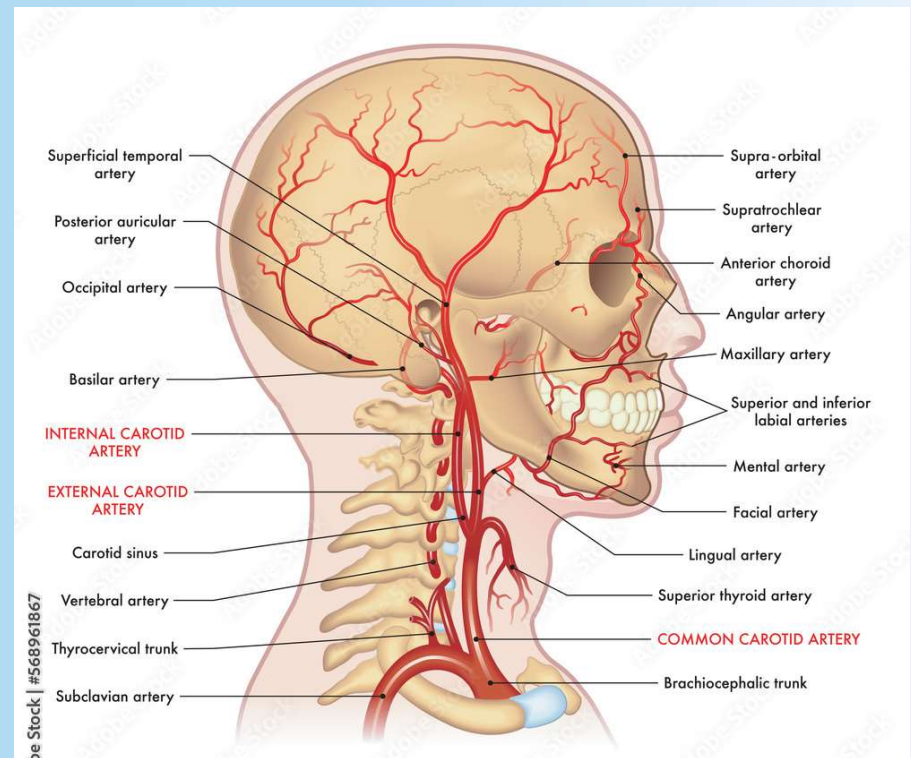


Arterial Supply to the Head & Neck

Sebastian Wolinski

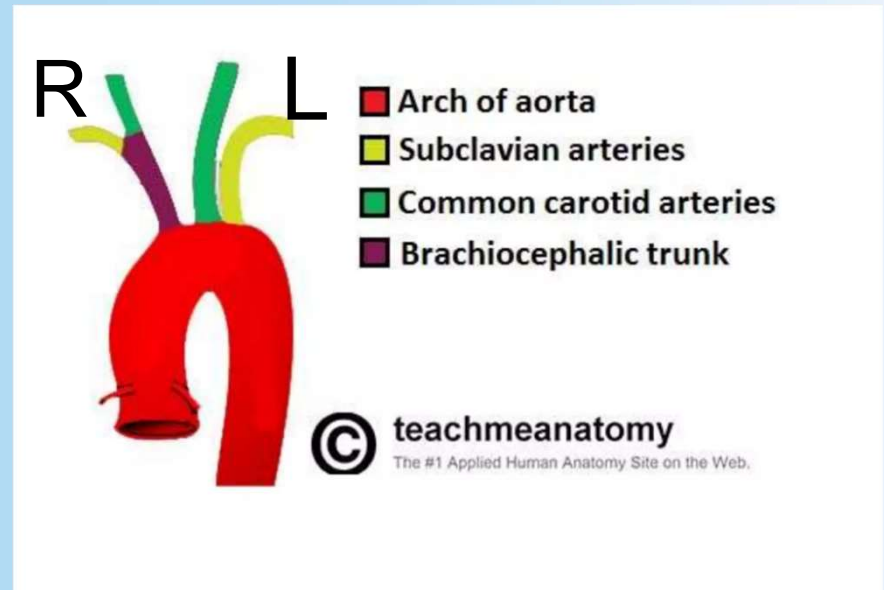
Objectives

- External Carotid a.
- Facial a.
- Maxillary a.
- Internal Carotid a.
- Aq. Humor and tears drainage
- Nasal cavity
- Meningeal blood supply



Travelling from Heart → Head

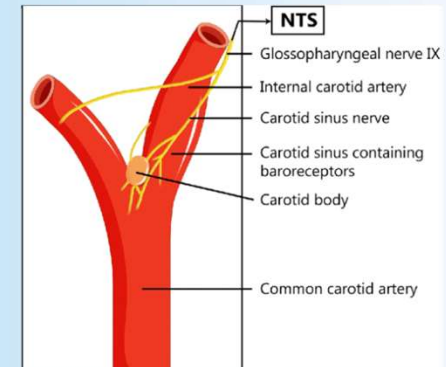
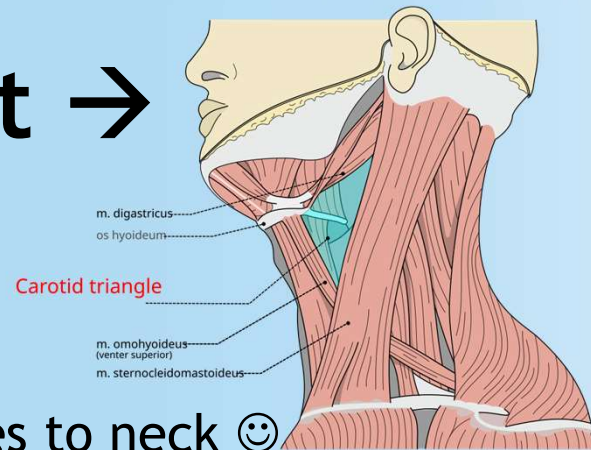
- The left & right divisions
Are NOT symmetrical!
- **Right side** - Subclavian & CCA
Come off the **Brachiocephalic Trunk**
- **Left side** - CCA & Subclavian a. **come off individually** from the aortic arch



Travelling from Heart → Head

- **Common Carotid artery**

- Does not give off any branches to neck 😊
- Bifurcates at the level of C4, within the 'carotid triangle'
- At the carotid bifurcation, we also find the **Carotid sinus**
 - Important for measuring **Blood Pressure** via **baroreceptors**
 - Innervated by CN IX (afferent) & CN X (efferent)



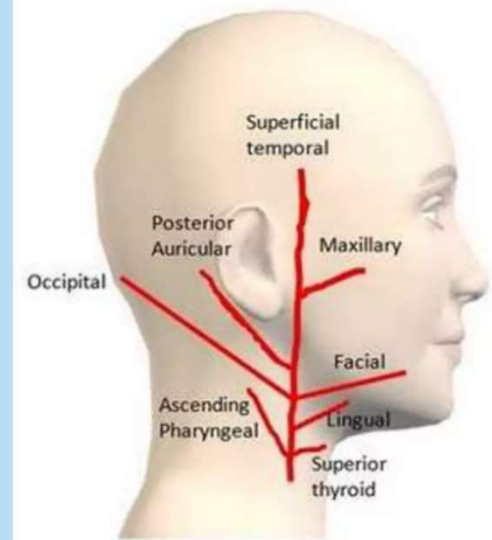
How can a carotid massage improve a patient experiencing a panic attack, or a Hypertensive emergency w/o access to medications?

Jump in the deep end! External Carotid Artery

- Supplies everything in head & neck outside of the cranium

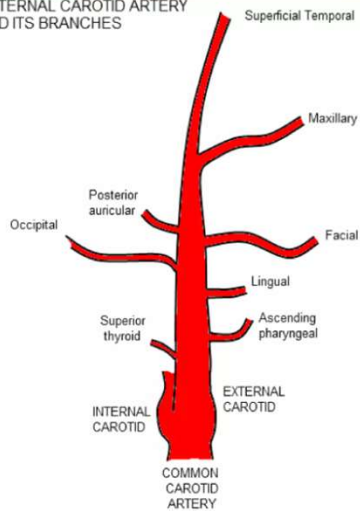


ternal carotid arter



External Carotid Artery

EXTERNAL CAROTID ARTERY
AND ITS BRANCHES



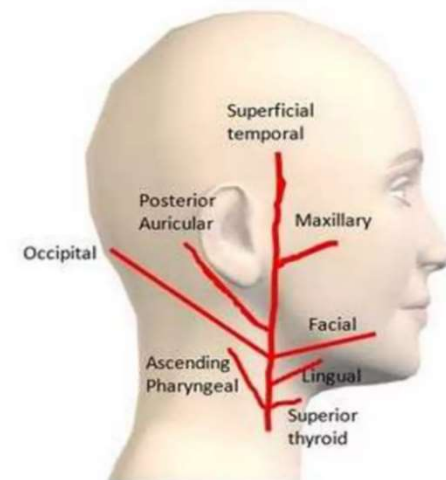
© Cambridge Questions 2010

-Some Ancient
Lovers Find Old
Positions More
Stimulating

-Some
Anatomists Like
Fornicating,
Others Prefer S
& M

-Some angry lady figured out PMS

External carotid artery



So, Let's travel up the ECA!



Superior thyroid artery

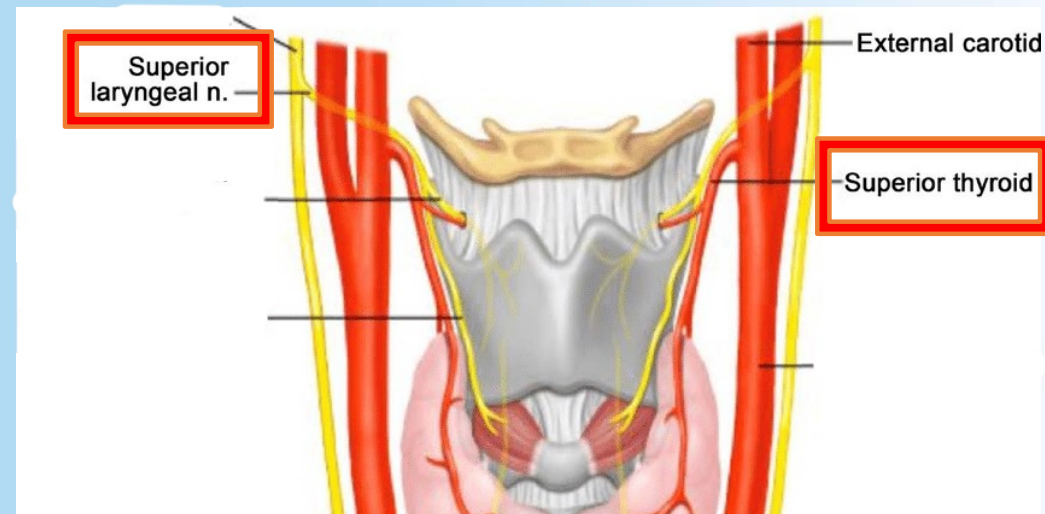
- First branch of ECA
- Runs with the External/**Superior laryngeal nerve** (synonymous)

Branches & Supply

- Thyroid gland (superior pole).
- Larynx (via superior laryngeal artery).
- Sternocleidomastoid (SCM) muscle

• Sup thyroid a. and external laryngeal nerve are at risk during **thyroidectomy**.

Nerve damage → **hoarse voice** (cricothyroid muscle paralysis).



“**STEP** on the Thyroid”

Superior thyroid a.

Thyroid gland + **E**xternal Laryngeal nerve

Pole (superior of thyroid)

Ascending Pharyngeal a.

Smallest branch of ECA

Branches & Supply

Pharyngeal branches:

→ Supply the **pharynx**.

Meningeal branches:

→ Enter the skull via foramen lacerum → **supply dura mater**.

Inferior tympanic branch:

→ Supplies the **middle ear** (anastomoses with other ear arteries).

High-Yield Points

Meningitis risk:

→ Can spread **infections** from pharynx → **meninges**.

Jugular foramen syndrome:

→ If involved in tumors, may affect CN IX-XI.

Test Question Example:

"A patient with a skull base tumor develops hoarseness and dysphagia. Which artery's involvement could explain this?"

Answer: Ascending pharyngeal artery (near CN IX-XI in jugular foramen).

Lingual artery

- Branches off at level of the **hyoid bone**.
- Passes **deep to the hyoglossus muscle** (key surgical landmark).

Branches & Supply

- **Dorsal lingual branches:** Posterior tongue and tonsils.
- **Deep lingual artery:** Tongue tip
- **Sublingual artery:** Floor of mouth and sublingual gland.

"Tongue Deeply Needs Sublingual Support"

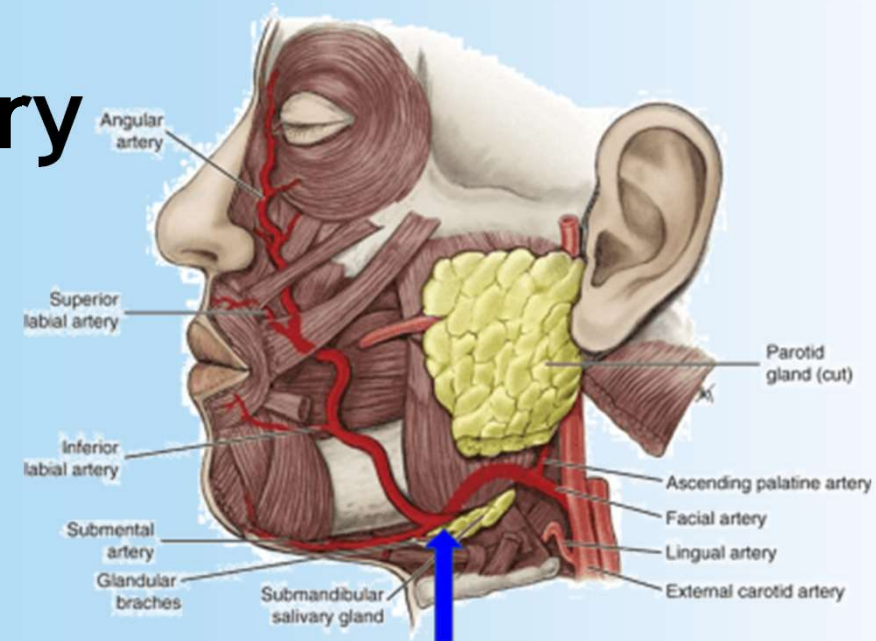
- Tongue (dorsal and deep branches)
- **Deep lingual artery**
- **Near hyoglossus**
- **Sublingual artery**

*During a frenectomy, bleeding occurs **from the floor of the mouth**. Which artery is most likely injured?*

Answer: Sublingual artery (branch of lingual artery).

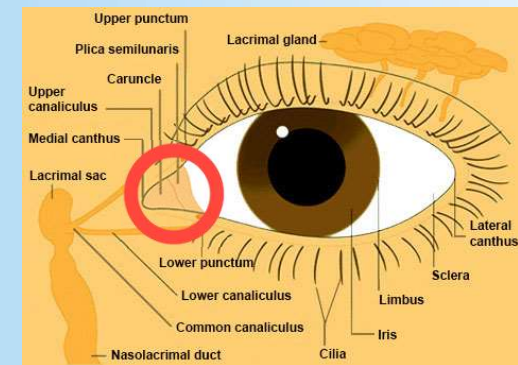
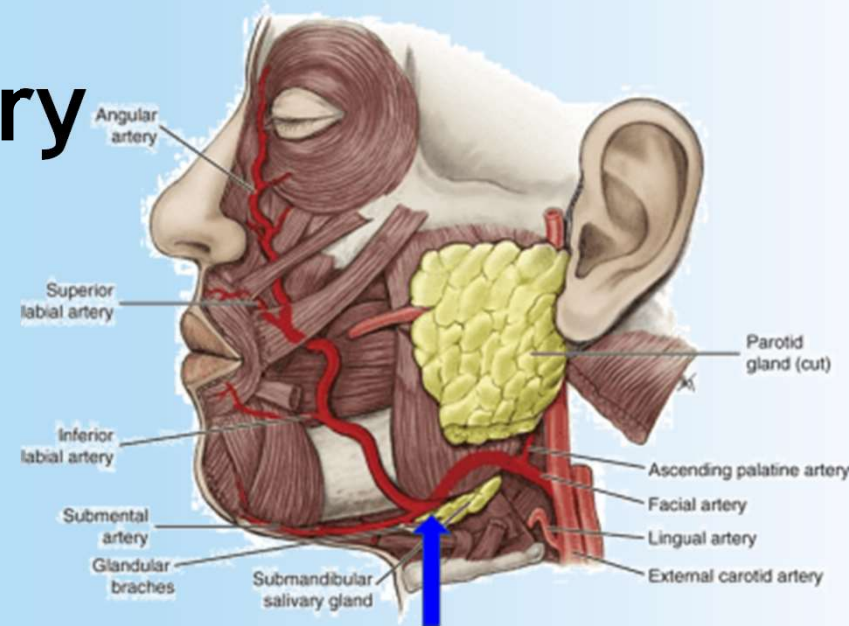
Facial artery

- ECA → runs deep to the submandibular gland
- Cervical (neck) branches:**
- **Ascending palatine artery** → Soft palate & tonsils
 - **Tonsillar artery** → Palatine tonsil
 - **Submental artery** → Chin & sublingual gland



Facial artery

- ECA → runs deep to the submandibular gland
- Facial (face) branches:
 - Inferior labial artery → Lower lip
 - Superior labial artery → Upper lip (**forms part of Kiesselbach's plexus**)
 - Lateral nasal artery → Nose
 - Angular artery (terminal branch) → Medial canthus of eye



Facial artery

Muscular Supply

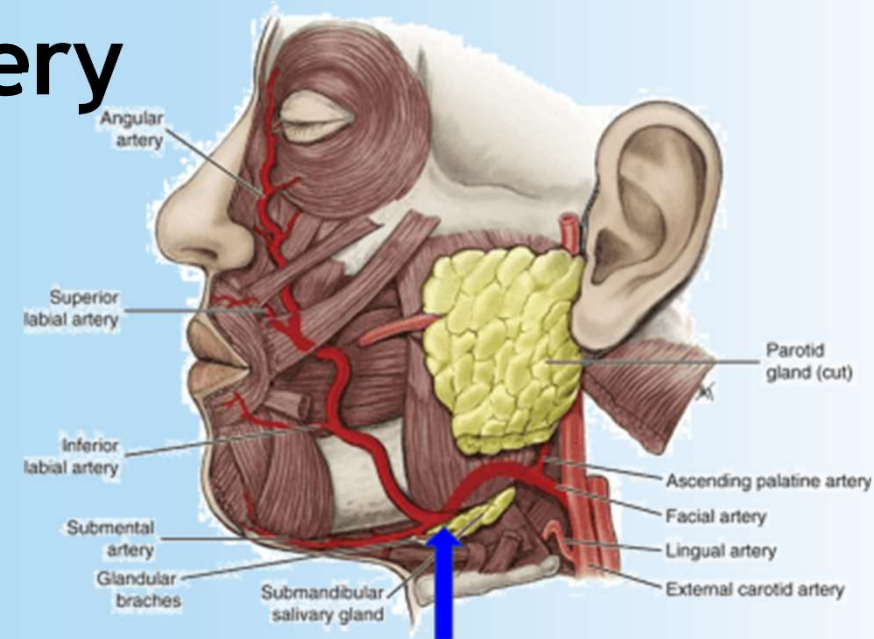
If you know what nerves of CN VII supply which muscles,
The facial a. is already a piece of cake!

Cervical Branches (Neck)

- **Submental artery** Supplies:
 - Mylohyoid (floor of mouth)
 - Digastric (anterior belly)
 - Platysma (neck/superficial muscle)

Facial Branches (Face)

- **Inferior labial artery** → Orbicularis oris (lip sphincter)
- **Superior labial artery** → Orbicularis oris + **Zygomaticus minor**
- **Angular artery** (terminal branch) → Nasalis (nose muscle)



Facial artery

- High yield Clinical points

✓ **Pulse point:** Can be palpated as it crosses the **mandible** (anterior to masseter muscle)

✓ **Epistaxis:** The **superior labial artery** contributes to Kiesselbach's plexus (common nosebleed site)

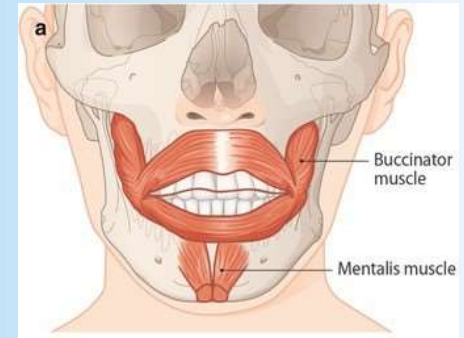
✓ **Compression:** **Bleeding** from facial wounds can be **controlled by pressing against the mandible**

✓ **Danger triangle:** Infections in this area can spread to cavernous sinus via angular vein

Facial artery



- More High Yield points
- HY EXAM Q TRAP!
 - The buccinator muscle is supplied by which artery?
 - Answer: **Maxillary** artery
 - Although it's a muscle of facial expression (CN VII), the buccinator m. is a **classic exception to the rule of facial n. facial a. cohabitation**.



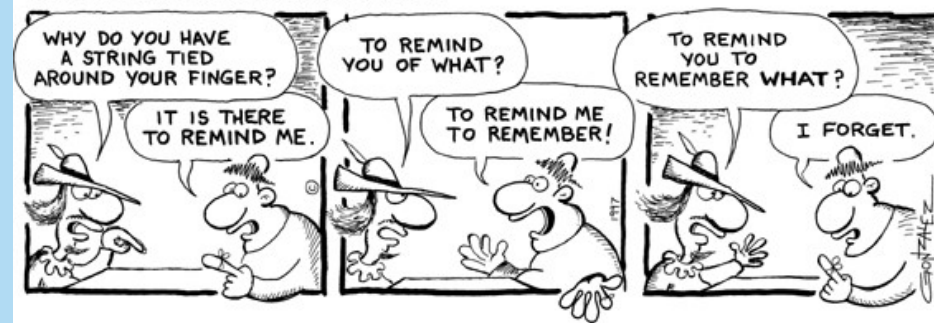
Facial artery

Mnemonics to the rescue!

"Facial Artery Supplies Lips, Nose, and Palate" (FASLNAP)

- Facial artery
- Ascending palatine
- Submental
- Labial (inferior/superior)
- Nasal
- Angular
- Palate (via ascending palatine)

Surewould Forest by Bob Gonzalez



"Facial Artery Feeds 4M's + Lips/Nose"

- **M**ylahyoid
- **M**entalis (via labial branches)
- **M**uscles of mastication (indirectly via anastomoses)
- **M**imetic muscles (orbicularis oris, nasalis)
- +
- **L**ips (labial arteries)
- **N**ose (angular artery)

How you might feel about the facial artery now...



Occipital and Posterior Auricular arteries

- Occipital a.

Supplies:

- **SCM muscle** (via muscular branch)
- **Scalp** (posterior head up to the vertex)
- **Meninges** (via meningeal branch through mastoid foramen)

Clinical:

- **Scalp lacerations bleed profusely** (anastomoses with contralateral side).

- Post. Auricular a.

Supplies:

- **Scalp** (behind the ear)
- **Auricle** (external ear)
- **Parotid gland**

Key Differences (High-Yield!)

Feature	Occipital Artery	Posterior Auricular Artery
Origin	Opposite facial artery	Above digastric muscle
Landmark	Deep to SCM	Behind the ear
Scalp Supply	Posterior vertex	Area behind the ear
Unique Supply	Meninges	Parotid gland

Maxillary artery

- Divides into **3 parts** relative to the **lateral pterygoid muscle**:
 - **Mandibular part** (before pterygoid)
 - **Pterygoid part** (around pterygoid)
 - **Pterygopalatine part** (after pterygoid)

Maxillary artery

Mandibular Part

1. Middle meningeal artery

Enters skull via foramen spinosum → supplies dura mater.

Clinical: Rupture → epidural hematoma (**lucid interval** → **unconsciousness**).

2. Inferior alveolar artery

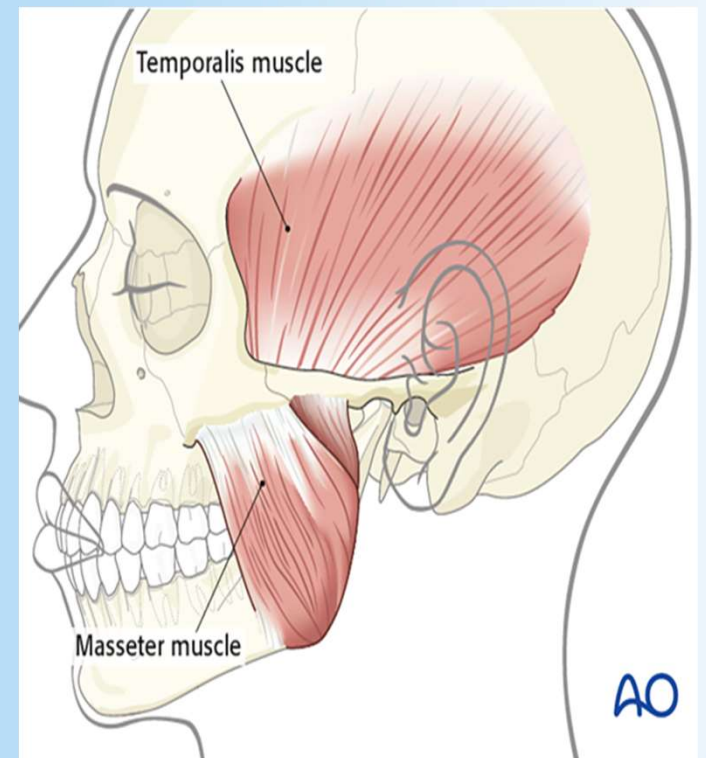
Enters mandibular foramen → supplies lower teeth.

Clinical: Dental procedures risk damage

Maxillary artery

Pterygoid Part

1. Masseteric artery → Masseter muscle.
2. Deep temporal arteries → Temporalis muscle



Maxillary artery

Pterygopalatine Part

1. Sphenopalatine artery

- Enters nose via sphenopalatine foramen → supplies nasal cavity (main source of epistaxis).

2. Infraorbital artery

- Supplies maxillary teeth and face (via infraorbital foramen).

3. Descending palatine artery → Hard/soft palate.

Maxillary artery

High Yield Points:

"Maxillary = Meninges + Mouth + Nose":

Meninges: Middle meningeal a.
(epidural hematoma).

Mouth: Teeth (inferior alveolar,
infraorbital).

Nose: Sphenopalatine artery
(nosebleeds).

Fractures: Trauma to pterygoid
region can cause severe bleeding
(e.g., LeFort fractures).

Test Q. Examples

1. "A patient presents after head trauma with a lucid interval followed by unconsciousness. Which artery is ruptured?"

→ **Answer:** Middle meningeal artery
(epidural hematoma).

2. "Which artery is ligated for uncontrolled nosebleeds?"

→ **Answer:** Sphenopalatine artery.

Superficial Temporal artery

→ runs superficially under the scalp

Supplies

- Scalp (frontal and parietal regions)
- **Parotid gland** (via transverse facial a.)
- Temporalis muscle (via middle temporal a.)

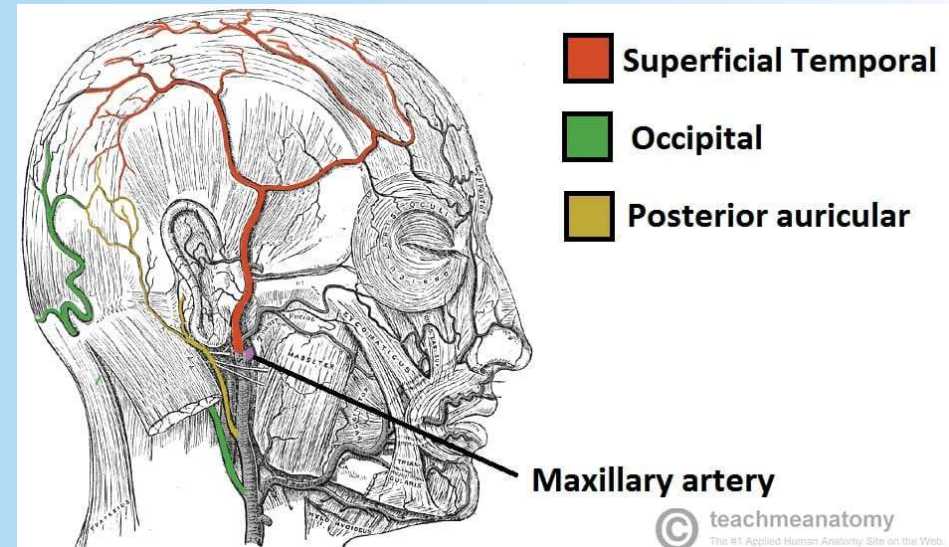
High-Yield Points

✓ Temporal arteritis (Giant Cell Arteritis):

- Inflammation of STA → **throbbing headache**, **jaw claudication**, risk of **blindness** (occlusion of ophthalmic artery)

✓ Scalp lacerations: STA bleeds profusely

✓ Facial trauma: can cause hematoma near the ear.



Test Q.

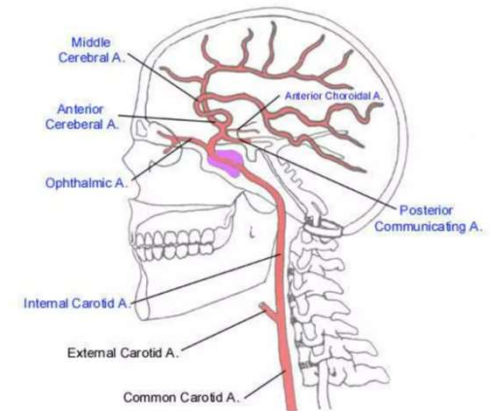
"A 70-year-old presents with sudden vision loss and a tender, pulseless artery near the ear. What is the diagnosis?"

Answer: Temporal arteritis (STA involvement).

Internal Carotid a.

- CCA → External Carotid a. + Internal carotid artery
- the ICA does not supply any aa. to the neck 😊
- Enters the skull via carotid canal in the **Petrous part of temporal bone**
- Gives 3 branches:
 - Ophthalmic artery
 - Anterior Cerebral artery
 - Posterior communicating artery

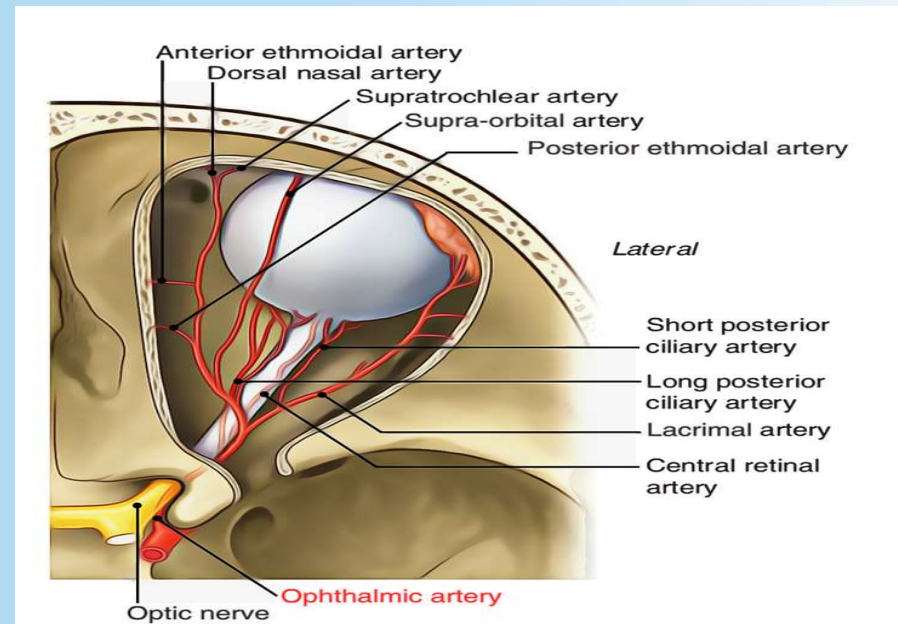
Internal Carotid Artery



Branches of the Internal Carotid Artery

- Ophthalmic artery:
 - Travels through Carotid sinus → subarachnoid space → optic canal w/ CN II
 - Supplies majority of the EYE (i.e. **central retina, extraocular mm., lacrimal gland**)
 - Also supplies some of the forehead, scalp, & nasal cavity + ethmoid sinus

- **Embolus** = block → monocular blindness
- **Compression** (e.g. tumor) can disrupt ophthalmic a. blood flow, leading to ophthalmoplegia (paralysis of eye muscles) + vision loss



Ophthalmic artery cont'd

Oh, Look! Some Eyes See Clearly!"

- **O**phthalmic
- **L**acrimal
- **S**upraorbital/Supratrochlear
- **E**thmoidal
- **S**hort/long ciliary
- **C**entral retinal

Key Branches & What They Supply

A. Orbital Structures

- **L**acrimal artery → Lacrimal gland (**tear production**) + **L**ateral eyelids.
- **S**upraorbital & **S**upratrochlear arteries → Forehead/scalp + **u**pper eyelid.
- **E**thmoidal arteries → Ethmoid sinuses + nasal cavity.

B. Eye & Vision

- **S**hort/long posterior ciliary arteries → Choroid (outer retina) + iris/ciliary body
- **C**entral retinal artery → Inner retina (occlusion → sudden blindness)

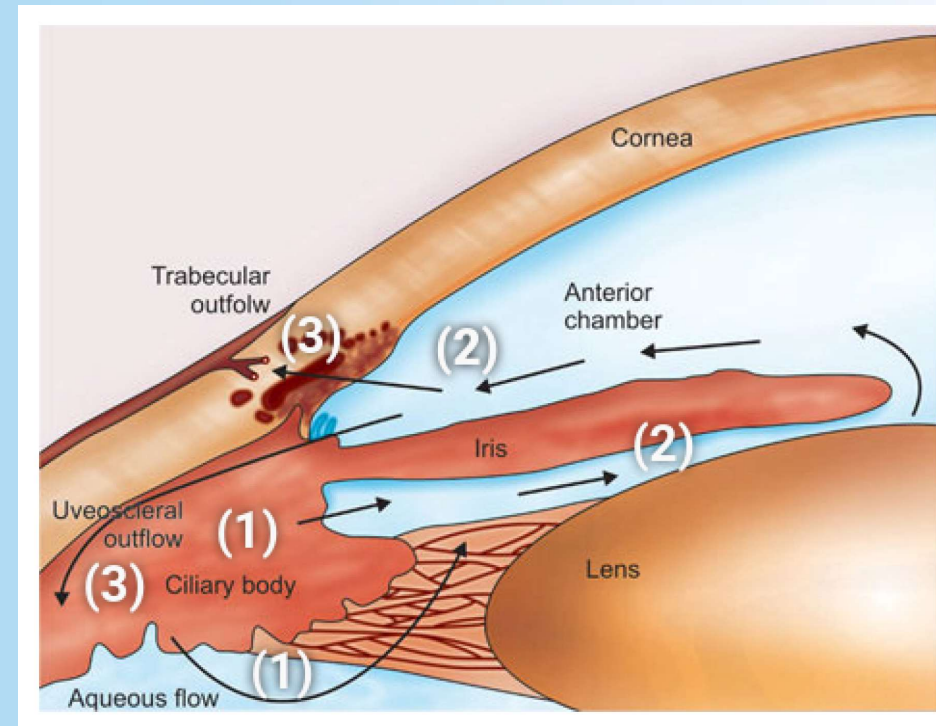
C. Anastomosis!

- **Dorsal nasal artery** → **Bridges with facial artery** (external carotid).



The Eye

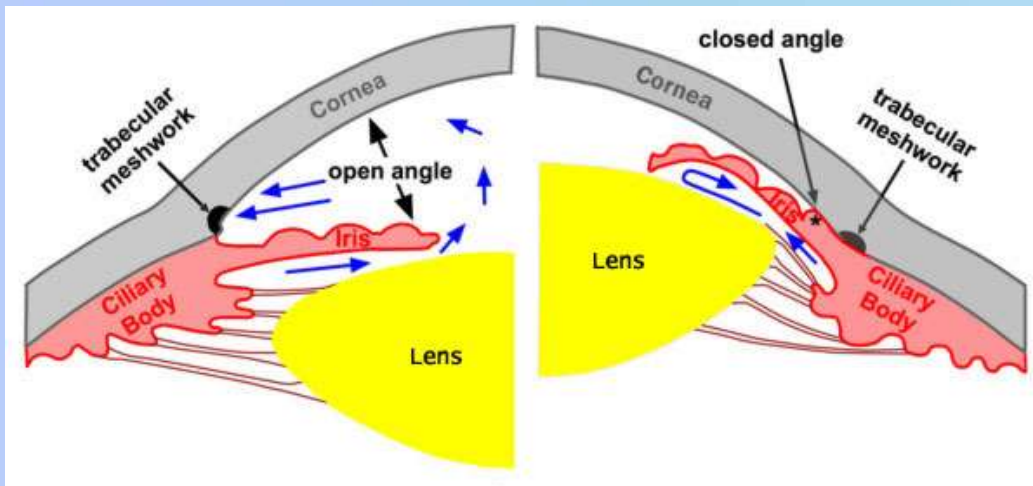
- Flow of Aqueous humor
- 1. produced by the ciliary body
- 2. flows behind the iris → anterior chamber
- 3. leaves the eye through Schlemm's Canal & trabecular meshwork
- "Aqueous *Travels the SCenic Route*" (Schlemm's Canal).



The Eye

- Flow of Aqueous humor
- BLOCKAGE of flow = **Acute angle closure glaucoma** → EMERGENCY!
- Leads to Blindness, fast!

AACG →



Healthy →



Figure 3: Clinical findings on slit-lamp examination:
a) In acute angle closure: clear reddening with ciliary injection (*); pupil moderately widened and no longer exactly circular (distorted area shown by +++); clouding of iris structures by corneal edema (#)
b) In a normal eye: no irritation of conjunctiva (*); pupil round, constricted on illumination (+++); clearly discernible iris structures (#)

Source: Department of Ophthalmology, University Hospital Freiburg



Tear Drainage (Nasolacrimal System)

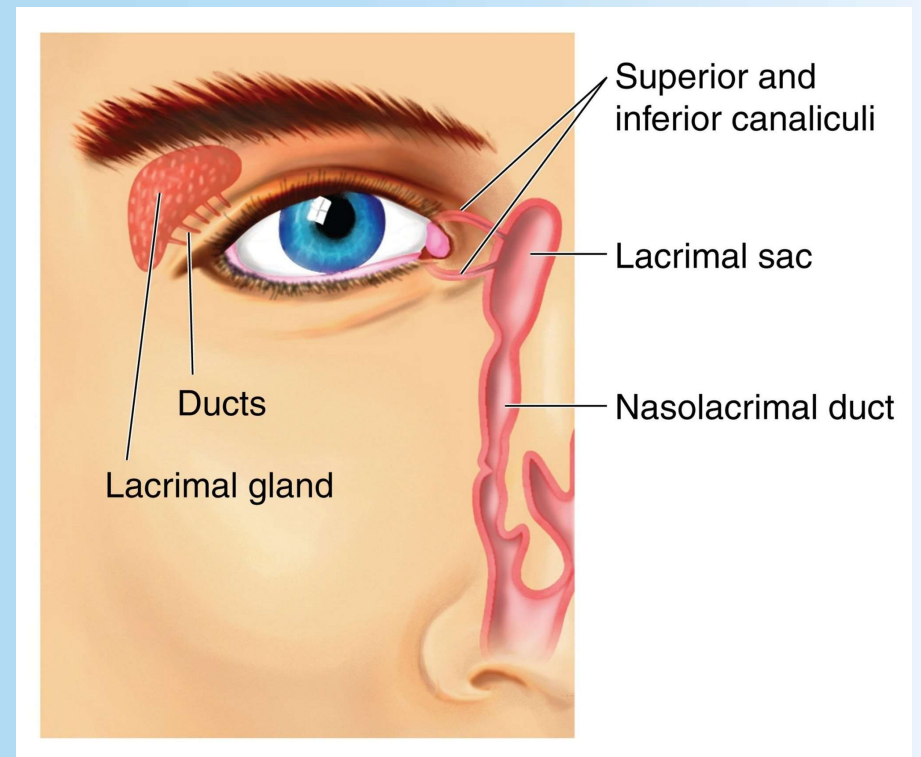
Tears produced by **lacrimal gland** → spread over eye.

Drain via:

Lacrimal puncta (upper/lower eyelids) →
Lacrimal canaliculi → **sac** → **Nasolacrimal duct** → Opens into **inferior nasal meatus**.

(explains why your nose gets runny when you cry!)

- Blockage → **epiphora** (excessive tearing).
- Mnemonic: *""Punks Cry So Nastily"*



Blood Supply to Nasal Cavity

Ophthalmic a. branches (ICA):

- Anterior/posterior ethmoidal arteries → Roof/superior septum.

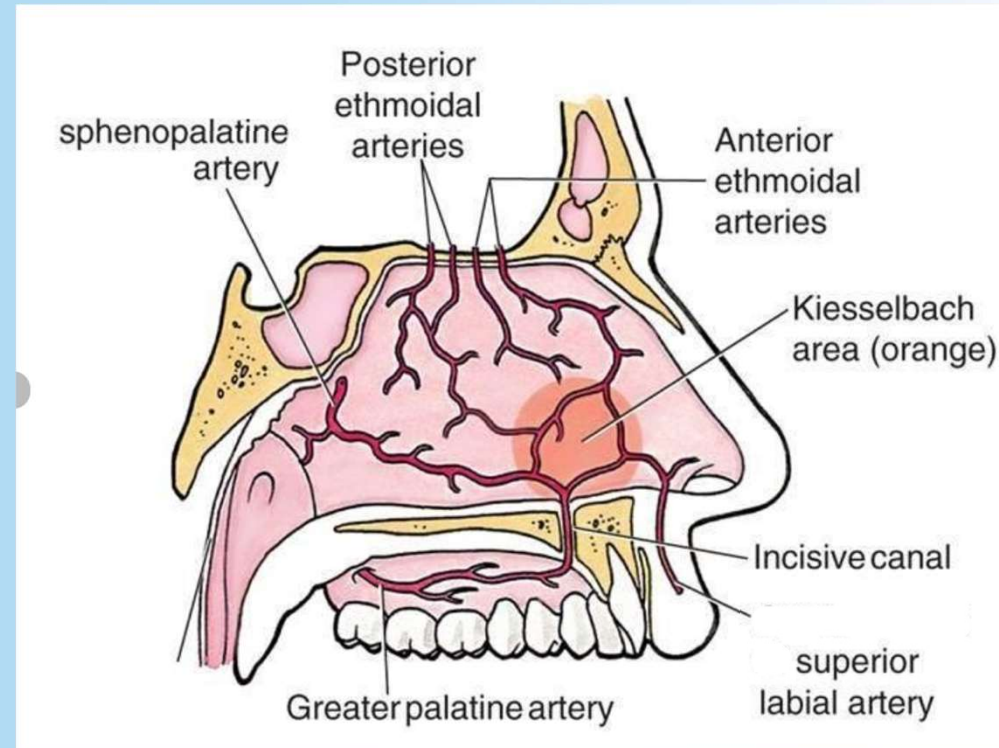
Maxillary a. branches (external carotid):

- Sphenopalatine artery → **Main supply (lateral wall/septum)**.
- Greater palatine artery → Floor.

Facial a. branch:

- Superior labial artery → Nostrils.

- **Kiesselbach's plexus** → **most common site of nosebleeds (epistaxis)**.



Mnemonic: "SPF for Nose" (Sphenopalatine, Palatine, Facial).

Eye, Cry, blow your Nose!



Summary Table

Topic	Key Structures	Clinical Relevance
Aqueous drainage	Trabecular meshwork → Schlemm's canal	Glaucoma
Tear drainage	Puncta → Canaliculi → Nasolacrimal duct	Epiphora
Nasal blood	Sphenopalatine, ethmoidal, facial arteries	Epistaxis (Kiesselbach's plexus)

Practice Q's

1. *A patient has elevated intraocular pressure. Which drainage structure is most likely blocked?*

Answer: Trabecular meshwork/Schlemm's canal.

2. *Where does the nasolacrimal duct empty?*

Answer: Inferior nasal meatus.

3. *Which arteries supply Kiesselbach's plexus?*

Answer: Sphenopalatine, ethmoidal, and superior labial aa.

Blood Supply to Meninges

Dura Mater (Outermost Layer)

A. Anterior Cranial Fossa

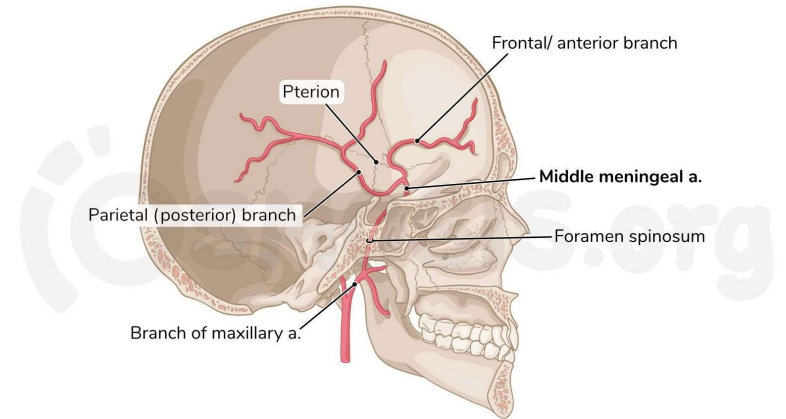
- Anterior meningeal branches (from ethmoidal arteries, off the ophthalmic artery).

B. Middle Cranial Fossa

- **Middle meningeal artery** (from maxillary artery):
 - Enters skull via foramen spinosum → **supplies most of dura.**
- Accessory meningeal artery (also from maxillary artery).

C. Posterior Cranial Fossa

- Posterior meningeal artery (from ascending pharyngeal artery).
- Meningeal branches of vertebral and occipital arteries.



Blood Supply to Meninges

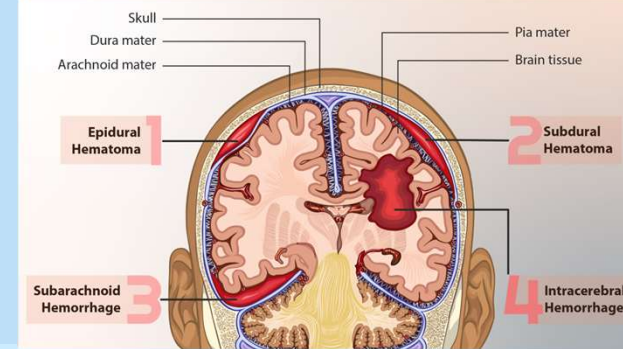
Arachnoid & Pia Mater (Middle/Inner Layers)

- Supplied by small **penetrating vessels** from:
 - **Cortical arteries** (e.g., branches of ACA, MCA, PCA).
 - **Choroidal arteries** (for choroid plexus in ventricles).

✓ Epidural vs. Subdural Hematoma:

- **Epidural:** Middle meningeal artery rupture (trauma, skull fracture).
- **Subdural:** Bridging **cortical veins** rupture (elderly, alcoholics).

Types of brain hemorrhage



**Those arteries are working overtime for
you to ace the exam!
Good Luck!**

- Trying to remember the
arteries of
the head and neck:

