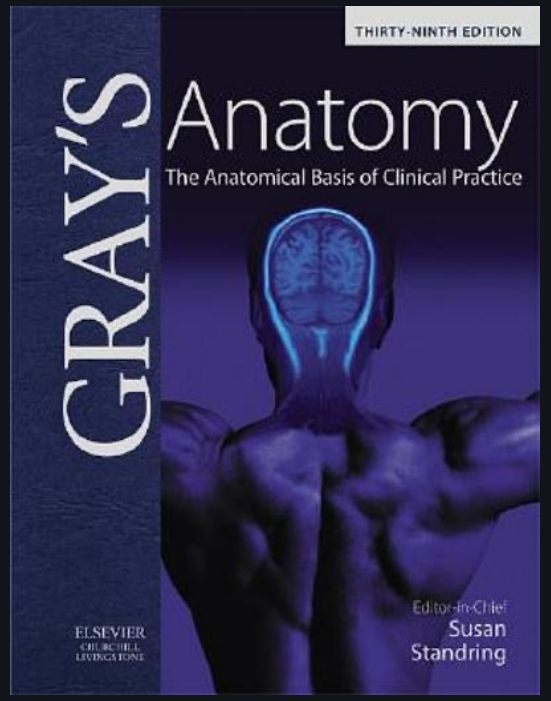


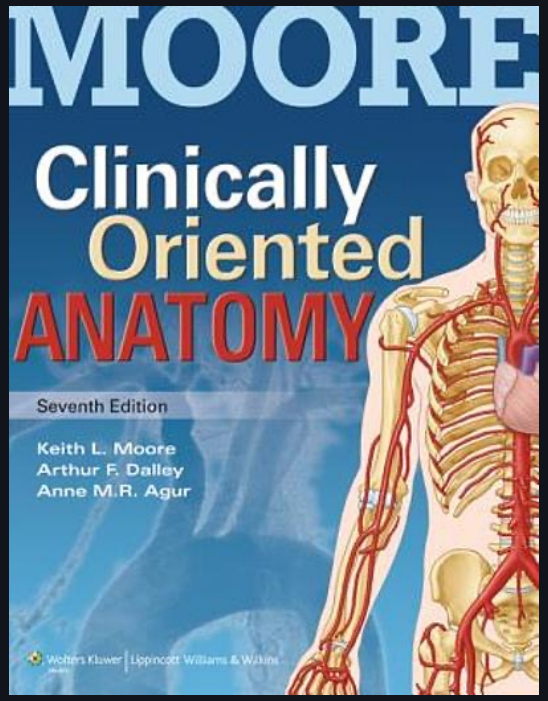
3. Suboccipital n. (Posterior primary rami of C1 spinal nerve)
Branches and innervates the suboccipital muscle (4X).

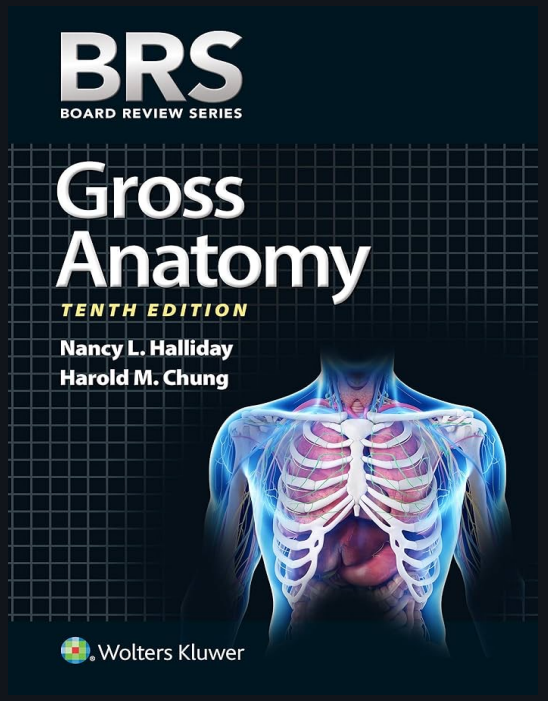
(Posterolateral view)

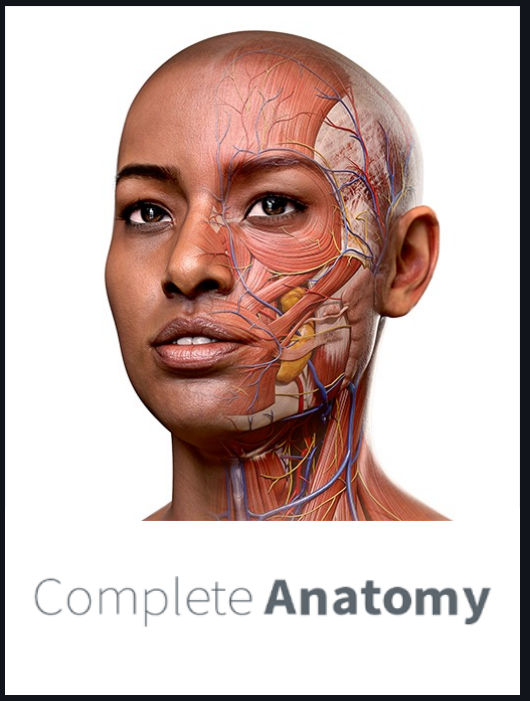
(Posterior view)

References and further readings





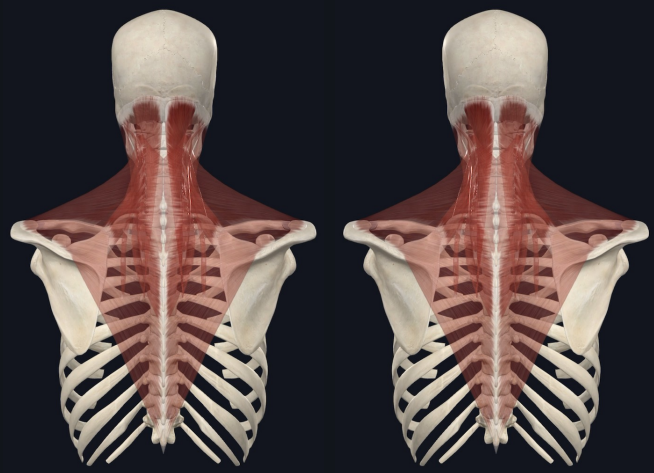




1. Moore, K. L., Dalley, A. F., Agur, A. M. R. (2014). Clinically Oriented Anatomy. The United Kingdom: Wolters Kluwer/Lippincott Williams & Wilkins Health.

2. Gray's Anatomy: The Anatomical Basis of Clinical Practice. (2016). Netherlands: Elsevier Limited.

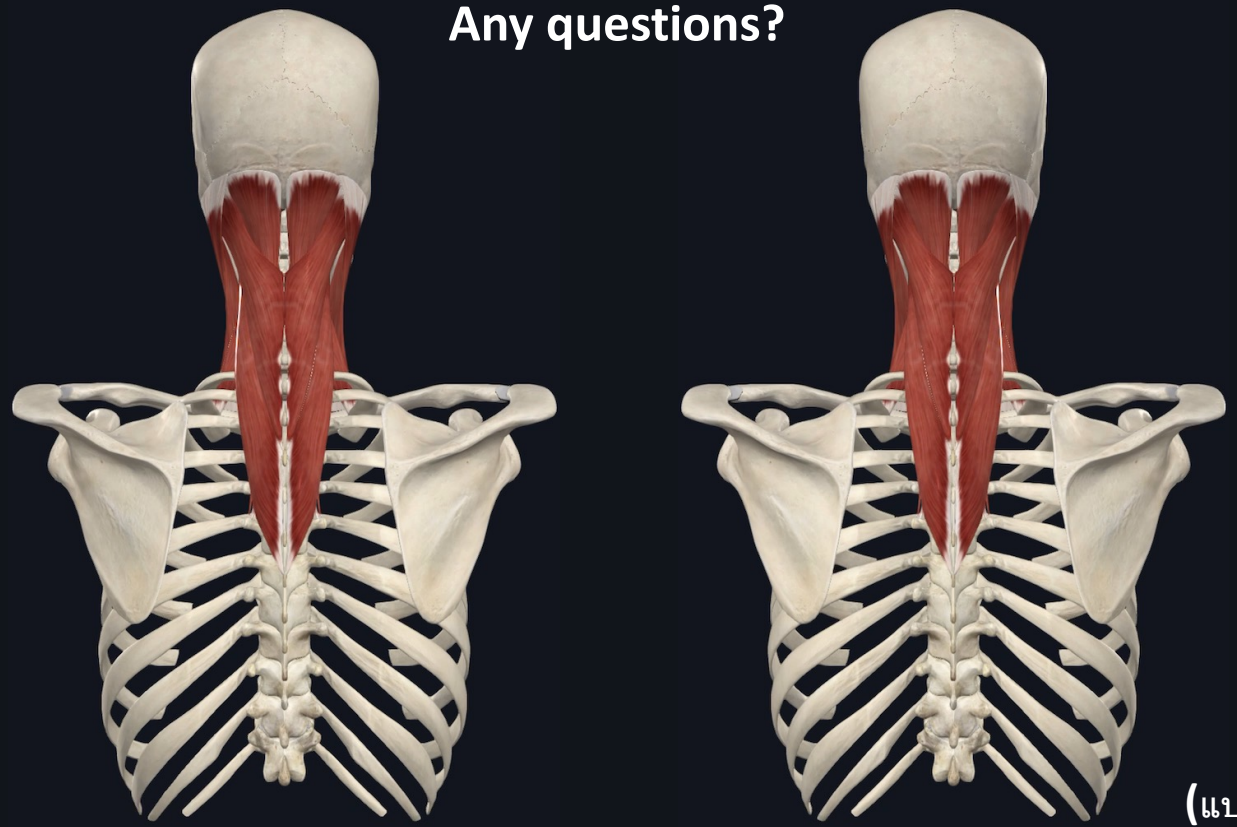
3. Halliday, N. L., Chung, H. M. (2022). BRS Gross Anatomy. The United States of America: Wolters Kluwer Health.



Department of Anatomy, Faculty of Dentistry, Mahidol University

DTAN 211: Gross Anatomy of Head and Neck in Dentistry

The Back



Any questions?

(แบบประเมินการสอนในชั้นต้น เพื่อประกอบการเสนอขอกำหนดตำแหน่งรองศาสตราจารย์)

IG: all.nupong
Email: Anupong.son@mahidol.ac.th

ANS

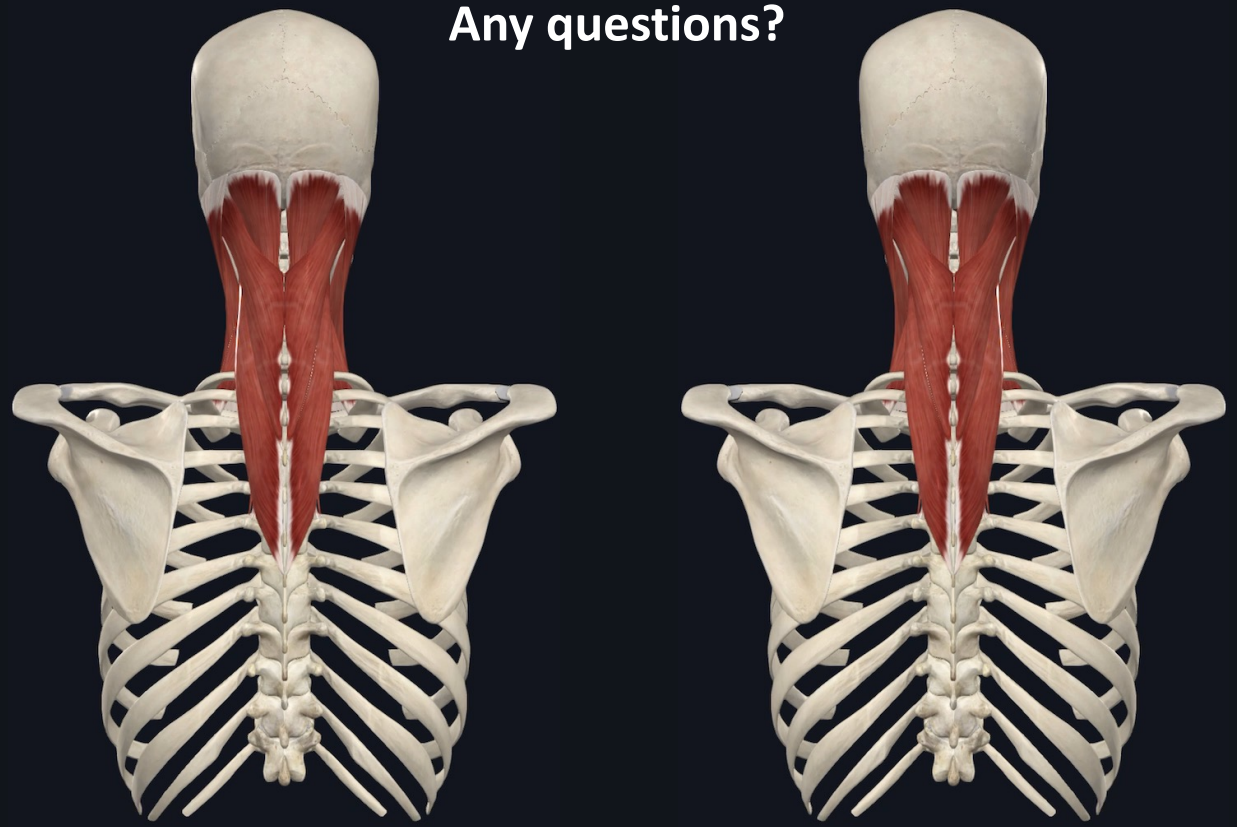
Assistant Professor Dr. Anupong Thongklam Songsaad
B.Sc. (Biology, 1st Class Honors), Ph.D. (Anatomy and Structural Biology)

Department of Anatomy, Faculty of Dentistry, Mahidol University

DTAN 211: Gross Anatomy of Head and Neck in Dentistry

The Back

Any questions?



(Self-reflection/Evaluation and comments)

IG: all.nupong
Email: Anupong.son@mahidol.ac.th

ANS

Assistant Professor Dr. Anupong Thongklam Songsaad
B.Sc. (Biology, 1st Class Honors), Ph.D. (Anatomy and Structural Biology)

Department of Anatomy, Faculty of Dentistry, Mahidol University

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IG: all.nupong
Email: Anupong.son@mahidol.ac.th

ANS

Assistant Professor Dr. Anupong Thongklam Songsaad
B.Sc. (Biology, 1st Class Honors), Ph.D. (Anatomy and Structural Biology)