The Extrinsic Muscles of the Back – Anatomy of the Torso

Aside from the intrinsic (or primary) muscles of the back, it is particularly the group of extrinsic (or secondary) back muscles that is of great concern for students of medicine as well as physical therapy. This is mostly due to the fact that this group is made up of many individual muscles, and that there are no simple mnemonics available with regard to their origin, insertion, function and innervation. Nevertheless, this article still tries to classify the extrinsic back muscles into logical subgroups in order to simplify studying them. After detailed explanations, an overview table of the muscles and muscle subgroups is provided at the end of the article.

The Extrinsic Muscles of the Back: Explanations

The extrinsic back muscles are also referred to as secondary back muscles.

Topographically, the muscles in this group are classed with the lateral torso wall and the upper extremity, which is due to their location as well as their genetic development from fetus to adult human being.

In broad terms, the extrinsic muscles of the back are innervated by the ventral branches of the spinal nerves and the individual cranial nerves.

In order to get an overview of this large group, it is very useful to create subgroups. In literature, three subgroups are mentioned, which are structured logically and relatively easy to study. They are based on location and functional anatomy. These three subgroups are:

1. Spinoscapular and spinohumeral muscles
2. Spinocostal muscles
3. Modified intercostal muscles

**Note:** Due to different specifications in different textbooks, it is recommended to always use the most up-to-date literature or flashcards in order to avoid any study restrictions.

**Spinoscapular and Spinohumeral Muscles**

The group of spinoscapular and spinohumeral muscles includes back muscles that have their osseous origin in the trunk and extend to the scapula or the humerus. They are large structures that run along the surface, and also belong to the musculature of the upper extremity.

They stabilize the shoulder girdle and influence how the torso functions when the arm is fixed. Their neuronal supply is ensured through nerve branches of the cervicobrachial plexus, which is formed by the ventral rami of the cervical spinal nerves. Among this group are the following muscles:

- Trapezius muscle
- Rhomboid major muscle
- Rhomboid minor muscle
- Levator scapulae muscle
- Latissimus dorsi muscle

**Trapezius Muscle**

The trapezius muscle is a large, flat, and most superficial muscle of the upper back. It can be divided into three sections: the superior region (descending part), the intermediate region (transverse part) and the inferior region (ascending part). Their innervation is provided by the accessory nerve (cranial nerve XI) and the cervical plexus (C2—C4).

**Note:** The trapezius may additionally be innervated by segment C1.
**Descending part**

The descending part originates from the **external occipital protuberance**, the **superior nuchal line**, the **nuchal ligament** and the **spinous processes of segments C2 and C3**. Its insertion point is at the **lateral third of the clavicle** and the **acromion**. This part is responsible for extension and contralateral rotation of the head and cervical spine.

**Functional note:** Aside from its primary function, the descending part also moves the scapula craniomedially, which, among other things, supports the elevation of the humerus.

**Transverse part**

The transverse part has its origin at the **spinous processes of C4—T1** and inserts into the **upper edge of the scapular spine** and the **acromion**. It moves the scapula medially.

**Ascending part**

The third and inferior section—the ascending part—has its origin at the **spinous processes of T5—T12** and inserts into the **lower edge of the medial third of the scapular spine**. Its responsibility is the medial-caudal translation of the scapula on the thorax.

**Functional note:** Along with the descending part, the inferior angle of the scapula can be moved ventrolaterally.

**Rhomboid Major Muscle**

The large rhomboid muscle has its origin from the **spinous processes of four thoracic vertebrae (T2—T5)** and inserts into the **medial border of the scapula** (caudal to the scapular spine). During active innervation by the **dorsal scapular nerve** from the C5 root of the brachial plexus, it acts as fixator of the scapula to the thorax and performs a translational movement of the scapula in craniomedical direction.
Rhomboid Minor Muscle

The small rhomboid muscle is located caudally from its larger counterpart and has its origin in the spinous processes of C7—T1. It inserts into the medial border of the scapula (caudal to the spine of the scapula) and shares innervation as well as function with the rhomboid major muscle: dorsal scapular nerve from the C5 root of the brachial plexus; fixation and craniomedial translation of the scapula on the thorax.

Levator Scapulae Muscle

This tube-like muscle originates from the transverse processes of C1—C4 and their posterior tubercles and inserts into the superior angle of the scapula. Aside from its primary function to elevate the scapula via the craniomedial translation on the
Thorax, it can also effect dorsal extension and ipsilateral lateral flexion of the cervical spine. It is innervated by the dorsal scapular nerve from the C5 root of the brachial plexus and the ventral rami of cervical plexus (C3—C4).

**Latissimus Dorsi Muscle**

The latissimus dorsi muscle is one of the largest back muscles. It has a very broad area of origin and a narrow insertion. It originates from the spinous processes of T7—L5, the dorsal part of the sacrum, the medial third of the iliac crest, 9th—12th rib, the thoracolumbar fascia and, in some people, also the inferior angle of the scapula.

It inserts into the crest of lesser tubercle of the humerus and acts on the torso and the upper arm. It has humeral functions as extensor, adductor, and internal rotator.

Furthermore, with regard to expiration and active coughing, it functions as auxiliary respiratory muscle. Moreover, it can pull the entire shoulder girdle in a dorsal as well as caudal direction. In functional anatomy, it is, therefore, often classified as part of the shoulder girdle musculature. Its neuronal supply is provided by the thoracodorsal nerve (C6—C8).

**Note:** It shares insertion, function, and innervation with the teres major muscle. The latissimus dorsi muscle is extremely prominent in swimmers and, even though it is well trained in these athletes regarding strength and endurance, it is often the cause of pathologies that eventually require intervention.

**Spinocostal Muscles**

The spinocostal muscles are located in the middle layer between the extrinsic musculature of the extremities and the intrinsic back musculature.
They extend from the spinous processes of the vertebral bodies to the dorsal rib sections and act as auxiliary respiratory muscles of inspiration. They are innervated via the intercostal nerves, which originate in the ventral rami of the thoracic segments. They are also classed with the lateral torso wall or—especially in older medical literature—the primary thorax wall muscles. This group includes two muscles:

- The serratus posterior superior muscle
- The serratus posterior inferior muscle

**Serratus Posterior Superior Muscle**

The serratus posterior superior muscle originates in the **spinous processes of lower two cervical and upper two thoracic vertebrae C6—T2** and inserts into the **costal angle of ribs 2—5**. It is innervated by the **ventral rami of the spinal nerves (T1—T4)** and elevates the ribs, which makes it a synergist muscle of **inspiration**.

**Serratus Posterior Inferior Muscle**

Originating from the **spinous processes of lower two thoracic and upper two lumbar vertebrae T11—L2**, the serratus posterior inferior muscle inserts into the **lower edge of the 9th—12th rib**. With active innervation by the **ventral rami of the spinal nerves (T9—T12)**, serratus posterior inferior muscle depresses the ribs, which makes it a synergist muscle of **expiration**.

**The Modified Intercostal Musculature**

The modified intercostal musculature is a morphological extension of the intrinsic back musculature in the deeper layers. It serves as a connection between the rib homologs of two consecutive segments in the extra-thoracic area of the spinal column. Its movement function, however, is very limited and therefore cannot be compared with other skeletal muscles. What the intercostal muscles are to the thoracic spine, the following muscles are to the lumbar spine and the cervical spine:

- Lateral lumbar intertransversarii muscles
- Anterior cervical intertransversarii muscles
- Rectus capitis lateralis muscle

The intertransversarii muscles, as the name indicates, are present between adjacent transverse processes of vertebrae. These muscles are innervated by the ventral rami of spinal nerves and help in the lateral flexion of the spine.

The Lateral Lumbar Intertransversarii Muscles

The lateral lumbar intertransversarii muscles originate from the **costal processes of all lumbar vertebrae** and insert into the **costal processes of the adjacent lumbar vertebrae**. With active innervation by the **lumbar plexus (ventral rami L1—L4)**, they act as a lateral flexor of the lumbar spine.

The Anterior Cervical Intertransversarii Muscles

These muscles originate from the **transverse processes of all cervical vertebrae** and insert into the **transverse processes of the adjacent cervical vertebrae**. They are innervated by the **cervical plexus (ventral rami of C2—C6)** and are lateral flexors of the cervical spine.

Rectus Capitis Lateralis Muscle

Originating from the **transverse process of atlas** (C1 vertebra), the rectus capitis lateralis muscle inserts into the **basilar part of the occipital bone**, lateral to the **occipital condyle**. It flexes the head laterally whenever it is actively innervated by the **cervical plexus (ventral ramus C1)**.

Table: Overview of the Extrinsic Muscles of the Back

<table>
<thead>
<tr>
<th>Muscle Group</th>
<th>Muscles</th>
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| Spinoscapular and spinohumeral musculature | - trapezius muscle  
- rhomboid major muscle  
- rhomboid minor muscle  
- levator scapulae muscle  
- latissimus dorsi muscle |
| Spinocostal musculature      | - serratus posterior superior muscle  
- serratus posterior inferior muscle |
Modified intercostal musculature
• lateral lumbar intertransversarii
• anterior cervical intertransversarii
• rectus capitis lateralis muscle

You can learn everything about the intrinsic back musculature in a separate article.

Review Questions

Solutions can be found below the references.

1. In how many muscle groups can the extrinsic back musculature be subdivided?
   1. 1
   2. 2
   3. 3
   4. 4
   5. 5

2. Which of the muscles listed below does not belong to the spinoscapular and spinohumeral group?
   1. Trapezius muscle
   2. Levator scapulae muscle
   3. Rhomboid major muscle
   4. Rhomboid minor muscle
   5. Deltoid muscle

3. Which of the functions listed below is executed by the modified intercostal musculature?
   1. Flexion
   2. Extension
   3. Lateral flexion
   4. Rotation
   5. Stabilization

References


Correct answers: 1C, 2E, 3C

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