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1.Circulating T cells contact blood vessels either when they extravasate across the walls of microvessels into inflamed tissues or when they enter into the walls of larger vessels in inflammatory diseases such as atherosclerosis. The blood vessel wall is largely composed of three cell types: endothelial cells lining the entire vascular tree, pericytes supporting the endothelium of microvessels and smooth muscle cells forming the bulk of large vessel walls. Each of these cell types interacts with and alters the behavior of infiltrating T cells in different ways, making these cells active participants in the processes of immune-mediated inflammation. Immune-mediated inflammation of peripheral tissues depends upon local recruitment of circulating leukocytes into an extravascular site. In most instances, leukocytes are recruited across the wall of post-capillary venules, which are composed of a continuous, one cell thick inner lining of endothelial cells (ECs) supported by an incomplete outer layer of pericytes (PCs) located within the basement membrane to whichcauses the ECs are attached.

Larger vessels are not directly involved in leukocyte trafficking into tissues, but may themselves be a target of inflammation, for example when arteries become involved by cell-mediated immune responses as occurs in atherosclerosis. In the arterial wall, the EC lining of the vessel is completely covered by vascular smooth muscle cells (SMCs), some of which are located within the vessel intima, consisting of the EC lining and the anatomic space immediately beneath the basement membrane of the ECs. However, most SMCs are densely concentrated in a multilayered, circumferentially oriented array within the vessel media, which surrounds and is separated from the intima by the internal elastic lamina. The arterial adventitia is external to the media and separated from it by the external elastic lamina. The adventitia contains fibroblasts, nerve endings, microvessels (known as vasa vasorum) and vascular stem cells. Some mononuclear leukocytes may also be present in each of these compartments that can increase dramatically in number with inflammation. It is increasingly appreciated that resident cell populations within the environment in which an immune response develops can play a major role in shaping the form of that immune response. While much of this emphasis has been on the roles played by parenchymal cells in peripheral tissues, cells of the blood vessel wall are also positioned to affect lymphocytes and recent observations have provided a deeper understanding of how blood vascular ECs, PCs and SMCs interact with infiltrating T cells in adaptive immune responses that occur near microvessels of inflamed peripheral tissues and within the wall of inflamed macrovessels. In this review we consider how these interactions impact the nature of the immune response, with focus on observations made with human cells and tissues. We discuss the issues surrounding the cell source in these experiments, and, when possible, emphasize conclusions based on in vivo observations. We caution against generalizing about the immunological functions of vascular cells, as in “ECs do the following but SMCs do

something else.” While each vascular cell type displays specific characteristics that define it as an EC, PC or SMC, each of these populations may vary significantly in both phenotype and function depending on the anatomic location; i.e. their most defining feature is simply their anatomic position within the vessel wall. Heterogeneity among vascular cells arises from several causes.The body’s natural barriers against disease-causing intruders – for example, our skin, the mucous and hairs in our nose, and the acid in our stomachs – are part of our innate immune systems.Adaptive immunity develops over a lifetime of contact with pathogens and vaccines, preparations which help our immune systems to distinguish friend from foe.Until a vaccine is available, our immune systems will need to adapt clinicunaided to COVID-19.

2. Adductor canal

The adductor canal (subsartorial or Hunter’s canal) is an aponeurotic tunnel in the middle third of the thigh, extending from the apex of the femoral triangle to the opening in the adductor magnus, the adductor hiatus.

Structure

It is an intermuscular cleft situated on the medial aspect of the middle third of the thigh on anterior compartment of thigh, and has the following boundaries:

- Anteromedial wall - sartorius.
- Posterior wall - adductor longus and adductor magnus.
- Laterally - vastus medialis.

It is covered in by a strong aponeurosis which extends from the vastus medialis, across the femoral vessels to the adductor longus and magnus.

- Lying on the aponeurosis is the sartorius (tailor's) 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.

Borders

The adductor canal is bordered by muscular structures:

- Anteromedial: Sartorius.
- Lateral: Vastus medialis.
- Posterior: Adductor longus and adductor 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.

Clinical relevance-Adductor canal block

In the adductor canal block, local anaesthetic is administered in the adductor canal to block the saphenous nerve in isolation, or together with the nerve to the vastus medalis

The block can be used to provide sensory anaesthesia for procedures involving the distal thigh and femur, knee and lower leg on the medial side. The sartorius and femoral artery are used as anatomical landmarks to locate the saphenous nerve.

Clinical Relevance -Adductor Canal Compression Syndrome

Adductor canal compression syndrome describes entrapment of the neurovascular bundle within the adductor canal. A rare condition, it is usually caused by hypertrophy of adjacent muscles such as vastus medialis.

It is most common in young males, who may present with claudication symptoms due to femoral artery occlusion (more common) or neurological symptoms due to entrapment of the saphenous nerve.

Adductor muscle, any of the **muscles** that draw a part of the body toward its median line or toward the axis of an extremity (compare abductor **muscle**), particularly three powerful **muscles** of the human thigh—**adductor** longus, **adductor** brevis, and **adductor** magnus.

3a. The **extraocular muscles** are located within the orbit, but are extrinsic and separate from the eyeball itself. They act to control the movements of the **eyeball** and the **superior eyelid**.

There are seven extraocular muscles originates from Annulus of Zinn (a tendinous ring),

The **extraocular muscles** include: the medial, inferior, and superior recti, the inferior oblique, and levator palpebrae **muscles**, all **innervated** by the oculomotor nerve (III); the superior oblique **muscle**, **innervated** by the trochlear nerve (IV); and the lateral rectus **muscle**, **innervated** by the abducens nerve (VI).Functionally, they can be divided into two groups:

- Responsible for eye movement – Recti and oblique muscles.
- Responsible for superior eyelid movement – Levator palpebrae superioris.

The extraocular muscles are innervated by lower motor neurons that form three cranial nerves: the abducens, the trochlear, and the oculomotor (Figure 20.3). The **abducens nerve** (cranial nerve VI) exits the brainstem from the pons-medullary junction and innervates the lateral rectus muscle. The **trochlear nerve** (IV) exits from the caudal portion of the midbrain and supplies the superior oblique muscle. In distinction to all other cranial nerves, the trochlear nerve exits from the dorsal surface of the brainstem and crosses the midline to innervate the superior oblique muscle on the contralateral side. The **oculomotor nerve** (III), which exits from the rostralmidbrain near the cerebral peduncle, supplies all the rest of the extraocular muscles. Although the oculomotor nerve governs several different muscles, each receives its innervation from a separate group of lower motor neurons within the third nerve nucleus.

Cranial nerve	Muscle
Oculomotor nerve (N. III)	Superior rectus muscle Inferior rectus muscle Medial rectus muscle Inferior oblique muscle
	Levator palpebrae superioris muscle
Trochlear nerve (N. IV)	Superior oblique muscle
Abducens nerve (N. VI)	Lateral rectus muscle

3b.The intraocular muscles include the ciliary muscle, the sphincter pupillae, 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 eye.