**NAME:** SAM-KALAGBOR CHIZAGAM

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**COURSE TITLE:** GROSS ANATOMY

**LEVEL:** 200

**ASSIGNMENT**

1. Describe the importance of vasculature in relation to immune system and outbreak of Pandemic Covid-19 on the human body.

**VASCULATURE TO IMMUNE SYSTEM**

The central nervous system (CNS) has a complex barrier system and has evolved specialized mechanisms to mount and regulate immune reactions. CNS immune responses differ based on anatomical location, and a clear distinction exists between responses that develop in the fluid spaces and membranous lining (or meninges) relative to the parenchyma. For example, early studies demonstrated that mouse sarcoma cells grow rapidly when injected into the brain parenchyma of rats but were immunologically rejected when placed close to a ventricle [a space filled with cerebrospinal fluid (CSF)]. These findings show that the development of robust immune reactions against parenchymal antigens depends on their entry into fluid spaces, which promotes egress into draining lymph nodes. Although the CNS parenchyma does not have a conventional lymphatic drainage system, lymphatics have been discovered in the dura mater and just outside holes in the skull bone. Once an immune response is mobilized in peripheral lymphoid tissues, leukocyte traffic into the CNS is heavily regulated by barriers that include the blood-brain barrier (BBB), blood-CSF barrier, and blood-meningeal barrier. Structural variations in these barriers influence the location and development of CNS immune responses that enter through vasculature. These barriers essentially control immune cell entry into different CNS compartments. Here, we review the anatomy and physiology of CNS vasculature and associated barriers and how these structures influence immune surveillance under steady-state and inflammatory conditions.

**VASCULTURE TO OUTBREAK OF COVID**

A [coronavirus](https://www.webmd.com/lung/coronavirus) is a kind of common [virus](https://www.webmd.com/a-to-z-guides/how-scientists-identify-virus) that causes an infection in your nose, sinuses, or upper throat. Most coronaviruses aren't dangerous.

COVID-19 is a disease that can cause what doctors call a respiratory tract infection. It can [affect your upper respiratory tract](https://www.webmd.com/lung/coronavirus-covid-19-affects-body) (sinuses, nose, and throat) or [lower respiratory tract](https://www.webmd.com/lung/what-does-covid-do-to-your-lungs) (windpipe and lungs). It's caused by a coronavirus named SARS-CoV-2.

It spreads the same way other coronaviruses do, mainly through person-to-person contact. Infections range from mild to serious.

SARS-CoV-2 is one of seven types of coronavirus, including the ones that cause severe diseases like Middle East respiratory syndrome (MERS) and sudden acute respiratory syndrome (sars). the other coronaviruses cause most of the [colds](https://www.webmd.com/cold-and-flu/default.htm) that affect us during the year but aren’t a serious threat for otherwise healthy people.

In early 2020, after a December 2019 [outbreak](https://www.webmd.com/cold-and-flu/what-are-epidemics-pandemics-outbreaks) in China, the World Health Organization identified SARS-CoV-2 as a new type of coronavirus. The outbreak quickly spread around the world.

**IS THERE MORE THAN ONE STRAIN OF SARS-COV-2?**

It’s normal for a virus to change, or mutate, as it infects people. A Chinese study of 103 COVID-19 cases suggests the virus that causes it has done just that. [They found two strains](https://www.webmd.com/lung/coronavirus-strains), which they named L and S. The S type is older, but the L type was more common in early stages of the outbreak. They think one may cause more cases of the disease than the other, but they’re still working on what it all means.

**HOW LONG WILL THE CORONAVIRUS LAST?**

It’s too soon to tell how long the [pandemic](https://www.webmd.com/lung/what-is-a-pandemic) will continue. It depends on many things, including researchers’ work to learn more about the virus, their search for a treatment, and the public’s efforts to slow the spread.

1. Subsartorial canal is an important area in the lower limb, Discuss.

**SUBSARTORIAL CANAL**

This is also called the adductor canal or hunter’s canal.

John Hunter was an anatomist and surgeon at London.

Hunter’s operation for the treatment of popliteal aneurysm by ligating the femoral artery in the adductor canal is a landmark in the history of vascular surgery.

The adductor canal is an intermuscular space situated on the medial side of the middle one-third of the thigh.

**EXTEND:** The canal extends from the apex of the femoral triangle above to the tendinous opening in the adductor magnus below.

**SHAPE:** The canal is triangular on cross section.

**BOUNDARIES:** It has anterior, posterior and medial walls.

◼The anterior wall is formed by the vastus medialis.

◼The posterior wall or floor is formed by the adductor longus above and the adductor magus below.

◼The medial wall or roof is formed by a strong fibrous membrane joining the anterior and posterior walls.

◼The roof is overlapped by the Sartorius.

**Note**: The subsartorial plexus of nerves lies on the fibrous roof of the canal under cover of the sartorius.

**CONTENTS:** These are as follows;

1. The femoral artery enters the canal at the apex of the femoral triangle. Within the canal it gives off muscular branches and a descending genicular branch. The descending genicular artery is the last branch of the femoral artery arising just above the hiatus magus.

2. The femoral vein lies posterior to the femoral artery in the upper part and lateral to the artery in the lower part of the canal.

3. The saphenous nerve crosses the femoral artery anteriorly from lateral to medial side.

4. The nerve to the vastus medialis

5. Two divisions of the obturator nerve (ant division emerges at the lower border of the adductor longus to give branches to the subsartorial plexus and ends by supplying the femoral artery while the posterior division runs on the anterior of the adductor magnus accompanies the femoral and popliteal arteries and ends by supplying the knee joint.

1. Describe the Extraocular and intraocular Muscles with their nerve supply.

**EXTRAOCULAR MUSCLE**

Extraocular muscles are present in the retrobulbar space (behind the eyeball) and are responsible for coordinated movements of the eyeball.

**EXTRAOCULAR MUSCLES: RECTUS & OBLIQUE GROUP OF MUSCLES**

**1. Rectus muscles                                   2. Oblique muscles**

1. Medial rectus                                         a. Superior oblique (CN IV)
2. Lateral rectus (CN VI)                             b. Inferior oblique
3. Superior rectus
4. Inferior rectus

**Origin and insertion of the extraocular muscles**

The **superior rectus** originates from the annulus of Zinn (common tendinous ring) and is attached to the top of the [eye](https://www.lecturio.com/magazine/sensory-systems/) 7.7 mm from the limbus.

The **inferior rectus** is attached to the bottom of the eye 6.5 mm from the limbus. It also originates from the annulus of Zinn.

The **medial rectus** is attached to the side of the eye near the [nose](https://www.lecturio.com/magazine/sensory-systems/) 5.5 mm from the limbus.

The **lateral rectus** is attached to the side of the eye near the [temple](https://www.lecturio.com/magazine/bony-skull/) 6.9 mm from the limbus.

The **superior oblique** originates from the apex of the orbit. The apex of the orbit is just above the annulus of Zinn. The tendon of the muscle moves from behind the orbit through a pulley-like structure called the trochlea and comes anteriorly and is attached to the top of the eye at the superior and lateral aspect of the eyeball. Its tendon crosses beneath the superior rectus muscle before attachment.

The **inferior oblique** starts from the front of the orbit near the nose from the maxillary bone just behind the lacrimal space. It travels backward posteriorly and laterally in the orbit before attaching to the inferior of the globe.

**Function of the extraocular muscles**

The **superior rectus** moves the eye **upwards and medially in the vertical plane**. Both the superior recti pull up the eyeball and allow the individual to look in an upward direction. Upward gaze is because of the function of the two superior recti.

The **inferior rectus** moves the eye **downwards and medially in the vertical plane**. Both the inferior recti pull the eyeball downwards and allow the individual to see in a downward direction. Downward gaze is because of the function of the two inferior recti.

The **lateral rectus** moves the eye **outward laterally in the horizontal plane**. And the **medial rectus** moves the eye **medially toward the nose in the horizontal plane**. Lateral rectus of one eye and medial rectus of the other eye contract simultaneously when an individual is looking one side.

The **superior oblique** rotates the eyeball **inward, downwards and nasally** along the long axis of the eye.

The **inferior oblique** rotates the eye **outward and upward**.

**Levator palpebrae superior** is the muscle of the eyelid. It **holds the eyelid up**, keeping the **eyes open**. The **blinking reflex** involves this muscle through a reflex arc.

**ASSESSMENT OF THE EXTRAOCULAR MUSCLES**

**Medial and lateral recti** have simple actions – they move the eye in the **horizontal plane** (left and right). To test the extraocular eye muscles, the patient is asked to **follow the examiner’s finger** who moves it in the air making the **figure of an H**. The superior oblique muscle points the eye down when it is looking medially and the inferior oblique muscle points the eye up when it is looking medially.

So, if a patient is looking up and to his right, he is using his:

* Right eye – lateral and superior rectus muscles
* Left eye – medial rectus and superior oblique muscles

Knowing the function and innervation of the extraocular muscles is extremely helpful for **diagnosing neurological disorders such as brain herniation, and eye motility disorders like strabismus**.

Extraocular muscles are also affected in various diseases affecting the eye, such as graves disease, orbital metastasis, orbital trauma, and cellulitis, etc.

**NERVE SUPPLY**

The extraocular eye muscles are innervated by [**three cranial nerves**](https://www.lecturio.com/magazine/12-cranial-nerves/). The third cranial nerve, the **oculomotor nerve**, innervates all the extraocular muscles except the lateral rectus and the superior oblique muscles. The lateral rectus is innervated by the **abducens nerve (CN VI)**. The superior oblique muscle is innervated by the **trochlear nerve (CN IV)**. The levator palpebrae superior muscle is also innervated by the oculomotor nerve.

The oculomotor nerve is divided into two divisions: upper and lower division. The upper-division supplies the superior rectus muscle and the levator palpebrae superioris muscle. The lower division supplies the inferior rectus, medial rectus, and inferior oblique.

Cranial nerve IV (trochlear nerve) enters the middle of superior oblique muscle between the origin and the trochlea. Nerves of all the other muscles enter their respective muscles at the junction of the anterior two-thirds and posterior one-third.