1. **Immunity** is conferred on us by our blood cells that are formed in our bone marrow and other locations for these blood cells to be transported throughout our body, the body employs its intensive vasculature, that is network of blood vessels. The blood vessels transport these immunity blood cells throughout the body for them to carry out their duties. Immunity provides resistance to infections and toxins and helps to overcome disease conditions. The main parts of the immune system are: white blood cells, antibodies, the complement system, the lymphatic system, the spleen, the thymus, and the bone marrow. These are the parts of your immune system that actively fight infection. The coronavirus is like any other virus not much more than a shell around genetic material and a few proteins. To replicate, it needs a host in the form of a living cell. Once infected, this cell does what the virus commands it to do: copy information, assemble it, release it. But this does not go unnoticed. Within a few minutes, the body's immune defence system intervenes with its innate response: Granulocytes, scavenger cells and killer cells from the blood and lymphatic system stream in to fight the virus. While T cells help destroy infected cells, B cells form antibodies that can keep the virus in check. In the case of the coronavirus, these are neutralizing antibodies that bind to the spike protein of the virus. This is the site of attack of the virus, with which it enters the host, i.e. our human cell. Neutralizing antibodies specifically incapacitate the spike protein. Our immune system remembers the antibodies it has produced and is thus prepared for a new infection with the same intruder.

### The **adductor canal** (Hunter’s canal or subsartorial canal) is a narrow conical tunnel located in the thigh. It is approximately 15cm long, extending from the apex of the [femoral triangle](https://teachmeanatomy.info/lower-limb/areas/the-femoral-triangle/) to the adductor hiatus of the adductor magnus. The canal serves as a **passageway** from structures moving between the anterior thigh and posterior leg. The abductor canal has three muscular structures borders:

* Anteromedial; sartorius
* Lateral: Vastus medialis
* Posterior: Abductor longus and abductor magnus.

The adductor canal runs from the apex of the femoral triangle to the **adductor hiatus** – a gap between the adductor and hamstring attachments of the adductor magnus muscle.

## **Contents**

The adductor canal serves as a **passageway** for structures moving between the anterior thigh and posterior leg. It transmits the**femoral artery**, femoral vein (posterior to the artery), nerve to the vastus medialis and the saphenous nerve – the largest cutaneous branch of the femoral nerve. As the femoral artery and vein exit the canal, they are called the **popliteal artery** and **vein** respectively.

**CLINICAL RELEVANCE**

* Adductor canal block
* Adductor canal compression syndrome.
1. There are seven extraocular muscles – the levator palpebrae superioris, superior rectus, inferiorrectus, medial rectus, lateral rectus, inferior oblique and superior oblique. Functionally, they can be divided into two groups.
* **Responsible for eye movement**– Recti and oblique muscles.
* **Responsible for superior eyelid movement**– Levator palpebrae superioris.

## Levator Palpebrae Superioris

The levator palpebrae superioris (LPS) is the only muscle involved in raising the superior eyelid. A small portion of this muscle contains a collection of smooth muscle fibres – known as the superior tarsal muscle. In contrast to the LPS, the superior tarsal muscle is innervated by the sympathetic nervous system.

* **Attachments:**Originates from the lesser wing of the [sphenoid](https://teachmeanatomy.info/head/osteology/sphenoid-bone/) bone, immediately above the optic foramen. It attaches to the superior tarsal plate of the upper eyelid (a thick plate of connective tissue).
* **Actions:**Elevates the upper eyelid.
* **Innervation:**The levator palpebrae superioris is innervated by the [oculomotor nerve](https://teachmeanatomy.info/head/cranial-nerves/oculomotor/) (CN III). The superior tarsal muscle (located within the LPS) is innervated by the sympathetic nervous system.

**Muscles of eye movement:** There are six muscles involved in the control of the eyeball itself. They can be divided into two groups; the four recti muscles, and the two oblique muscles.

### Recti Muscles

There are four recti muscles; superior rectus, inferior rectus, medial rectus and lateral rectus. These muscles characteristically originate from the **common tendinous ring**. This is a ring of fibrous tissue, which surrounds the optic canal at the back of the [orbit](https://teachmeanatomy.info/head/organs/eye/bony-orbit/). From their origin, the muscles pass anteriorly to attach to the sclera of the eyeball. The name recti is derived from the **latin** for ‘straight’ – this represents the fact that the recti muscles have a direct path from origin to attachment. This is in contrast with the oblique eye muscles, which have an angular approach to the eyeball.

**Superior Rectus**

* **Attachments**: Originates from the superior part of the common tendinous ring, and attaches to the superior and anterior aspect of the sclera.
* **Actions**: Main movement is elevation. Also contributes to adduction and medial rotation of the eyeball.
* **Innervation**: [Oculomotor nerve](https://teachmeanatomy.info/head/cranial-nerves/oculomotor/)(CN III).

**Inferior Rectus**

* **Attachments**: Originates from the inferior part of the common tendinous ring, and attaches to the inferior and anterior aspect of the sclera.
* **Actions**: Main movement is depression. Also contributes to adduction and lateral rotation of the eyeball.
* **Innervation**: [Oculomotor nerve](https://teachmeanatomy.info/head/cranial-nerves/oculomotor/)(CN III).

**Medial Rectus**

* **Attachments**: Originates from the medial part of the common tendinous ring, and attaches to the anteromedial aspect of the sclera.
* **Actions**: Adducts the eyeball.
* **Innervation**: [Oculomotor nerve](https://teachmeanatomy.info/head/cranial-nerves/oculomotor/) (CN III).

**Lateral Rectus**

* **Attachments**: Originates from the lateral part of the common tendinous ring, and attaches to the anterolateral aspect of the sclera.
* **Actions**: Abducts the eyeball.
* **Innervation**: [Abducens nerve](https://teachmeanatomy.info/head/cranial-nerves/abducens-nerve/) (CN VI).

There are two oblique muscles – the superior and inferior obliques. Unlike the recti group of muscles, they do not originate from the common tendinous ring.

From their origin, the oblique muscles take an **angular** approach to the eyeball (in contrast to the straight approach of the recti muscles). They attach to the posterior surface of the sclera.

**Superior Oblique**

* **Attachments**: Originates from the body of the [sphenoid](https://teachmeanatomy.info/head/osteology/sphenoid-bone/)bone. Its tendon passes through a trochlear, and then attaches to the sclera of the eye, posterior to the superior rectus.
* **Actions**: Depresses, abducts and medially rotates the eyeball.
* **Innervation**: [Trochlear nerve](https://teachmeanatomy.info/head/cranial-nerves/trochlear-nerve/) (CN IV).

**Inferior Oblique**

* **Attachments**: Originates from the anterior aspect of the orbital floor. Attaches to the sclera of the eye, posterior to the lateral rectus
* **Actions**: Elevates, abducts and laterally rotates the eyeball.
* **Innervation**: [Oculomotor nerve](https://teachmeanatomy.info/head/cranial-nerves/oculomotor/) (CN III).

**Intraocular** **muscles:** include the ciliary muscle, the snďpupillae, and the dilator pupillae. The ciliary muscle is a smooth muscle ring that controls accommodation by altering the shape of the lens, as well as controlling the flow of aqueous humor into Schlemm's canal. The ciliary muscle is attached to the zonular fibers which suspend the lens. Upon contraction of the ciliary muscle, the tension on the lens is lessened which causes it to adopt a more spherical shape to focus on near objects. Relaxation of the ciliary muscle has the opposite effect, optimising distant focus. The sphincter pupillae and dilator pupillae are also composed of smooth muscle. The sphincter pupillae encircles the pupil and is responsible for the constriction of its diameter, while the dilator muscle is arranged radially and increases the pupillary diameter. There are three primary axes of ocular movements: vertical, transverse, and anteroposterior. Rotation around the vertical axis results in either adduction (medial movement) or abduction (lateral movement) of the eye. Rotation around the transverse axis causes elevation (superior motion) or depression (inferior motion). The anteroposterior axis enables movement of the superior pole of the eye medially (intorsion) or laterally (extorsion). The rotations around the anteroposterior axis allow the eye to adjust to tilting of the head. The medial rectus muscle is responsible for medial rotation around the vertical axis, and the lateral rectus lateral rotation. The superior rectus muscle primarily elevates the eye and contributes to adduction and intorsion. The inferior rectus depresses and laterally rotates the eye and contributes to adduction and extorsion. The superior oblique abducts, depresses, and medially rotates the eye, while the inferior oblique abducts, elevates, and laterally rotates the eyelid.

The primary retractor of the upper eyelid is the levator palpebrae superioris, which is a skeletal muscle. The superior tarsal muscle (Müller's muscle) is comprised of smooth muscle and also contributes to the elevation of the upper eyelid. In the lower eyelid, the retractors are the capsulopalpebral fascia and the inferior tarsal muscle. The orbicularis oculi is the main protractor (closure) of the eyelids. It is a flat, ringlike band of skeletal muscle surrounding the anterior orbit composed of three parts: the orbital portion, the palpebral portion, and the lacrimal portion.