

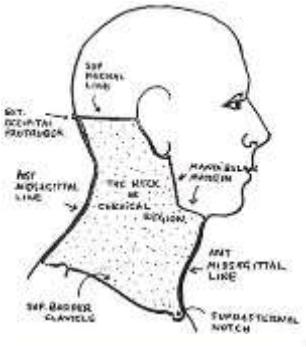
# Topographical anatomy of the neck

1. Neck – boundaries, palpation points, triangles and regions
2. Cervical fascia and interfascial spaces in the neck
3. Anterior cervical region:
  - ✓ submandibular triangle
  - ✓ carotid and muscular triangles
  - ✓ sternocleidomastoid region
4. Lateral cervical region
5. Viscera of the neck

## Neck

Collum s.  
Cervix

### Neck boundaries



# Boundaries of the neck

## cranial:

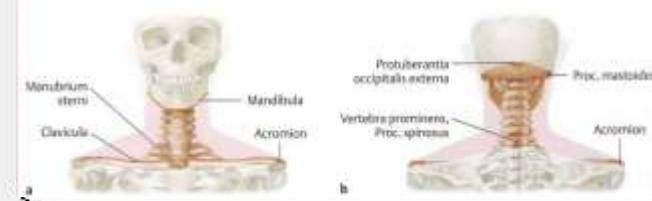
- ✓ *basis mandibulae*
- ✓ *proc. mastoideus*
- ✓ *linea nuchalis superior*
- ✓ *protuberantia occipitalis externa*

## caudal:

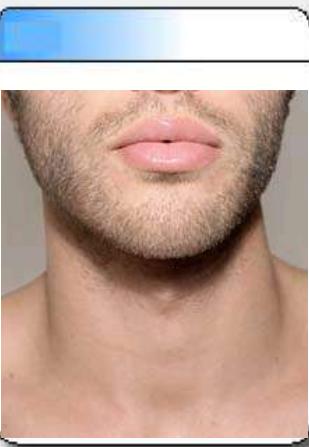
- ✓ *incisura jugularis sterni*
- ✓ *clavicula*
- ✓ *acromion scapulae*
- ✓ *proc. spinosus (C<sub>7</sub>)*



© L-H. Begrenzungen des Halses



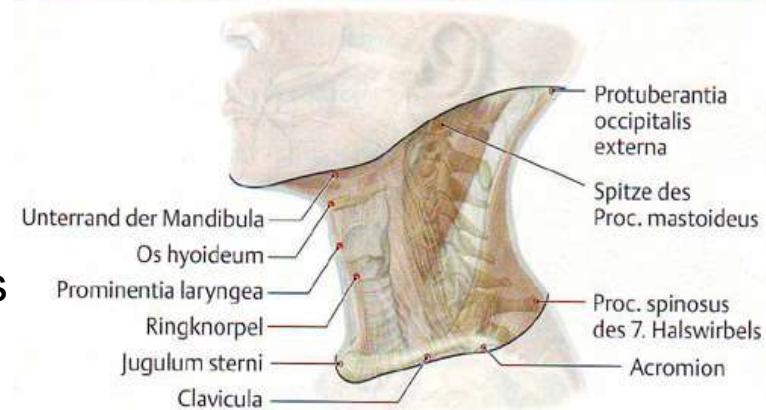
## External points



# External palpation points

## ■ anterior surface:

- ✓ hyoid bone – C<sub>3</sub>
- ✓ superior thyroid notch
- ✓ laryngeal prominence – C<sub>4</sub>  
*(Adam's apple)*
- ✓ cricoid cartilage  
of the larynx – C<sub>6</sub>
- ✓ the isthmus  
of the thyroid gland:  
II-IV tracheal cartilage
- ✓ upper cartilaginous rings  
of the trachea

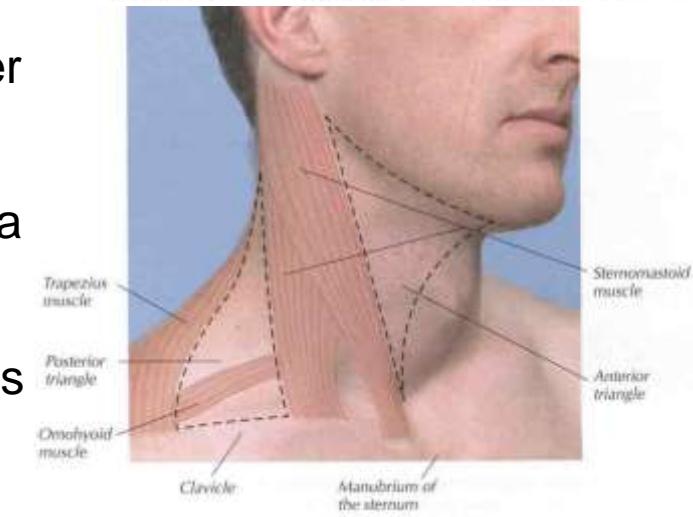
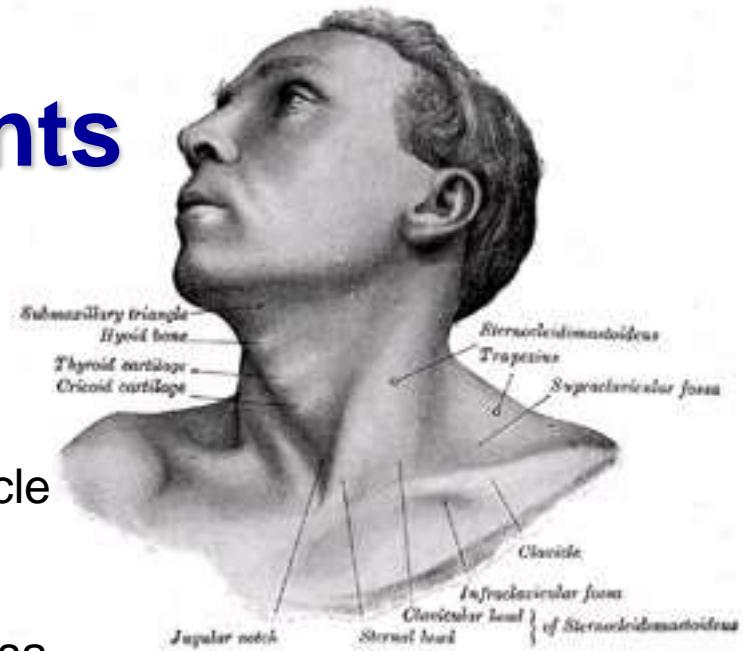


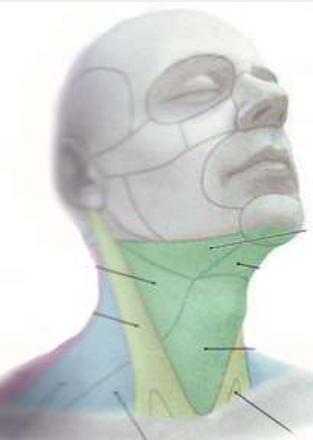
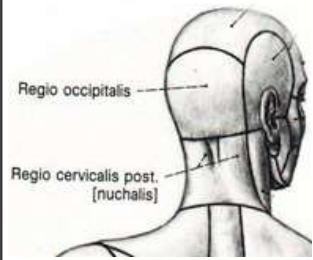
## External points



# External palpation points

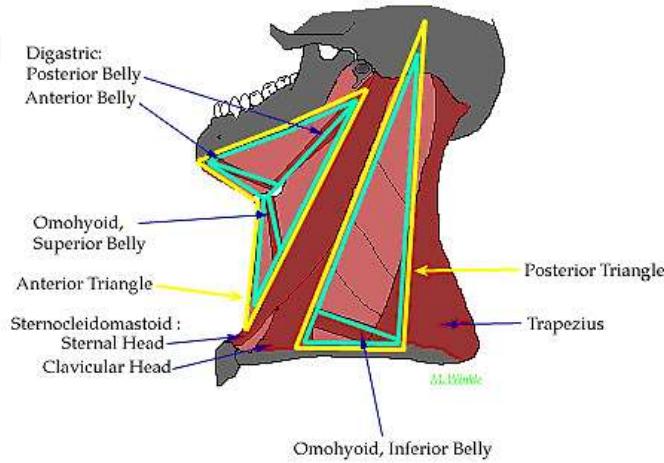
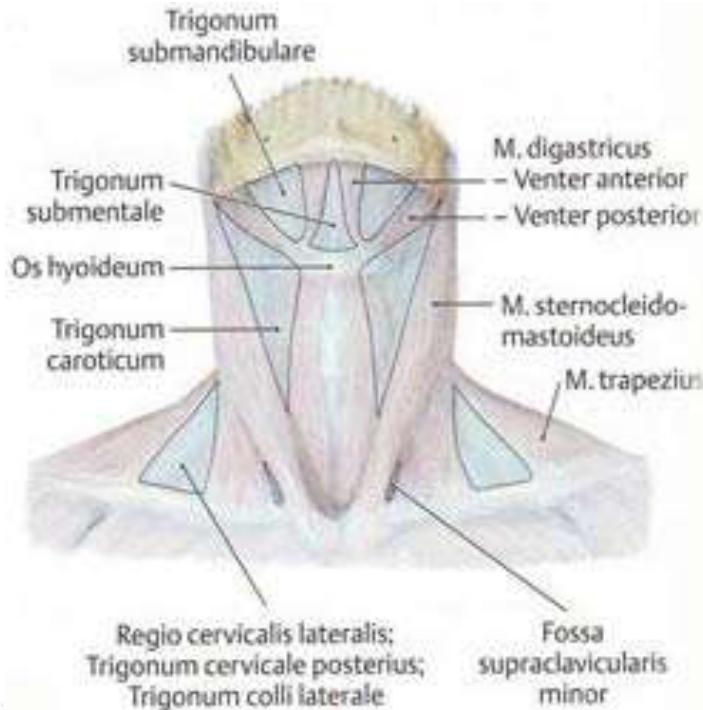
- lateral surface:
  - ✓ the anterior border of the trapezius
  - ✓ the contour of the sternocleidomastoid muscle
  - ✓ above the medial end of the clavicle – lesser supraclavicular fossa
  - ✓ between the posterior border of the sternocleidomastoid muscle and the clavicle – greater supraclavicular fossa (omoclavicular triangle):  
the brachial plexus trunks & subclavian arterial pulsations
  - ✓ along the anterior muscular border – carotid pulsations





# Cervical regions and triangles

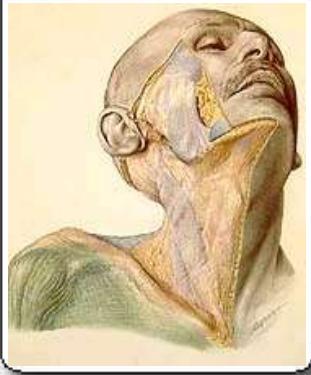
- ✓ anterior cervical region
- ✓ sternocleidomastoid region
- ✓ lateral cervical region
- ✓ posterior cervical region



- **anterior triangle of neck:**
  - ✓ submandibular triangle
  - ✓ carotid triangle
- **lateral triangle of neck:**
  - ✓ omotrapezoid triangle
  - ✓ omoclavicular triangle

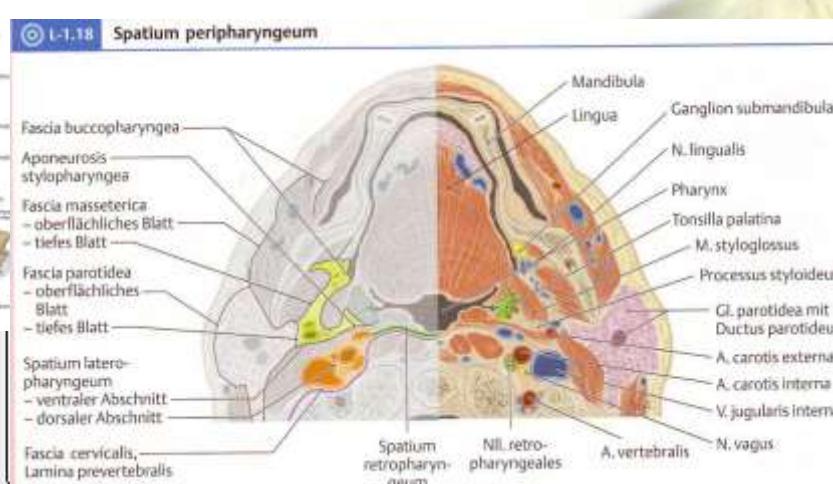
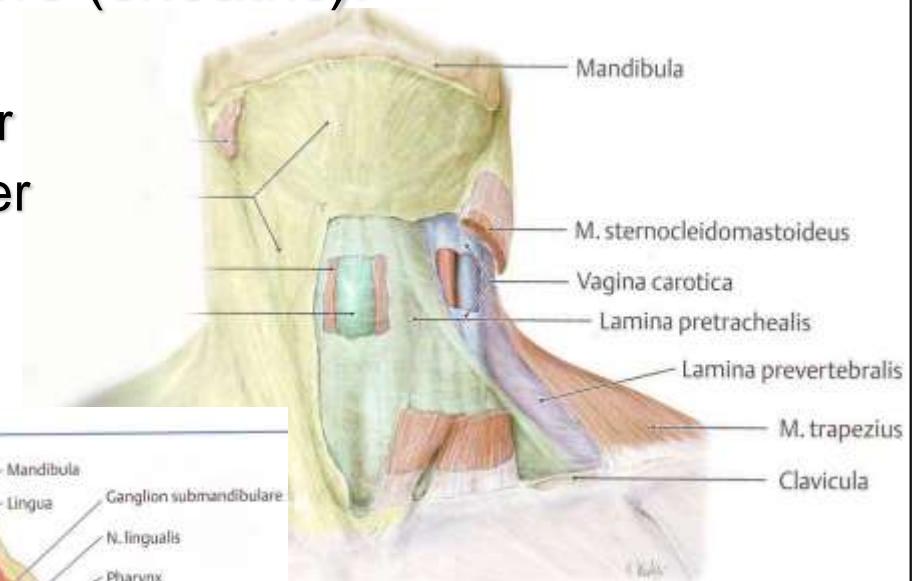
# (Deep) cervical fascia, *fascia cervicalis (profunda)*

Fascia cervicalis



- three fascial layers (sheaths):

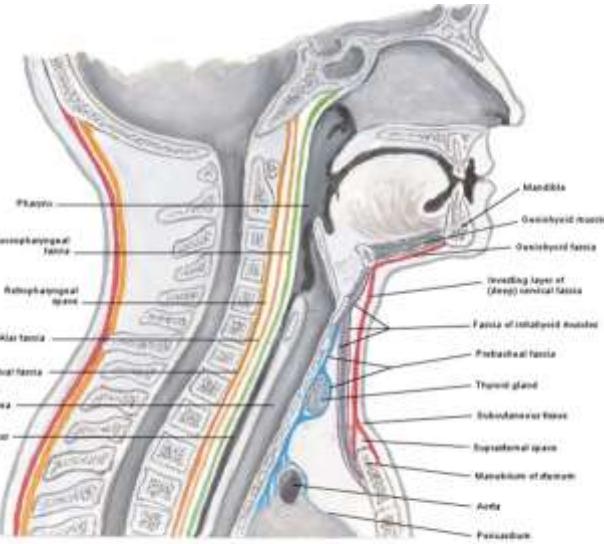
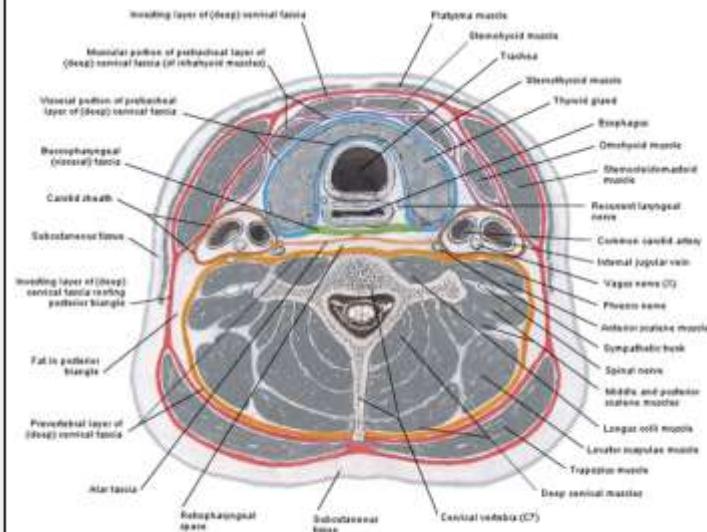
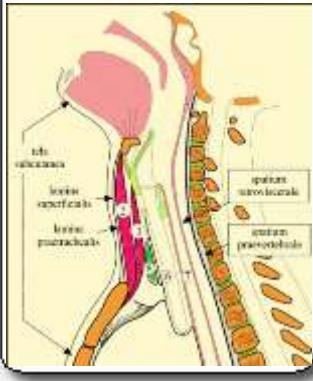
- ✓ investing layer
- ✓ pretracheal layer
- ✓ prevertebral layer



- suprasternal space
- peripharyngeal space
  - ✓ lateropharyngeal space
  - ✓ retropharyngeal space  
⇒ posterior mediastinum

# Cervical fascia, *fascia cervicalis*

## Fascia cervicalis



## ■ endocervical fascia:

- pretracheal space
  - prevertebral space
- ✓ thin muscular part
  - ✓ visceral lamina — covers the cervical viscera
  - ✓ pretracheal space ⇒ anterior mediastinum
  - ✓ parietal lamina ⇒ carotid sheath (*vagina carotica*)

## ■ cervical linea alba:

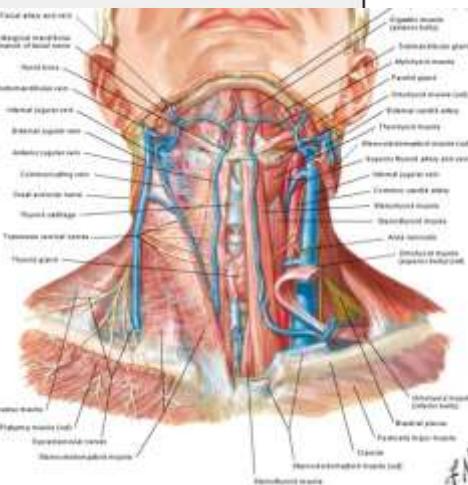
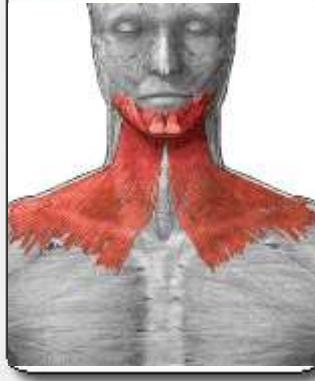
- ✓ accretion of pretracheal layer with investing layer
- ✓ extends to the manubrium of the sternum
- ⇒ bloodless surgical approach to the cervical viscera



## parts

### surface anatomy

#### Platysma



# Anterior cervical region

#### parts:

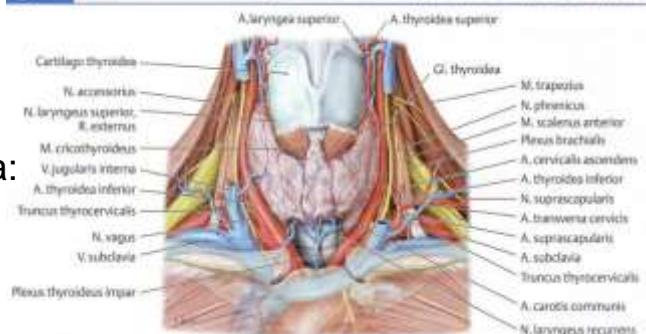
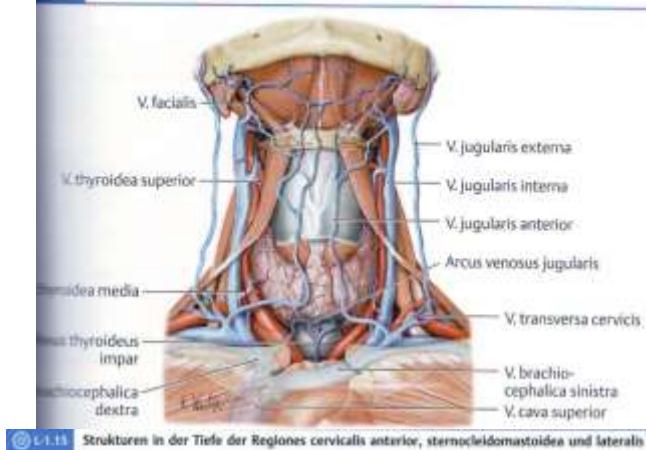
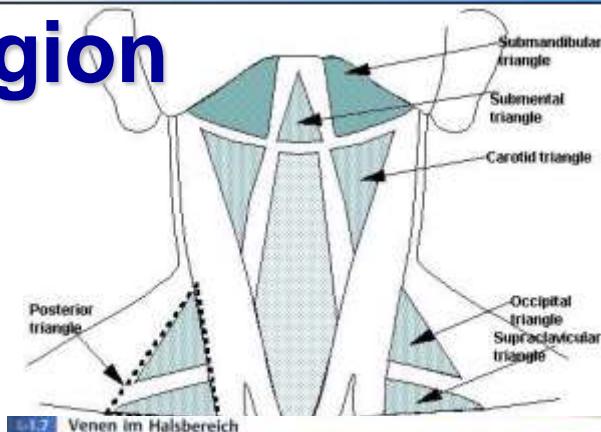
- ✓ suprathyroid (*regio suprathyoidea*):
  - submental region (submental triangle)
  - submandibular triangle ⇒ Pirogov triangle
- ✓ infrathyroid (*regio infrahyoidea*):
  - carotid triangle
  - laryngotracheal eminence

#### surface anatomy:

- ✓ skin – thin and pliable
- ✓ superficial muscle layer:
  - *m. platysma*
  - *linea alba*
- ✓ subcutaneous tissue – loose connective tissue:
  - *n. transversus colli*
  - *r. colli n. facialis*
  - superficial veins – *v. jugularis anterior*
  - superficial lymph nodes – submental and submandibular

- ✓ investing layer of deep cervical fascia:
  - suprasternal space
- ✓ pretracheal layer of deep cervical fascia:
  - sheath of inferior hyoid muscles – two laminae

- ✓ visceral fascia
- ✓ viscera of the neck



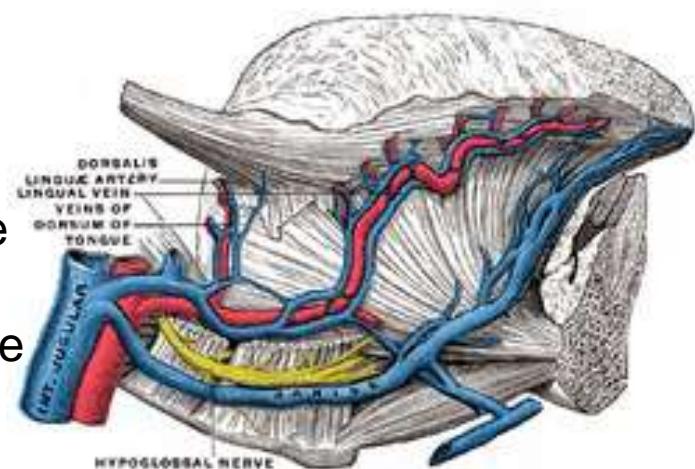
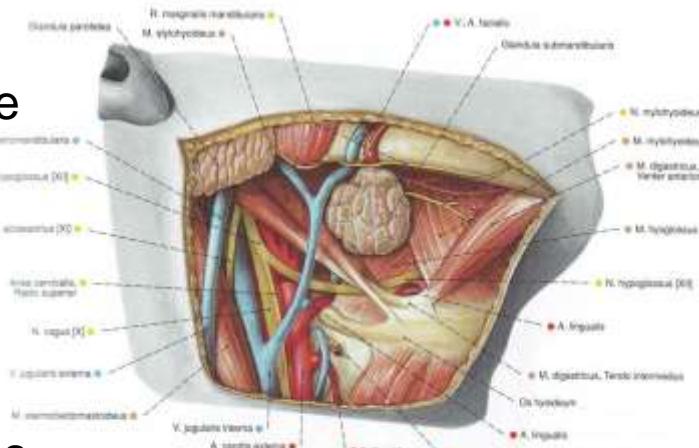
проф. д-р Николай Лазаров

**N.I. Pirogov**  
(1810-1881)



# Submandibular triangle

- boundaries:
  - ✓ superior – base of mandible
  - ✓ inferior – digastric muscle
- contents:
  - ✓ floor – mylohyoid muscle
  - ✓ submandibular gland
  - ✓ submandibular duct
  - ✓ submandibular lymph nodes
  - ✓ facial artery and vein
  - ✓ submental artery and vein, mylohyoid nerve
- Pirogov triangle:
  - ✓ anterior – mylohyoid muscle
  - ✓ inferior – digastric muscle
  - ✓ superior – hypoglossal nerve
  - ✓ floor – hyoglossus muscle
  - ✓ lingual vein
  - ✓ lingual artery – surgical approach



*Trigonum caroticum*

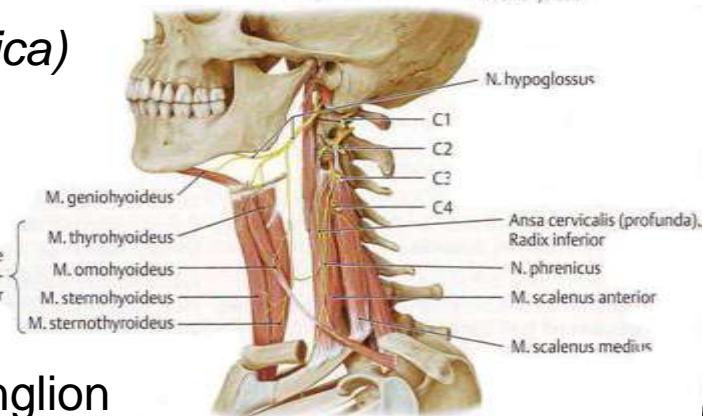
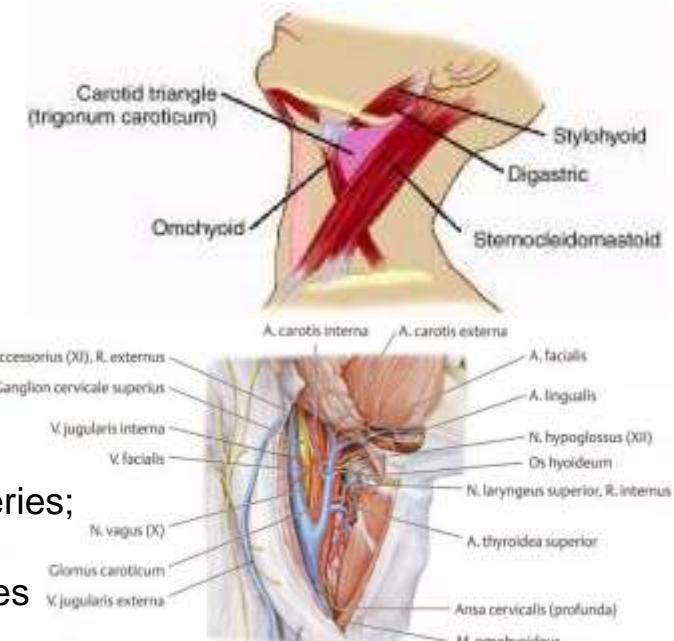
# Carotid triangle

- boundaries:

- ✓ anterior – superior belly of omohyoid muscle
- ✓ posterior – anterior border of sternocleidomastoid muscle
- ✓ superior – posterior belly of digastric muscle

- contents:

- ✓ major neurovascular bundle:
  - common carotid artery ⇒ internal and external carotid arteries; carotid sinus and carotid body
  - internal jugular vein – tributaries
  - vagus nerve – branches
- ✓ carotid sheath (*vagina carotica*)
- ✓ cervical plexus ⇒ *ansa cervicalis profunda*
- ✓ cervical portion of the sympathetic trunk – untere Halsengebinde-muskulatur vagus-sympathetic block after *Wischnewski*
- ✓ cervicothoracic (stellate) ganglion



**Trigonum caroticum**

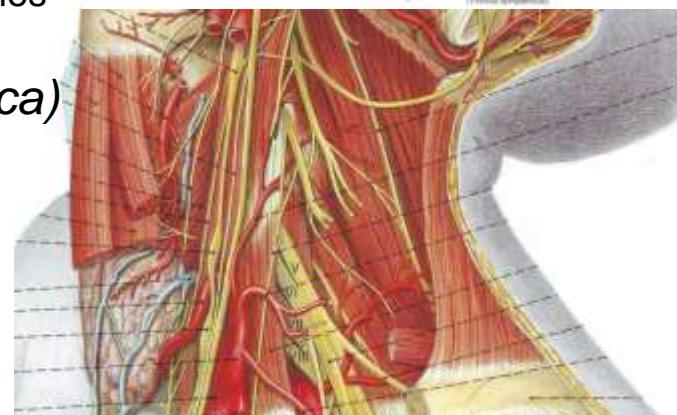
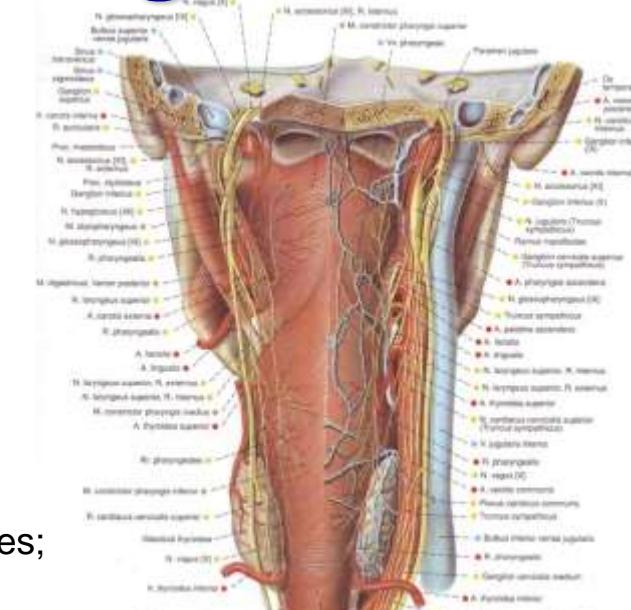
# Carotid triangle

- boundaries:

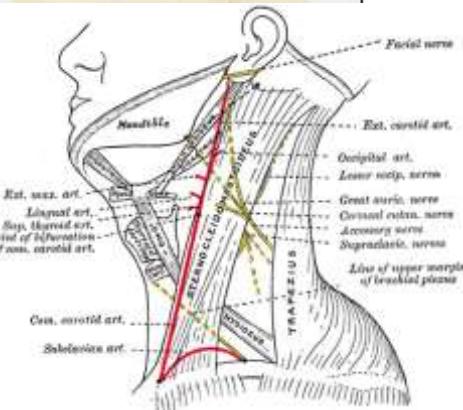
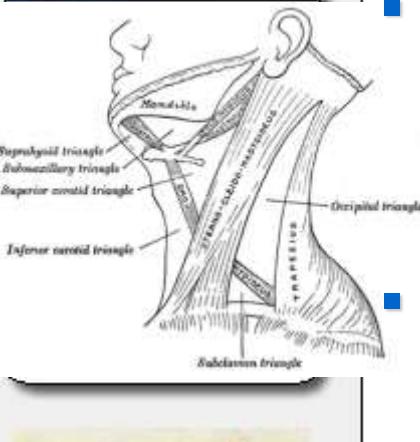
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- ✓ posterior – anterior border of sternocleidomastoid muscle
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- contents:

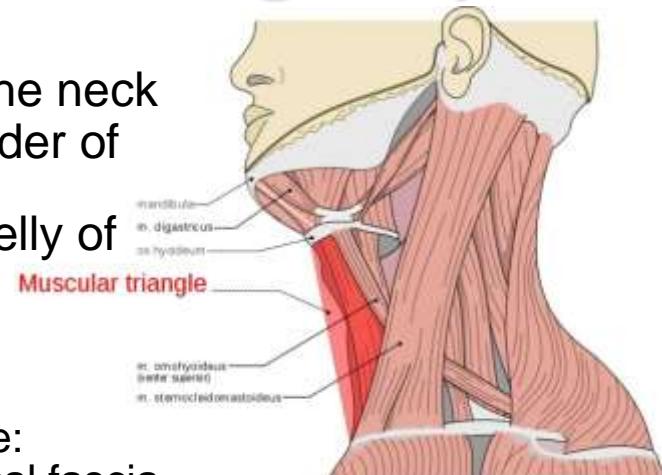
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# Muscular (omotracheal) triangle (inferior carotid trigone)



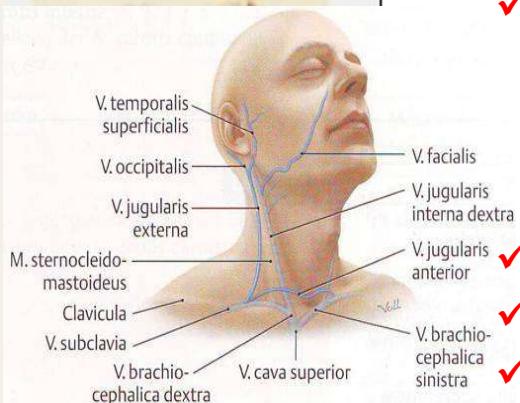
- boundaries:
  - ✓ anterior – median plane of the neck
  - ✓ inferior-lateral – anterior border of sternocleidomastoid muscle
  - ✓ superior-lateral – superior belly of omohyoid muscle
- surface anatomy:
  - ✓ skin – thin, movable and hairy
  - ✓ subcutaneous tissue – sparse:
    - investing layer of the cervical fascia
    - platysma
    - transverse cervical nerve, anterior jugular vein
  - ✓ muscle layer – pretracheal cervical layer
    - sternothyroid and sternohyoid muscles
  - ✓ thyroid gland – blood vessels and nerves
  - ✓ pretracheal space
    - inferior thyroid vein
    - unpaired thyroid venous plexus
  - ✓ larynx and trachea
  - ✓ pharynx and esophagus
  - ✓ deep lymph nodes



## location

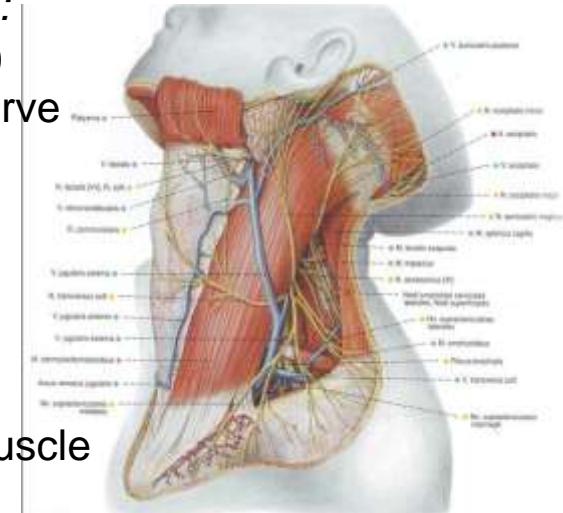
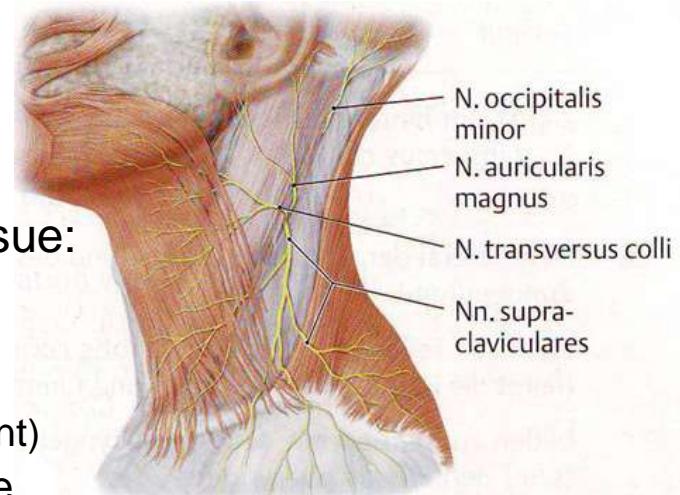
## surface anatomy

### Regio sterno-cleidomastoidea



# Sternocleidomastoid region

- boundaries – boundaries of sternocleidomastoid muscle
- surface anatomy:
  - ✓ skin – thin and movable
  - ✓ subcutaneous tissue – fat tissue:
    - platysma bundles
    - external jugular vein
    - cervical plexus ⇒ *punctum nervosum (Erb's point)*
  - ✓ muscular sheet – two laminae (*lamina superficialis fasciae cervicalis*):
    - accessory nerve (external branch)
    - sternocleidomastoid artery and nerve
    - lymph nodes, jugular trunk
  - ✓ sternocleidomastoid muscle
  - ✓ cervical neurovascular bundle
  - ✓ omohyoid muscle – in lower part
  - ✓ sternothyroid muscle
  - ✓ phrenic nerve – on anterior scalene muscle
  - ✓ subclavian thyrocervical trunk



*location*

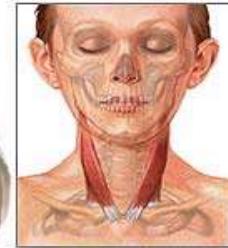
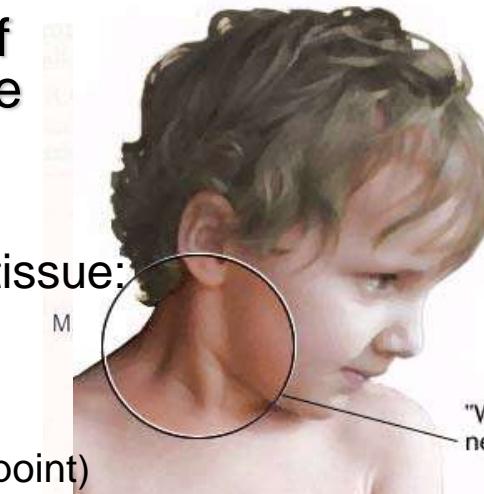
*surface anatomy*

*Regio sterno-  
cleidomastoidea*

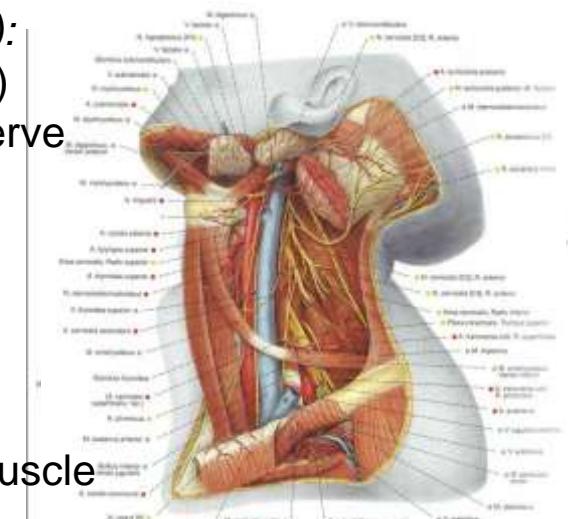


# Sternocleidomastoid region

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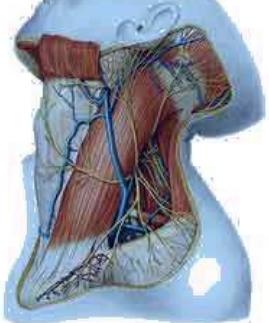
Sternocleidomastoid muscle stretches from the sternum to the skull behind the ear



*location*

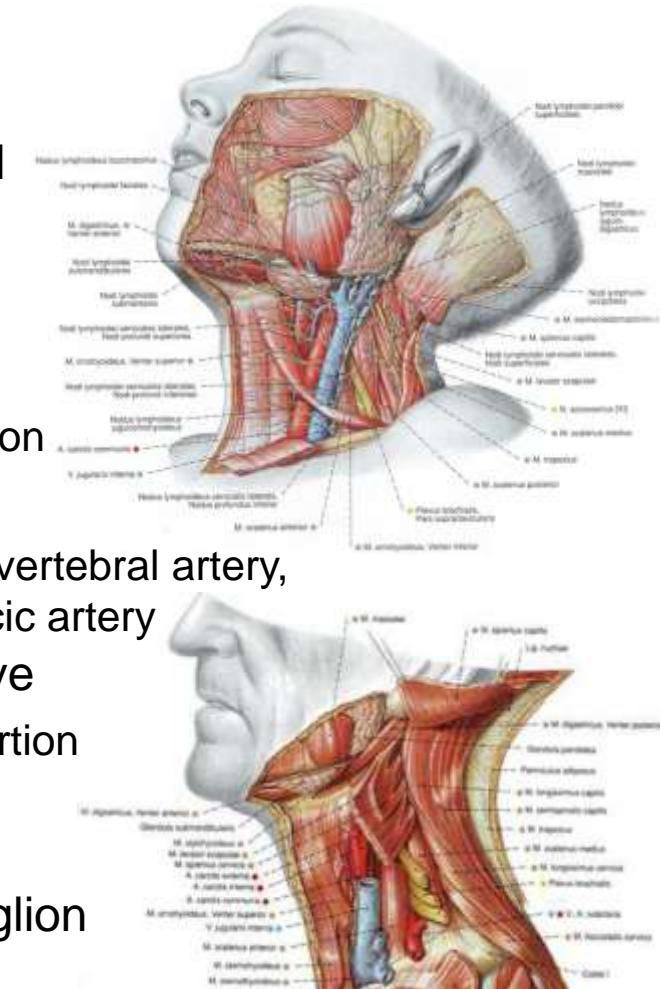
*surface anatomy*

*Regio sterno-cleidomastoidea*



# Sternocleidomastoid region: topographic-anatomical items

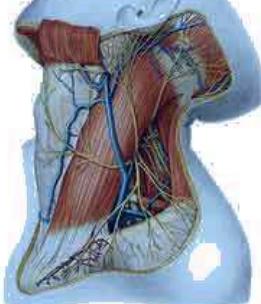
- antescalene space:
  - ✓ venous angle ⇌ thoracic duct; right lymphatic duct
  - ✓ vagus nerve, common carotid artery, phrenic nerve
- interscalene space:
  - ✓ subclavian artery ⇒ costocervical trunk
  - ✓ brachial plexus – proximal portion
- scaleno-vertebral triangle:
  - ✓ subclavian artery and vein ⇒ vertebral artery, thyrocervical trunk, internal thoracic artery
  - ✓ vagus nerve and phrenic nerve
  - ✓ sympathetic trunk – inferior portion ⇒ surrounded by *ansa subclavia*
  - ✓ recurrent laryngeal nerve
  - ✓ cervicothoracic (stellate) ganglion – sympathetic blockade



*location*

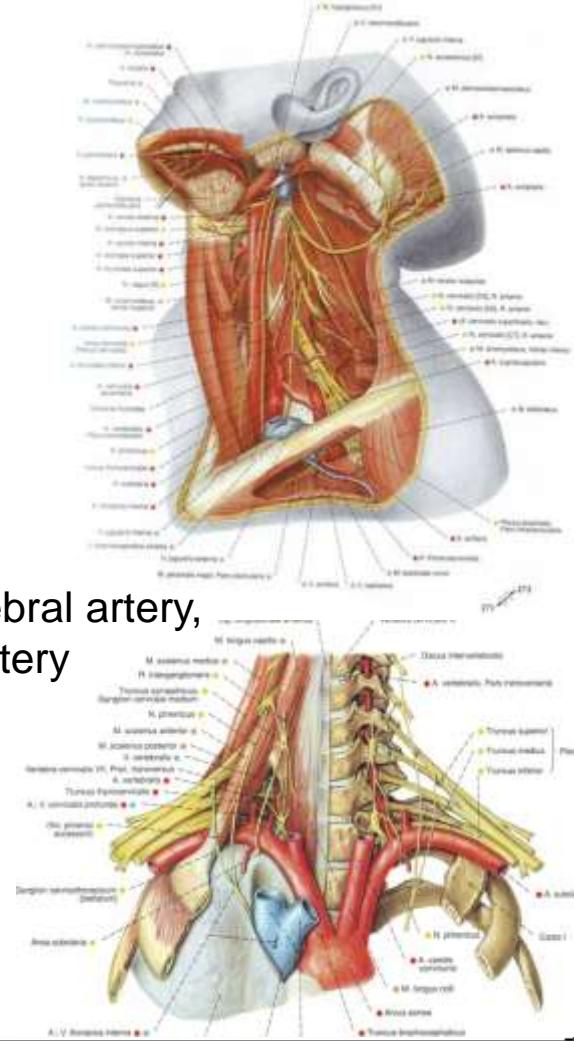
*surface anatomy*

*Regio sterno-cleidomastoidea*



# Sternocleidomastoid region: topographic-anatomical items

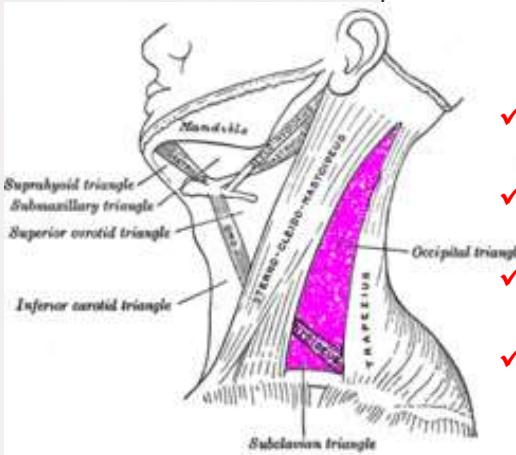
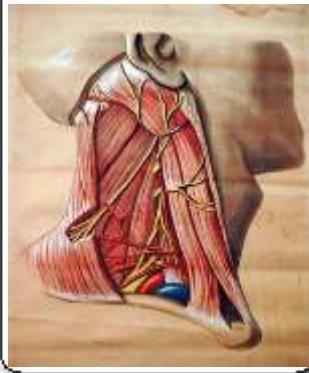
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## location

## surface anatomy

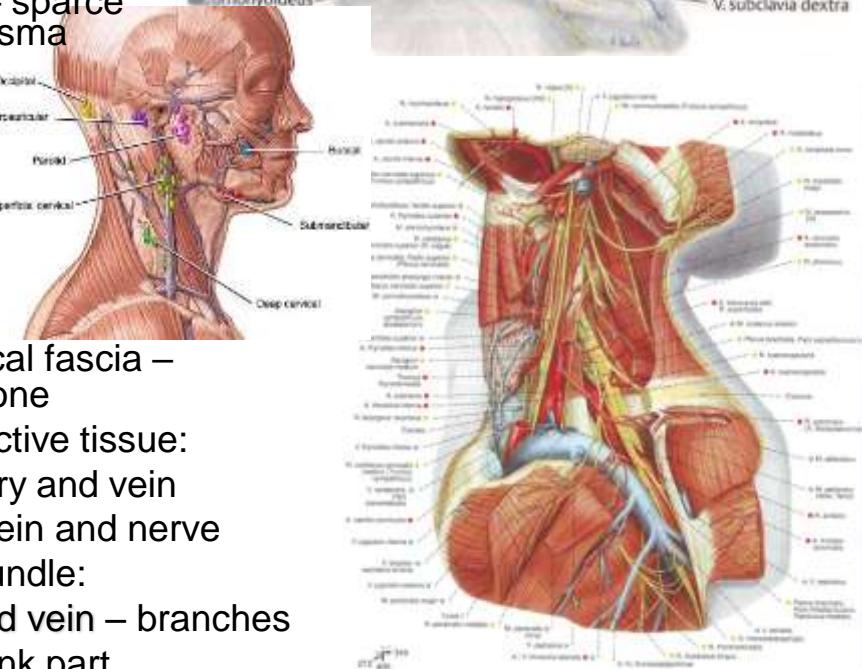
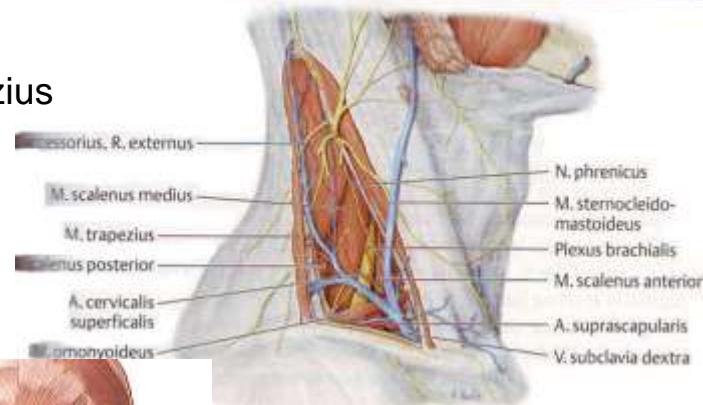
### Regio colli lateralis



# Lateral cervical region

- boundaries:
  - ✓ anterior – posterior border of sternocleidomastoid muscle
  - ✓ posterior – anterior border of trapezius
  - ✓ inferior – clavicle
  - ✓ greater supraclavicular fossa ⇒ omoclavicular triangle
- surface anatomy:
  - ✓ skin – thin and movable
  - ✓ subcutaneous fat tissue – sparse  
⇒ posterior border of platysma
  - ⇒ external jugular vein
  - ⇒ supraclavicular nerves
  - ⇒ lymph nodes
  - ✓ investing layer of the cervical fascia
  - ✓ loose connective tissue – accessory nerve
  - ✓ pretracheal layer of cervical fascia – only in omoclavicular trigone
  - ✓ adipose and loose connective tissue:
    - ⇒ superficial cervical artery and vein
    - ⇒ suprascapular artery, vein and nerve
    - ⇒ major neurovascular bundle:
      - subclavian artery and vein – branches
      - brachial plexus – trunk part

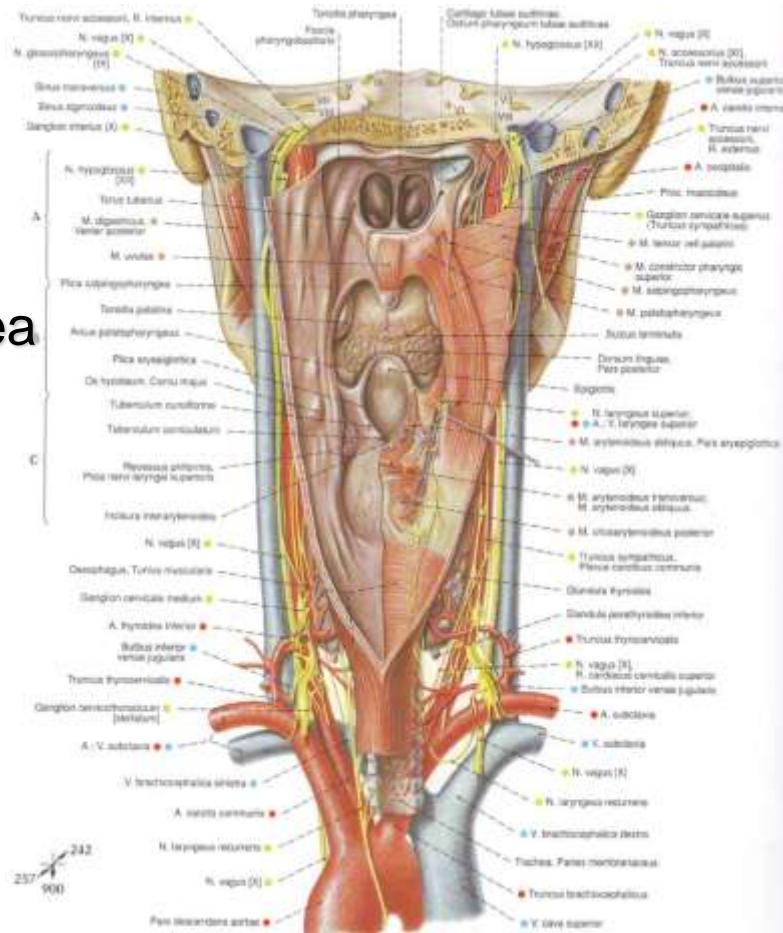
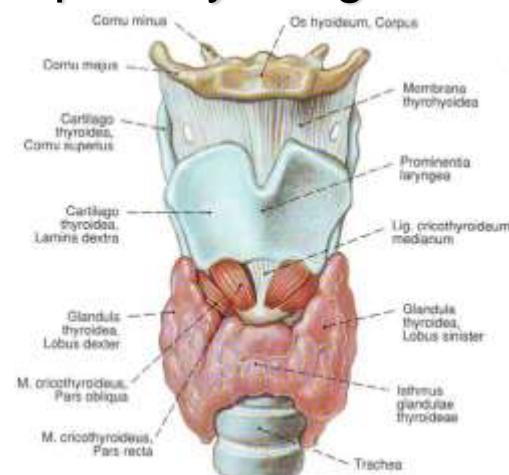
L-L16 Regio cervicalis lateralis



# Viscera of the neck

- Cervical viscera and glands:

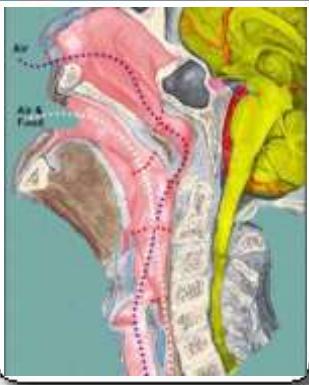
- ✓ submandibular gland
  - ✓ pharynx
  - ✓ cervical part of the esophagus
  - ✓ larynx
  - ✓ cervical part of trachea
  - ✓ thyroid gland
  - ✓ parathyroid glands



## topography

## structure

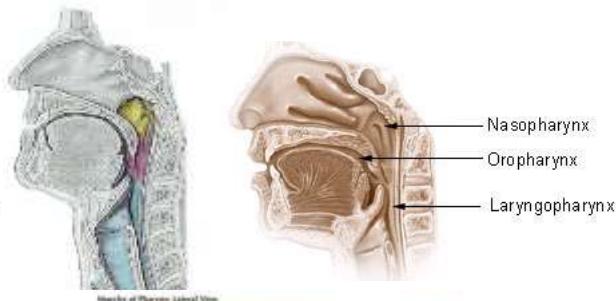
### Pharynx



# Pharynx

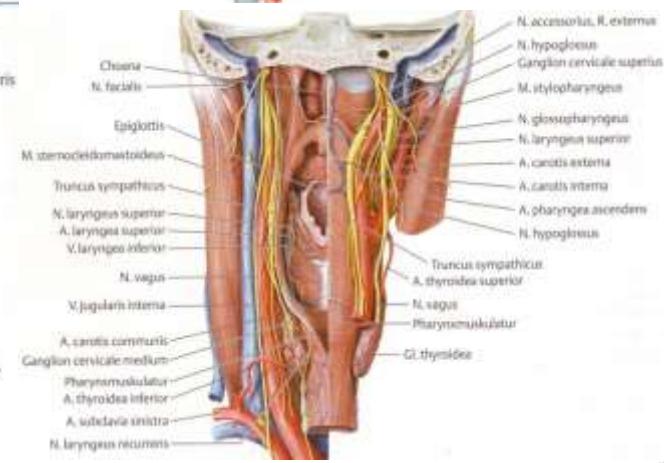
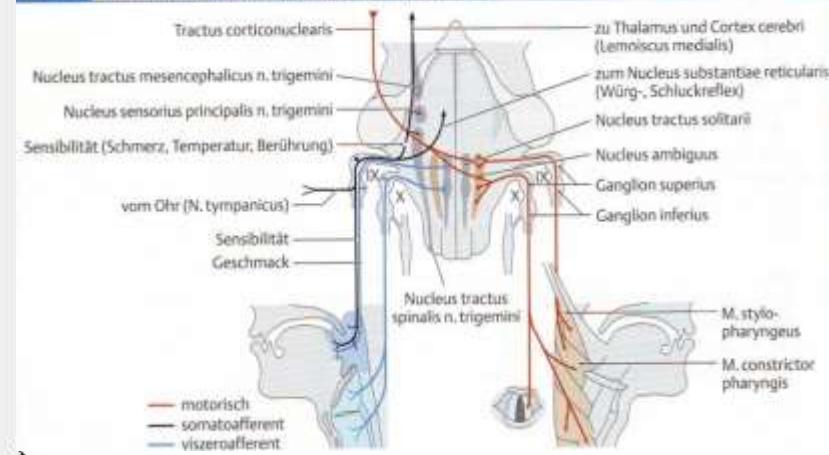
### Sensory innervation

- N. maxillaris [V2]
- N. glossopharyngeus [IX]
- N. vagus [X]



- upper border – base of the skull
- lower border – C<sub>6</sub> (cricoid cartilage)
  - ✓ retropharyngeal space ⇒ retropharyngeal lymph nodes  
⇒ abscesses and phlegmones of tonsillar and/or otogenic origin
  - ✓ parapharyngeal space ⇒ cervical neurovascular bundle  
⇒ internal carotid artery – most medially; at 1-1,5 cm lateral from the laryngeal wall

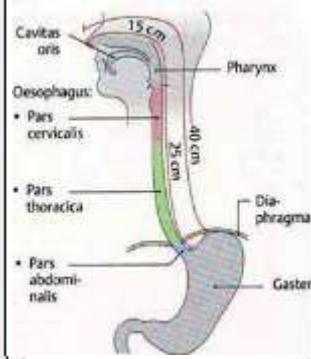
© 1-2-3 Motorische und sensible Innervation des Pharynx



# *topography*

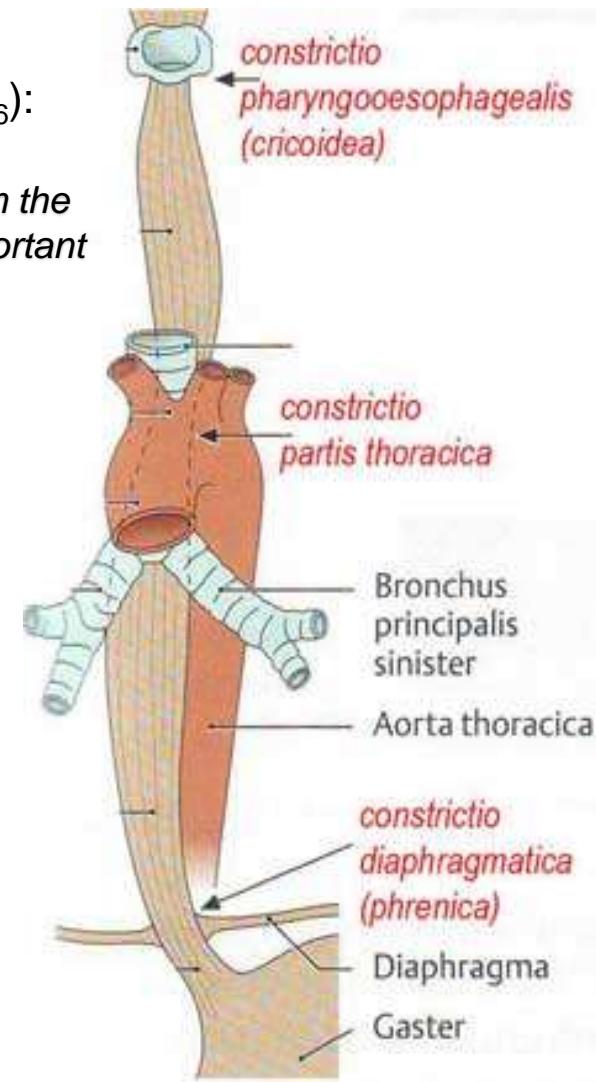
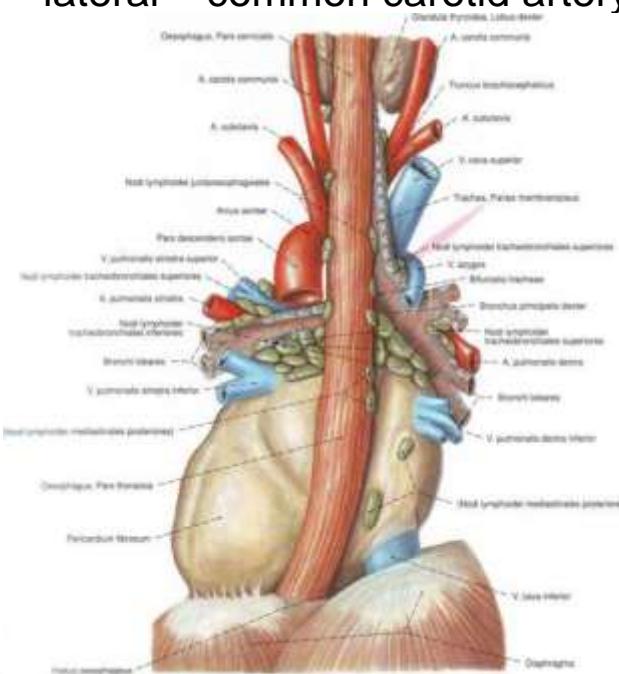
## ***structure***

## ***Esophagus***



# Cervical part of the esophagus

- cervical portion – 5-6 cm long:
    - ✓ upper border – cricoid cartilage ( $C_6$ ):
      - pharyngeal constriction  
*(intortius esophagi): at 15 cm from the upper incisor teeth – clinically important for endoscopy!*
    - ✓ lower border – jugular notch ( $Th_2$ )
    - ✓ lateral – common carotid artery



## topography

## structure

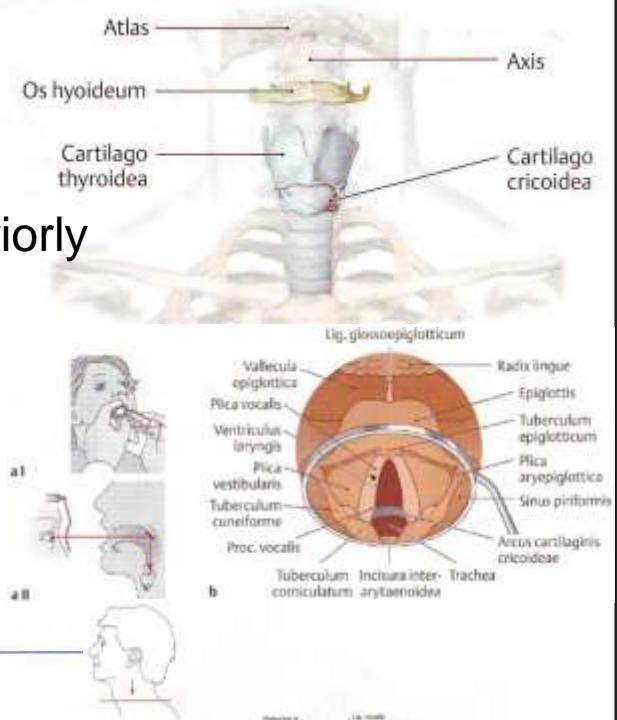
### Larynx



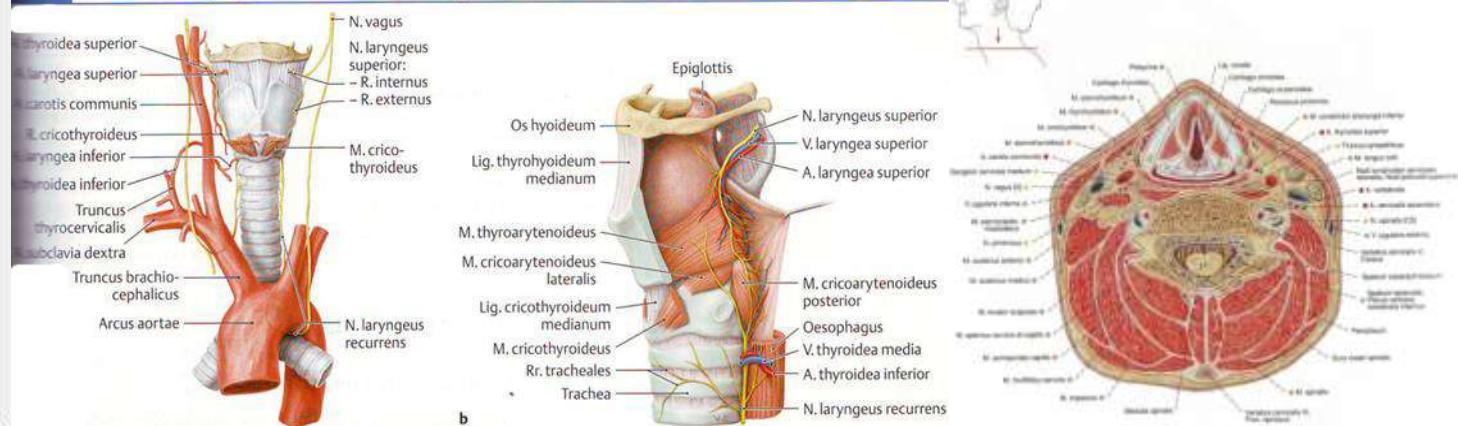
## topography:

- ✓ in men – C<sub>3</sub> (epiglottis)-C<sub>6</sub>
- ✓ in women and children – shorter and situated more superiorly
- ✓ in infants – up to C<sub>2</sub>-C<sub>3</sub>
- ✓ in elderly persons – C<sub>4</sub>-C<sub>6</sub>: *descensus laryngis*
- ✓ vocal folds – C<sub>5</sub>
- ✓ anterior – previsceral space

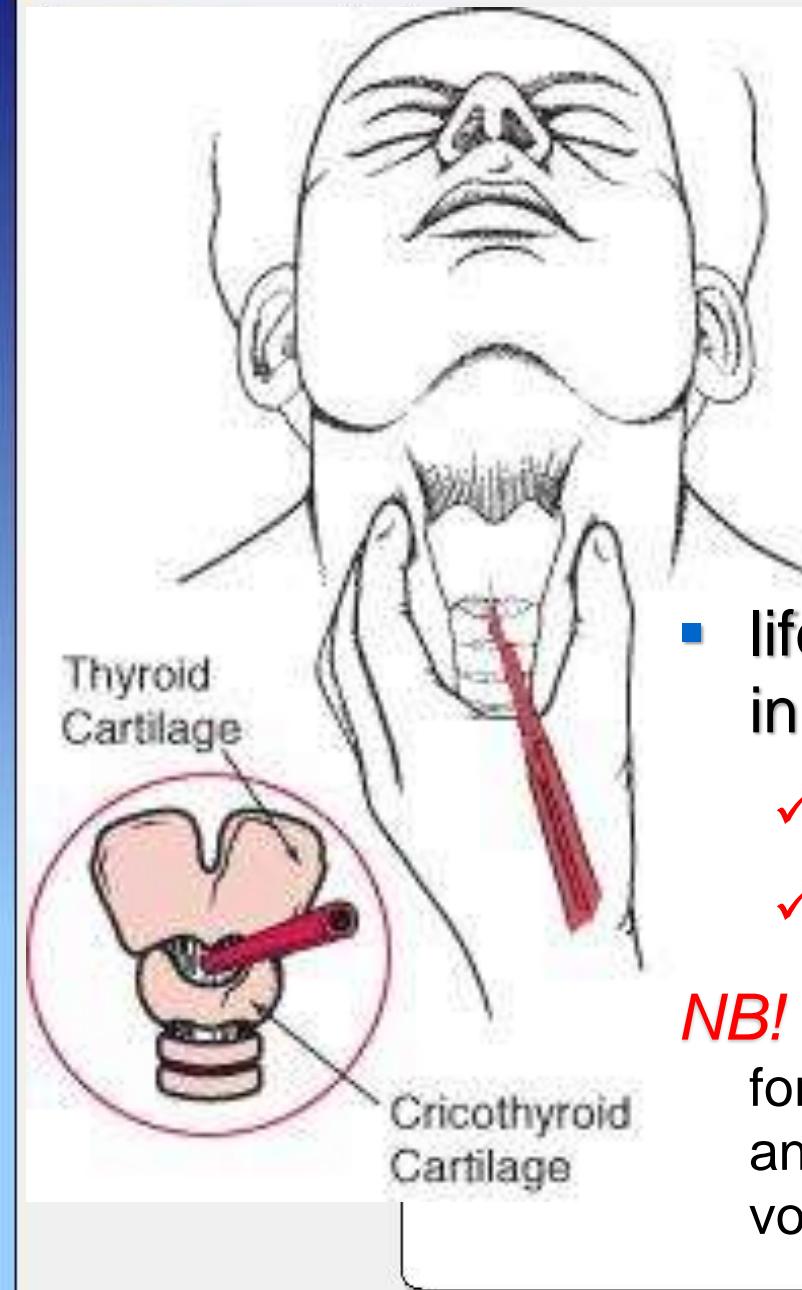
# Larynx



2.10 Arterielle Versorgung und Innervation des Kehlkopfs



# Cricothyrotomy (coniotomy)

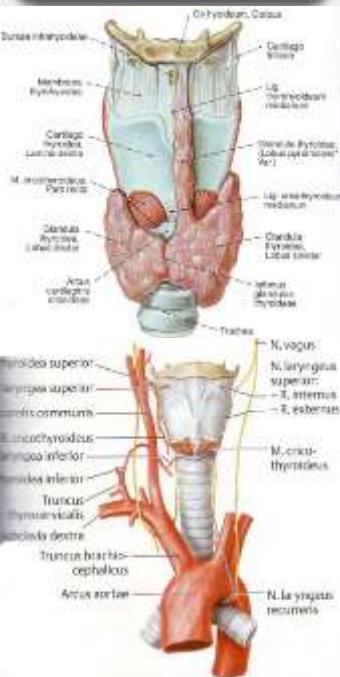
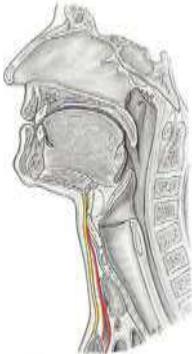


- life-saving procedure  
in extreme circumstances:

- ✓ angioedema (*Quincke's edema*)
- ✓ airway obstruction by a foreign body

**NB!** surgical cricothyrotomy is not recommended for infants or small children (age < 10) due to anatomical differences: close apposition of the vocal folds to the cricothyroid membrane

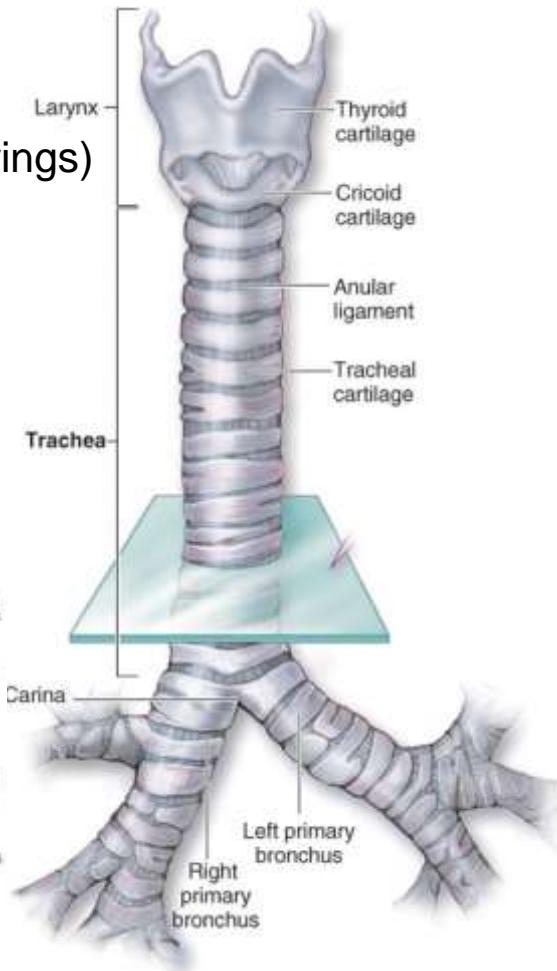
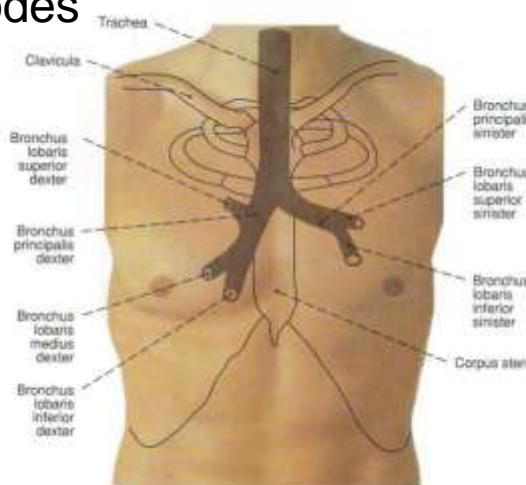
## Trachea



# Cervical part of the trachea

- cervical portion – 4-5 tracheal cartilage rings:

- ✓ upper end – cricoid cartilage ( $C_6$ )
- ✓ lower end – jugular notch ( $Th_2$ )
- ✓ isthmus of the thyroid gland (2-4<sup>th</sup> rings)
- ✓ recurrent laryngeal nerve
- ✓ unpaired thyroid venous plexus
- ✓ unpaired thyroid artery
- ✓ common carotid artery
- ✓ lymph nodes

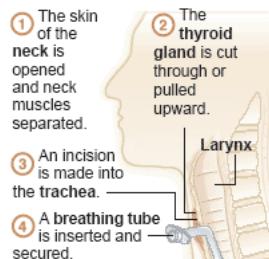




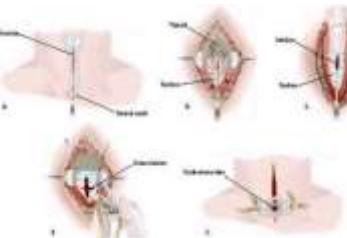
### Tracheotomy relieves breathing problems

The Vatican confirmed on Thursday that Pope John Paul II underwent a successful tracheotomy operation to ease his breathing problems.

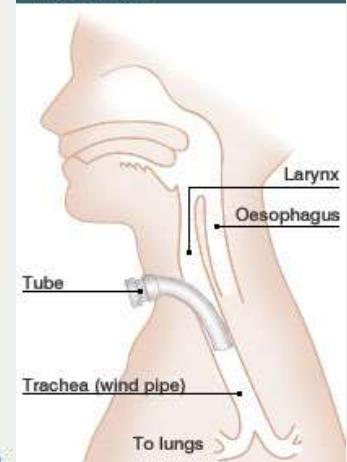
When surgery is needed  
A tracheotomy is performed when there is an obstruction in the larynx or when a person is unable to breathe spontaneously.



SOURCE: "The Surgery Book" Robert M. Youngson, M.D.

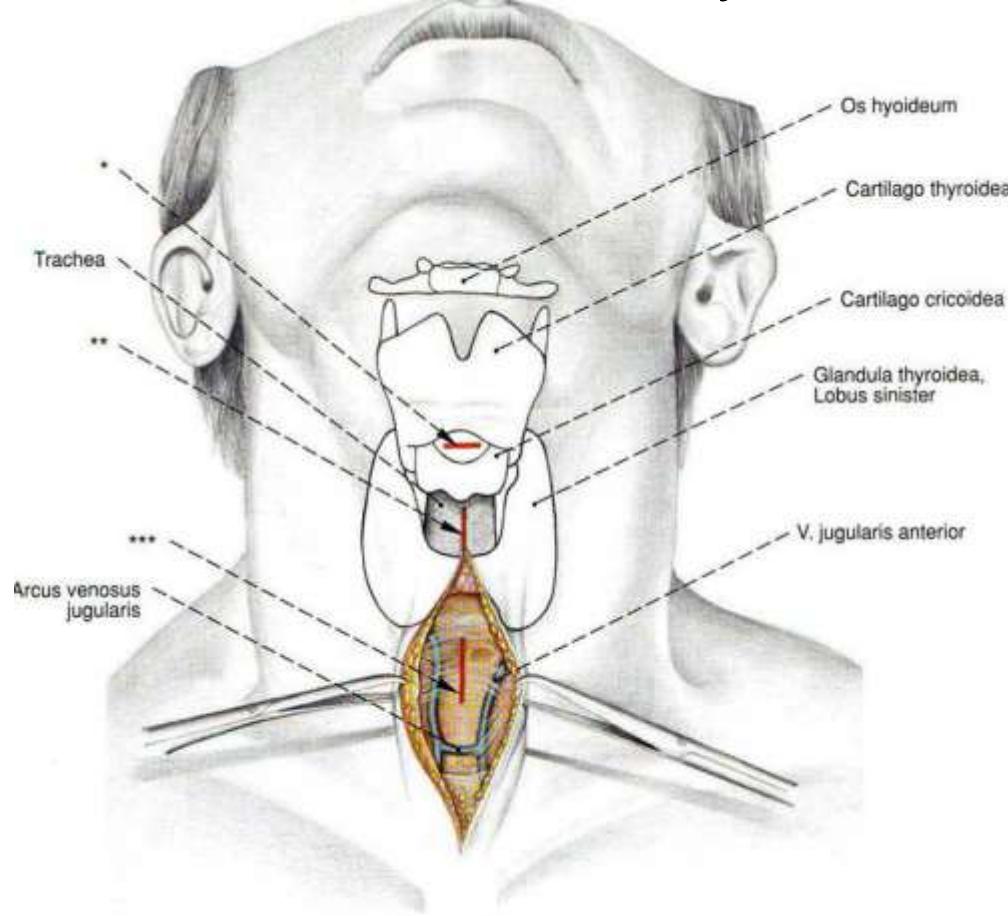


#### TRACHEOTOMY



# Tracheotomy vs. Tracheostomy

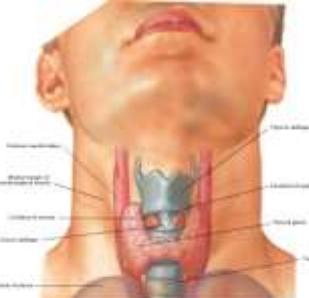
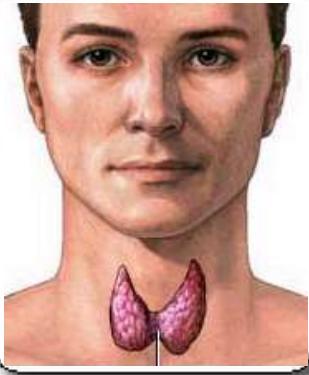
- ✓ superior (coniotomy)
- ✓ middle, and
- ✓ inferior tracheotomy



## topography

## structure

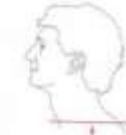
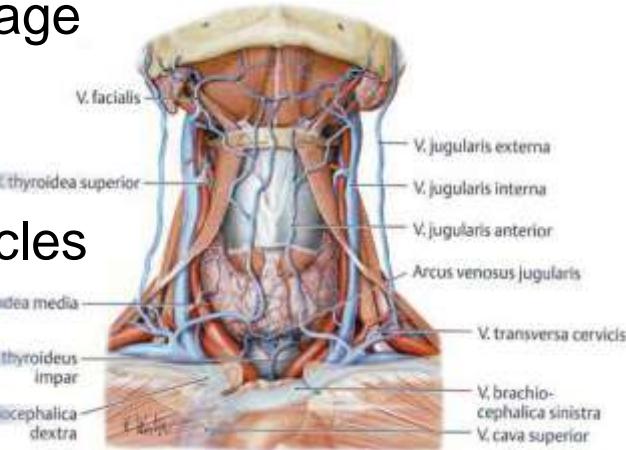
### Glandula thyroidea



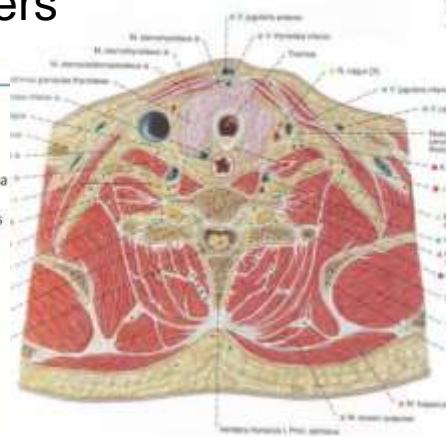
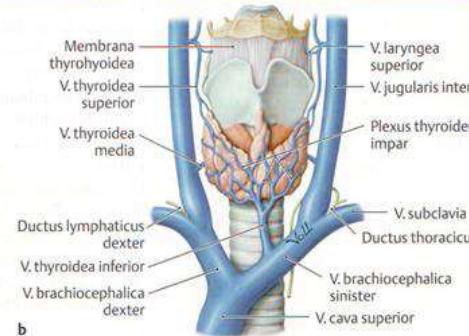
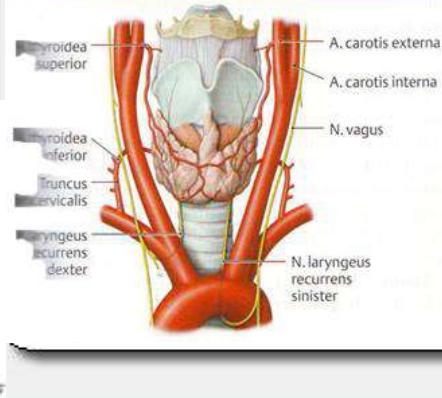
# Thyroid gland, *glandula thyroidea*

## topography:

- ✓ upper margin – thyroid cartilage
- ✓ lower margin – 1,5-2 cm from the jugular notch
- ✓ anterior – inferior hyoid muscles
- ✓ lateral:
  - common carotid artery
  - recurrent laryngeal nerve
  - esophagus – swallowing disorders



2.13 Blutgefäße und Nerven in der Schilddrüsenregion



проф. д-р Николай Лазаров

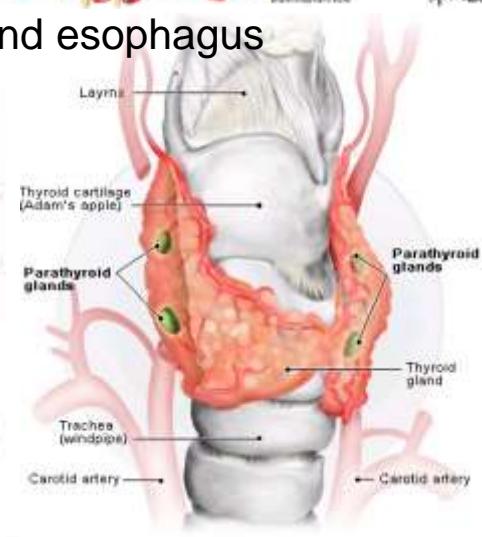
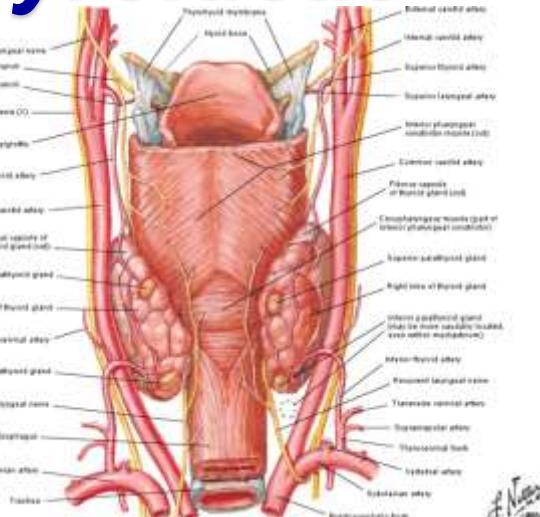
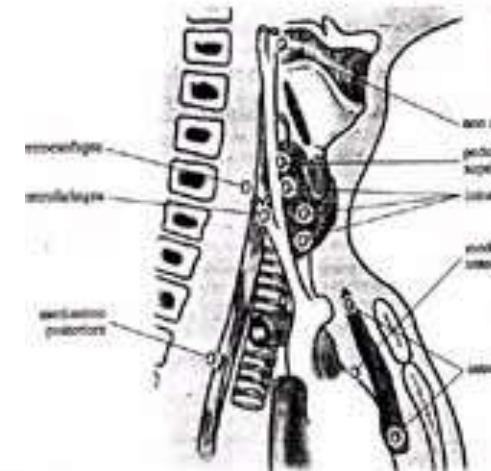
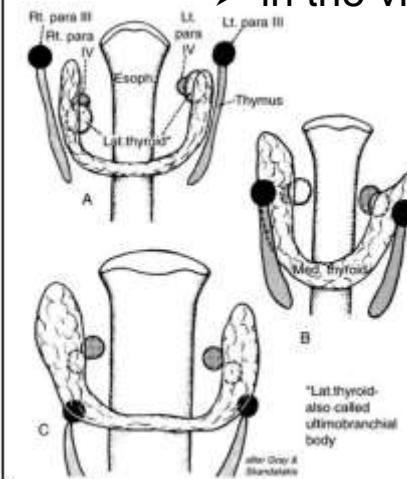
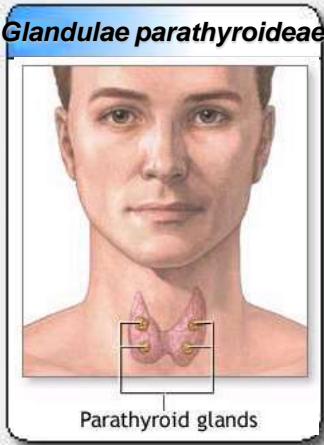
## ***topography***

## **structure**

# Parathyroid glands, *glandulae parathyroideae*

- **topography:**

- ✓ superior parathyroid glands – inferior margin of thyroid cartilage
  - ✓ inferior parathyroid glands – 2-4<sup>th</sup> tracheal rings
  - ✓ ectopic glands:
    - in the thyroid gland
    - along the cervical migrating axis
    - in the mediastinum
    - in the vicinity of the thymus, trachea





The Karen ethnic group "giraffe women"  
**Myanmar and Thailand  
Province Mae Hong Son**



*Thank you ...*

проф. д-р Николай Лазаров