Scalp and Face

Part I/ Scalp

The scalp extends from the superciliary arches anteriorly to the external occipital protuberance and superior nuchal lines posteriorly and down to the ears and zygomatic arches laterally.

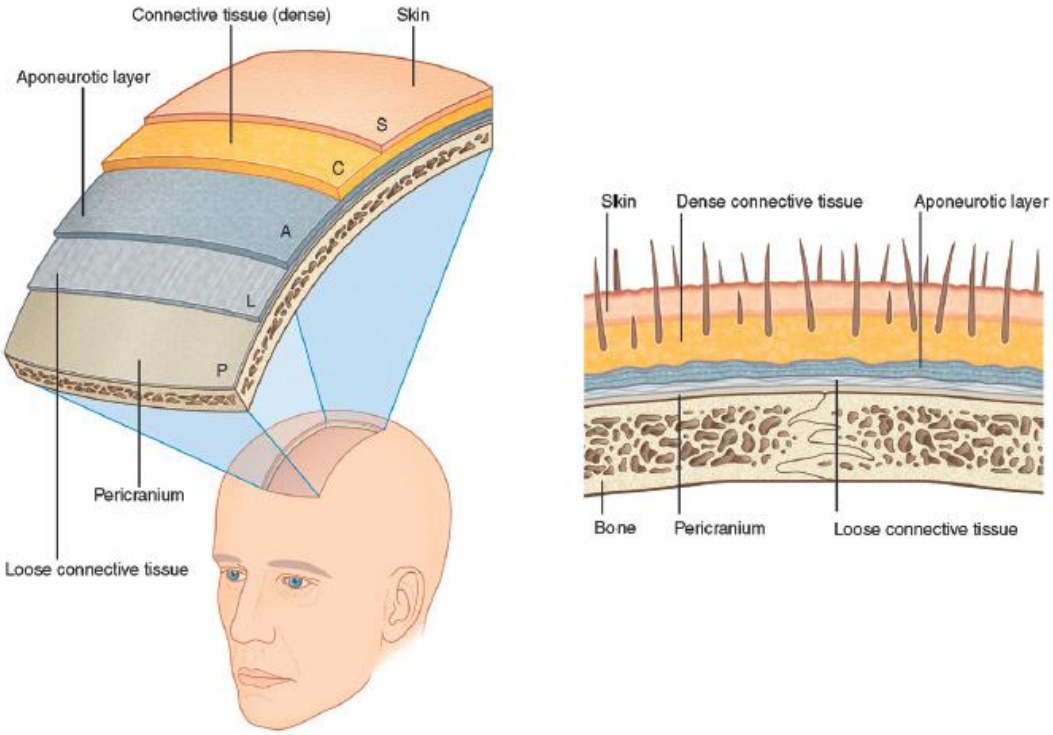
The forehead, from eyebrows to hairline (or where it should be), is common to the face and scalp. The scalp consists of five layers; Conveniently, the first letters of each layer together spell SCALP, making recall easier. The first three layers are intimately bound together and move as a unit.

- **S**kin: the skin of the scalp is the thickest in the body and it's thickest of part is the occipital region, also it is the hairiest part of the body and contains a high concentration of sebaceous glands.
- **C**onnective tissue beneath the skin: is a dense fibrofatty layer containing fibrous septa that unite the skin to the underlying epicranial aponeurosis. This layer contains numerous blood vessels. The arteries are derived from both the external and internal carotid arteries, and free anastomoses occur between them.
- **A**poneurosis (epicranial). This is a thin, tendinous sheet that unites the occipital and frontal bellies of the occipitofrontalis muscle. Laterally the aponeurosis blends with the temporoparietal fascia (superficial temporal fascia) which comes down over the deep temporal fascia to the zygomatic arch.

  The subaponeurotic space is the potential space deep to the epicranial aponeurosis. It is limited in front and behind by the origins of the occipitofrontalis muscle, and it extends laterally as far as the attachment of the aponeurosis to the temporal fascia.
- **L**oose areolar tissue. This occupies the subaponeurotic space and loosely connects the epicranial aponeurosis to the periosteum of the skull (the pericranium). This is the plane of movement of the scalp, that is, when the scalp moves, the first three layers (SCA) slide along this layer relative to the underlying periosteum. The areolar tissue contains a few small arteries, but it also contains some important emissary veins.

The emissary veins are valveless and connect the superficial veins of the scalp with the diploic veins of the skull bones and with the intracranial venous sinuses.

- **P**ericranium. The pericranium is the periosteum covering the outer surface of the skull bones. The pericranium is continuous with the periosteum on the inner surface of the skull bones (endosteum) at the sutures between the individual skull bones.

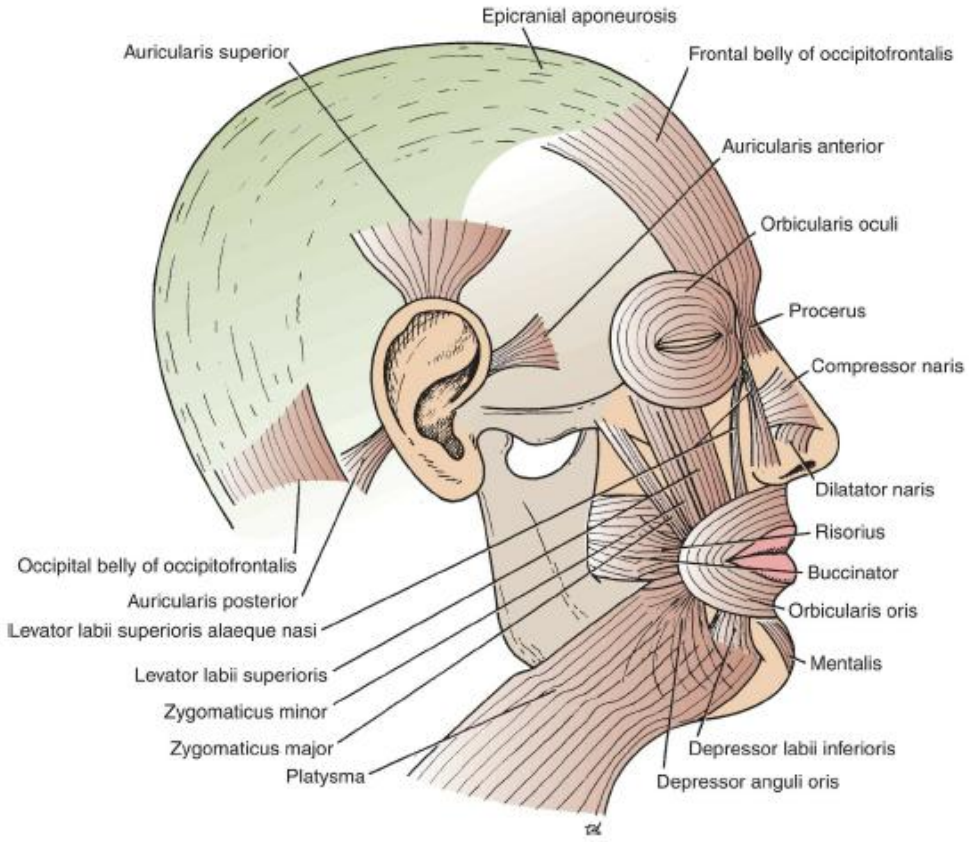


Muscles of the Scalp

The occipitofrontalis is the sole skeletal muscle in the scalp. The muscle consists of paired frontal and occipital bellies connected by the epicranial aponeurosis (galea aponeurotica). This muscle is responsible for movement of the scalp. Note that when this muscle contracts, the first three layers of the scalp (SCA) move together as a unit. The loose areolar tissue of the fourth layer of the scalp allows the aponeurosis to move on the pericranium. The frontal bellies of the occipitofrontalis can raise the eyebrows in expressions of surprise or horror.

Occipitofrontalis Muscle

	Origin	Insertion	Nerve supply	Action
Occipital belly	Highest nuchal line of occipital bone	Epicranial Aponeurosis	Facial Nerve	Move the scalp and raises the eye brow
Frontal belly	Skin of the eye brow			



Sensory Nerve Supply

The main trunks of the sensory nerves lie in the dense connective tissue layer (the "C" layer) of the scalp. The nerves are arranged in two main groups:
(1) branches of the trigeminal nerve located anterior to the ear and
(2) branches of cervical spinal nerves located posterior to the ear. Moving laterally from the midline; the following nerves are present:

Trigeminal branches:

I. **Supratrochlear nerve**;

Is a branch of the ophthalmic division (V_1) of the trigeminal nerve, it emerges from the supra orbital foramen or notch and winds around the superior orbital margin to supply the scalp. It passes backward close to the median plane and reaches nearly as far as the vertex of the skull.

II. **Supraorbital nerve**;

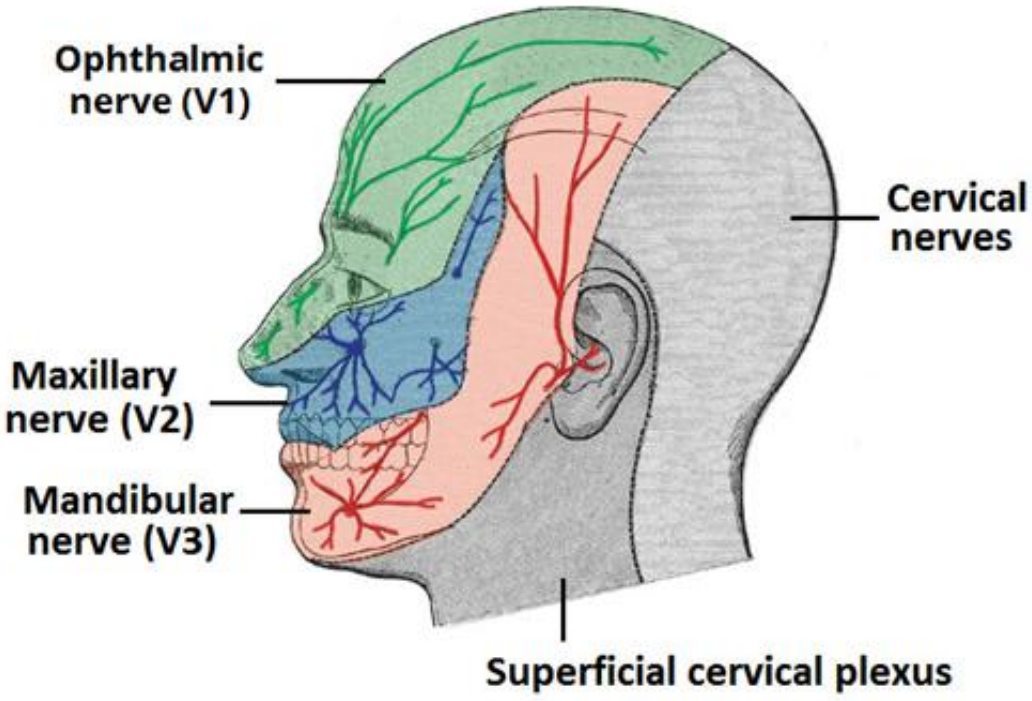
Is a branch of the ophthalmic division of the trigeminal nerve, it has the same course of supratrochlear nerve but it lies laterally and extend further posteriorly up to the vertex.

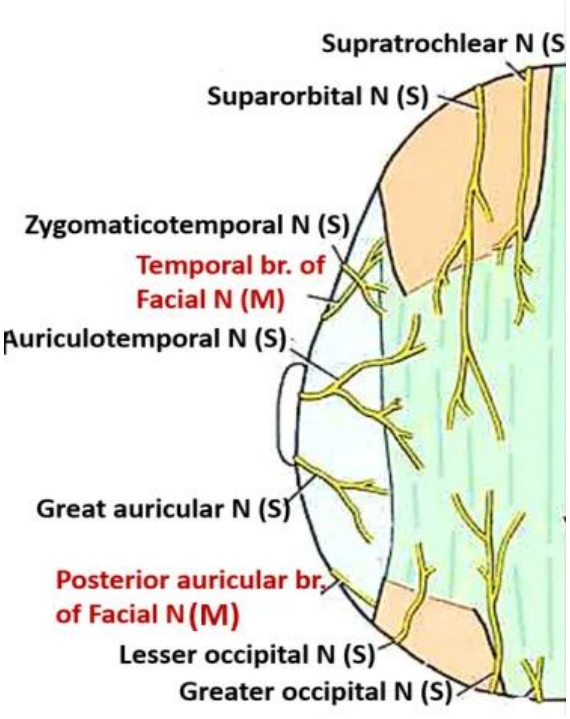
III. **Zygomaticotemporal nerve**;

Is a branch of the maxillary division (V_2) of the trigeminal nerve, emerge from zygomaticotemporal foramen and supplies the scalp over the temple.

IV. **Auriculotemporal nerve**;

Is a branch of the mandibular division (V_3) of the trigeminal nerve, ascends over the side of the head in front of the auricle. Its terminal branches supply the TMJ, skin over the temporal region and part of the auricle.





Cervical spinal nerve branches:

1. **Lesser occipital nerve (C2)**;
   Is a branch of the cervical plexus (ventral rami of the first 4 cervical nerves), it ascends along the posterior edge of the sternocleidomastoid muscle and supplies the scalp over the lateral part of the occipital region and the skin over the medial surface of the auricle.
2. **Greater occipital nerve**;
   Is a branch of the posterior ramus of the second cervical nerve, ascends over the back of the scalp and supplies the skin as far forward as the vertex of the skull.

Arterial Supply

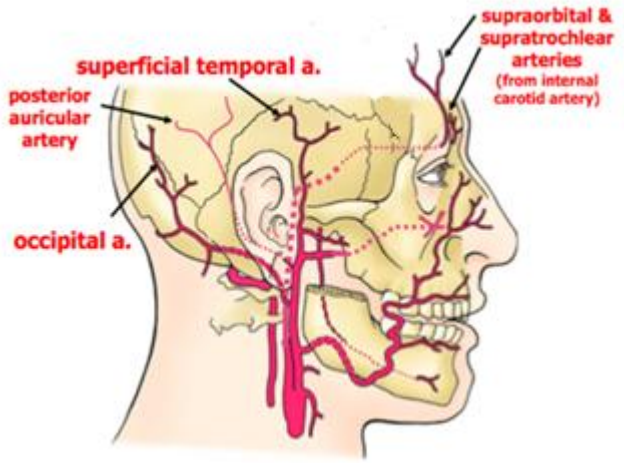
The scalp has a rich blood supply to nourish the hair follicles, and, for this reason, the smallest cut bleeds profusely. As with the cutaneous nerves, the arteries run through the dense connective tissue layer (the “C” layer) of the scalp, typically follow the nerves, and form an extensive, freely anastomosing network. Moving laterally from the anterior midline, the following arteries are present:

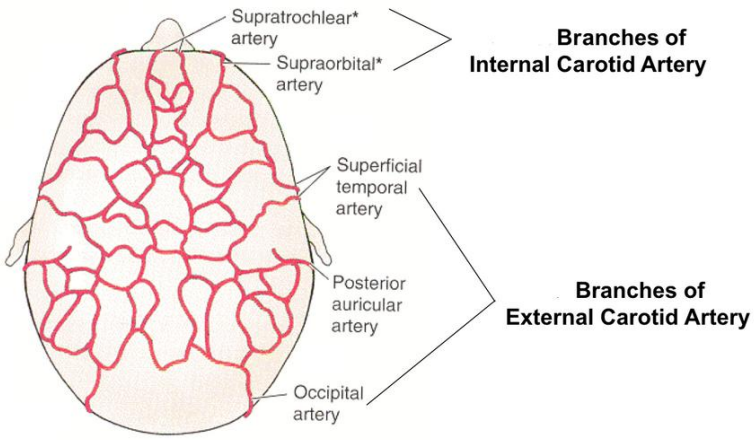
a) The **supratrochlear** and the **supraorbital arteries**, branches of the ophthalmic artery (which is a branch of the internal carotid artery), ascend over the forehead in company with the supratrochlear and supraorbital nerves.

b) The **superficial temporal artery**, the smaller terminal branch of the external carotid artery, ascends in front of the auricle in company with the auriculotemporal nerve. It divides into anterior and posterior branches, which supply the skin over the frontal and temporal regions.

c) The **posterior auricular artery**, a branch of the external carotid artery, ascends behind the auricle to supply the scalp above and behind the auricle.

d) The **occipital artery**, a branch of the external carotid artery, ascends from the apex of the posterior triangle in company with the greater occipital nerve and pierces the trapezius muscle to reach the scalp. It supplies the skin over the back of the scalp and reaches as high as the vertex of the skull.

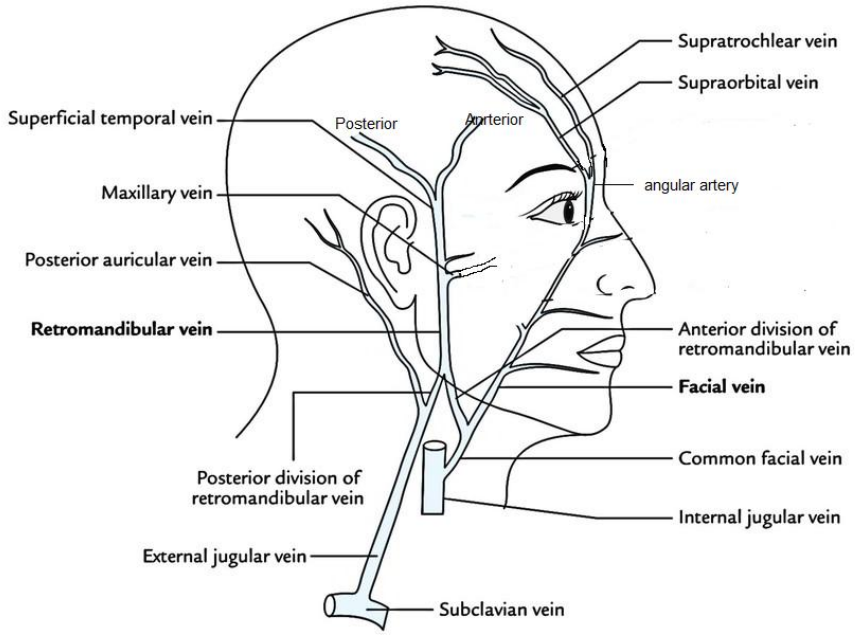




Venous Drainage

The major veins of the head and neck drain the deoxygenated blood into the **superior vena cava** in the right atrium of the heart, these veins are formed by union of other smaller veins (tributaries); as in the following:

- The **supratrochlear** and **supraorbital veins** unite at the medial margin of the orbit to form the **angular vein** which continue as **facial vein** (which drains into the **internal jugular vein**)
- The **superficial temporal vein** unites with the **maxillary vein** in the parotid gland to form the **retromandibular vein**, which divides into anterior and posterior division.
- The **posterior auricular vein** unites with the **posterior division of the retromandibular vein**, just below the parotid gland, to form the **external jugular vein** (which drains into the **subclavian vein**).
- The **occipital vein** drains into the **suboccipital venous plexus**, which lies beneath the floor of the upper part of the posterior triangle; the plexus in turn drains into the vertebral veins or the internal jugular vein.
- The veins of the scalp freely anastomose with one another and are connected to the diploic veins of the skull bones and the intracranial venous sinuses by valveless emissary veins

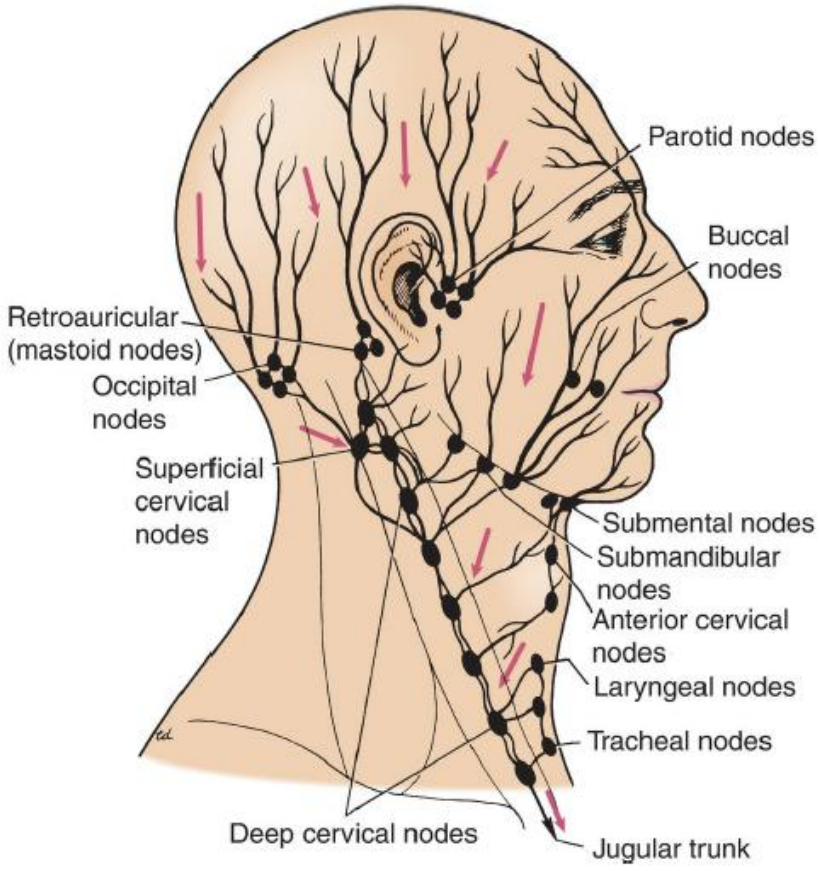


Lymph Drainage

A lymph node is part of the immune system, they are widely present throughout the body and are connected by the lymphatic vessels. They are major sites of B and T cells and other white blood cells, acting as filters for foreign cells and cancer cells. The lymph nodes are subjected to a number of different pathological conditions including tumours, infection and inflammation.

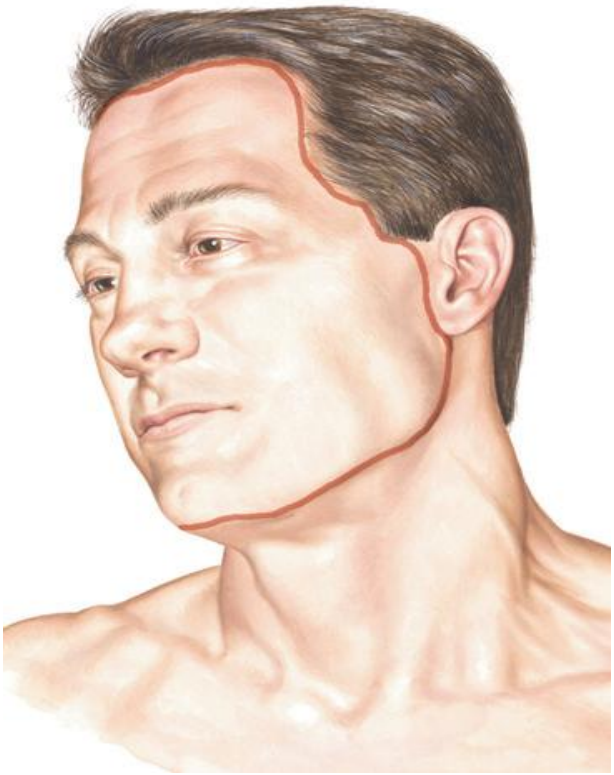
The main lymph nodes of the scalp and their drainage sites are:

- Lymph vessels in the anterior part of the scalp and forehead drain into the **submandibular lymph nodes.**
- Drainage from the lateral part of the scalp above the ear is into the **superficial parotid (preauricular) nodes**.
- Lymph vessels in the part of the scalp above and behind the ear drain into the **mastoid nodes**.
- Vessels in the back of the scalp drain into the **occipital nodes**.



Part II/ Face

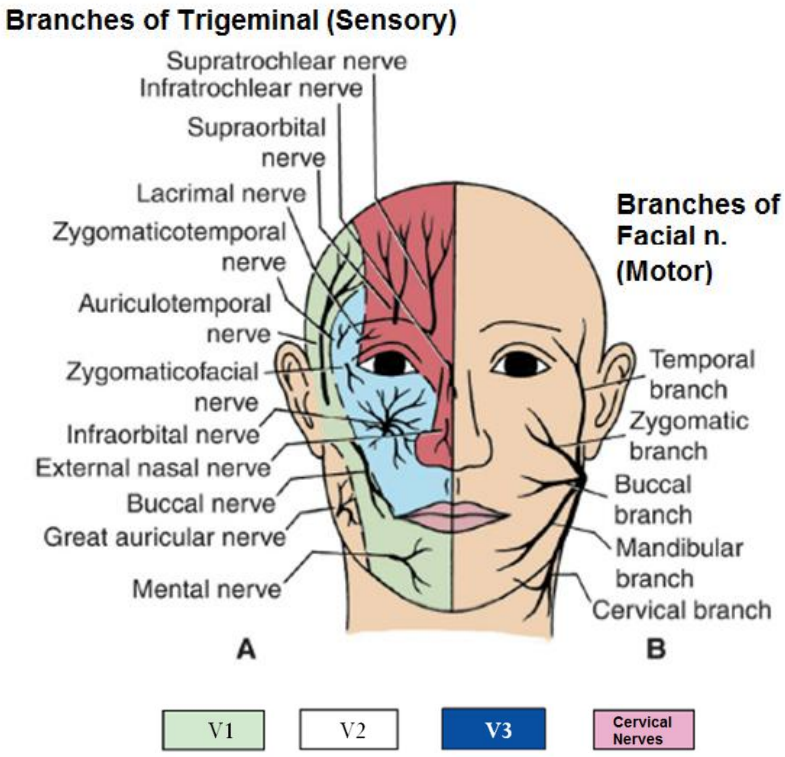
- ✓ The area bordered from the hairline (or where it should be) superiorly, anterior border of the auricles laterally and the inferior border of the chin inferiorly.
- ✓ Major contents: eyes, nose, mouth, muscles of facial expression, muscles of mastication, parotid gland, trigeminal nerve, and facial nerve.
- ✓ The face is critical for individual identity, facial expression is a highly evolved means of nonvocal communication.
- ✓ The skin of the face possesses numerous sweat and sebaceous glands. It is connected to the underlying bones by loose connective tissue, in which are embedded the muscles of facial expression. There is no deep fascia in the face.
- ✓ The layer of muscles in the face is known as Superficial Muscular Apneurotic Sytem (SMAS) layer
- ✓ Wrinkle lines of the face result from the repeated folding of the skin perpendicular to the long axis of the underlying contracting muscles, coupled with the loss of youthful skin elasticity.

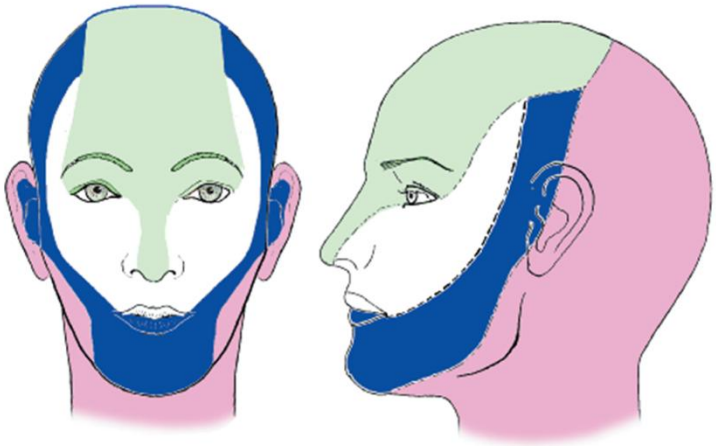


Sensory Nerve Supply

The skin of the face is supplied by branches of the three divisions of the trigeminal nerve, except for the small area over the angle of the mandible and the parotid gland; which is supplied by the great auricular nerve (branch of the cervical plexus C_2,C_3).

The trigeminal branches are not only supply the skin of the face but; also supply proprioceptive fibers to the underlying muscles of facial expression, they are the sensory nerve supply to the mouth, teeth, nasal cavities, and paranasal air sinuses.





I. Ophthalmic Nerve (V_1)

The ophthalmic nerve branches into Frontal, lacrimal and Nasociliary nerves, these nerves end to five terminal cutaneous branches that supply the skin of the forehead, the upper eyelid, the conjunctiva, and the side of the nose down to and including the tip.

- The **supratrochlear nerve** (branch of frontal nerve): winds around the upper margin of the orbit medial to the supraorbital nerve. It divides into branches that supply the skin and conjunctiva on the medial part of the upper eyelid and the skin over the lower part of the forehead, close to the median plane.
- The **supraorbital nerve** (branch of frontal nerve): winds around the upper margin of the orbit at the supraorbital notch/supraorbital foramen. It divides into branches that supply the skin and conjunctiva on the central part of the upper eyelid; it also supplies the skin of the forehead as far as to the vertex.
- The **infratrochlear nerve**: It supplies the skin and conjunctiva on the medial part of the upper eyelid and the adjoining part of the side of the nose.
- The **external nasal nerve** leaves the nose by emerging between the nasal bone and the upper nasal cartilage. It supplies the skin on the side of the nose down as far as the tip.
- The **lacrimal nerve** supplies the skin and conjunctiva of the lateral part of the upper eyelid.

Maxillary Nerve (V_2)

The maxillary nerve supplies the skin on the posterior part of the side of the nose, the lower eyelid, the cheek, the upper lip, and the lateral side of the orbit. Three branches of the nerve pass to the skin.

1) The **infraorbital nerve** is a direct continuation of the maxillary nerve. It enters the orbit and appears on the face through the infraorbital foramen. It immediately divides into numerous small branches, which radiate out from the foramen and supply the skin of the lower eyelid and cheek, the side of the nose, and the upper lip.
2) The **zygomaticofacial nerve** passes onto the face through a small foramen on the lateral side of the zygomatic bone. It supplies the skin over the prominence of the cheek.
3) The **zygomaticotemporal nerve** emerges in the temporal fossa through a small foramen on the posterior surface of the zygomatic bone. It supplies the skin over the

Mandibular Nerve

The mandibular nerve supplies the skin of the lower part of the face (including the lower lip), part of the auricle and the temporal region (scalp). Three branches of the nerve pass to the skin.

A. The **Mental nerve** emerges from the mental foramen of the mandible and supplies the skin of the lower lip and chin.

B. The **Long buccal nerve** emerges from beneath the anterior border of the masseter muscle and supplies the skin over a small area of the cheek.

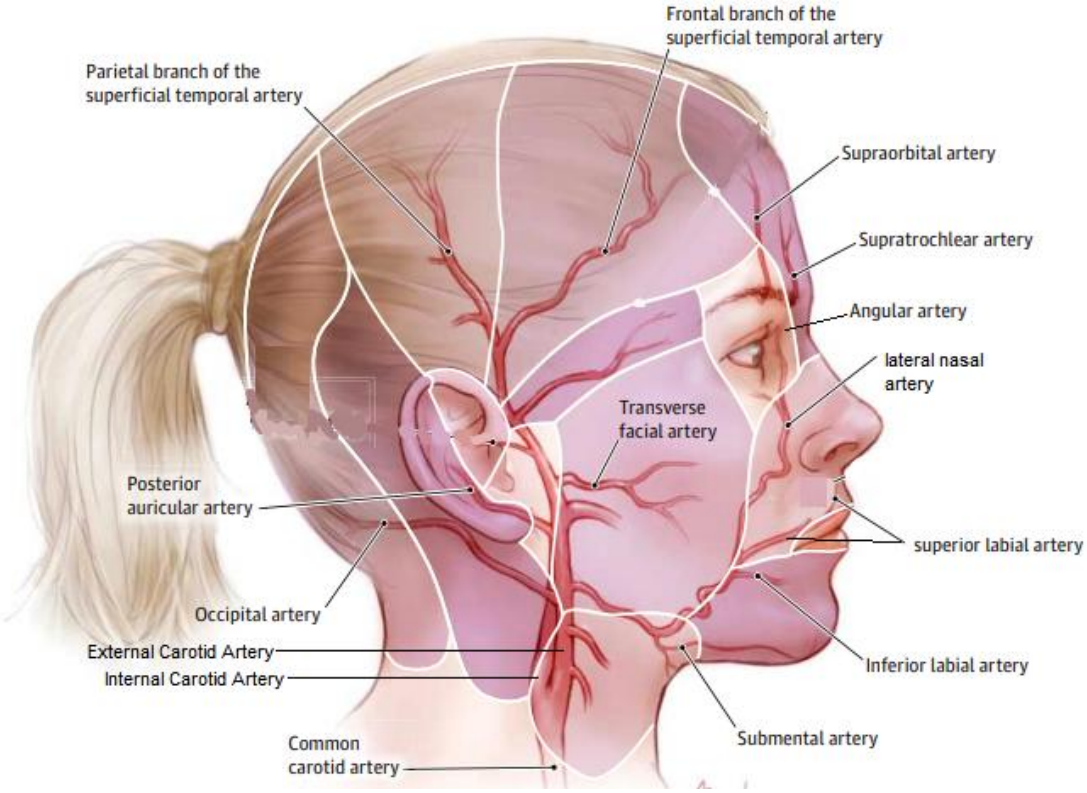
C. The **Auriculotemporal nerve** ascends from the upper border of the parotid gland between the superficial temporal vessels and the auricle. It supplies the skin of the auricle, the external auditory meatus, the outer surface of the tympanic membrane, and the skin of the scalp above the auricle.

Arterial Supply

The face receives a rich blood supply from two main vessels, the facial and superficial temporal arteries, which are supplemented by several small arteries that accompany the sensory nerves of the face.

- **The facial artery**

- **Course**: arises from the external carotid artery in the upper neck. It arches upward and over the submandibular salivary gland and curves around the inferior margin of the body of the mandible at the anterior border of the masseter muscle. Its pulse can be easily felt here. It next runs upward in a tortuous course toward the angle of the mouth. It then ascends along the side of the nose to the medial angle of the eye, where it anastomoses with the terminal branches of the ophthalmic artery.
- **Branches**
  1. The **submental artery** It supplies the skin of the chin and lower lip.
  2. The **inferior labial artery** arises near the angle of the mouth. It runs medially in the lower lip and anastomoses with its fellow of the opposite side.
  3. The **superior labial artery** arises near the angle of the mouth. It runs medially in the upper lip and gives branches to the septum and ala of the nose.
  4. The **lateral nasal artery** arises from the facial artery alongside the nose. It supplies the skin on the side and dorsum of the nose.
  5. The **angular artery** is the terminal part of the facial artery. It runs between the side of the nose and the medial canthus of the eye.



- **The superficial temporal artery**

- The smaller terminal branch of the external carotid artery, commences in the parotid gland. It ascends in front of the auricle to supply the scalp.
- **Branches**
  - **a)** The **transverse facial artery** arises within the parotid gland. It runs forward across the cheek just above the parotid duct and below the zygomatic arch.
  - **b)** The **anterior (frontal)** and **posterior (temporal)** branches are the terminal branches of the superficial temporal artery. They distribute across the temporal fossa.

- **Ophthalmic artery**

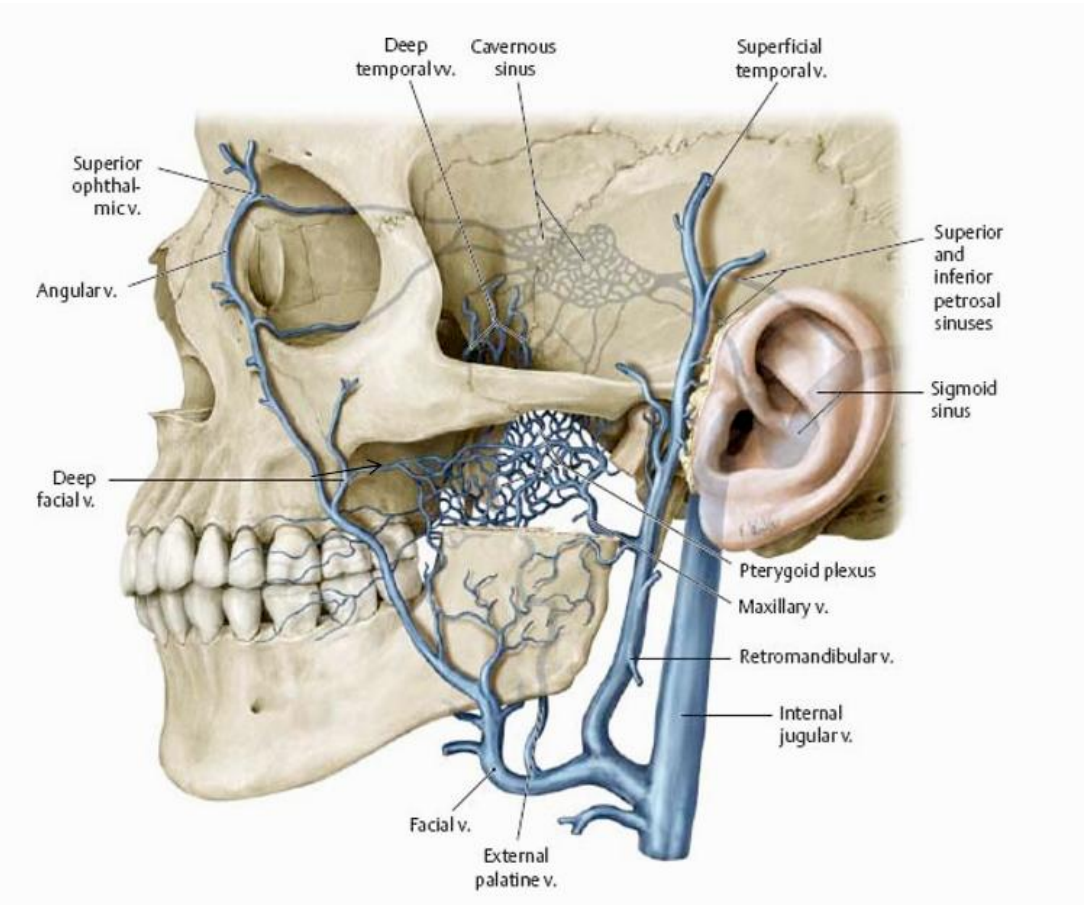
Is a branch of internal carotid artery, gives two small branches accompany the nerves; the **supraorbital, supratrochlear** that supply the forhead up to the vertex.

- **Maxillary artery**

Is a branch of the external carotid artery that gives small branches accompanying the nerves. These branches are **infraorbital**, **zygomaticofacial** and **mental** arteries.

Venous Drainage

- The **facial vein** is formed at the medial angle of the eye by the union of the supraorbital and supratrochlear veins. The facial vein connects to the cavernous sinus (intra cranial venous sinus) by way of the superior ophthalmic vein. This anastomosis is of great clinical importance because it provides a pathway for the spread of infection from the face to the cavernous sinus. The facial vein descends behind the facial artery to the lower margin of the body of the mandible. It crosses superficial to the submandibular gland and is joined by the anterior division of the retromandibular vein. The facial vein ends by draining into the internal jugular vein.The facial vein receives tributaries that correspond to the branches of the facial artery.
- The **transverse facial vein** joins the superficial temporal vein within the parotid gland.



Lymph Drainage

- Lymph from the forehead and the anterior part of the face drains into the **submandibular lymph nodes**.
- The lateral part of the face (including the lateral parts of the eyelids) drains into the **parotid lymph nodes (pre auricular lymph nodes).**
- The central part of the lower lip and the skin of the chin drain into the **submental lymph nodes.**

This is the End of the Lecture – Good Luck