

REGIONAL ANATOMY OF THE HEAD

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Borders against neck

Superficial:

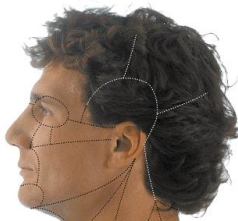
- protub. occipit. ext.
- linea nuchae sup.
- porus acusticus ext.
- mandible

Deep:

- basis cranii ext.

Cranial region

Border: glabella - protub. occip. ext.



Superficial regions:

- regio frontalis
- regio parietalis
- regio occipitalis
- regio temporalis

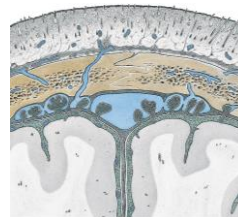
Deep regions:

- basis cranii int.
- basis cranii ext.

Scalp and calvaria

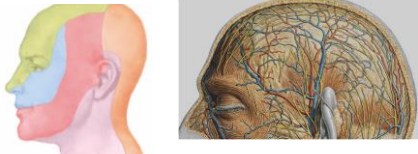
Layers:

1. skin (+ hairs)
2. Subcutaneous tissue
3. galea aponeurotica
4. Loose subgaleal tissue
5. periosteum
5. bone (lamina ext., diploe, lamina int.)
6. dura mater encephali



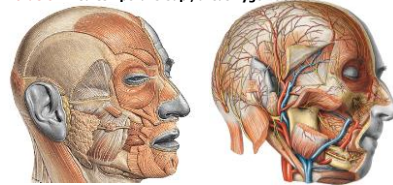
Regiones frontoparietooccipitales

- a., v. et n. supraorbitalis a supratrochlearis
- a., v., n., zygomaticotemporalis
- a. et v. temporalis superficialis, n. auriculotemporalis, n. auricularis magnus
- a. et v. auricularis post.
- a. et. v. occipitalis, n. occipitalis major et minor



Regio temporalis

Borders: linea temporalis sup., arcus zygomaticus

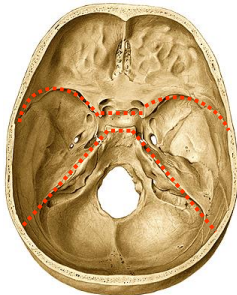


- skin
- n. auricularis magnus
- m. temporoparietalis (n.VII.)
- a., v. temporalis spf. (v. retromandibularis)

- n. auriculotemporalis
- fascia temporalis
- m. temporalis
- a.,v., n. temporalis prof.

BASIS CRANII INTERNA

- Fossa cranii anterior
- Fossa cranii media
- Fossa cranii posterior

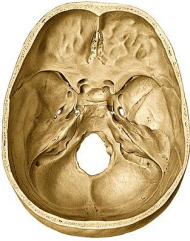


BASIS CRANII INTERNA – Fossa cranii anterior



- os frontale:**
- partes orbitales - sinus frontalis
- pars nasalis
- crista frontalis - falx cerebri + sinus durae matris
- os ethmoidale:**
- lamina cribrosa - nn. olfactorii, a. meningea ant. n. ethmoidalis ant. (rr. nasales)
- crista galli
- os sphenoidale:**
- alae minores - canalis opticus (n. opticus, a. ophthalmica)
- sulcus praechiasmaticus - chiasma opticum

BASIS CRANII INTERNA – Fossa cranii media



- os sphenoidale:**
 - facies cerebralis alae majores
 - sella turcica
- os temporale**
 - facies ant. pyramidis
 - squama ossis temporalis



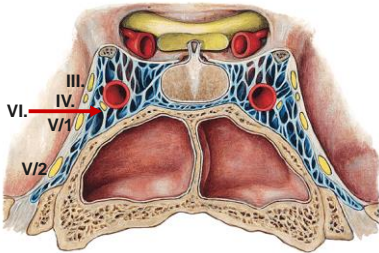
Fossa cranii media - structures



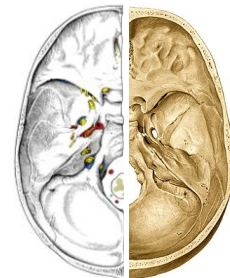
- fossa hypophysialis:**
 - hypophysis
- sulcus caroticus:**
 - sinus cavernosus
- sulcus sinus petrosi superioris**
 - sinus petrosus superior
- impressio trigemini**
 - ganglion trigeminale



Sinus cavernosus - structures



Fossa cranii media - openings



- fissura orbitalis superior**
 - n. III., IV., VI.
- n. ophthalmicus (+branches)**
- vena ophthalmica sup.**
- apertura int. canalis carotici**
 - a. carotis int.
- hiatus canalis n. petrosi majoris**
 - n. petrosus major
- hiatus canalis n. petrosi minoris**
 - n. petrosus minor

Fossa cranii media - openings

foramen rotundum
n. maxillaris

foramen ovale
n. mandibularis, veins

foramen spinosum
a. meningea media, r. meningeus n. mandibularis

BASIS CRANII INTERNA – Fossa cranii posterior

os sphenoidale
clivus (synchondrosis sphenooccipitalis)

os temporale
facies post. pyramidis

os occipitale

Fossa cranii posterior

Structures related to dura mater enceph.
protuberantia occipitalis interna
eminentia cruciformis

Structures related to dural sinuses
sulcus sinus sagittalis superioris
sulcus sinus transversi
sulcus sinus sigmoidei
sulcus sinus petrosi superioris
sulcus sinus petrosi inferioris

Fossa cranii posterior – openings

porus acusticus internus
canalis n. facialis (VII), n. VIII.

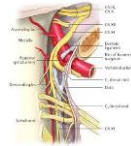
apertura externa aqueductus vestibuli
ductus endolymphaticus

apertura externa canaliculi cochlae
Perilymph drainage

Fossa cranii posterior – openings

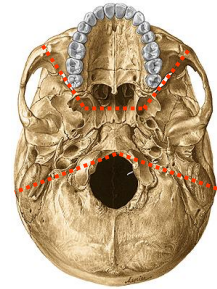


- foramen jugulare**
nn. IX., X., XI., vena jugularis interna
- canalis hypoglossi**
n. XII
- canalis condylaris**
- emissarium**
- foramen magnum**
spinal cord, a. vertebralis, n. XI., veins



BASIS CRANII EXTERNA

- Fossa cranii anterior
- Fossa cranii media
- Fossa cranii posterior



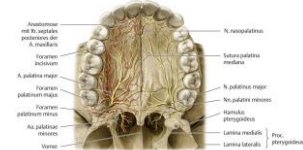
BASIS CRANII EXTERNA – fossa cranii anterior



- Palatum durum**
- processus palatini maxillarum**
- laminae horizontales ossis palatini**
- choanae**
- maxilla**

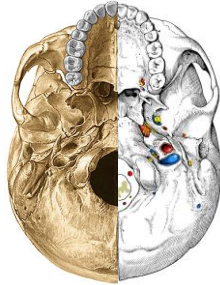


BASIS CRANII EXTERNA – fossa cranii anterior



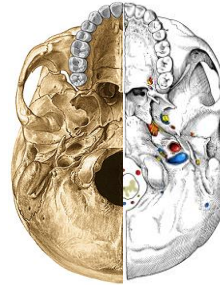
- Palatum durum:**
- foramen palatinum majus** – nervus palatinus major, arteria palatina major
- foramina palatina minora** – nervi palatini minores, arteriae palatinae minores
- foramen incisivum** – nervus nasopalatinus, small spetal arteries from a. maxillaris
- Choanae** – cavitas nasi

BASIS CRANII EXTERNA – fossa cranii media



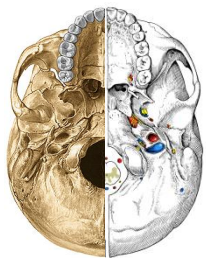
- Os sphenoidale:**
corpus – crista et vomer (choanae)
alae majores
 foramen ovale – n. mandibularis
 foramen spinosum – a. meningea media,
 r. meningeus
processus pterygoideus
 canalis pterygoideus – n. canalis pteryg.
 (n. petrosus prof. + n. petrosus major)

BASIS CRANII EXTERNA – fossa cranii media (os temporale)



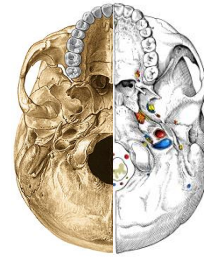
- synchondrosis sphenopetrosa (n. petrosus major et minor)
 apertura externa canalis carotici (a. carotis int., plexus caroticus)
 canalis musculotubarius (m. tensor tympani, tuba auditiva)
 apertura externa canaliculi tympanici (n. tympanicus)
 apertura externa canaliculi cochlae (perilympha)
 fossa jugularis (v. jugularis int.)
 canaliculus mastoid. (n. auricularis)
 foramen jugulare (nn. IX., X., XI.)
 foramen stylomastoideum (n. VII.)

BASIS CRANII EXTERNA – fossa cranii media (os temporale)

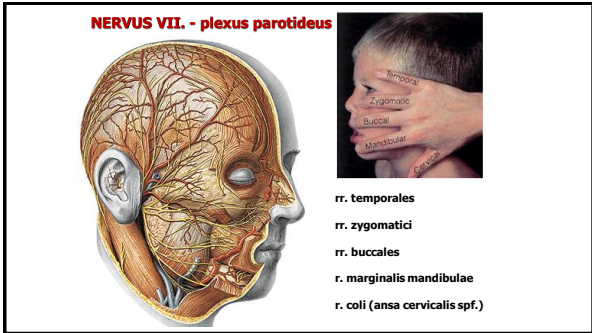
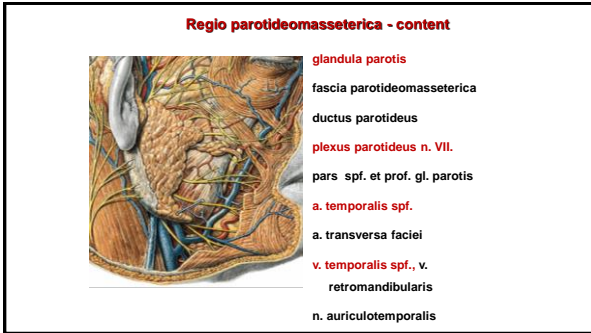
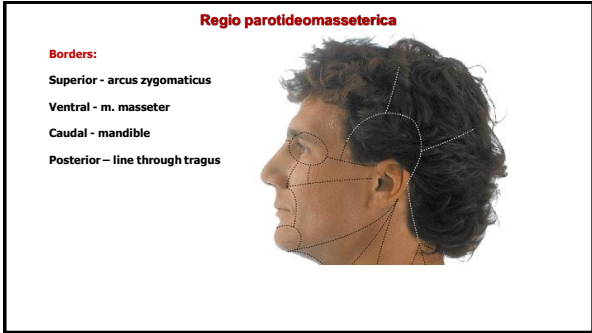
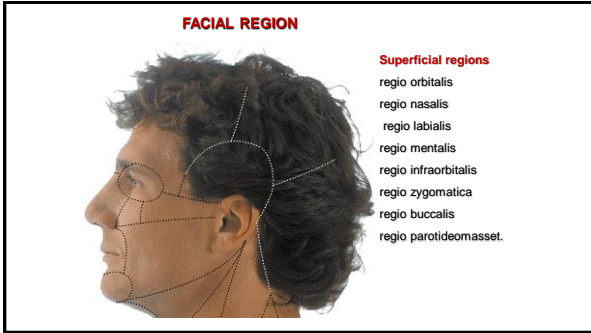


- processus mastoideus (m. sternocleidomastoideus)
 incisura mastoidea (m. digastricus)
 sulcus arteriae occipitalis (a. occipitalis)
 fossa mandibularis et tuberculum articulare (art. temporomandibularis)
 os tympanicum – sulcus (membrana tympani)
 fissura petrotympanica (chorda tympani)
 fissura tympanomastoidea (n. auricularis n. X.)

BASIS CRANII EXTERNA – fossa cranii posterior (os occipitale)



- foramen magnum**
 medulla spinalis,
 a. vertebralis
 a. spinalis ant. + aa. spinales post.
 plexus venosi vertebrales int. + basilaris
 radix spinalis n. XI.
condyli occipitales – art. atlantooccipitales
canalis n. hypoglossi – n. XII.
canalis condylaris – emissarium
protuberantia occip. ext. + crista occipit.
 lig. nuchae
lineae nuchae



Retromandibular region



- n.VII.
- r. stylohyoideus
(m. stylohyoideus)
- r. digastricus
(venter post. m. digastrici)
- n. auricularis post.
- a. auricularis post.
(a. carotis ext.)

Other facial regions

Regiones: orbitalis, nasalis, infraorbitalis, buccalis, zygomatica mentalis

Layers:

Skin and subcutaneous tissue

innervation - n. V.

mm. of facial expression

innervation - n. VII.

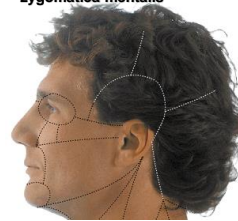
Blood supply

a. et v. facialis

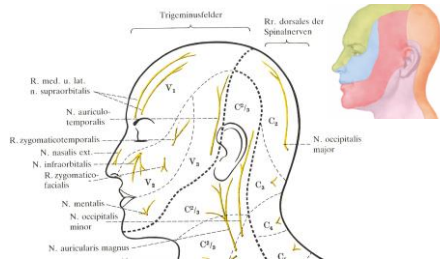
(branches of a. maxillaris et ophthalmica)

Mucosa and submucosa

gll. labiales, buccales, nasales



Skin innervation



Muscles of the facial expression



Around eye

m. orbicularis oculi

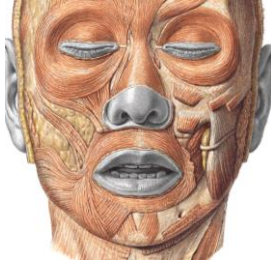
m. procerus

m. corrugator supercilii

Around nose

m. nasalis

Muscles of the facial expression



Around mouth

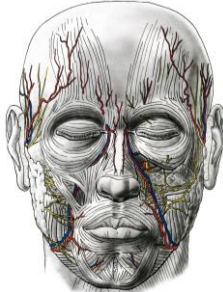
- m. levator labii sup.
- m. levator labii sup. al. nasi,
- m. levator anguli oris
- m. zygomaticus major et minor
- m. buccinator
- m. risorius
- m. orbicularis oris
- m. depressor anguli oris
- m. depressor labii inf.
- m. mentalis

Blood supply of the face



- a. facialis
- a. labialis sup. et inf. (circulus arteriosus oris)
- a. alaris nasi
- a. angularis
- a. maxillaris
- a. mentalis
- a. infraorbitalis
- a. ophthalmica
- a. supraorbitalis
- a. supratrochlearis et infratrochlearis
- a. temporalis spf.
- a. transversa faciei

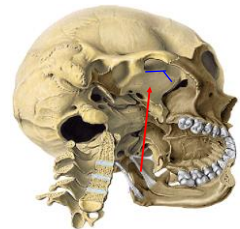
Blood drainage of the face



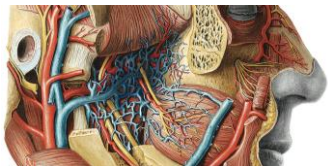
- v. facialis
- vena profunda faciei
(connected with plexus pterygoideus)
- plexus pterygoideus (v. maxillaris)
- v. mentalis
- v. infraorbitalis
- v. ophthalmica sup. et. inf.
- v. supraorbitalis
- v. palpebralis med. et lat.
- v. supratrochlearis et infratroch.

Regio infratemporalis

- Superior wall**
crista infratemporalis alae majoris ossis sphenoidalis
- Medial wall**
lamina lateralis processus pterygoidei
Lateral side of the pharynx
- Ventral wall**
facies infratemporalis corporis maxillae
- Lateral wall**
ramus mandibulae
- Dorsal wall**
Styloid septum



Regio infratemporalis



musculus pterygoideus med. et lat.

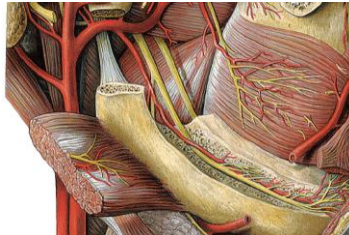
n. mandibularis

Branches for masticatory muscles, m. tensor tympani a veli palatini, n. buccalis, n. auriculotemporalis, n. lingualis, n. alveolaris inf.

a. maxillaris (pars mandibularis et pterygoidea)

plexus pterygoideus

Regio infratemporalis



Canalis mandibulae:

a. et n. alveolaris inf. (nervus mylohyoideus), n. buccalis, n. lingualis

Spatium praestiloideum et retrostiloideum

Styloid septum

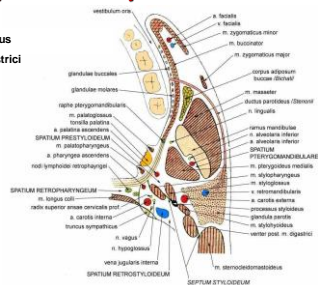
- m. sternocleidomastoideus
- venter posterior m. digastrici
- m. stylohyoideus
- m. stylopharyngeus
- m. styloglossus

Spatium praestiloideum

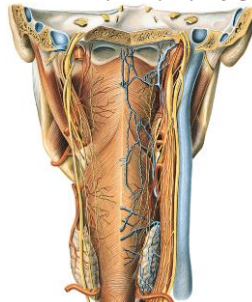
- a. carotis ext.
- v. retromandibularis

Spatium retrostiloideum

- a. carotis int.
- v. jugularis int.
- nn. IX., X., XI., XII.
- tr. sympathicus



Spatium parapharyngeum



a. carotis int.

a. pharyngea asc.

v. jugularis int.

plexus venosus pharyngeus

n. IX. (m. stylopharyngeus)

n. X. (vagina carotica - dors.)


n. XI. (m. sternocleidomast.)

n. XII. (arcus n. hypoglossi)

tr. sympathicus

(praeventral fascia)

Fossa pterygopalatina



Superior wall
 facies maxillaris alae majoris ossis sphenoidalis
 foramen rotundum (fossa cranii media)
 fissura orbitalis inferior (orbita)


Medial wall
 lamina perpendicularis ossis palatini
 foramen sphenopalatinum (cavum nasi osseum)

Ventral wall
 tuber maxillae (foramina alveolaria)

Dorsal wall
 processus pterygoideus ossis sphenoidalis
 canalis pterygoideus (basis cranii externa)

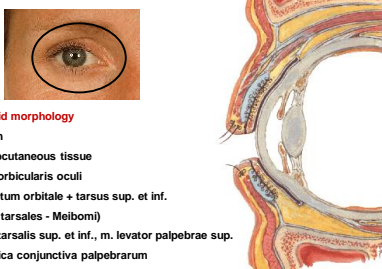
Inferiorly
 canalis palatinus major (cavum oris)

Fossa pterygopalatina - content



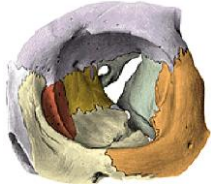
<p>a. maxillaris (pars pterygopal.)</p> <p>a. infraorbitalis</p> <p>a. alveolaris sup. post.</p> <p>a. palatina descendens</p> <p>a. canalis pterygoidei</p> <p>a. sphenopalatina</p>	<p>n. maxillaris</p> <p>n. infraorbitalis</p> <p>n. zygomaticus</p> <p>nn. pterygopalatini</p> <p>ggl. pterygopalatinum</p> <p>nn. palatini (major et minores)</p> <p>n. canalis pterygoidei (n. petrosus maj., prof.)</p> <p>nn. nasales post., rr. orbitales</p>
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Regio orbitalis + orbit



Eyilid morphology
 skin
 Subcutaneous tissue
 m. orbicularis oculi
 septum orbitale + tarsus sup. et inf.
 (gl. tarsales - Meibomi)
 m. tarsalis sup. et inf., m. levator palpebrae sup.
 tunica conjunctiva palpebrarum

Orbit – bony part



<p>Aditus orbitae</p> <p>margo supraorbitalis, infraorb.</p> <p>Superior wall</p> <p>pars orbitalis ossis frontalis</p> <p>ala minor ossis sphenoidalis</p>	<p>Medial wall</p> <p>processus frontalis maxillae</p> <p>os lacrimale</p> <p>lamina orbitalis ossis ethmoidalis</p> <p>ala minor ossis sphenoidalis</p> <p>Lateral wall</p> <p>facies orbitalis ossis zygomatici</p> <p>facies orbitalis alae majoris ossis sphenoid.</p> <p>fissura orbitalis superior et inferior</p> <p>Inferior wall</p> <p>facies orbitalis corporis maxillae</p> <p>facies orbitalis ossis zygomatici</p> <p>processus orbitalis ossis palatini</p>
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Orbit – content

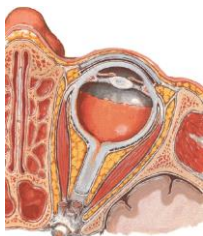
periorbit
 fissura orbitalis sup. et inf. (m. orbitalis)
 vagina bulbi

Extraocular muscles and their fascia

mm. recti (sup., inf. med., lat.)
 mm. obliqui (sup., inf.)
 m. levator palpebrae sup.

spatium episclerale

Loose connective tissue
 corpus adiposum orbitae
 bulbus oculi



Retrobulbar space – upper part

borders:

periorbita
 m. levator palpebrae sup.

n. lacrimalis
 r. comm. cum n. zygomatico

n. frontalis
 n. supraorbitalis (med., lat.)
 n. supratrochlearis

n. trochlearis
 m. obliquus bulbi sup.



Retrobulbar space – middle part

borders: m. levator palpebrae sup. + plane through n. opticus

n. abducens

m. rectus lat.

ramus sup. n. oculomotorii

m. levator palpebrae sup

m. rectus sup. et med.

ramus inferior n. oculomotorii

ggl. ciliare

nn. ciliares breves

n. nasociliaris

n. ethmoidalis ant., post., n. infratrochlearis

a. ophthalmica

a. ethmoidalis ant., post., a. infratrochlearis

v. ophthalmica sup.



Retrobulbar space – inferior part

borders: plane through n. opticus + floor of the orbit

ramus inf. n. oculomotorii

m. rectus inf.

m. obliquus bulbi inf.

a. + n. infraorbitalis

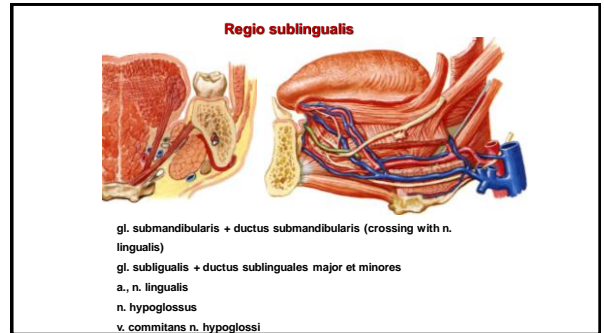
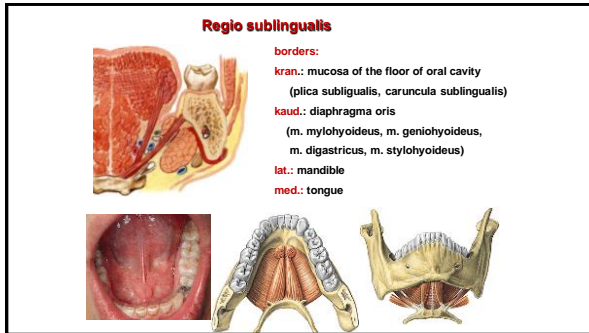
canalis infraorbitalis

a. + n. zygomaticus

foramen zygomaticoorbitale

v. ophthalmica inf.





References

Čihák, R.: Anatomie 3. Praha, Grada, 2001, 2004

Sobotta, J.: Atlas of Human Anatomy Vol 1–2 Munich, Urban und Schwarzenberg, 1993

Williams, P. & Warwick, R.: Gray's Anatomy, 37 ed, Churchill Livingstone, 1996

Netter, F.: Atlas of Human Anatomy, 4th ed., Elsevier, USA, 2006