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Volumi clinici nell'irradiazione delle neoplasie cervico-cefaliche
Clinical volumes in head and neck cancer radiotherapy
XXI° CONGRESSO NAZIONALE AIRO
Genova, 19-22 novembre 2011
Magazzini del Cotone
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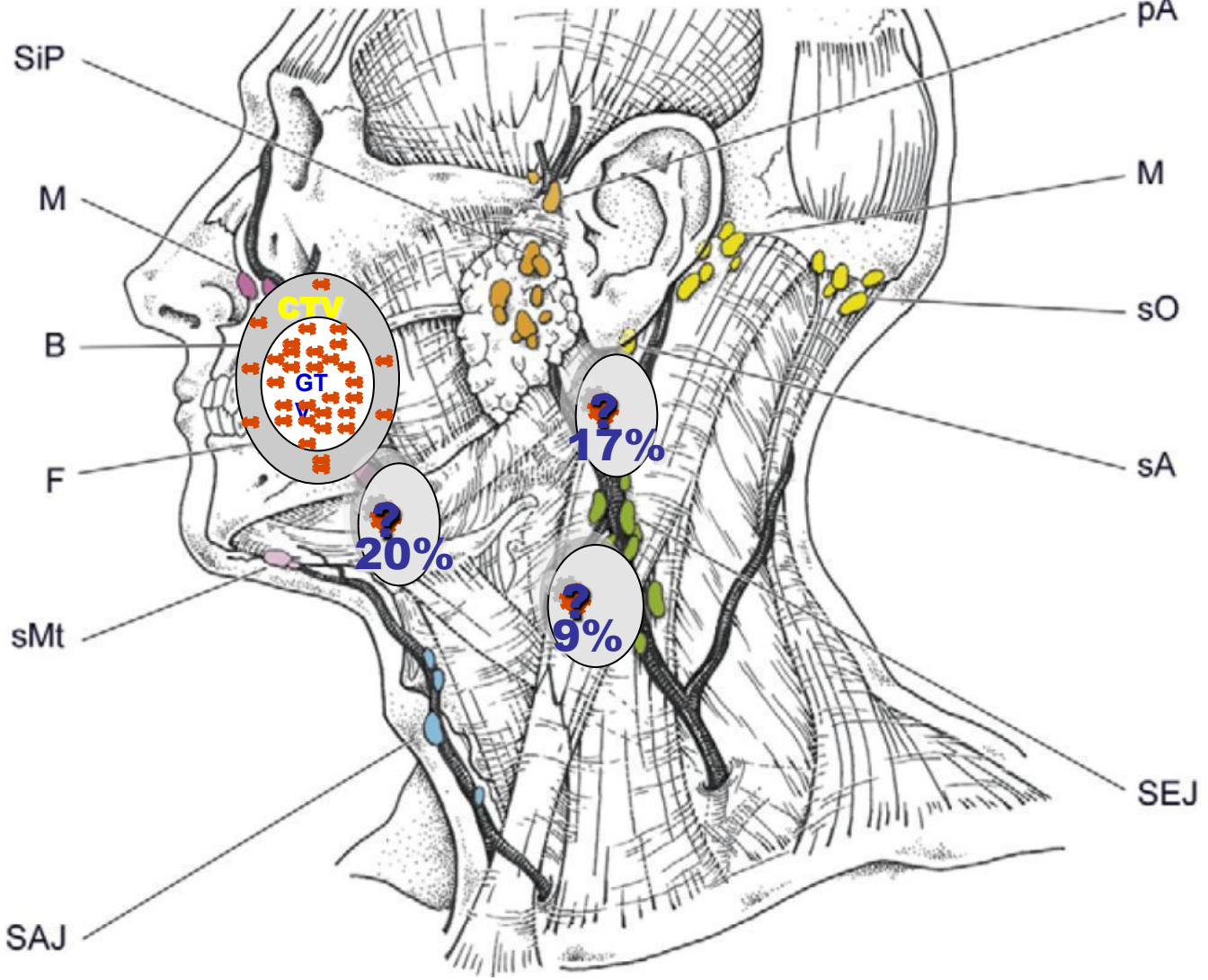
What are the clinical volumes?



a risk of subclinical involvement greater than15–20% should be used to define nodal CTV2

Yao et al. Am. J. Clin Oncol 2006

Volumes defined

anatomical/physiological basis

Volumes
GTV
CTV

Conceptual volumes

Volumes

Pre-RT work up:

- Instrumental images (RMI,PET)
- clinical examination
- Diagram of tumoral/lymphnodal extension

Radiotherapy preparation

- Immobilization mask with 5 fixation points (Gilbeau 2001)
- c.e.-TC with mdc (3 mm slides).

Sequential IMRT?
SIB?

Delineations of Volumes
GTV
CTV1
CTV2
CTV3

- ***Diagram of tumoral/lymphonodal extension***
- ***Clinical examination description***
- ***c.e. CT***
- ***MRI (tongue, parapharynx, paranasal sinuses, nasopahrynx and skul base)***
- ***Pet-TC (not standard- complementary informations)***

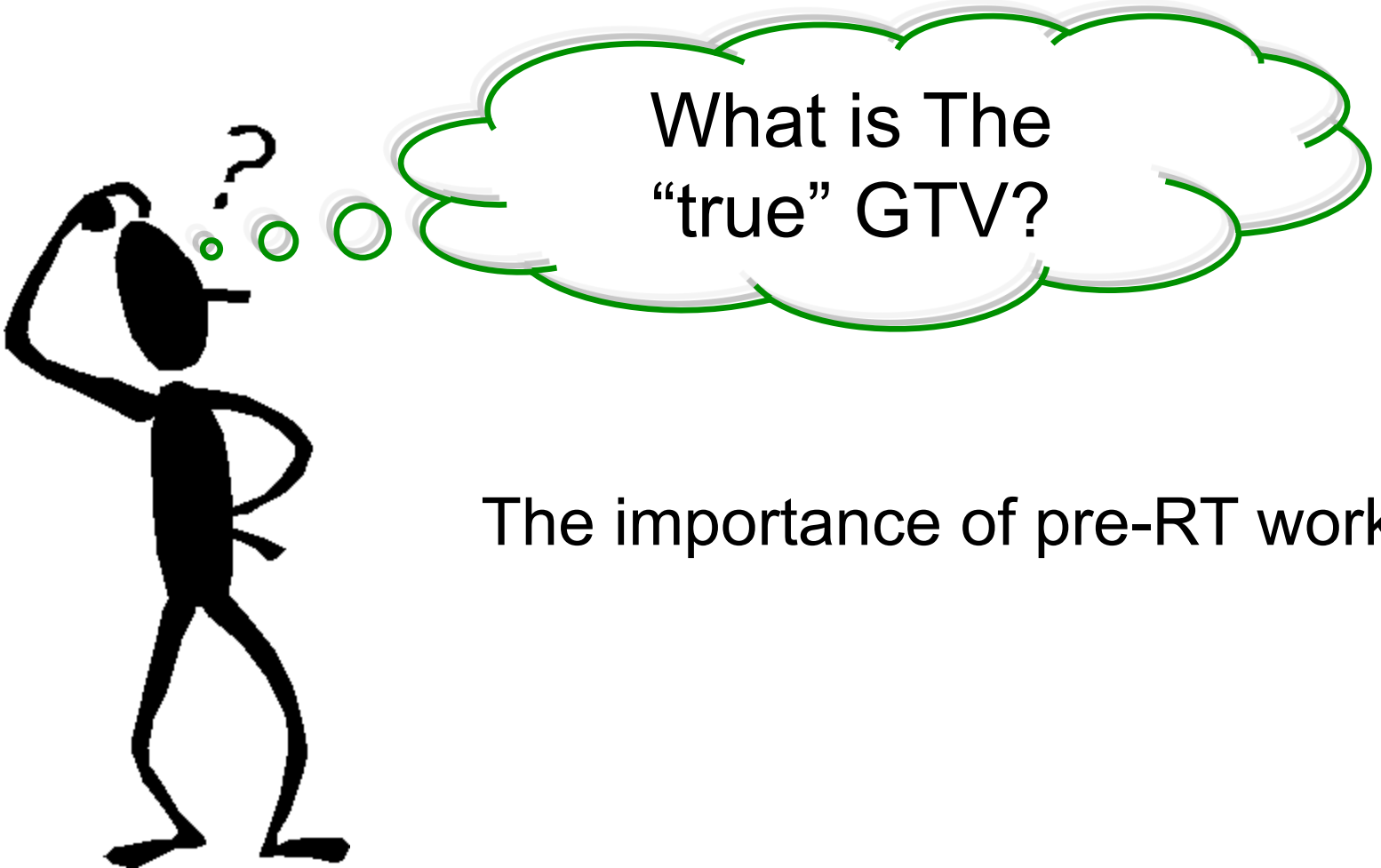
(Troost 2010)

Delineations of Volumes
GTV
CTV1
CTV2
CTV3

Planning

Defintion of GTV

- Volumes of known tumor infiltration



The importance of pre-RT work up

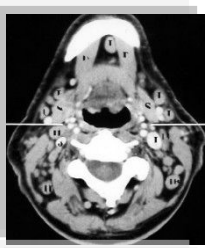
The “True” GTV

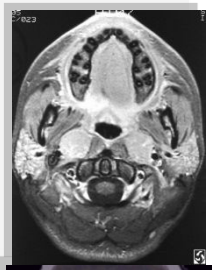
- In order to delineate the “true” GTV and avoid delineating inflammation and artifacts... **Imaging and physical examinations** are the basis...”

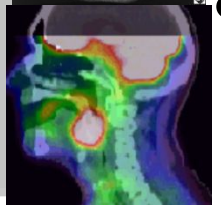
» Eisbruch and Gregoire Semin Radiat Oncol 2009

Imaging and physical examination

C-factor or certainty factor







C2 (Imaging)

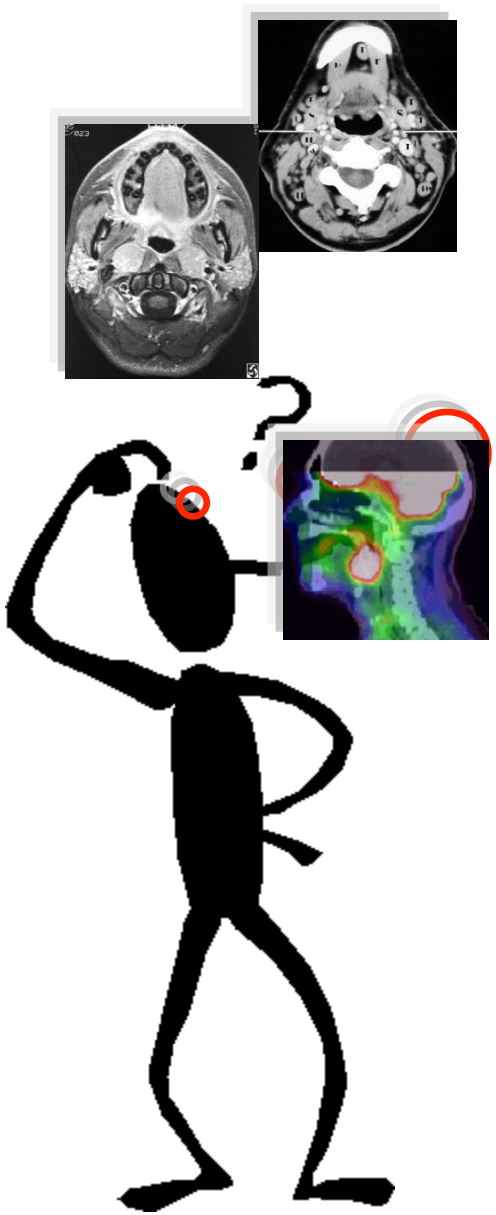
- c.e. CT → CT-GTV
- MRI → MRI-GTV
- FDG-PET → FDG-PET-GTV

C1

- Physical examination → GTV

How to integrate functional imaging with anatomic imaging?

- CT and MRI overstimate the GTV, but also miss similar tumor extension
- Pet is often smaller than CT-based GTV
  - » (Paulino IJROBP 2005)
- The three Imaging modalities overestimate surgical specimen GTVs
  - » (Daisne Radiology 2004)
- PET misses the target (evaluated by surgical specimen) in 13% of the cases
  - » (Daisne Radiology 2004)



What to do?

Add C1-factor

Clinical examination

- All 3 imaging modalities underestimated the **mucosal extent of disease.**

- The mucosal extent is better evaluated by ***physical examination, palpation and fiberoptic endoscopy***:
  - Base of tongue, tonsils, palate involvement, Glossotonsillar sulcus, Oral cavity extension

Eisbruch Semin. Radiat. Oncol 2009

Pre-RT work up:

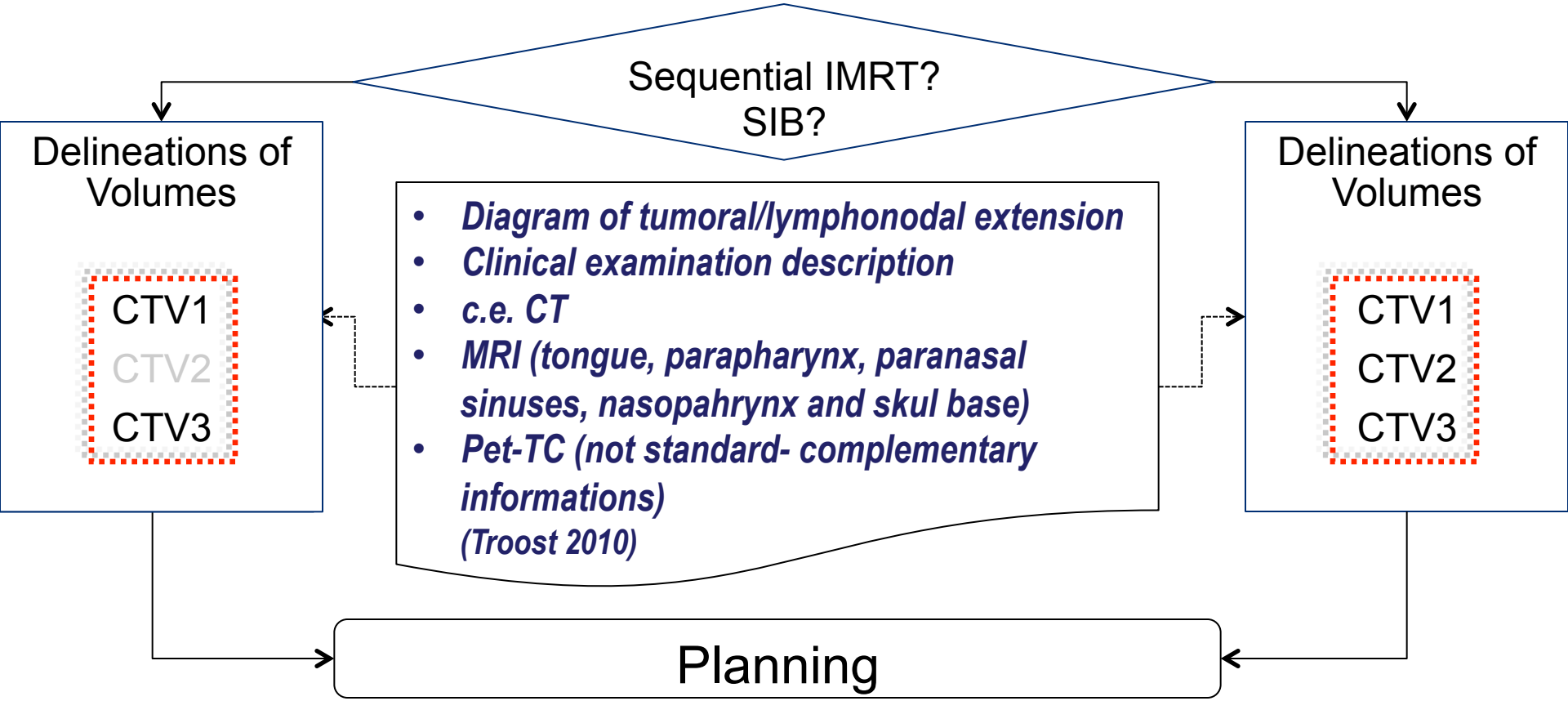
•Instrumental images (RMI,PET)

Diagram of tumoral/lymphnodal extension

Radiotherapy preparation

•Immobilization mask with 5 fixation points (Gilbeau 2001)

•TC with mdc (3 mm slides)



Considerations guiding the selection of the CTV around the primary tumor

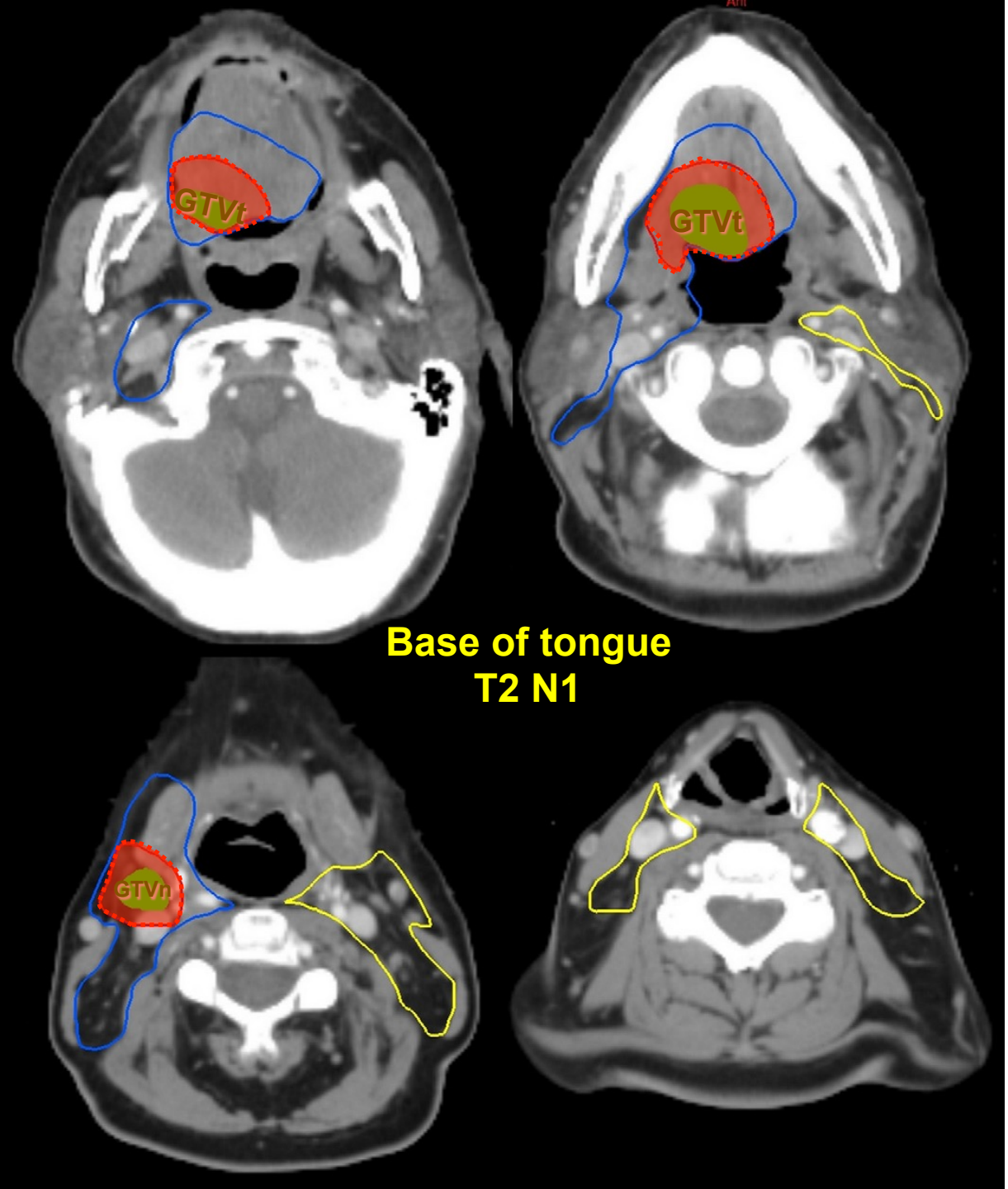
The microscopic spreading of SCC:

- follows the **anatomic compartments** of head and neck
  - (eg, paralaryngeal, parapharyngeal, pre-epiglottic spaces,)
- is hindered by **anatomic barriers**
  - (eg, bone cortex, muscular fascia, cervical fascia and ligaments).
- spreads through muscles or adipose spaces where **boundaries are not clear**
  - (eg. Tongue, neck muscles or neck adipose volume when their fascia has been interrupted)

Clinical Target Volume

Target	definitions	% risk
CTV1	containing the GTV[1-2]	
	Postoperative (resection bed of removed GTVt/n) [3]	
CTV2	microscopic high risk disease [4-5]	> 10-20%
CTV3	Normal regions but some risk [6]	≥5%

1. Sanguineti 2008;2 Schwartz 2010; 3 Peters 1993; 4 Hu Ks 2009; 5. Candela 1990; 6 Chao 2002

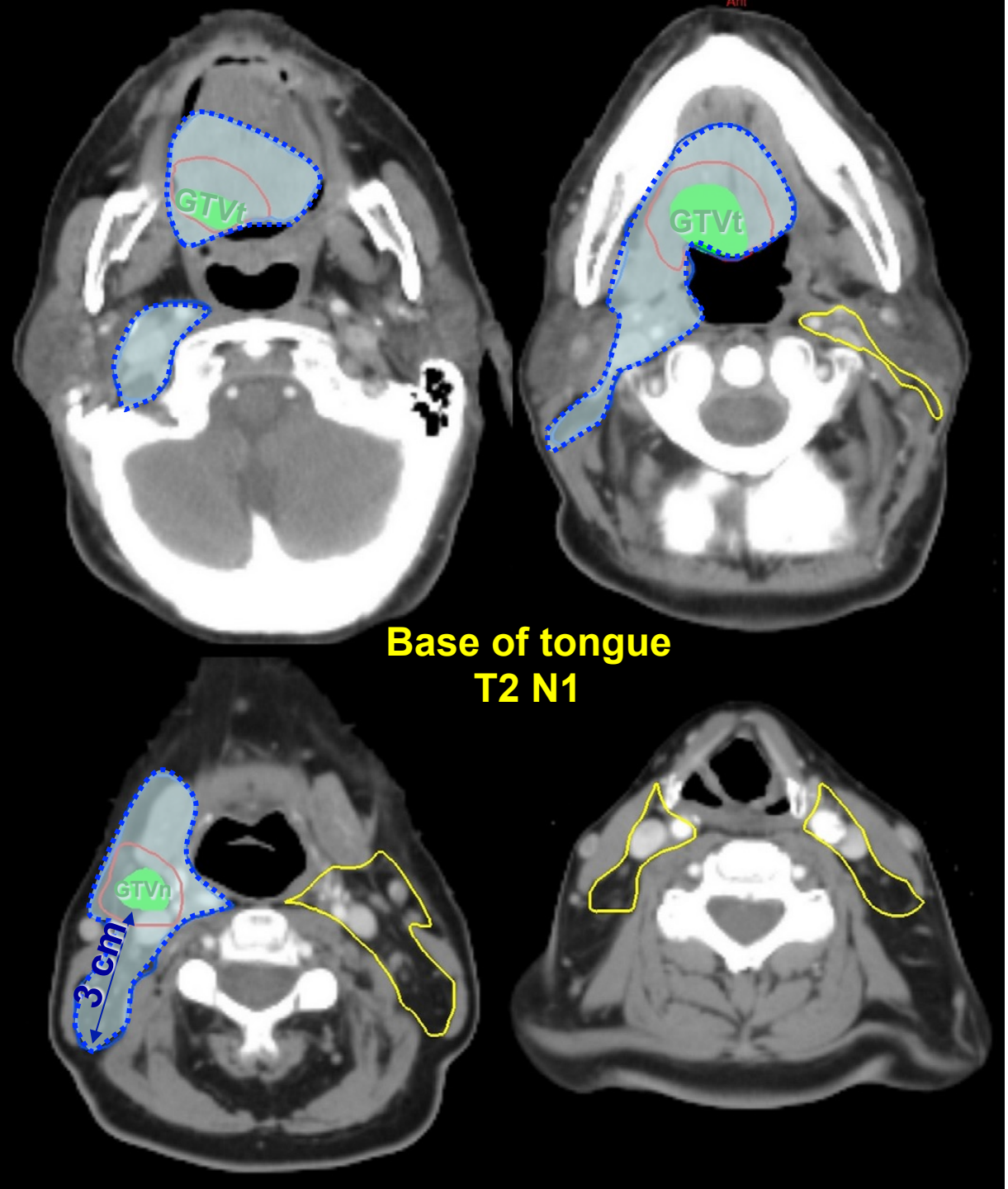


GTVt Base of tongue

GTVn N1 livel IIa

CTVt1 Base of tongue
3-10mm

CTVn1 N1 level IIa
3- 10 mm



GTVt Base of tongue

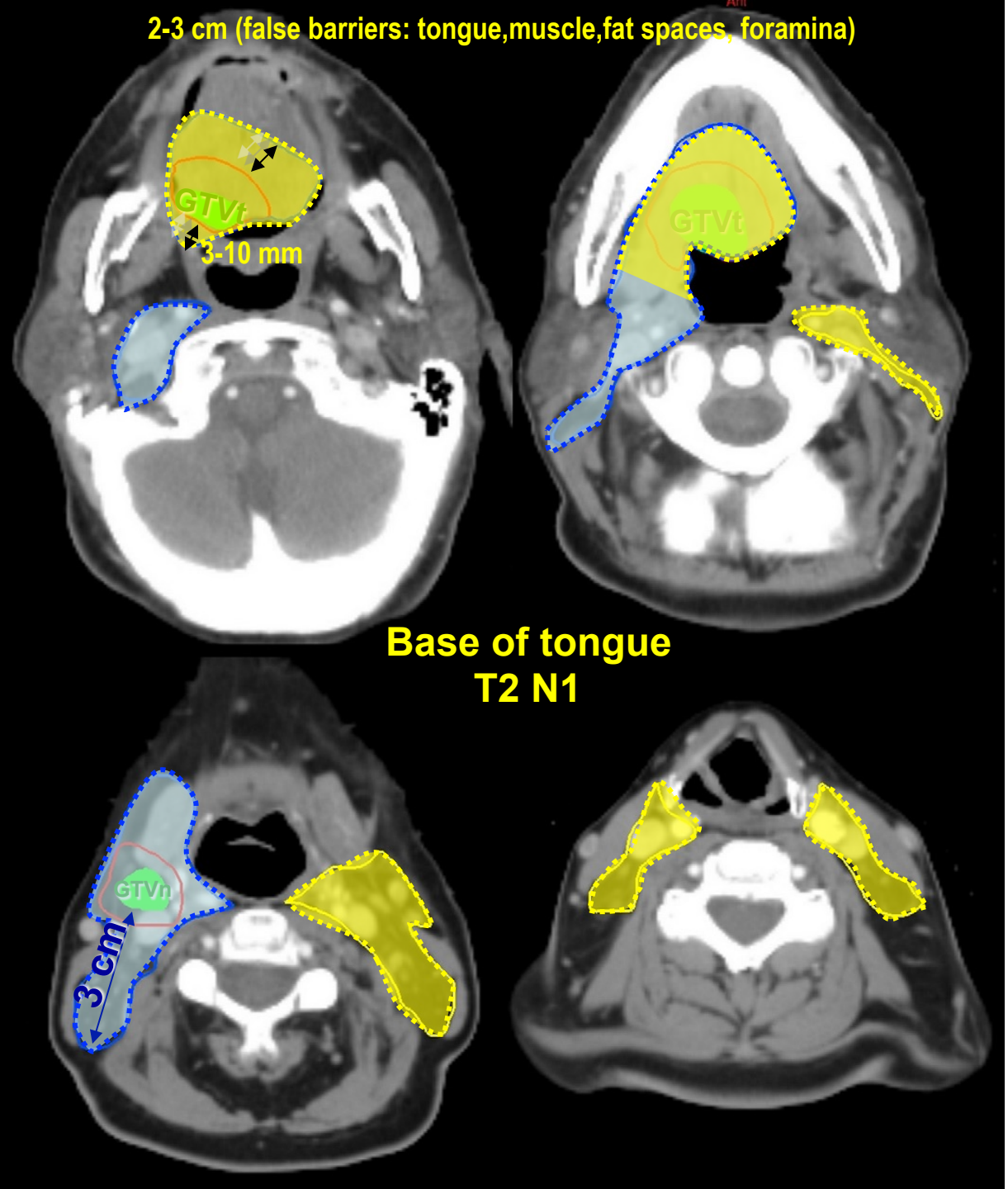
GTVn N1 livel IIa

CTVt1 Base of tongue
3-10mm

CTVn1 N1 level IIa
3- 10 mm

CTVt2 = CTV3

CTVn2 N1 level IIa
within 3 cm distance (10-20%)



GTVt Base of tongue

GTVn N1 livel IIa

CTVt1 Base of tongue
3-10mm

CTVn1 N1 level IIa
3- 10 mm

CTVt2 = CTV3

CTVn2 N1 level IIa
within 3 cm distance (10-20%)

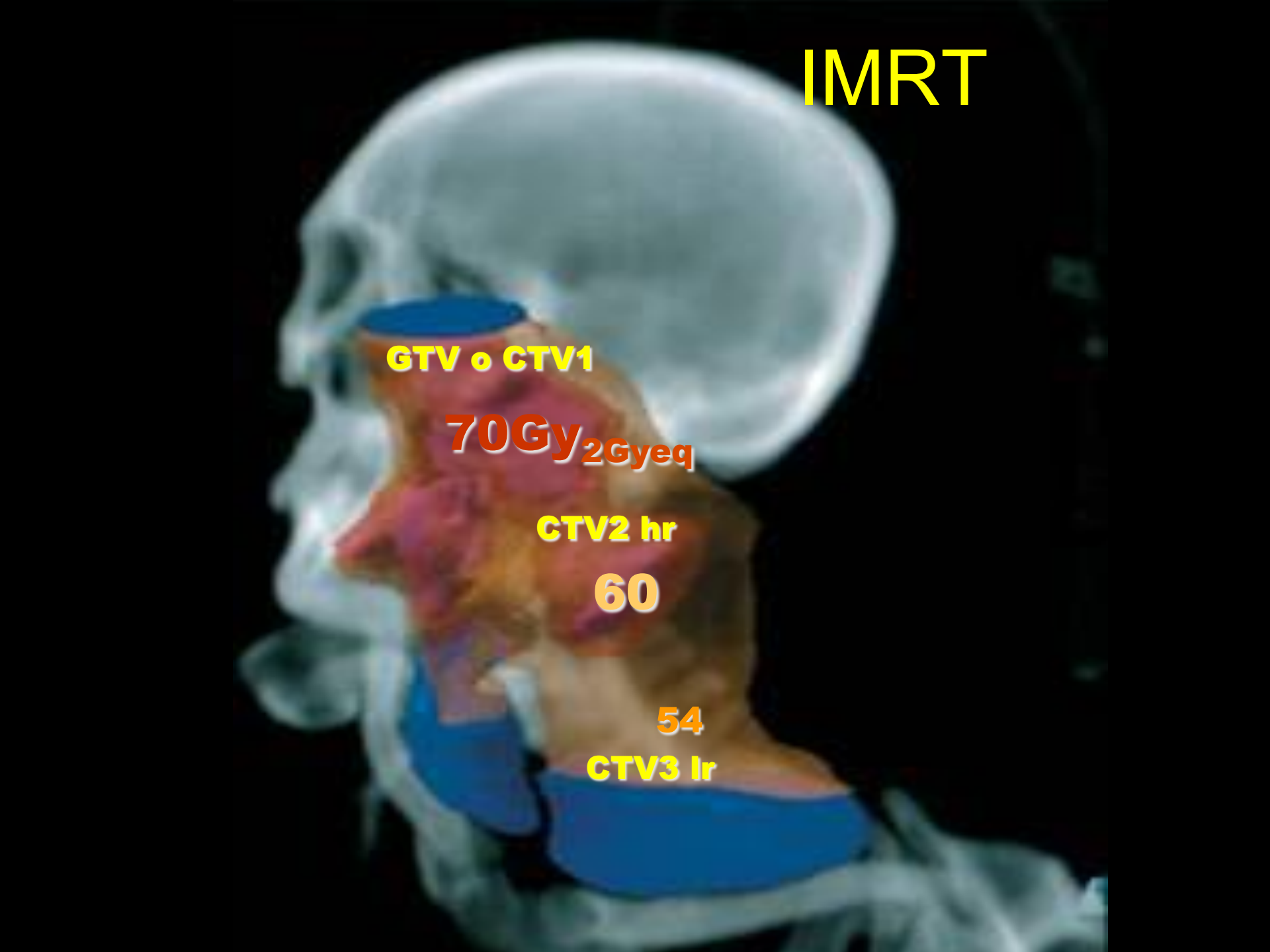
CTVt3 = next structures
or 2-3 cm if false barrier

CTVn3 Low risk (5-10%)

Intergroup consensus
Gregoire-Levendag 2003
2006

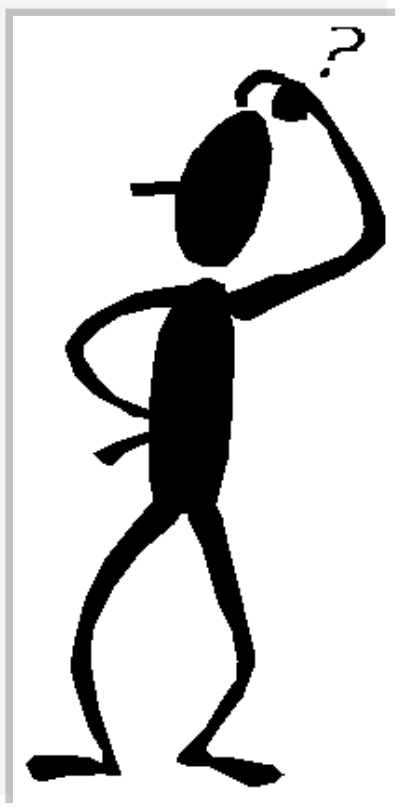
	Simultaneous Integrated boost						Sequential IMRT	
	Tumor in site				Post operatory		T in site	Post operat.
	UCSF (1)	Chao 2005 (2)	RTOG 0022 (3)	ICRU 83 Appendix (5)	UCSF (1)	Parsport (4)	Lapeyre 2011	
			Parsport (4)		CHAO			
Conc. CT	Yes	Yes	No	No	yes	No	Yes	Yes
CTV1	70 Gy	70 Gy	65-66 Gy	69 Gy	66 Gy	60 Gy	70 Gy	66 Gy
	33*2,12Gy	35*2 Gy	30*2,2Gy	30*2,3 Gy	33*2Gy	30*2Gy	35*2Gy	33x2 Gy
CTV2 Optional	59,4 Gy	63 Gy	60 Gyb		59,4Gy			
	33*1,8Gy	35*1,8Gy	30*2Gy		33*1,8Gy			
CTV3	54 Gy	56 Gy	54 Gy	55,5 Gy	54Gy	54Gy	50 Gy	50 Gy
	33*1,64 Gy	35*1,6 Gy	30*1,8 Gy	30*1,85Gy	33*1,64Gy	30*1,8Gy	25*2 Gy	25*2 Gy

IMRT

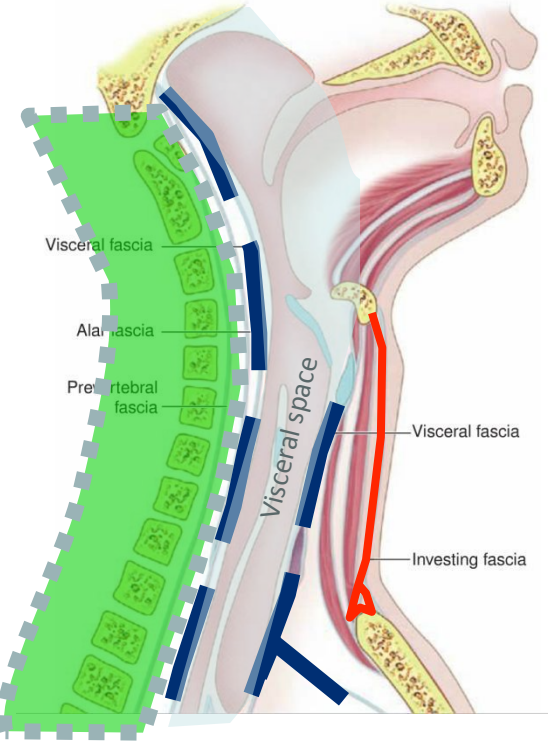


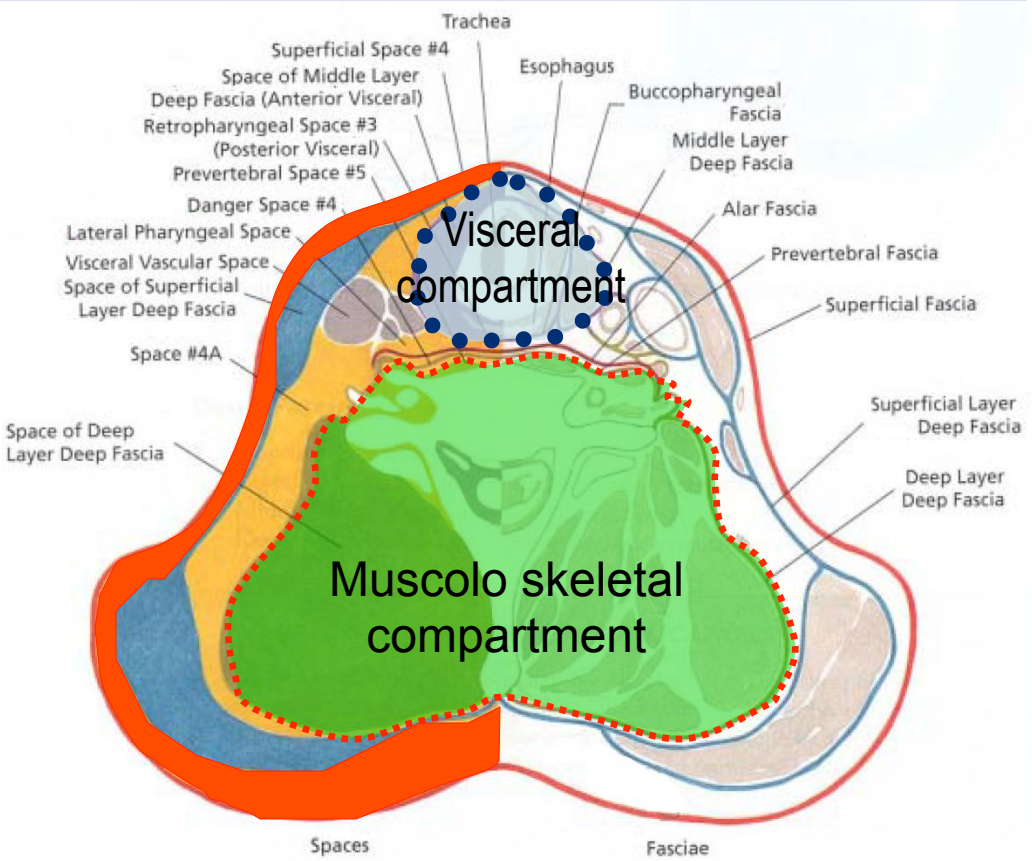
What is importare to individuate the clinical volumes?

- **Compartimentation** of head and neck



Deep spaces in the head & neck	Definition
• VISCERAL COMPARTEMENT Grodinsky/ Holyoke (1938)	Within the fascia surrounding the viscera of interest
• SUPERFICIAL COMPARTEMENT	Between superficial fascia and superficial layer of deep fascia
• MUSCOLO-SKELETAL COMPARTMENT	Within the deep layer of deep fascia





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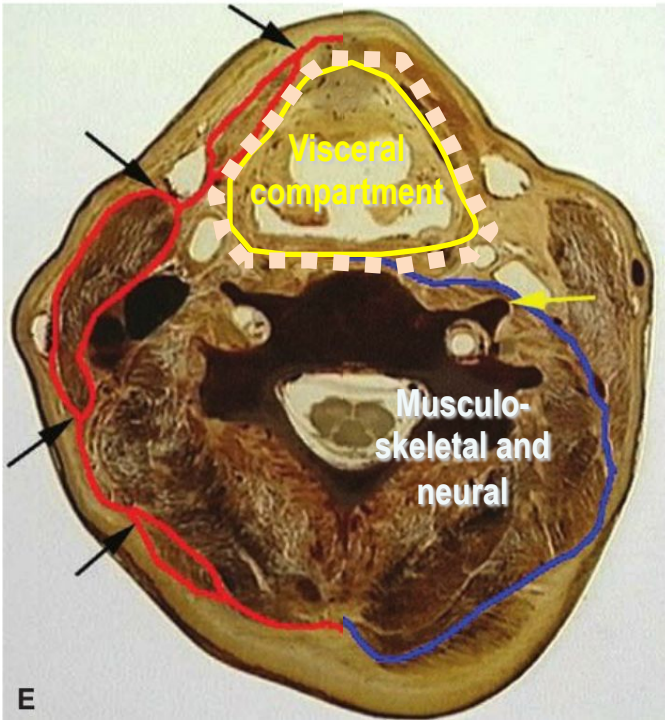
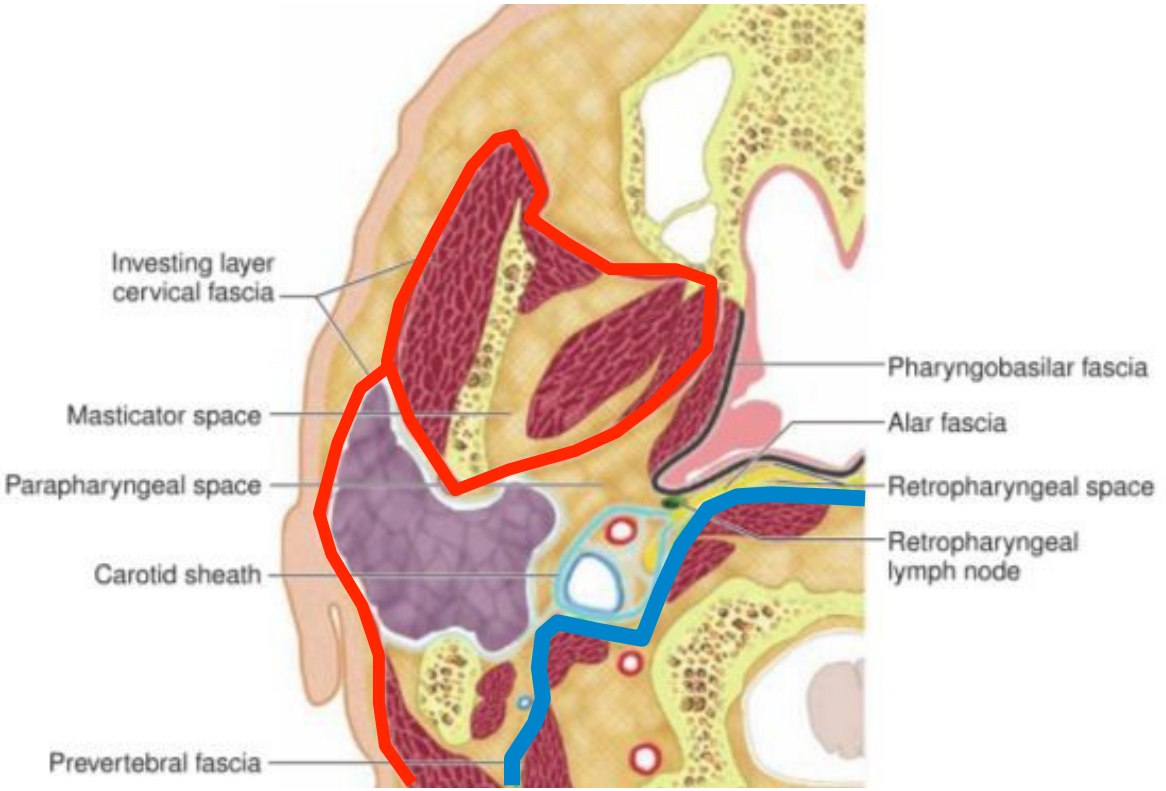
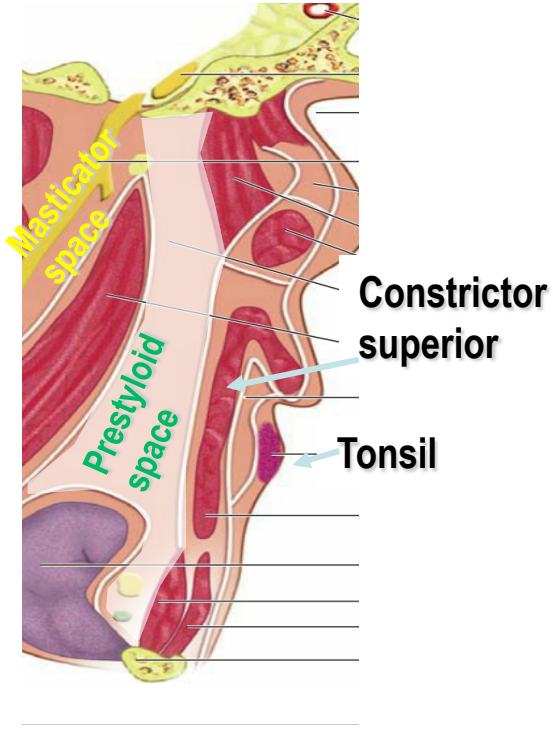
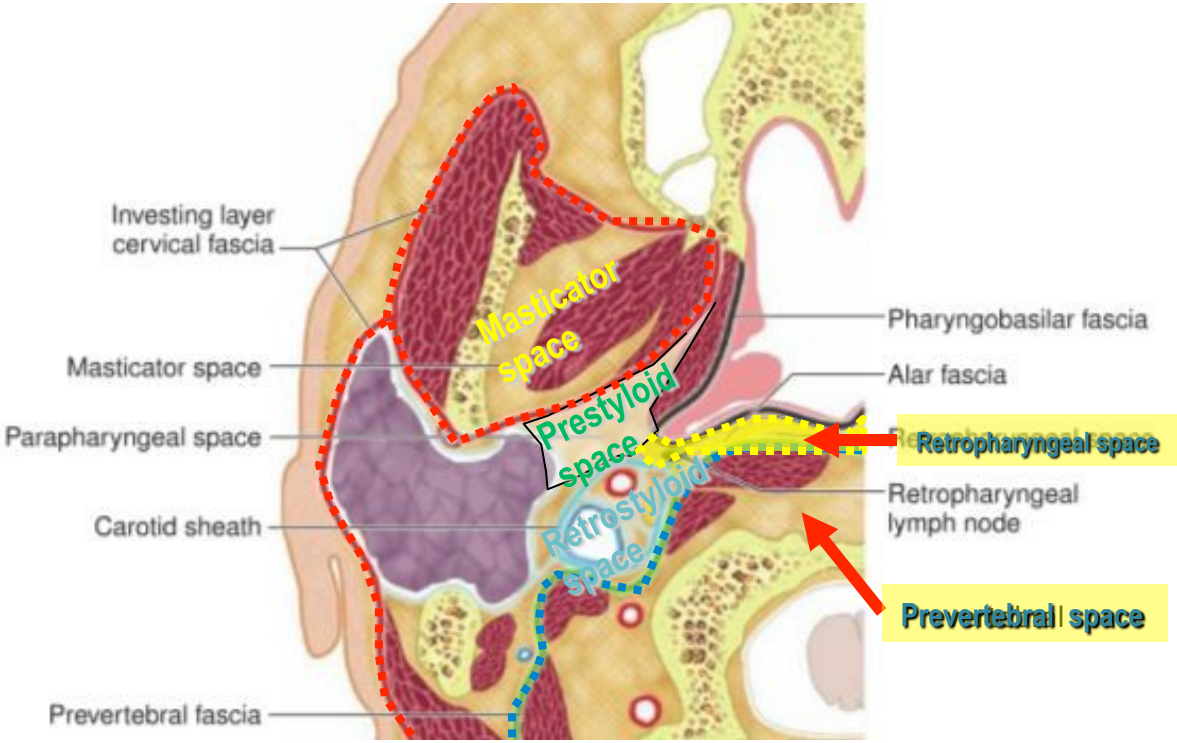




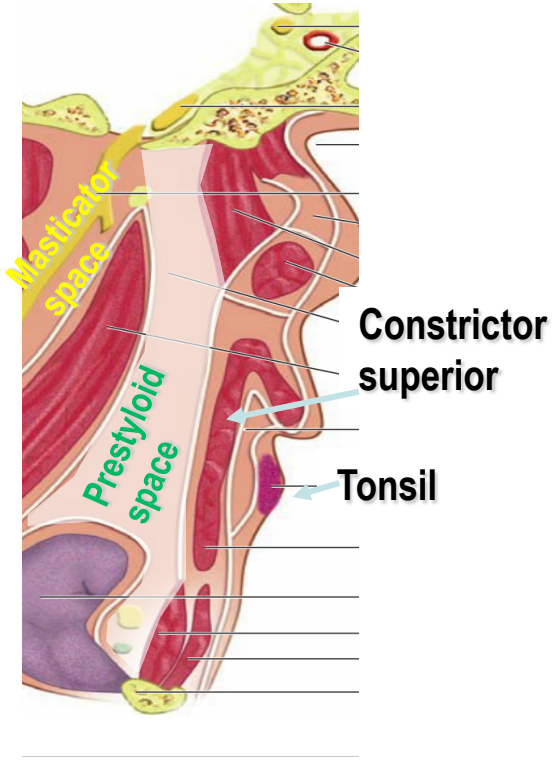
Deep spaces in the head/neck

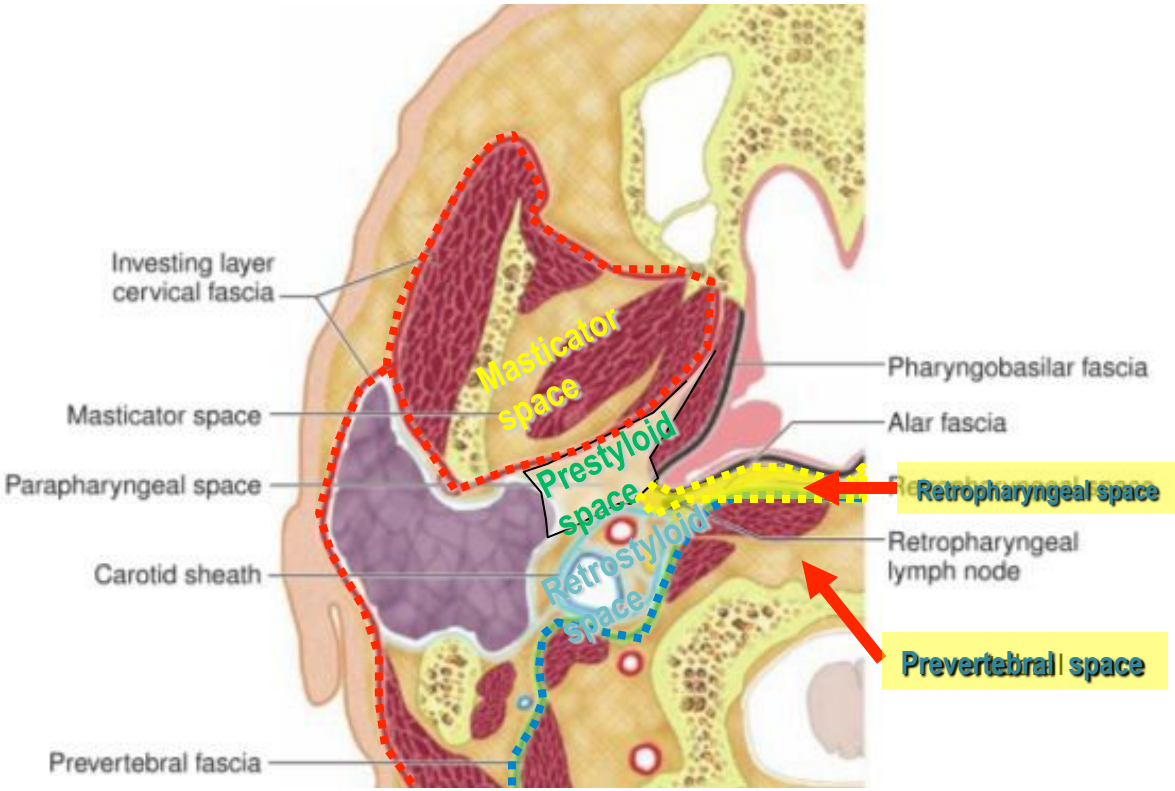
Definition





Deep spaces in the head & neck	Definition
• PREVERTEBRAL SPACE Grodinsky/Holyoke (1938)	Deep to prevertebral fascia
• RETROPHARYNGEAL SPACE Grodinsky/Holyoke (1938)	Between the visceral and prevertebral fasciae; Continuous with parapharyngweal space laterally

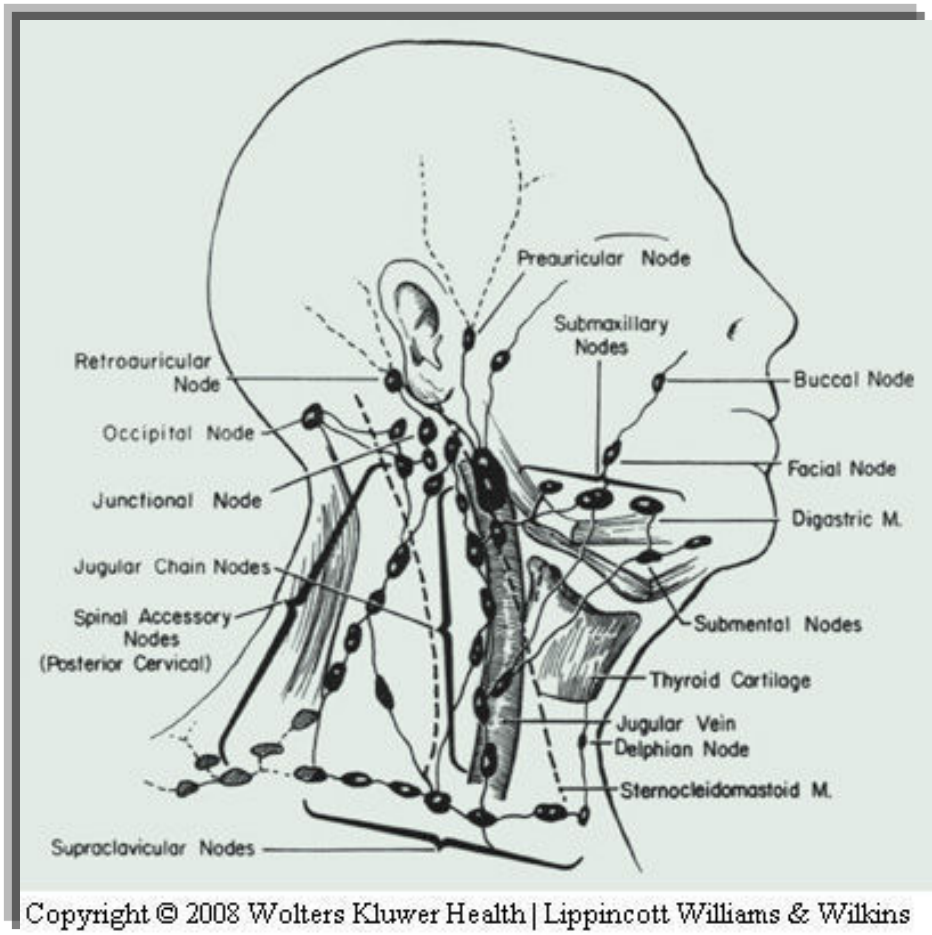




The lymph-node drenage pathways

TNM atlas (1991-3) for lymph nodes of the neck (Rouviere 1948)

Group number	Terminology
1	Submental nodes
2	Submandibular nodes
3	Cranial jugular nodes
4	Medial jugular nodes
5	Caudal jugular nodes
6	Dorsal cervical nodes along the spinal accessory nerve
7	Supraclavicular nodes
8	Prelaryngeal and paratracheal nodes
9	Retropharyngeal nodes
10	Parotid nodes
11	Buccal nodes
12	Retroauricular and occipital nodes



Anatomy of the human lymphatic system. Ann Arbor, MI: Edward Brothers; 1938:27

IJROBP vol 59(1) ; 28-42,2004 (Einsbruk et al.)

Il punto in cui la VGI incrocia il ventre posteriore del m digastrico separa la porzione superiore del livello II (i linfonodi giunzionali o area retrostiloidea), da quella inferiore

Robbins' classification (AHNS e AAO, 1991 (MSKCC, Milano, Amsterdam, Villejuif

Level	Terminology
Ia	Submental group
Ib	Submandibular group
II	Upper jugular
III	Middle jugular group
IV	Lower jugular group
VA	Posterior triangle group
VB	Posterior triangle group
VI	Anterior compartment group

(Only the lymph node groups routinely remove during neck dissection were considered)

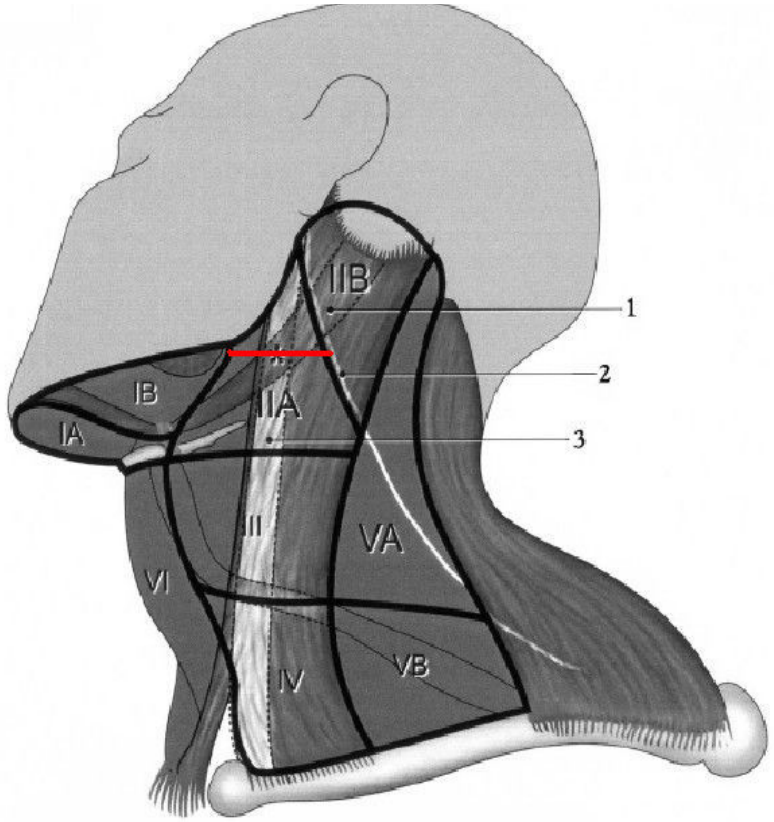


Fig. 4. Neck nodal levels (after Robbins *et al.* [19]). Asterisk denotes crossing of jugular vein by posterior belly of digastric muscle, marking cranial-most CT image at which Level II nodal CTV delineated in contralateral side of neck. It excluded uppermost part of sublevel IIA and most of IIB. 1, posterior belly of digastric muscle; 2, spinal accessory nerve; 3, internal jugular vein.

On CT or MRI, as the visualization of the posterior belly of the digastric muscle is not always easy, the caudal edge of the lateral process of C1 is recommended to define the upper limit of level II

The lymph-node drenage pathways

Comparison between the TNM atlas terminology and the Robbins' classification of the lymph nodes of the neck

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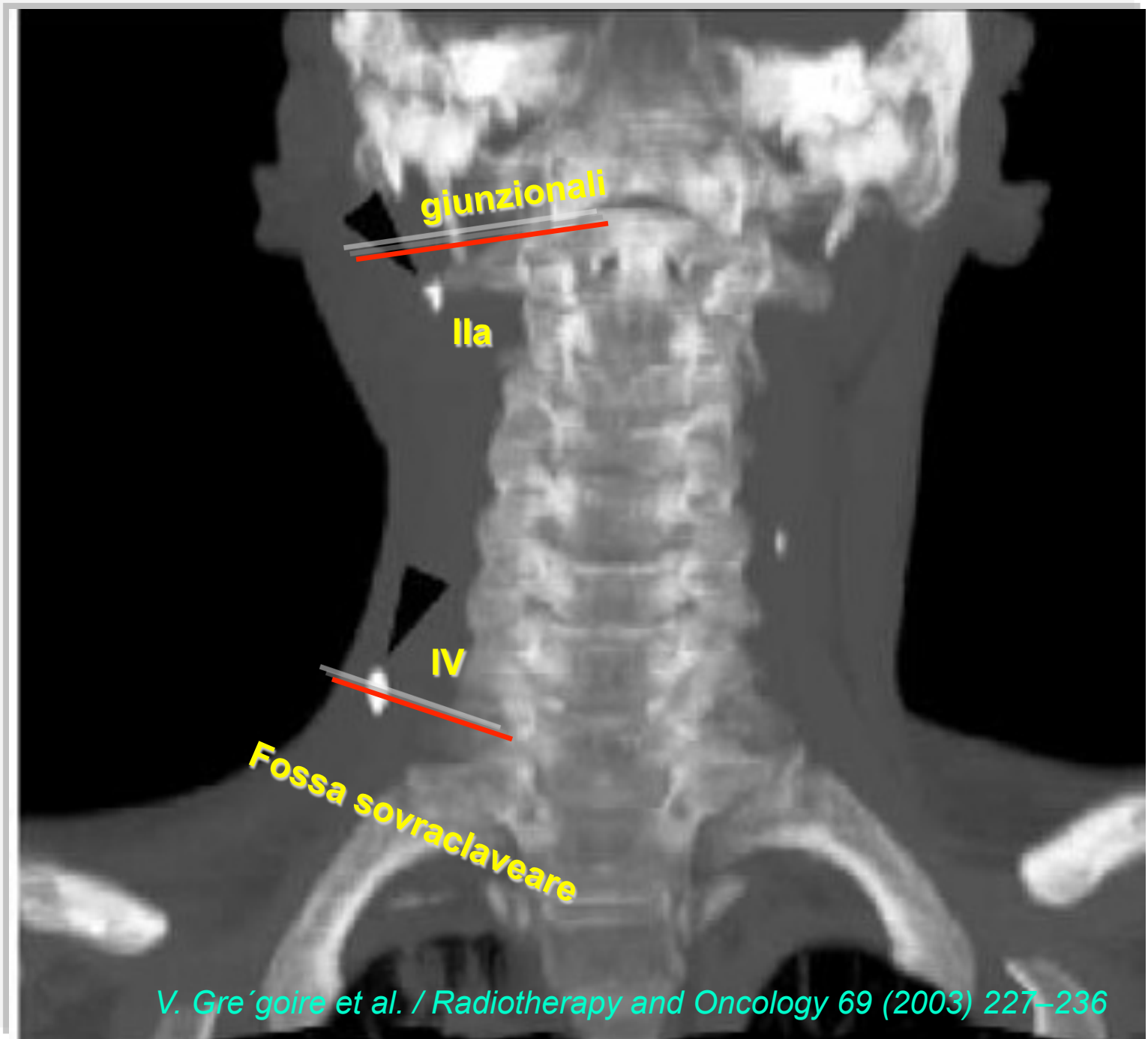
Radiotherapy and Oncology Vol. 56 (2000) pp 135-150 **Selection and delineation of lymph node target volumes in head and neck conformal radiotherapy. Proposal for standardizing terminology and procedure based on the surgical experience,** Gregoire et al



V. Gre´goire et al. / Radiotherapy and Oncology 69 (2003) 227–236

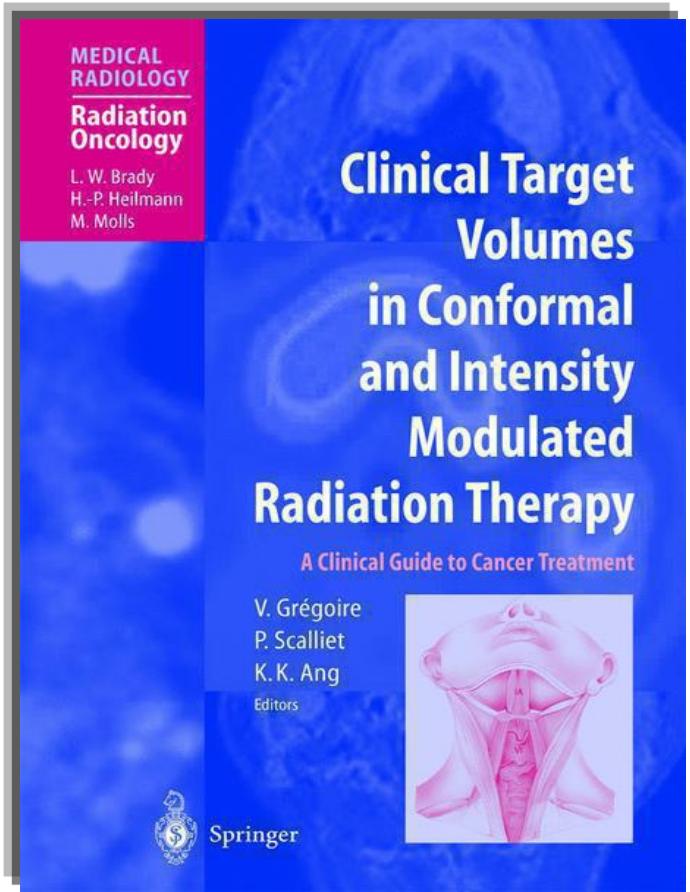
Radiotherapy and Oncology 85 (2007) 146—155
www.thegreenjournal.com

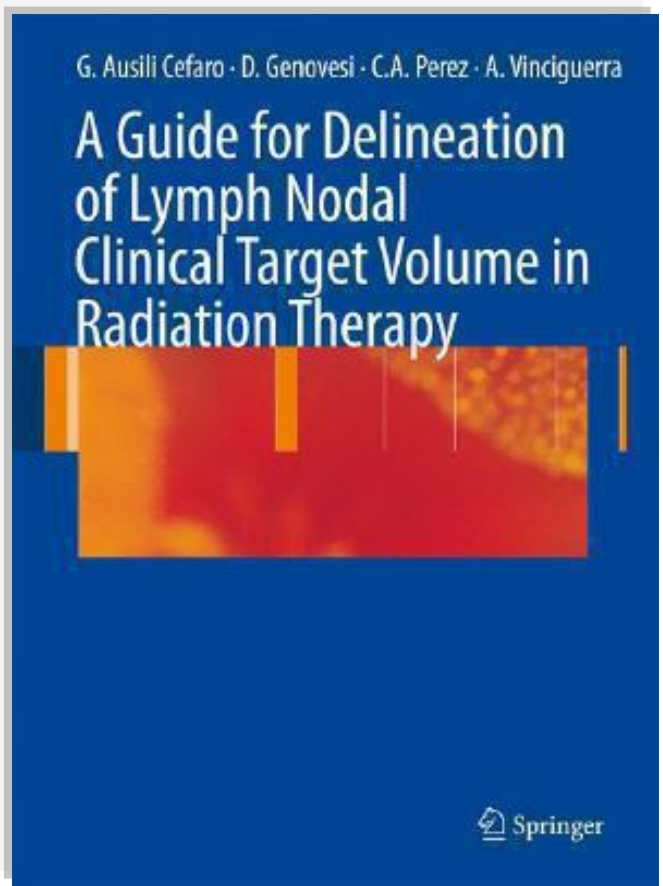
Educational review

Anatomical bases for the radiological delineation of lymph node areas. Major collecting trunks, head and neck

Benoît Lengelé[a], Marc Hamoir[b], Pierre Scalliet[c,*], Vincent Grégoire[c]

[a]*Department of Experimental Morphology,* [b]*Department of Oto-rhino-laryngology and Head and Neck Surgery, and* [c]*Department of Radiation Oncology, Université Catholique de Louvain, Brussels, Belgium*



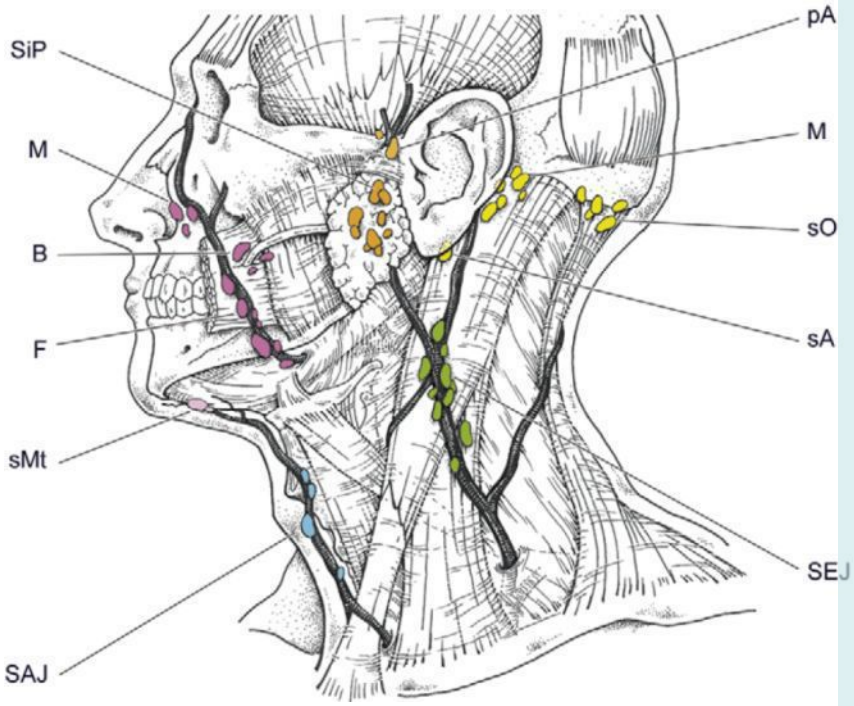


What lymph-node levels?

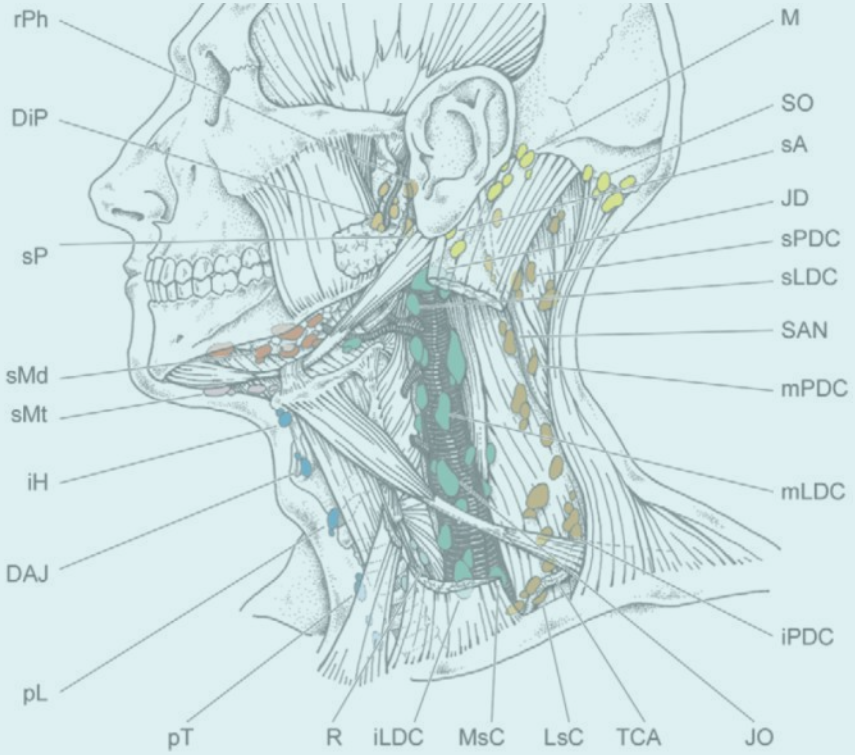
Superficial

Deep

Lymph node groups of the pericervical circle and of descending *superficial* chains

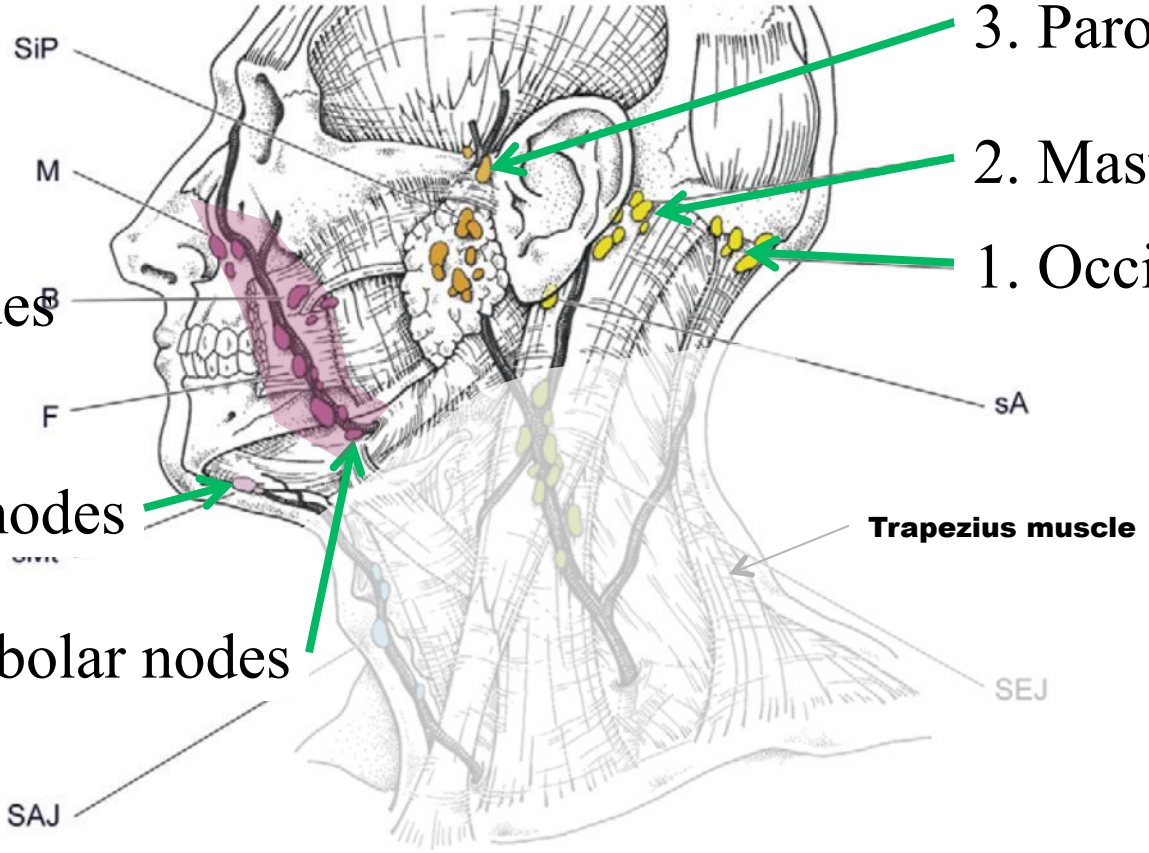


Descending deep *cervical* chains



Lengelé B, et Al. Radiother Oncol 2007 Oct;85(1):146-155.

Lymph node groups of the PERICERVICAL CIRCLE



3. Parotid nodes

2. Mastoid nodes

1. Occipital nodes

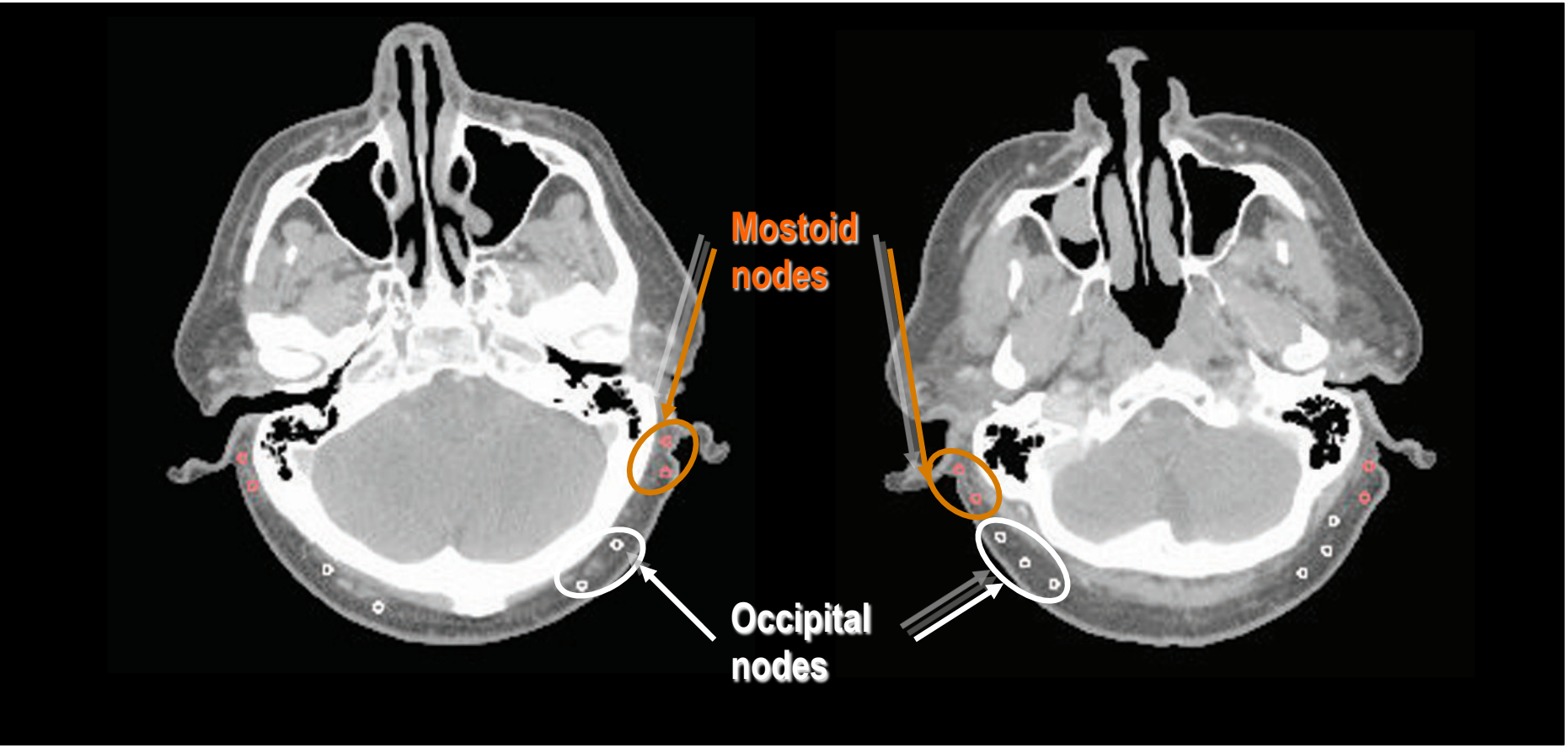
6. Facial Nodes

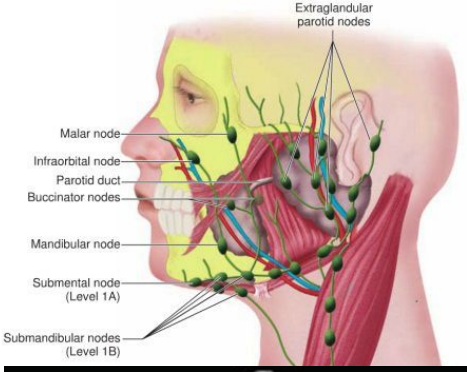
5. Submental nodes

4. Submandibolar nodes

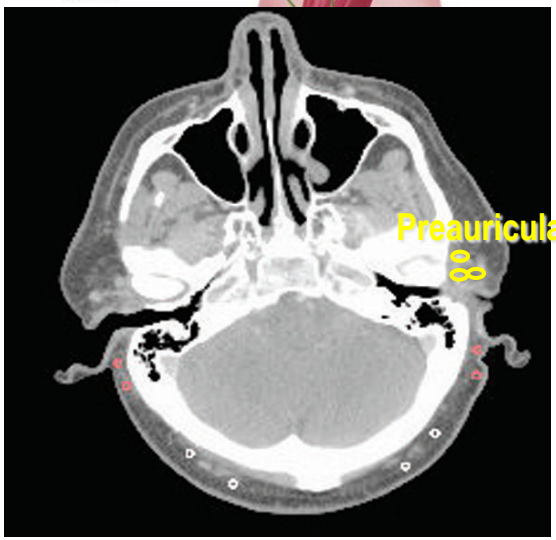
Afferent lymphatic of submandibular nodes:
M:Malar n.; B: Buccinator n.; F: Facial n.

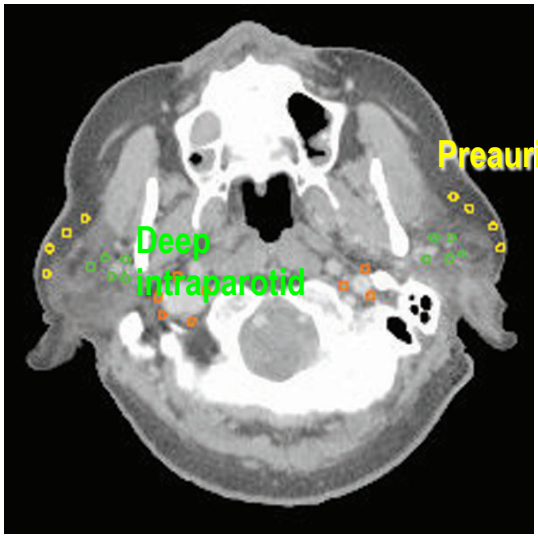
1. Occipital
2. Mastoid nodes

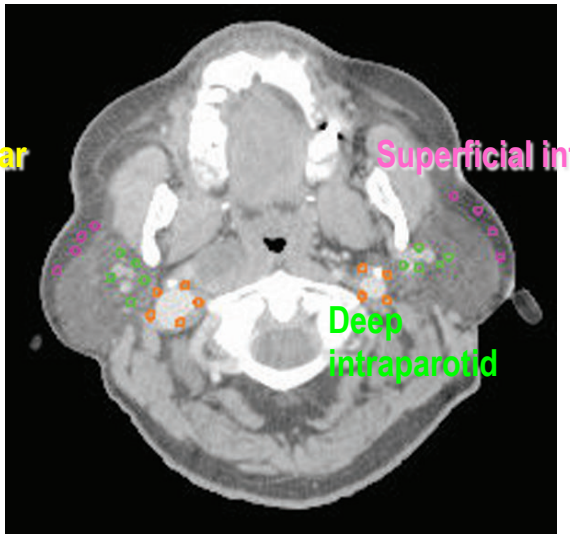


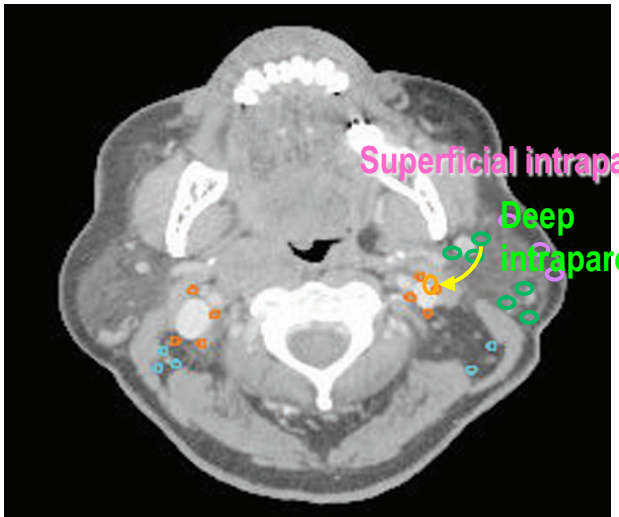


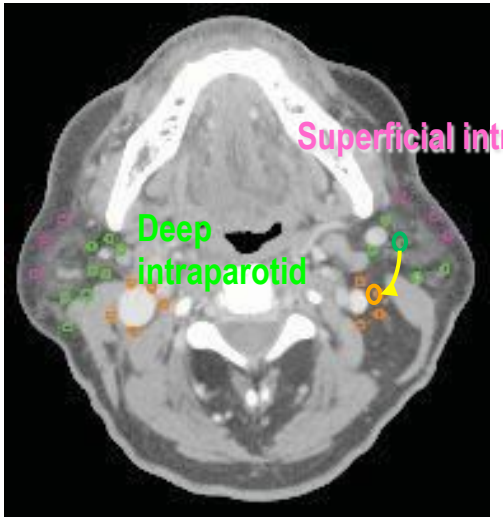
3. Parotid Nodes



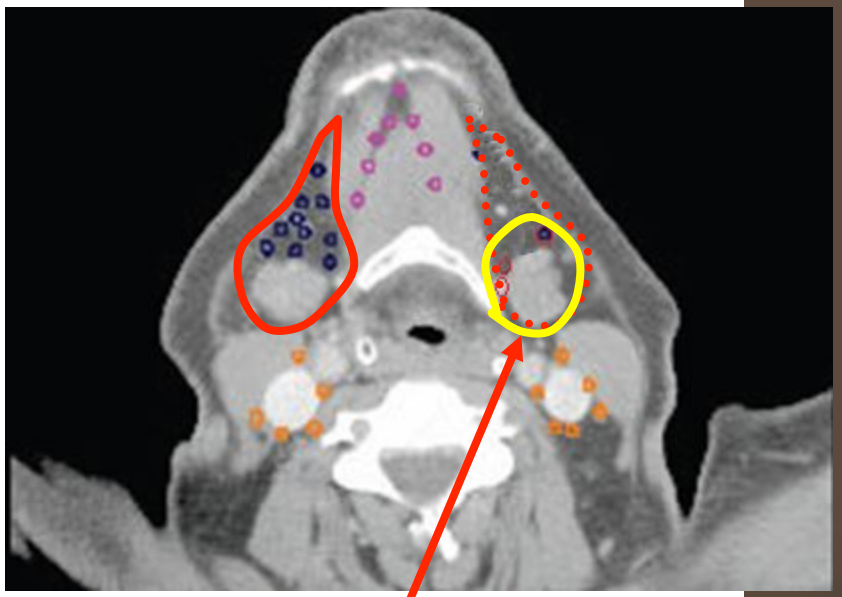




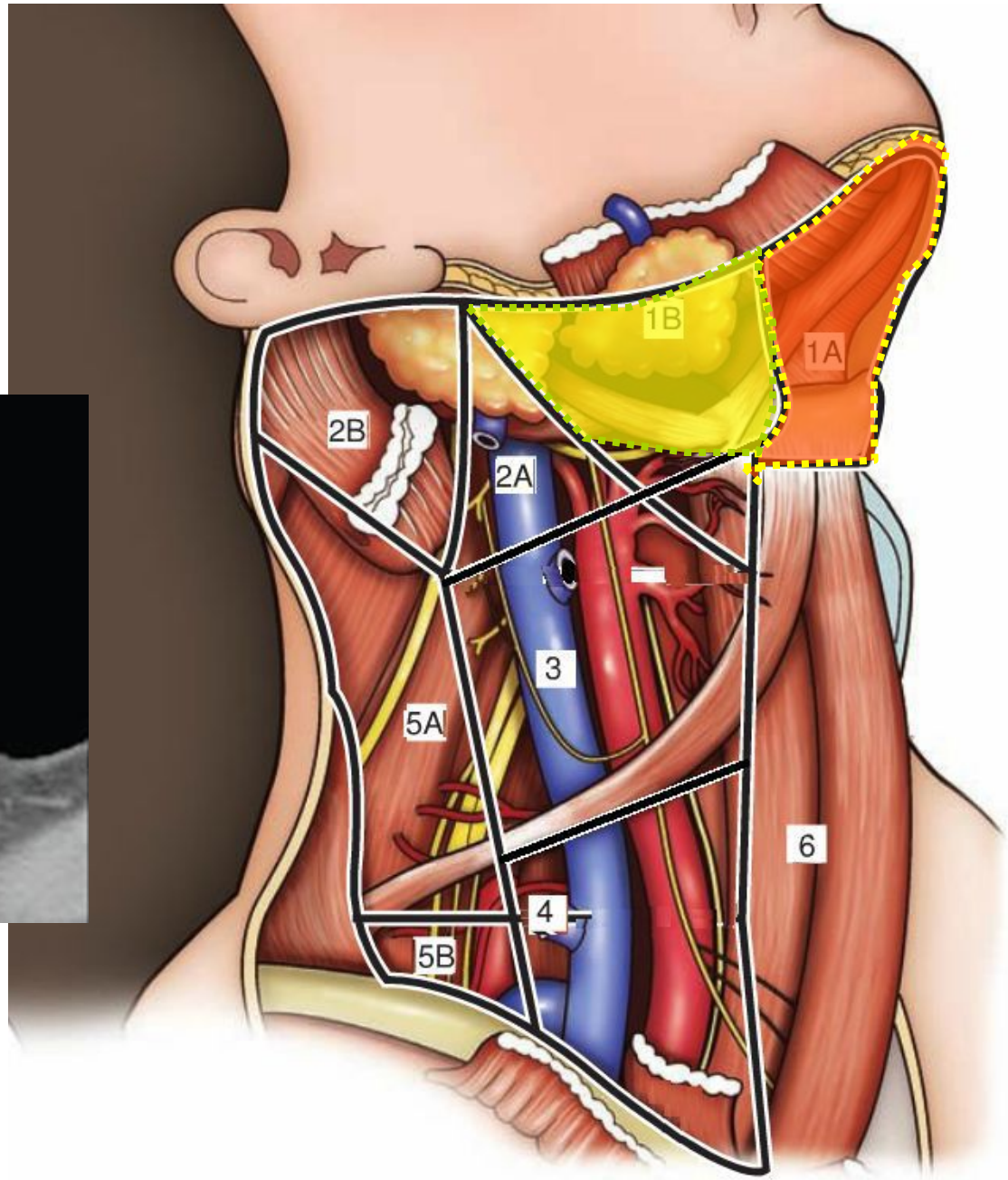




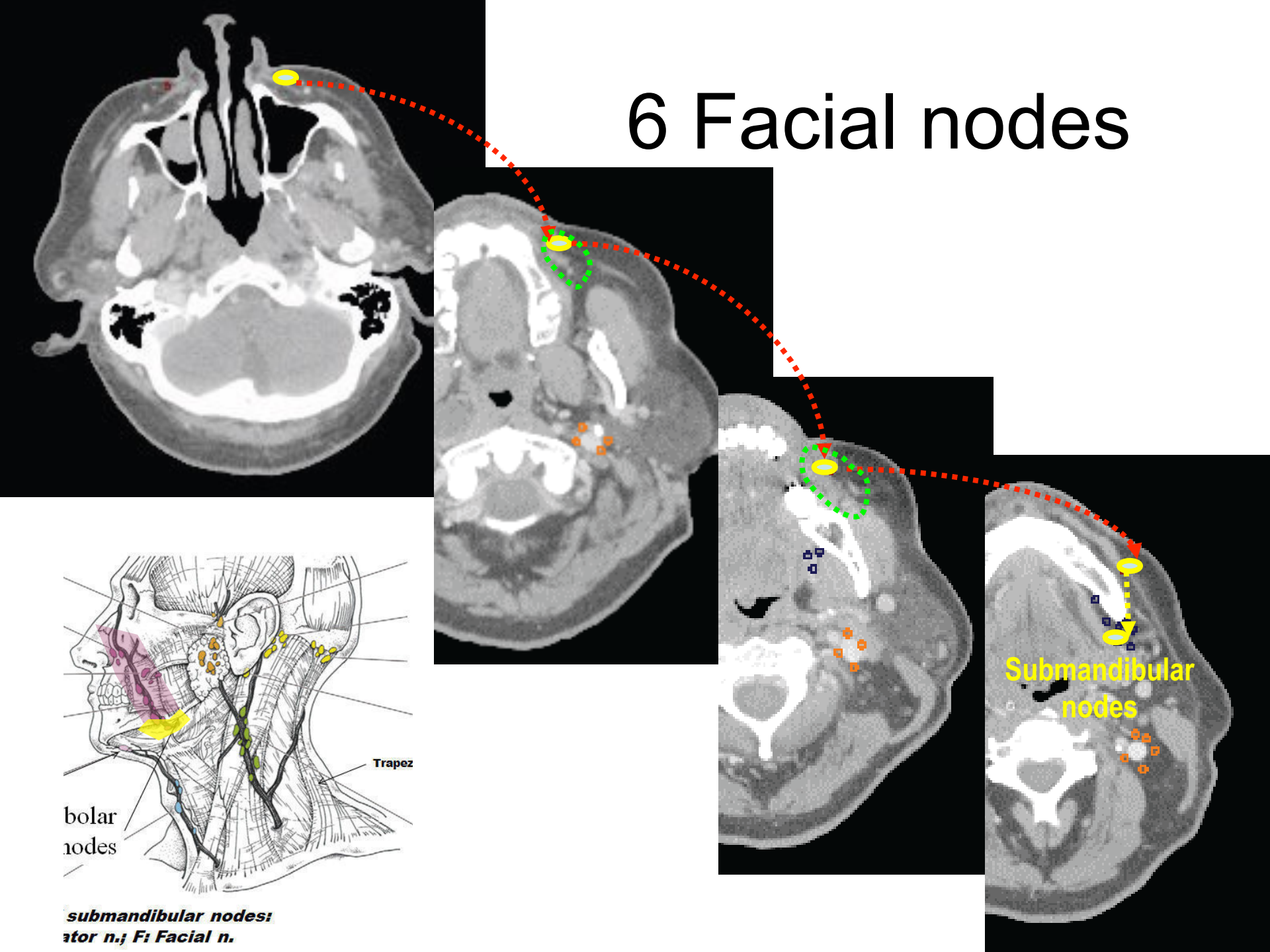
4. Submandibular
5. Submental



Sanguinetti et al. IJROBP 2009



6 Facial nodes

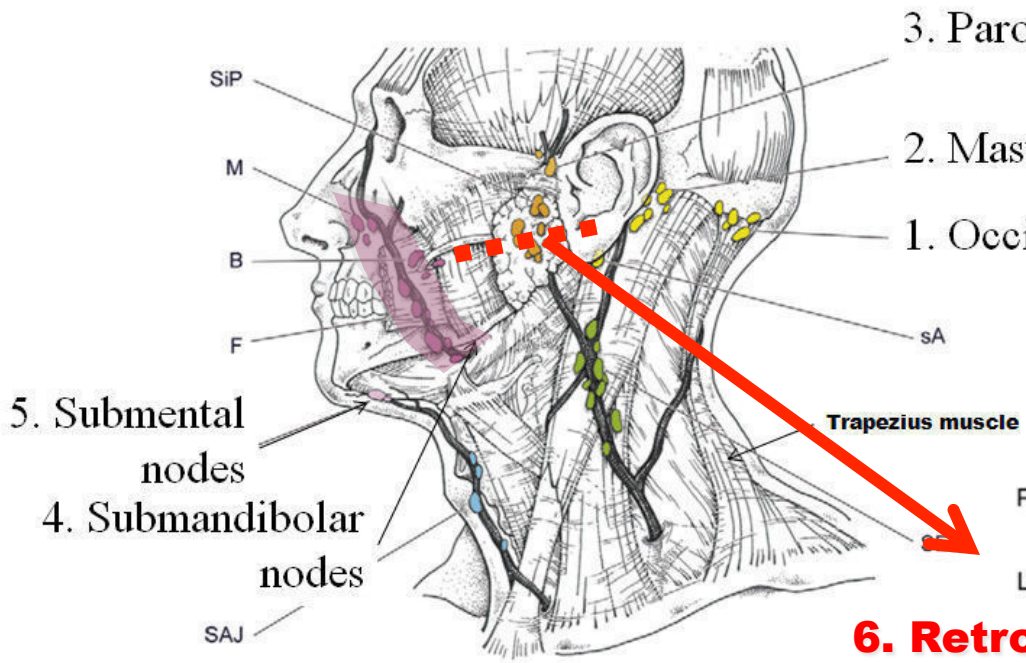


submandibular nodes:
ator n.; F: Facial n.

Lymph node groups of the pericervical circle:

Retro Pharingeal nodes

Facial nodes



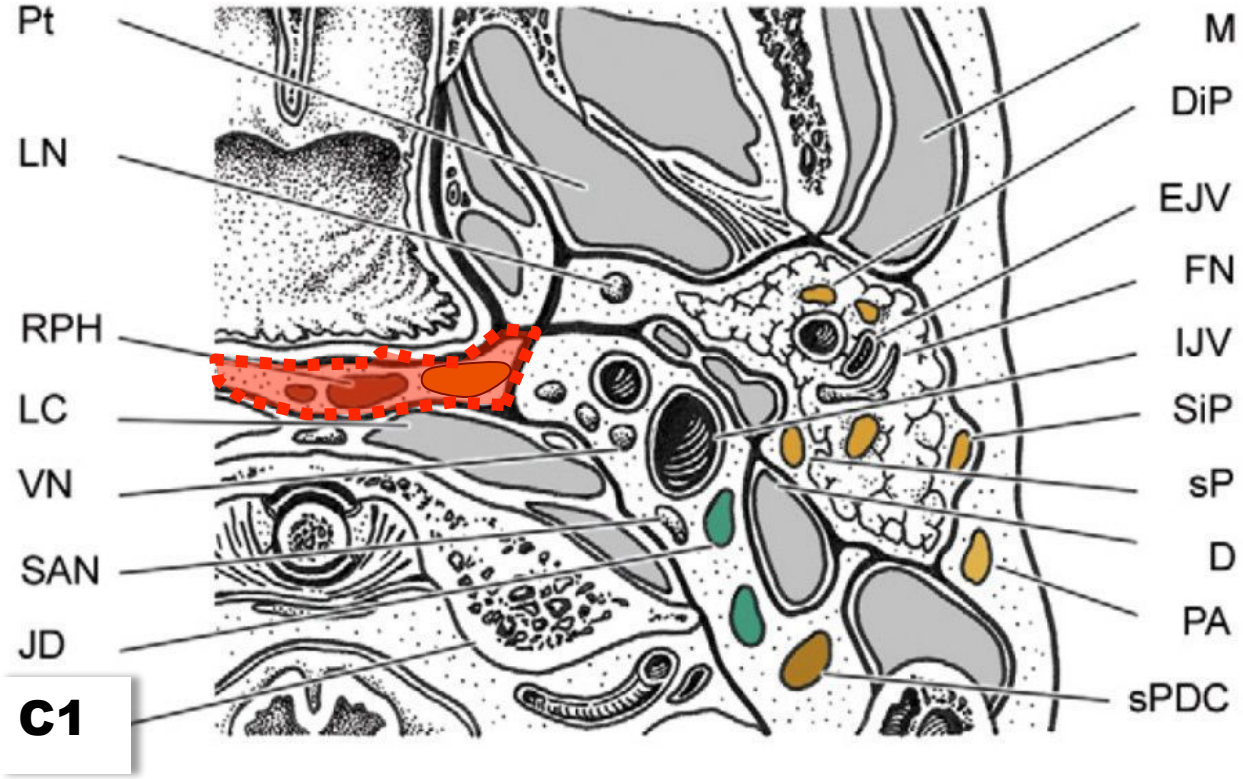
Afferent lymphatic of submandibular nodes: M:Malar n.; B: Buccinator n.; F: Facial n.

Retro Pharingeal nodes can be considered the deepest seated part of the peri-cervical circle.

6. Retro Pharingeal nodes

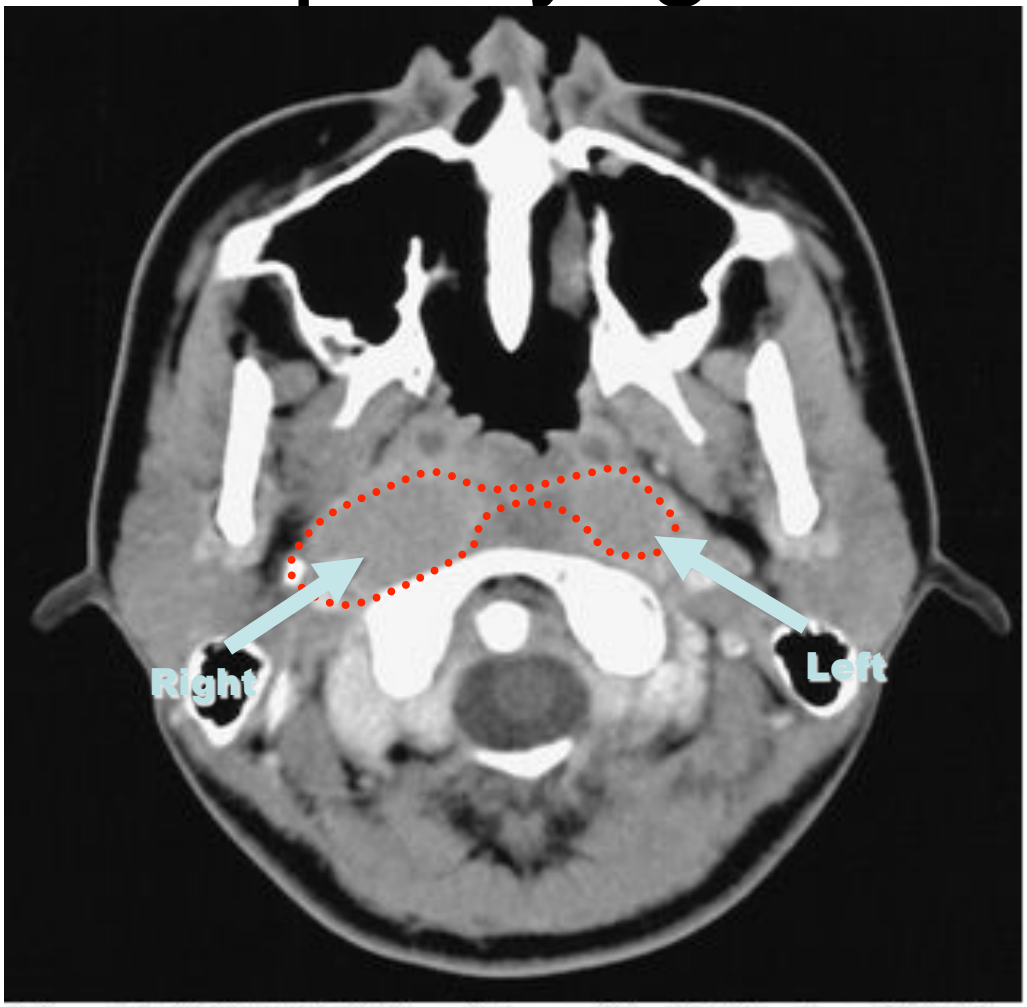
6. Retro Pharingeal nodes

Retro Pharingeal nodes can be considered the deepest seated part of the peri-cervical circle.



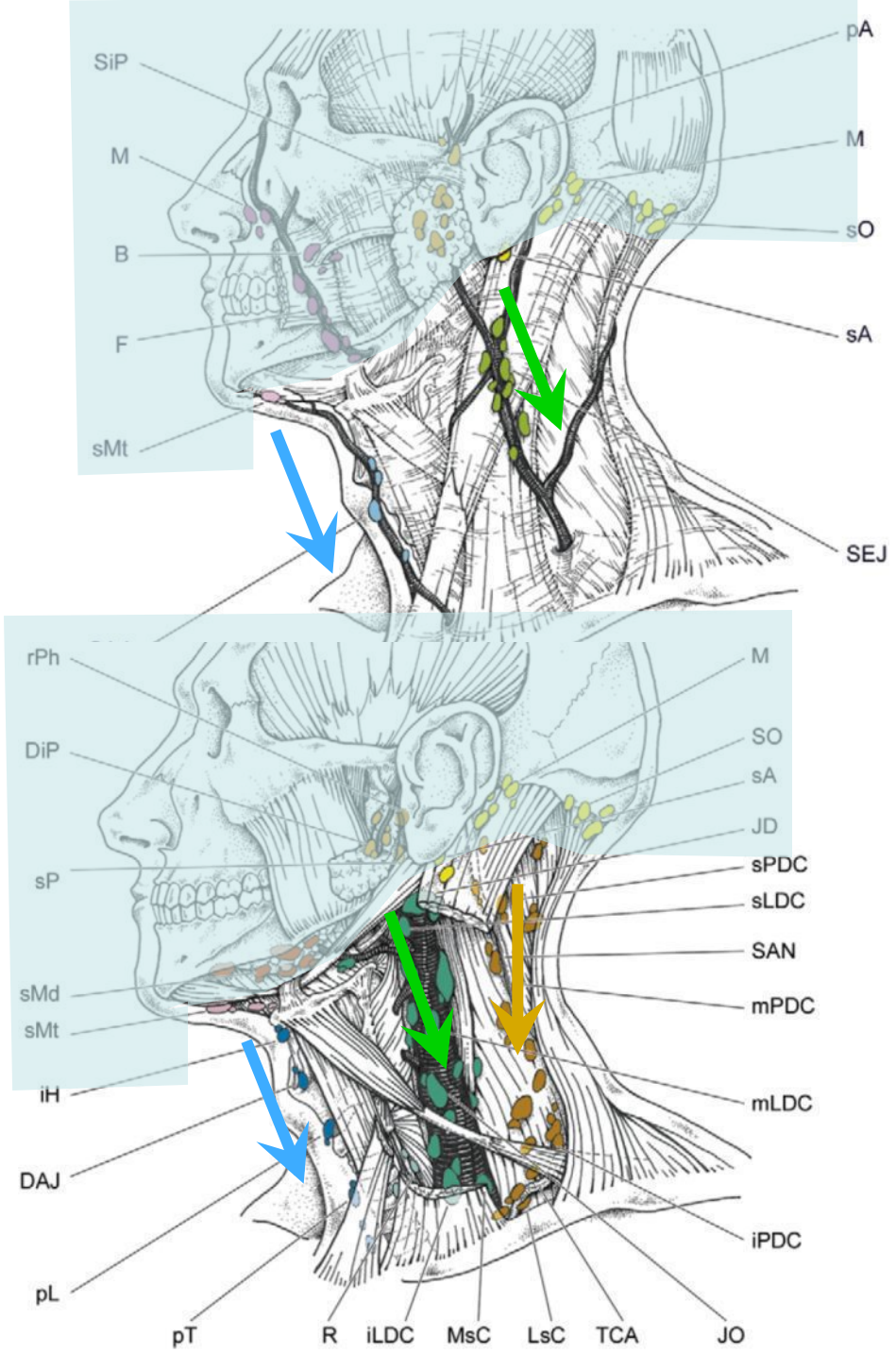
- Laterali→ rinofaringe e parete faringea posteriore
- Mediali→ (raramente coinvolti (Feng 2007). Devono essere irradiati solo quando l laterali sono positivi o in caso di coinvolgimento della parte faringea posteriore (anche nell'orofaringe).

Retro-pharyngeal nodes



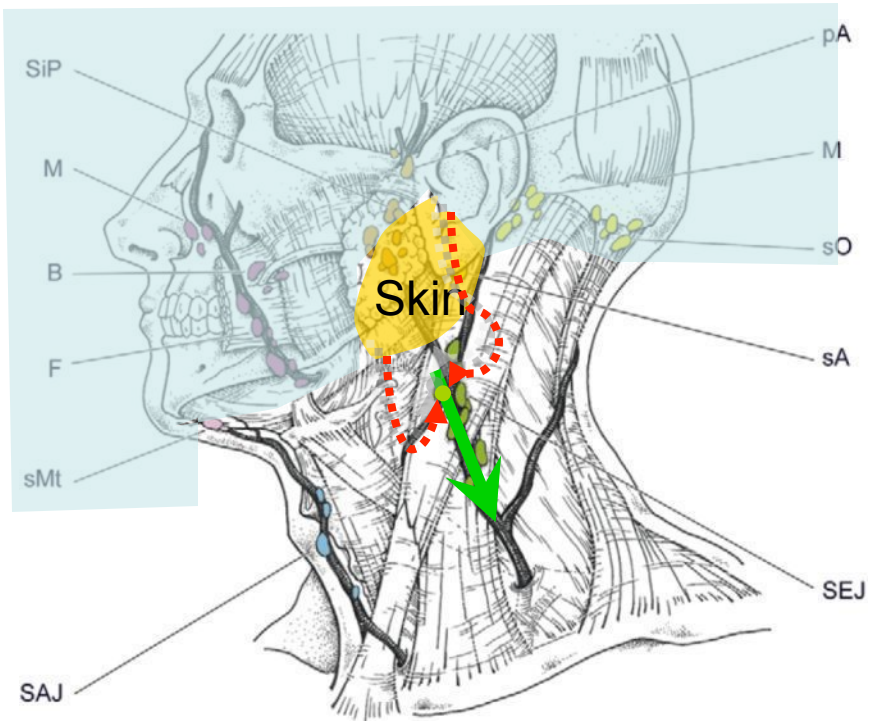
Descending *cervical* chains

- **Superficial**
  - **Lateral (external jugular chain)**
  - **Anterior**
- Deep
  - Anterior and Recurrent chain
  - Lateral
  - Posterior

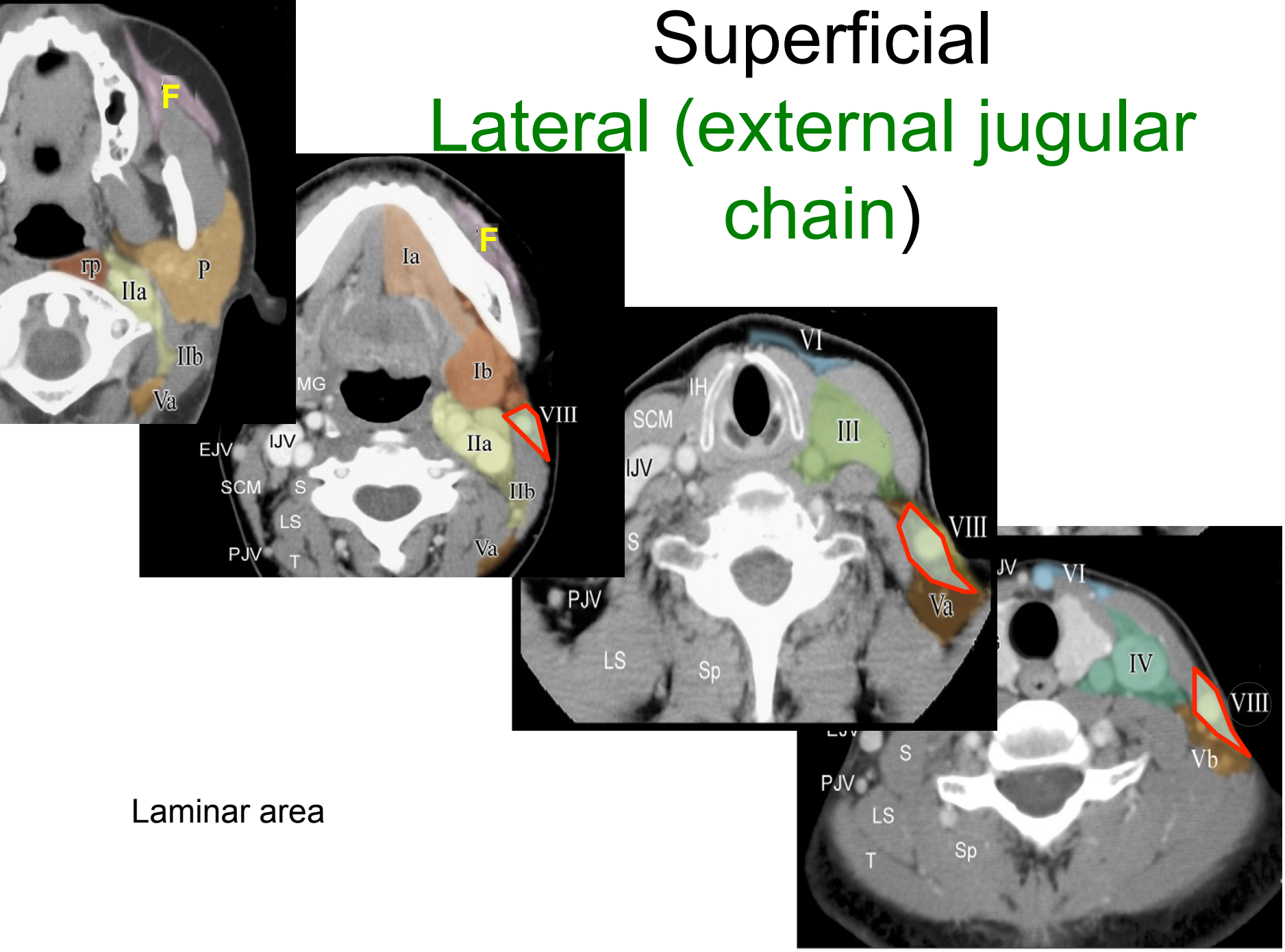


Descending *cervical* chains

- **Superficial**
  - **Lateral (external jugular chain)**



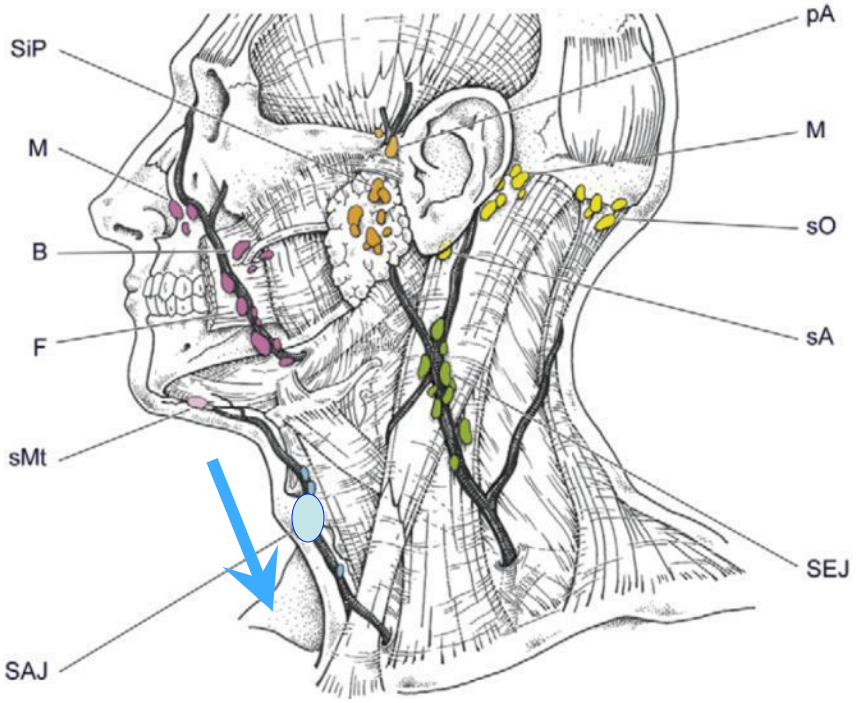
Superficial Lateral (external jugular chain)

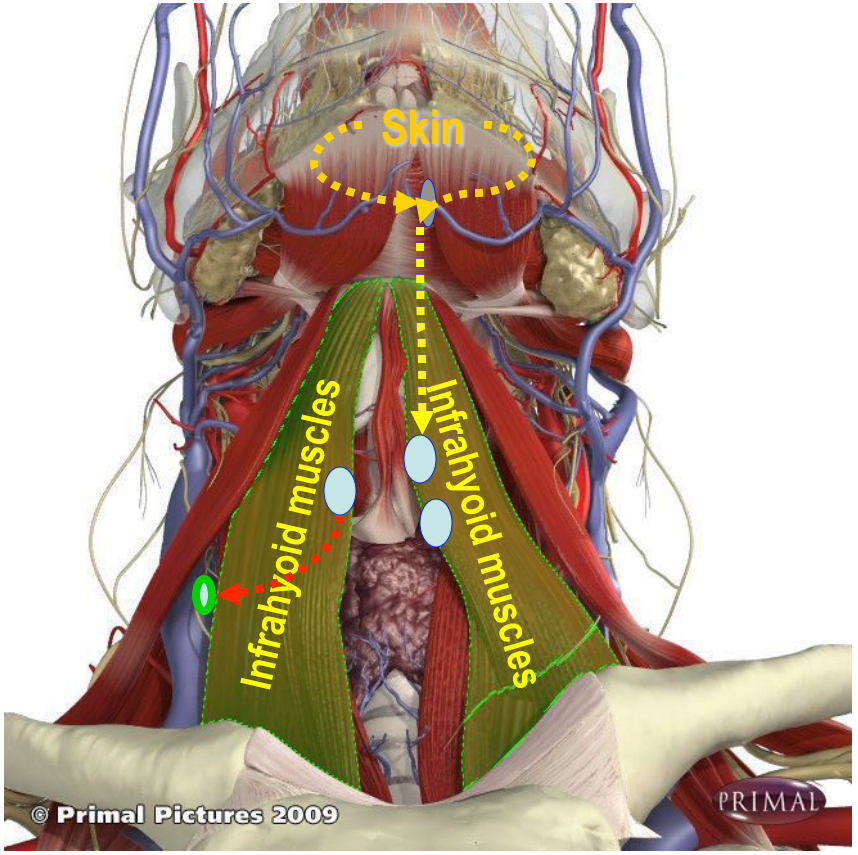


Laminar area

Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

Superficial descending anterior chain



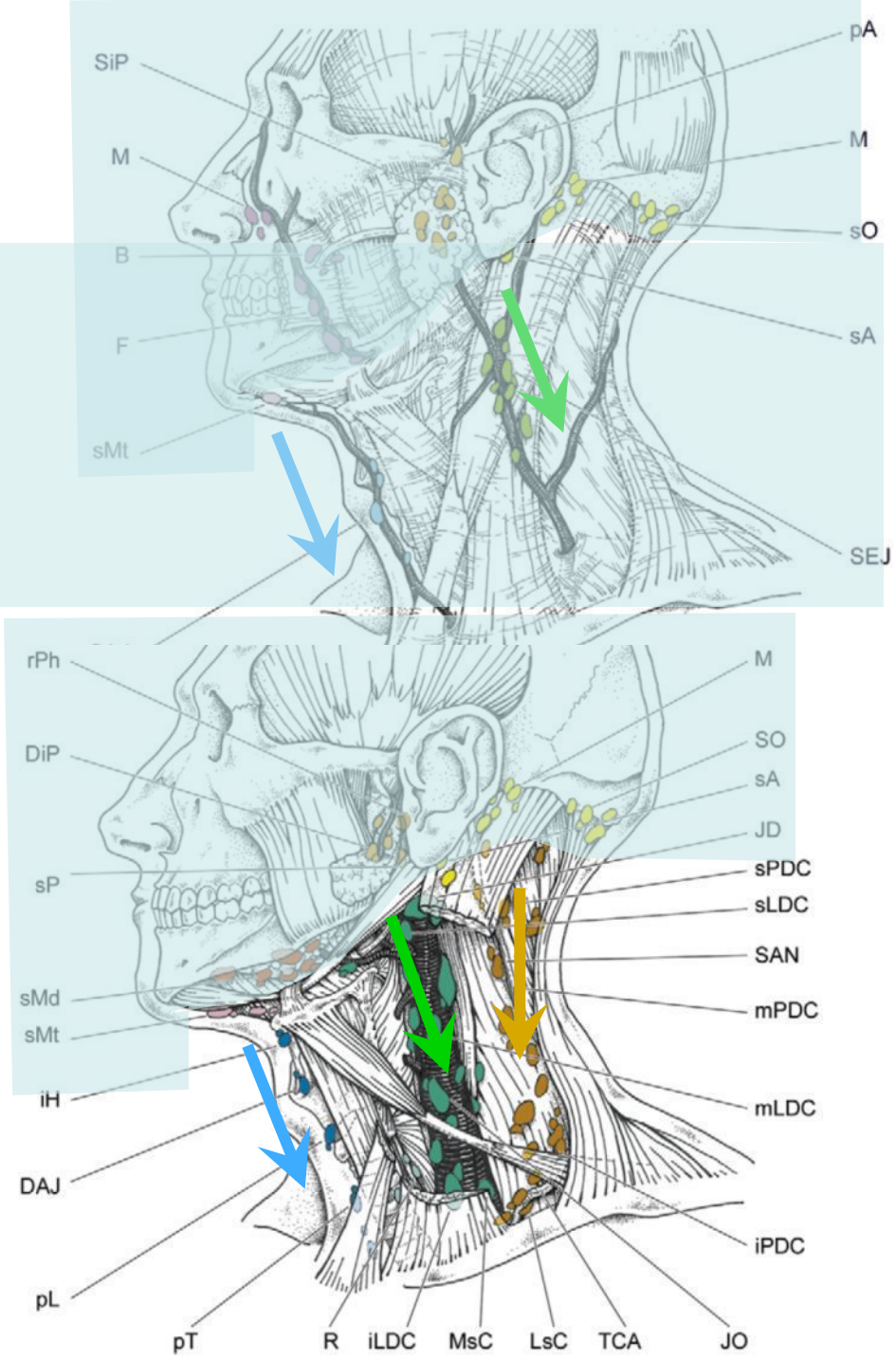


Between cervical superficial fascia and visceral fascia

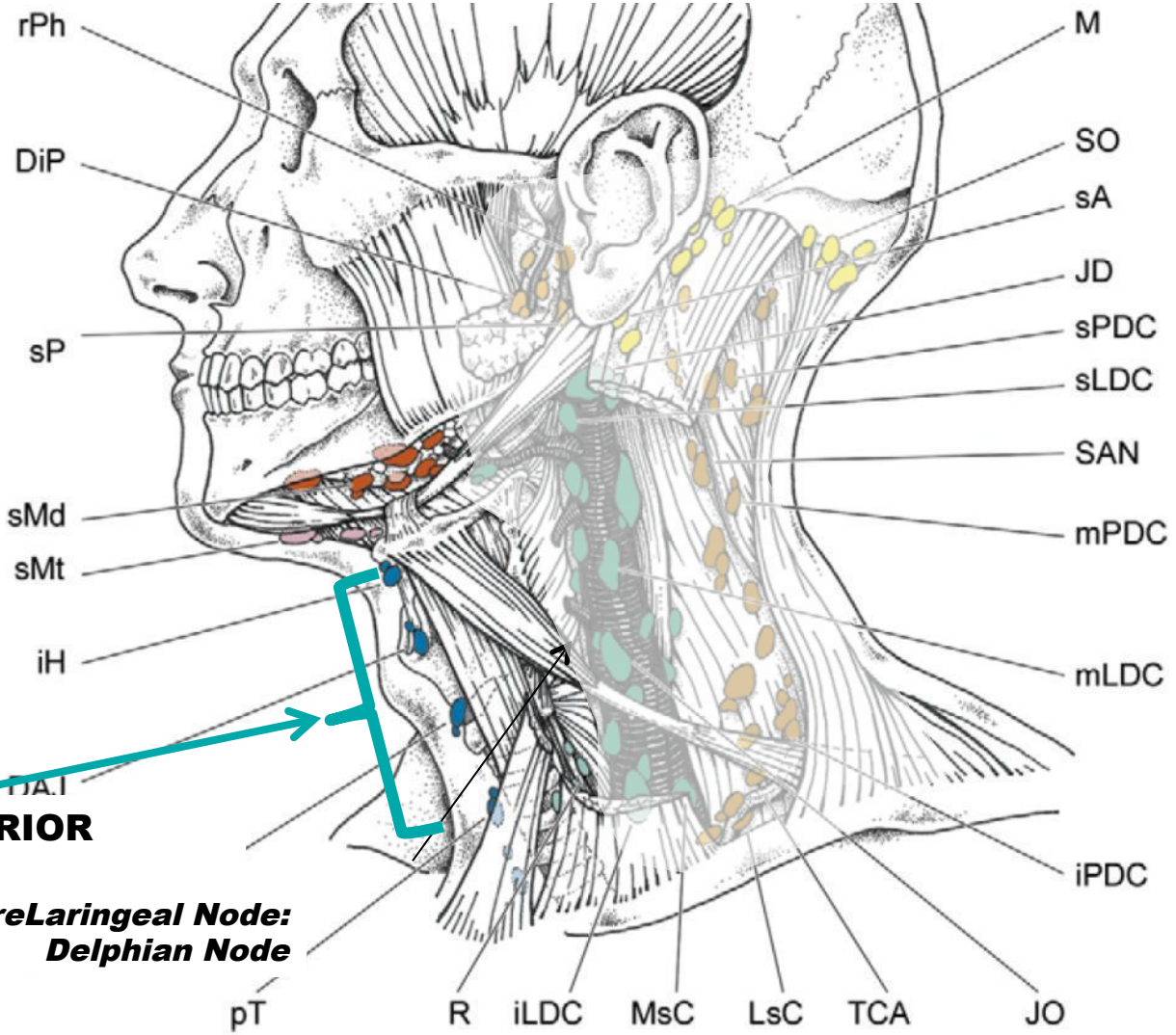
Descending *cervical* chains

- **Superficial**
  - **Lateral (external jugular chain)**
  - **Anterior**

- **Deep**
  - **Anterior and Recurrent chain**
  - **Lateral**
  - **Posterior**



The DEEP descending chains



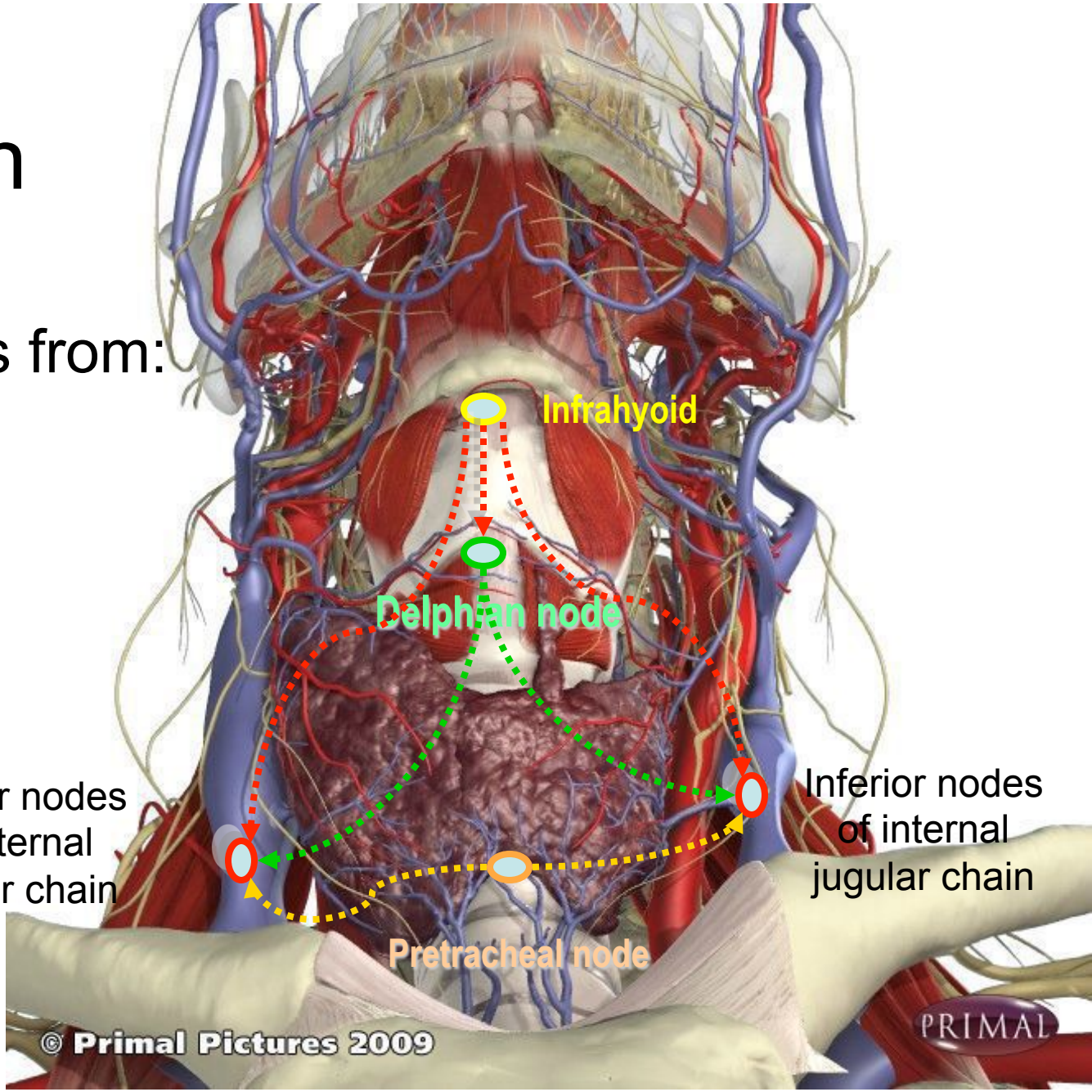
THE DEEP ANTERIOR jugular chain

PreLaringeal Node: Delphian Node

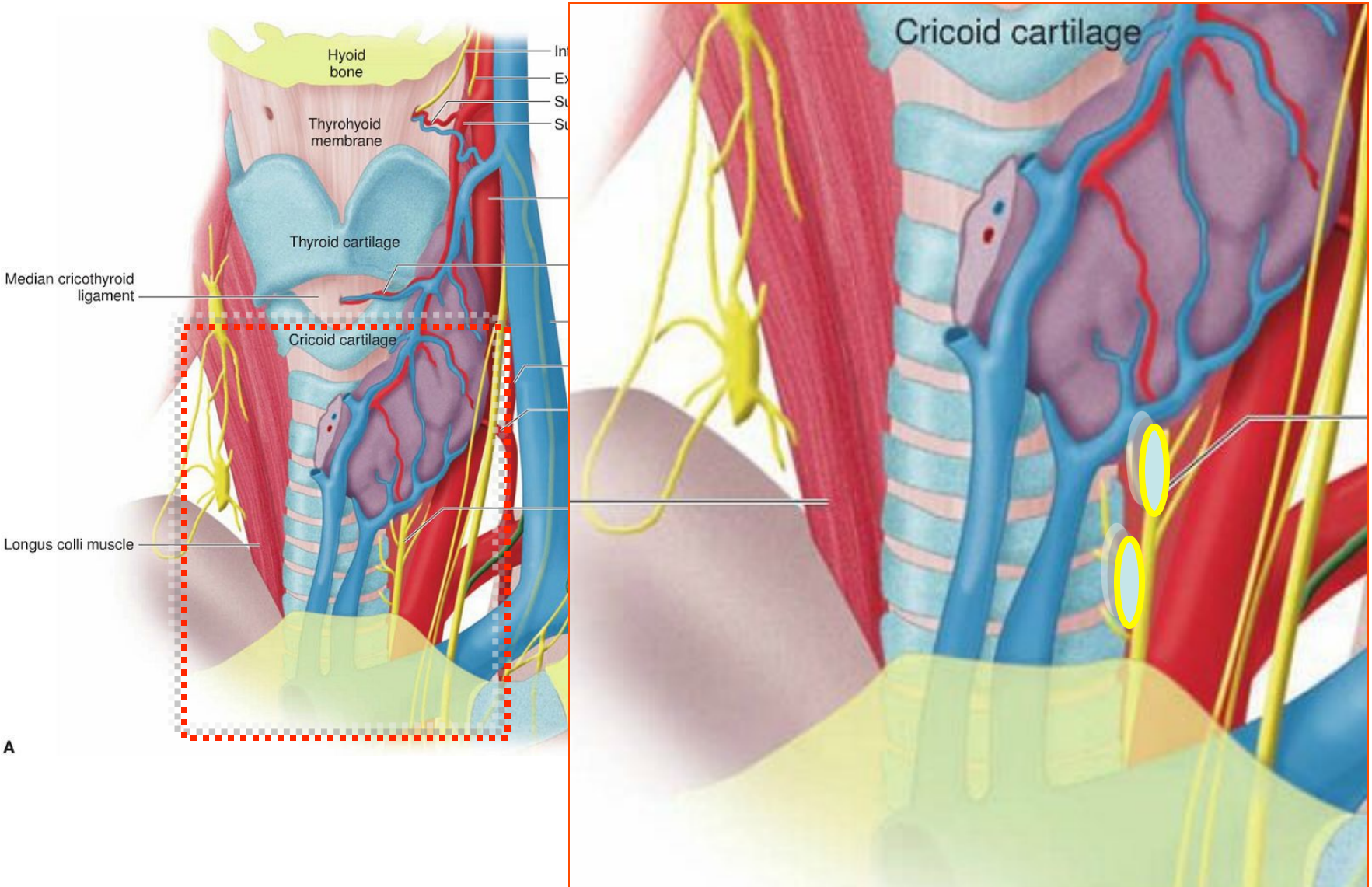
Anterior Deep Chain

Receive afferents from:

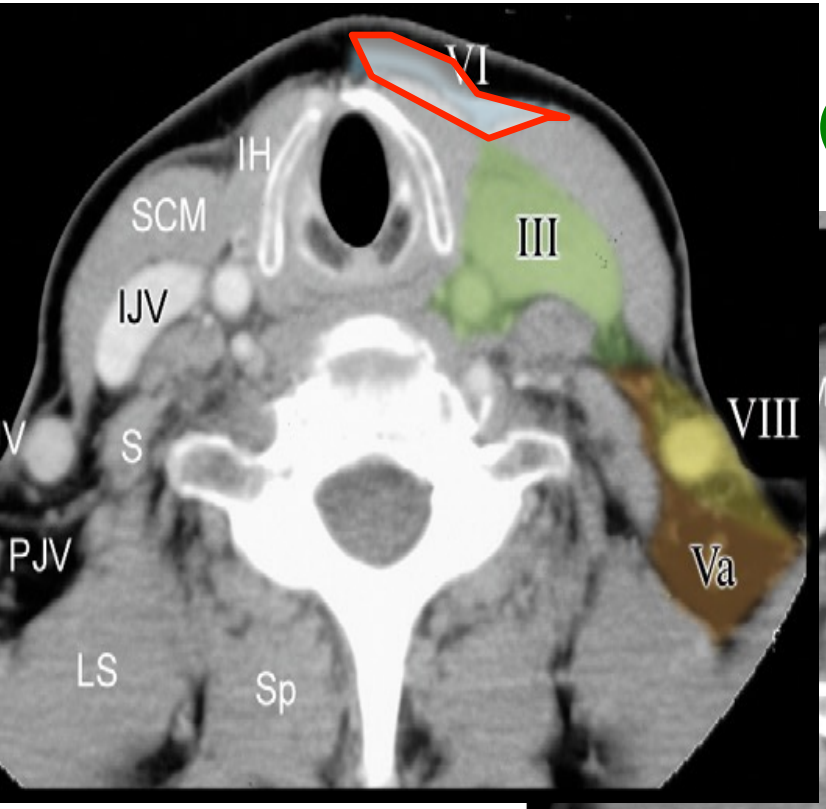
- Glottic
- Subglottic
- Hypopharynx
- Thyroid

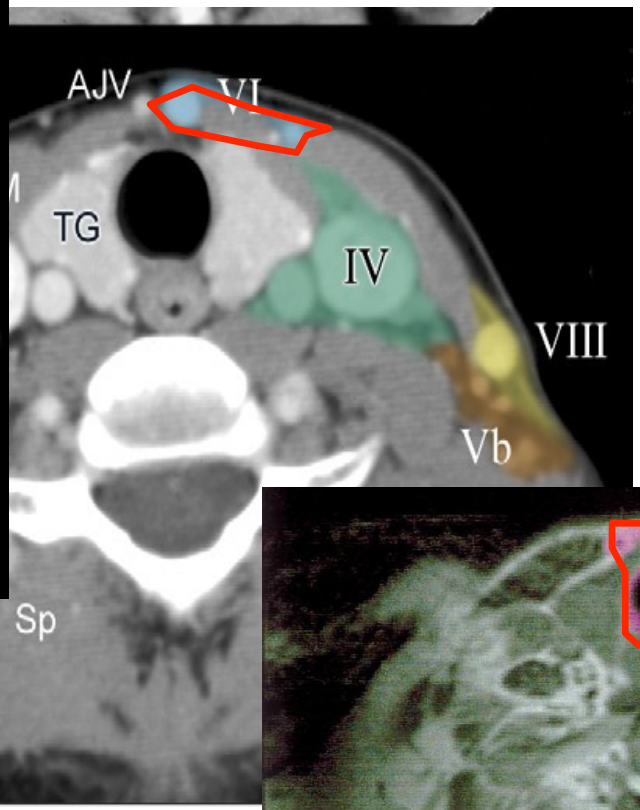


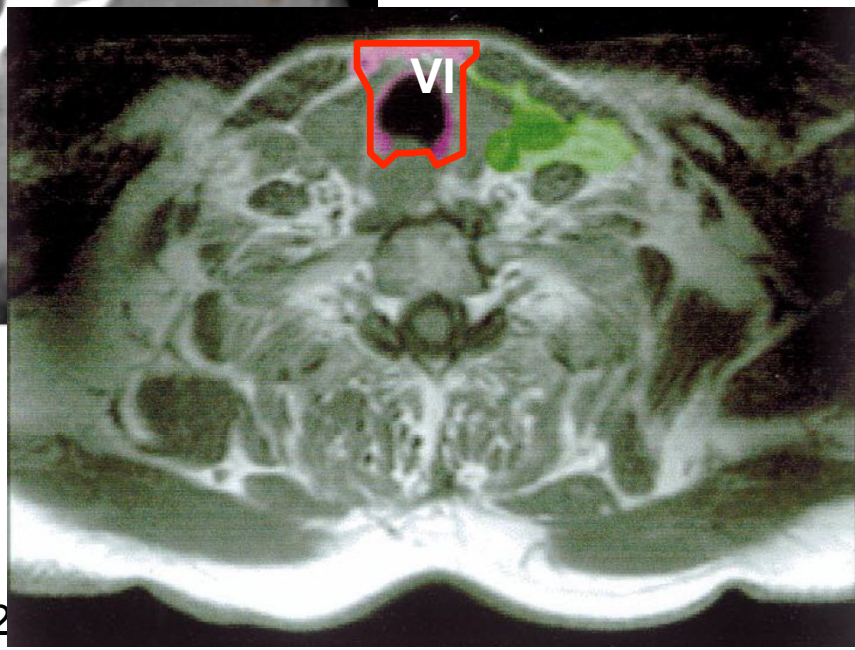
Recurrent chain



Deep (in visceral space) Anterior department (anterior cervical area and recurrent)



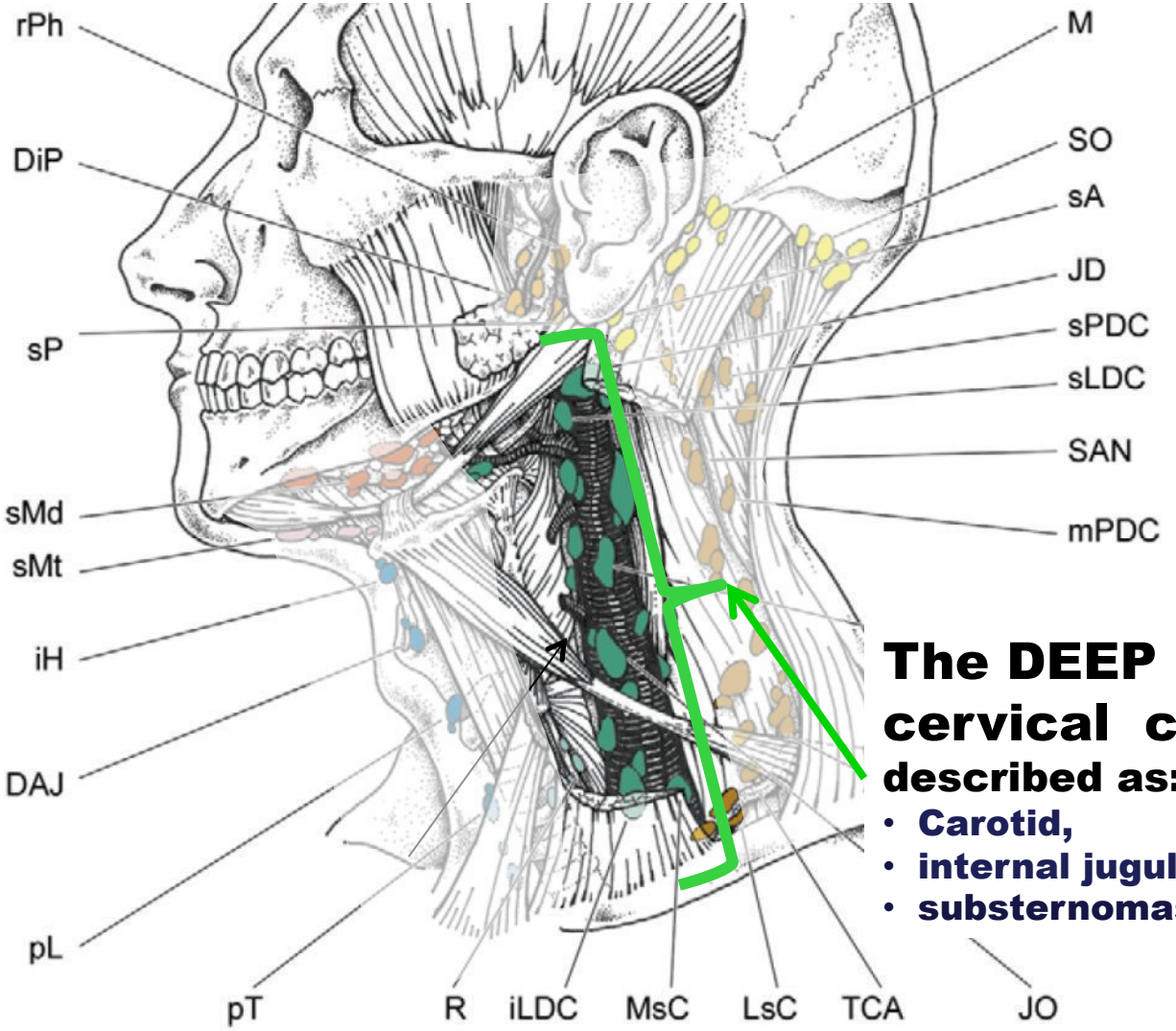




Laminar area

Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2

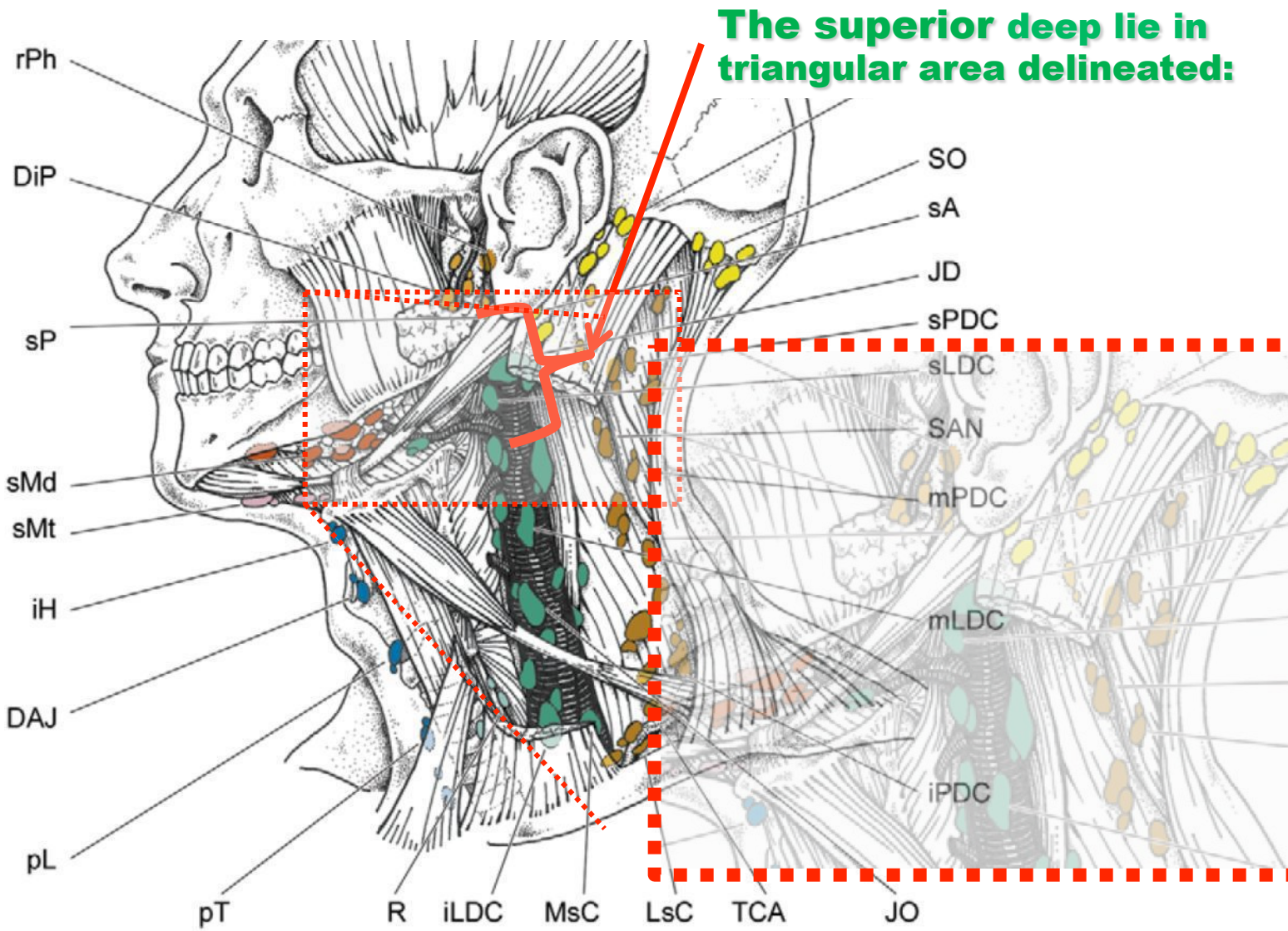
The DEEP descending chains



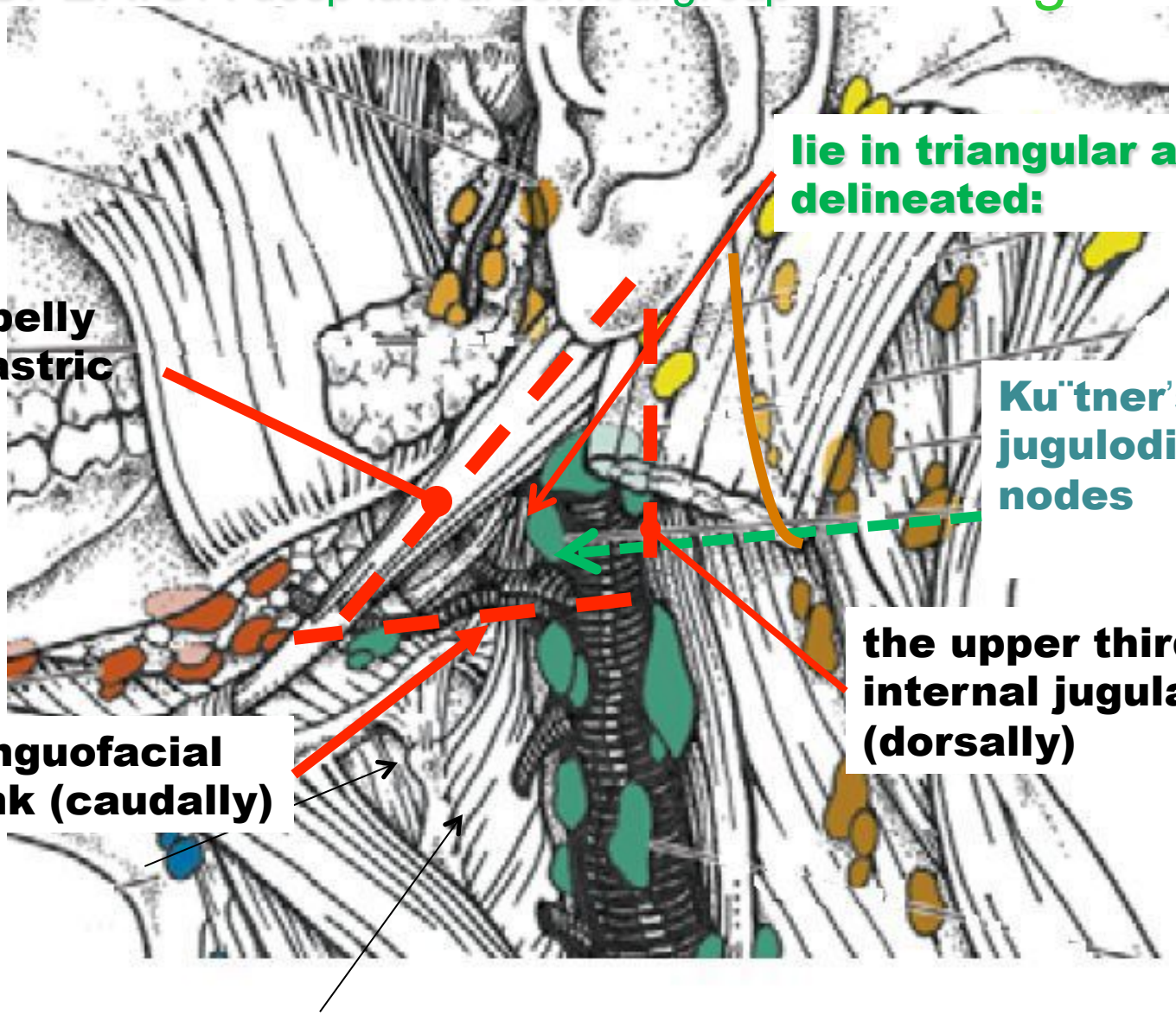
The DEEP LATERAL cervical chain described as:

- **Carotid,**
- **internal jugular or**
- **substernomastoid chain**

The SUPERIOR deep lateral cervical chain or subdigastric



The SUPERIOR deep lateral cervical group or subdigastric



lie in triangular area delineated:

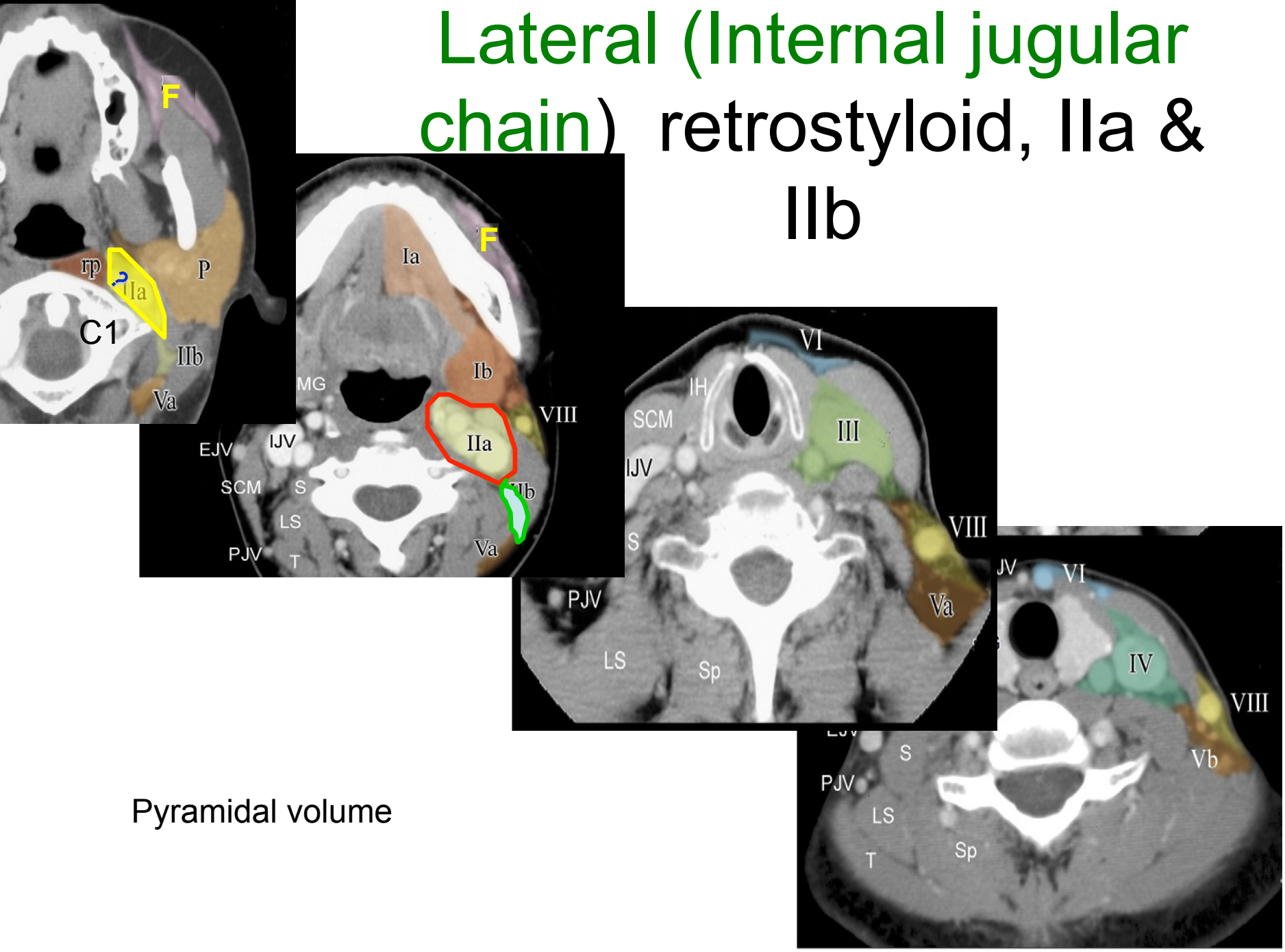
Posterior belly of the digastric muscle (cranially)

Ku¨tner's jugulodigastric nodes

the upper third of the internal jugular vein (dorsally)

The thyrolinguofacial venous trunk (caudally)

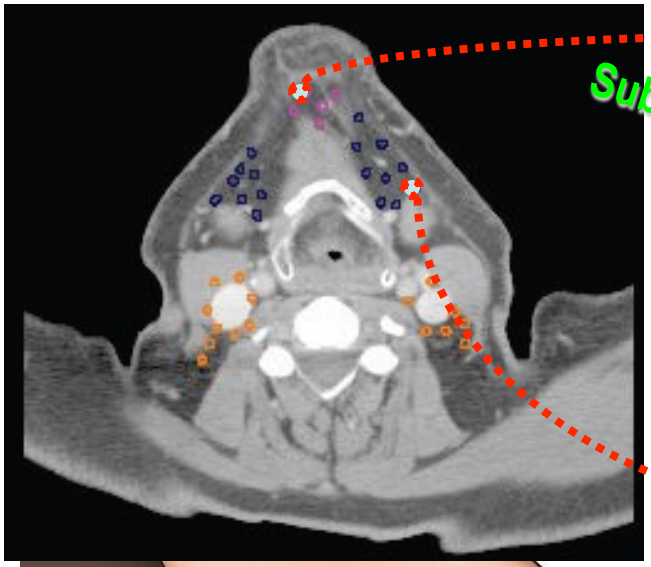
Lateral (Internal jugular chain) retrostyloid, IIa & IIb

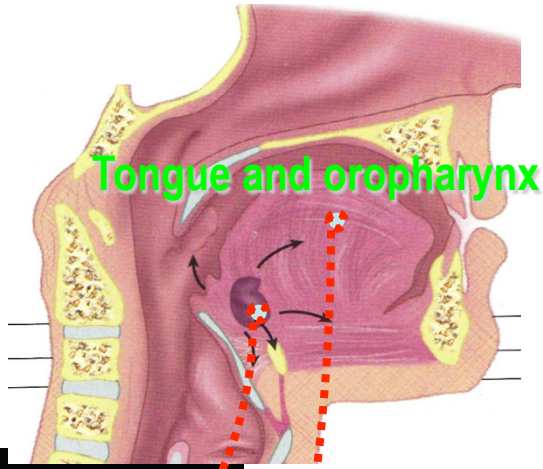


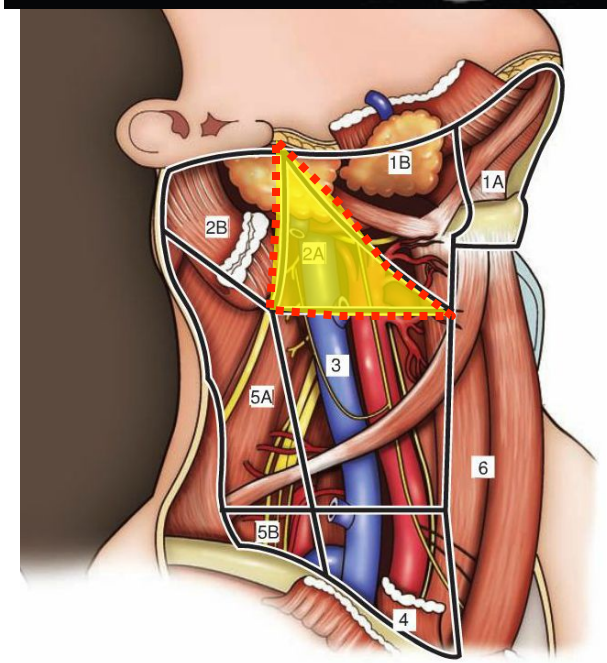
Pyramidal volume

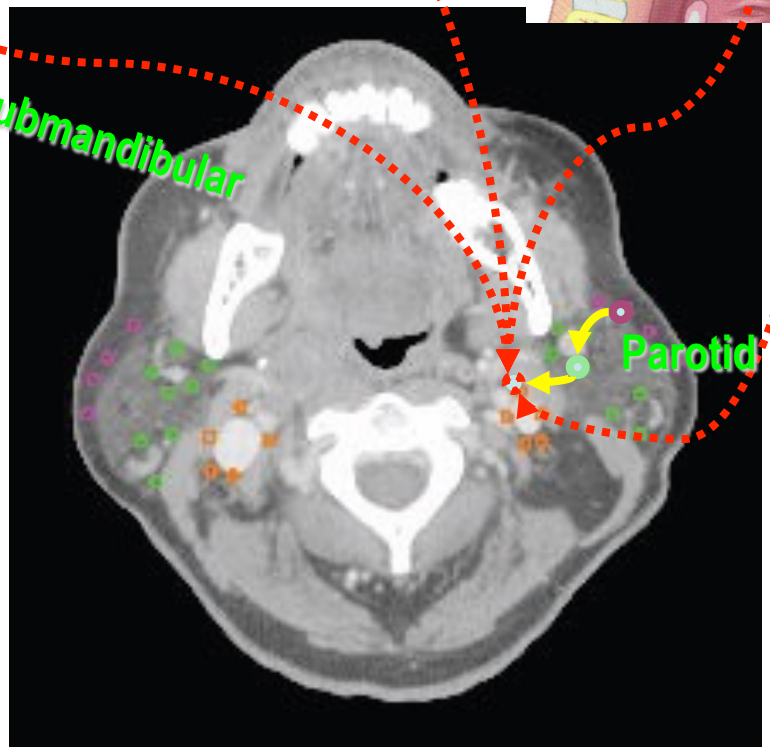
Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

Superior deep lateral cervical IIa

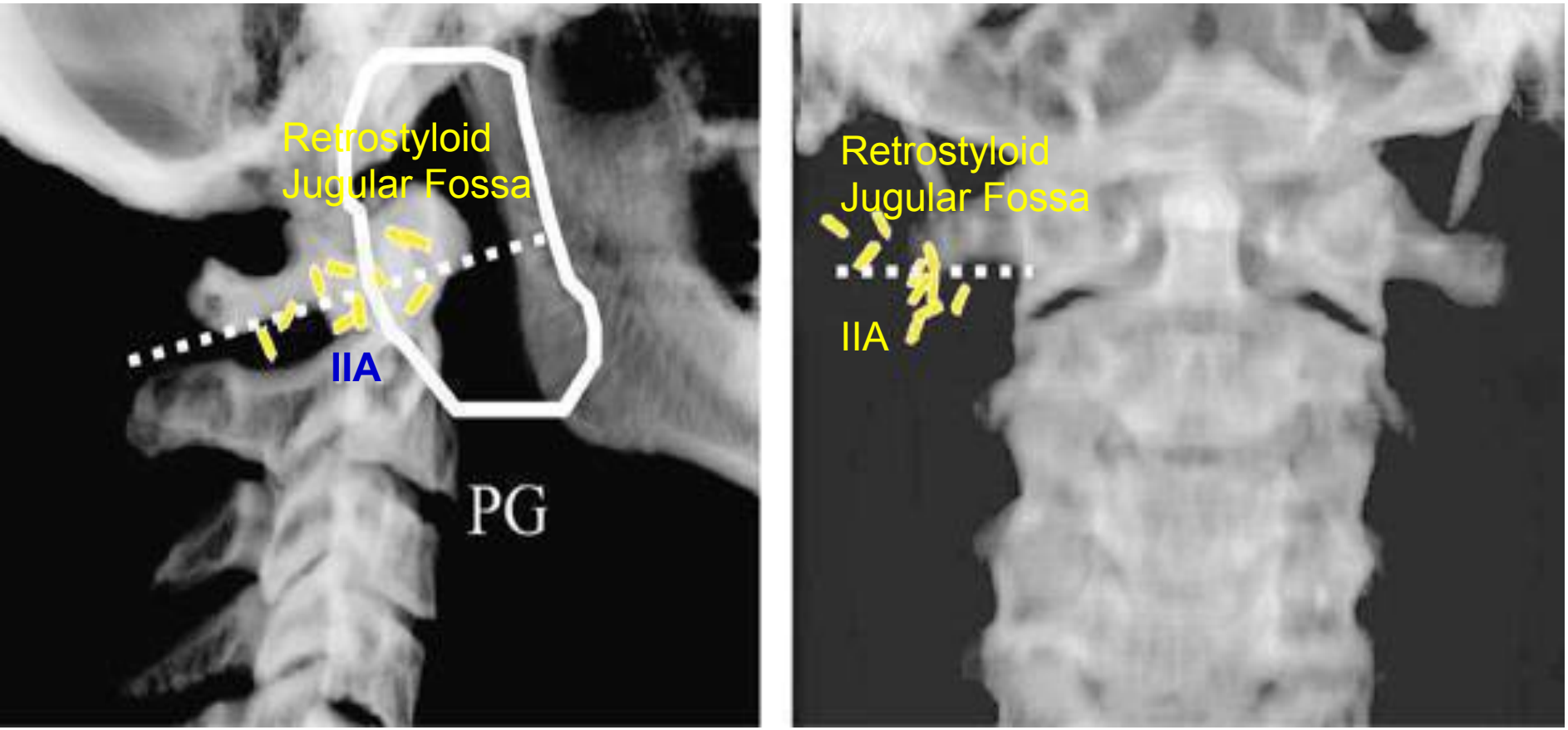








Superior limit of surgical field IIa (C1 → no skull base)



- Projection of clips (anteroposterior and lateral x-ray films) placed intraoperatively at cranial border node-negative neck. Clips cluster around caudal border transverse process corpus vertebra C1. See also the projection of circumference of parotid gland (PG) as determined by computed tomography.

Levendag Gregoire IJROBP 2005

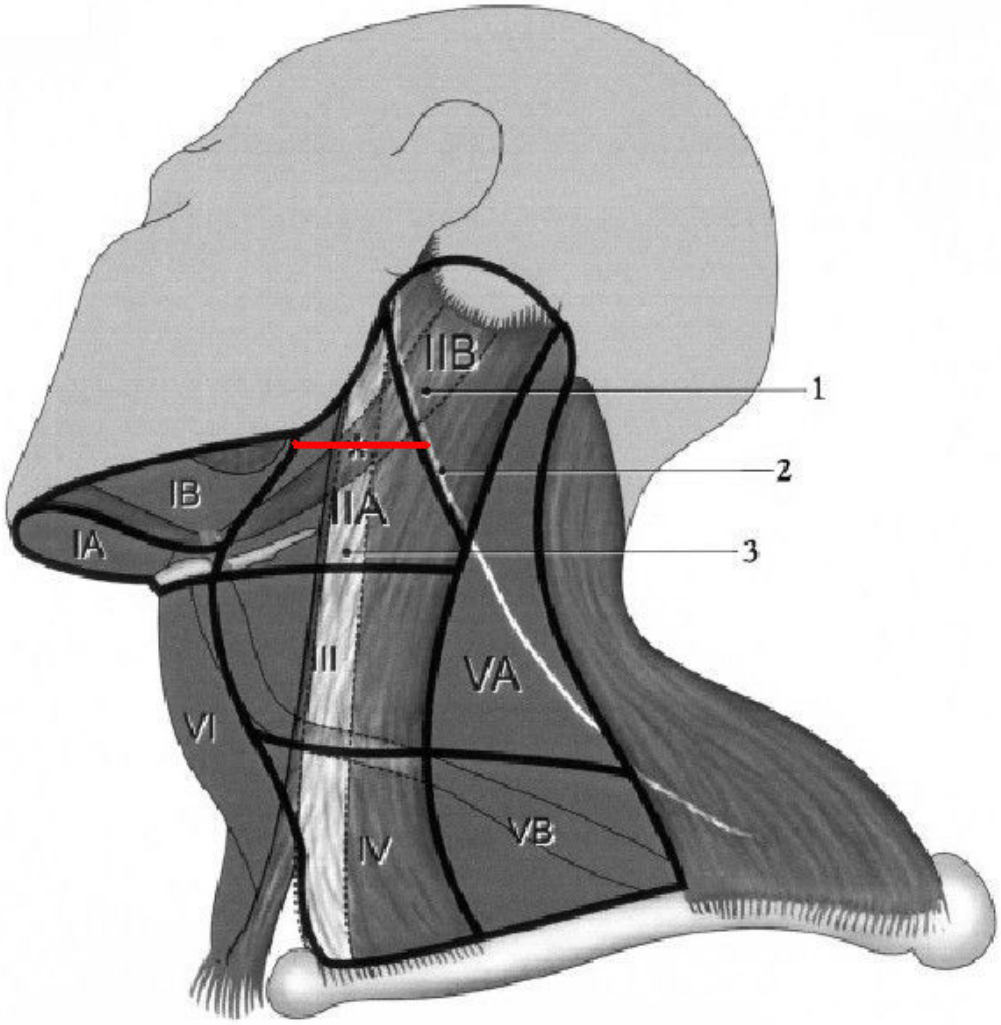
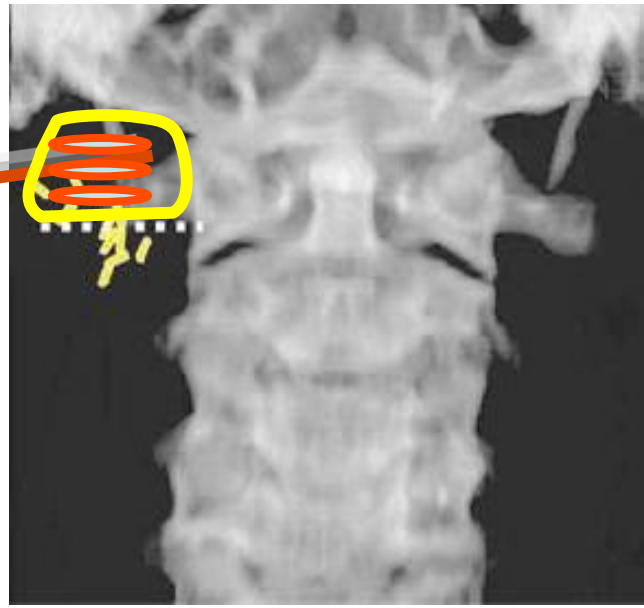


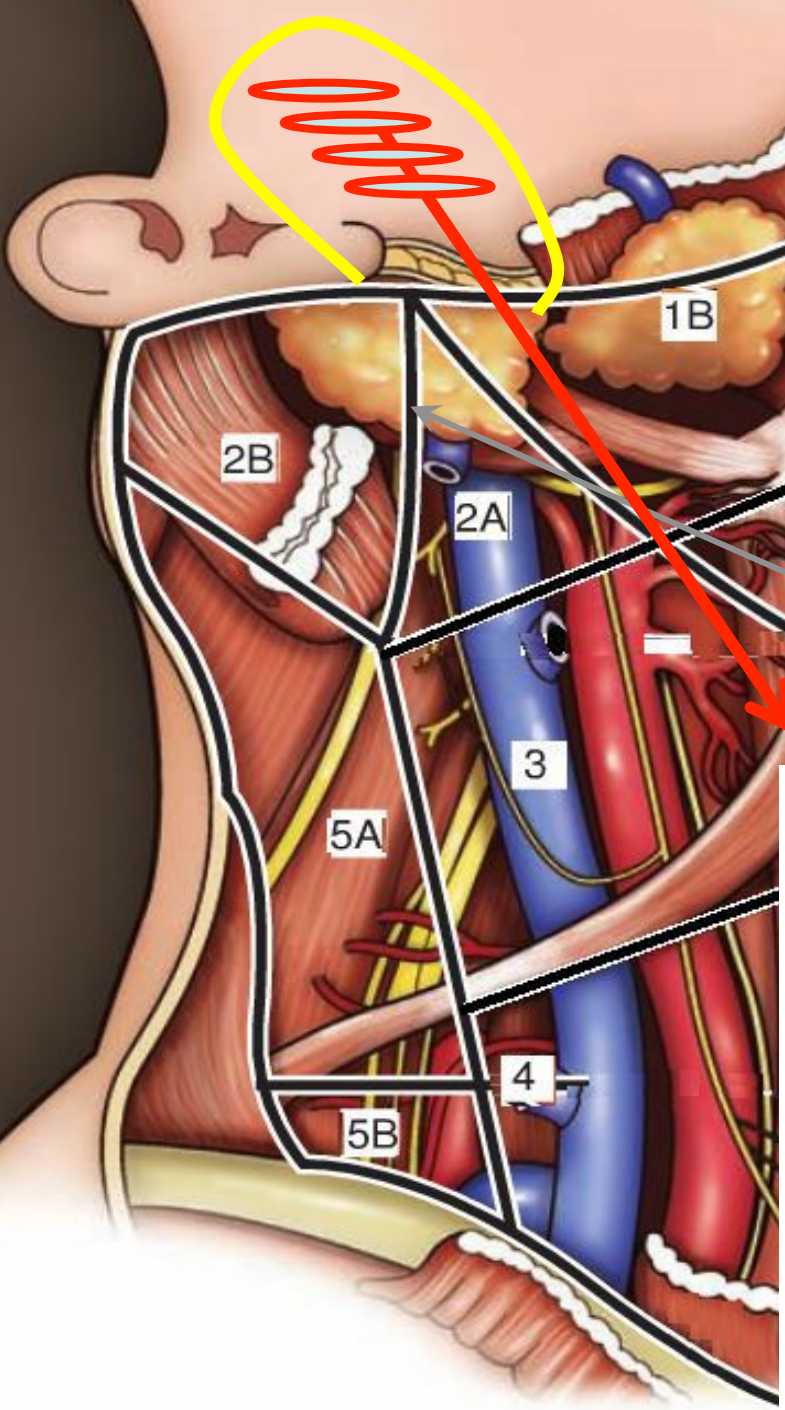
Fig. 4. Neck nodal levels (after Robbins *et al.* [19]). Asterisk denotes crossing of jugular vein by posterior belly of digastric muscle, marking cranial-most CT image at which Level II nodal CTV delineated in contralateral side of neck. It excluded uppermost part of sublevel IIA and most of IIB. 1, posterior belly of digastric muscle; 2, spinal accessory nerve; 3, internal jugular vein.

The red line denotes crossing of jugular vein by posterior belly digastric muscle. This crossing, visible on CT esclude uppermost part of sublevel IIA, called retrostyloid space, from irradiation

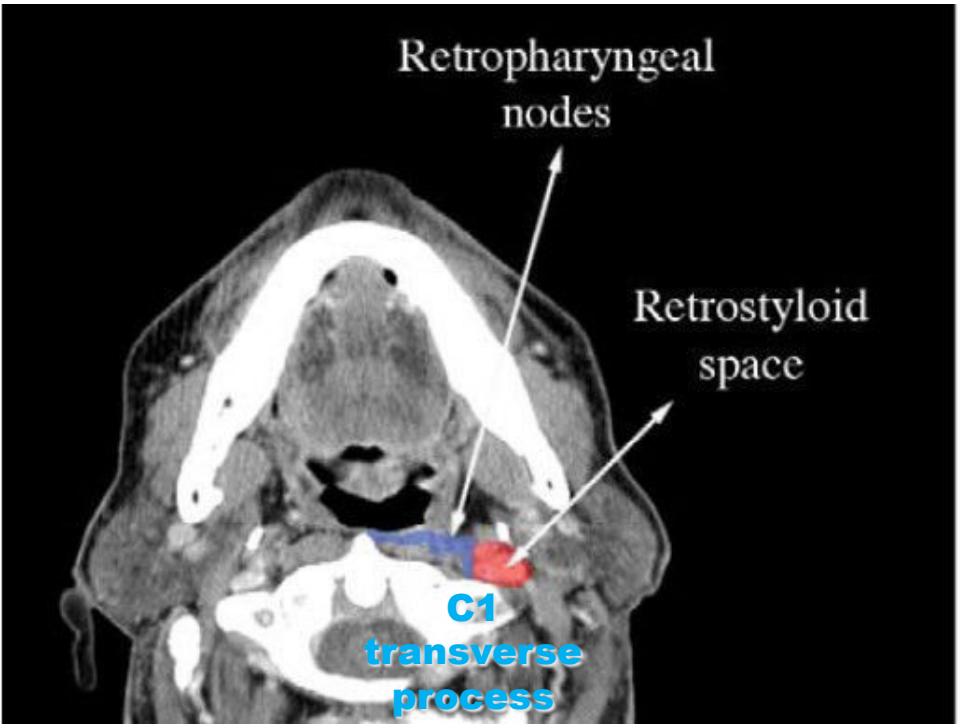
On CT or MRI, as the visualization of the posterior belly of the digastric muscle is not always easy, the caudal edge of the lateral process of C1 is recommended to define the upper limit of level II

Retrostyloid space
C1
If N+ IIa e IIb





In case of involvement of upper level II (IIa or IIb) with one or more lymph nodes, it is recommended to extend the upper border of level II to include the retrostyloid space up to the base of skull



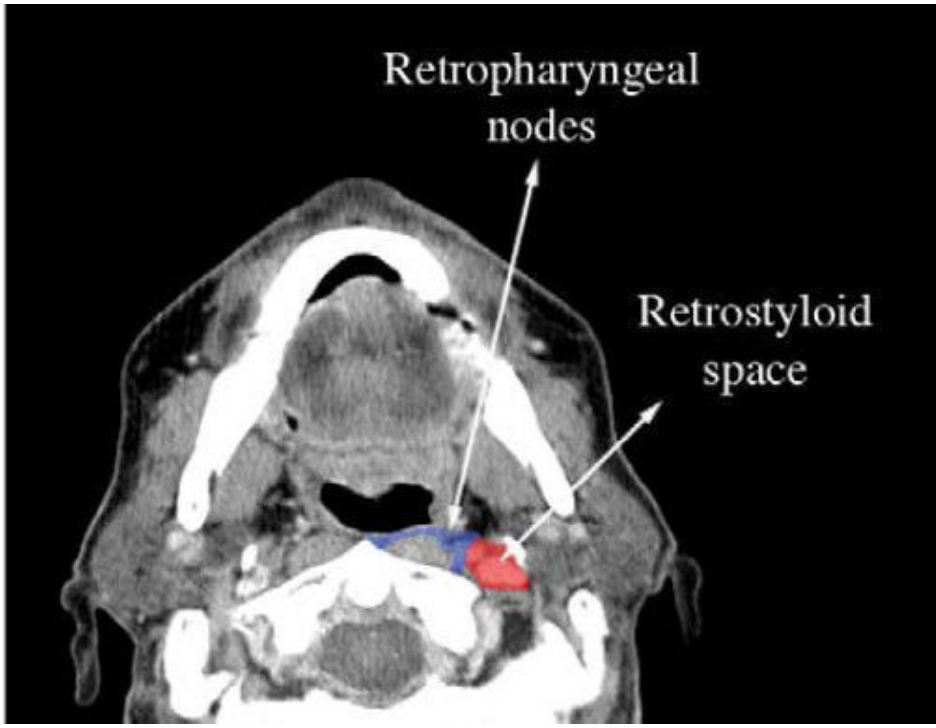
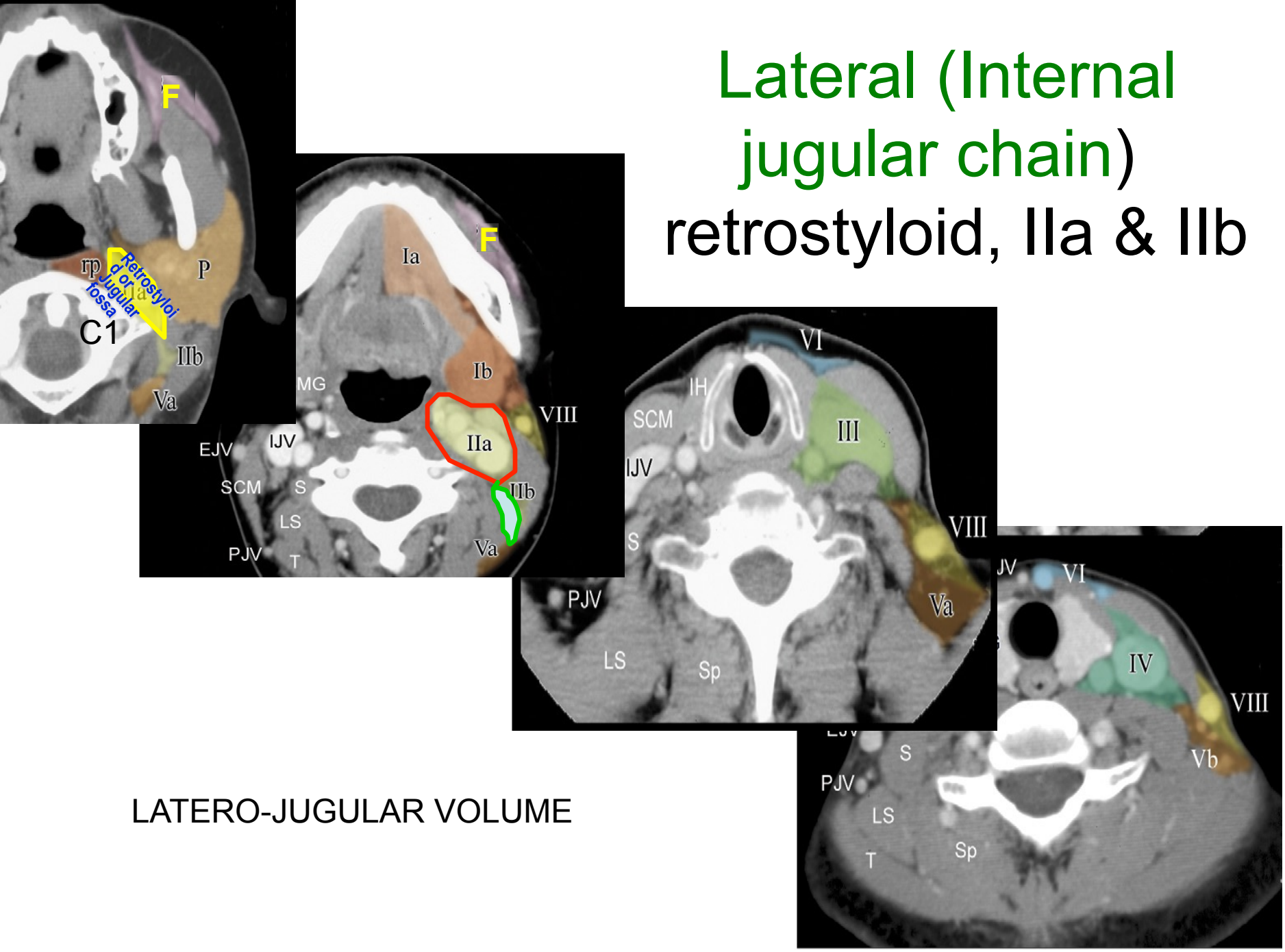


Table 1

Space	Cranial	Caudal	Anterior	Posterior	Lateral	Medial
Retrostyloid	Base of skull (jugular foramen)	Upper limit of level II	Parapharyngeal space	Vertebral body/ base of skull	Parotid space	Lateral edge of RP nodes

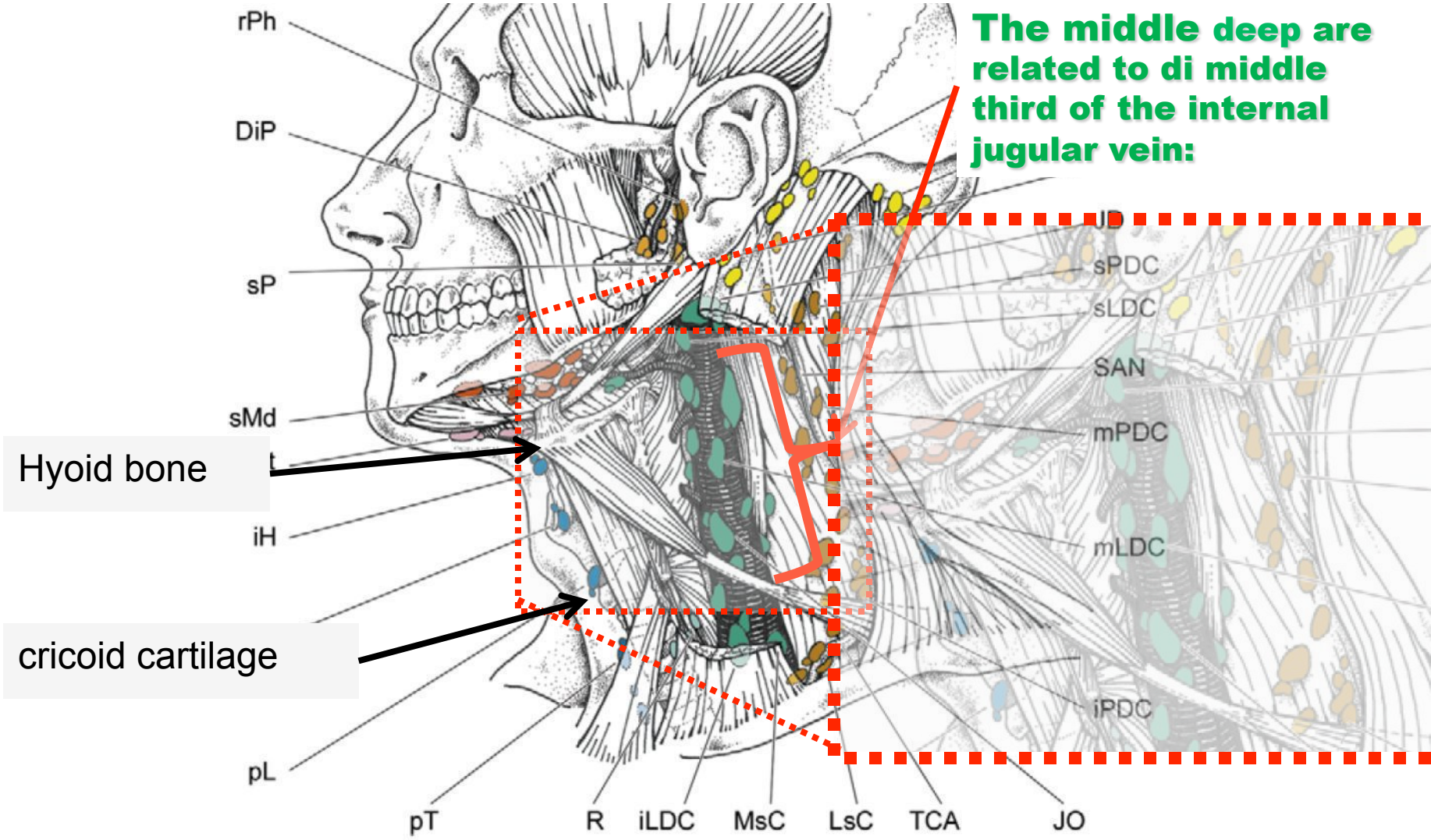
Lateral (Internal jugular chain) retrostyloid, IIa & IIb



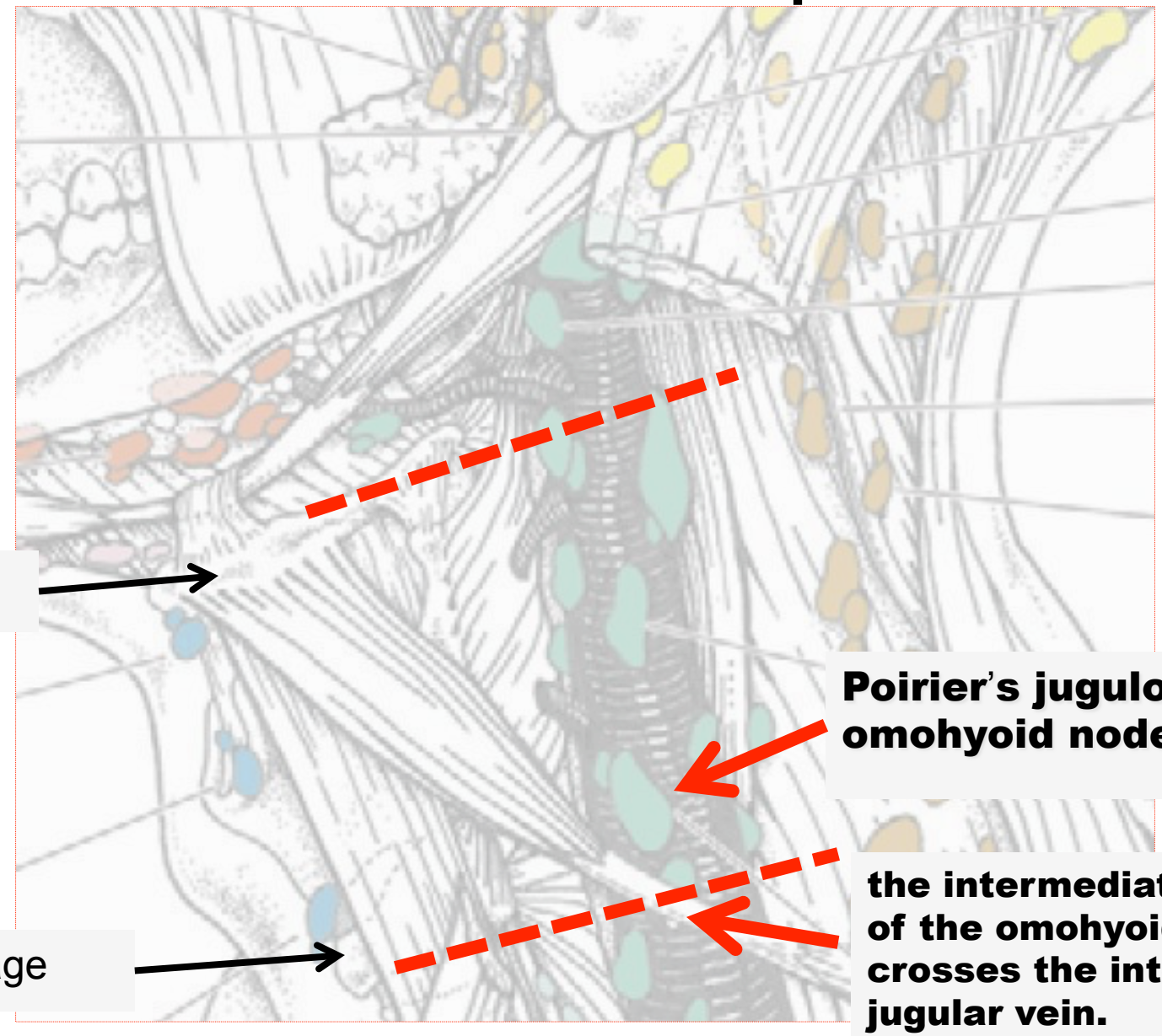
LATERO-JUGULAR VOLUME

Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

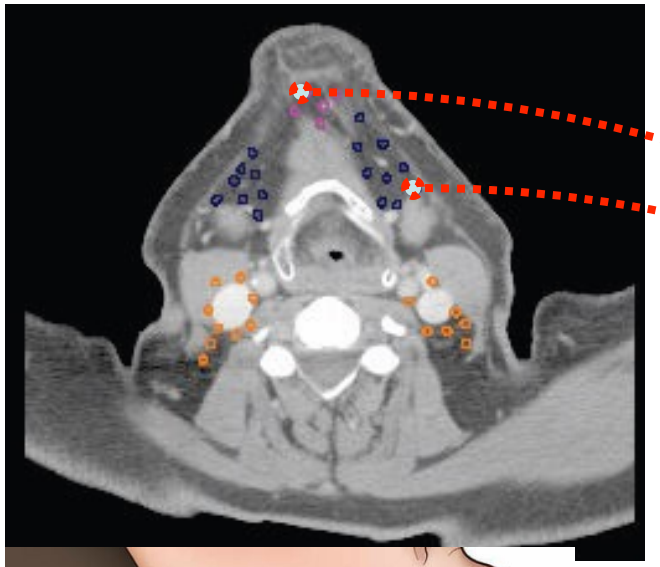
The MIDDLE deep lateral cervical chain



The deep lateral cervical chain: The middle deep

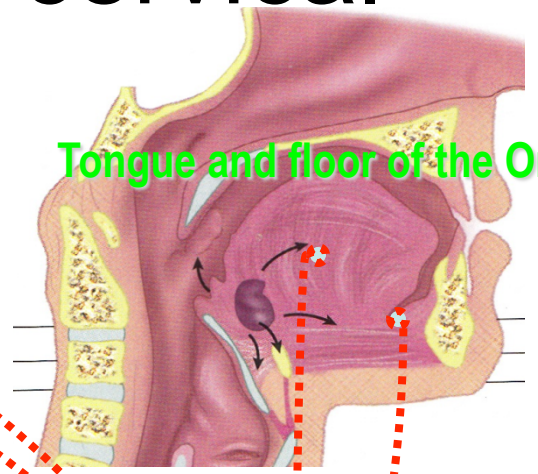


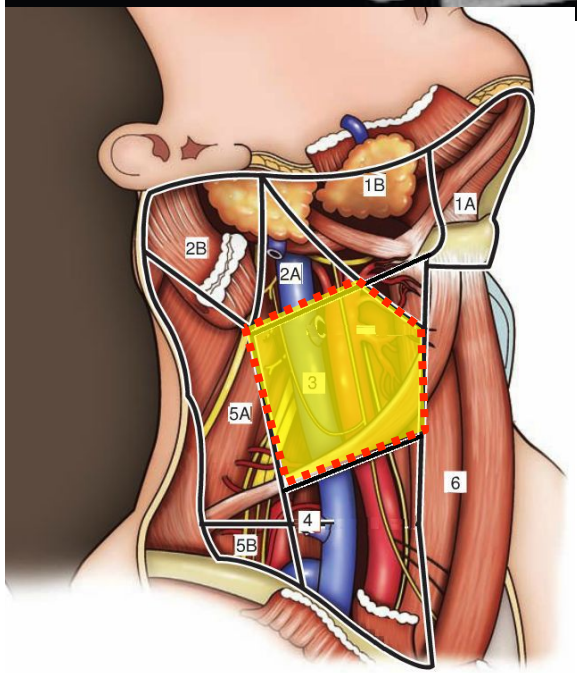
Middle deep lateral cervical III

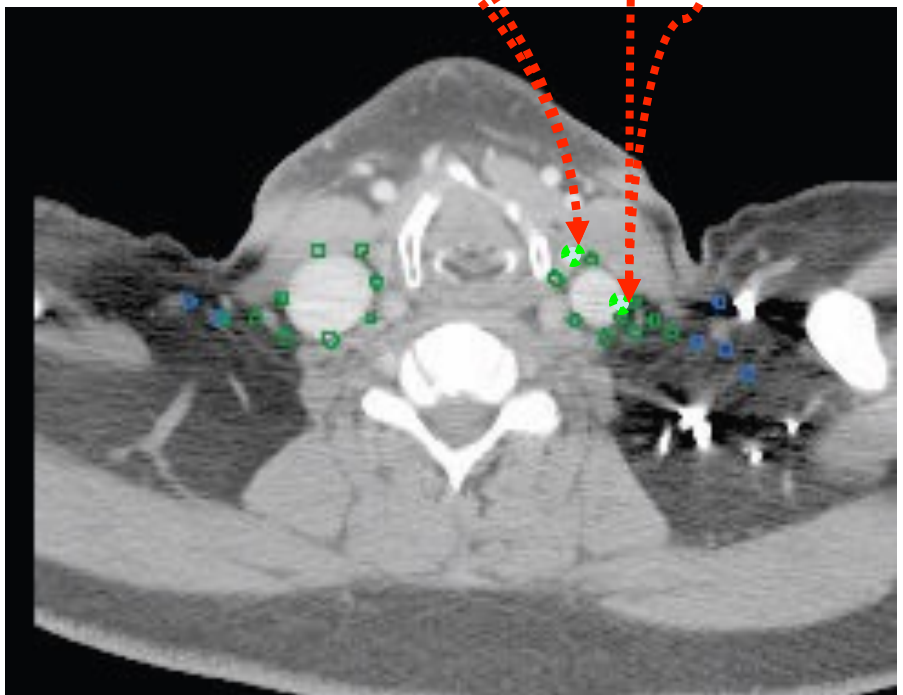


Submental

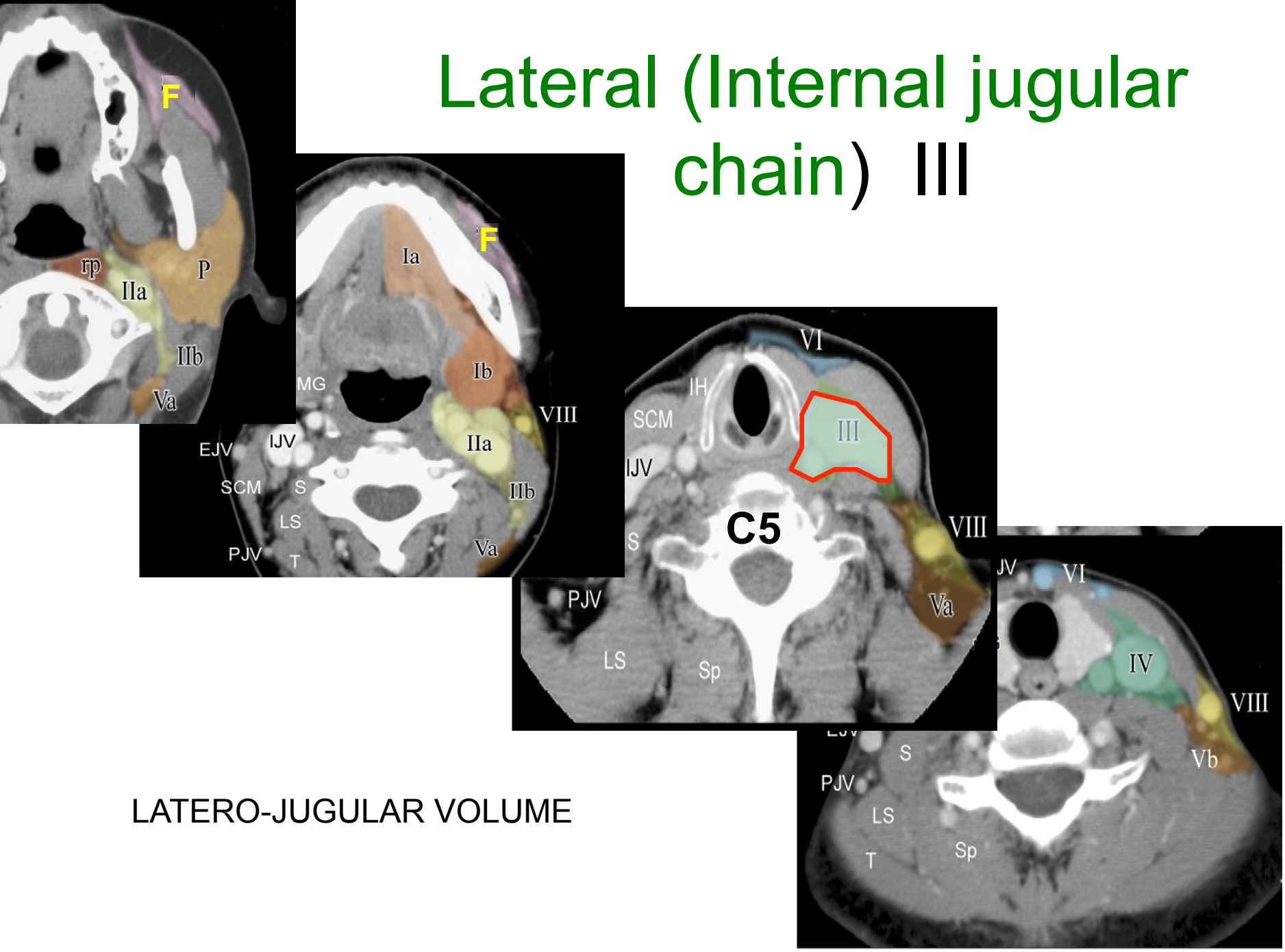
Submandibular







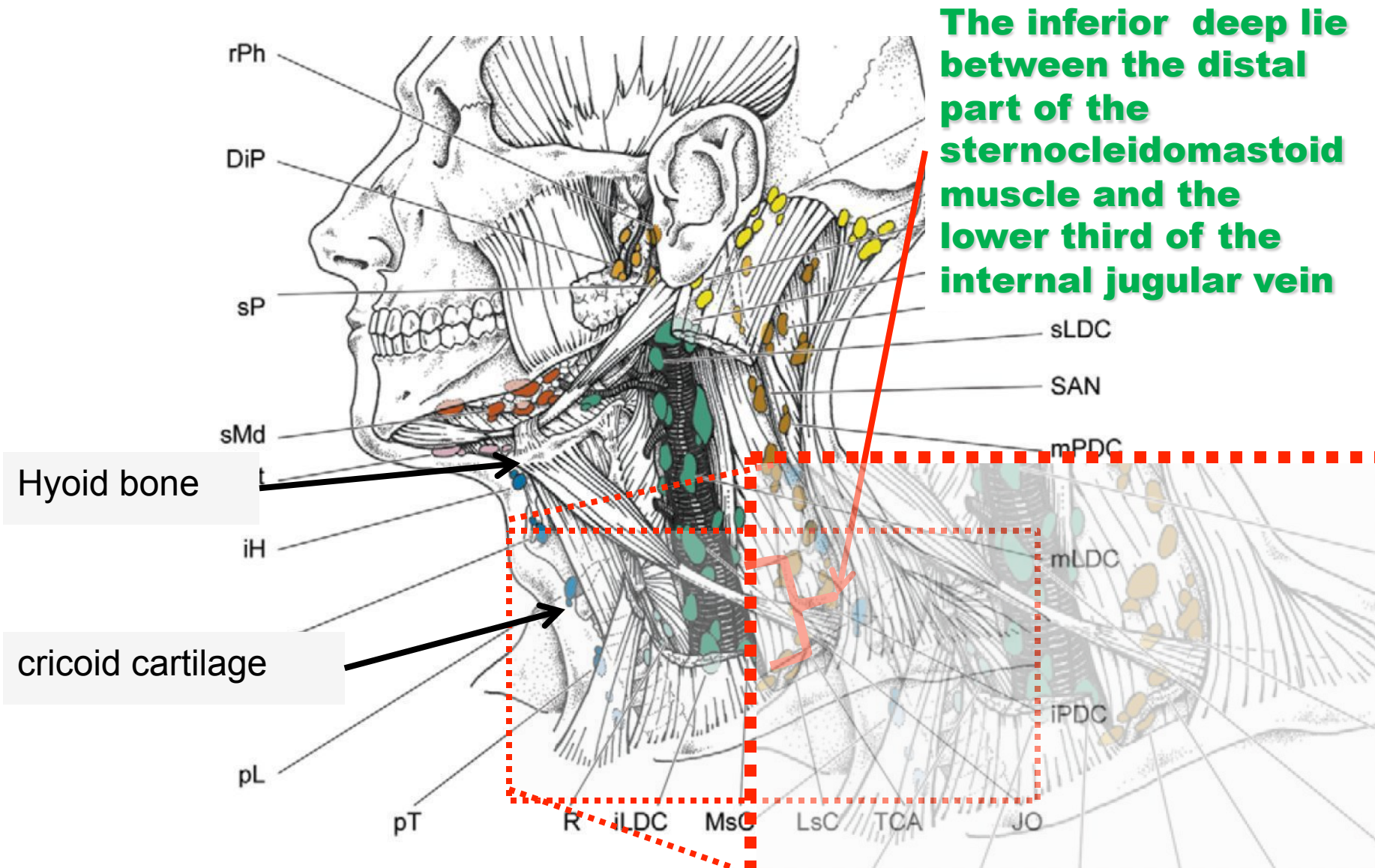
Lateral (Internal jugular chain) III



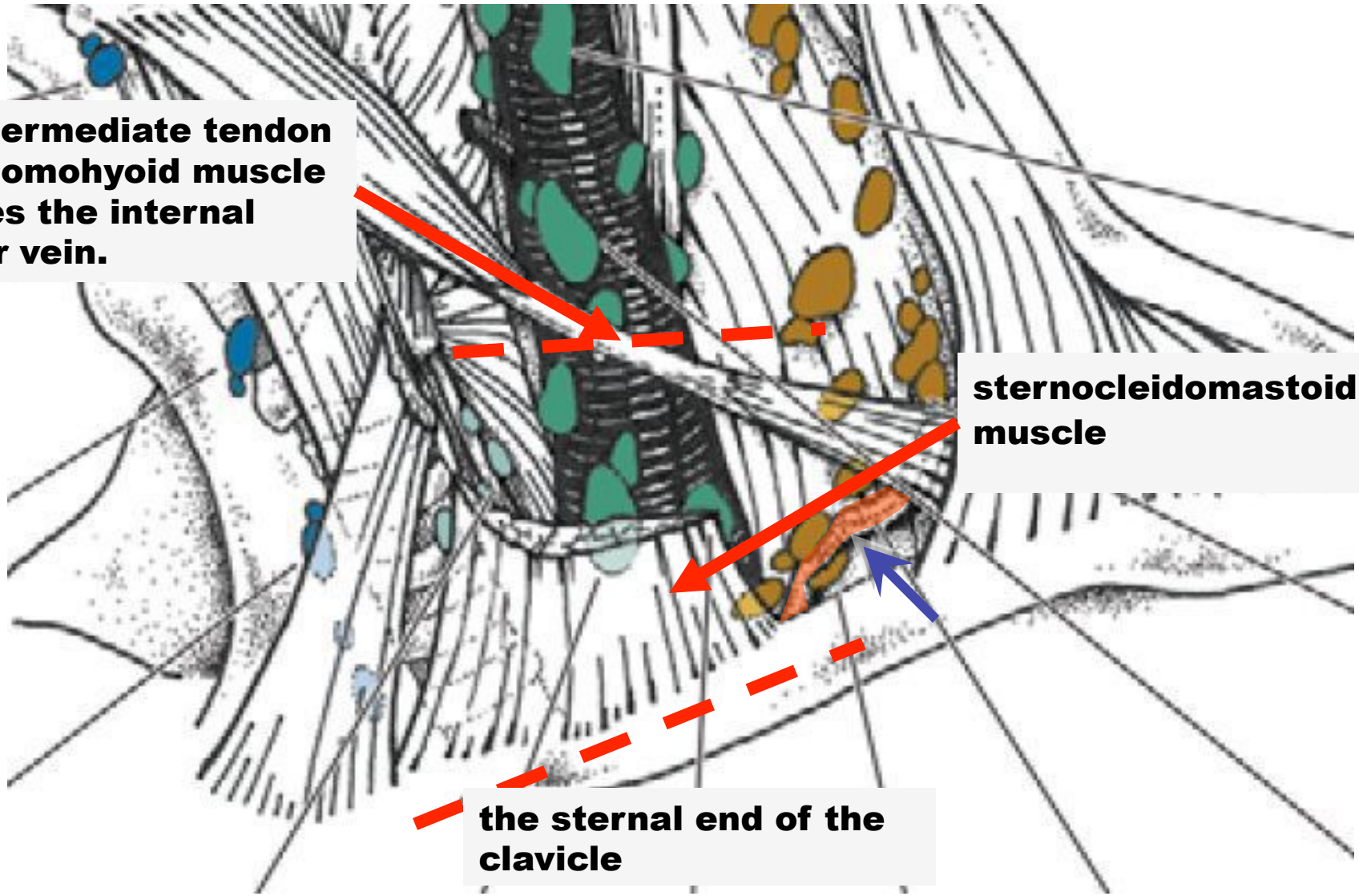
LATERO-JUGULAR VOLUME

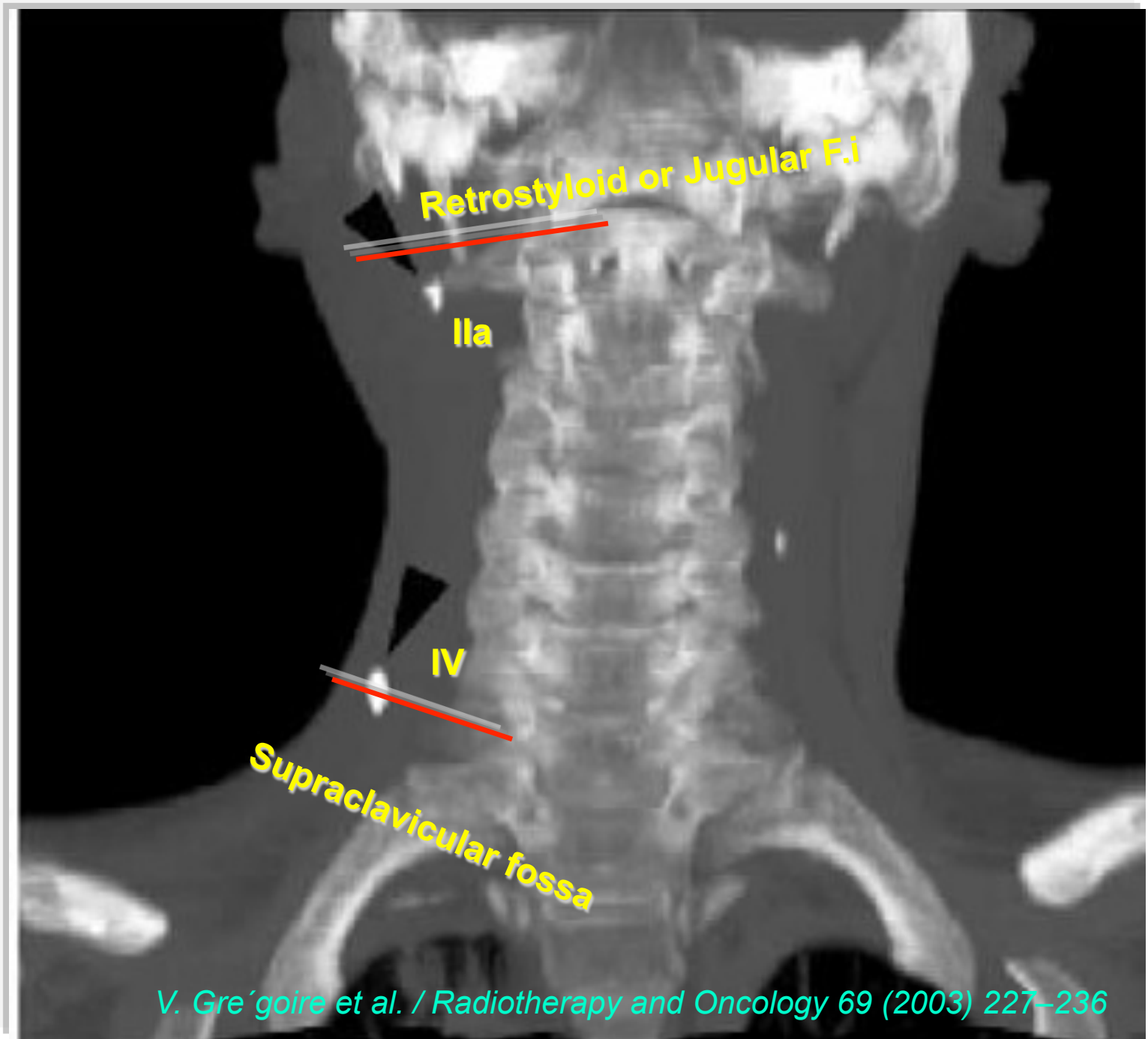
Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

The INFERIOR deep lateral cervical chain (IV)



The inferior deep lie between the distal part of the sternocleidomastoid muscle and the lower third of the internal jugular vein


the intermediate tendon of the omohyoid muscle crosses the internal jugular vein.
sternocleidomastoid muscle
the sternal end of the clavicle



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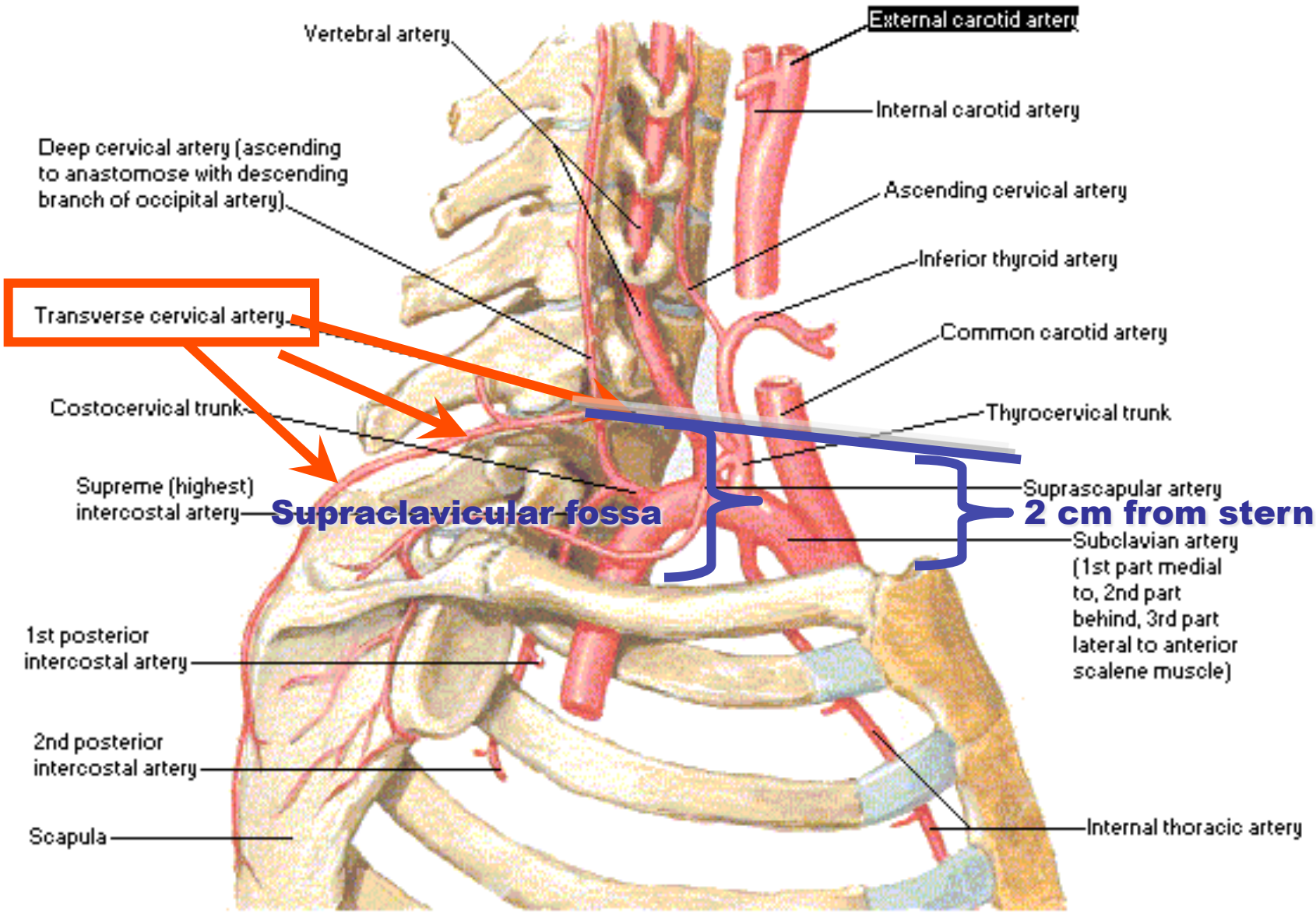
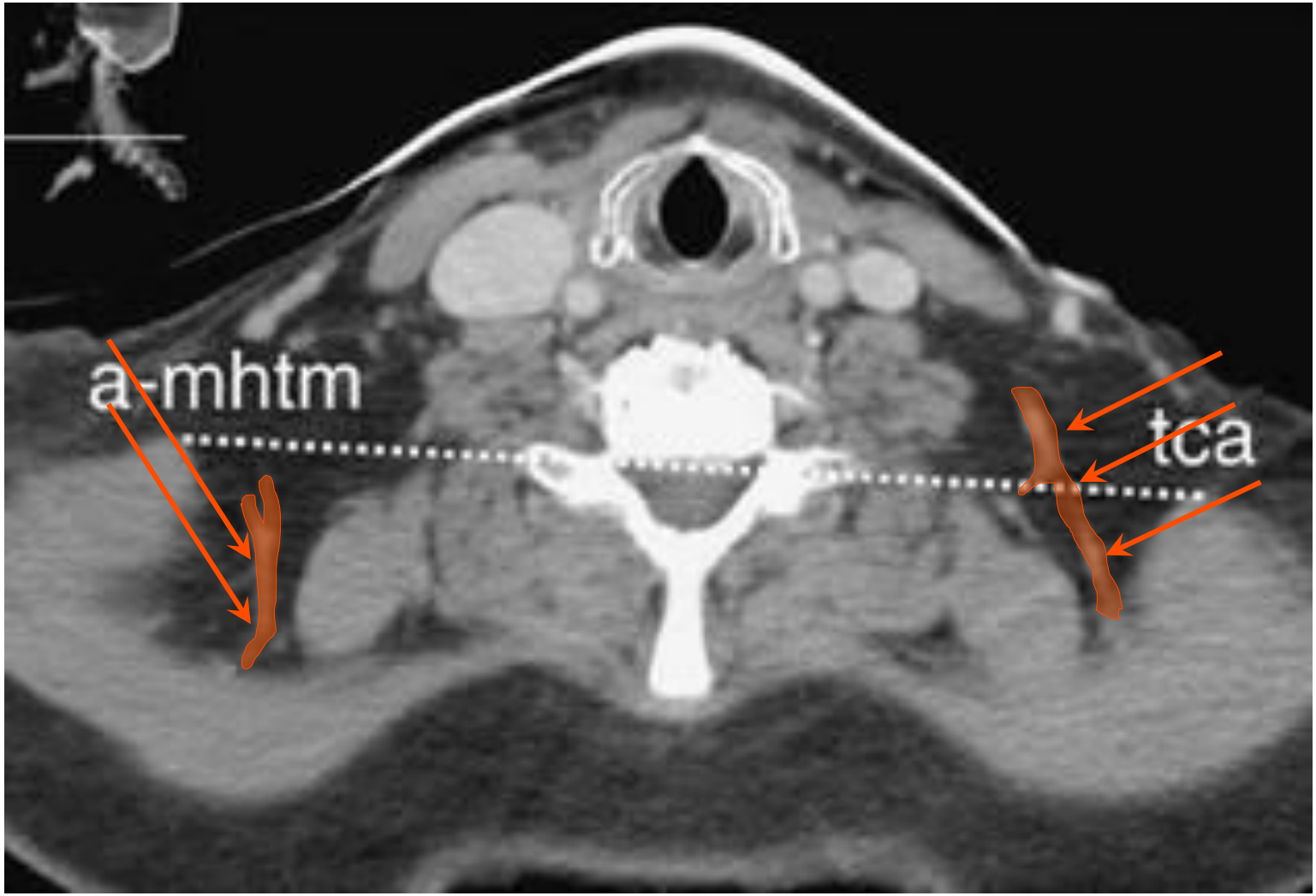
Subclavian Artery

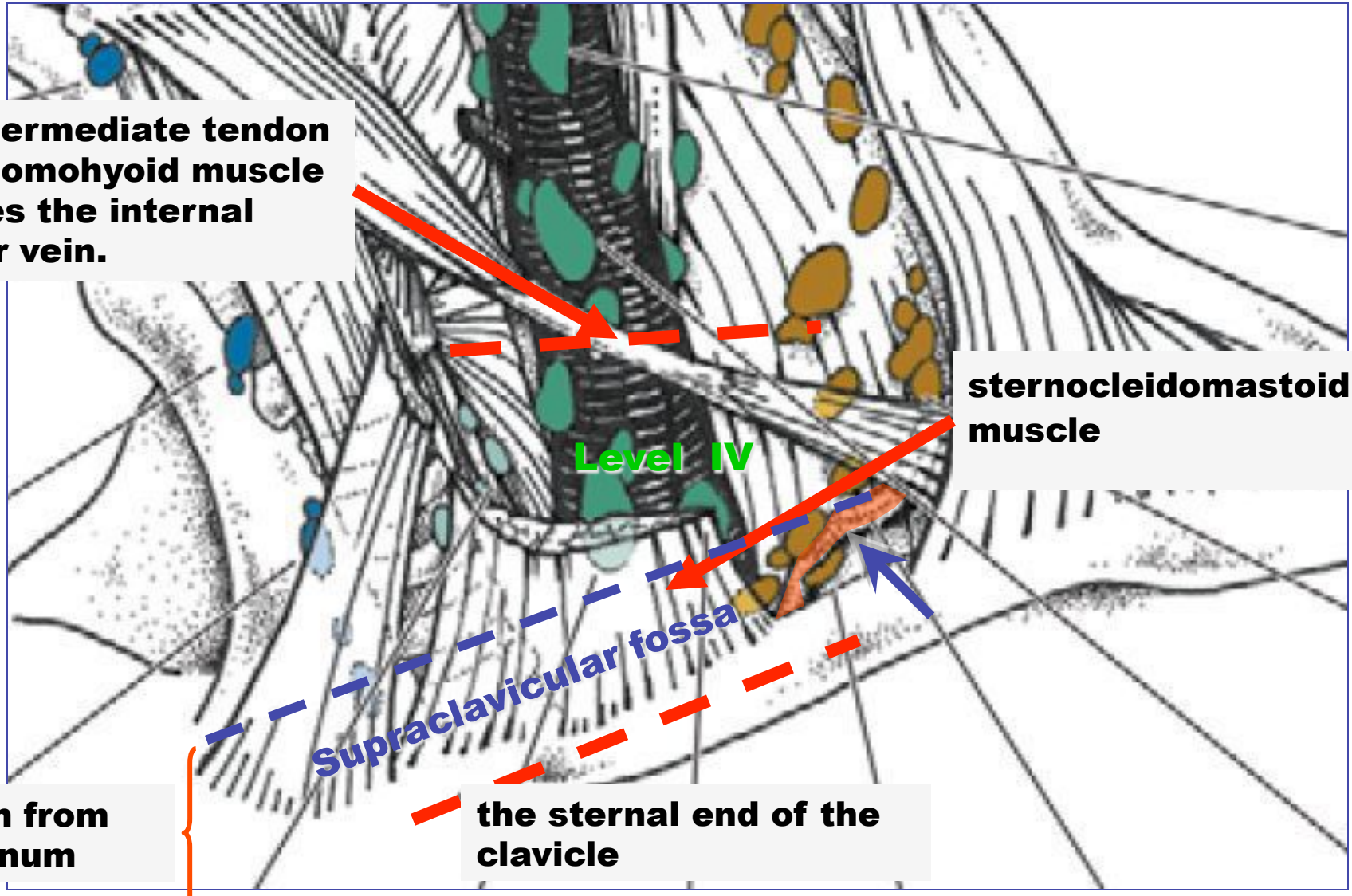
Right Lateral Schematic View



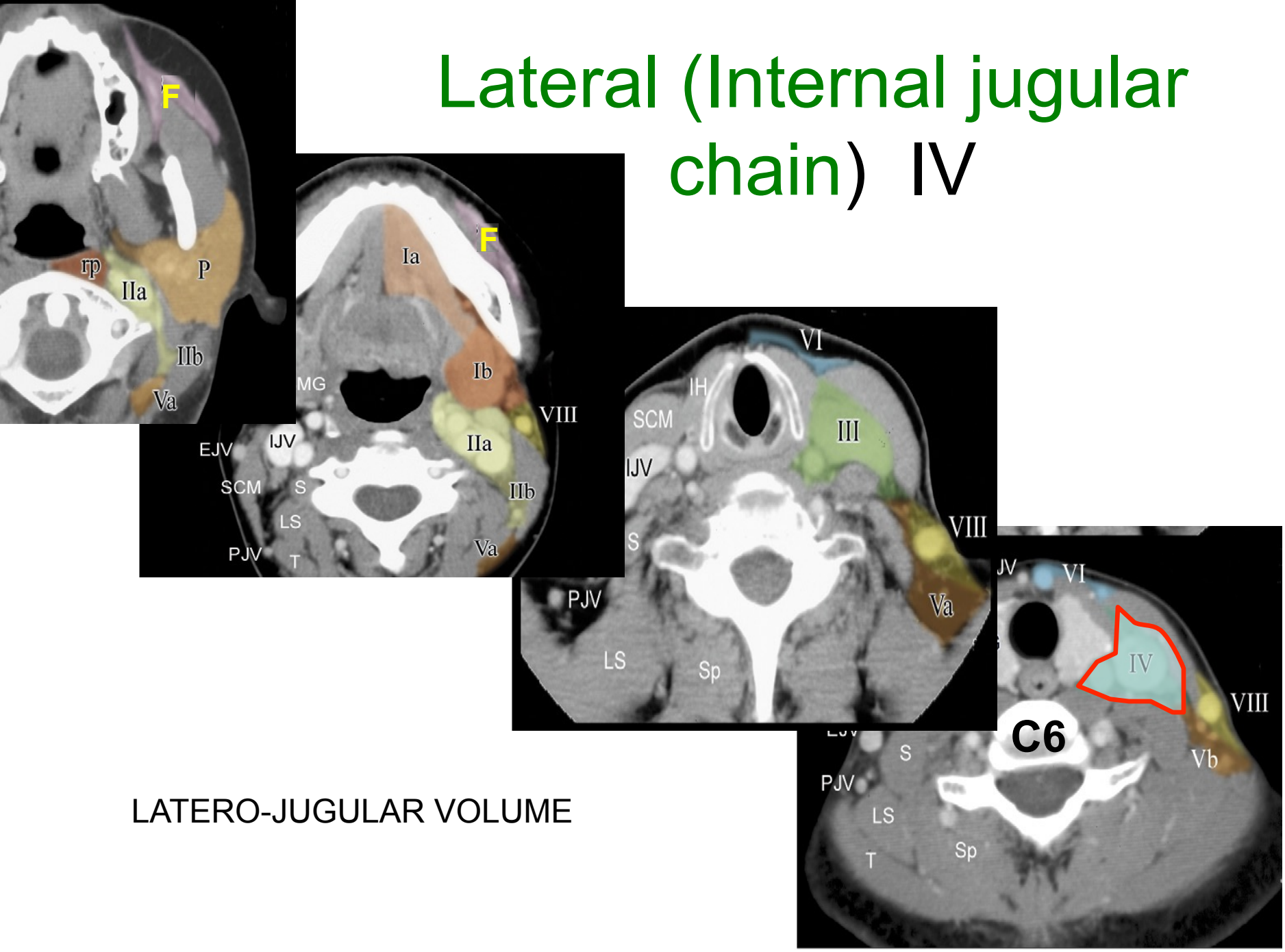
Arteria cervicale trasversa



Supraclavicular fossa



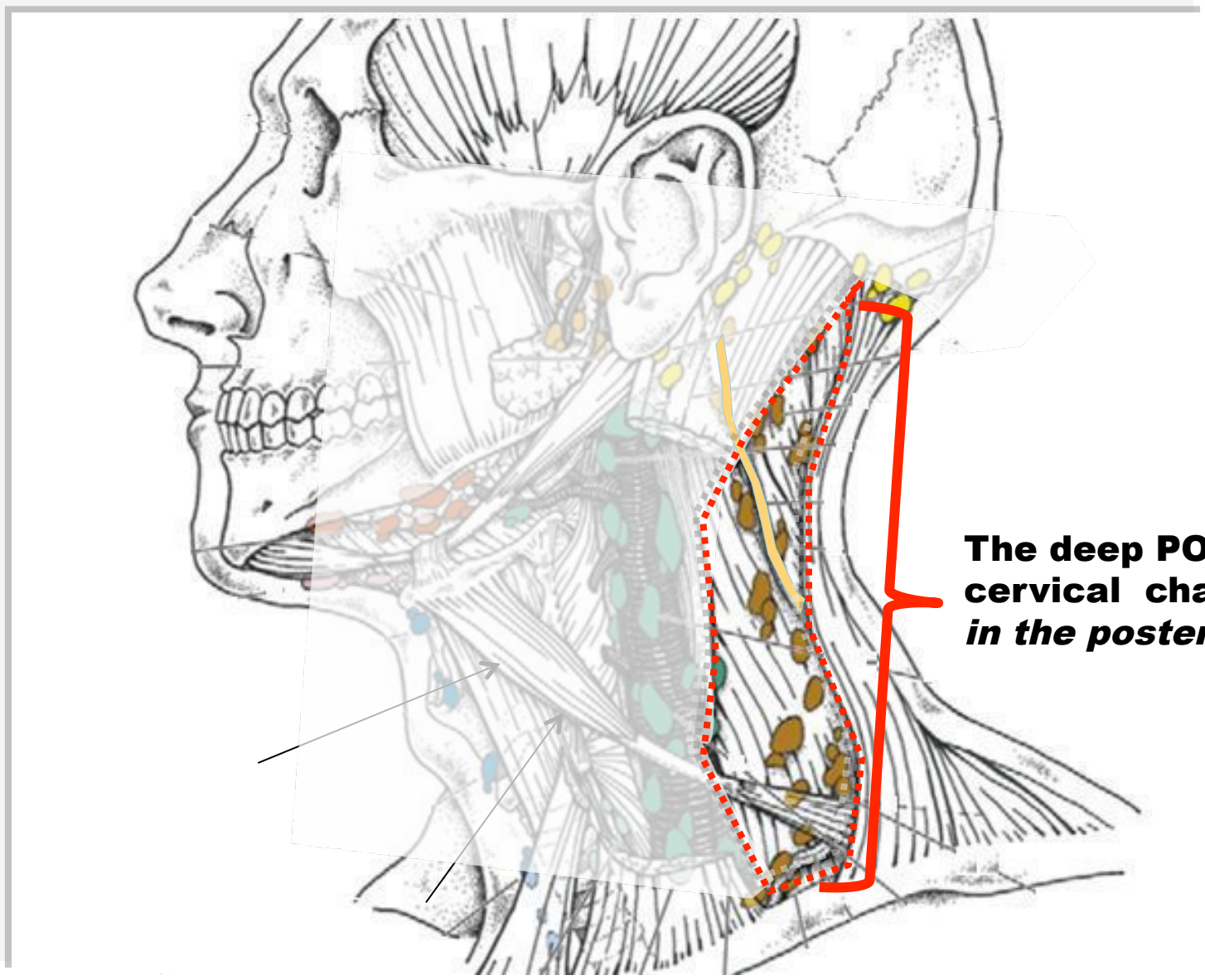
Lateral (Internal jugular chain) IV



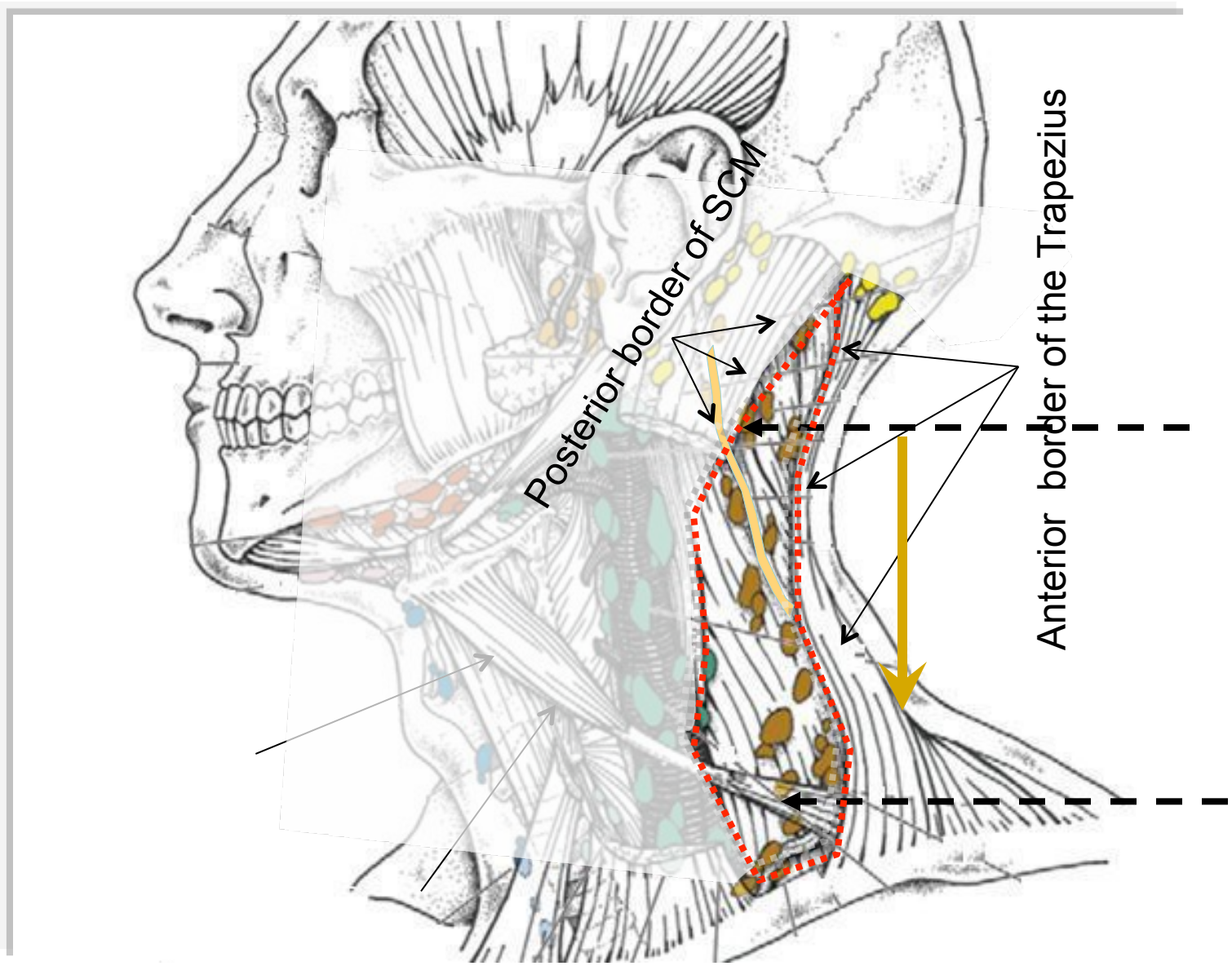
LATERO-JUGULAR VOLUME

Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

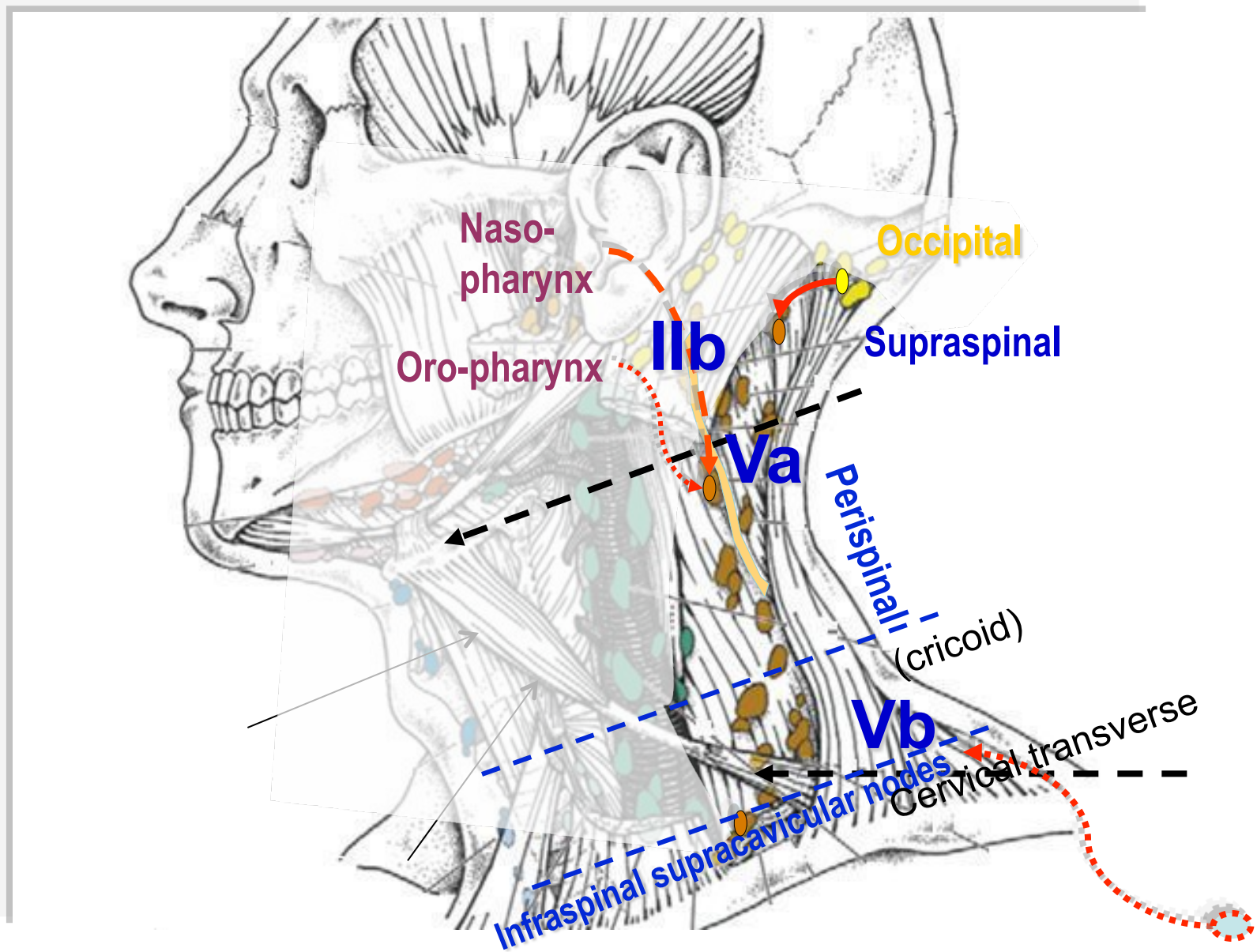
The deep descending POSTERIOR chains



The deep descending POSTERIOR chains



The deep descending POSTERIOR chains

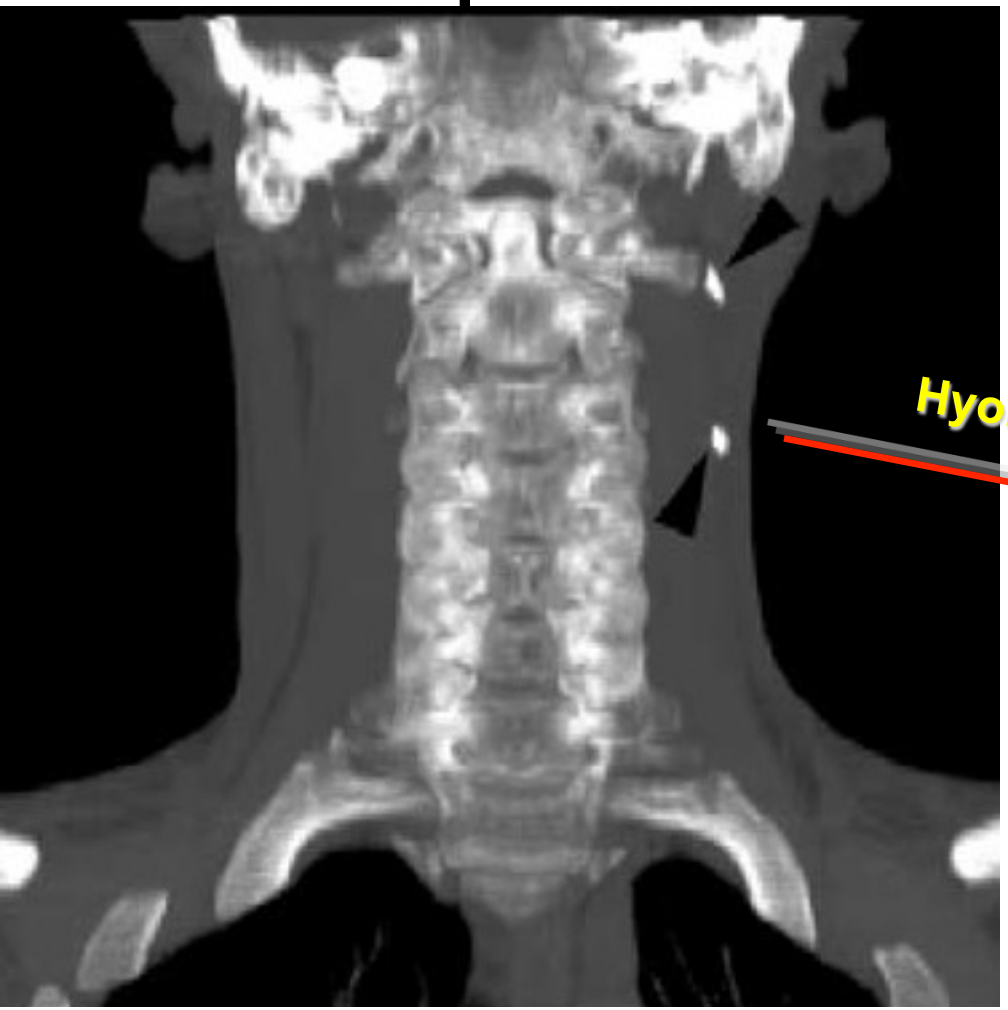


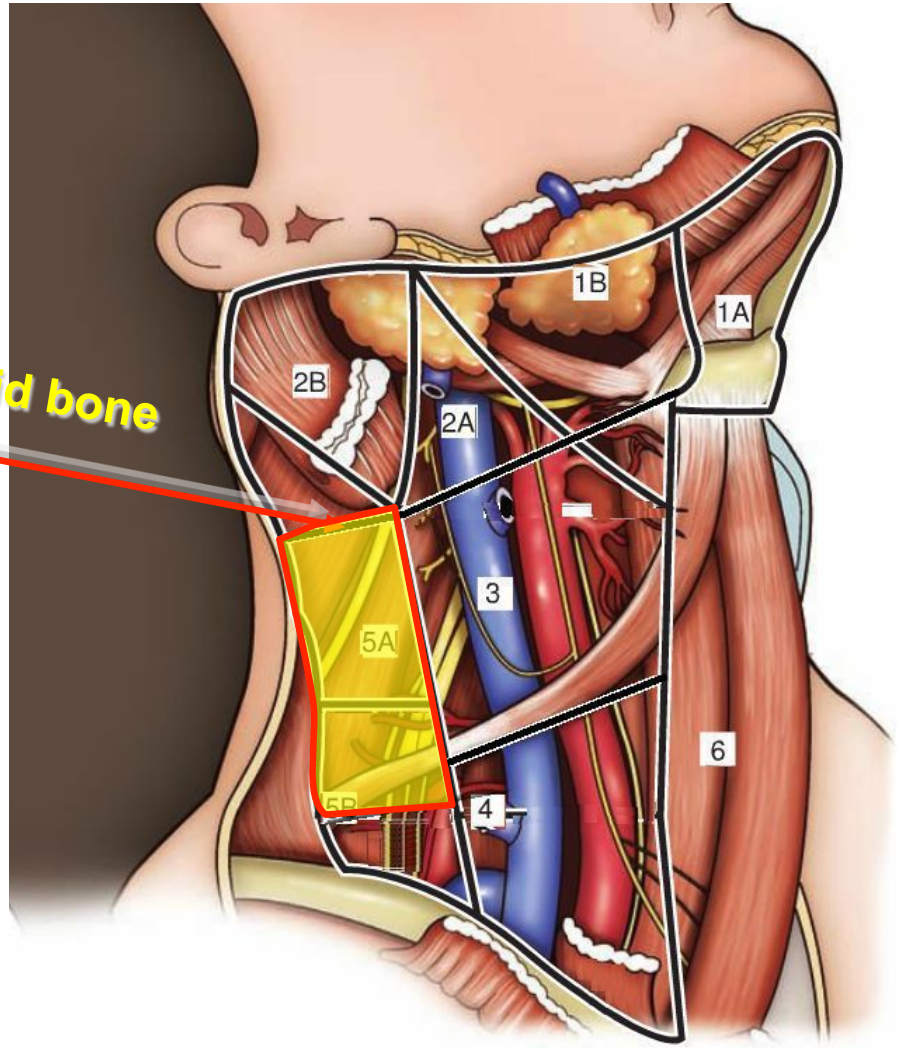
Irradiare IIB?

- The 11 mentioned prospective pathologic studies [11–17, 20–22, 24], which include 536 patients with squamous carcinomas of diVerent sites **(oral cavity, oropharynx, larynx, hypopharynx)** and subsites, suggest that it is not necessary to dissect sublevel IIB when dissecting clinically negative necks in patients with squamous carcinomas of the upper aerodigestive tract, in view of the **low incidence of sublevel IIB lymph node metastases (18/536 = 3.3%).**
- ***Sublevel IIB is not within the primary lymphatic drainage route of most squamous carcinomas of the head and neck*** [25].

Ferlito A., Silver CE, Rinaldo A. Eur Arch Otorhinolaryngol. (2008) 265:621-626)

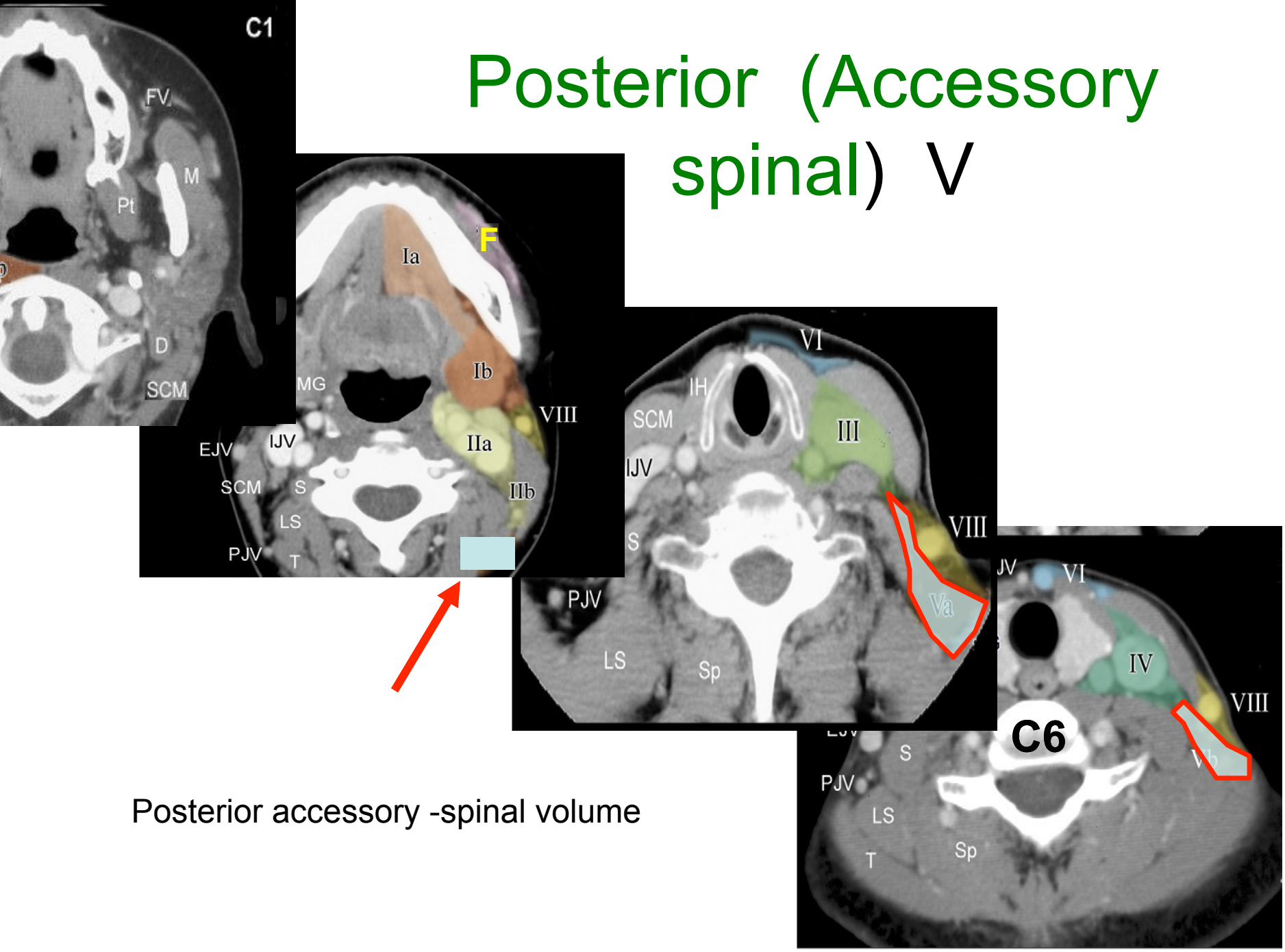
Superior Limit Of Level V





V. Gre´goire et al. / Radiotherapy and Oncology 69 (2003) 227–236

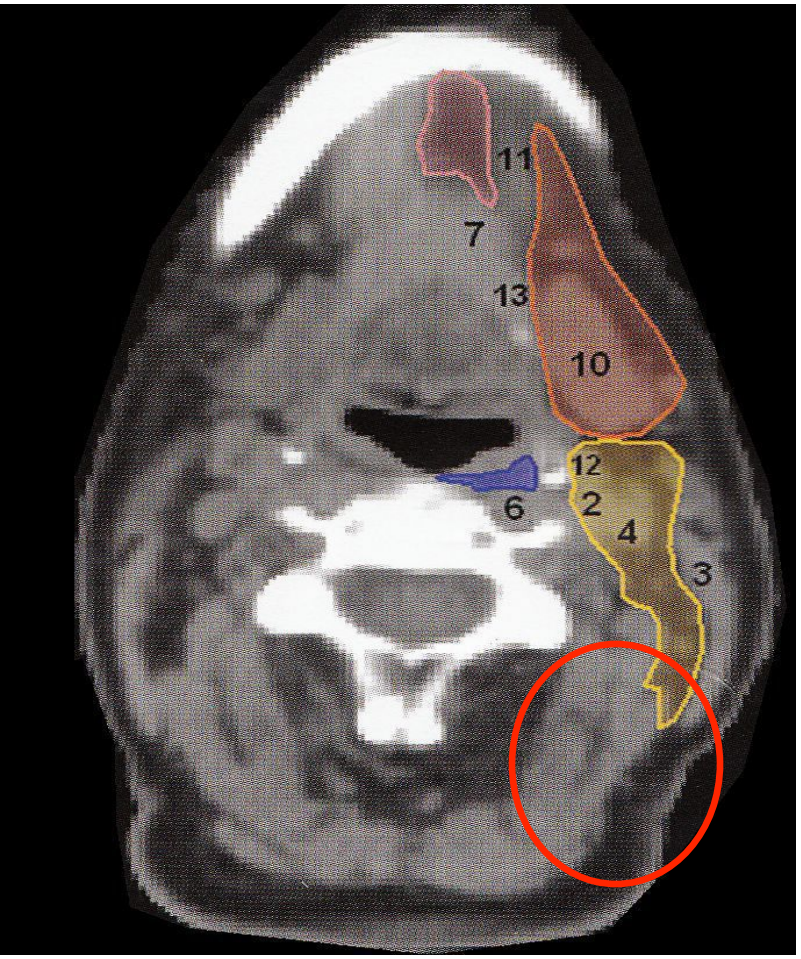
Posterior (Accessory spinal) V

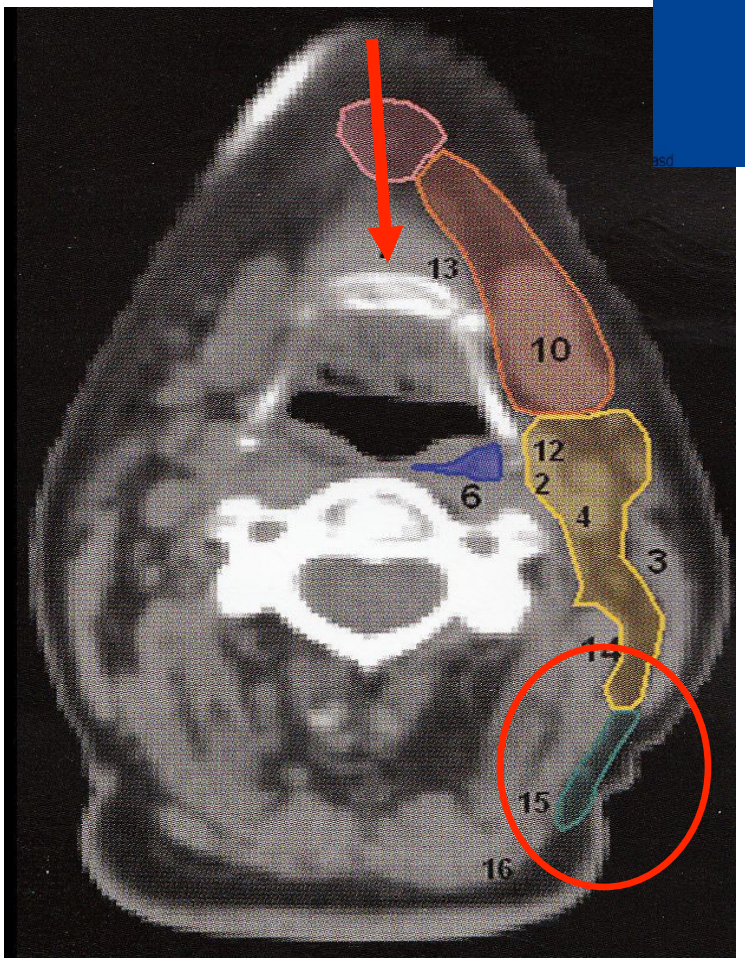


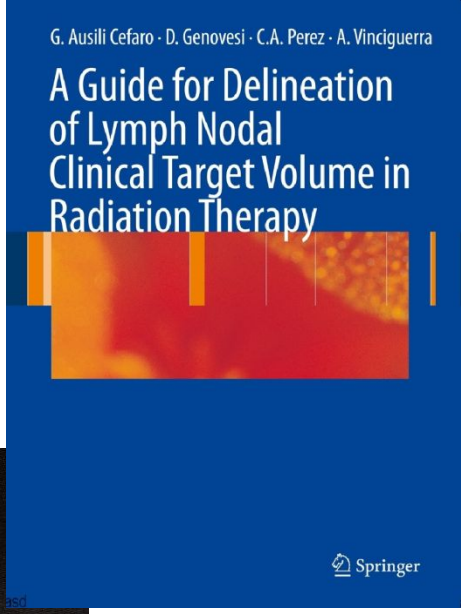
Posterior accessory -spinal volume

Lengelé B, Hamoir M, Scalliet P et al. Radiother Oncol. 2007

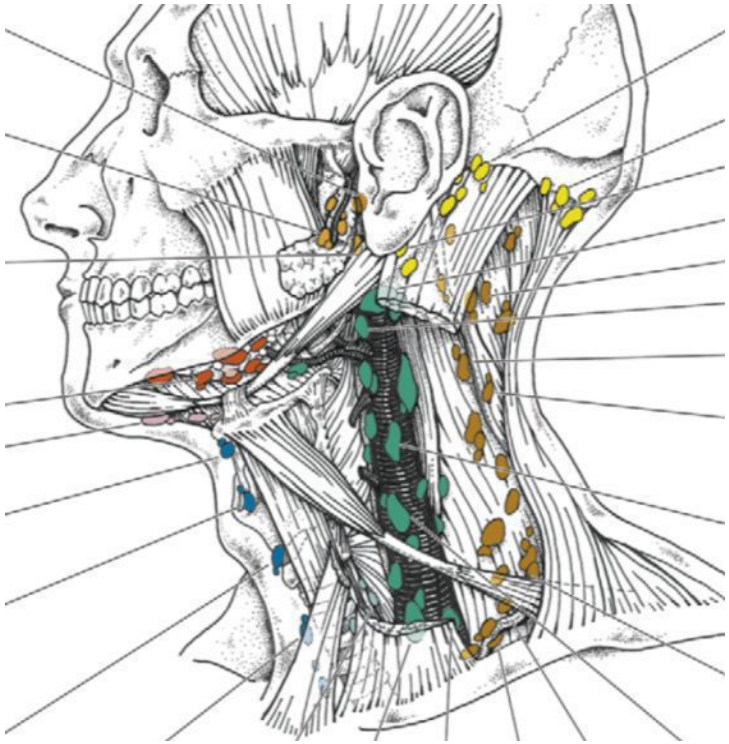
Posterior (Accessory spinal) V
Superior Limit

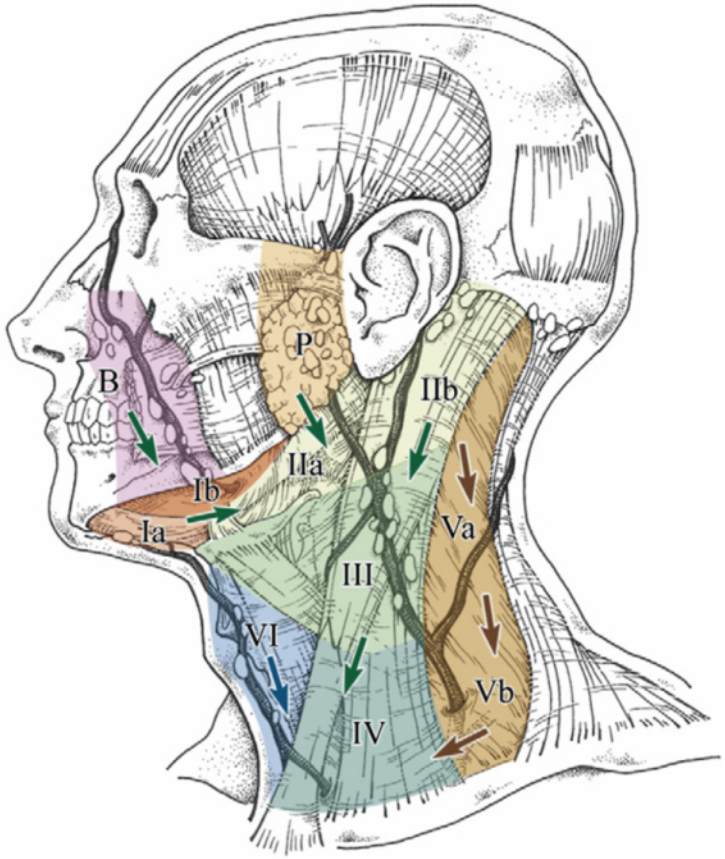




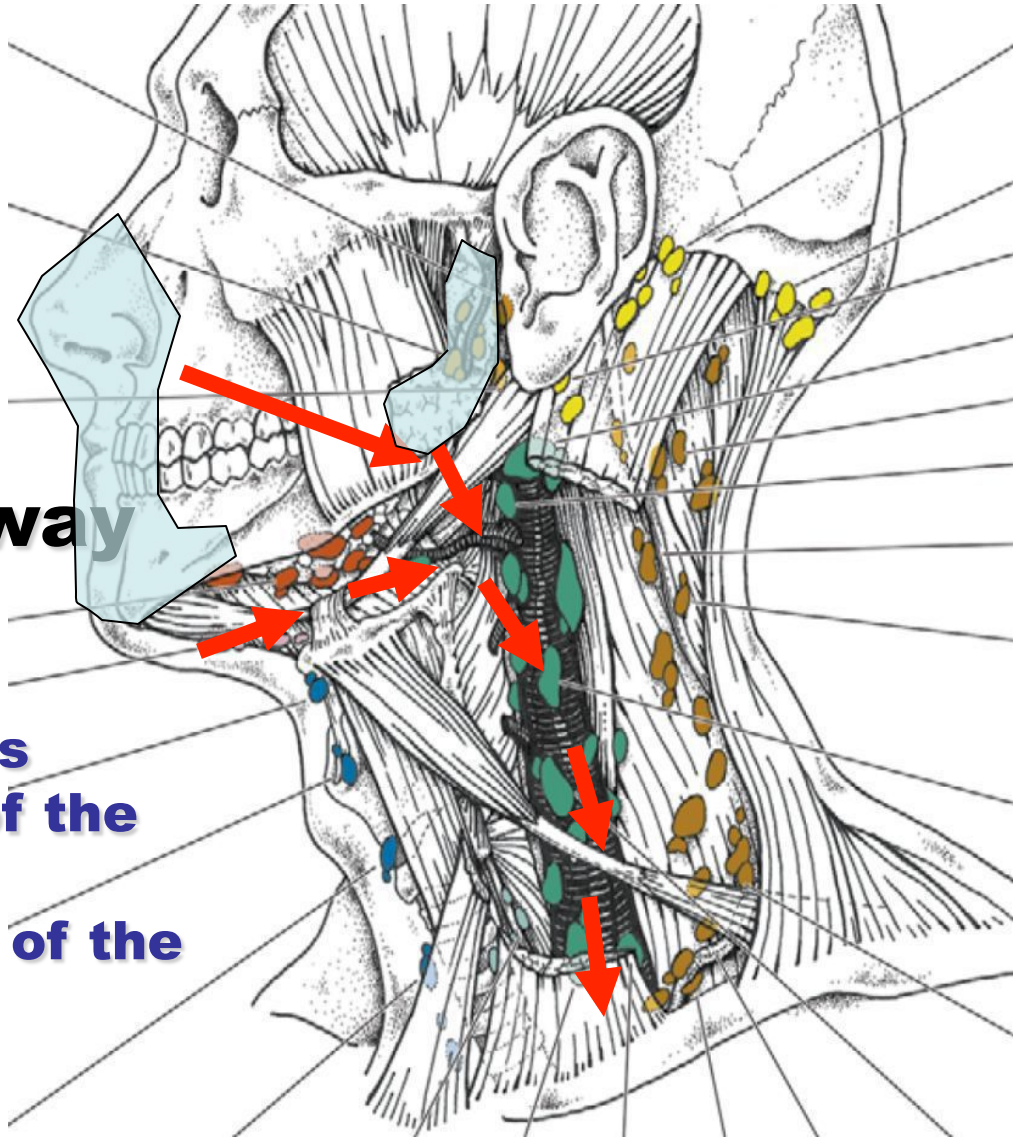


Functional drainage pathways





Main Lymphatic pathway



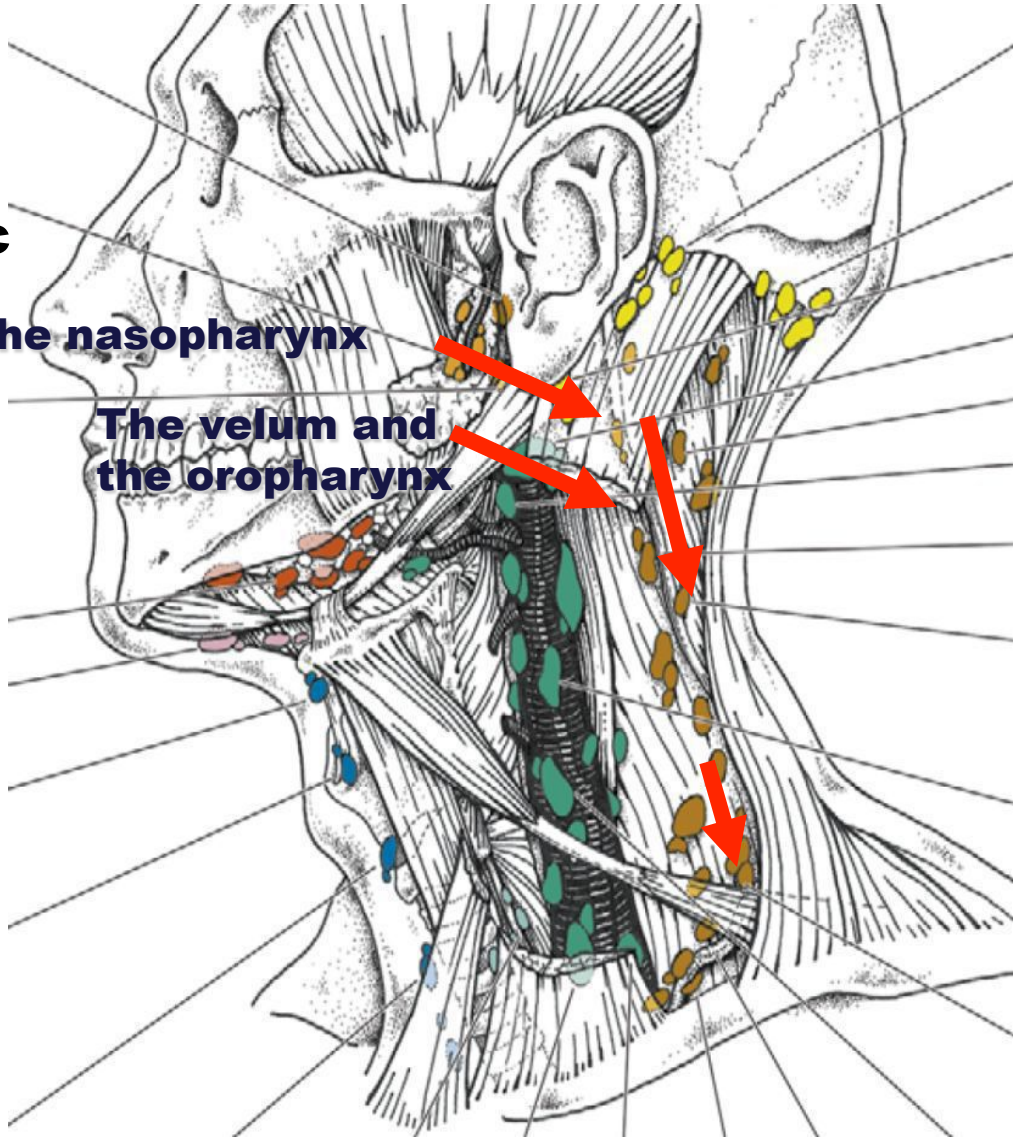
This central pathway basically drains

- **the parotid**
- **buccal groups of nodes**
- **the superficial areas of the face**
- **the anterior segments of the oral**
- **nasal Cavities**.

Posterior accessory pathway

This additional lymphatic pathway offers an alternative means of drainage to the deep dorsal parts of the visceral cavities of the face including

- **the nasopharynx,**
- **the oropharynx,**
- **the velum**

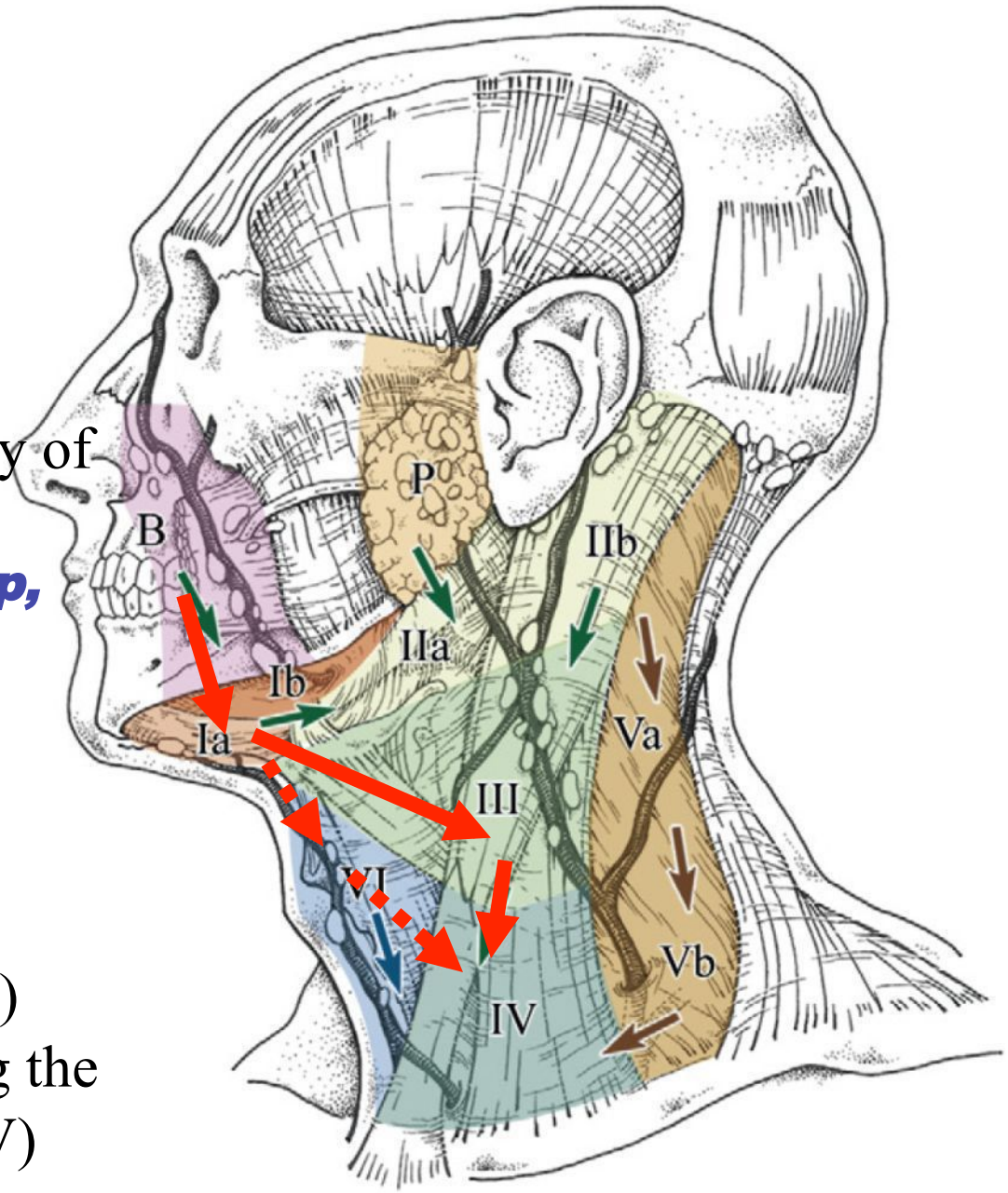


The anterior Lymphatic pathway

This alternative anterior pathway of nodal dissemination:

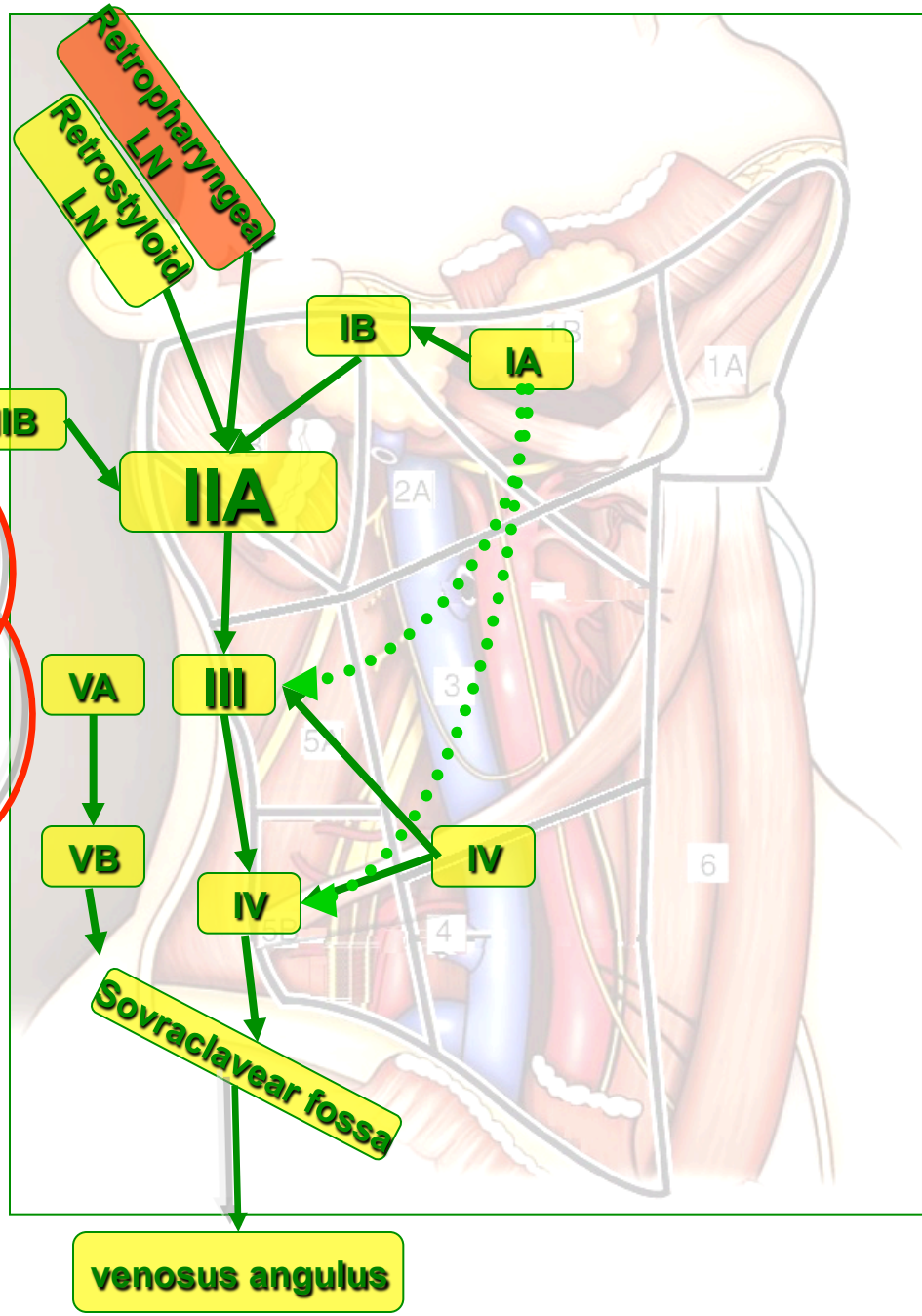
- ***Median part of the lower lip,***
- ***the anterior oral floor and***
- ***the apex of the tongue.***

It follows direct connecting channels spread between the submental (level Ia) and the jugulo-omohyoid (level III) nodes or, more rarely, reaching the lower internal jugular (level IV) nodes.



Functional drainage pathways

... is a sufficient guide to select lymphonodal areas to irradiate?



How is the risk of subclinical disease defined?

- Historic data regarding:

1. Number of pts with clinically positive neck nodes found at presentation (MDAH)

   (patients treated between 1948-1978)

   Lindberg Cancer 1972, McLaughlin H&N 1995

2. Number of pts with pathologically positive neck nodes found at surgery (MSKCC)

   Candela, Shah 1990

Number of pts with **clinically positive neck nodes** found at presentation *(adapted From Gregoire 2000)*

		Level (Percentage of the node+ pts.)									
	N. Pt N+	I		II		III		IV		V	
Oral cavity (n=787)	36	42	3.5	79	8	18	3	5	1	1	0
Oropharynx (n=1497)	64	13	2	81	24	23	5	9	2.5	13	3
Hypopharynx (n=847)	70	2	0	80	13	51	4	20	3	24	2
Supraglottic Larynx (n=428)	55	2	0	71	21	48	10	18	7	15	4
Naspharynx (440 pts)*	80	9	8	71	56	36	32	32	26	15	10

*Sham 1990

Lindberg Cancer 1972

Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Negative** Neck After Elective Radical Neck Dissection

CTV 2) Risk of sublinical involvement greater than15–20%

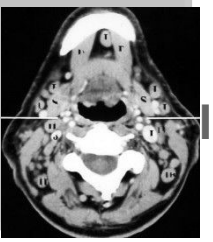
		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	192	20%	17%	9%	3%	0,5%
Oropharynx	48	2%	25%	19%	8%	2%
Hypopharynx	24	0%	13%	13%	0%	0%
Larynx	79	5%	19%	20%	9%	2,5%

Shah JP, Candela FC, Poddar AK. The patterns of cervical lymph node metastases from squamous carcinoma of the oral cavity. *Cancer* 1990;66(1):109–113.)

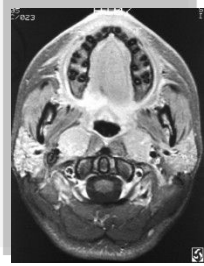
Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Positive** After Therapeutic Radical Neck Dissection

		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	324	46%	43%	33%	15%	3%
Oropharynx	165	14%	71%	42%	28%	9%
Hypopharynx	104	5%	19%	20%	9%	2,5%
Larynx	183	7%	57%	59%	29%	4%

Shah JP, Candela FC, Poddar AK. AJ Surg 1990;160(4):405-409



Incidence of Positive Retropharyngeal Nodes for Various Primary Sites and Clinical Neck Stages (794 Tumors)



CUT OFF 10%

CT and RMI

Primary Site	Clinical Neck Stage		Overall %
	N0 Neck No. %	N+ Neck[a] No. %	
Nasopharynx	2/5 (40%)	12/14 (86%)	74
Pharyngeal wall	6/37 (16%)	12/56 (21%)	19
Soft palate	1/21 (5%)	6/32 (19%)	13
Tonsillar region	2/56 (4%)	14/120(12%)	9
Pyriform sinus or postcricoid area	0/55 (0%)	7/81 (9%)	5
Base of tongue	0/31 (0%)	5/90 (6%)	4
Supraglottic larynx	0/87 (0%)	4/109 (4%)	2

[a]N+, neck nodes clinically involved (stages N1–3B).

From McLaughlin MP, Mendenhall WM, Mancuso AA, et al. Retropharyngeal adenopathy as a predictor of outcome in squamous cell carcinoma of the head and neck. *Head Neck* 1995;17:190–198,

TABLE 11.4a

CONSENSUS GUIDELINES FOR TARGET DELINEATION OF NODAL LEVELS IN THE ELECTIVE TREATED NECK

Level	Cranial	Caudal	Anterior	Posterior	Lateral	Medial
Ia	Geniohyoid muscles	Hyoid bone	Symphysis menti	Hyoid bone	Medial edge of anterior belly of digastric	Midline
Ib	Mylohyoid muscles cranial edge of SMG	Hyoid bone	Symphysis menti	Posteriorborder of SMG	Medial border of mandible	Lateral edge of anterior belly of digastric
IIa	Inferior border of lateral process of C1	Inferior edge of hyoid	Posterior border of SMG	Posterior edge of IJV	Medial edge of SCM	Medial border of ICA
IIb	(As IIa)	Inferior edge of hyoid	Posterior edge of IJV	Posterior border of SCM	Medial edge of SCM	Medial edge of ICA; deep cervical muscles
III	Inferior edge of hyoid	Inferior edge of cricoid	Anterior edge of SCM	Posterioredge of SCM	Medial edge of SCM	Medial ICA/deep cervical muscle
IV	Inferior edge of cricoid	2 cm superior to SCL joint	Anterior edge of SCM	Posterior edge of SCM	Medial edge of SCM	Medial ICA/deep cervical mm
Va	Superior edge of hyoid	Inferior edge of cricoid	Posterior edge of SCM	Anterior border of trapezius	Platysma	Paraspinal muscles
Vb	Inferior edge cricoid	Transverse cervical vessels	Posterior edge of SCM	Anterior border of trapezius	Platysma	Paraspinal muscles
VI	Inferior border of thyroid	Manubrium	Platysma	Common carotid artery	SCM	Trachea
Retropharyngeal	Skull base	Top of hyoid bone	Pharyngeal constrictor muscles	Prevertebral fascia	Medial border of carotid artery	Midline
Retrostyloid	Jugular foramen	Inferior border of lateral process of C1	Parapharyngeal space	Vertebral body/skull base	Parotid space	Lateral edge of RP nodes
Supraclavicular	Lower border IV/Vb	Sternoclavicular joint	Skin/SCM/ clavicle	Anterior edge of postscalenus muscles	Lateral edge of posterior scalenus muscles	Trachea/thyroid gland

SMG, submandibular gland; IJV, internal jugular vein; SCM, sternocleidomastoid; ICA, internal carotid artery; SCL, supracricoid partial laryngectomy; RP, retropharyngeal.

Consensus R&O 2003/Gregoire 2006

Table 9
Suggested guidelines for the treatment of the neck of patients with head and neck squamous cell carcinomas (AJCC 1997)

Location of primary tumor	Appropriate node levels to be treated	
	Stage N0–N1	Stage N2b
Oral cavity	I, II, and III (+IV for anterior tongue tumors)	I, II, III, IV and V[a]
Oropharynx	II[b], III, and IV (+retropharyngeal nodes for posterior pharyngeal wall tumors)	I, II, III, IV, V and retropharyngeal nodes
Hypopharynx	II[b], III, and IV (+VI for esophageal extension)	I, II, III, IV, V and retropharyngeal nodes (+VI for esophageal extension)
Larynx[c]	II[b], III, and IV (+VI for transglottic and subglottic tumors)	(I), II, III, IV and V (+VI for transglottic and subglottic tumors)
Nasopharynx	II, III, IV, V, and retropharyngeal nodes	II, III, IV, V, and retropharyngeal nodes

[a] May be omitted if only levels I–III are involved.
[b] Nodes in level IIb could be omitted for N0 patients.
[c] T1 glottic cancer excluded.

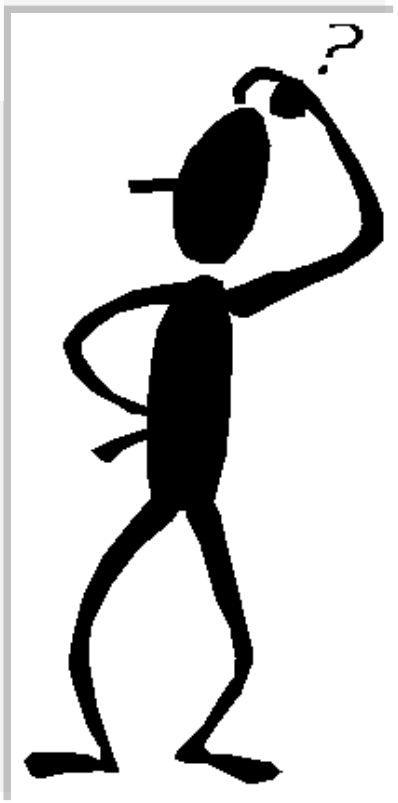
Postoperative recommendations

- Include jugular fossa if level II is pN+
- In ECE lymph-nodes include at least 1 cm around its site
- Not removable-concerned muscle needs to be irradiated
- 1 year after a neck surgery unpredictable subcutaneous shunt creating: the CTV becomes undetermined.

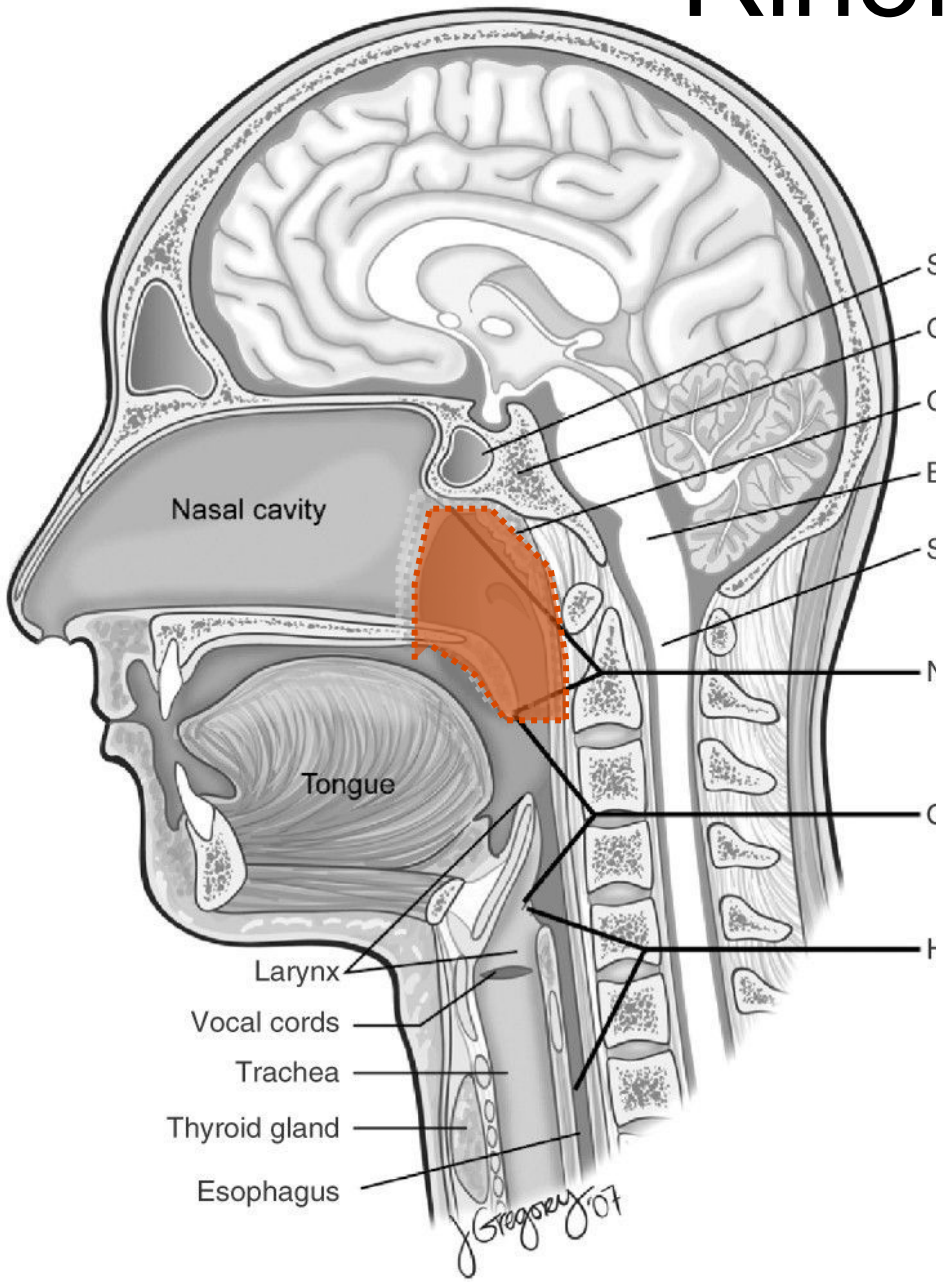
What is importare to individuate the clinical volumes?

- **Compartimentation** of head and neck

⇒Volume definition based on the **site of tumor and its natural hystory**



Rinofaringe



Nasopharynx

T1 Tumor confined to the nasopharynx, or tumor extends to oropharynx and/or nasal cavity without parapharyngeal extension*

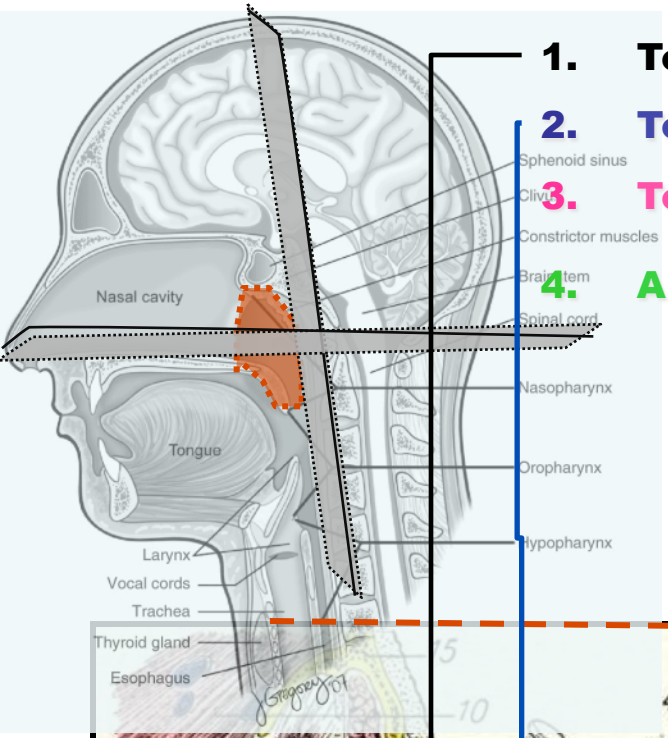
T2 Tumor with **parapharyngeal extension***

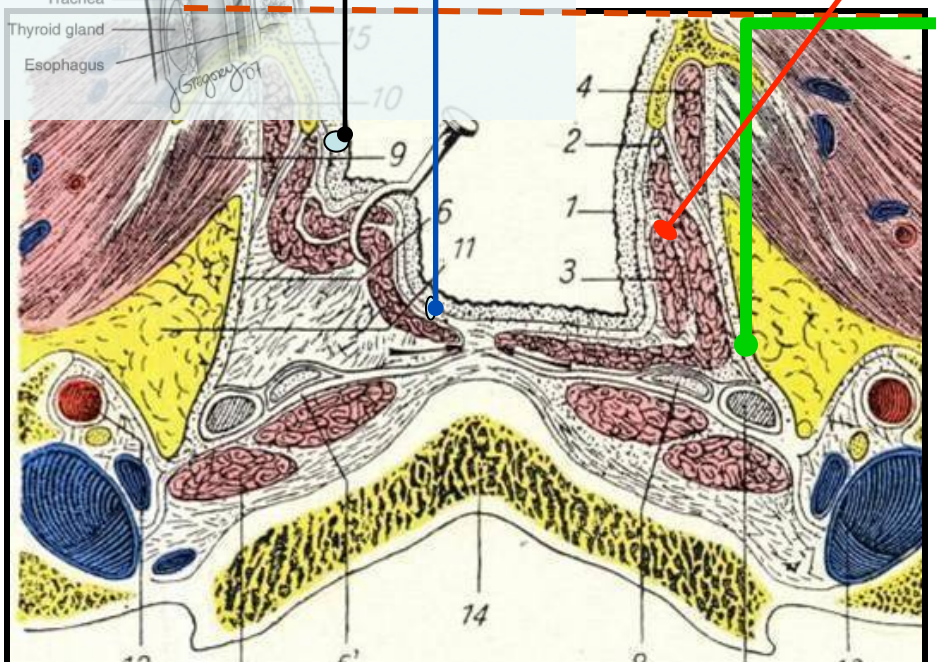
T3 Tumor involves bony structures of **skull base** and/or paranasal sinuses

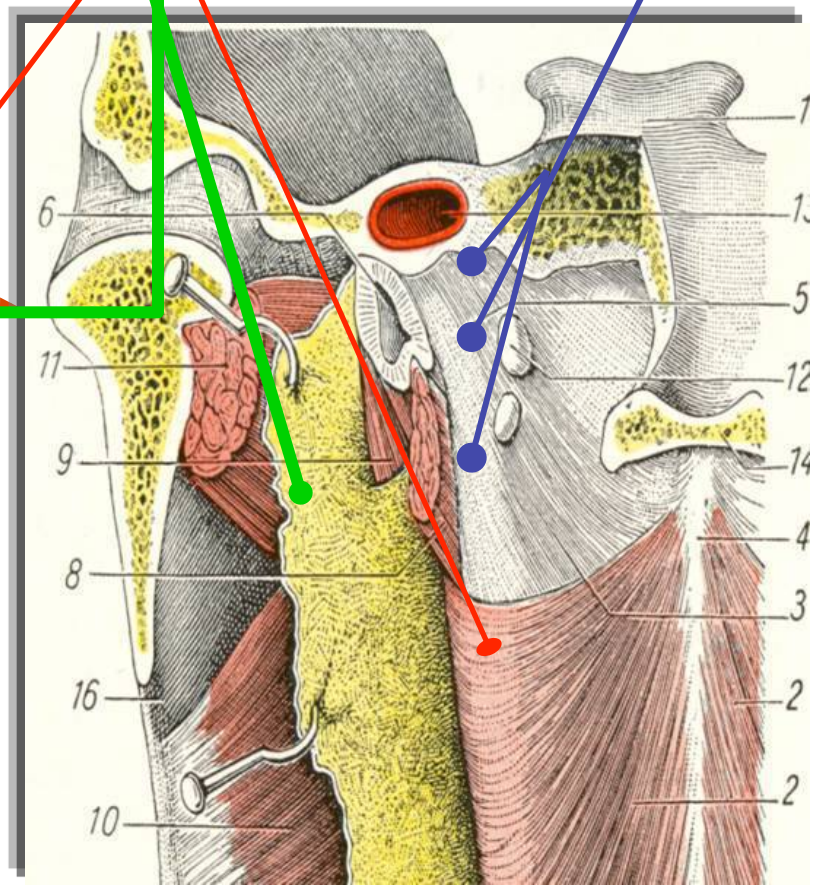
T4 Tumor with intracranial extension and/or involvement of cranial nerves, hypopharynx, orbit, or with extension to the infratemporal fossa/masticator space

Rinofaringe

1. **Tonaca interna: mucosa**
2. **Tonaca media: Tonaca fibrosa o Fascia faringo basilare**
3. **Tonaca esterna: muscolare**
4. **Aponevrosi esterne: fascia viscerale**



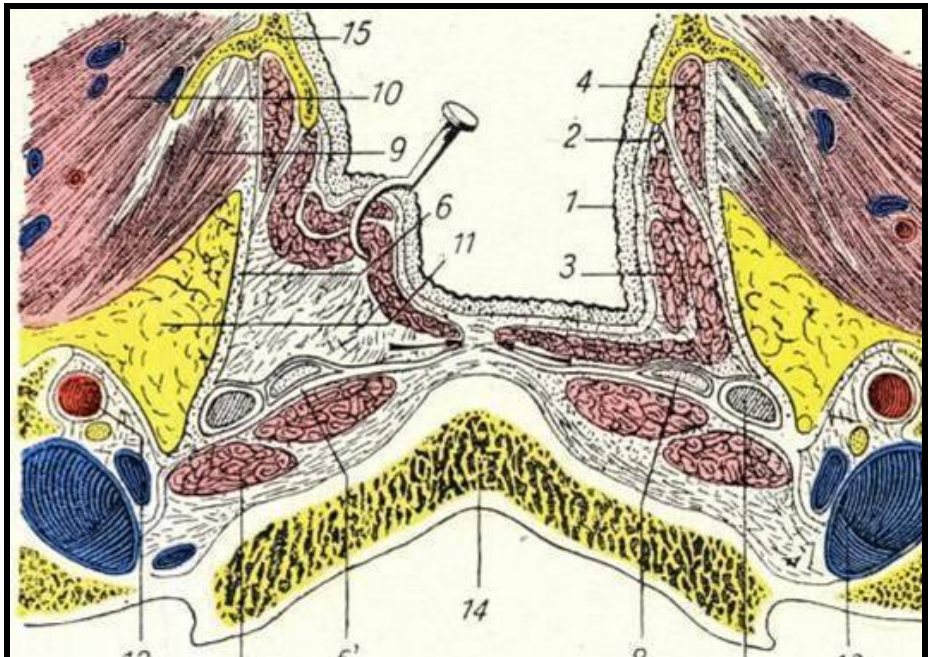


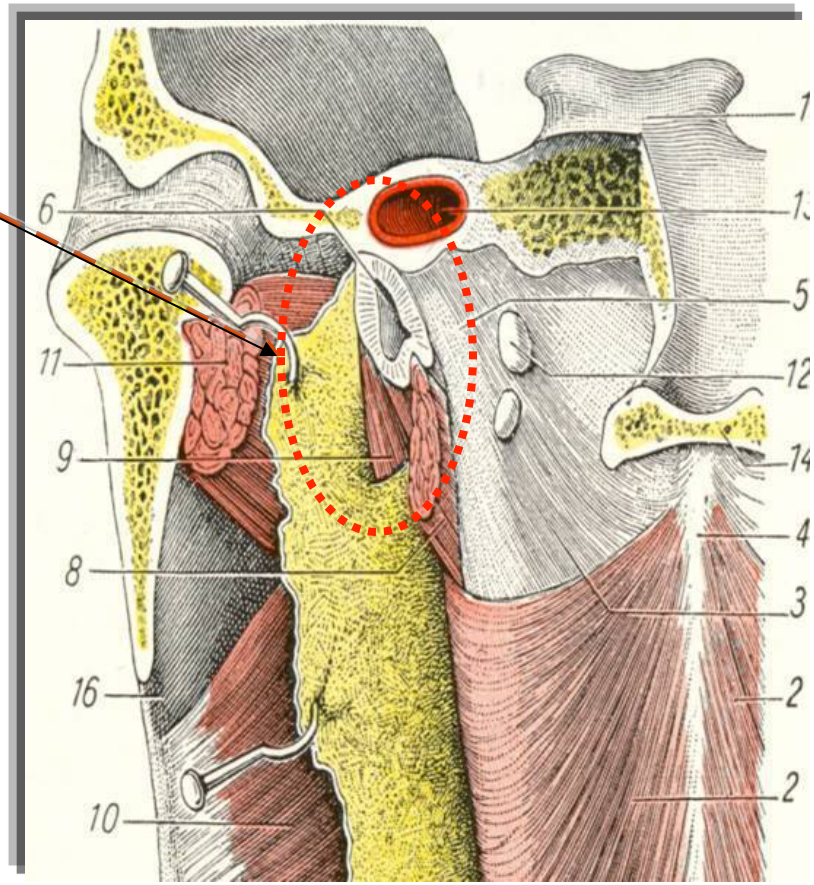


Rinofaringe

1. **Tonaca interna: mucosa**
2. **Tonaca media: Tonaca fibrosa o Fascia faringo basilare**
3. **Tonaca esterna: muscolare**
4. **Aponevrosi esterne: laterale e prevertebrale**

Locus minoris resistentiae





Rinofaring

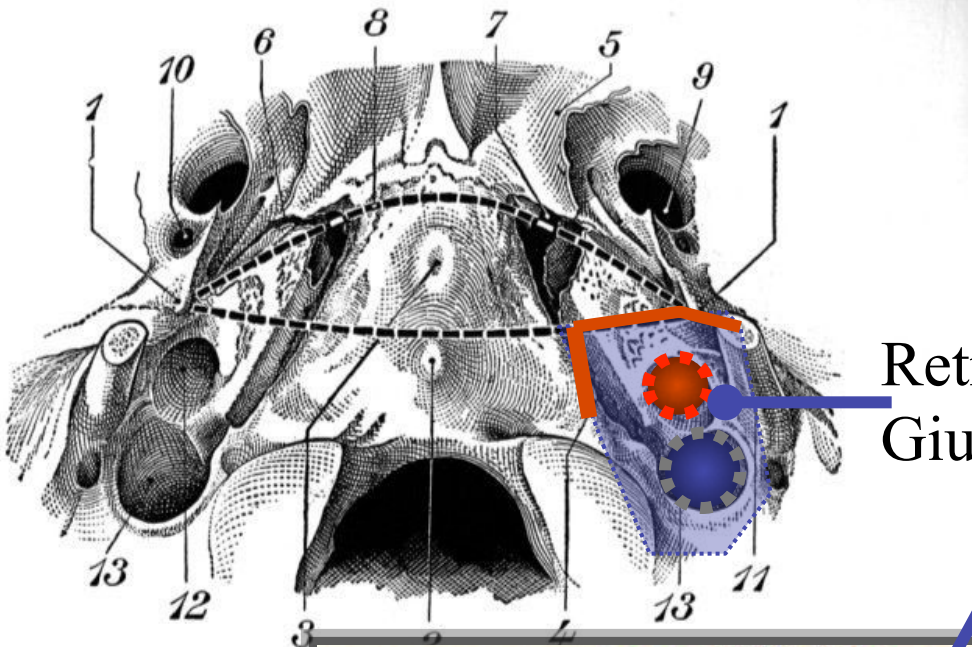
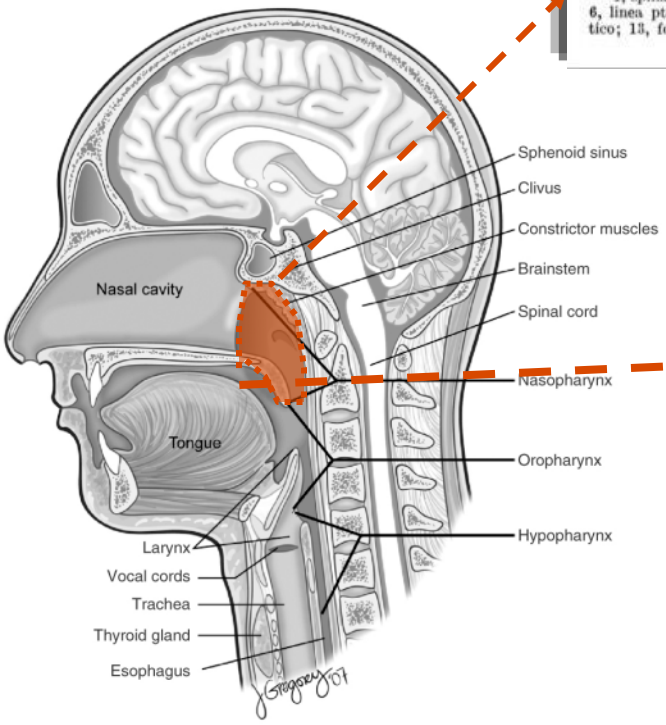
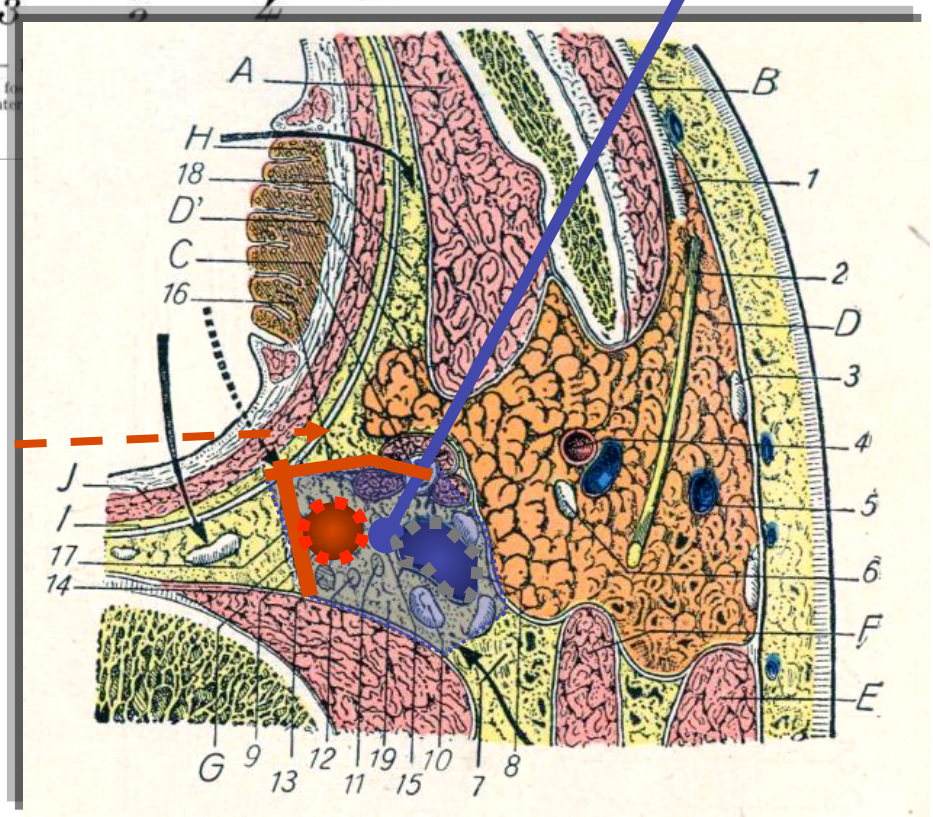


Fig. 335. —
1, spina dello sfenoide; 2, tubercolo faringeo; 3, fo
6, linea pterigospinosa; 7, foro lacero; 8, linea inte
tico; 13, foro giugulare.

Retrostiloideo
Giunzionali





Rinofaringe

Retrofaringeo

Retrostiloideo
Giunzionali

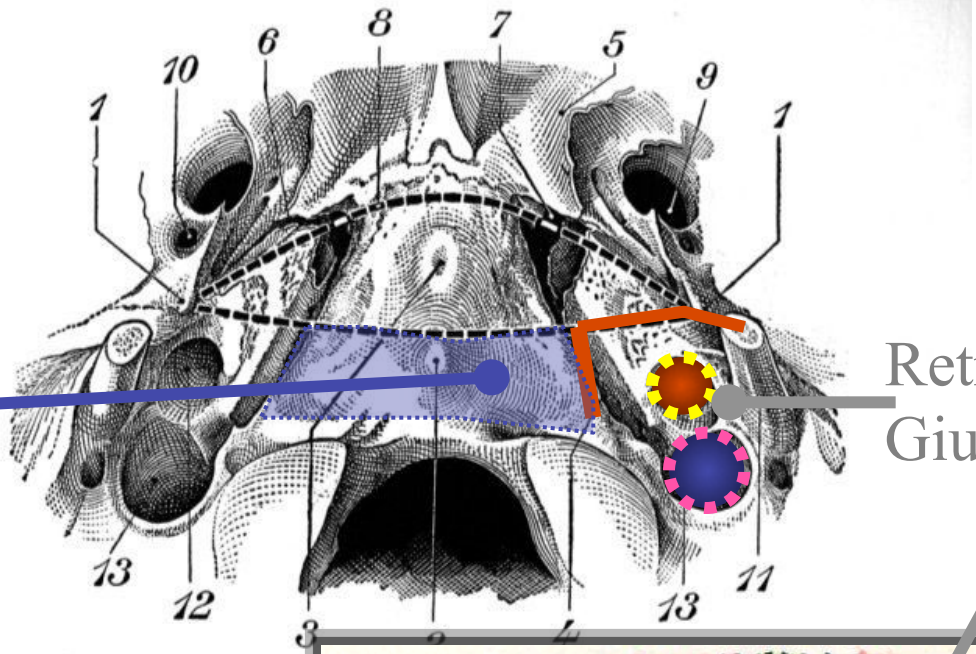
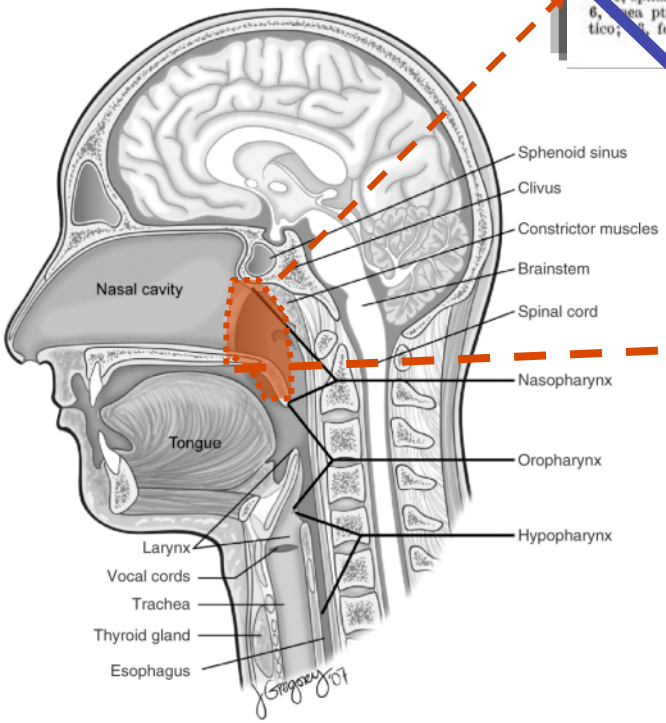
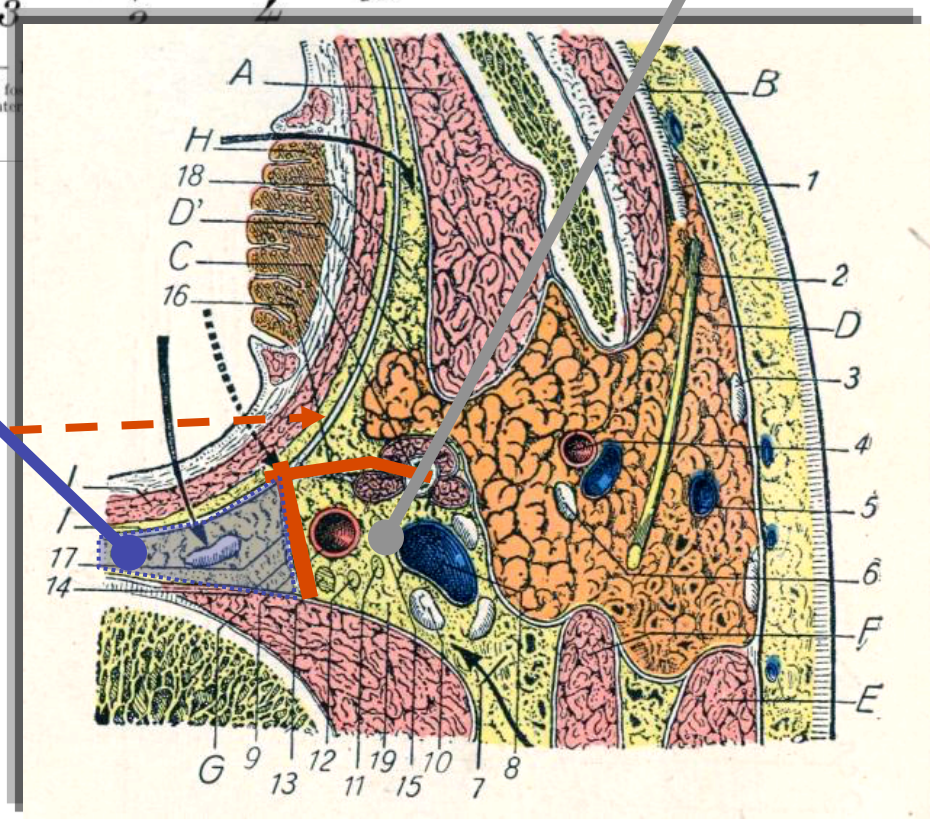


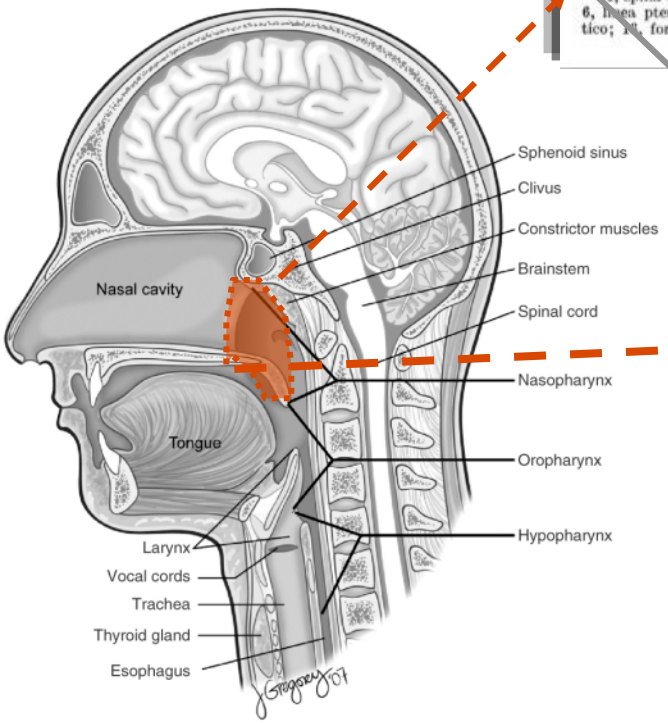
Fig. 335. —
1, spina dello sfenoide; 2, tubercolo faringeo; 3, fo
6, ea pterigospinosa; 7, foro lacero; 8, linea inte
tico; , foro giugulare.





Nasopharynx

Parafaringeo
Prestiloideo
Retrostiloideo
Giunzionali
Retrofaringeo



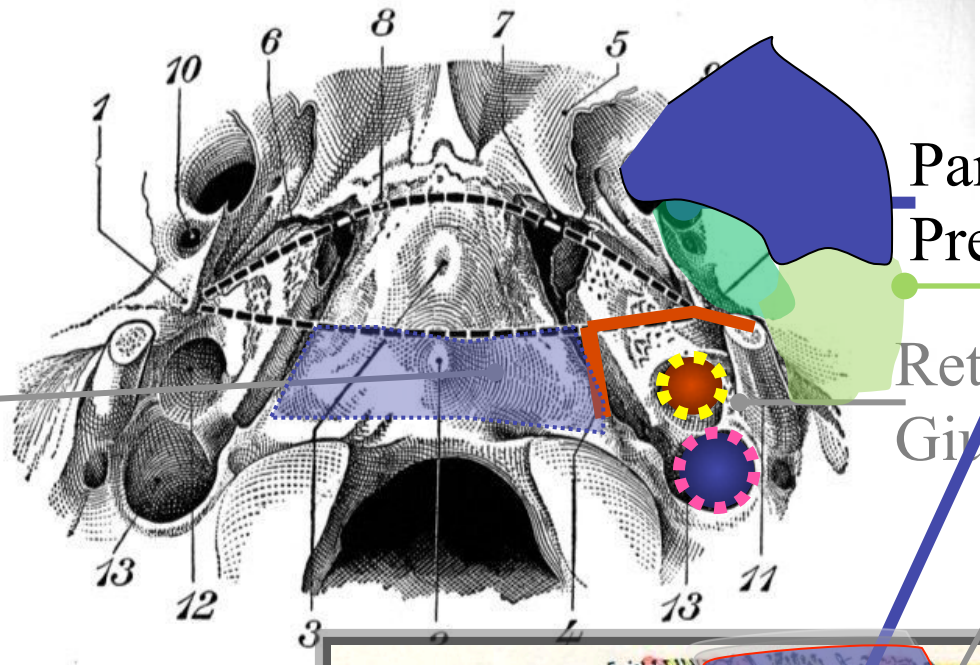
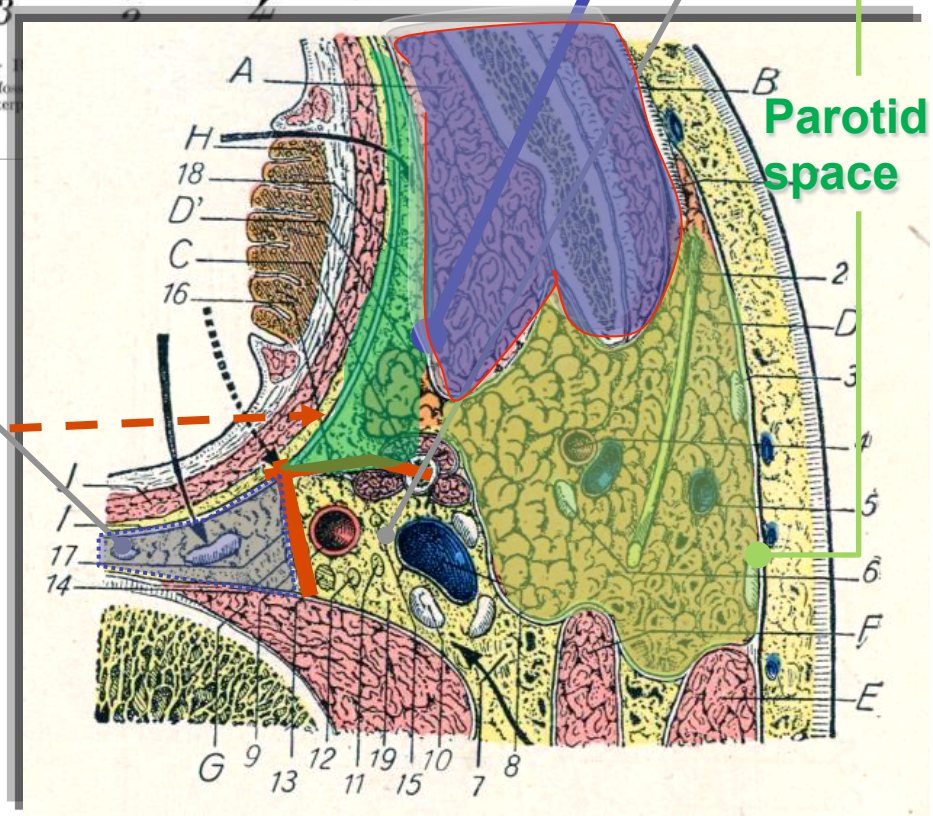
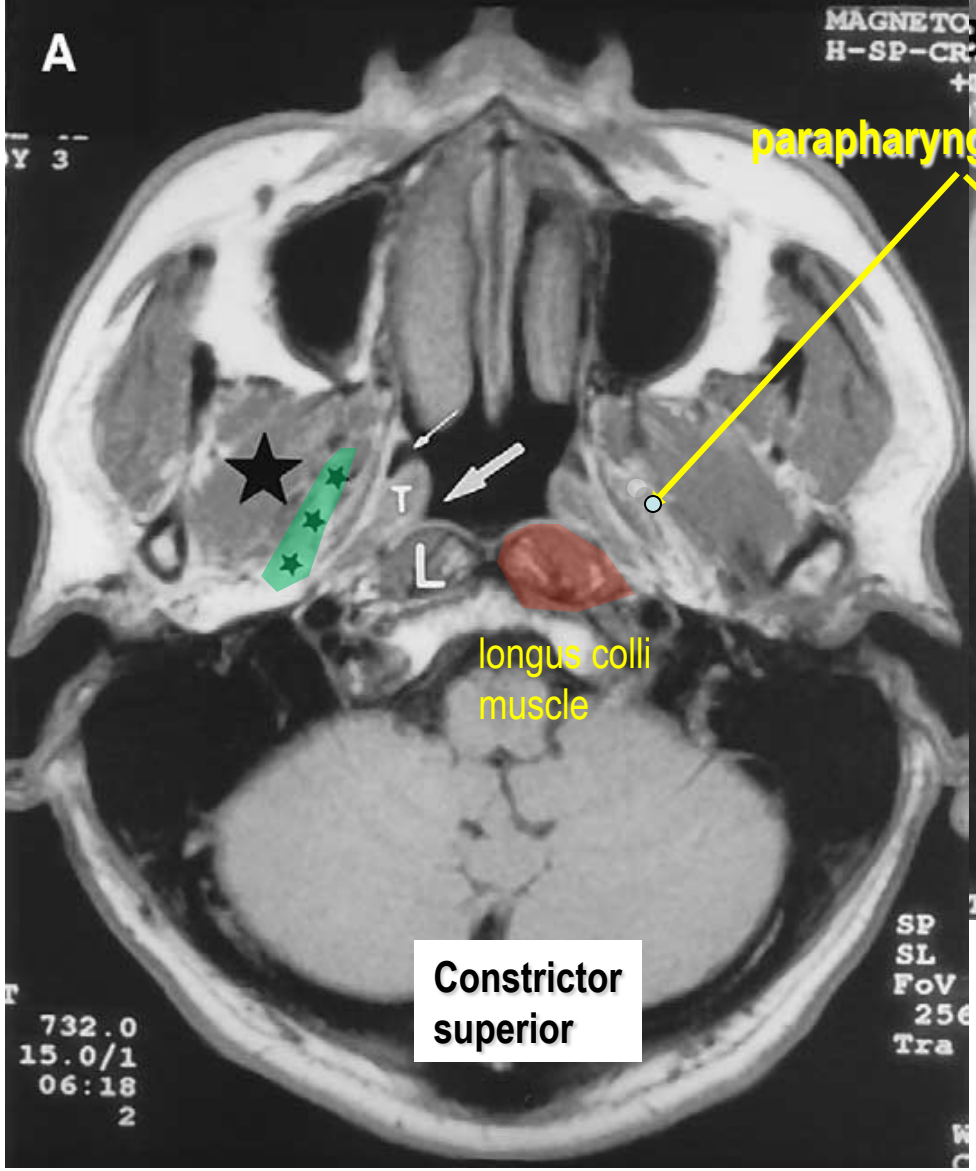
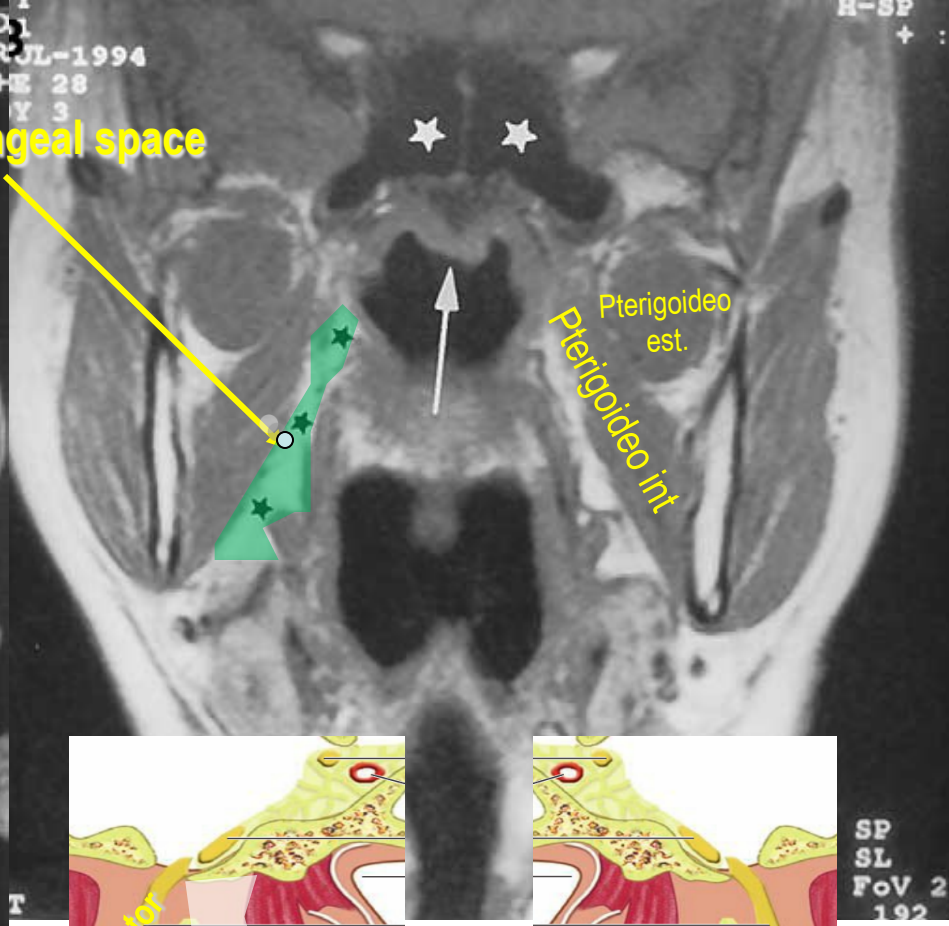


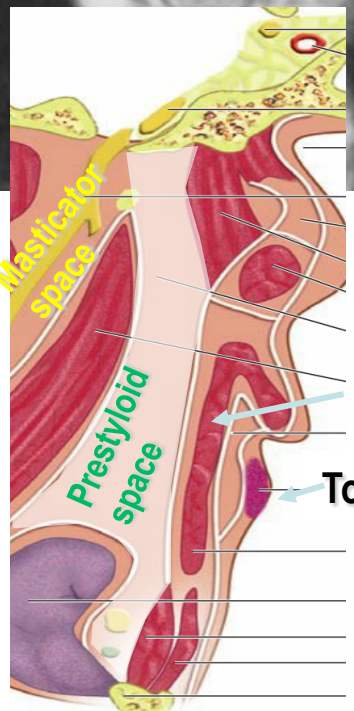
Fig. 335. — 1, spina dello sfenoide; 2, tubercolo faringeo; 3, fo... 6, linea pterigospinosa; 7, foro lacero; 8, linea inter... tico; 13, foro giugulare.

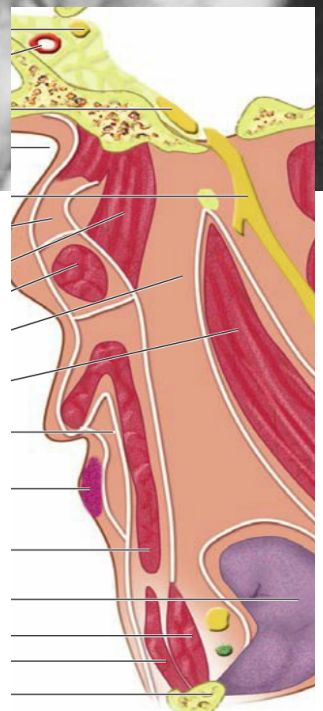


Parotid space

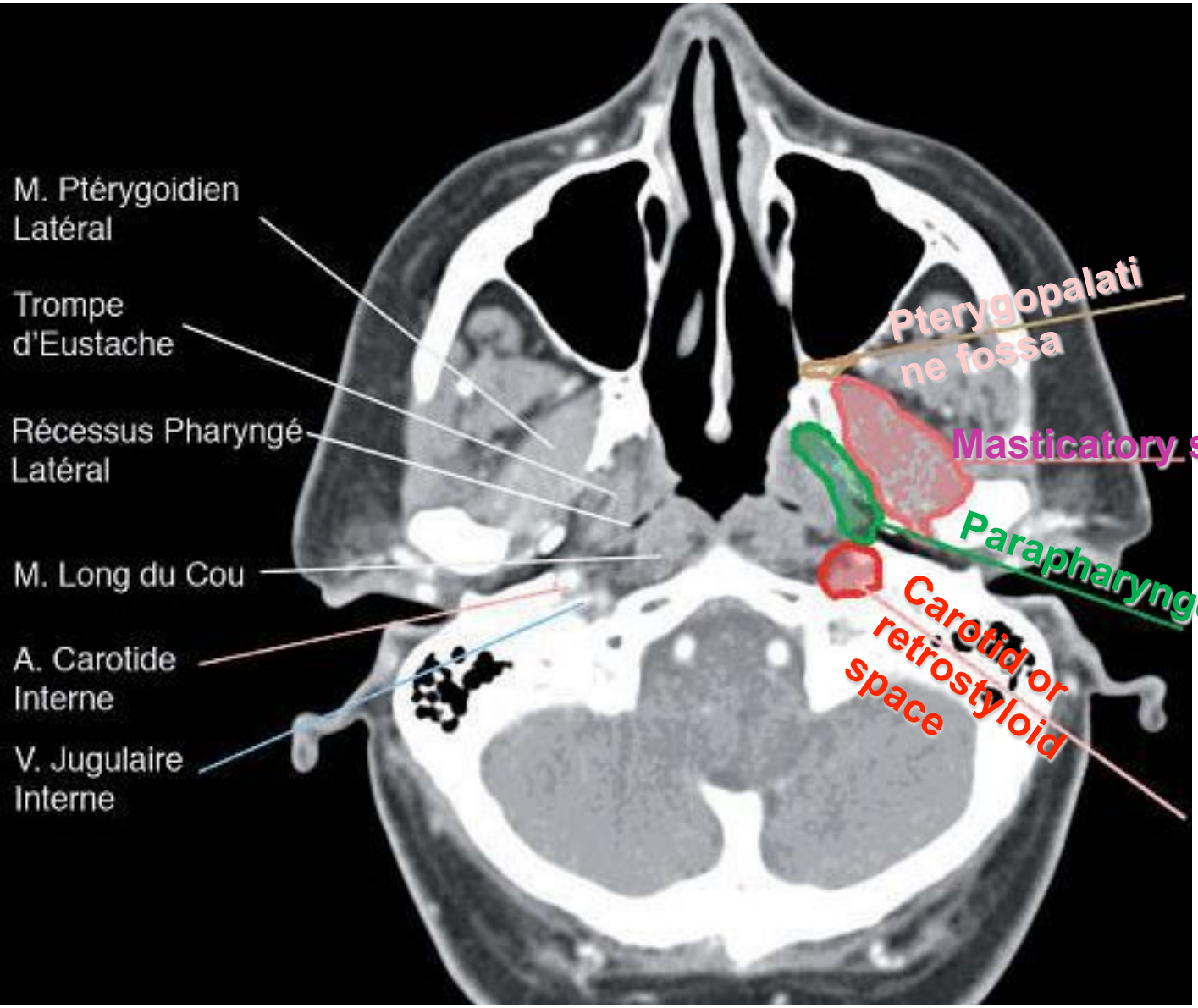

A
parapharyngeal space
longus colli muscle
Constrictor superior


Pterigoideo est.
Pterigoideo int

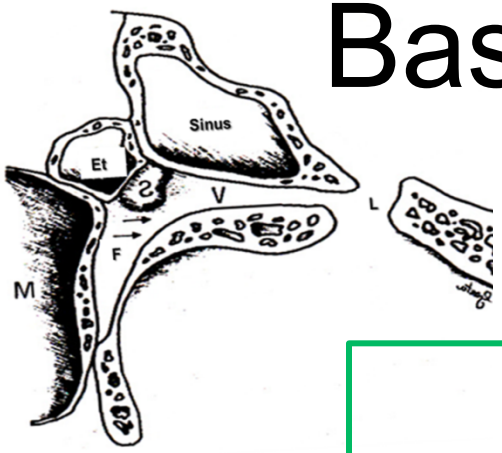

Masticator space
Prestyloid space
Tonsil



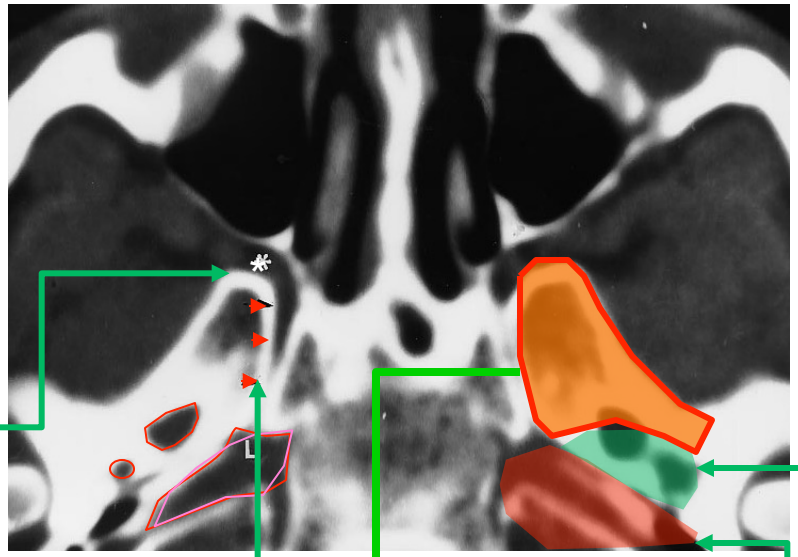
Cranialmente



Basi cranio



Pterygo maxillary Fossa



Foramen lacerum

Roof of Masticatory space

Vidian canal

Forame ovale

Forame spinoso

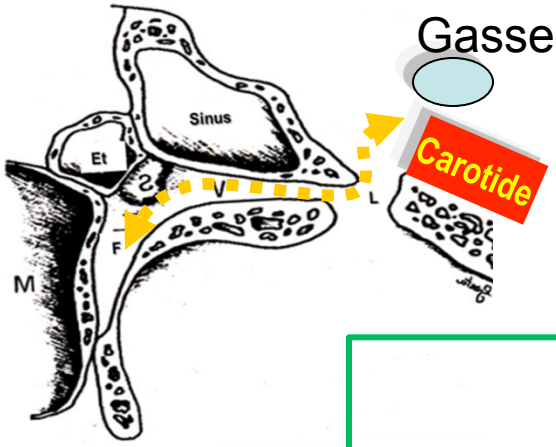
Canale carotico

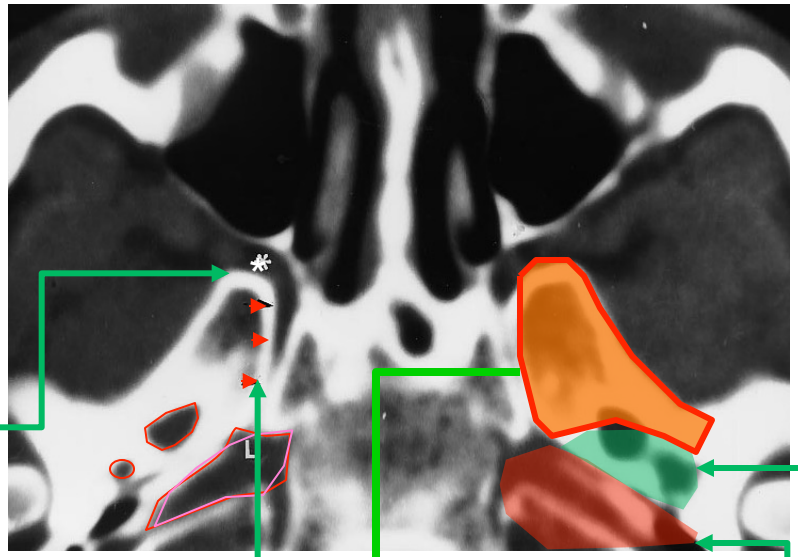
Roof of Parapharyngeal space

Foramen lacerum anterior

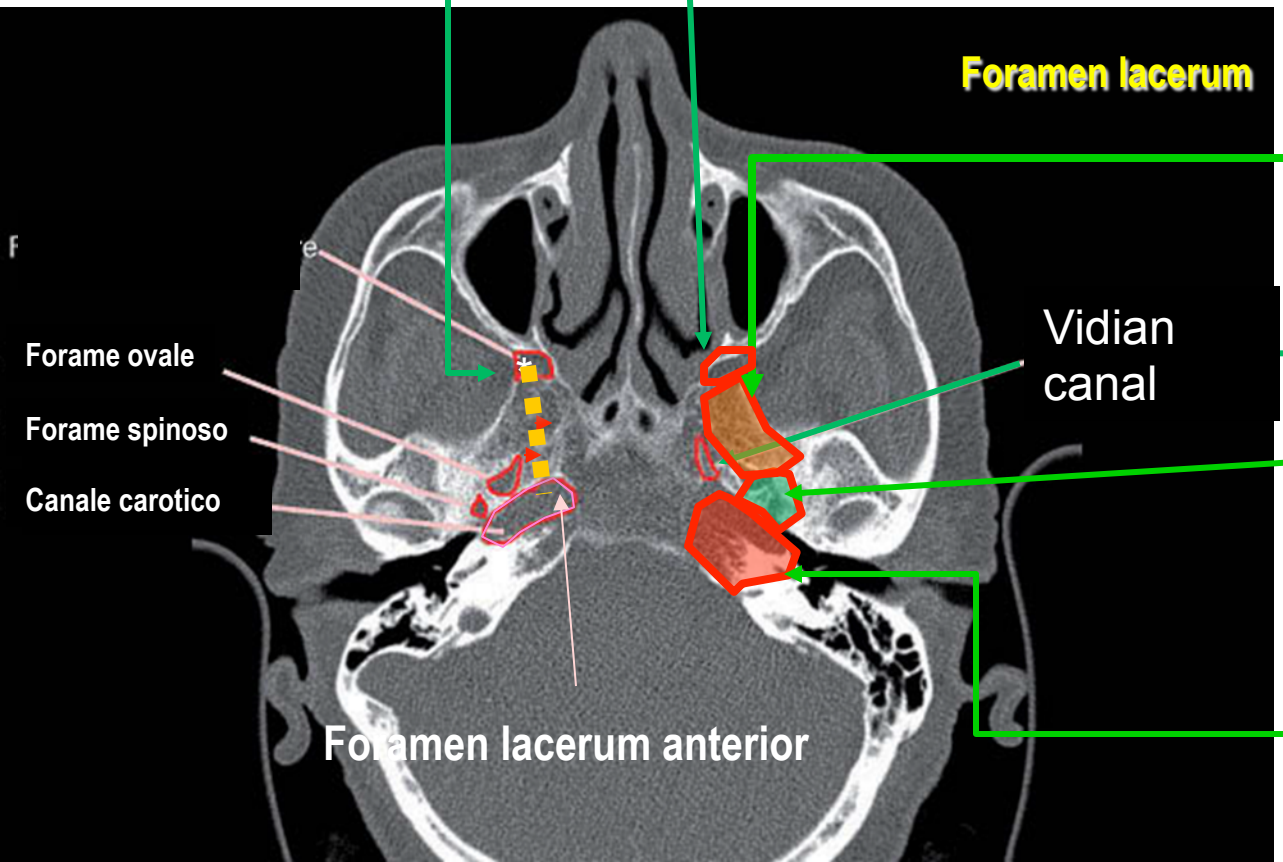
Roof of Retrostyloid space

Gasser Cranial





Pterygo maxillary Fossa



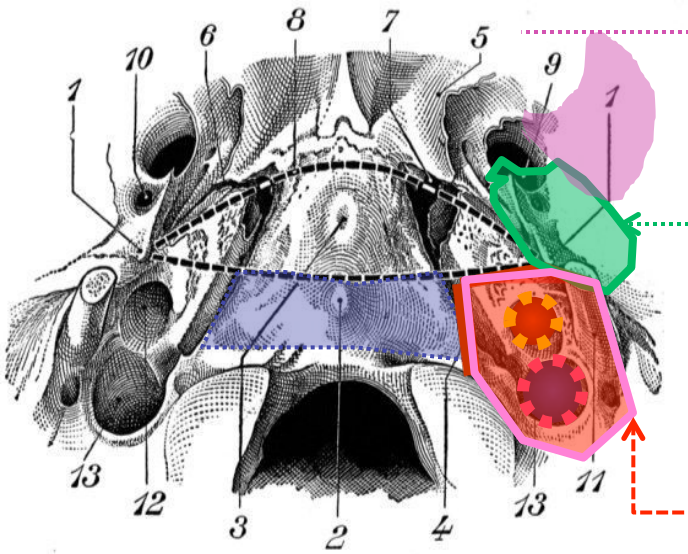
Roof of Masticatory space

Vidian canal

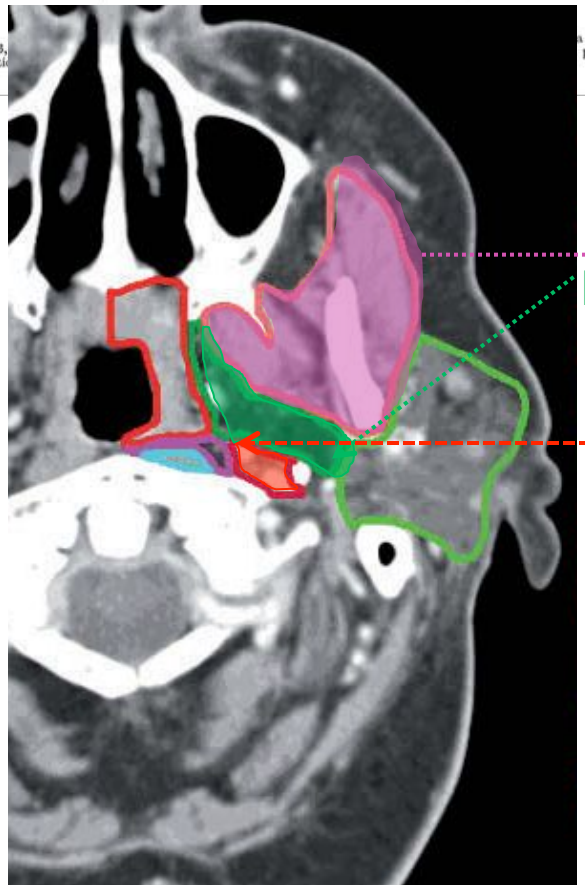
Roof of Parapharyngeal space

Roof of Retrostyloid space

Nasopharynx
Lateral Extension (80%)

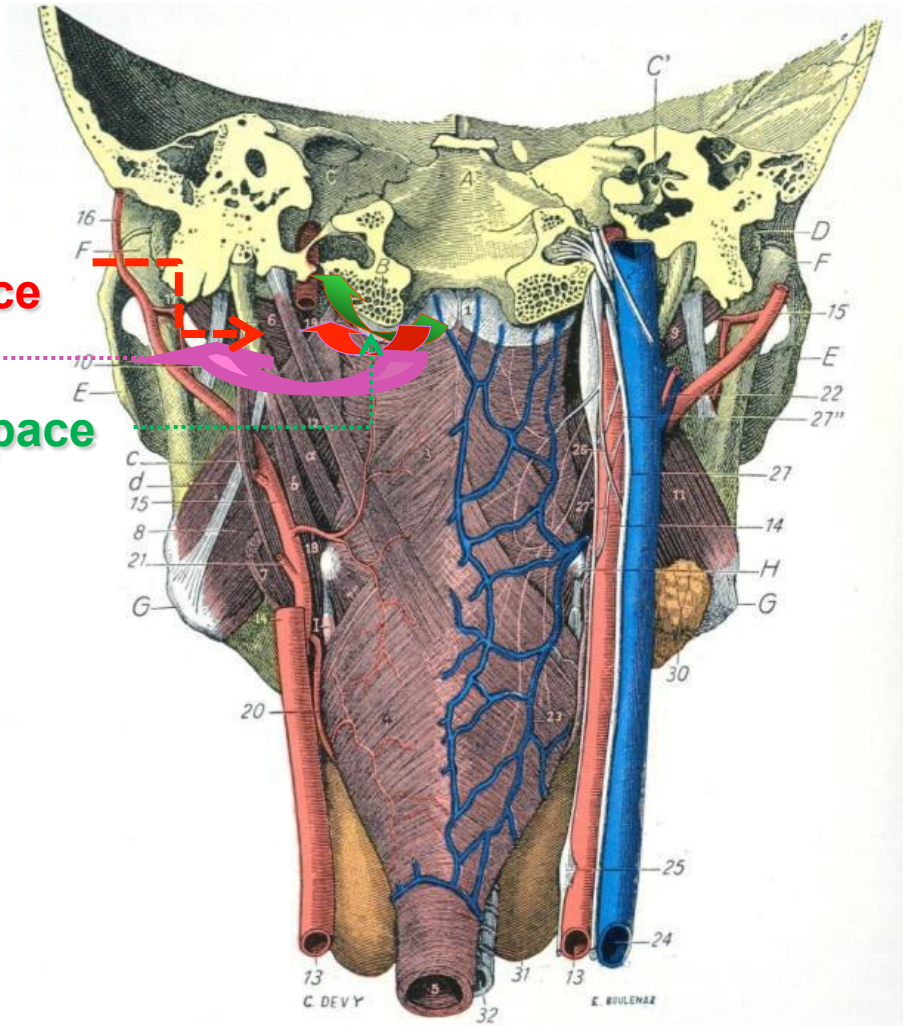


Masticatory space

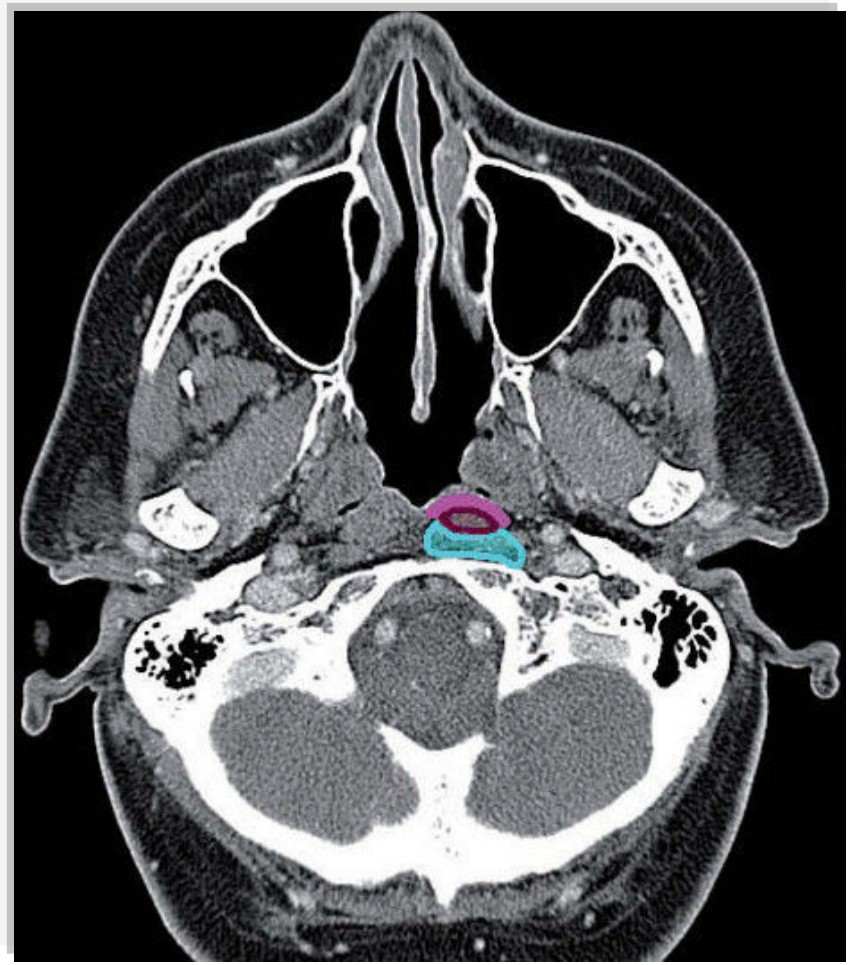


Carotid or
retrostyloid space

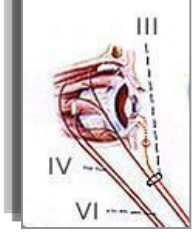
Parapharyngeal space



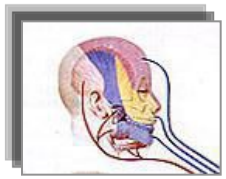
Postero-inferior extension ~ 20%



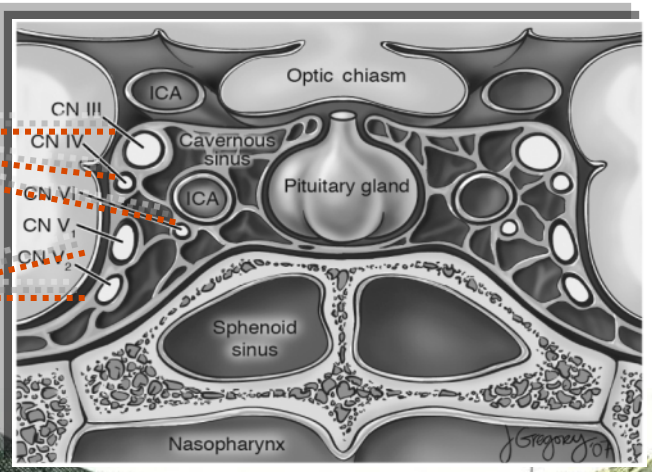
- Extension into retropharyngeal space

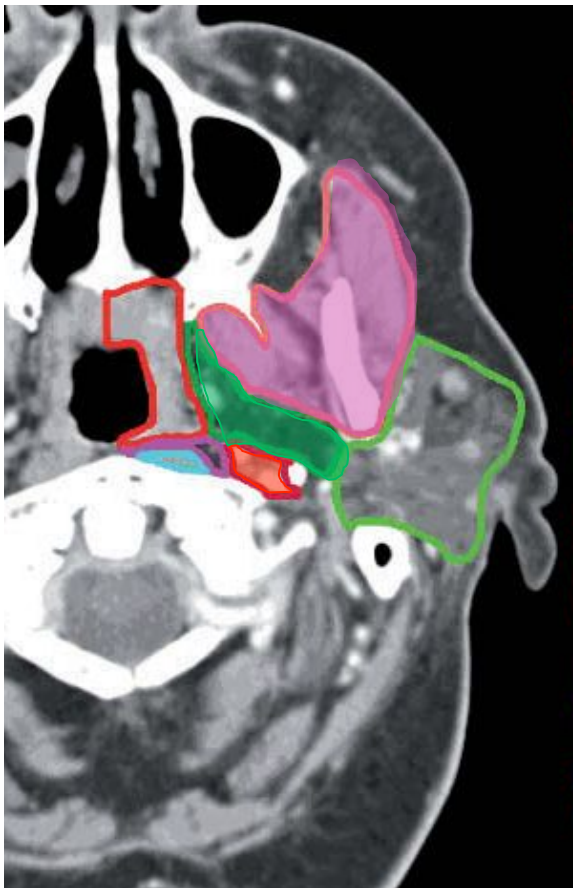


Oculomotore (III) , tocleare (IV), abducente (VI)

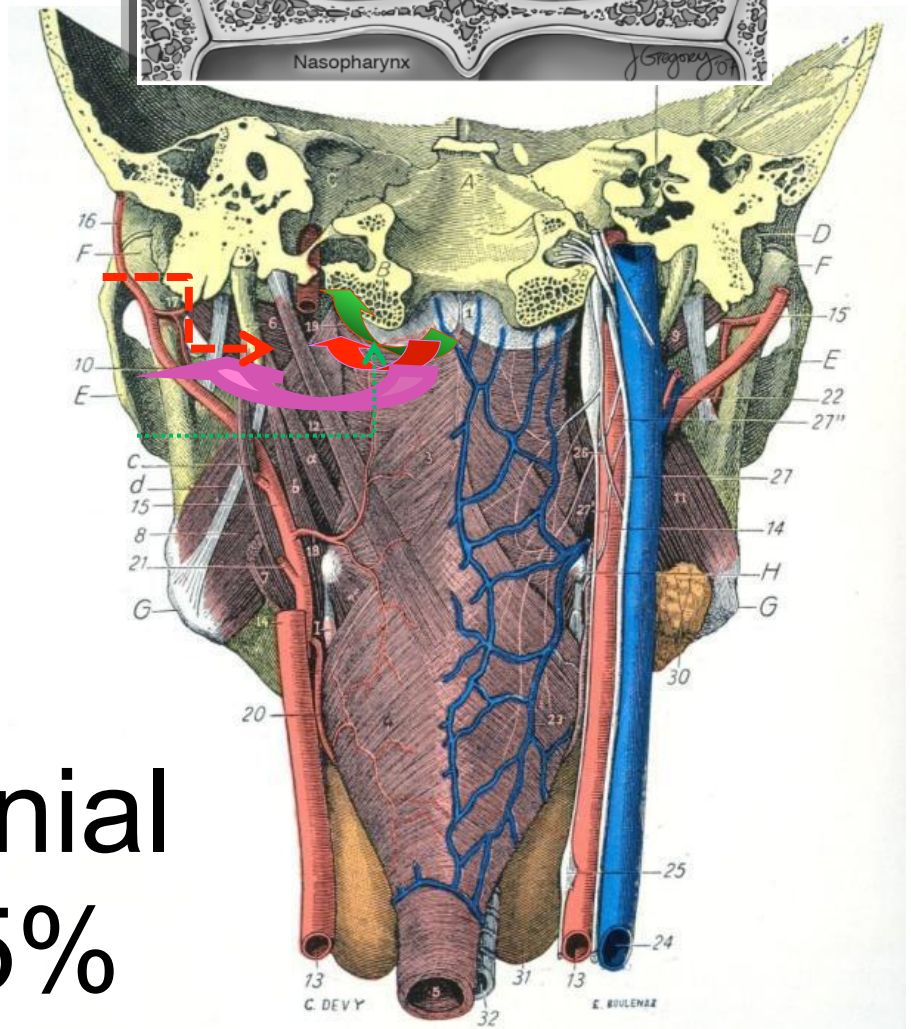


Dolore facciale e mal di testa

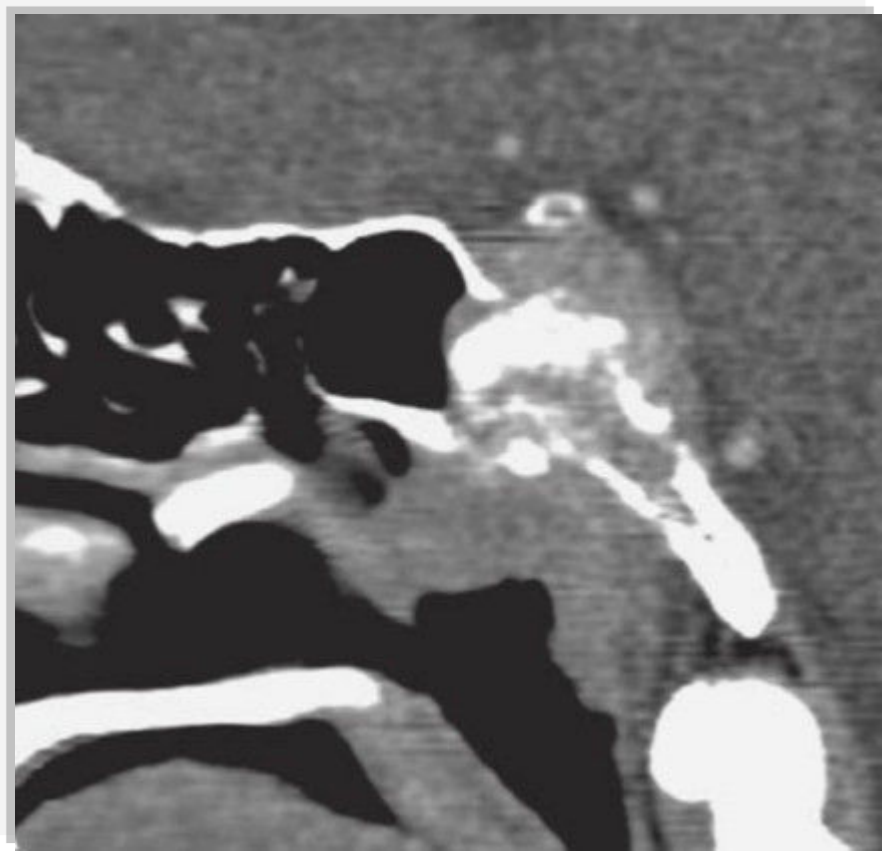


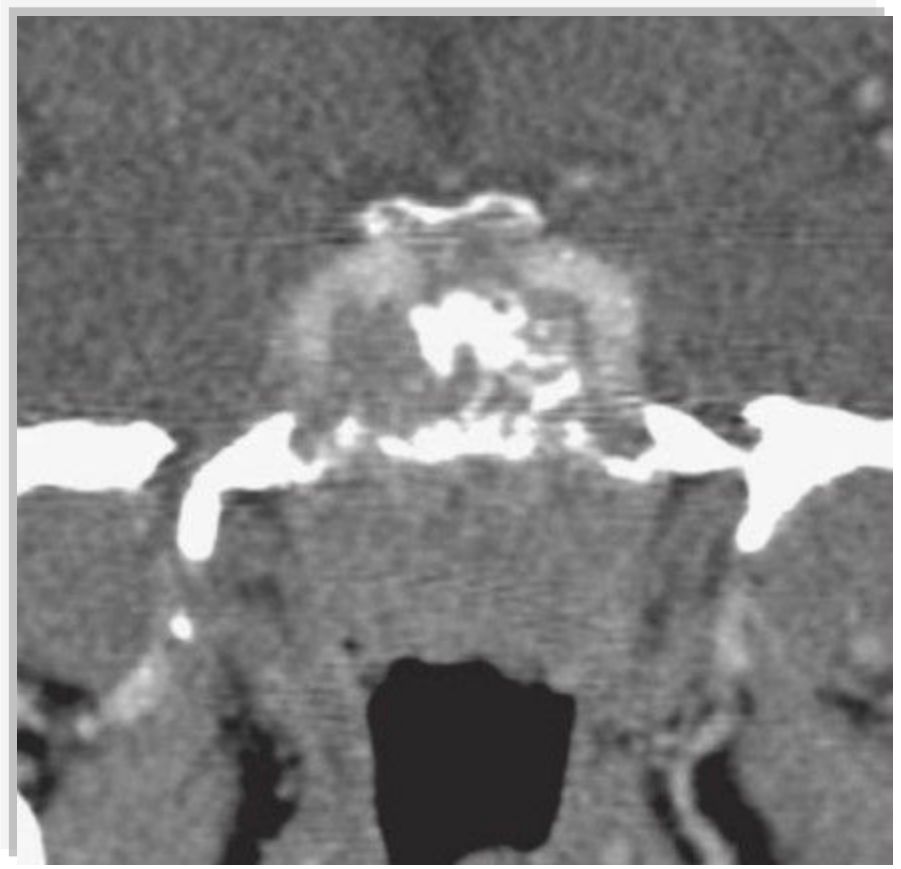


Cranial
< 5%



Cranial diffusion





From Mancuso H & R radiology 2011

Disponible en ligne sur Elsevier Masson France

ELSEVIER MASSON

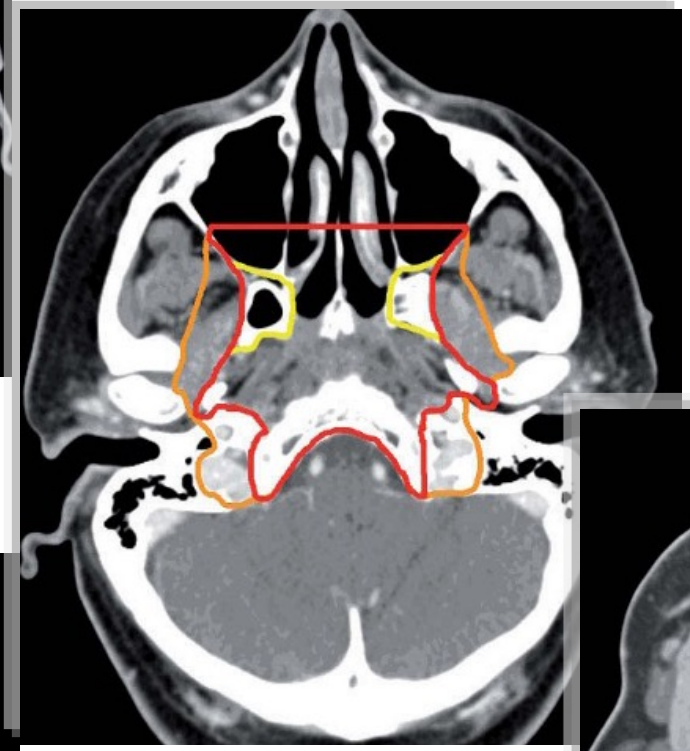
Cancers du cavu

Nasopharyngeal ca

B. Fleury*, M.C. Biston,

Département de radiothérapie, Cent

Article	Equipe	Limites du CTV tumoral				
		En haut	En bas	En avant	En arrière	Latéralement
Marcy et al., 2005 [33]	CAL, France	Sinus sphénoidal (moitié inférieure) Base du crâne dont foramen lacerum, foramen ovale et ganglion de Gasser	Musculature pharyngée Voile du palais Ogive amygdalienne Ganglions rétropharyngés	Fosses nasales Fosses ptérygo-maxillaires Canal ptérygoïdien	Espace prévertébral Clivus	Espaces parapharyngés espaces carotidiens
Sultanem et al., 2000 [39]	UCSF, USA	Sinus sphénoidal inférieur Base du crâne	Ganglions rétropharyngés	Fosses ptérygomaxillaires Tiers postérieur des cavités nasales et des sinus maxillaires	Clivus	Espaces parapharyngés
Lee et al., 2002 [28] Lee et al., 2003 [27]	UCSF, USA	Partie inférieure du sinus sphénoïde Base du crâne	Ganglions rétropharyngés	Fosses ptérygo maxillaires - Tiers postérieur des cavités nasales et des sinus maxillaires	Clivus	Espaces parapharyngés
Eisbruch et al., 2002 [11]	U. Michigan, USA	Sinus sphénoïdal Base du crâne dont sinus caverneux, foramen ovale, foramen épineux	Ganglions rétropharyngés	Apophyses ptérygoïdes Tiers postérieurs des cavités nasales et des sinus maxillaires	Clivus	Espaces parapharyngés (jusqu'à mi amygdales) Muscles ptérygoïdiens Espaces carotidiens
Kwong et al., 2006 [22] Kwong et al., 2004 [23]	QMH, Hong Kong	Sinus sphénoidal Base du crâne dont pointe de l'os pétreux, fissure orbitaire inférieure, foramen ovale, foramen épineux, sinus caverneux	Moitié antérieur du corps vertébral de C1 Muscles pré vertébraux	Tiers postérieur des cavités nasales et des sinus maxillaires	Clivus Muscles prévertébraux	Espaces parapharyngés Trompe d'Eustache Muscles ptérygoïdiens médiaux
Tham et al., 2009 [41]	NCC, Singapourg	Sinus sphénoïde Sinus caverneux Pointe des rochers Foramen ovale	Ganglions rétropharyngés	- Fosses ptérygo maxillaires - Tiers postérieur des cavités nasales et des sinus maxillaires	Clivus (moitié antérieure si intact, en entier si envahi)	Espaces parapharyngés
Kam et al., 2004 [20]	PoWH, Hong Kong	Sinus sphénoidal Sinus caverneux pointe des rochers	Ganglions rétropharyngés	- Fosses ptérygo maxillaires - Tiers postérieur des cavités nasales et des sinus maxillaires	Clivus (moitié antérieure si intact, en entier si envahi)	Espaces parapharyngés entiers



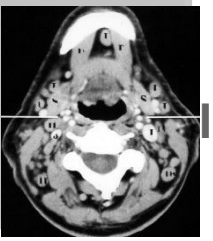
- In rosso: tutti gli autori
- In arancio la maggiorparte degli autori,
- In giallo solo qualche autore
  (metà basicranio solo 1 autore)

Limiti volumi clinici (CTVt)

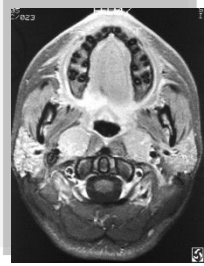
Direzione		Limiti
In alto	L	Forami ovale,spinoso e lacero.
	A	Ganglio di Gasser e seni cavernosi

Number of pts with clinically positive neck nodes found at presentation *(adapted From Gregoire 2000)*

		Level (Percentage of the node+ pts.)									
	N. Pt N+	I		II		III		IV		V	
Oral cavity (n=787)	36	42	3.5	79	8	18	3	5	1	1	0
Oropharynx (n=1497)	64	13	2	81	24	23	5	9	2.5	13	3
Hypopharynx (n=847)	70	2	0	80	13	51	4	20	3	24	2
Supraglottic Larynx (n=428)	55	2	0	71	21	48	10	18	7	15	4
Naspharynx (440 pts)*	**80**	**9**	**8**	**71**	**56**	**36**	**32**	**32**	**26**	**15**	**10**



Incidence of Positive Retropharyngeal Nodes for Various Primary Sites and Clinical Neck Stages (794 Tumors)



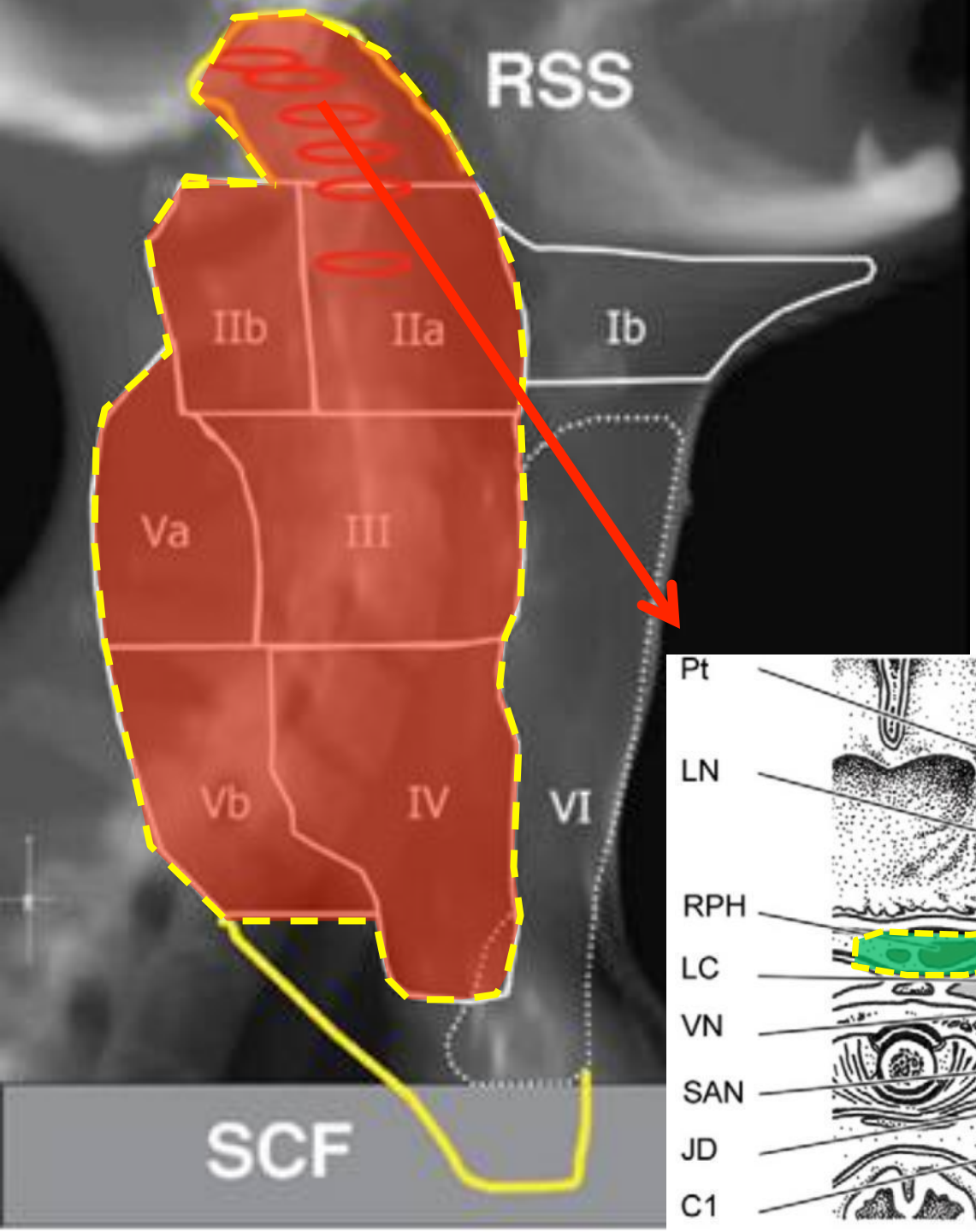
CUT OFF 10%

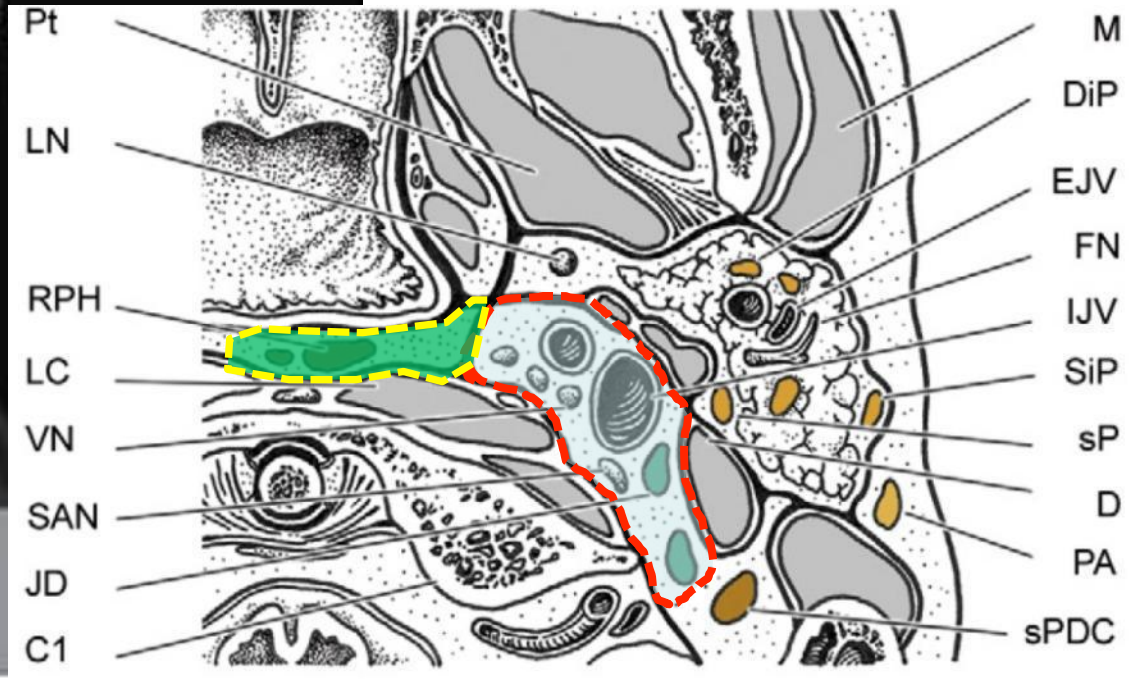
CT and RMI

Primary Site	Clinical Neck Stage N0 Neck No. %	N+ Neck[a] No. %	Overall %
Nasopharynx	2/5 (40%)	12/14 (86%)	74
Pharyngeal wall	6/37 (16%)	12/56 (21%)	19
Soft palate	1/21 (5%)	6/32 (19%)	13
Tonsillar region	2/56 (4%)	14/120 (12%)	9
Pyriform sinus or postcricoid area	0/55 (0%)	7/81 (9%)	5
Base of tongue	0/31 (0%)	5/90 (6%)	4
Supraglottic larynx	0/87 (0%)	4/109 (4%)	2

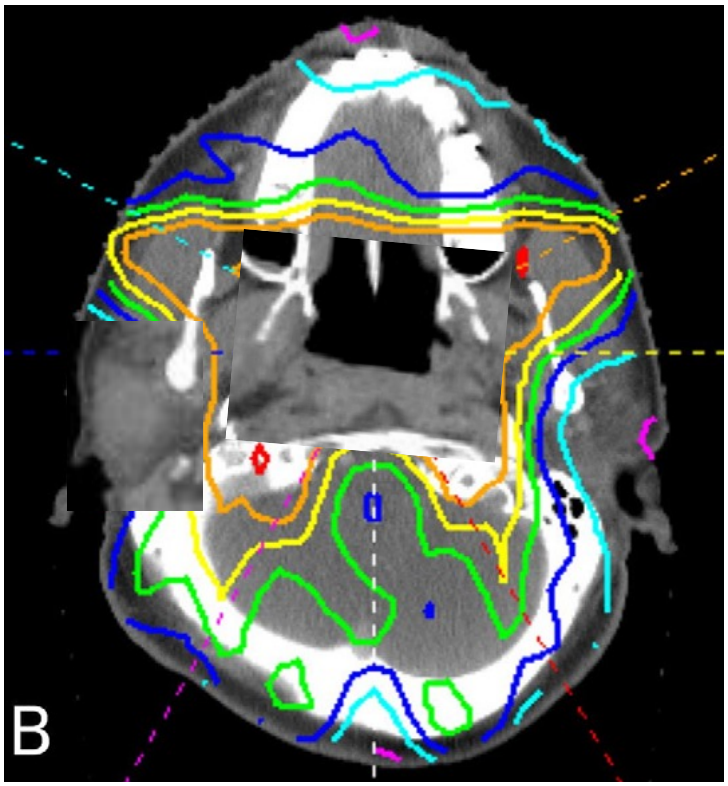
[a]N+, neck nodes clinically involved (stages N1–3B).

From McLaughlin MP, Mendenhall WM, Mancuso AA, et al. Retropharyngeal adenopathy as a predictor of outcome in squamous cell carcinoma of the head and neck. *Head Neck* 1995;17:190–198,


RSS
IIb
IIa
Ib
Va
III
Vb
IV
VI
SCF

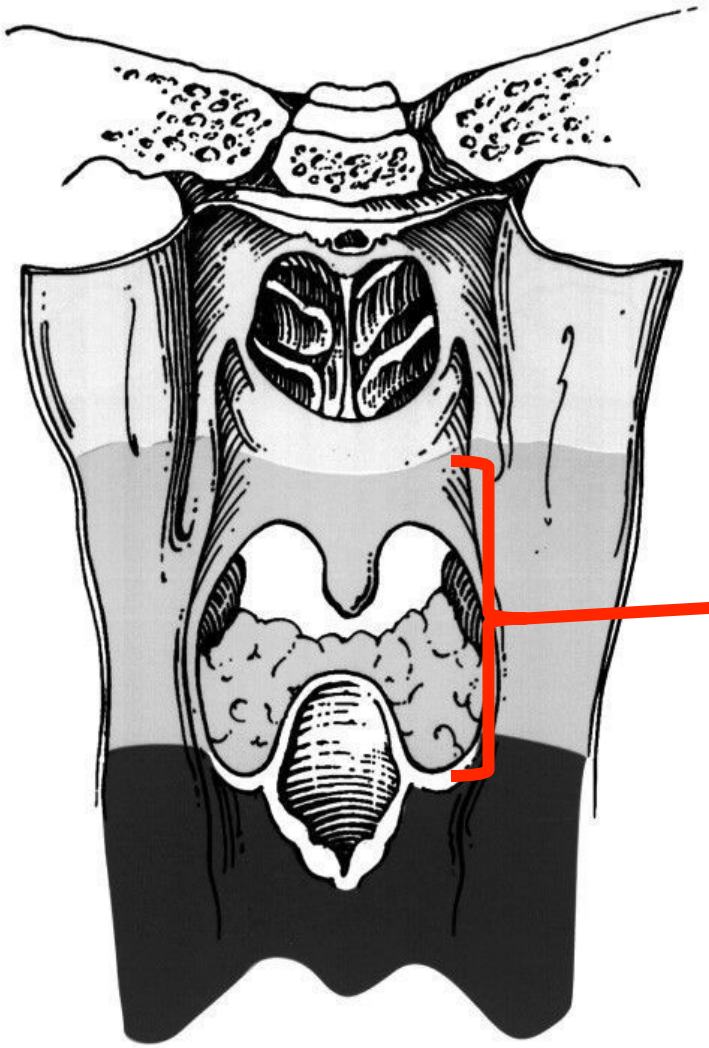

Pt
LN
RPH
LC
VN
SAN
JD
C1
M
DiP
EJV
FN
IJV
SiP
sP
D
PA
sPDC

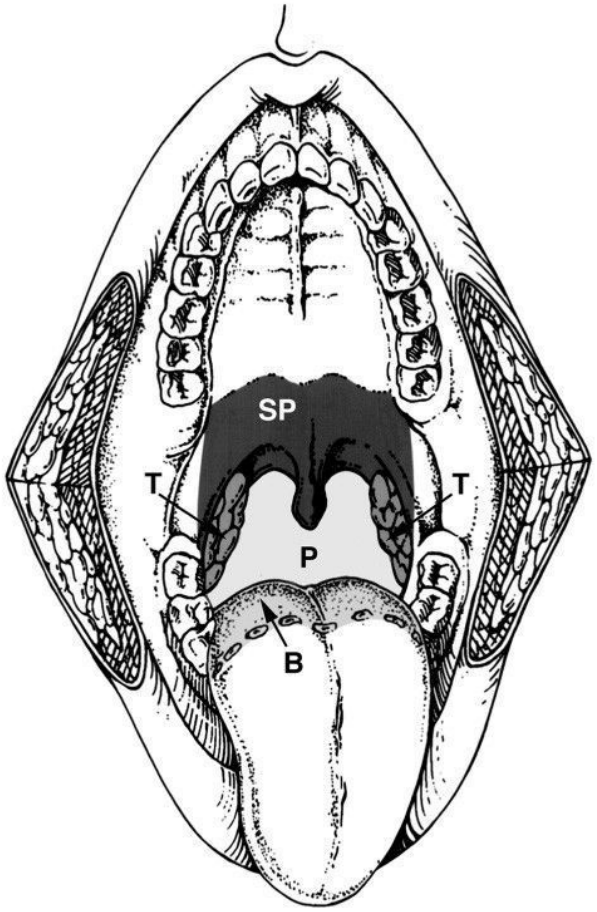
Parotid relapse



- Eustachian tube has several patterns of drainage, one of which is to superficial parotid lymph node

Orofaringe



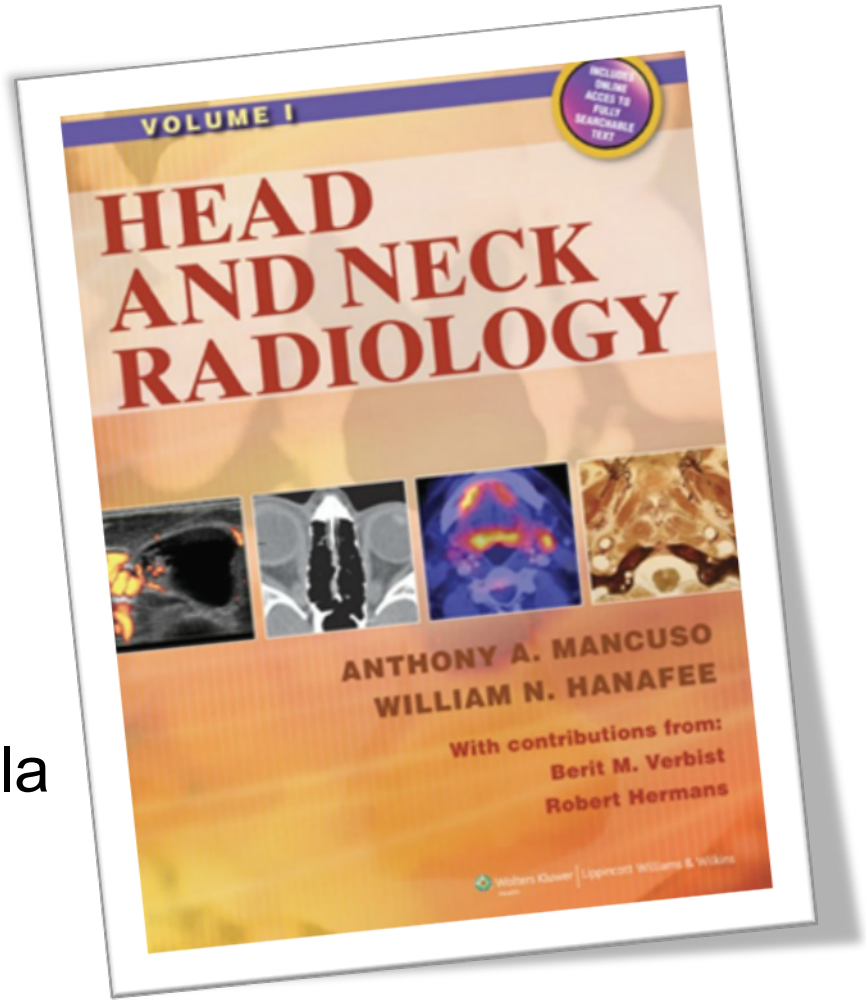


Nasopharynx
Oropharynx
Hypopharynx

B Base of tongue
T Tonsils
SP Soft palate
P Pharyngeal wall

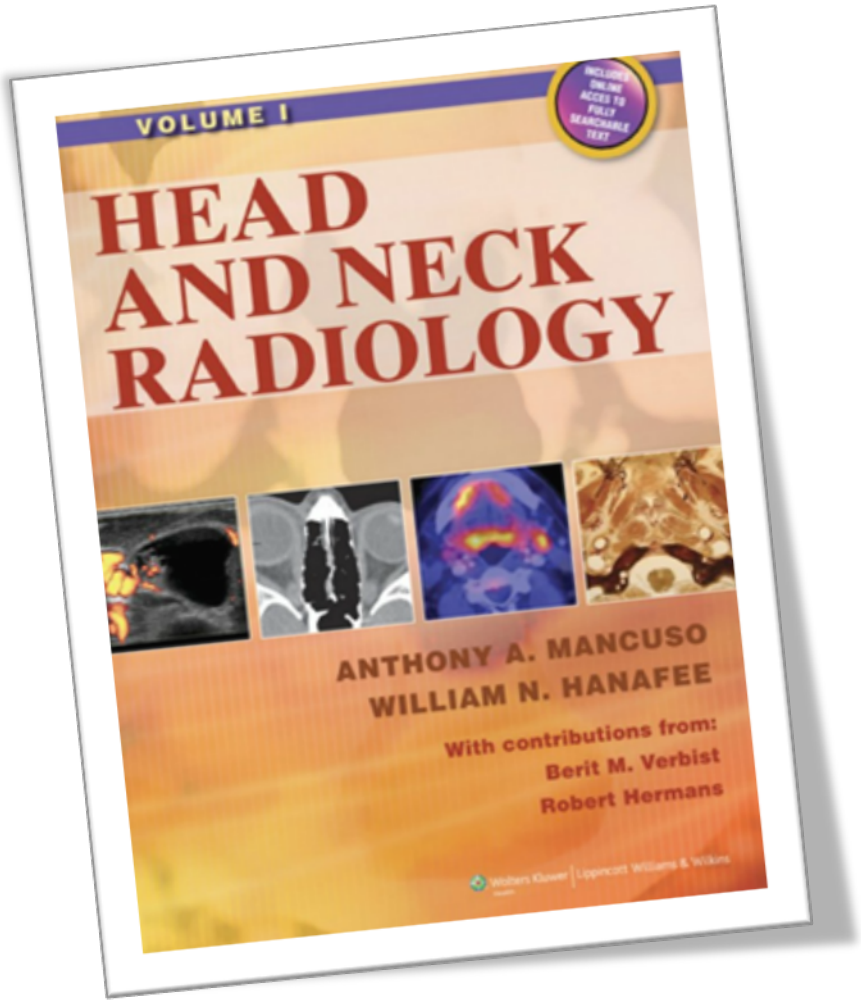
Oropharynx

- Posterior wall
  - Posterior Pharyngeal wall
- Roof:
  - Soft palate
- Lateral wall:
  - Anterior Pillar
  - Tonsils and posterior pillar
- Floor
  - Base of tongue and Vallecula

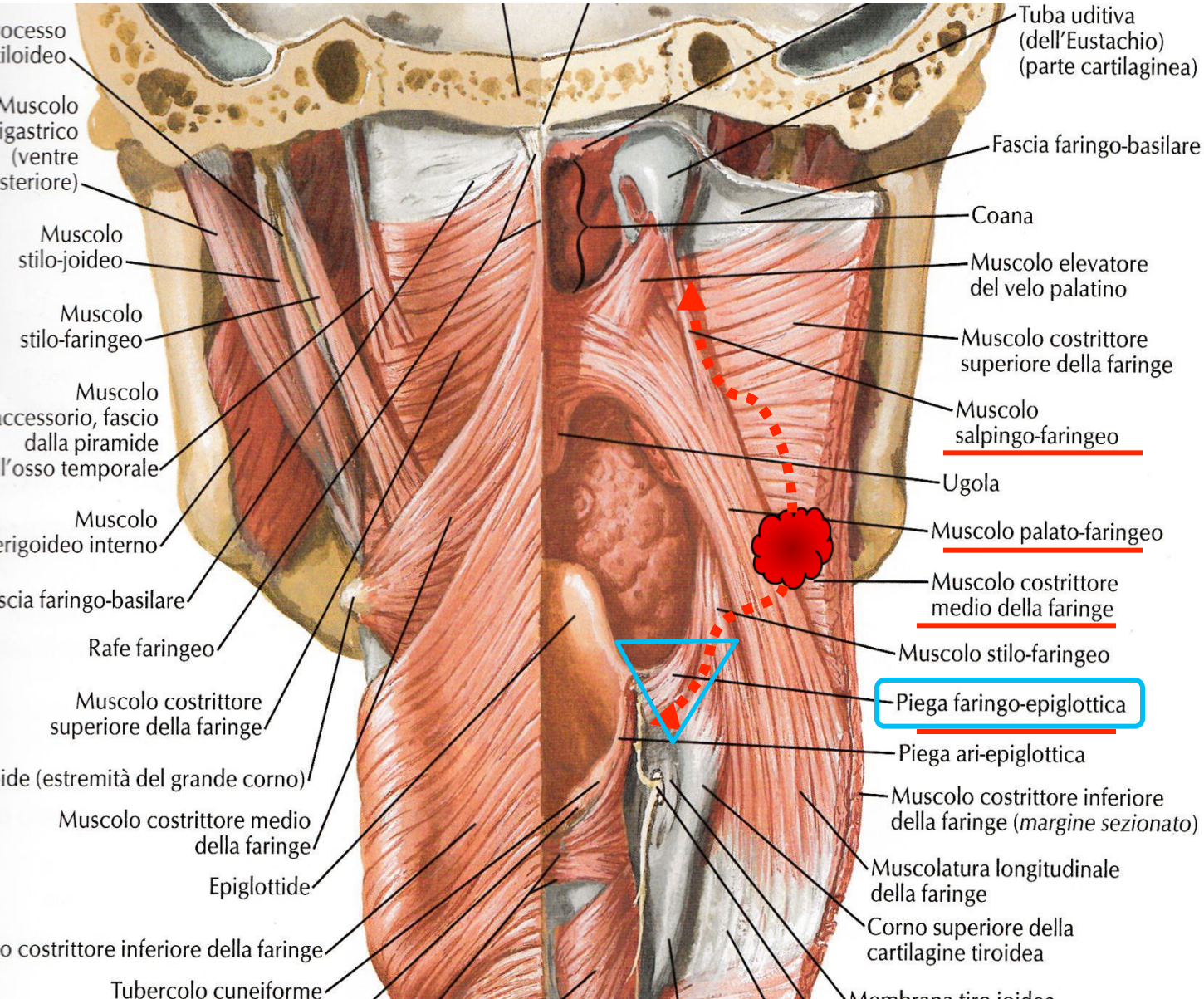


Oropharynx

- Posterior wall
  - Posterior Pharyngeal wall

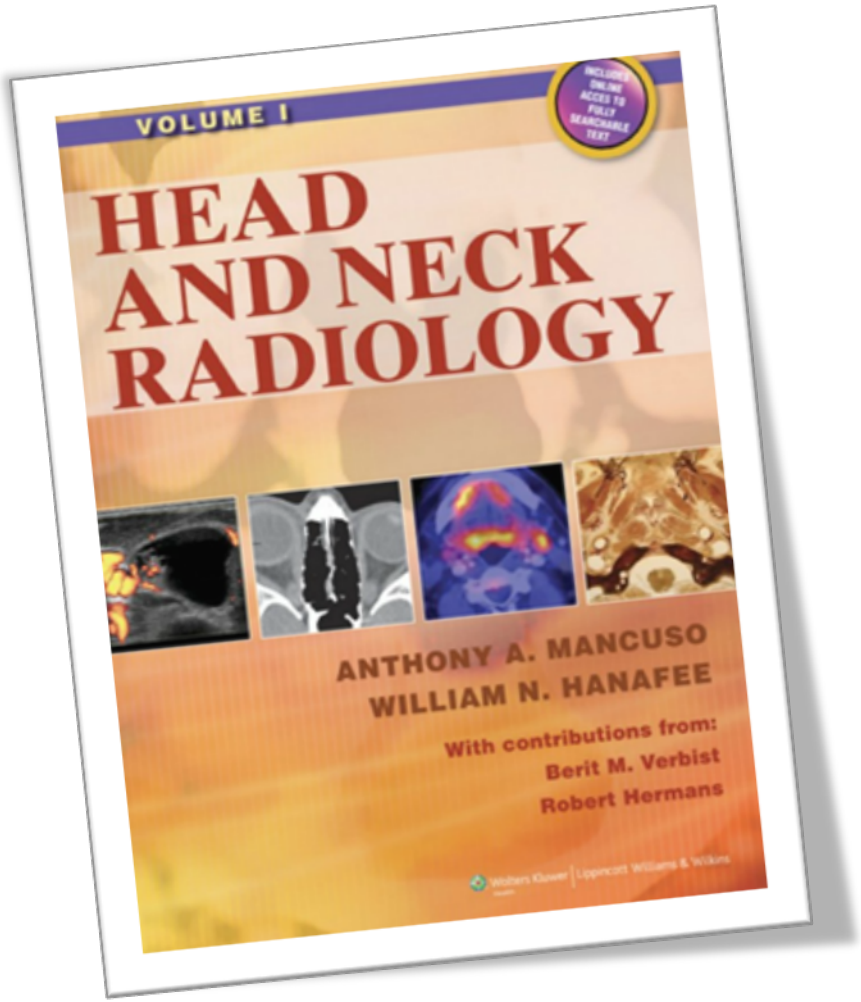


Posterior pharyngeal wall

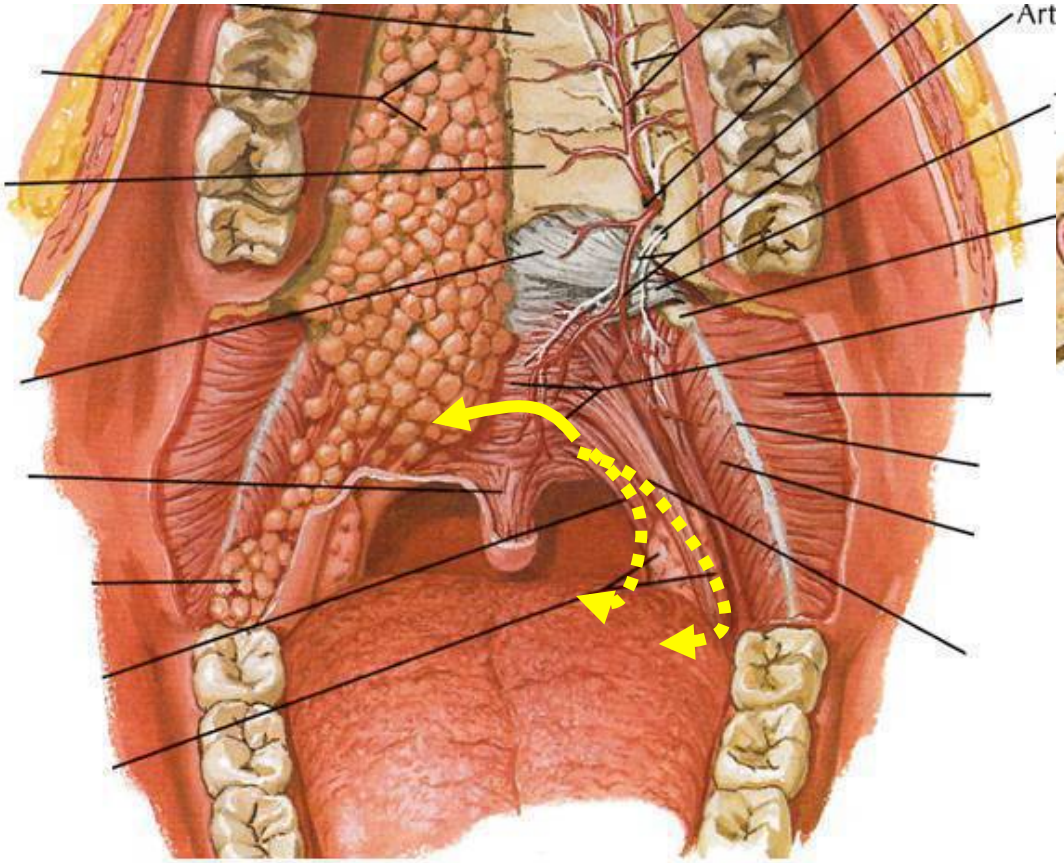


Oropharynx

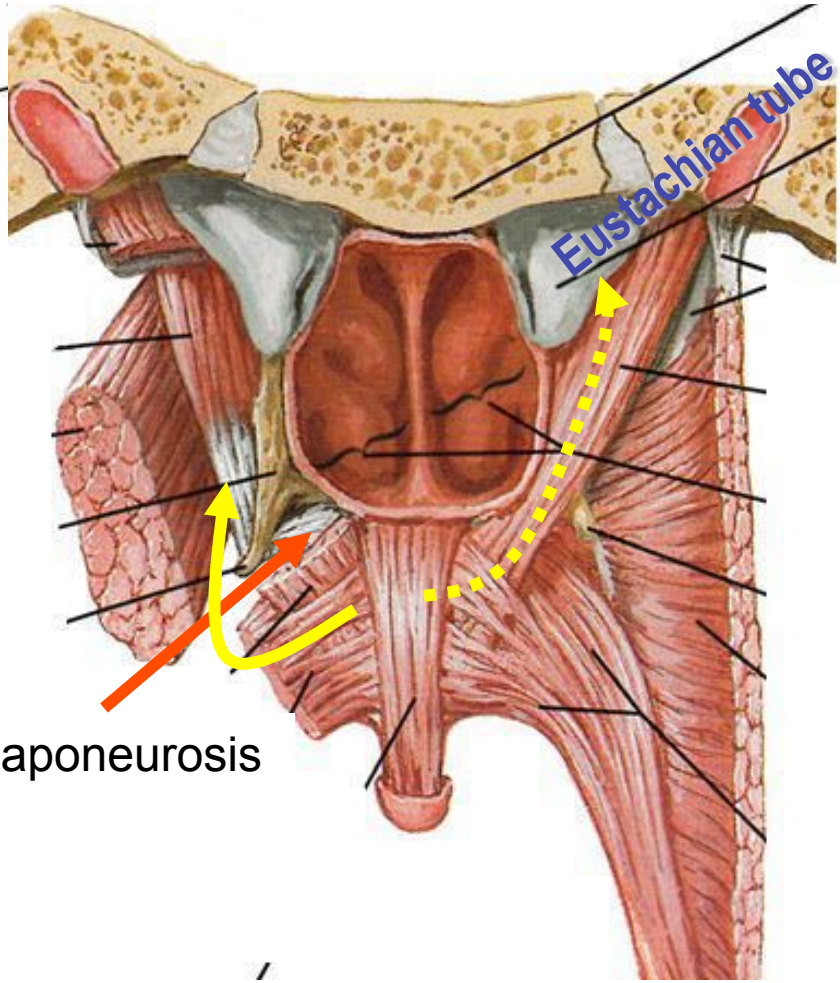
- Roof:
  - Soft palate



Soft palate

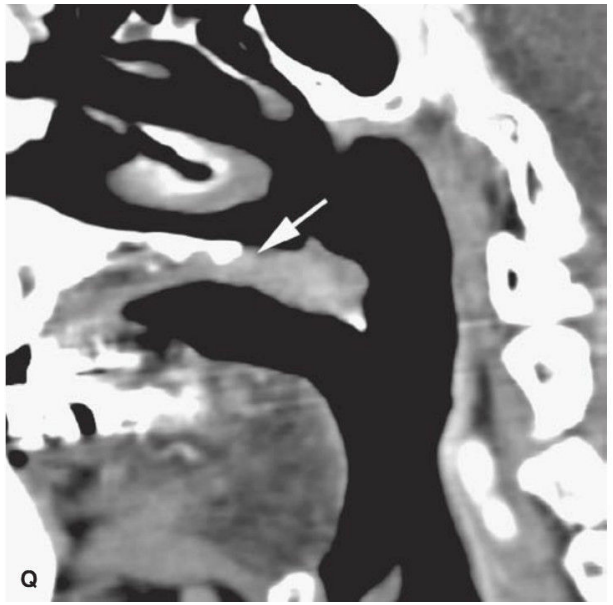


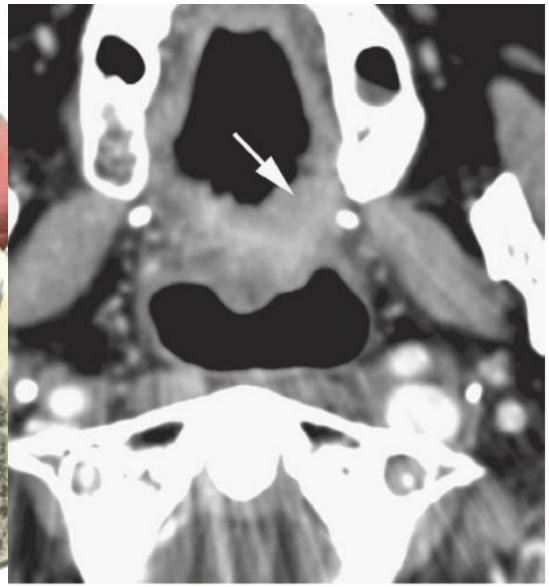
M. T. Involve anterior surface

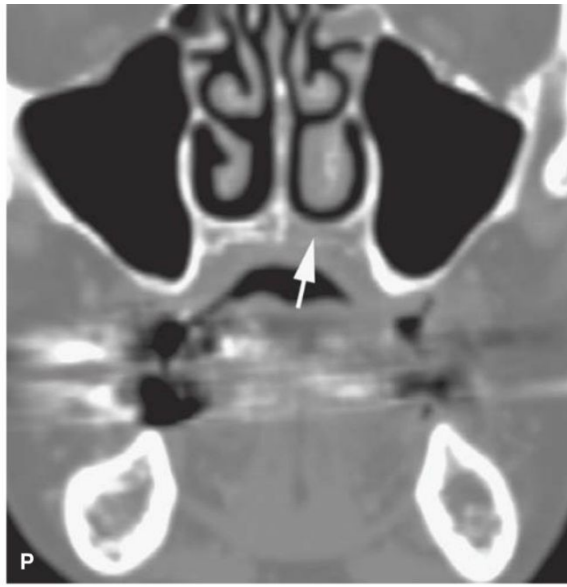


palatine aponeurosis

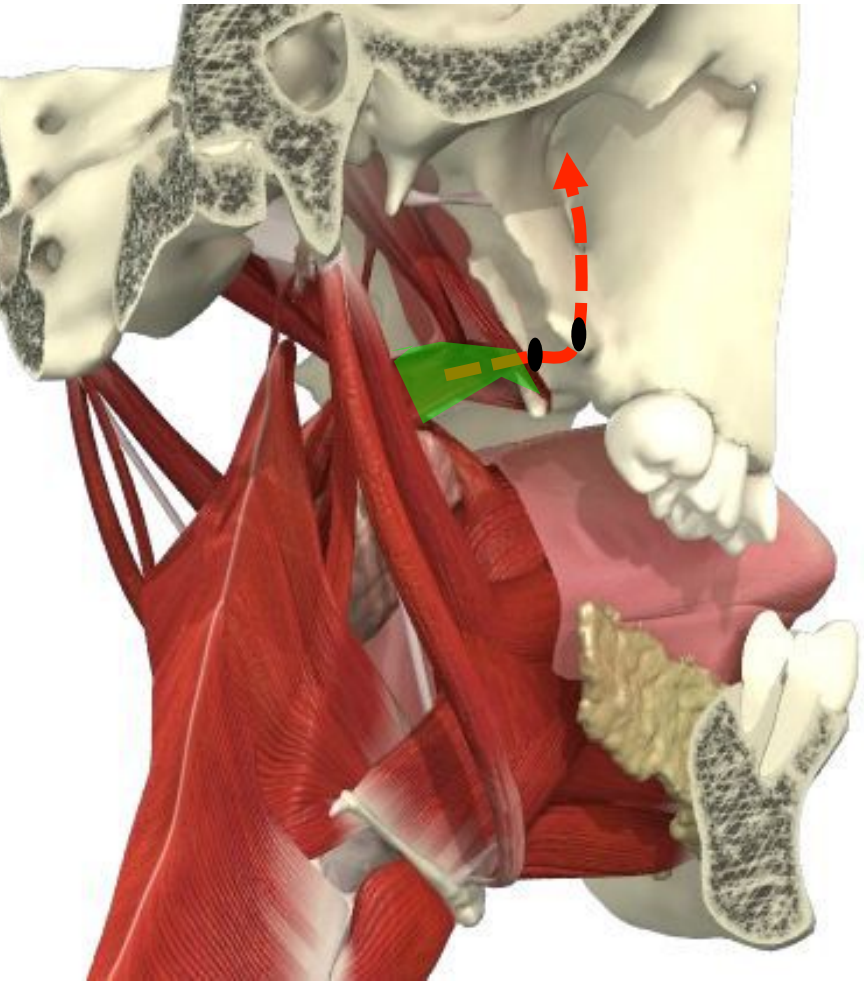
Soft palate

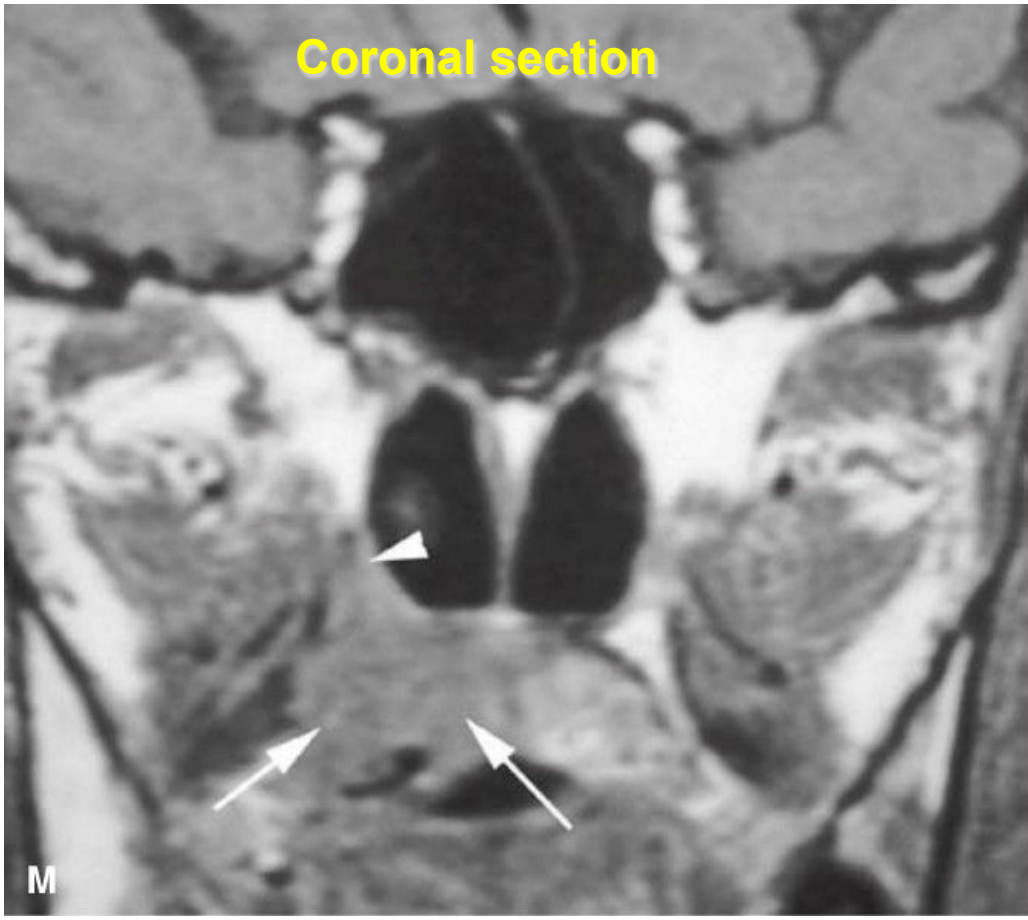






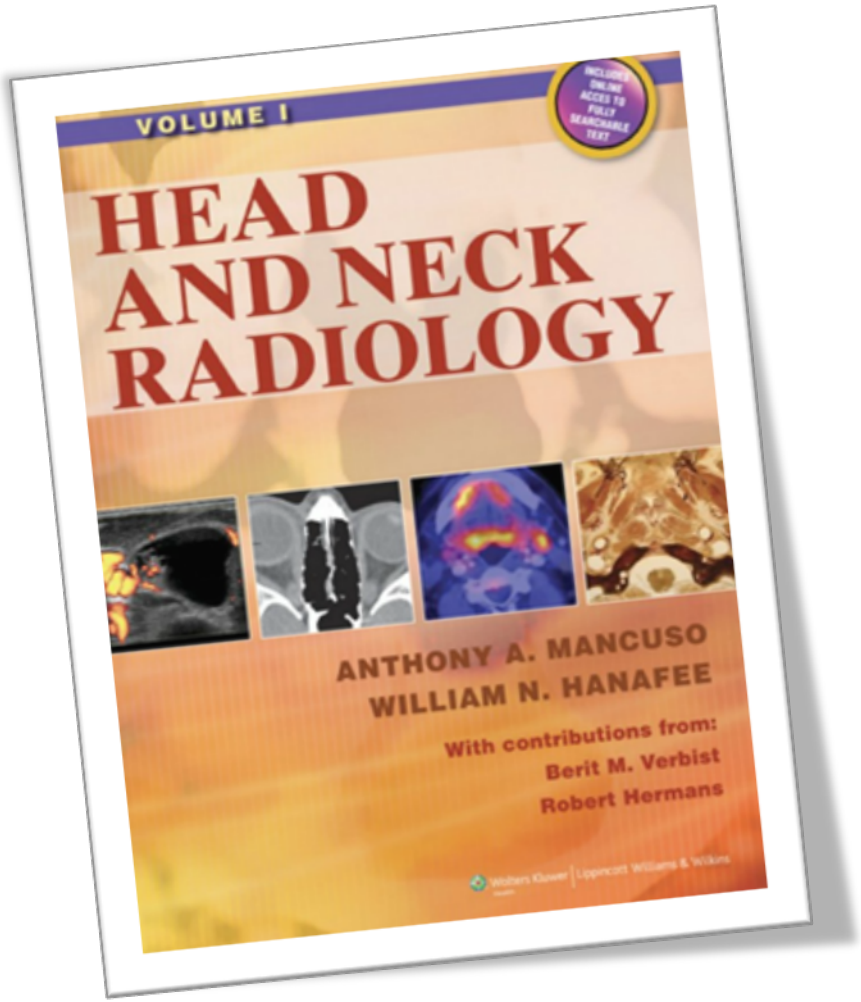
Velo palatino
diffusione verso la fossa pterigopalatina



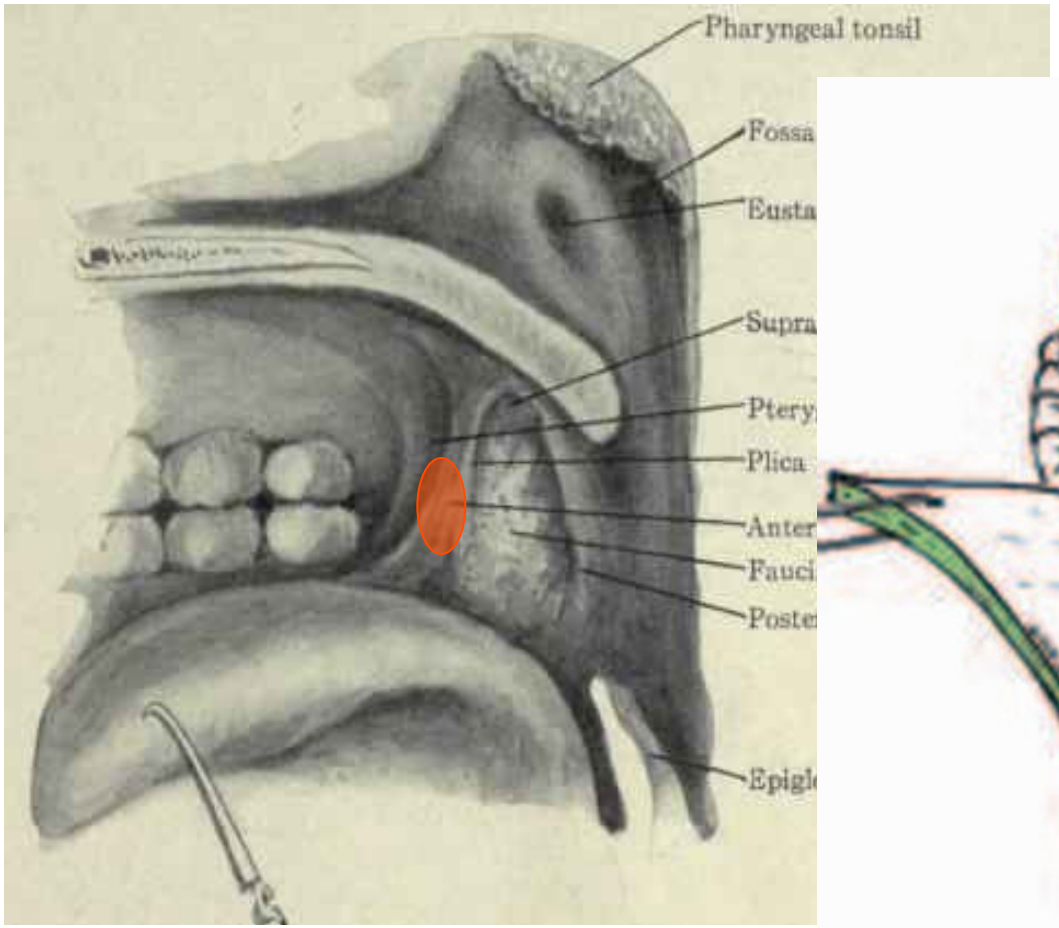


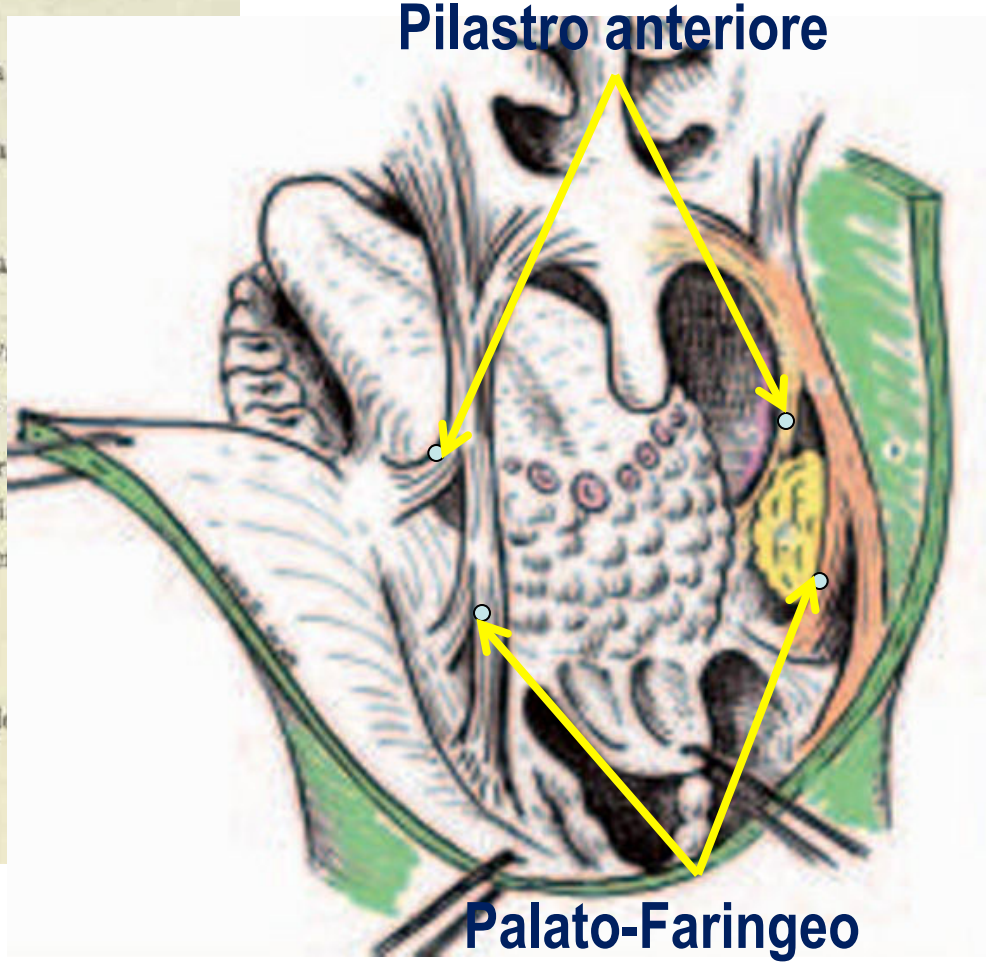
Oropharynx

- Lateral wall:
  - Anterior Pillar
  - Tonsils and posterior pillar



Anterior Pillar



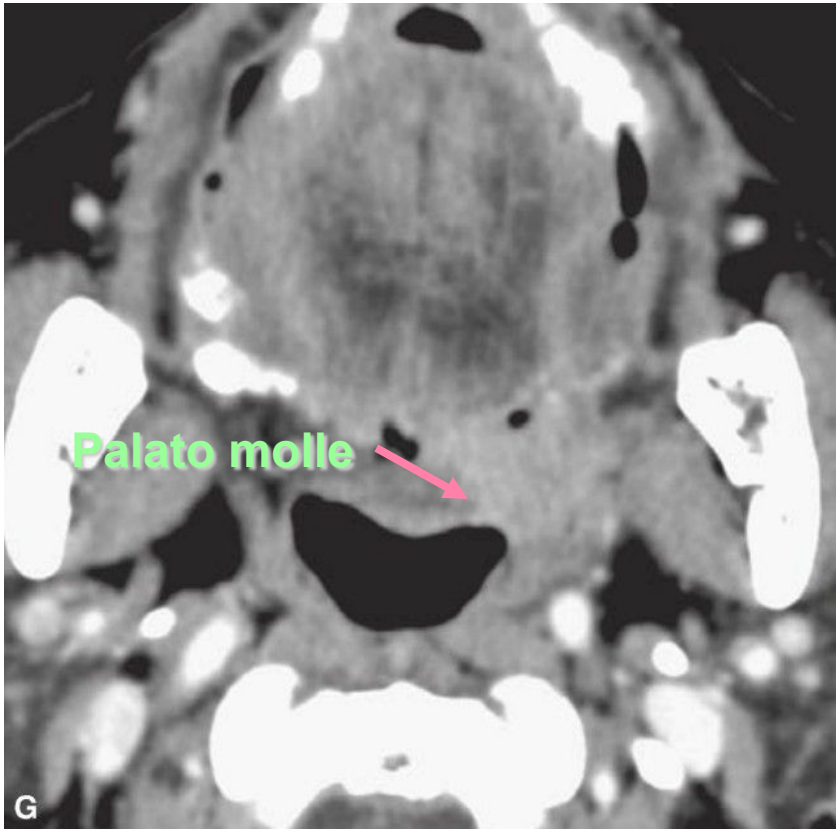


Palato-glosso
Pilastro anteriore

Palato-Faringeo
Pilastro posteriore

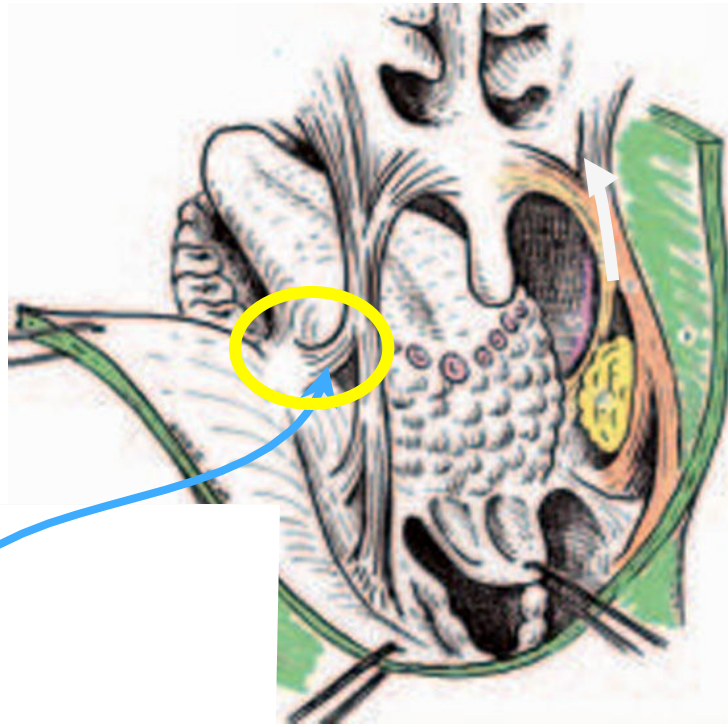
Diffusione dal pilastro anteriore

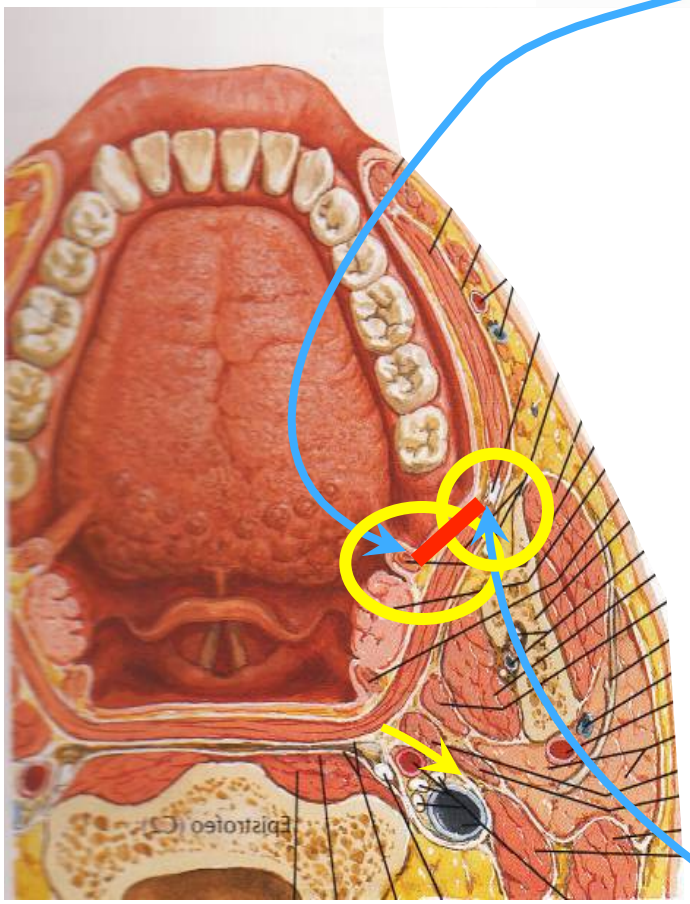
- In alto: palato molle.

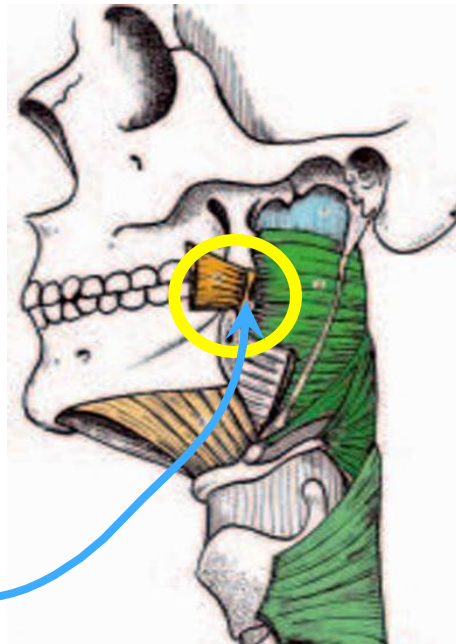


Diffusione dal pilastro anteriore

- In alto: palato molle.
- Antero-laterale: commissura e trigono

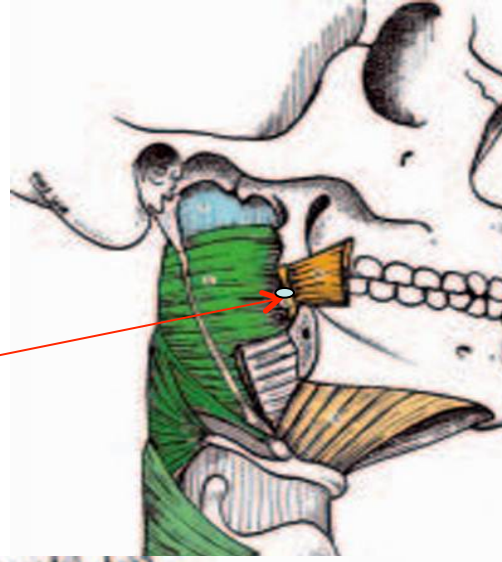




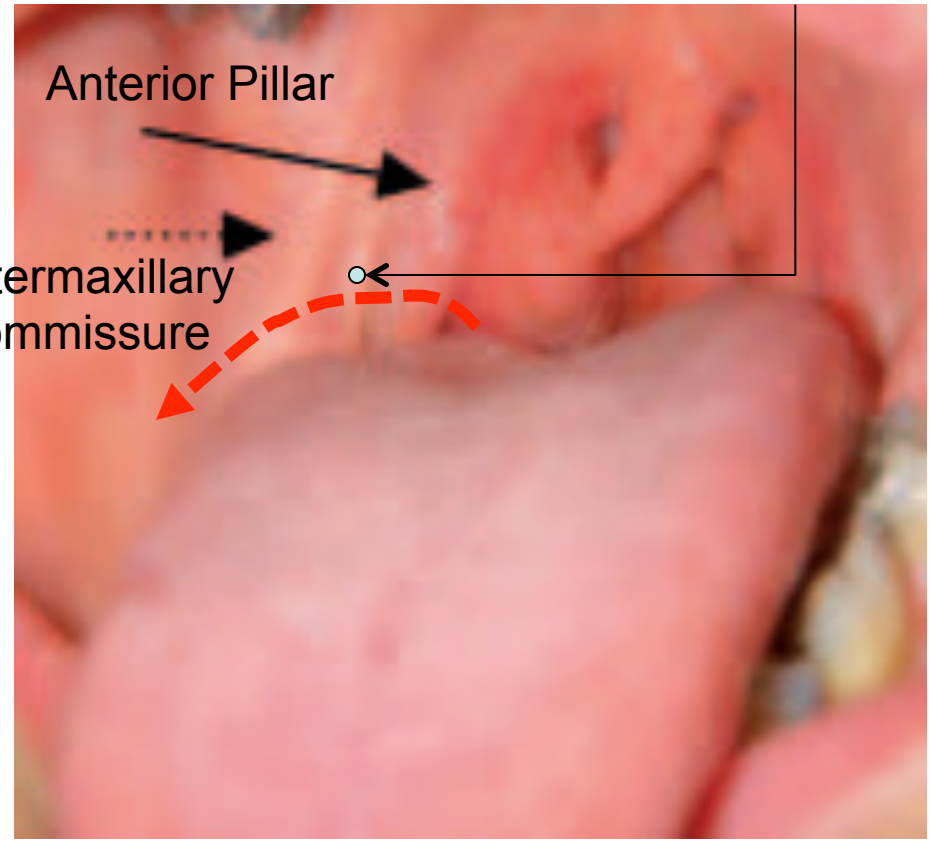


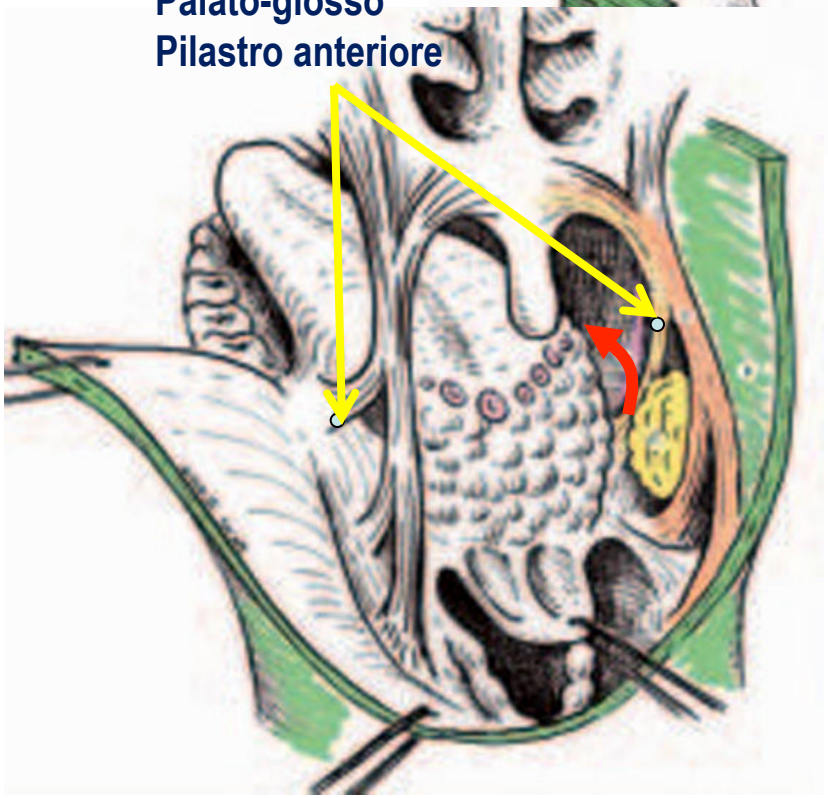
Regione tonsillare

- Antero-laterale: commissura e trigono.



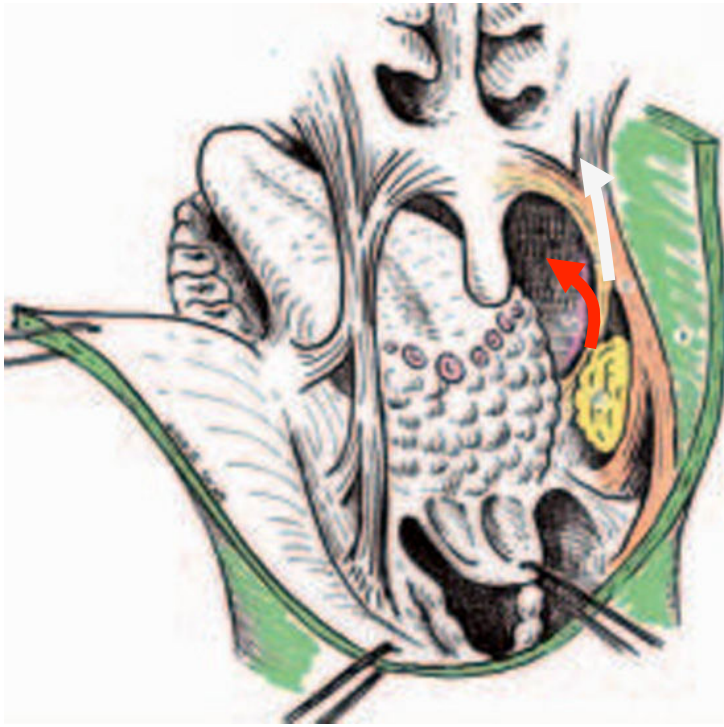
ligament pterygomandibular

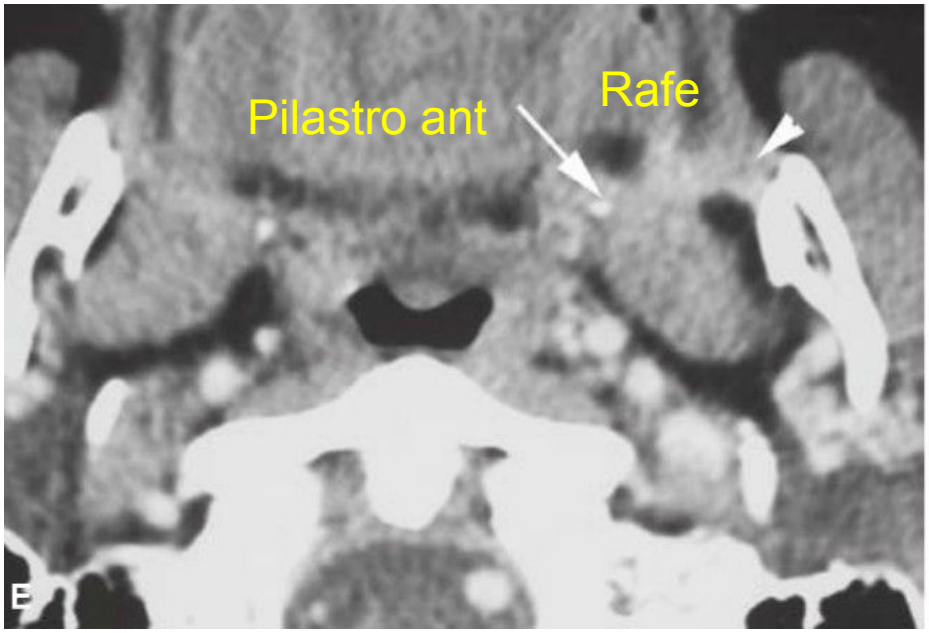


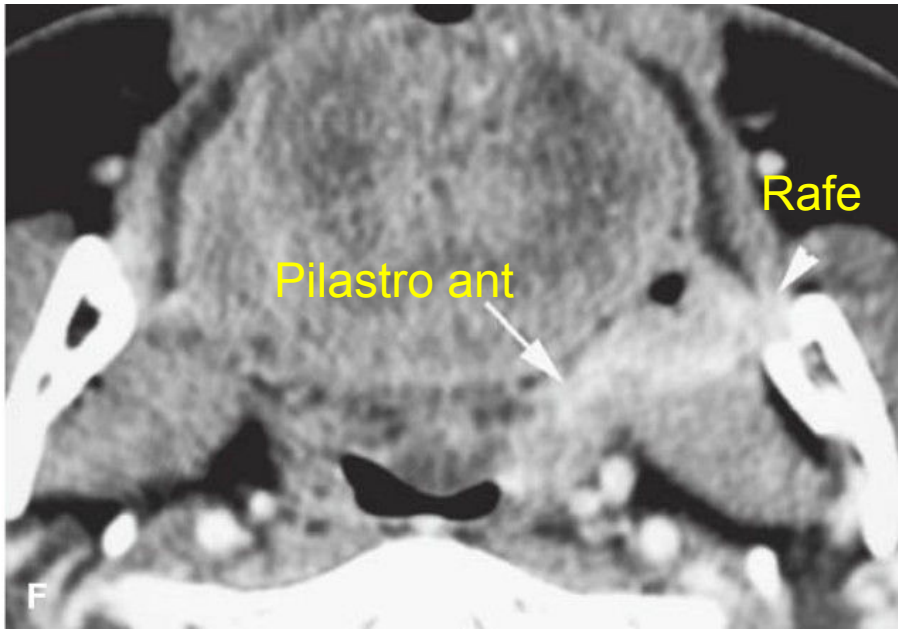


Diffusione dal pilastro anteriore

- In alto: palato molle.
- Antero-laterale: commissura e trigono.







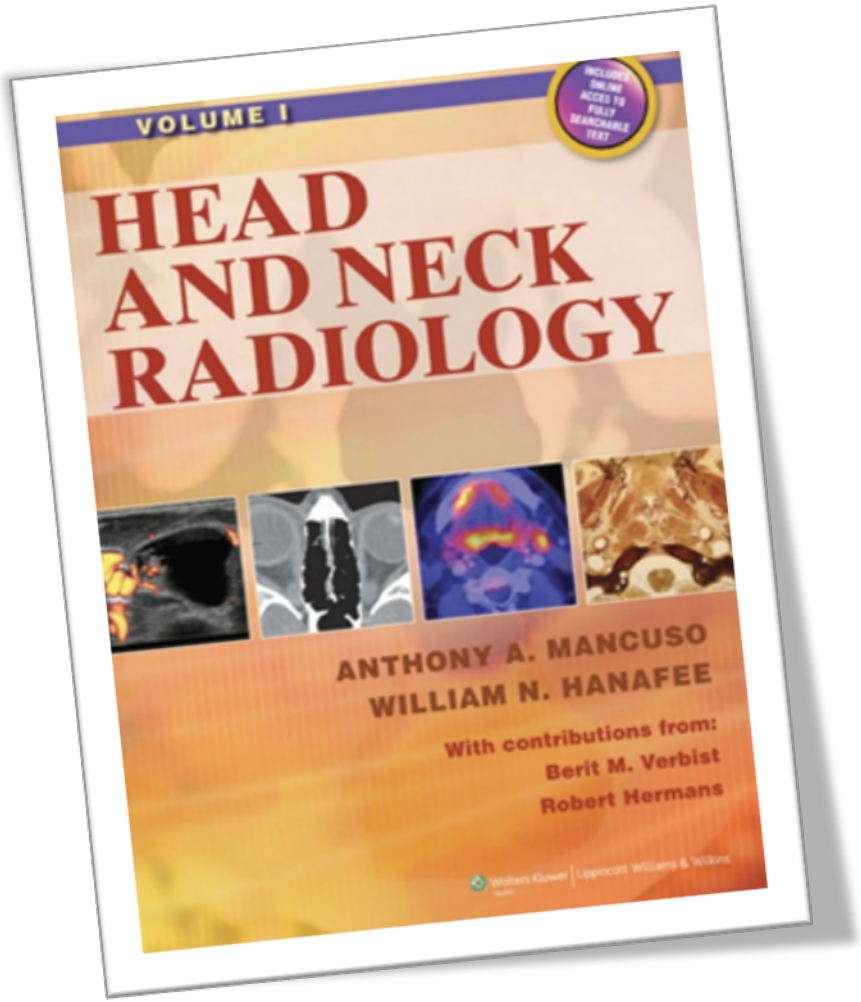
Diffusione dal pilastro anteriore

- In alto: palato molle.
- Antero-laterale: commissura e trigono.

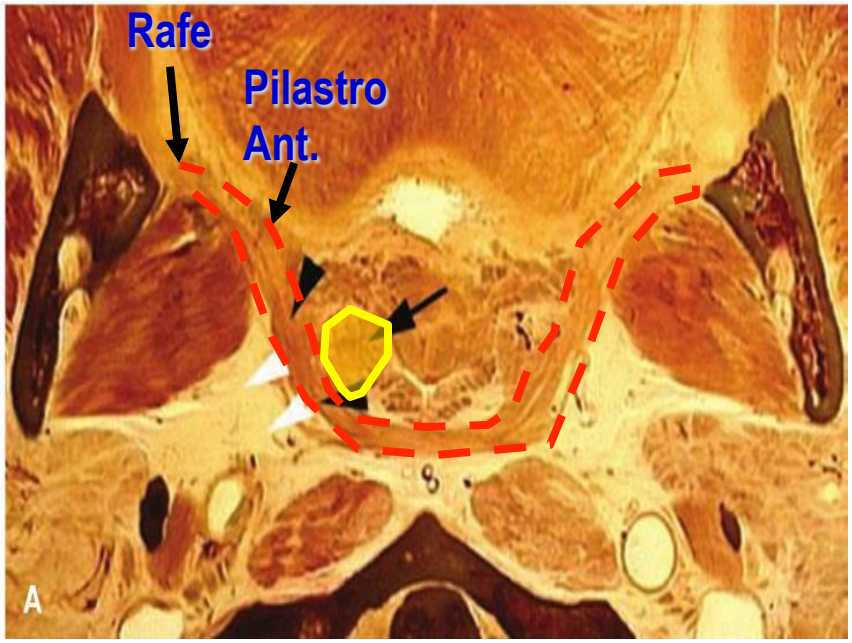
- Infero-medialmente: solco amigdalo-glosso e regione glossoepiglottica, base lingua.

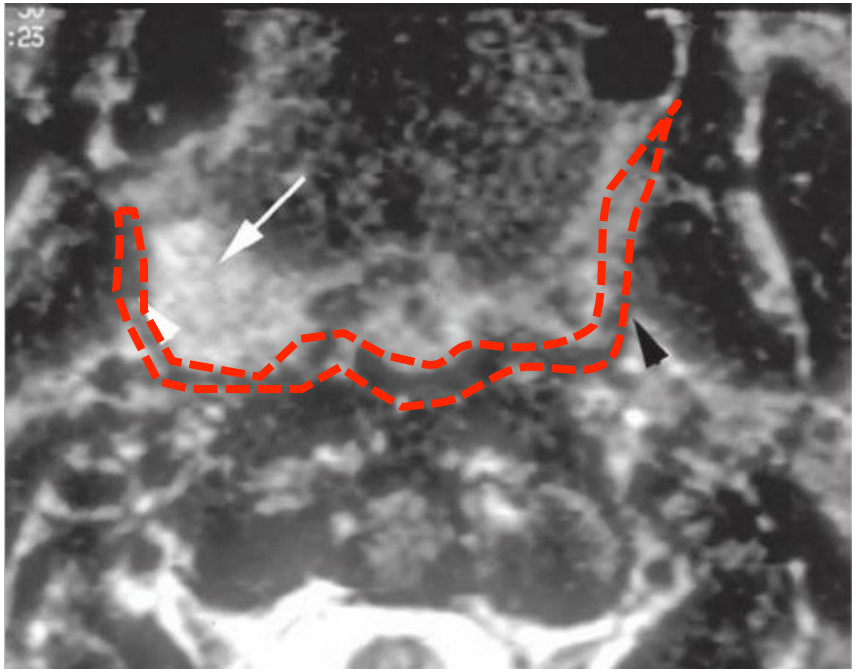
Oropharynx

- Lateral wall:
  - Anterior Pillar
  - Tonsils and posterior pillar

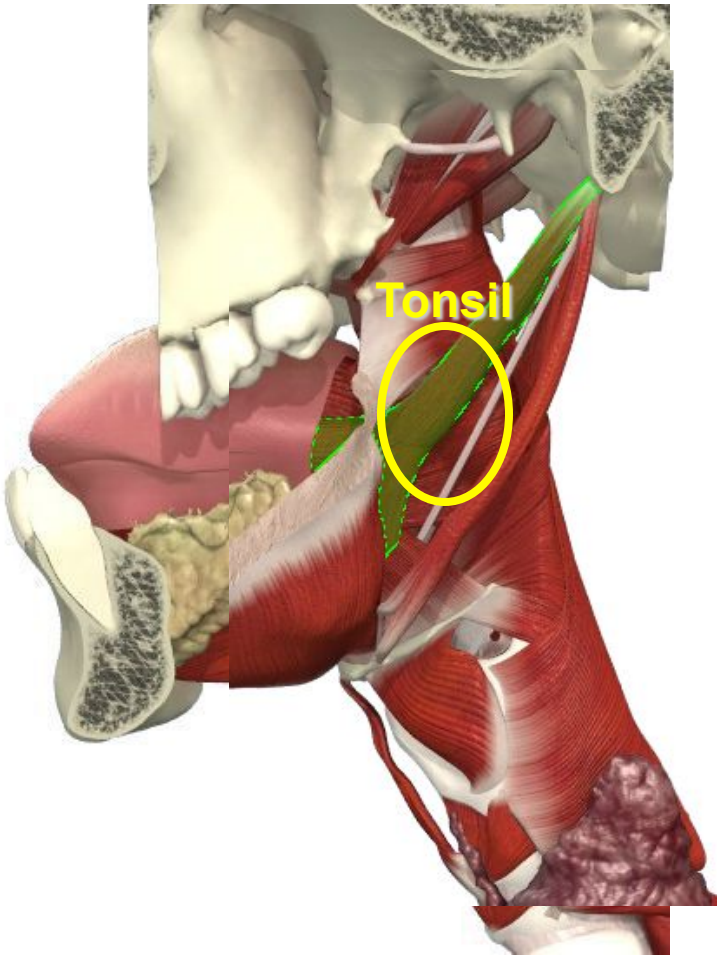


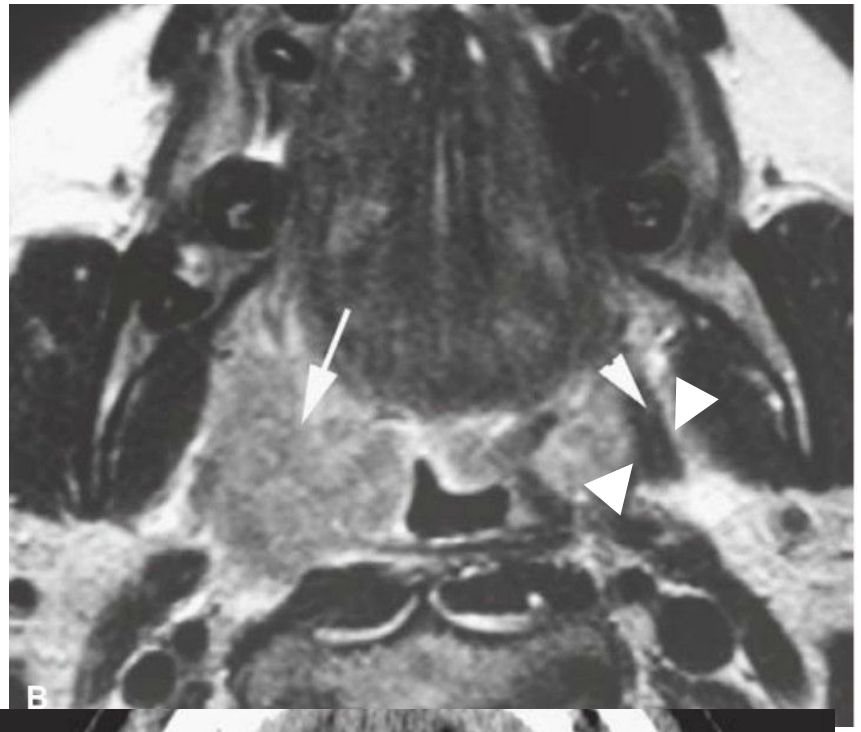
Lateralmente
Costrittore superiore



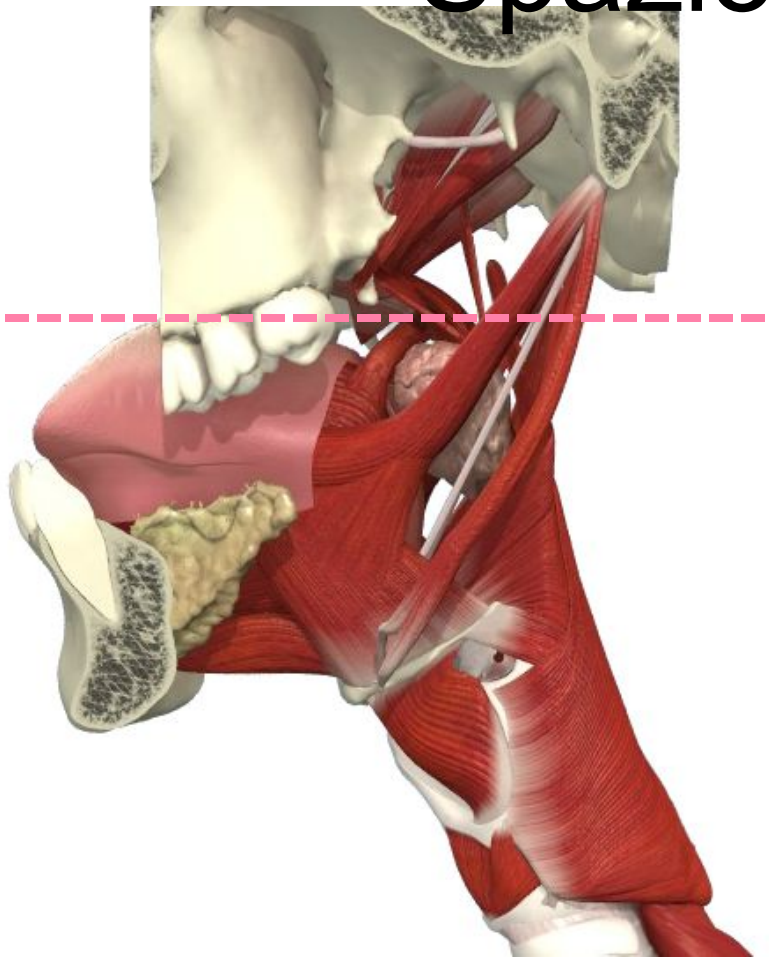


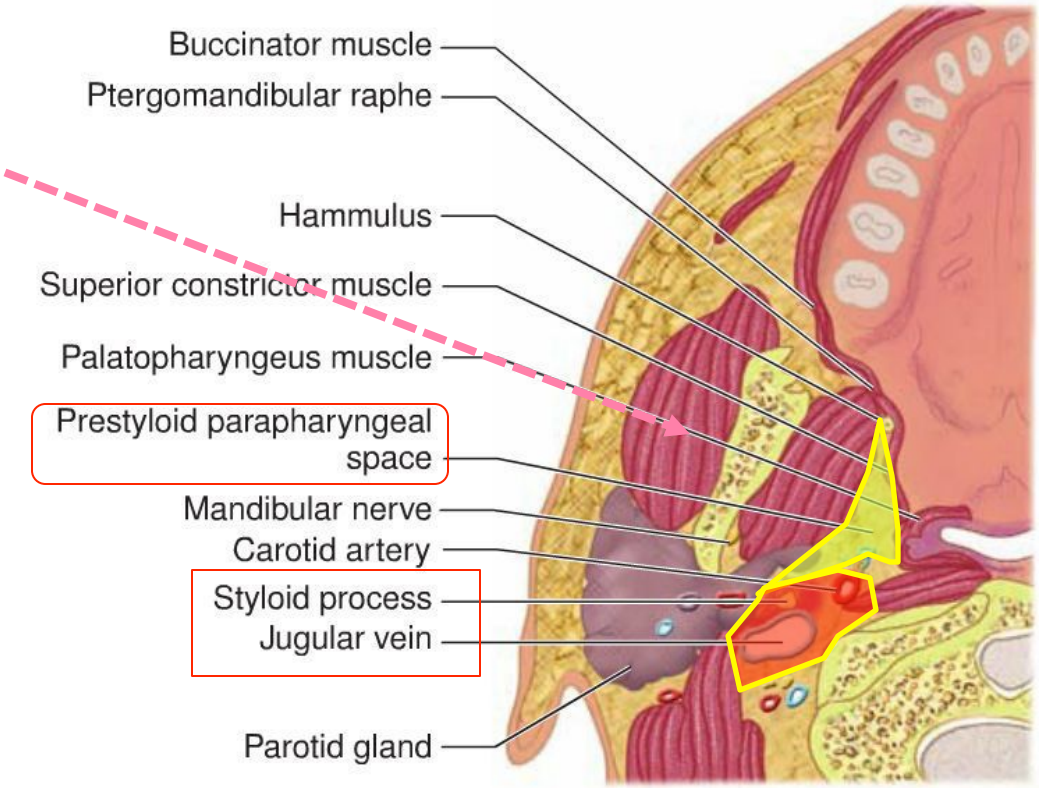
Lateralmente Stiloglosso



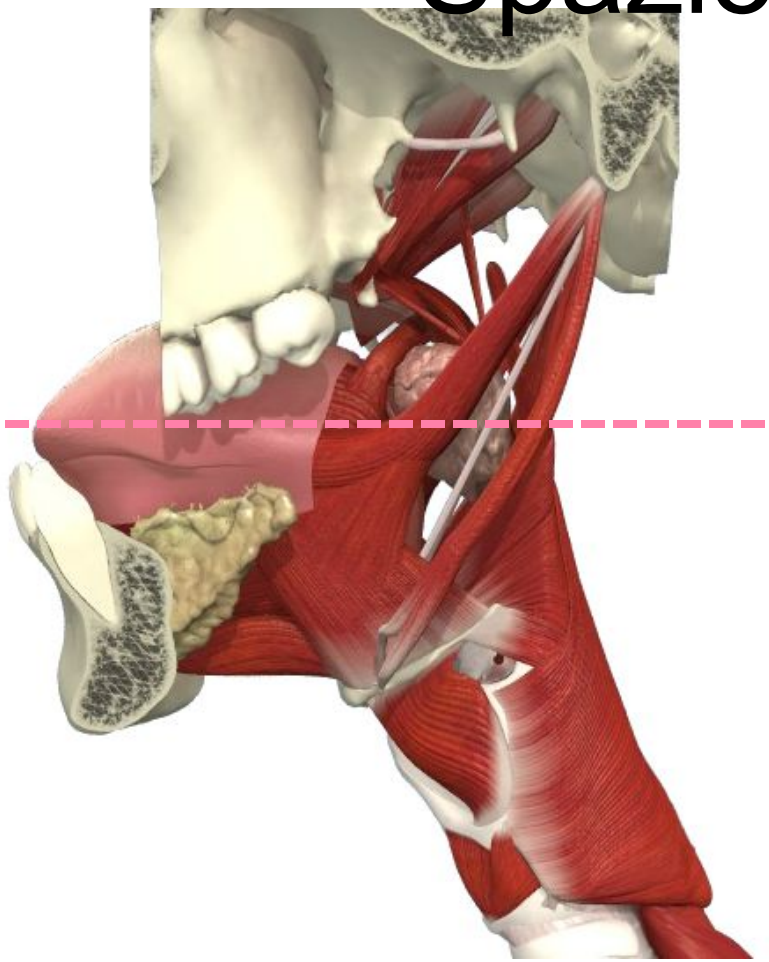


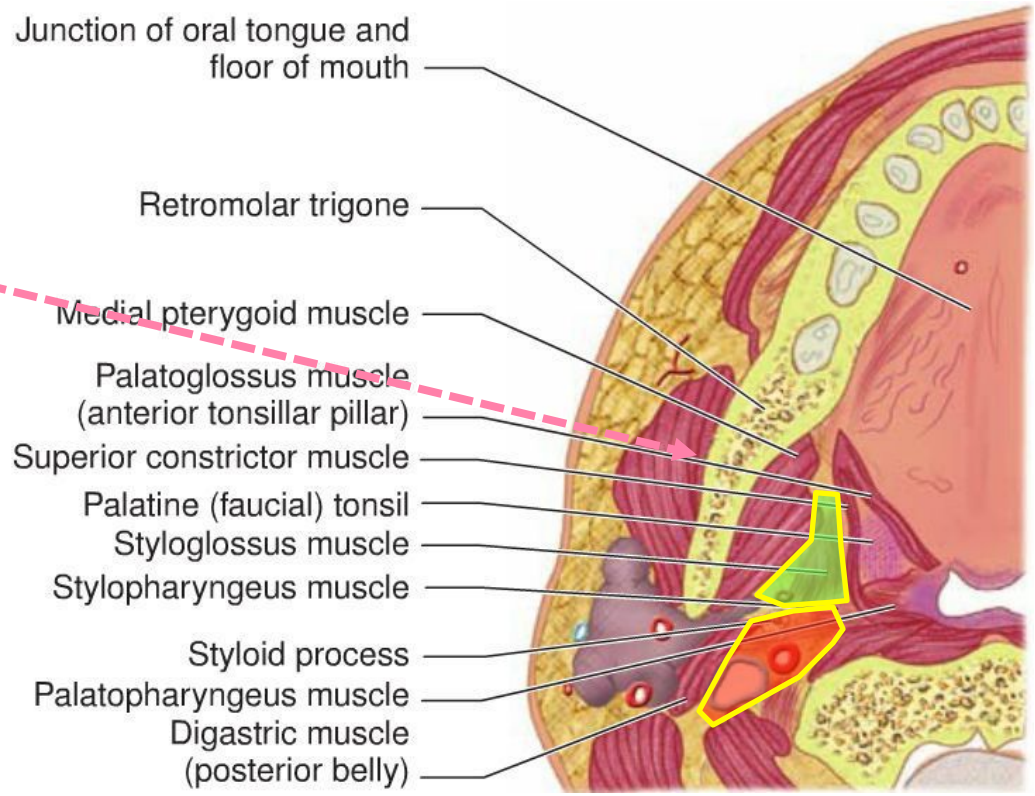
Lateralmente
Spazio parafaringeo





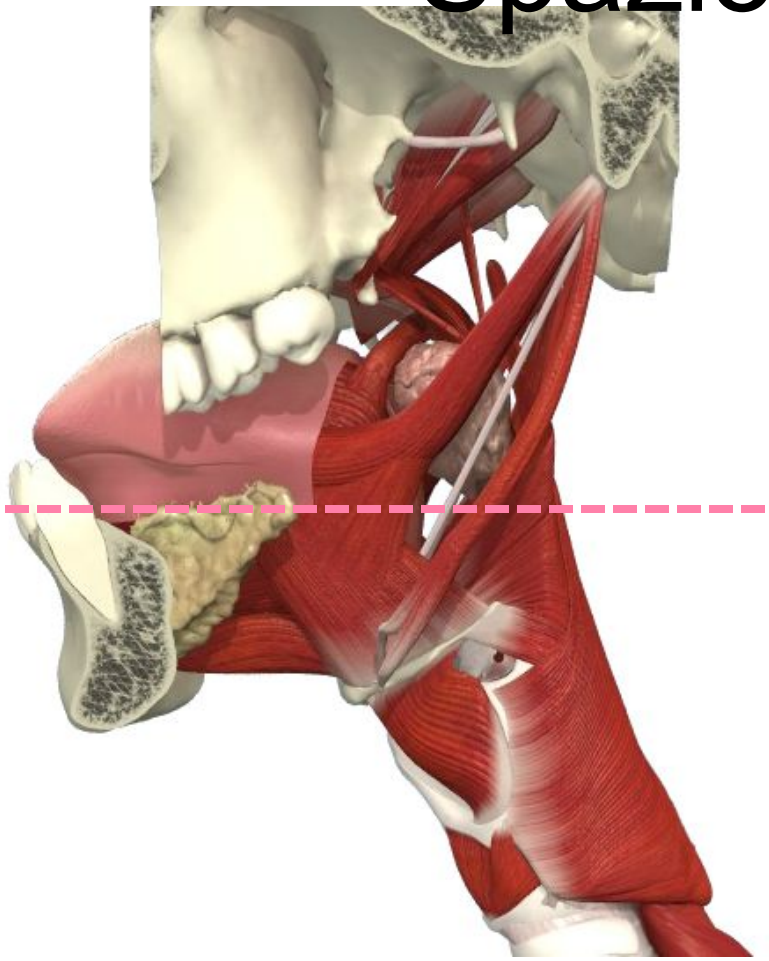
Lateralmente
Spazio parafaringeo

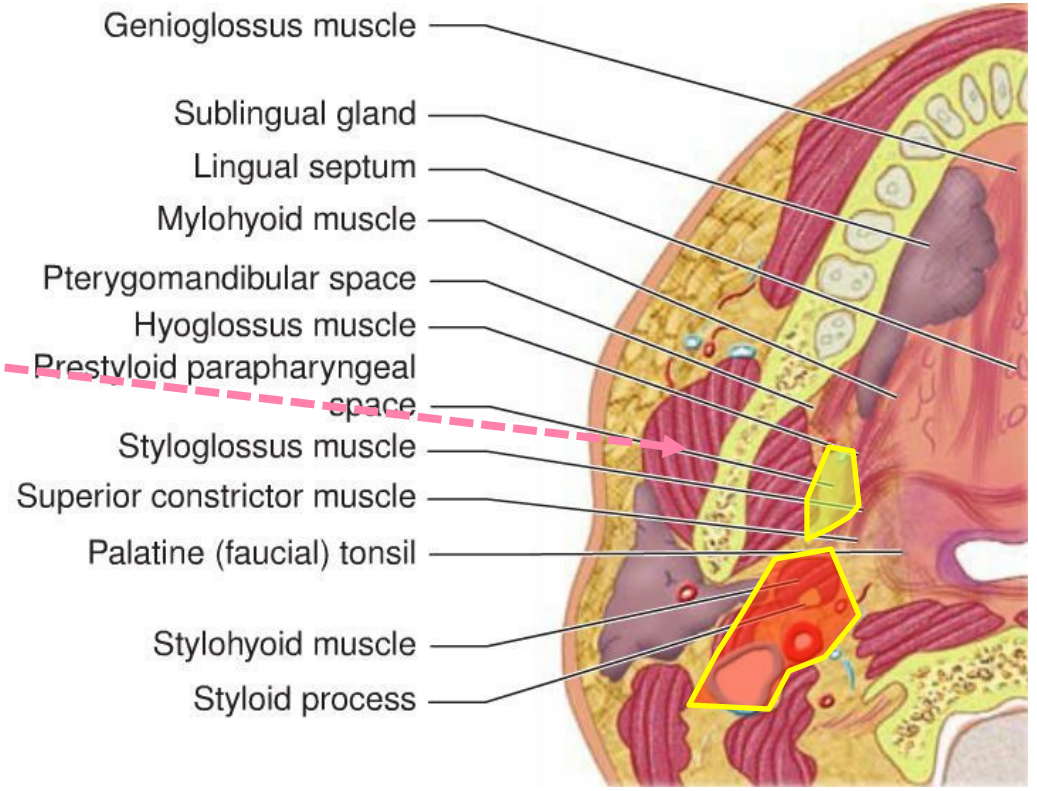




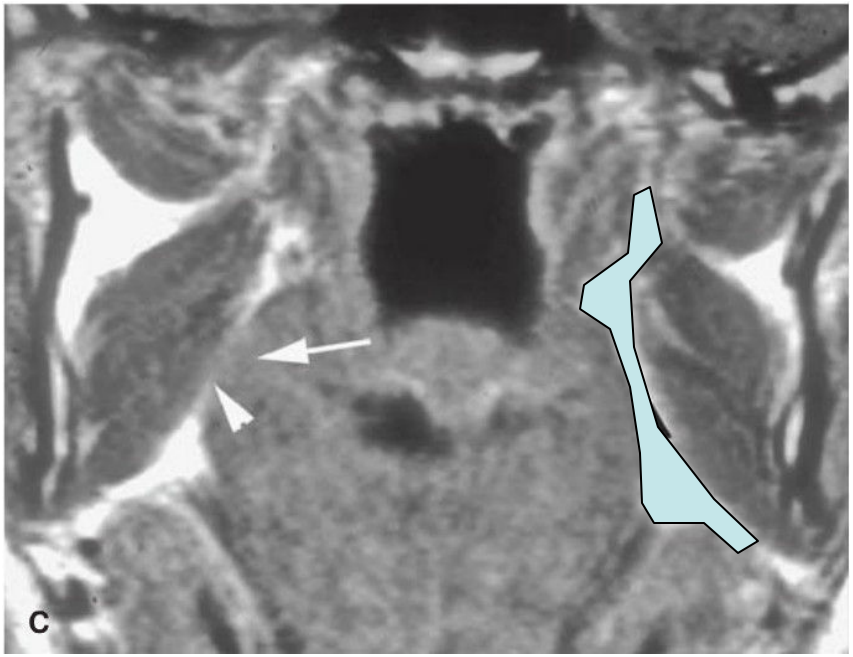
Spazio prestiloideo va a chiudersi

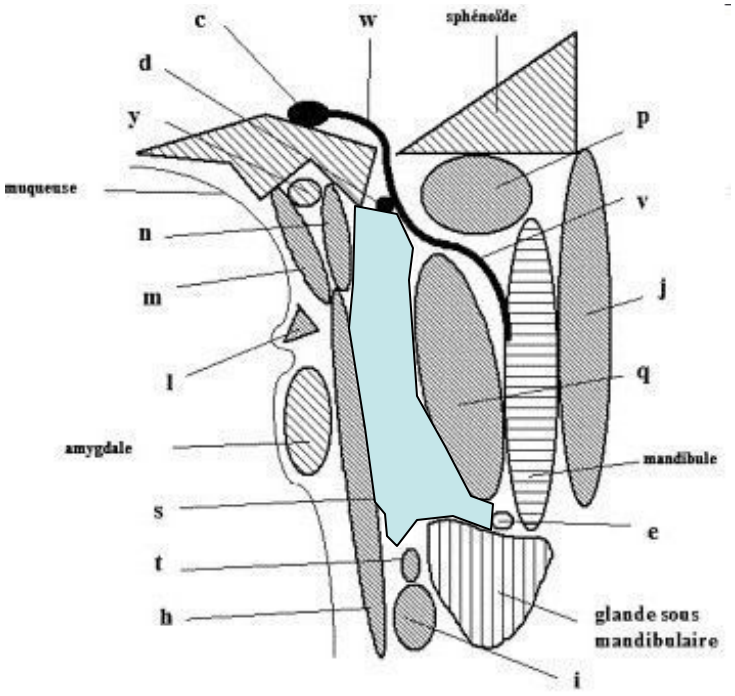
Lateralmente
Spazio parafaringeo



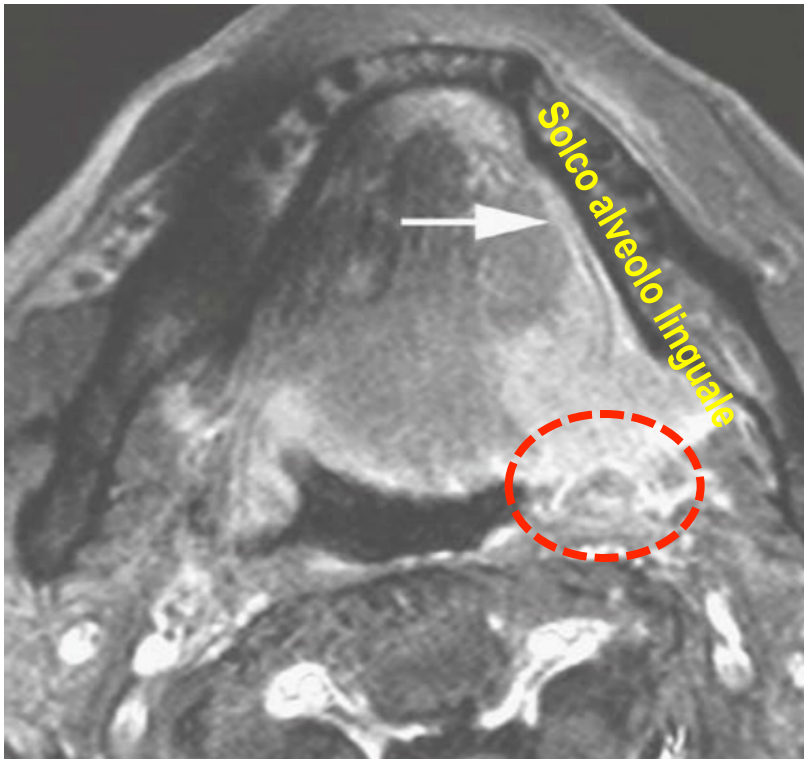


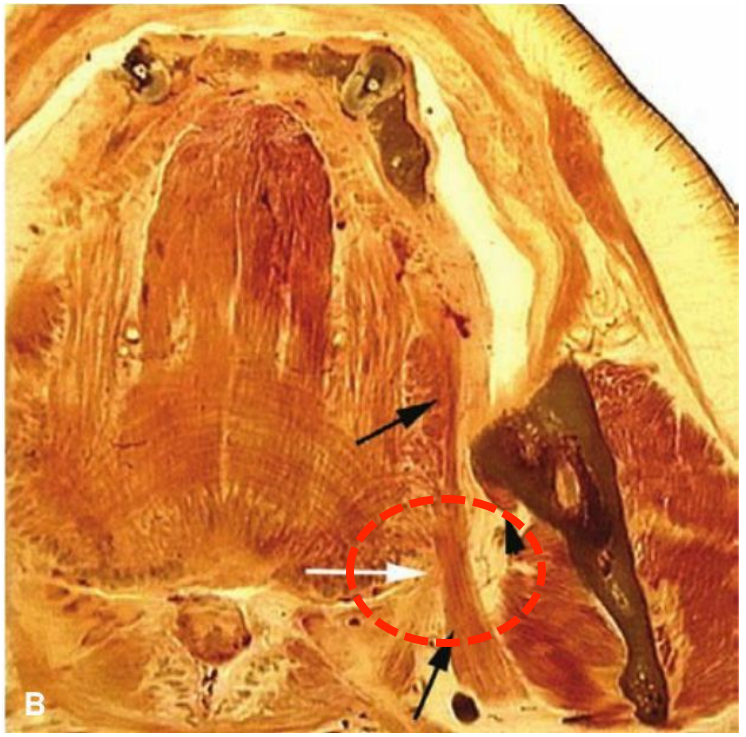
Lateralmente
Spazio parafaringeo



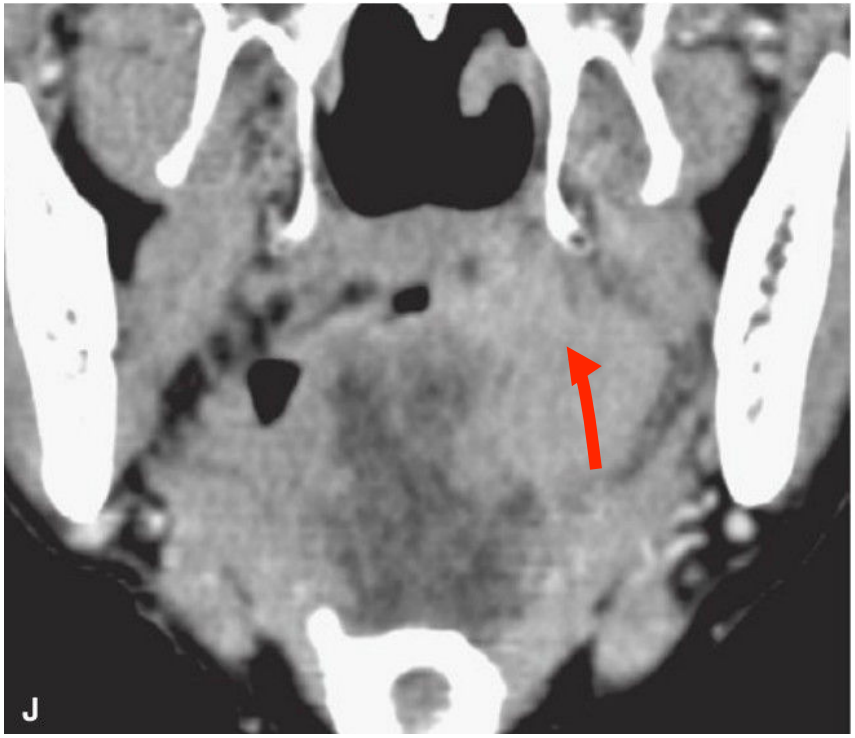


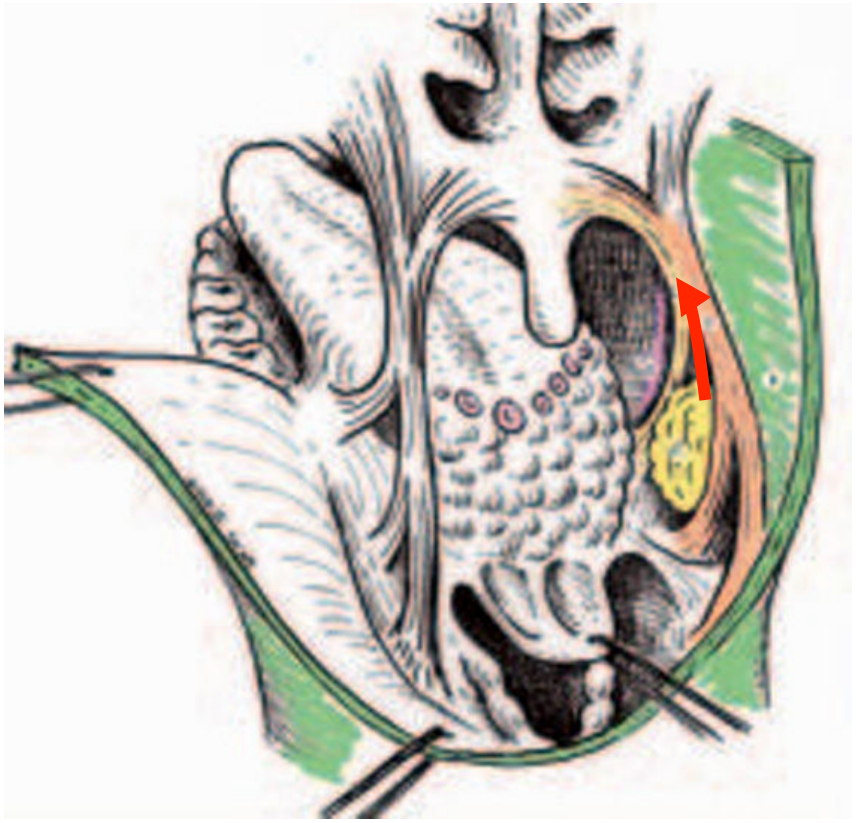
Lateralmente in basso solco amigdaloglosso





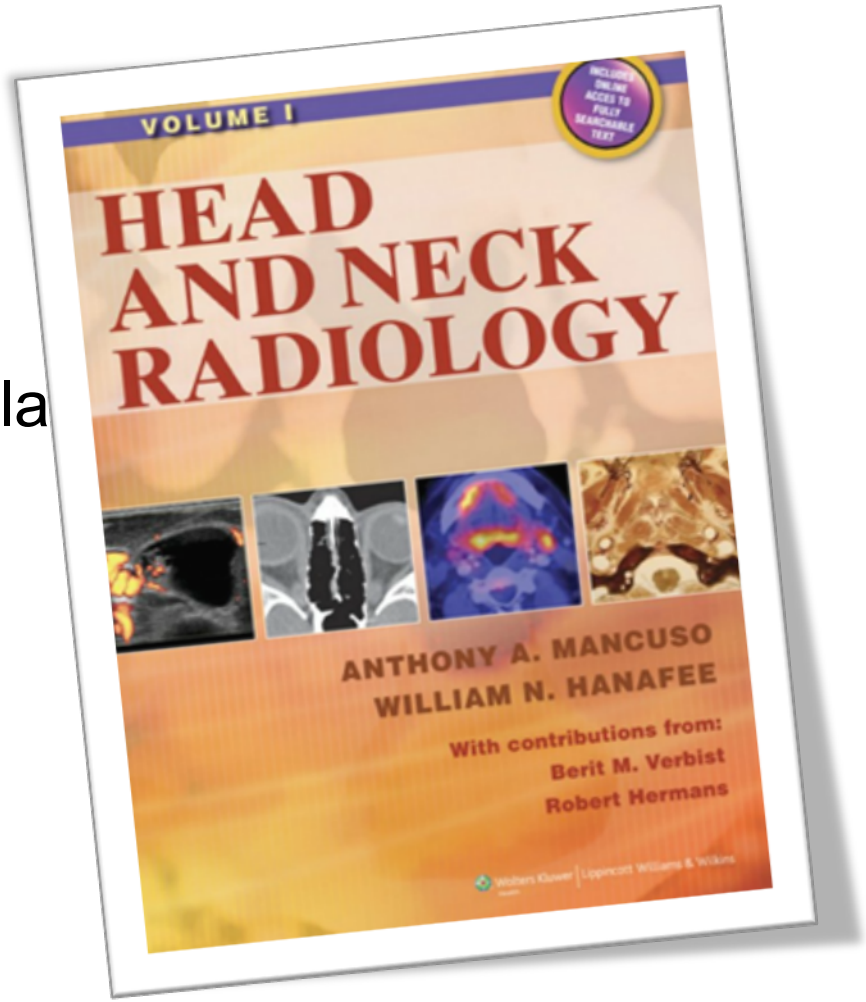
Lateralmente in alto velo palatino



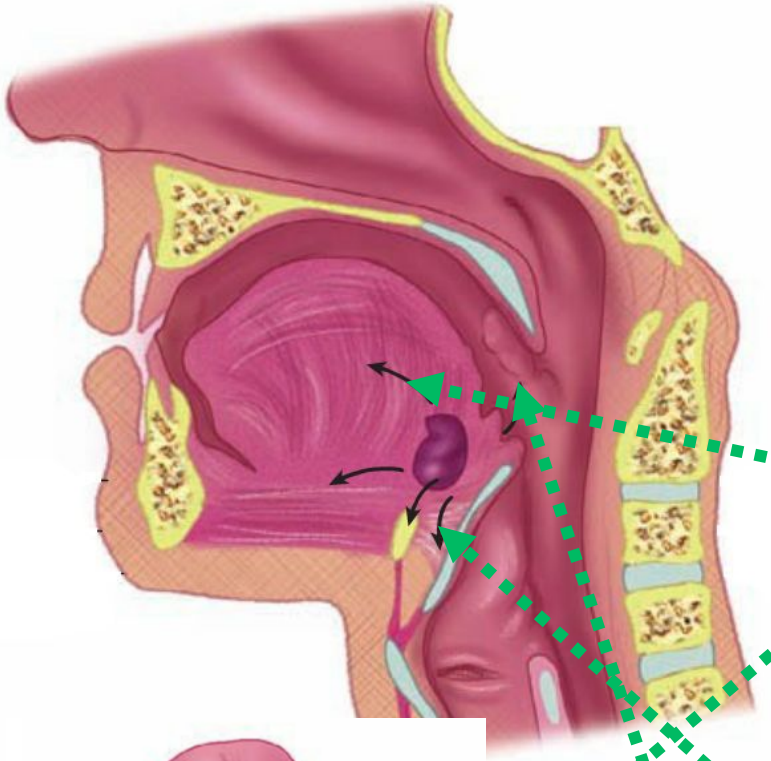


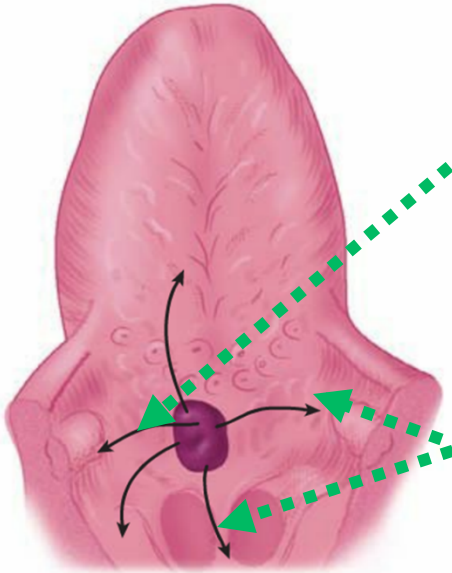
Oropharynx

- Floor
  - Base of tongue and Vallecula



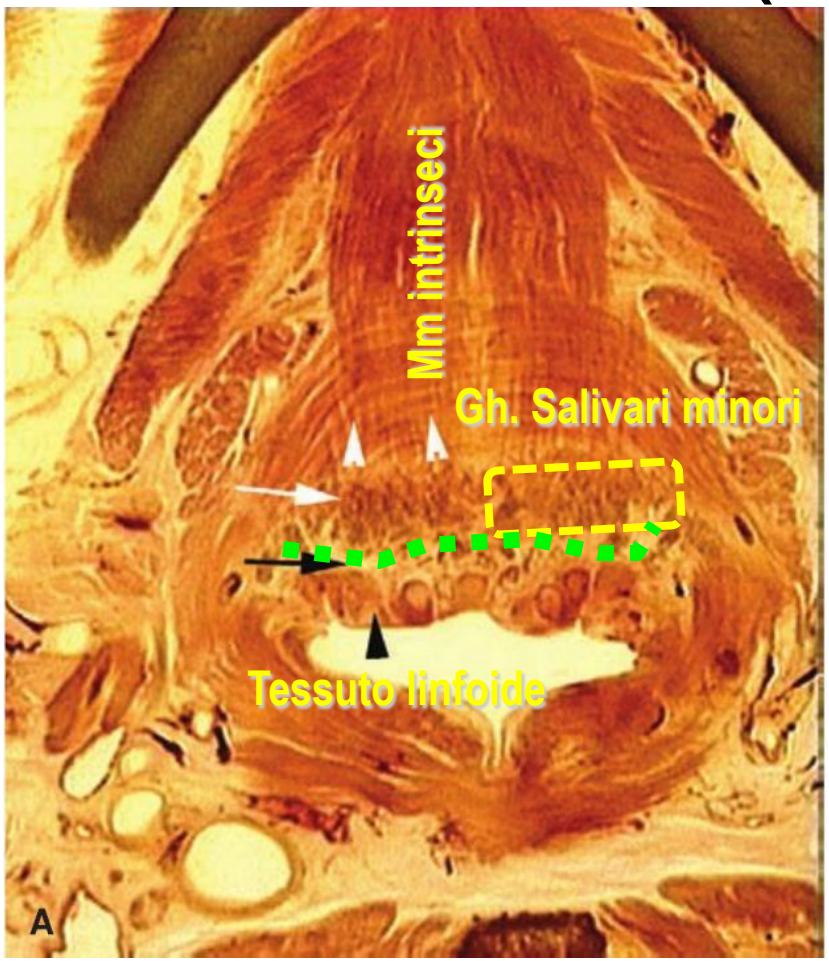
Base della lingua e vallecula

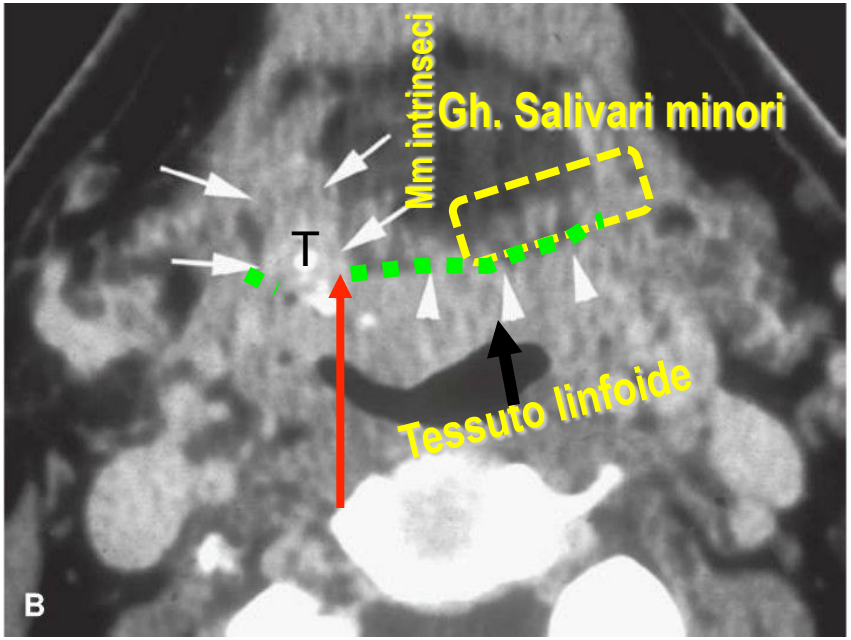




Direzione	
In avanti	• **verso la lingua** • **verso il pavemento della bocca**
Lateralmente	Attraverso il solco amigdalo glosso verso la parete laterale
In basso	• **All'esterno dietro il miloioideo** • Verso lo spazio preepiglottico
Posteriormente	la superficie linguale dell'epiglottide
Medialmente	Diffusione alla base controlaterale (molto frequente)

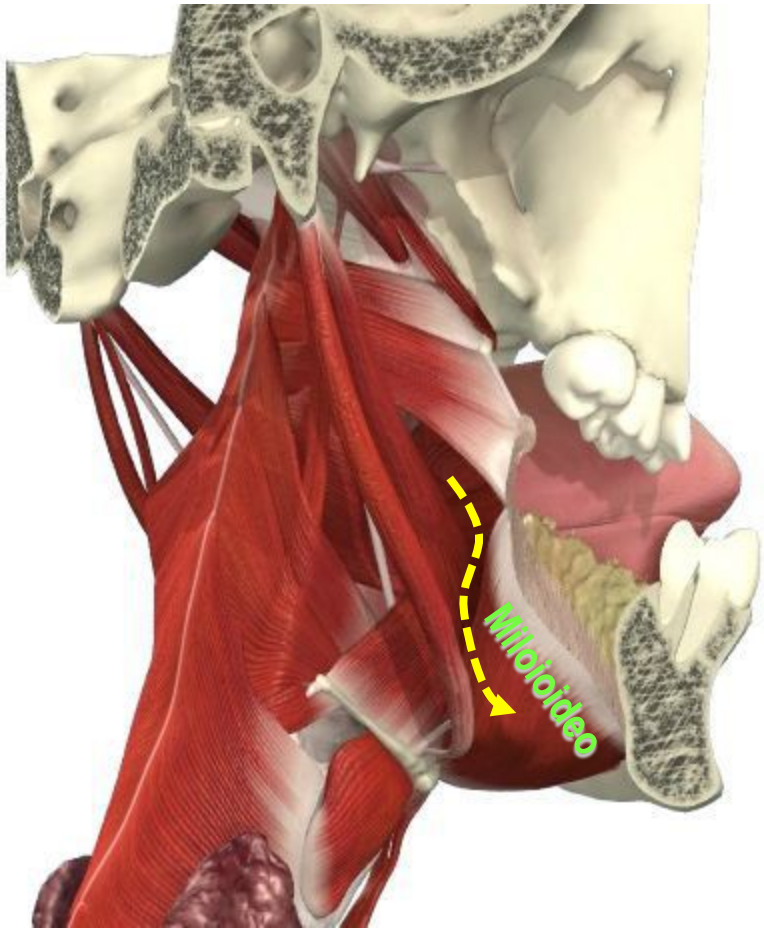
Base della lingua infiltrante (o superficiale)

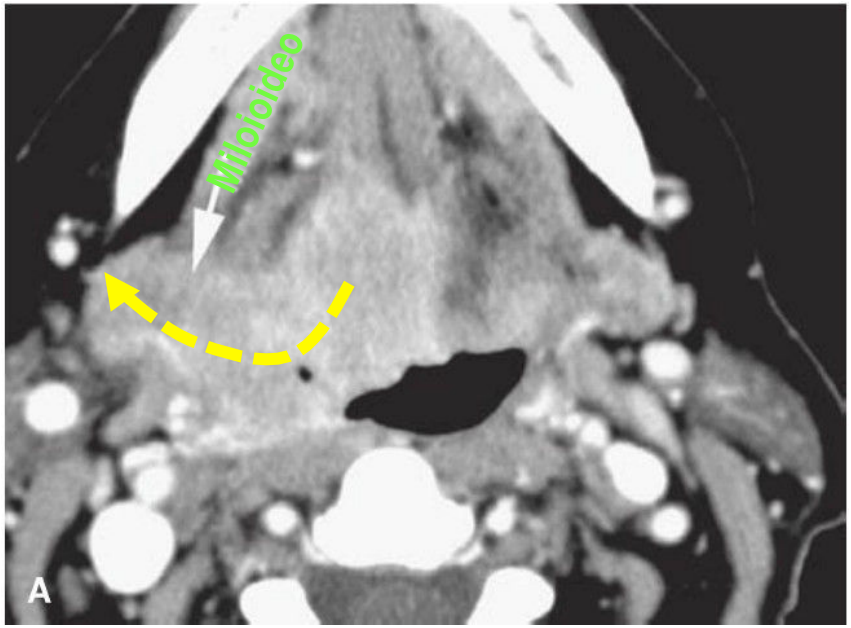




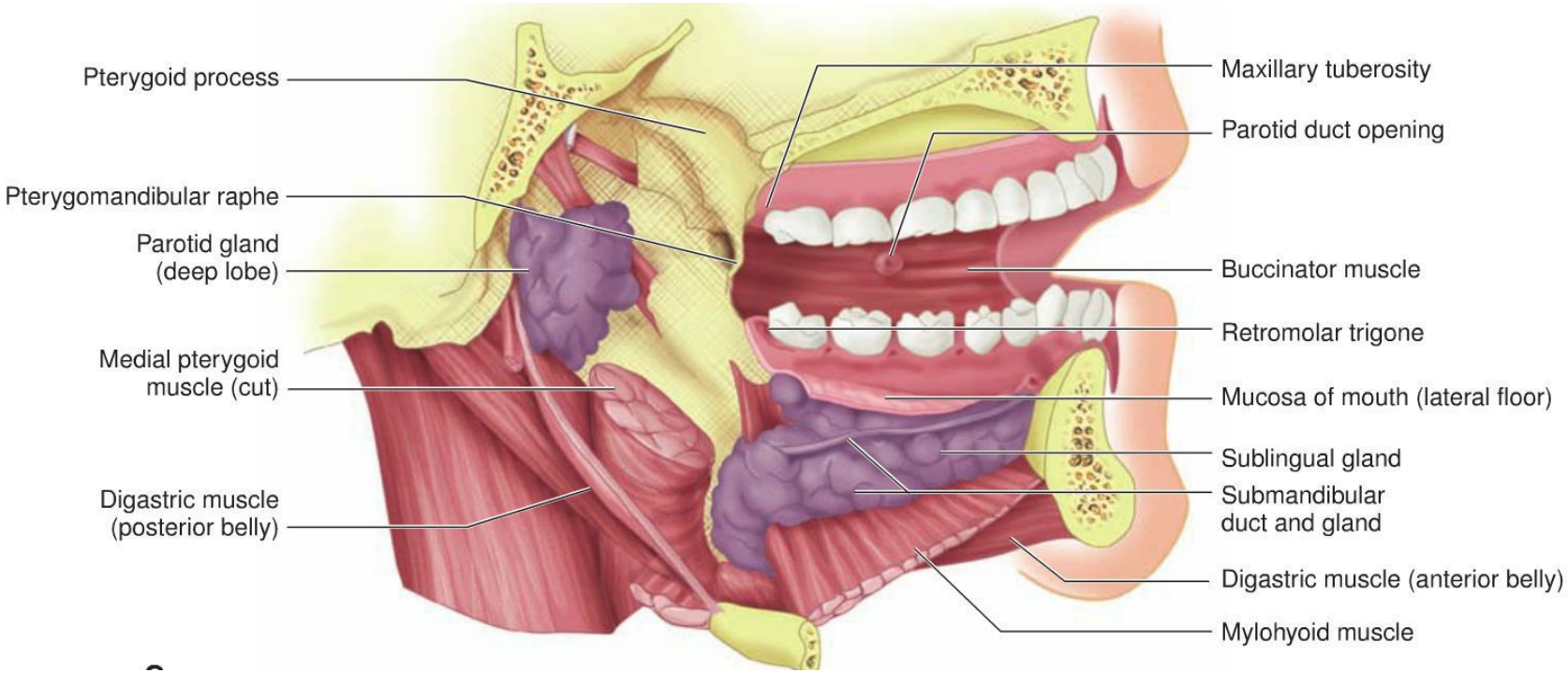
Interruzione dello spazio tra tessuto linfoide della basee lingua e gh.salivari minori

Base della lingua
Estensione nella regione del collo



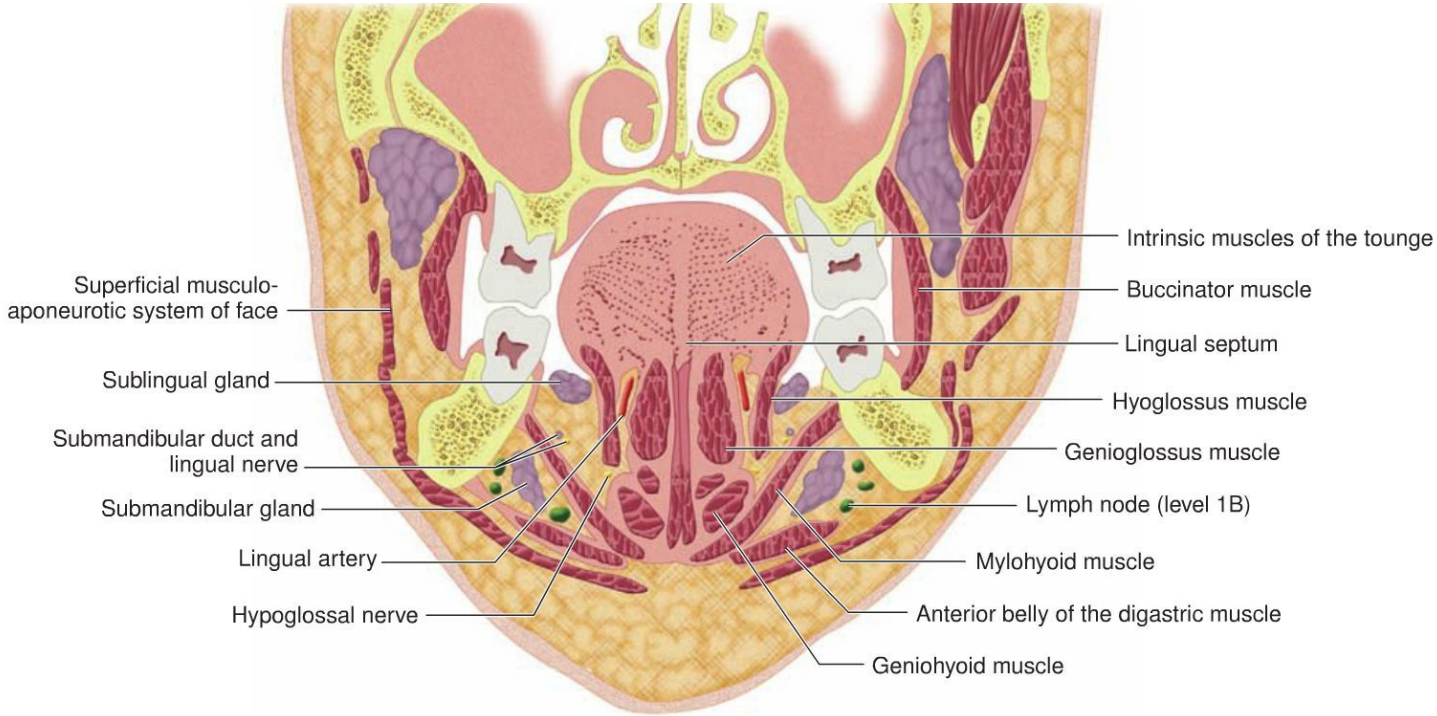


Oral cavity


Pterygoid process
Pterygomandibular raphe
Parotid gland (deep lobe)
Medial pterygoid muscle (cut)
Digastric muscle (posterior belly)
Maxillary tuberosity
Parotid duct opening
Buccinator muscle
Retromolar trigone
Mucosa of mouth (lateral floor)
Sublingual gland
Submandibular duct and gland
Digastric muscle (anterior belly)
Mylohyoid muscle

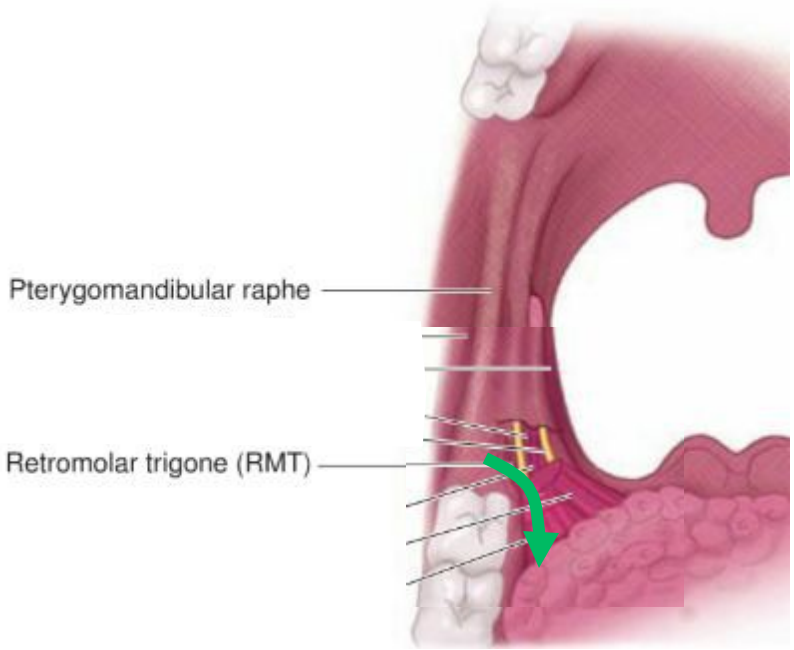
Cavità orale

- Retromolar trigone
  - Floor of the Mouth
  - Oral tongue



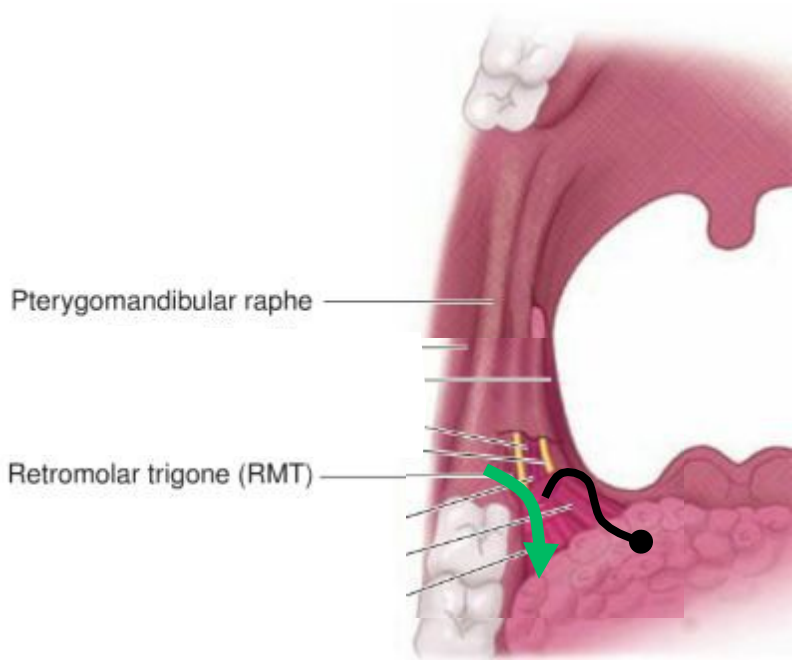
Trigono retromolare

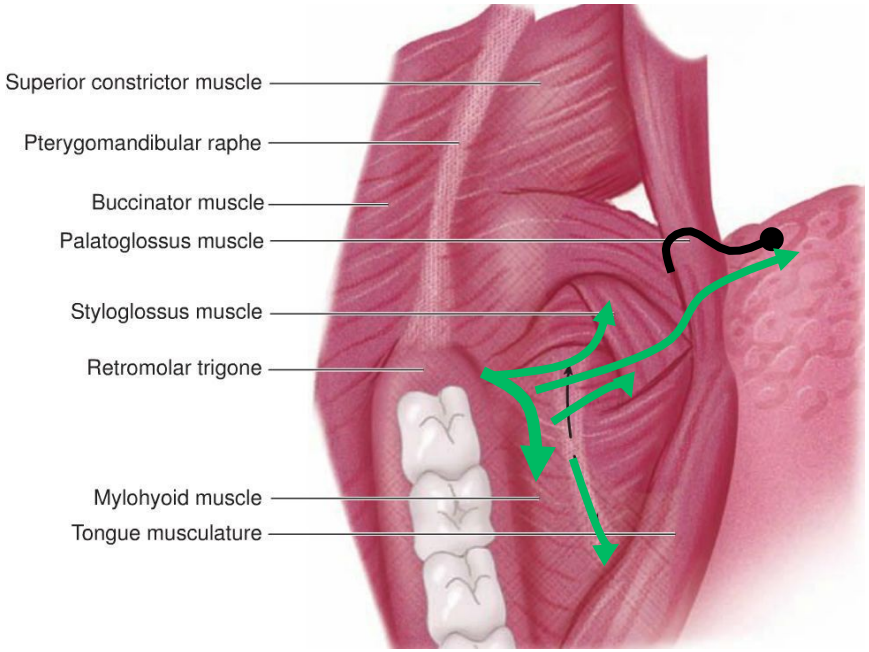
- Antero medialmente: verso il piede del pilastro anteriore



Trigono retromolare

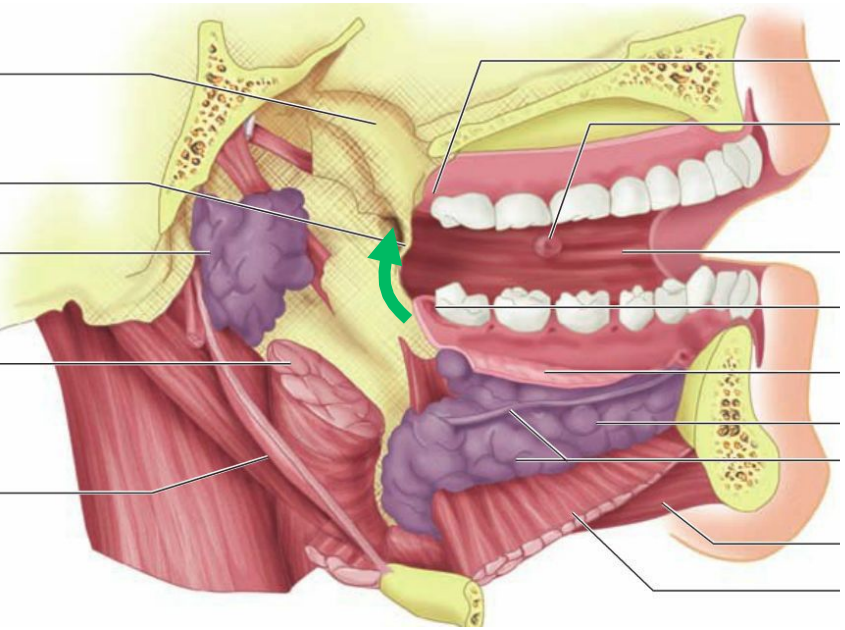
- Antero medialmente: verso il piede del pilastro anteriore raggiungendo il solco gengivolinguale

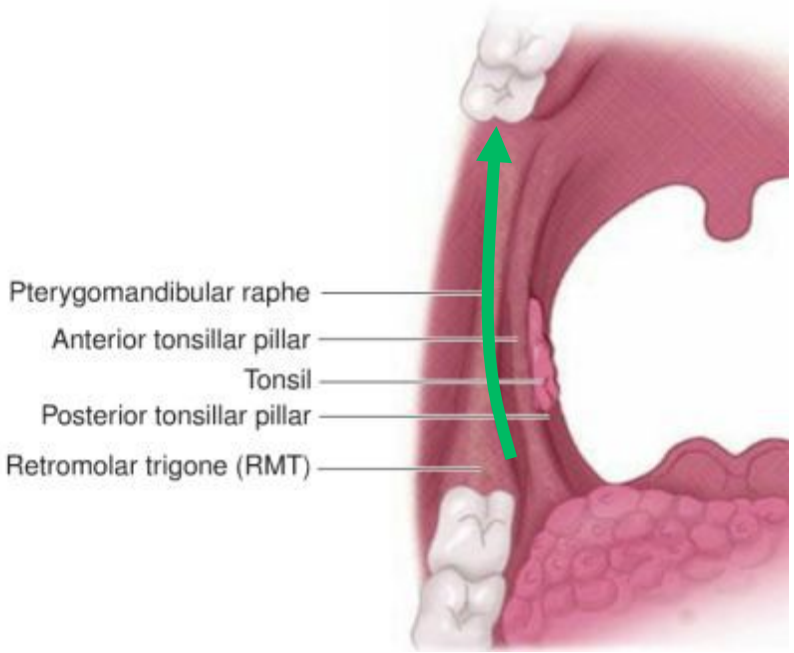




Trigono retromolare

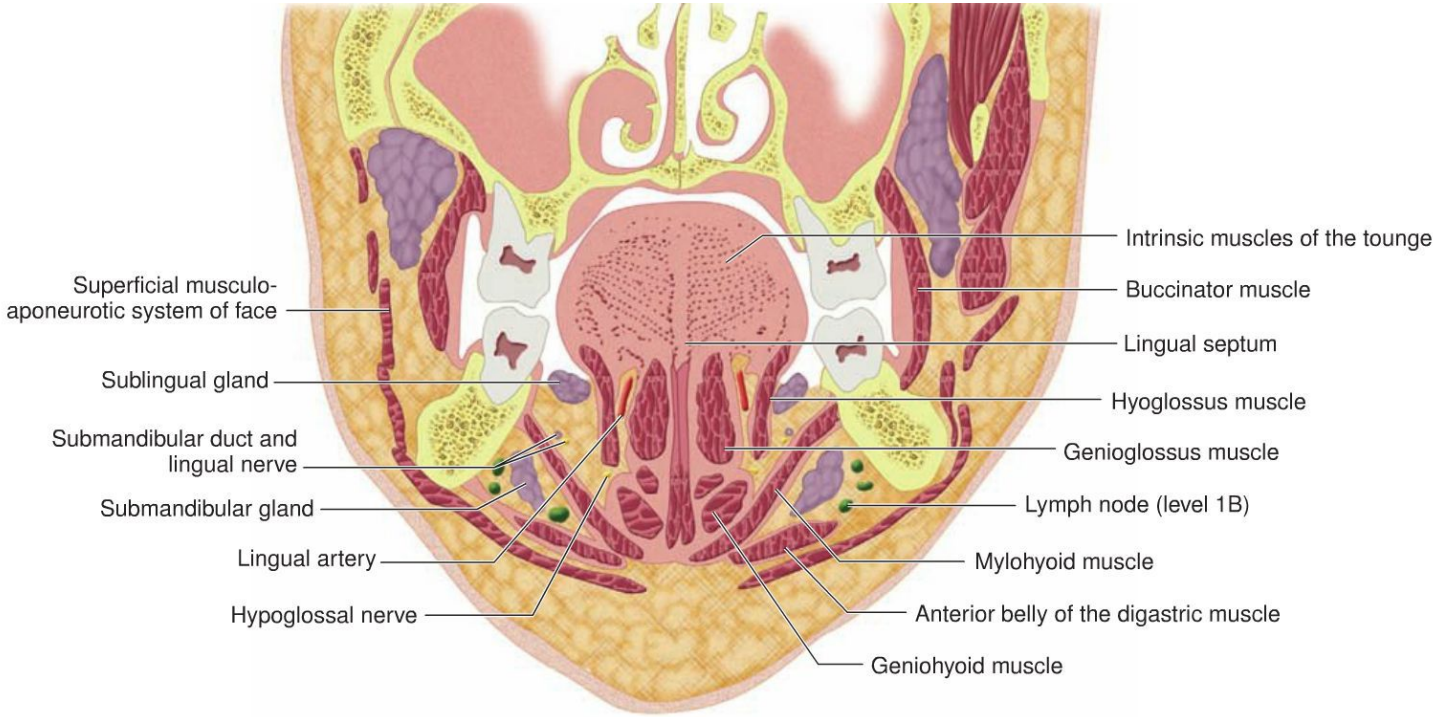
- In alto: verso la tuberosità mascellare, lo pterigoide.



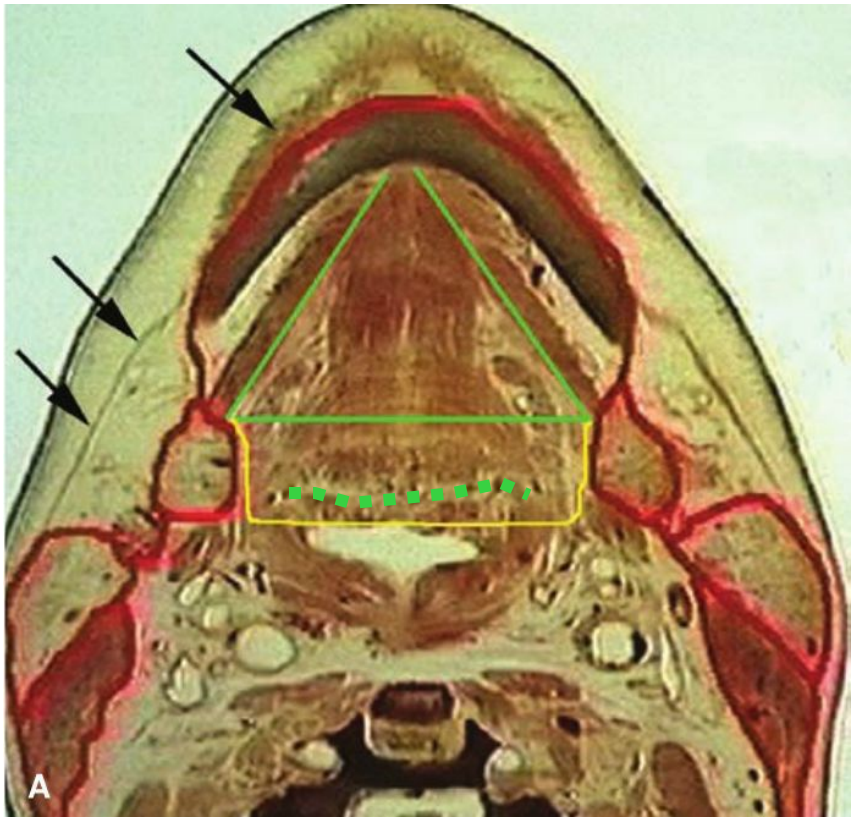


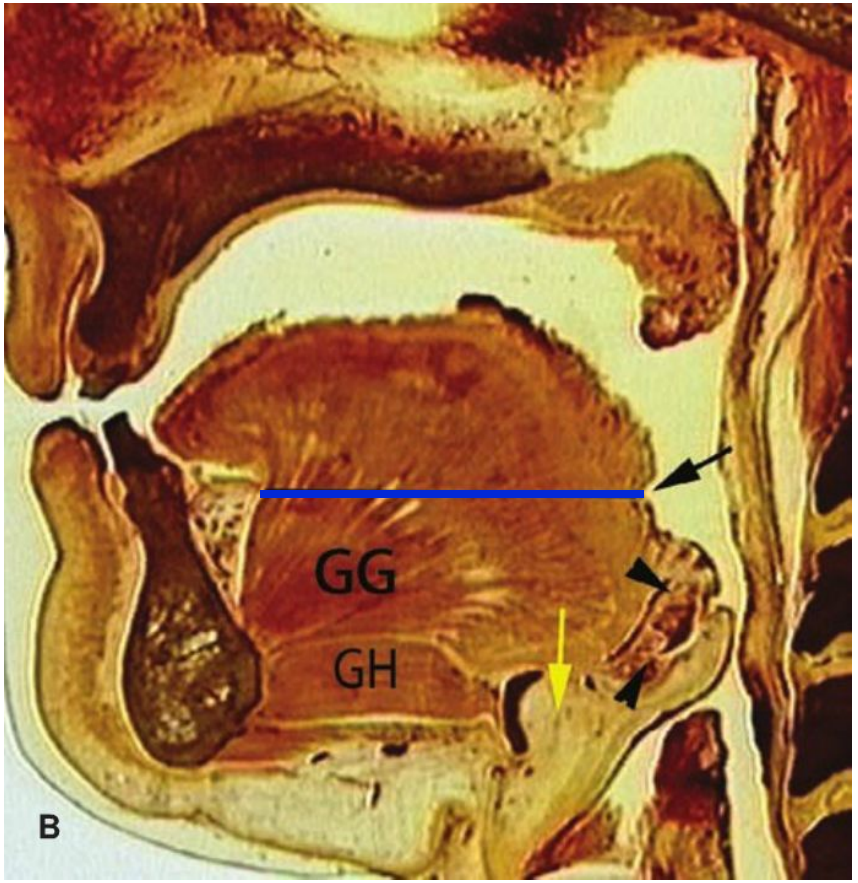
Cavità orale

- Retromolar trigone
- ⟹ Floor of the Mouth
- ⟹ Oral tongue

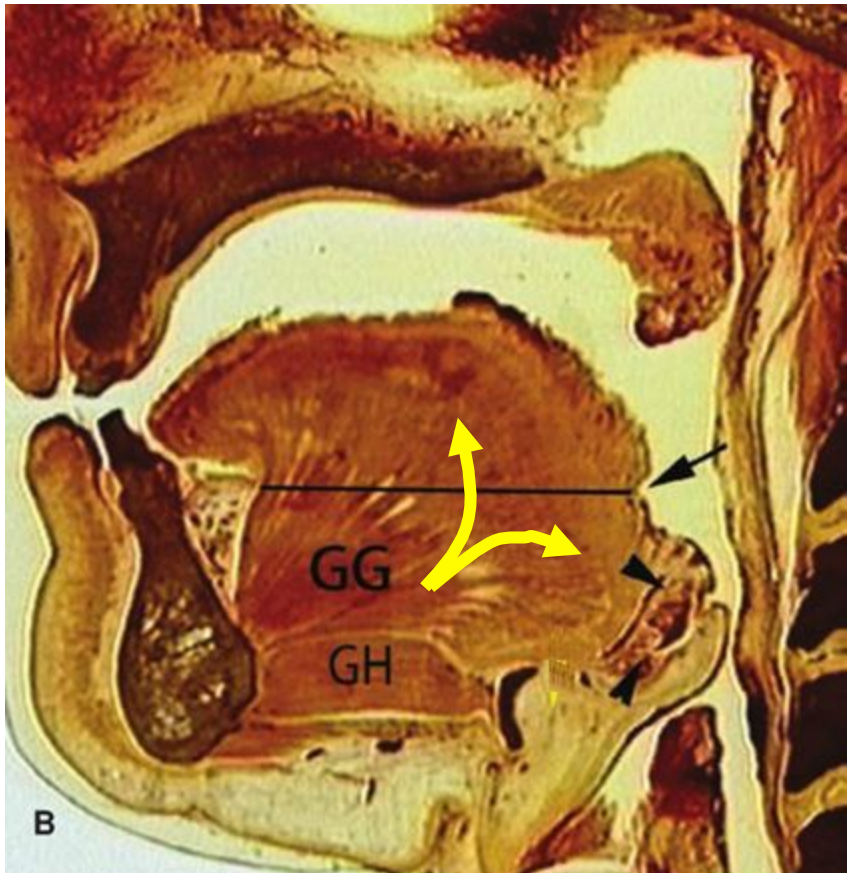


Limite tra pavimento della bocca e lingua



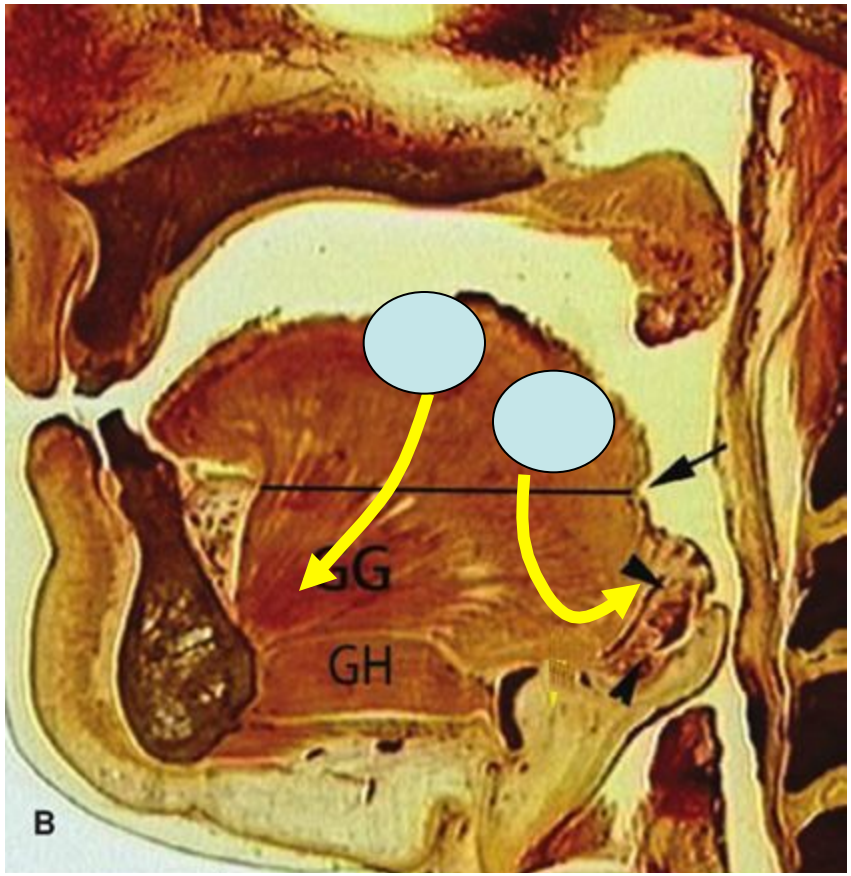


Floor of the mouth Superiorly



- Spread into the oral tongue

Oral tongue



- The lesion of **middle third** spreads into floor of mouth along tongue muscles.
- The lesion of the **posterior third spread** into base of the tongue, posterior pillar, amigdaloglossus sulcus and tonsil

Cancer/Radiothérapie 14 Suppl. 1 (2010) S34–S42

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Cancer de l'oropharynx

Oropharyngeal Cancer

C. Lafond[a,*], Y. Pointreau[b,c,d,e], C. Debelleix [f,g], F. Denis[a], G. Calais[b], J. Bourhis[h], J. Thariat[i]

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CANCER RADIOTHÉRAPIE

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Proposition de sélection et délimitation des volumes cibles microscopiques péritumoraux dans les cancers de la cavité buccale et de l'oropharynx (aires ganglionnaires exclues)

Propositions for the selection and the delineation of peritumoral microscopic disease volumes in oral cavity and oropharyngeal cancers (lymph nodes excluded)

M. Lapeyre [a,*], P. Henrot [b], M. Alfonsi [c], E. Bardet [d], R.J. Bensadoun [e], G. Dolivet [f], V. Favrel [g], O. Gallocher [h], P. Giraud [i], P. Graff [a], S. Guerif [j], P. Lagarde [k], E. Lartigau [l], V. Marchesi [m], P. Pommier [n], M. Rives [o], J. Tortochaux [p], B. Toussaint [q], P. Verrelle [p], J. Bourhis [r], G. Calais [s], Groupe oncologie radiothérapie tête et cou (GORTEC)

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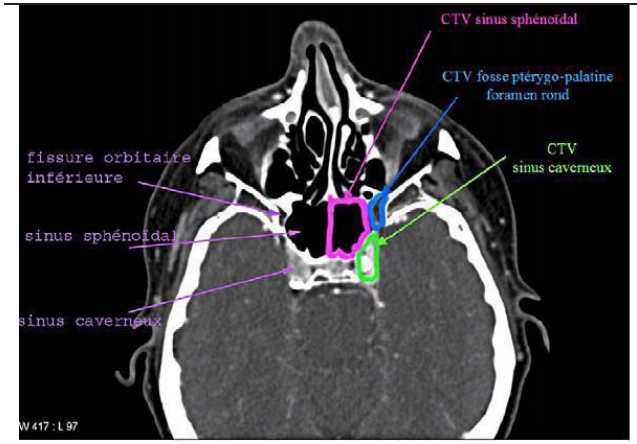
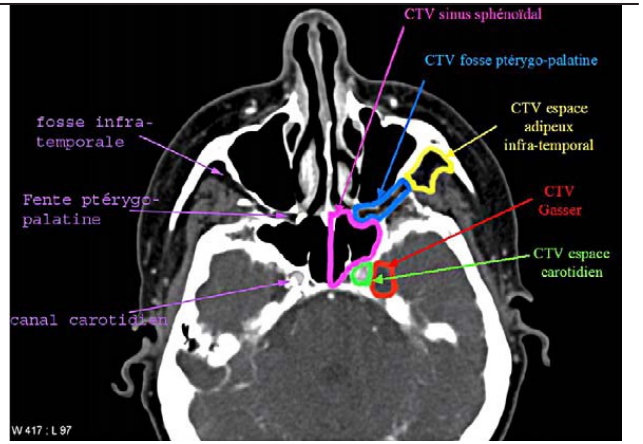
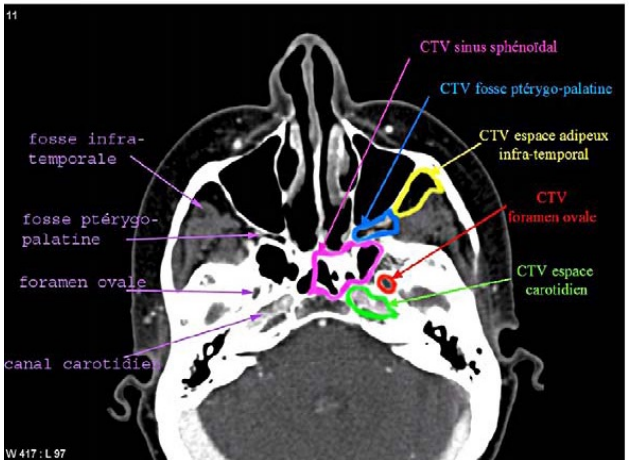
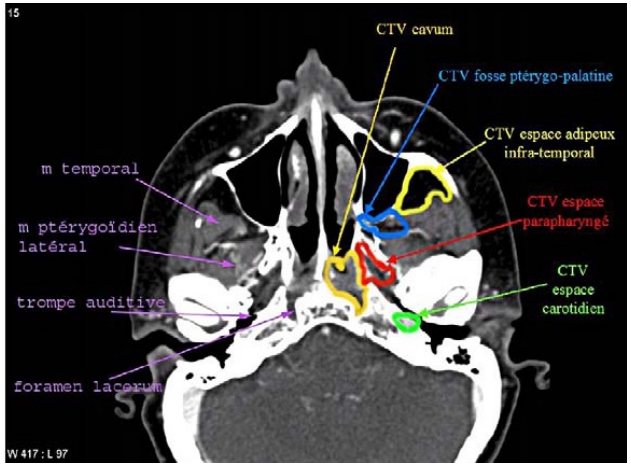
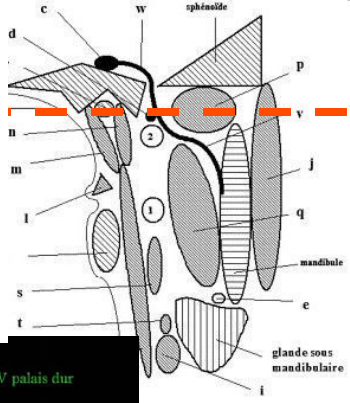


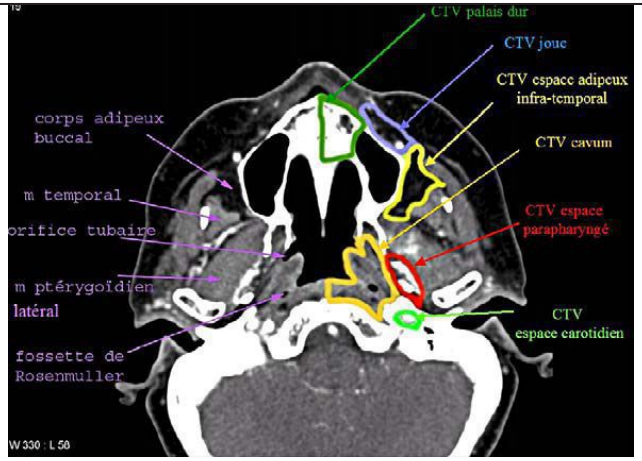


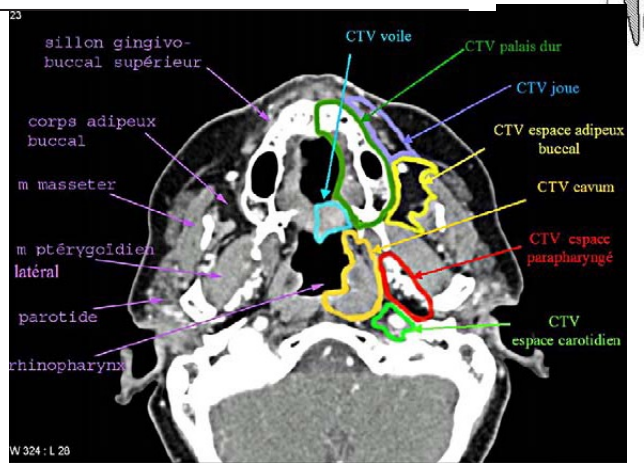


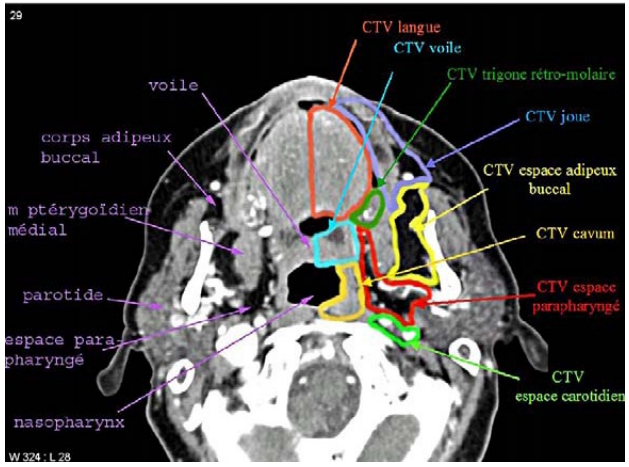


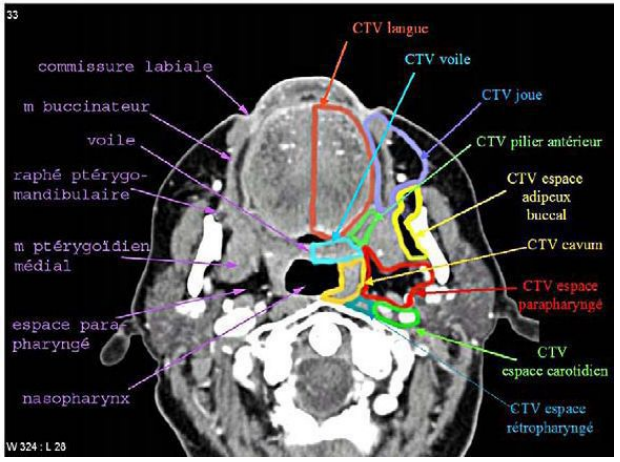
Cancer/Radiothérapie 14 Suppl. 1 (2010) S34–S42



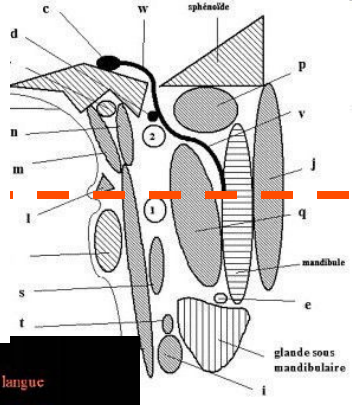


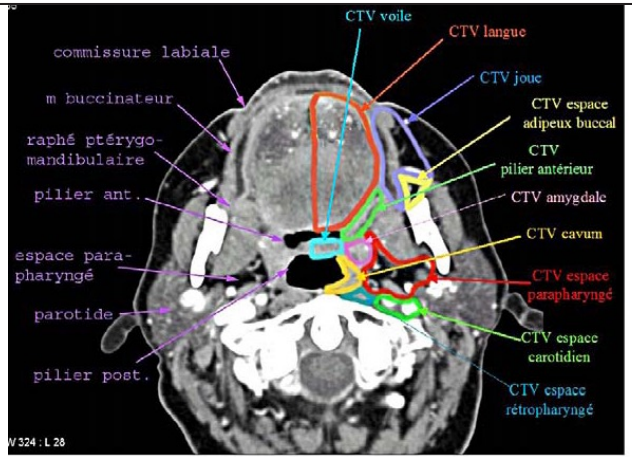


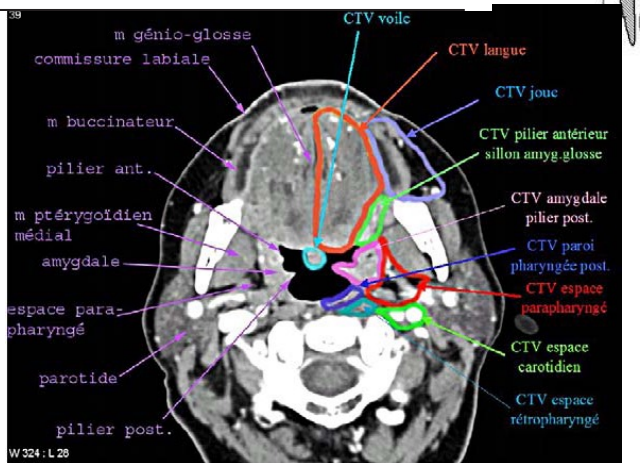


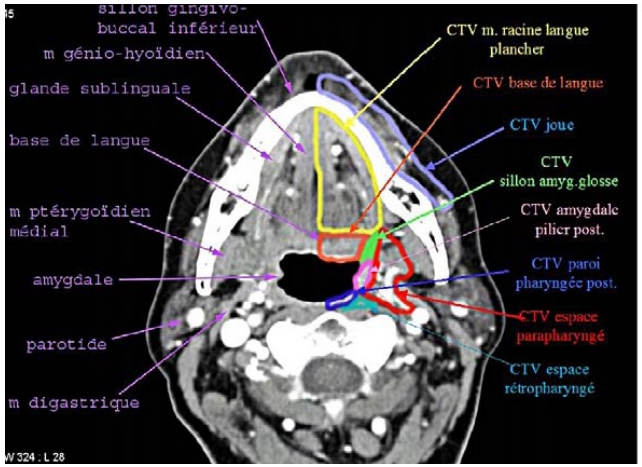


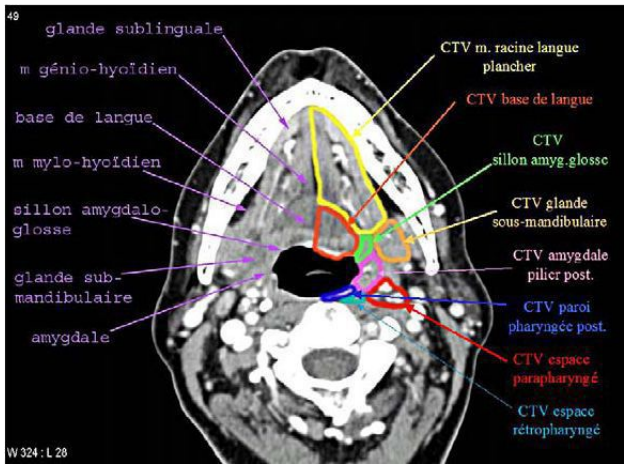
Cancer/Radiothérapie 14 Suppl. 1 (2010) S34–S42



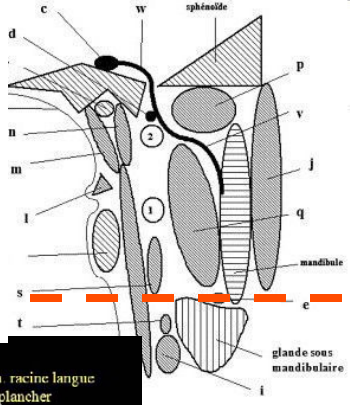


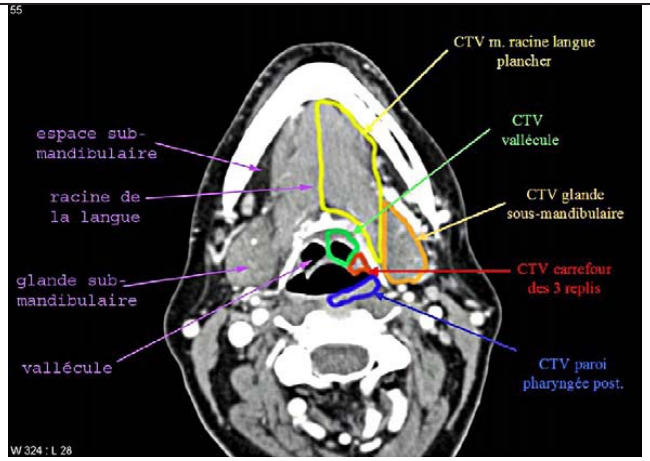


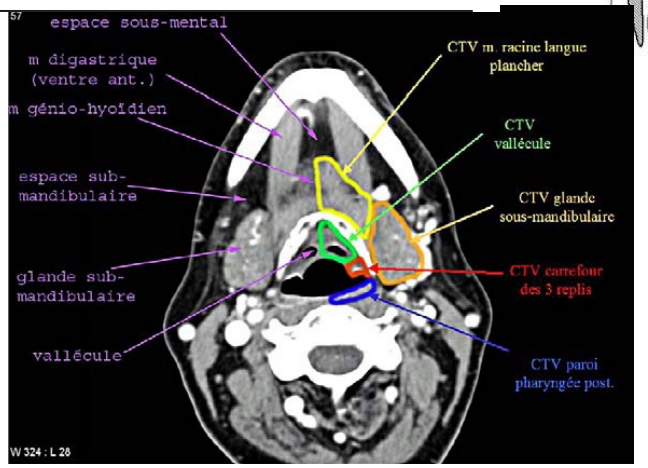


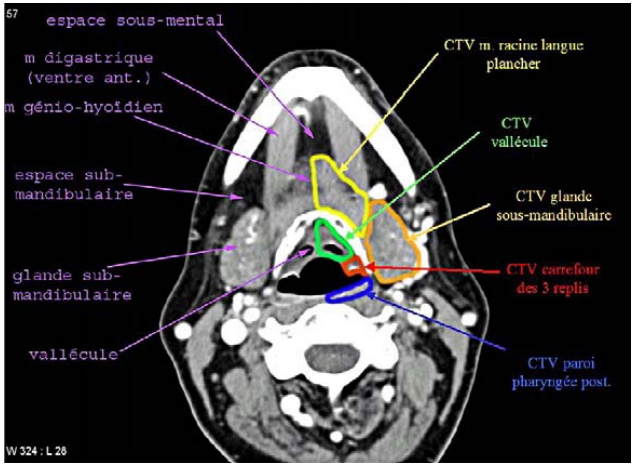


Cancer/Radiothérapie 14 Suppl. 1 (2010) S34–S42









Cancer/Radiothérapie 14 Suppl. 1 (2010) S34–S42

Cancer de l'oropharynx

Oropharyngeal Cancer

C. Lafond[a,*], Y. L

Sous-localisations	Volumes à délimiter pour obtenir le CTV global
Pilier antérieur	CTV amygdale et pilier postérieur, CTV pilier antérieur et sillon amygdaloglosse, CTV base de langue homolat. (2 cm), CTV langue postérieure homolat. (2 cm), CTV plancher postérieur homolat. (2 cm), CTV glande sous-mandibulaire homolat., CTV voile homolat., CTV joue (2 cm), CVT trigone rétromolaire homolat., gencive postérieure homolat. (2 cm), muscle ptérygoïdien médial homolat.
Amygdale	CTV amygdale et pilier postérieur homolat., CTV pilier antérieur et sillon amygdaloglosse homolat., CTV base de langue homolat. (2 cm), CTV langue postérieure homolat. (2 cm), CTV voile homolat., CTV carrefour des 3 replis homolat., CTV espace parapharyngé homolat., CTV foramen ovale homolat., CTV Gasser homolat. Tumeur évoluée : prendre en plus : muscle ptérygoïdien médial homolat., branche montante de mandibule homolat., CTV espace carotidien homolat., CTV sinus caverneux homolat., CTV rétropharyngé homolat., CTV cavum homolat.
Pilier postérieur	CTV paroi pharyngée postérieure homolat., CTV pilier postérieur et amygdale homolat., CTV voile homolat., CTV cavum homolat., CTV espace rétropharyngé homolat., repli pharyngoépiglottique homolat., CTV carrefour des 3 replis homolat., CTV parapharyngé homolat.,
Voile	CTV voile bilat., CTV amygdale et piliers bilat. (partie supérieure), CTV cavum homolat., CTV trigone rétromolaire supérieur homolat., CTV espace parapharyngé homolat. Tumeur avec extension supérieure : prendre en plus : muscle ptérygoïdien médial homolat., CTV sinus sphénoïdal homolat., CTV foramen ovale homolat., CTV Gasser homolat. Tumeur latéralisée : prendre en plus : CTV fosse ptérygomaxilllaire homolat.
Sillon amygdaloglosse	CTV sillon amygdaloglosse et pilier antérieur homolat., CTV amygdale et pilier postérieur homolat., CTV base de langue homolat., CTV langue et plancher* (1/3 postérieur) homolat., CTV vallécule homolat., CTV carrefour des 3 replis homolat., CTV espace parapharyngé homolat.,
Base de langue	CTV base de langue bilat., CTV vallécule homolat., CTV langue homolat. (2 cm), CTV sillon amygdaloglosse homolat., CTVs amygdale et piliers homolat. Tumeur évoluée : prendre en plus : CTV langue bilat., CTV racine de langue et plancher* bilat., CTV glandes sous-mandibulaires bilat., CTV espace parapharyngé bilat., CTV espace carotidien bilat.
Vallécule	CTV base de langue bilat., CTV vallécule bilat., CTV carrefour des 3 replis homolat., face linguale de l'épiglotte, espace préépiglottique. Tumeur latéralisée : prendre en plus : sinus piriforme (partie supérieure), paroi pharyngée latérale (2 cm)
Paroi pharyngée postérieure	CTV paroi pharyngée postérieure (marge > 2 cm), CTV pilier postérieur de l'amygdale bilat., CTV espace parapharyngé homolat.., CTV espace rétropharyngé homolat., CTV cavum homolat., CTV voile homolat.,

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Proposition de sélection et délimitation des volumes cibles microscopiques péritumoraux dans les cancers de la cavité buccale

M. Lapeyre [a,]
O. Galloch
P. Pom

Tableau 1
Cavité buccale. Volume péritumoral microscopique (CTV global) à délimiter selon les sous-localisations tumorales. Le principe repose sur le fait de prendre au moins une structure anatomique (« CTV structure ») de contiguïté supplémentaire par rapport à la tumeur macroscopique. Le CTV global est obtenu en additionnant les différents « CTVs structures » sélectionnés (illustration : Fig. 1)

Sous-localisations	Volumes à délimiter pour obtenir le CTV global
Plancher buccal	CTV racine de langue et plancher [a] bilat., CTV glande sous-mandibulaire homolat. (bilat. si ligne médiane dépassée), gencive et mandibule de proximité homolat. (bilat. si ligne médiane dépassée)
Langue mobile	CTV langue bilat., CTV racine de langue et plancher [a] bilat., CTV glande sous-mandibulaire bilat., CTV sillon amygdaloglosse et pilier antérieur homolat. (bilat. si ligne médiane dépassée). Atteinte du 1/3 post. : cf. Base de langue (Tableau 2)
Face interne de joue	CTV joue homolat., CTV glande sous-mandibulaire homolat., CTV trigone rétromolaire supérieur et inférieur homolat., CTVs espace graisseux buccal et infratemporal homolat., gencive supérieure et inférieure homolat. Tumeur avancée : prendre en plus : la joue in toto, l'espace parotidien homolat., le muscle ptérygoïdien médial homolat., CTV fosse ptérygomaxillaire homolat., CTV Gasser homolat.
Gencive inférieure	Trigone rétromolaire inférieur homolat., mandibule homolat.(2 cm), CTV plancher postérieur homolat. (2 cm), CTV glande sous-mandibulaire homolat., CTV joue homolat. (2 cm), la gencive inférieure homolat. (2 cm en avant de la tumeur)
Gencive supérieure	CTV trigone rétromolaire homolat., CTV joue homolat. (2 cm), CTV palais dur homolat. (2 cm), la gencive supérieure homolat. (2 cm en avant de la tumeur)
Palais dur	CTV palais dur bilat., CTV trigone rétromolaire bilat., gencives supérieures bilat., CTV voile bilat. En cas d'atteinte osseuse, les volumes correspondent à ceux du sinus maxillaire
Trigone rétromolaire supérieur	CTV trigone rétromolaire homolat., CTV joue homolat. (2 cm), CTV palais dur homolat. (2 cm), la gencive homolat. (2 cm), CTV pilier antérieur homolat., CTV amygdale homolat., CTV voile homolat., le muscle ptérygoïdien médial homolat., CTVs espaces graisseux buccal et infratemporal homolat., CTV espace parapharyngé homolat. Tumeur avancée : prendre en plus : CTV fosse ptérygomaxillaire homolat., CTV Gasser homolat.
Trigone rétromolaire inférieur	Trigone rétromolaire inférieur homolat., mandibule homolat. (2 cm), CTV plancher postérieur homolat. (2 cm), CTV glande sous-mandibulaire homolat., CTV joue homolat.(2 cm), la gencive homolat. (2 cm), CTV pilier antérieur homolat., CTV amygdale homolat., CTV voile homolat.

Homolat. : homolatéral ; bilat. : bilatéral ; CTV : volume cible anatomoclinique.
[a] muscles génioglosse, géniohyoïdien, mylohyoïdien et glandes sublinguales.

Number of pts with **clinically positive neck nodes** found at presentation *(adapted From Gregoire 2000)*

		Level (Percentage of the node+ pts.)									
	N. Pt N+	I		II		III		IV		V	
Oral cavity (n=787)	36	42	3.5	79	8	18	3	5	1	1	0
Oropharynx (n=1497)	64	13	2	81	24	23	5	9	2.5	13	3
Hypopharynx (n=847)	70	2	0	80	13	51	4	20	3	24	2
Supraglottic Larynx (n=428)	55	2	0	71	21	48	10	18	7	15	4
Naspharynx (440 pts)*	80	9	8	71	56	36	32	32	26	15	10

*Sham 1990

Lindberg Cancer 1972

Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Negative** Neck After Elective Radical Neck Dissection

CTV 2) Risk of sublinical involvement greater than15–20%

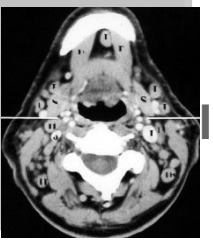
		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	192	20%	17%	9%	3%	0,5%
Oropharynx	48	2%	25%	19%	8%	2%
Hypopharynx	24	0%	13%	13%	0%	0%
Larynx	79	5%	19%	20%	9%	2,5%

Shah JP, Candela FC, Poddar AK. The patterns of cervical lymph node metastases from squamous carcinoma of the oral cavity. *Cancer* 1990;66(1):109–113.)

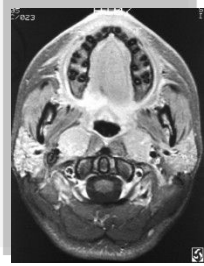
Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Positive** After Therapeutic Radical Neck Dissection

		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	324	46%	43%	33%	15%	3%
Oropharynx	165	14%	71%	42%	28%	9%
Hypopharynx	104	5%	19%	20%	9%	2,5%
Larynx	183	7%	57%	59%	29%	4%

Shah JP, Candela FC, Poddar AK. AJ Surg 1990;160(4):405-409



Incidence of Positive Retropharyngeal Nodes for Various Primary Sites and Clinical Neck Stages (794 Tumors)



CUT OFF 10%

CT and RMI

Primary Site	Clinical Neck Stage		
	N0 Neck No. %	N+ Neck[a] No. %	Overall %
Nasopharynx	2/5 (40%)	12/14 (86%)	74
Pharyngeal wall	6/37 (16%)	12/56 (21%)	19
Soft palate	1/21 (5%)	6/32 (19%)	13
Tonsillar region	2/56 (4%)	14/120(12%)	9
Pyriform sinus or postcricoid area	0/55 (0%)	7/81 (9%)	5
Base of tongue	0/31 (0%)	5/90 (6%)	4
Supraglottic larynx	0/87 (0%)	4/109 (4%)	2

[a]N+, neck nodes clinically involved (stages N1–3B).

From McLaughlin MP, Mendenhall WM, Mancuso AA, et al. Retropharyngeal adenopathy as a predictor of outcome in squamous cell carcinoma of the head and neck. *Head Neck* 1995;17:190–198,

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0360-3016/09/$–see front matter

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CLINICAL INVESTIGATION **Head and Neck**

DEFINING THE RISK OF INVOLVEMENT FOR EACH NECK NODAL LEVEL IN PATIENTS WITH EARLY T-STAGE NODE-POSITIVE OROPHARYNGEAL CARCINOMA

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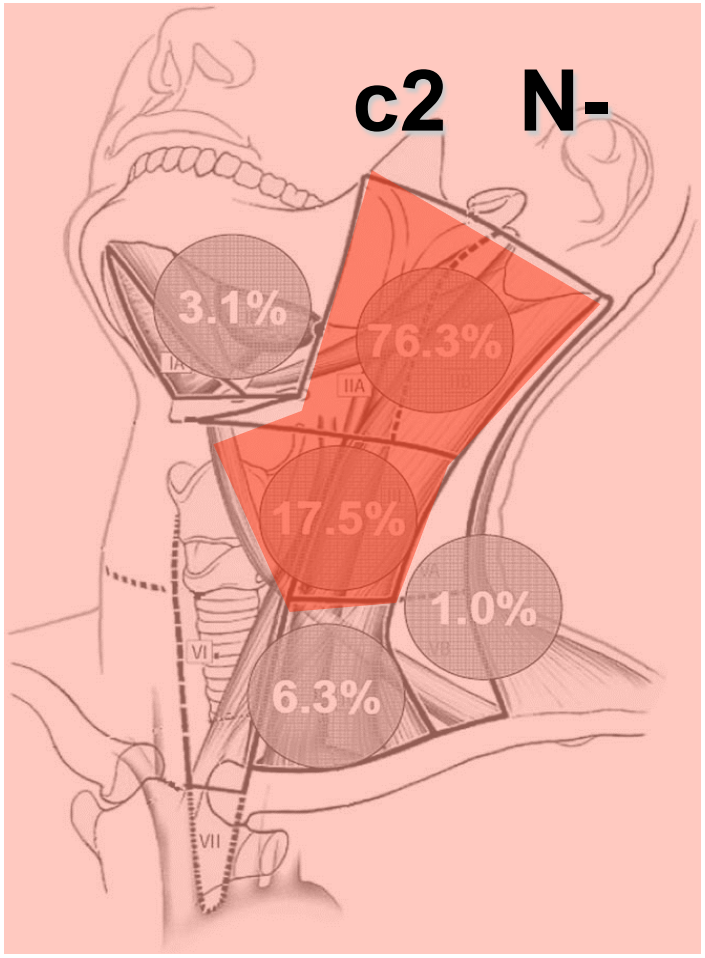
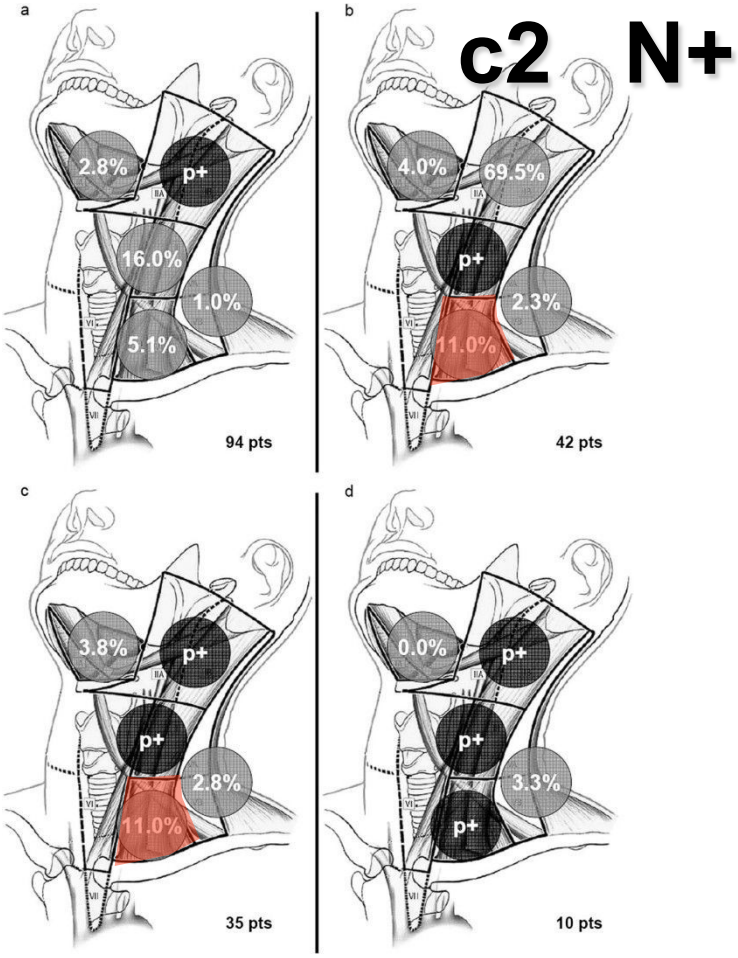
January 1998 to December 2007 were retrospectively identified.
Patients:

(1) upfront ND; i.e., before definitive radiotherapy with or without chemotherapy;
(2) early clinical T-stage (cT1 or cT2);
(3) neck nodes that were clinically palpable or detectable on imaging at presentation;

Estimated risk of pathologic involvement of each nodal level when results are negative or positive on imaging (computed tomography).





Conclusions

In cT1-2 **cN+** :

- Ipsilateral Levels II and III should always be considered at high risk of involvement despite negative findings on CT
- Level IV should be included in the lowest dose/risk level CTV.

Sanguineti. G et al. IJROBP 2009

Quando irradiare IIb?

Cavità orale «N_o»?

Table 3 Lymph node status at sublevel IIB evaluated by prospective studies in oral cavity squamous carcinoma with clinically negative neck

Author(s)	Year	Number of patients	Institutions	Mts detected in sublevel IIB by pathologic analysis	Mts detected in sublevel IIB by molecular analysis
Lim et al. [21]	2004	74	Yonsei University, Seoul, South Korea	4	
Elsheikh et al. [22]	2005	48	Tanta University, Tanta, Egypt	3	5[a]
Bolzoni Villaret et al. [16]	2007	54	Brescia University, Brescia, European Institute of Oncology, Milan, and Regina Elena Institute of Oncology, Rome, Italy	1	
Paleri et al. [17]	2008	10	Royal Adelaide Hospital, Adelaide, South Australia and Freeman Hospital, Newcastle upon Tyne, UK	1[b]	

[a] This number includes the three cases of metastases detected in sublevel IIB by pathologic analysis. The primary tumor was situated in the tongue in all the five cases

[b] The primary tumor was localized at the floor of the mouth and adjacent alveolus (T4), and no other positive nodes were evident at other levels in this patient

Ferlito A., Silver CE, Rinaldo A. Eur Arch Otorhinolaryngol. (2008) 265:621-626)

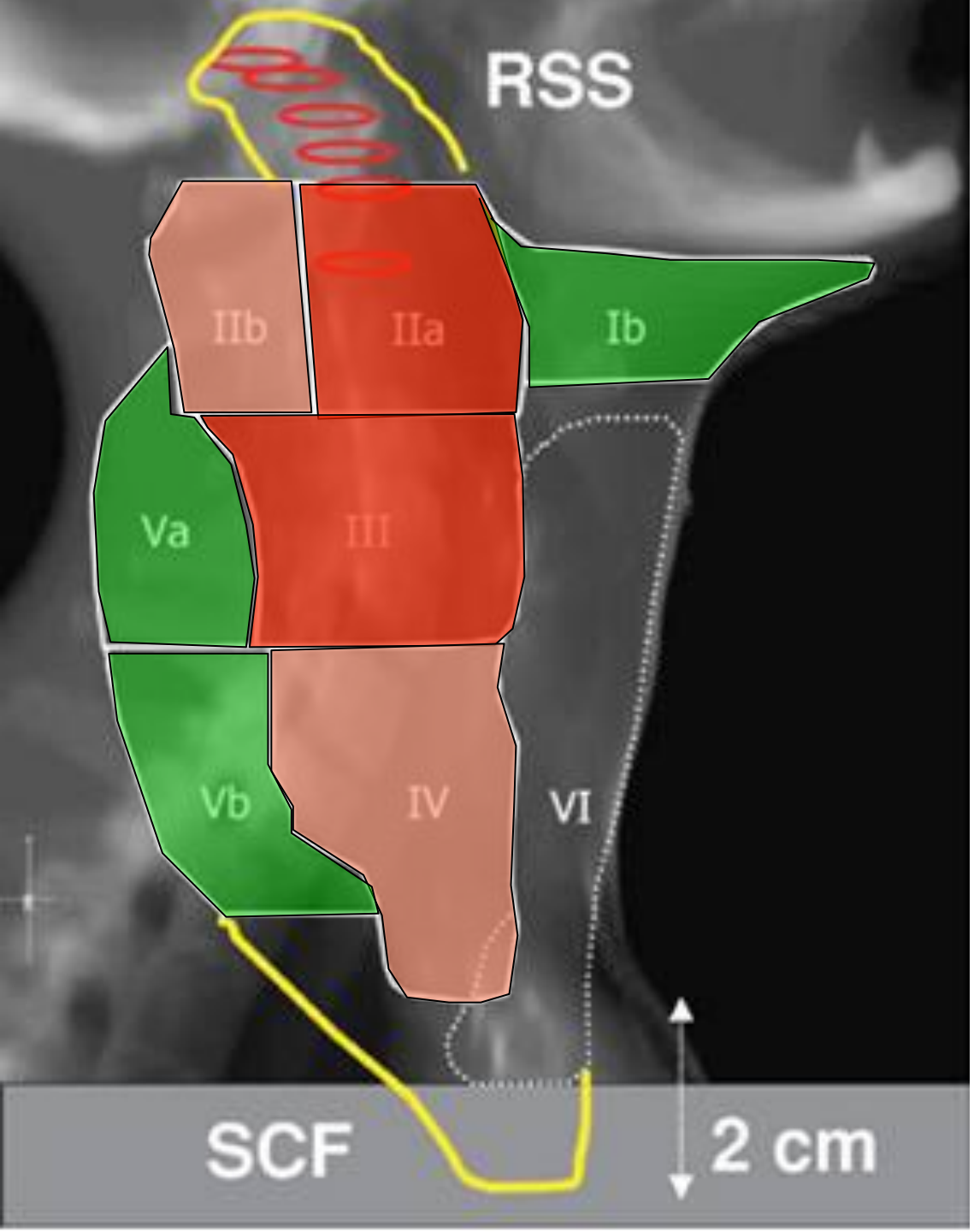
Quando irradiare IIb?

Orofaringe «cN_o»?

Table 4 Lymph node status at sublevel IIB evaluated by prospective studies in oropharyngeal squamous carcinoma with clinically negative neck

Author(s)	Year	Number of patients	Institutions	Mts detected in sublevel IIB by pathologic analysis
Lee et al. [24]	2006	21	Chung-Ang University, Konkuk University, and Yonsei University, Seoul, South Korea	None
Bolzoni Villaret et al. [16]	2007	10	Brescia University, Brescia, European Institute of Oncology, Milan, and Regina Elena Institute of Oncology, Rome, Italy	1
Paleri et al. [17]	2008	9	Royal Adelaide Hospital, Adelaide, South Australia and Freeman Hospital, Newcastle upon Tyne, UK	None

Ferlito A., Silver CE, Rinaldo A. Eur Arch Otorhinolaryngol. (2008) 265:621-626)

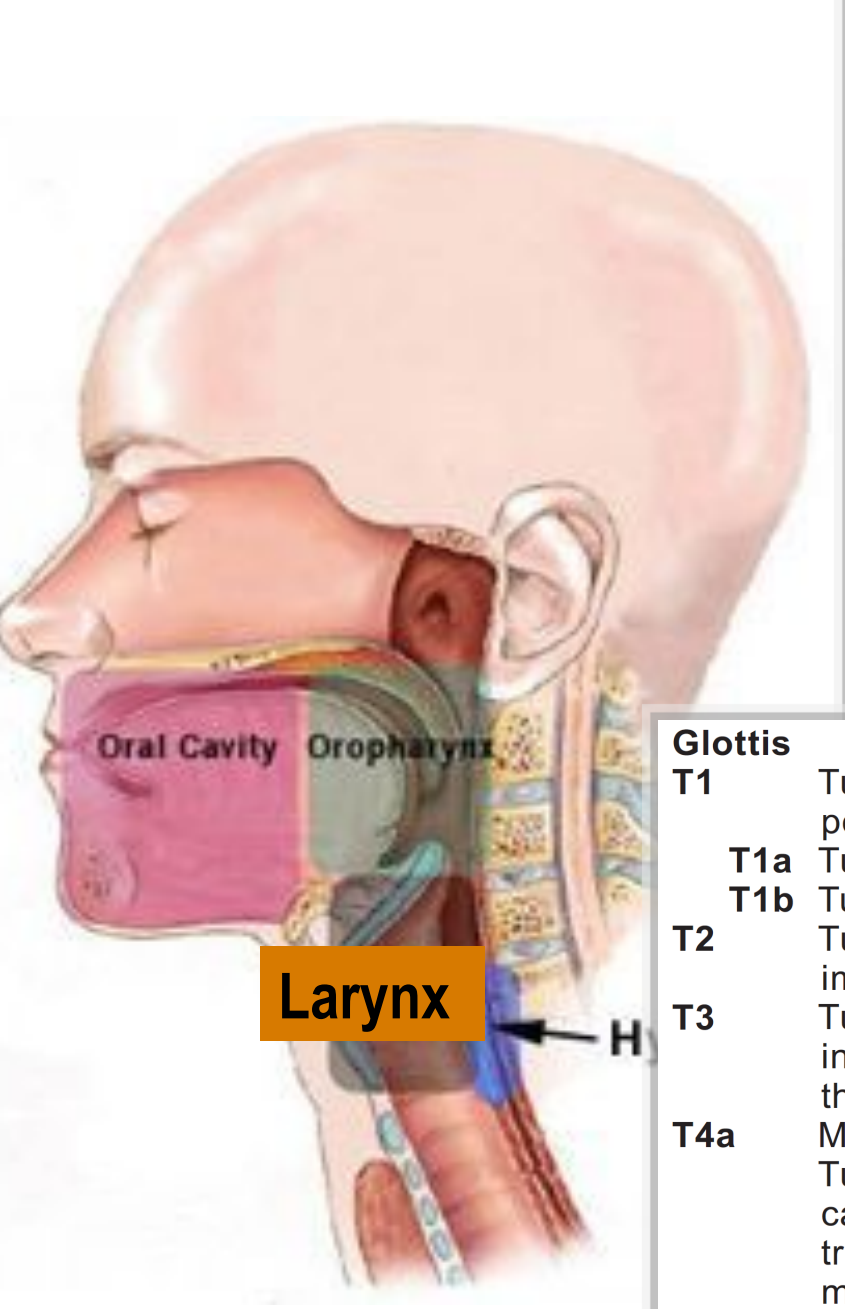


Conclusions

In **cN0** :

- Ipsilateral Levels IIa and III should always be considered at high risk of involvement despite negative findings on CT
- Level IV should be included in the lowest dose/risk level CTV.

Ferlito et al. Eur Arch Otor. 2008



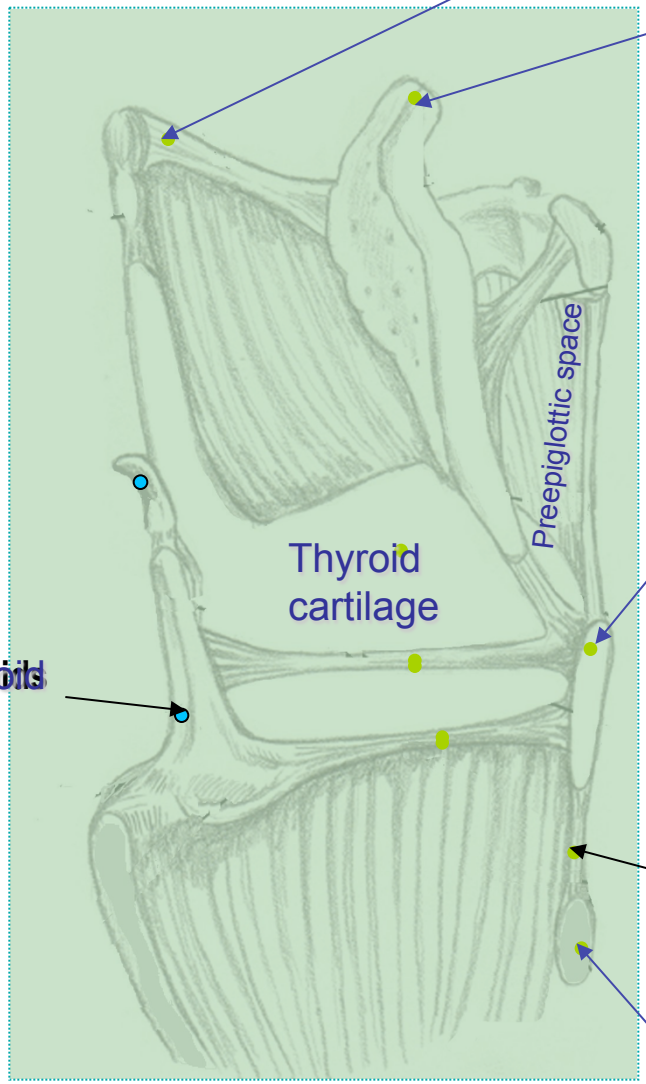
Supraglottis

T1	Tumor limited to one subsite of supraglottis with normal vocal cord mobility
T2	Tumor invades mucosa of more than one adjacent subsite of supraglottis or glottis or region outside the supraglottis (eg, mucosa of base of tongue, vallecula, medial wall of pyriform sinus) without fixation of the larynx
T3	Tumor limited to larynx with vocal cord fixation and/or invades any of the following: postcricoid area, pre-epiglottic space, paraglottic space, and/or inner cortex of thyroid cartilage
T4a	Moderately advanced local disease Tumor invades through the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)
T4b	Very advanced local disease Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Glottis

T1	Tumor limited to the vocal cord(s) (may involve anterior or posterior commissure) with normal mobility
T1a	Tumor limited to one vocal cord
T1b	Tumor involves both vocal cords
T2	Tumor extends to supraglottis and/or subglottis, and/or with impaired vocal cord mobility
T3	Tumor limited to the larynx with vocal cord fixation and/or invasion of paraglottic space, and/or inner cortex of the thyroid cartilage
T4a	Moderately advanced local disease Tumor invades through the outer cortex of the thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscle of the tongue, strap muscles, thyroid, or esophagus)
T4b	Very advanced local disease Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures

Skeletal framework



Hyoid Bone

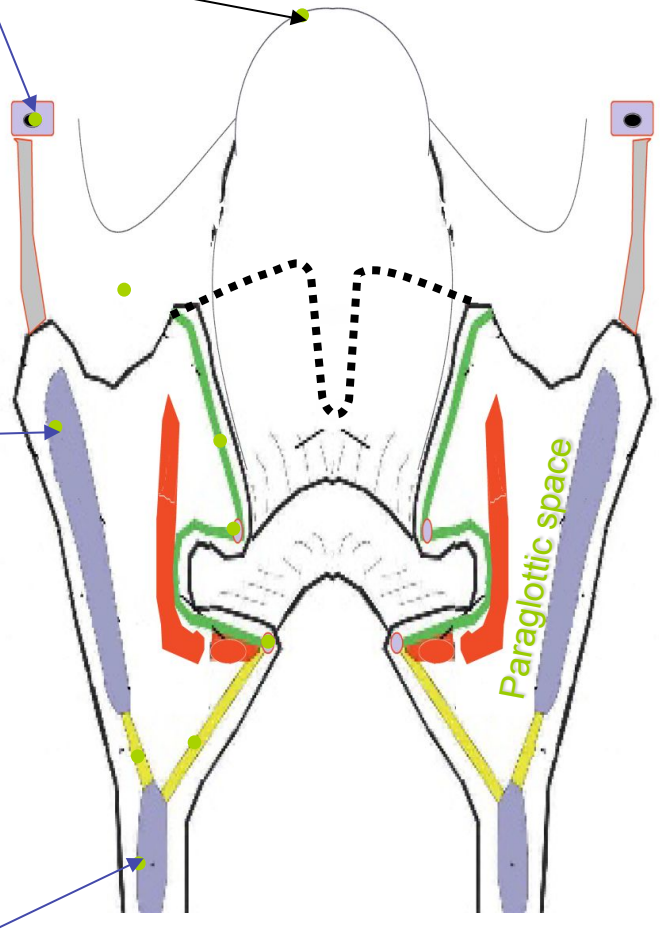
Epiglottis

Thyroid cartilage

Crico-Thyroid Ligament

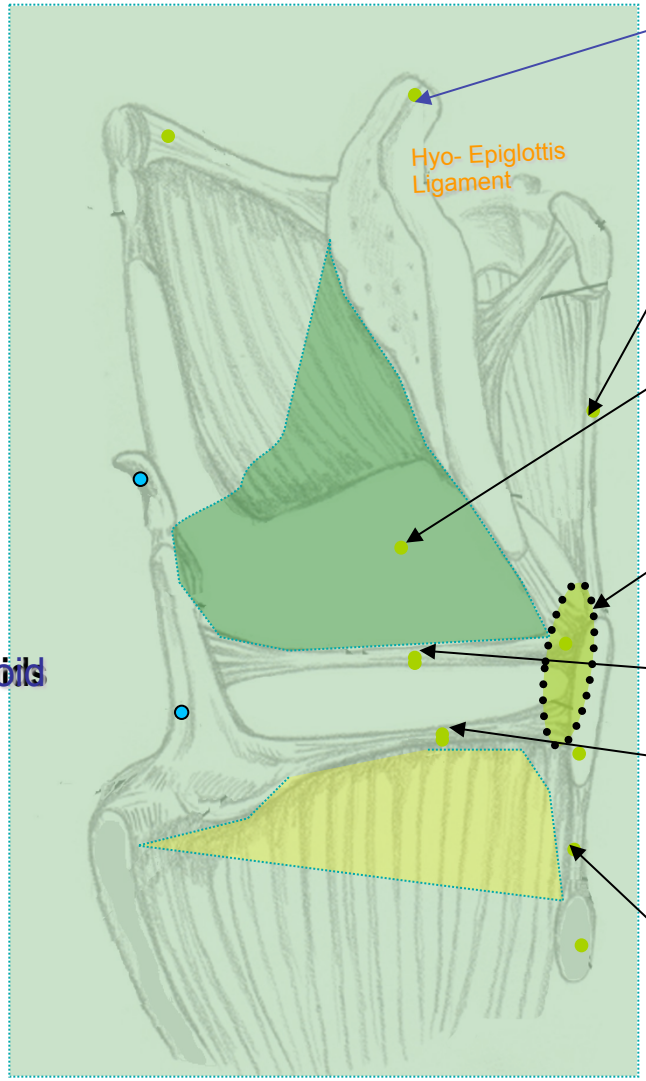
Anterior condensation of conus elasticus

Cricoid cartilage



False barriers

Connective tissue barriers



Epiglottis

Thyro-Hyoid membrane

Quadrangular membrane

Anterior commissure tendon

Broyles ligament

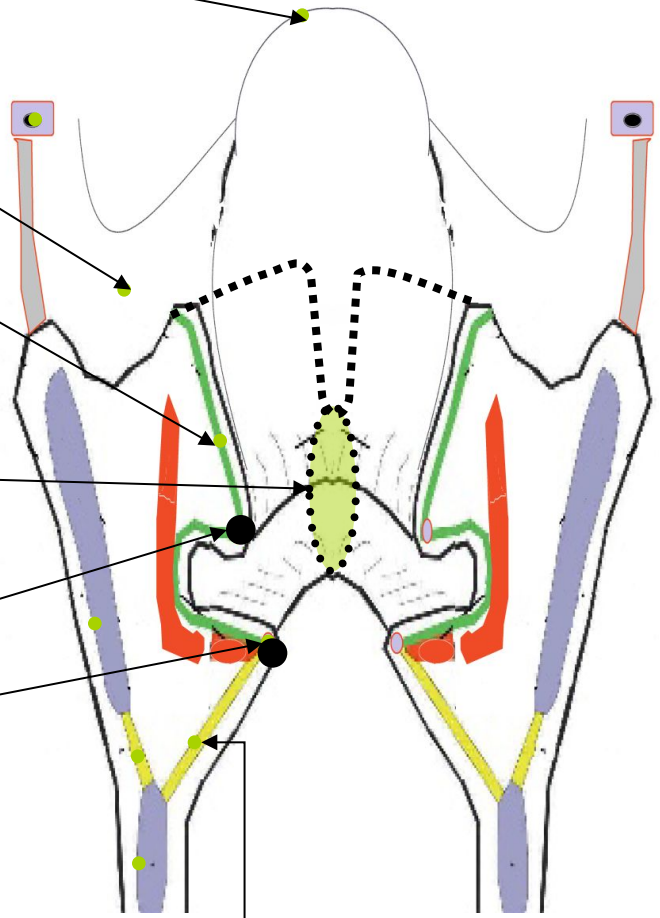
Ventricular ligament

Vocal ligament

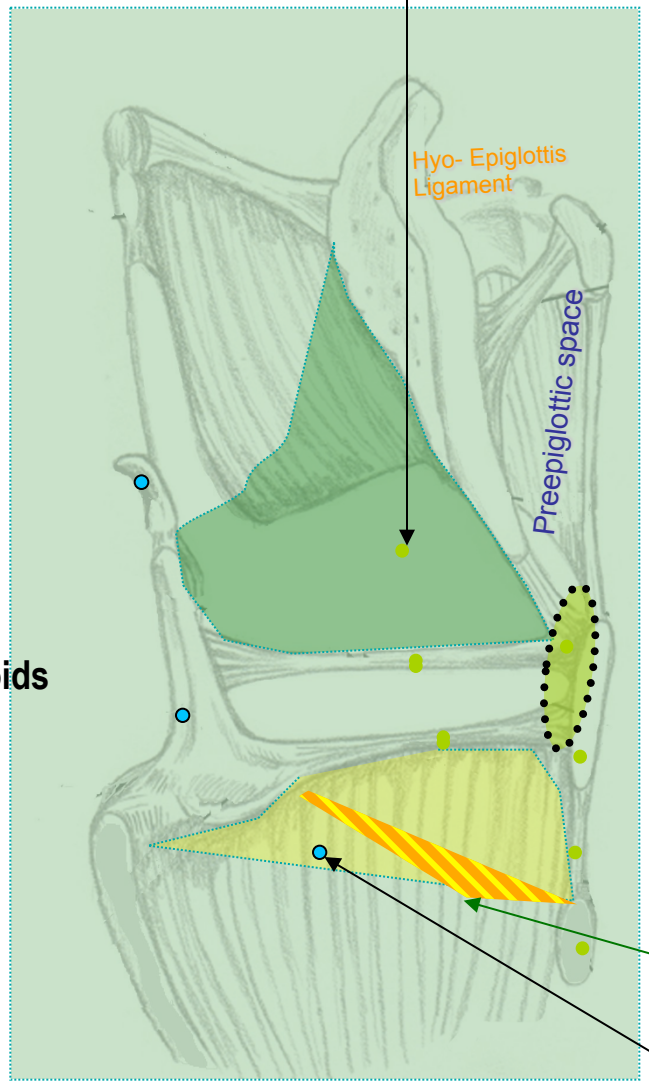
Crico-Thyroid Ligament

Anterior condensation of conus elasticus

Conus elasticus



Laryngeal space



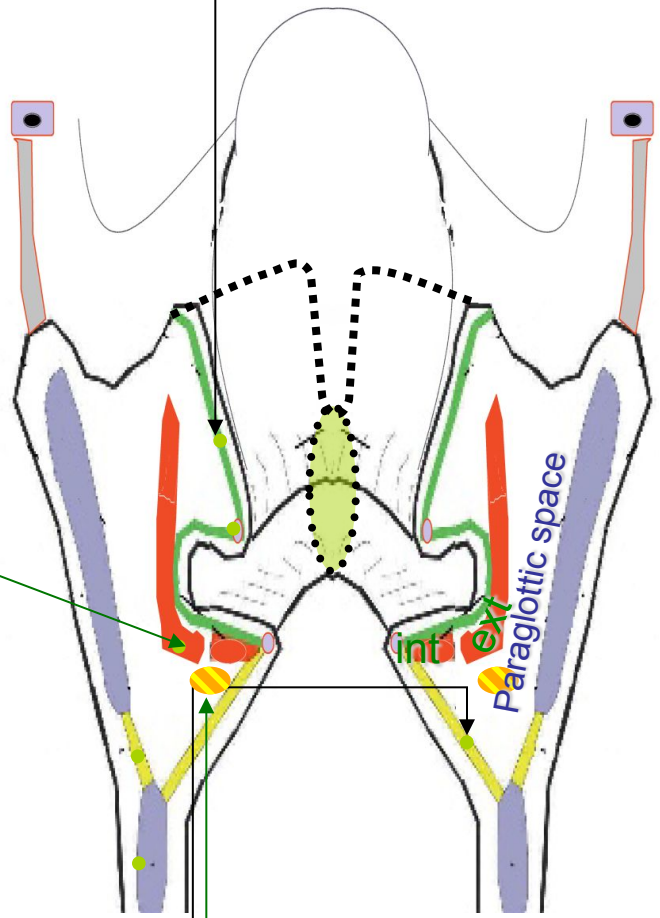
Quadrangular membrane

Arytenoids

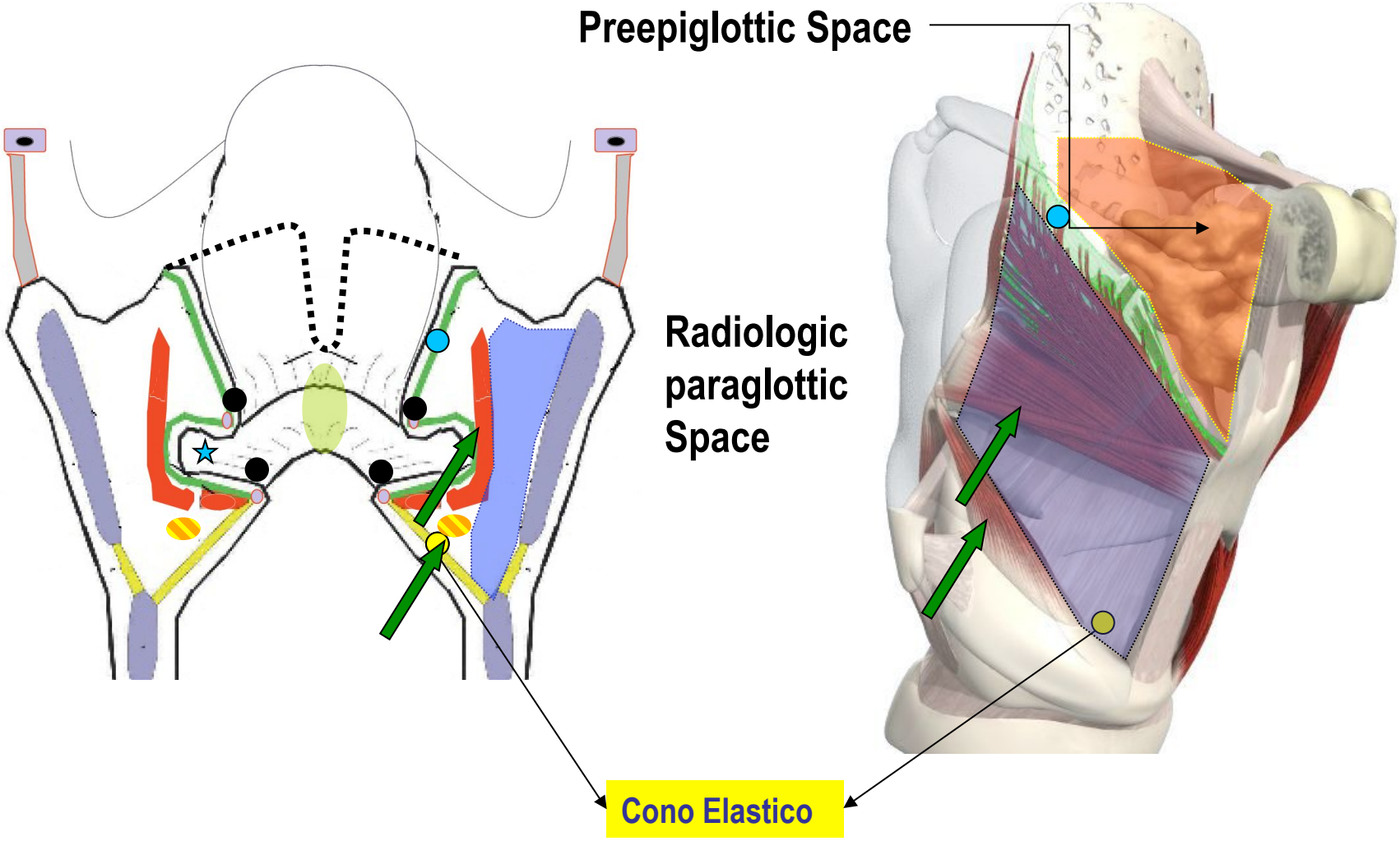
Thyroid Arythenoid muscle

Crico Arythenoid Lateral m

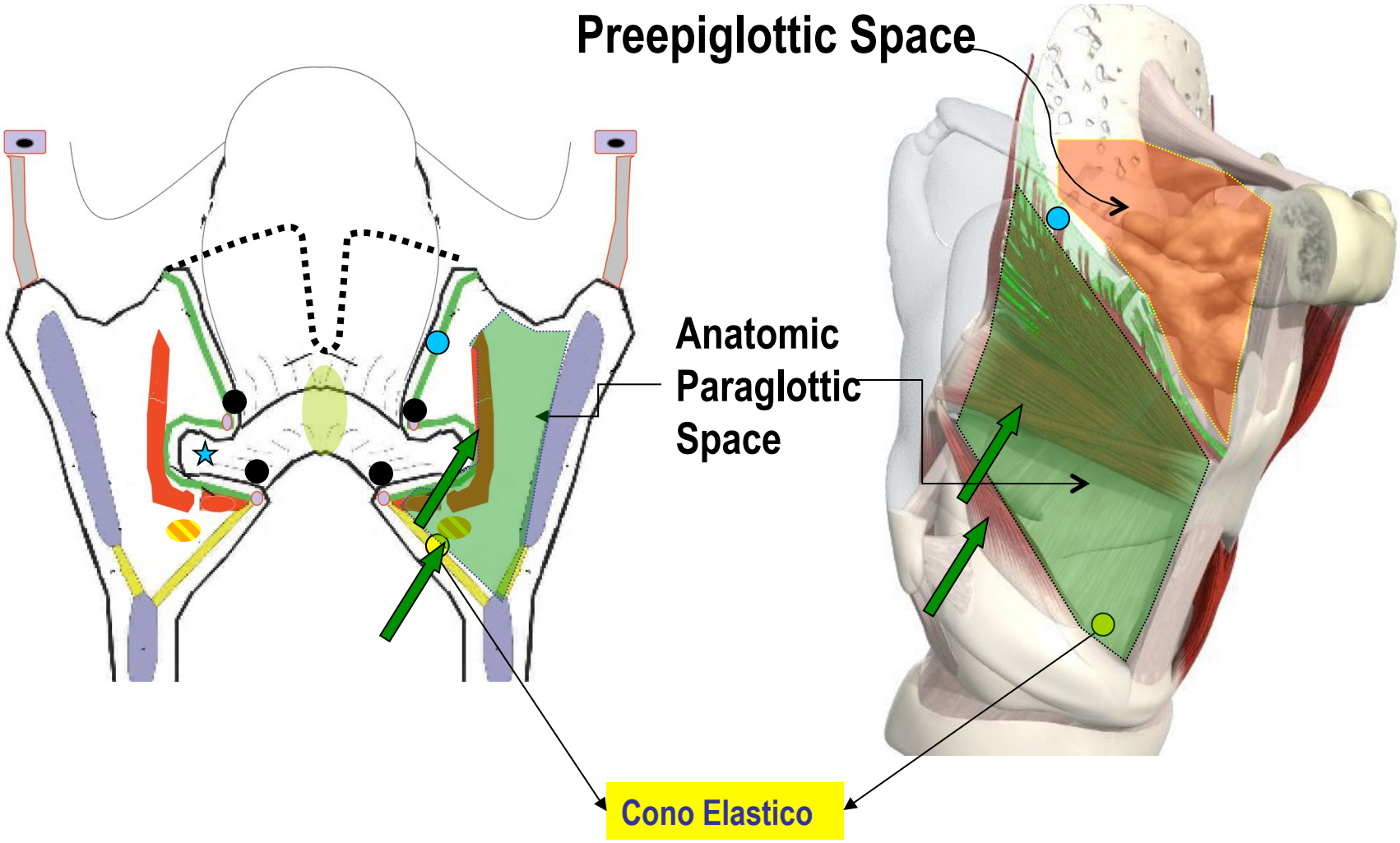
Conus elasticus



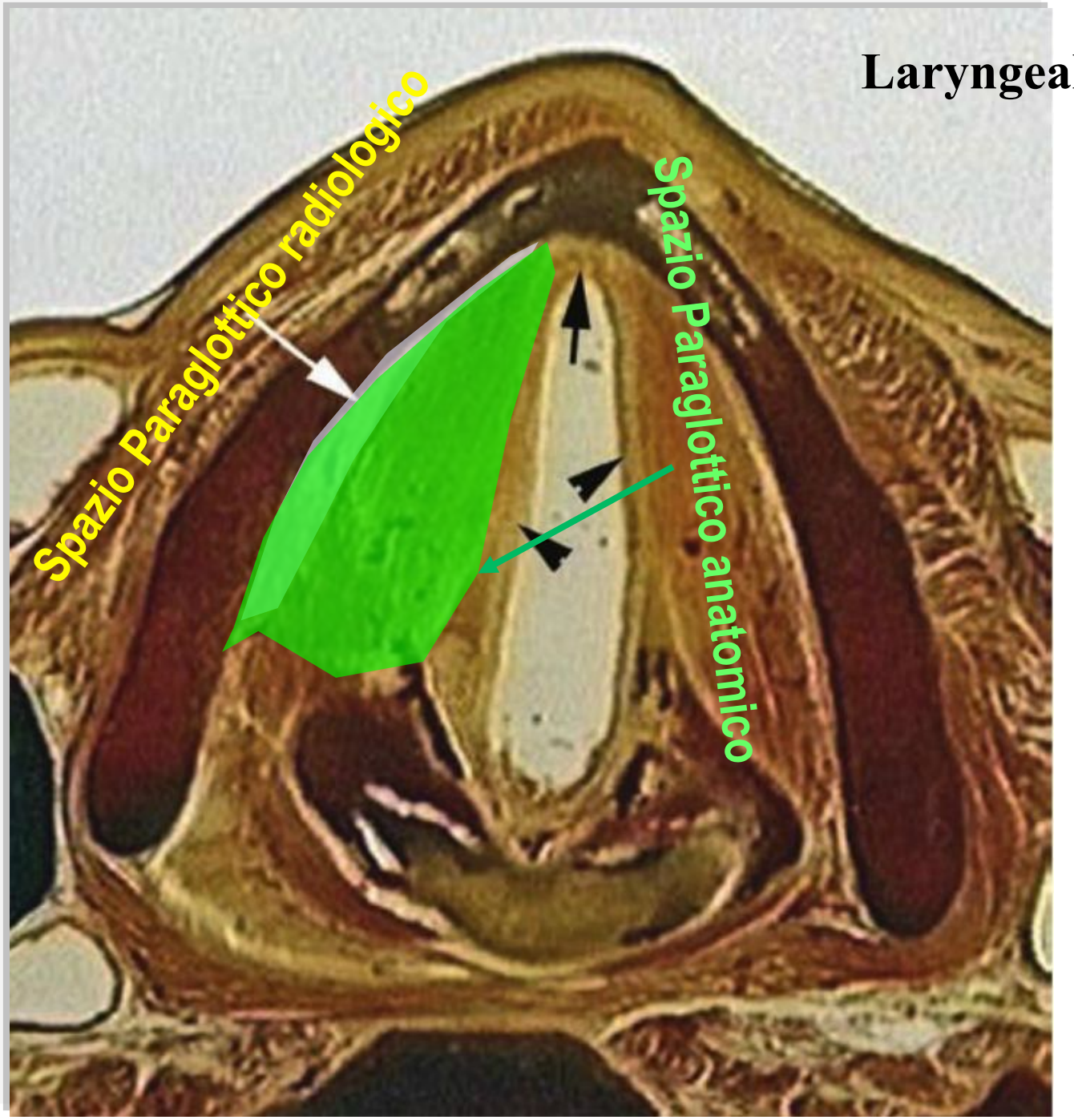
Laryngeal space



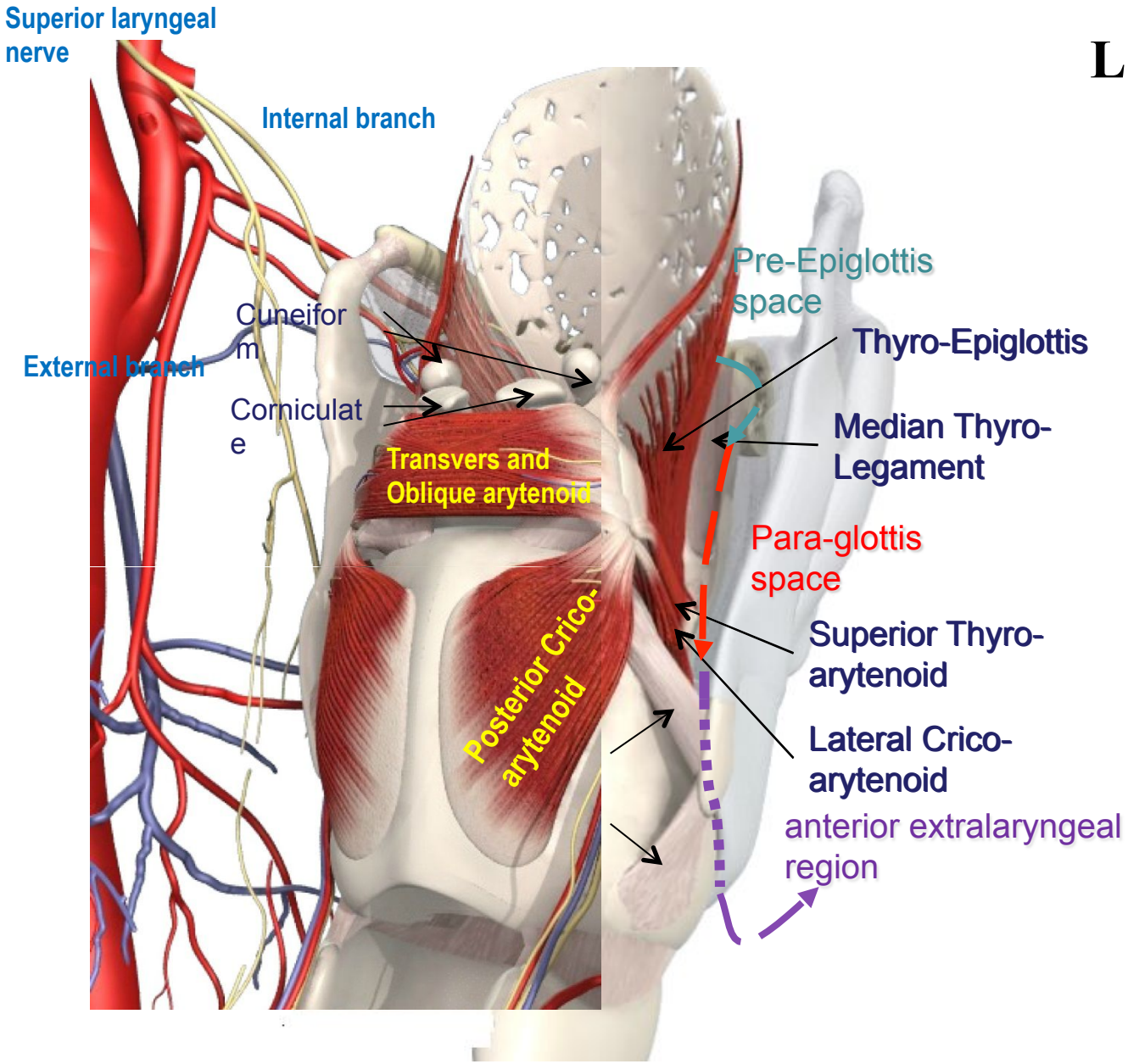
Laryngeal space

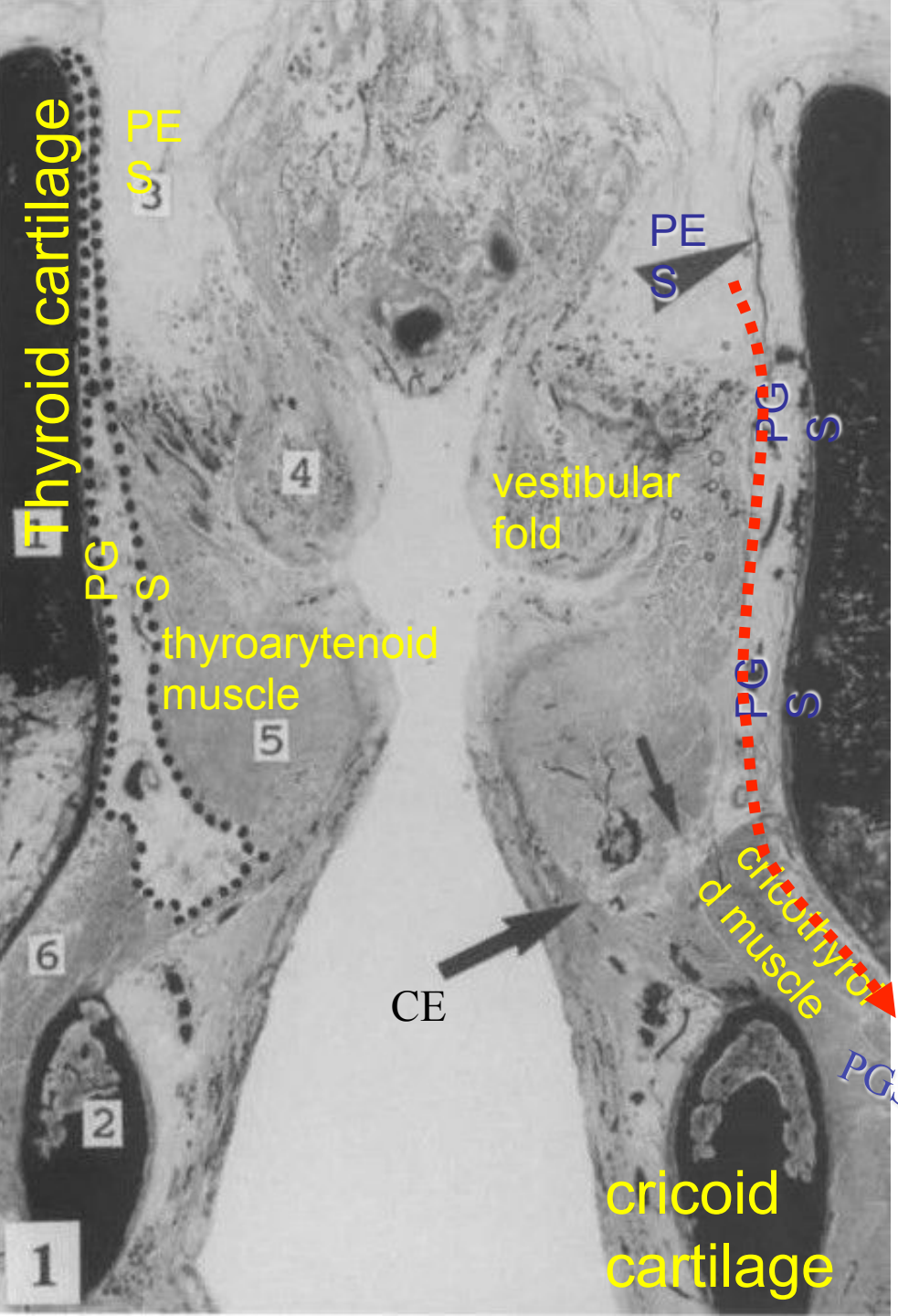


Laryngeal space



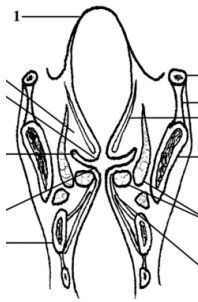
Laryngeal space



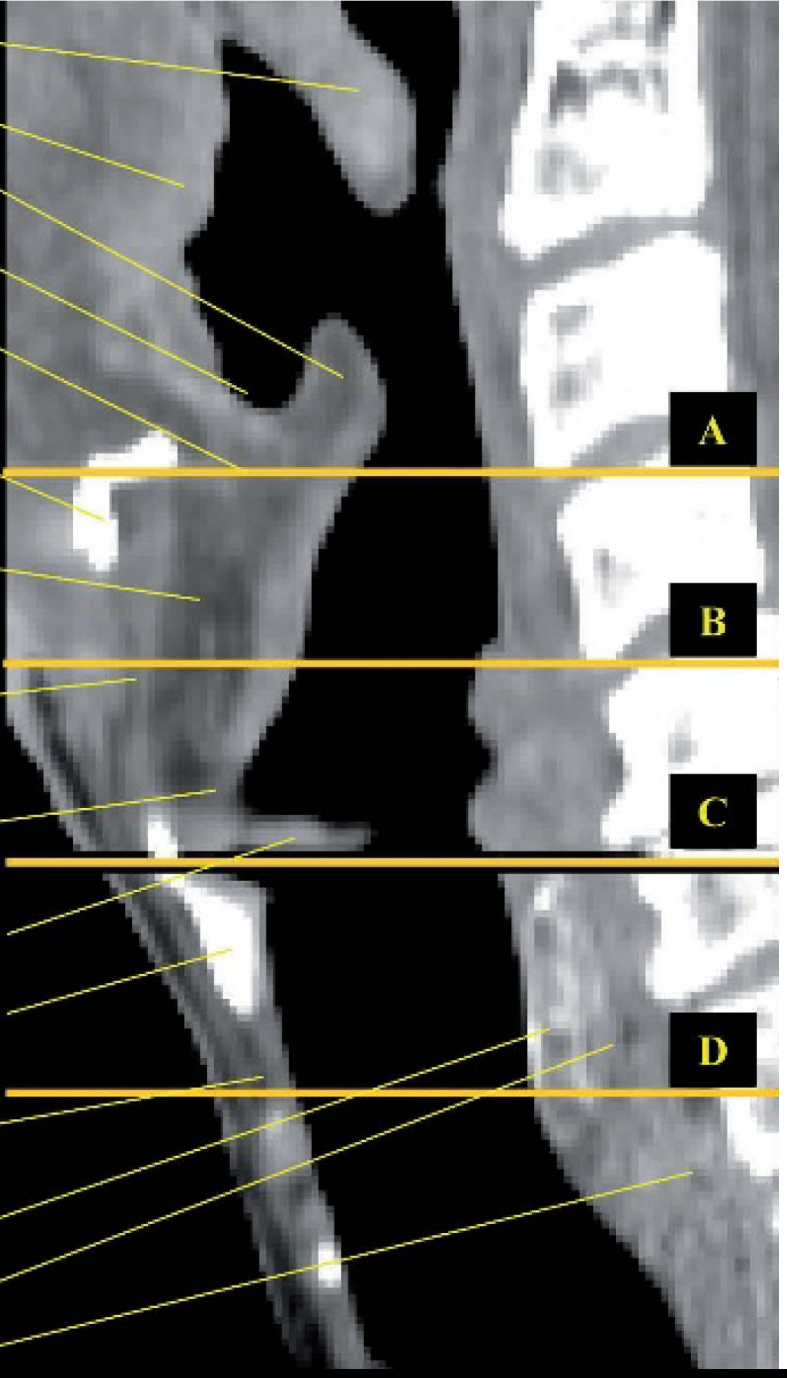


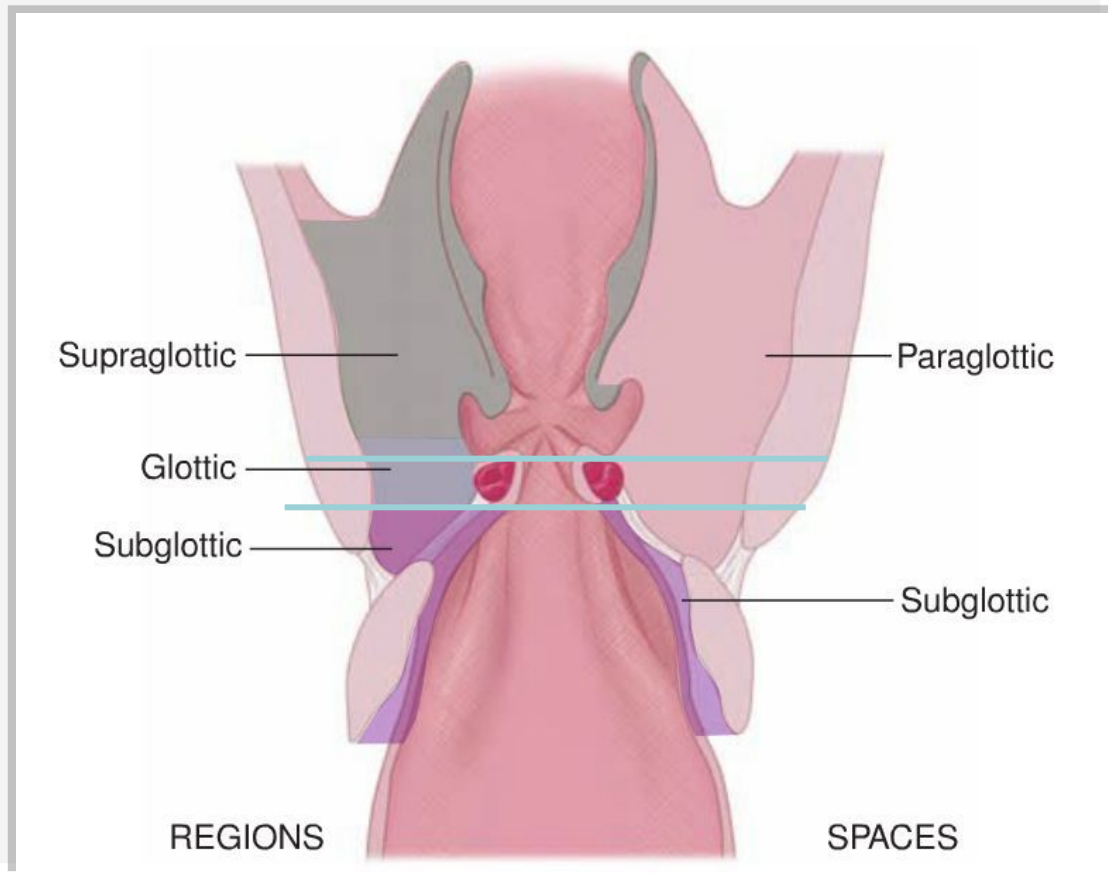
Plastinated larynx of a 56-year-old male showing a 600-gm
frontal section through the anterior third of the vocal cords.

- Azure II/methylene blue and basic fuchsin stain, x 2.6. Left side:
- Thyroid cartilage (1),
- cricoid cartilage (2),
- periepiglottic space (PES, 3),
- vestibular fold (4),
- thyroarytenoid muscle (5),
- cricothyroid muscle (6),
- paraglottic space (PGS, dotted line). Right side: The PGS and PES are separated by a collagenous fiber septum (arrowhead).
- A similar structure is absent at the caudal surface of the thyroarytenoid muscle (short arrow).
- The CE borders the PGS inferomedially (long arrow)



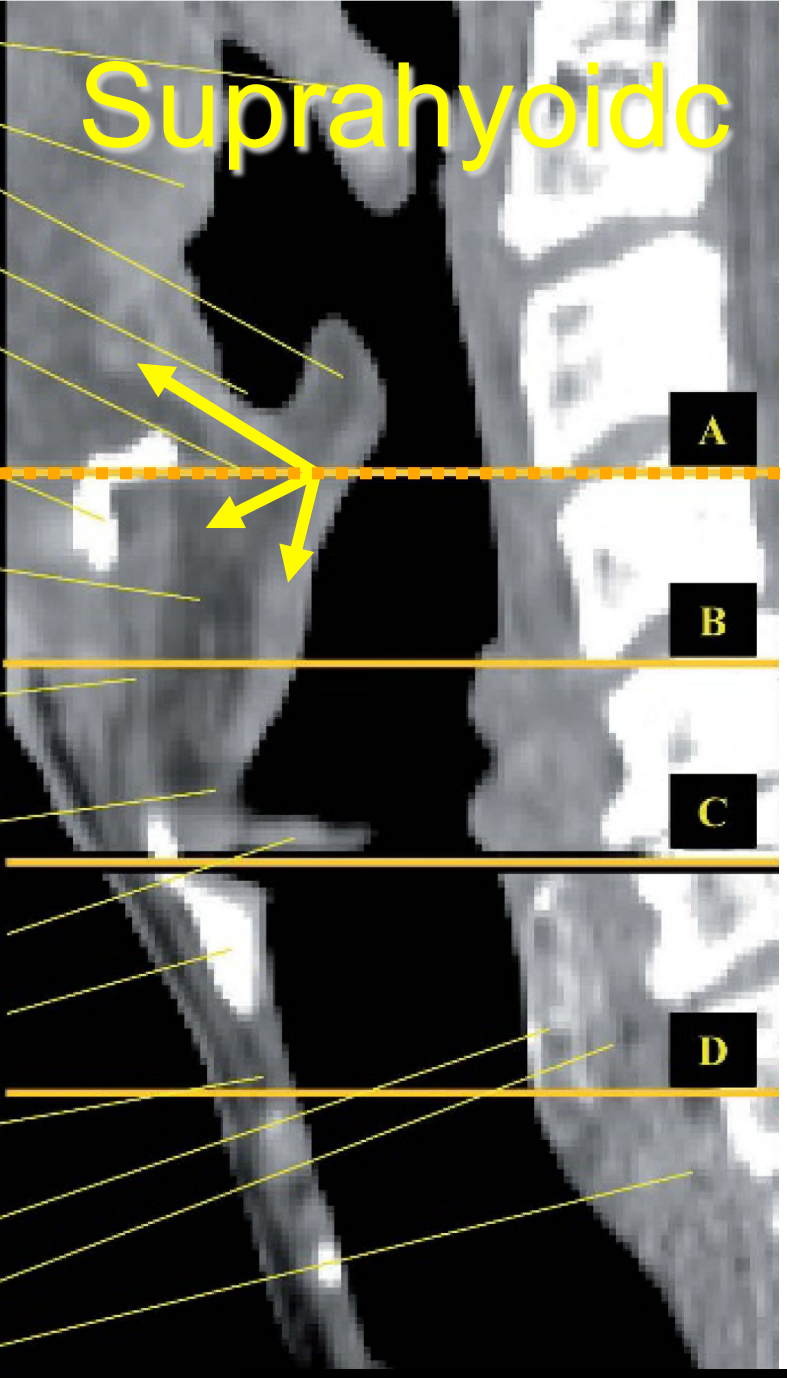
Spread of carcinoma within the larynx

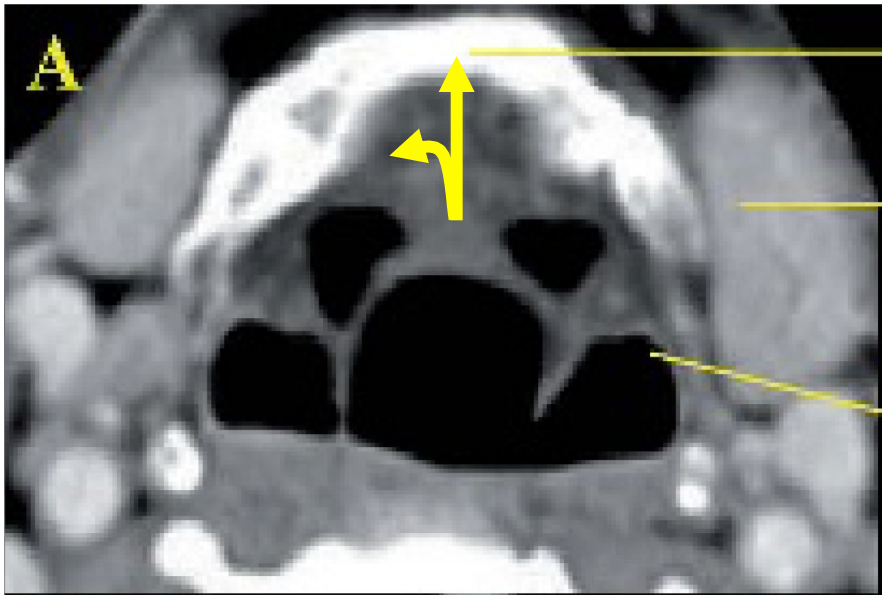




Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S5

Suprahyoidc



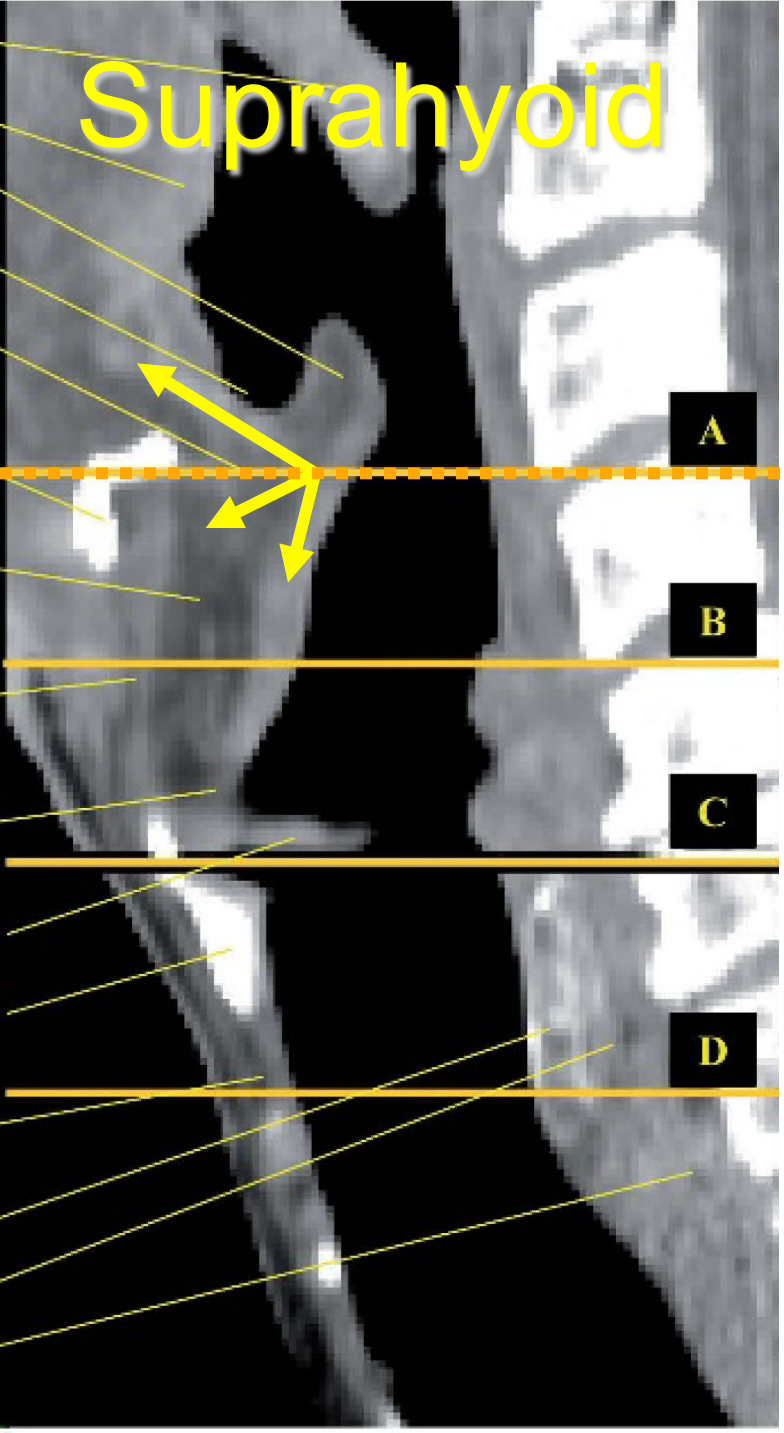


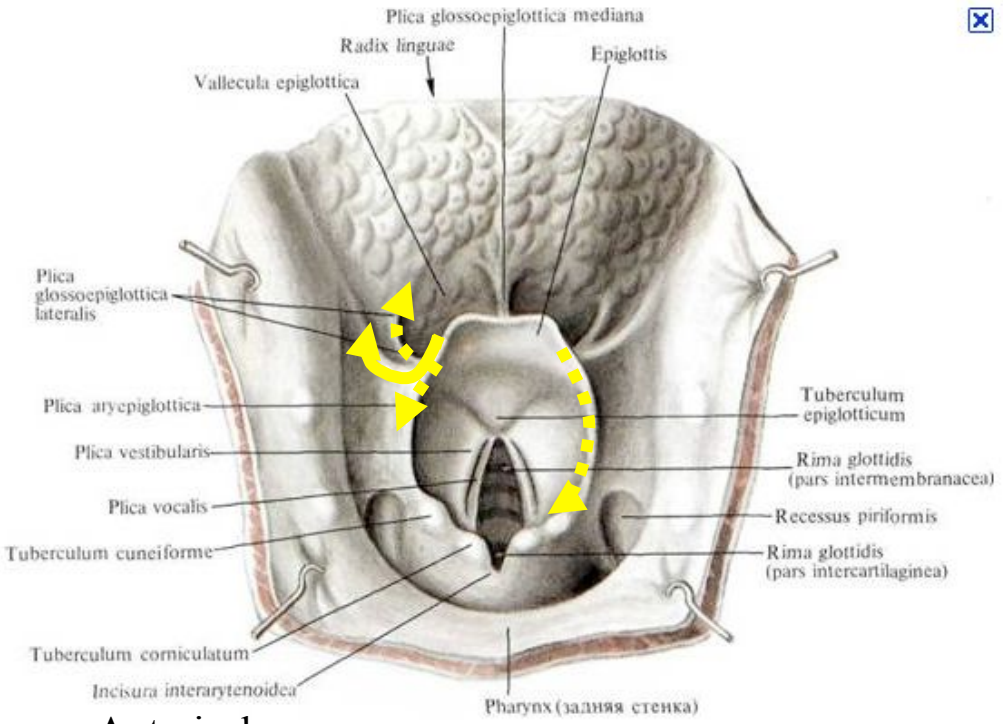
Anteriorly

- Tongue (superficial)
- Preepiglottic space

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S5

Suprahyoid





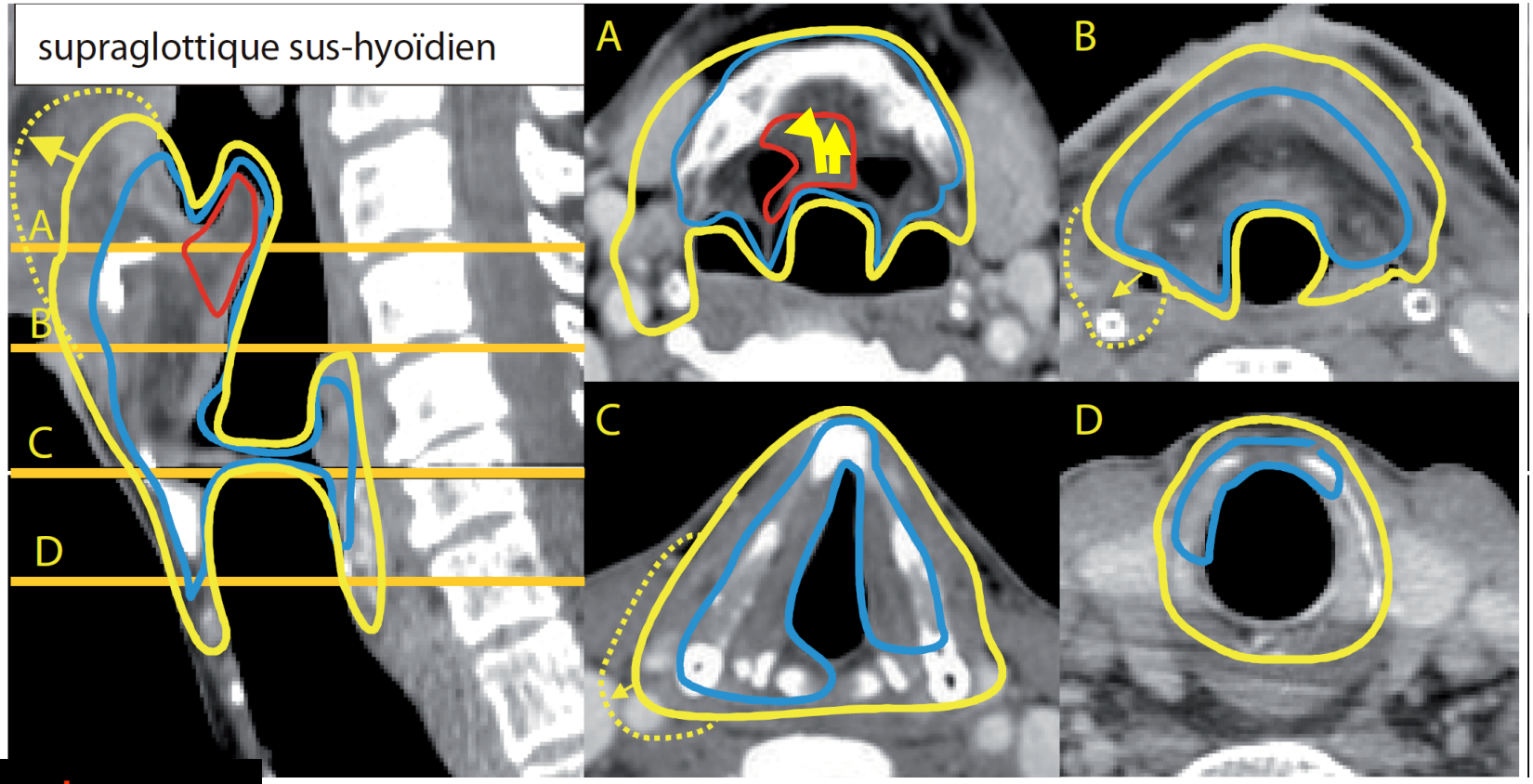
Anteriorly

- Tongue (superficial)
- Preepiglottic space

Laterally

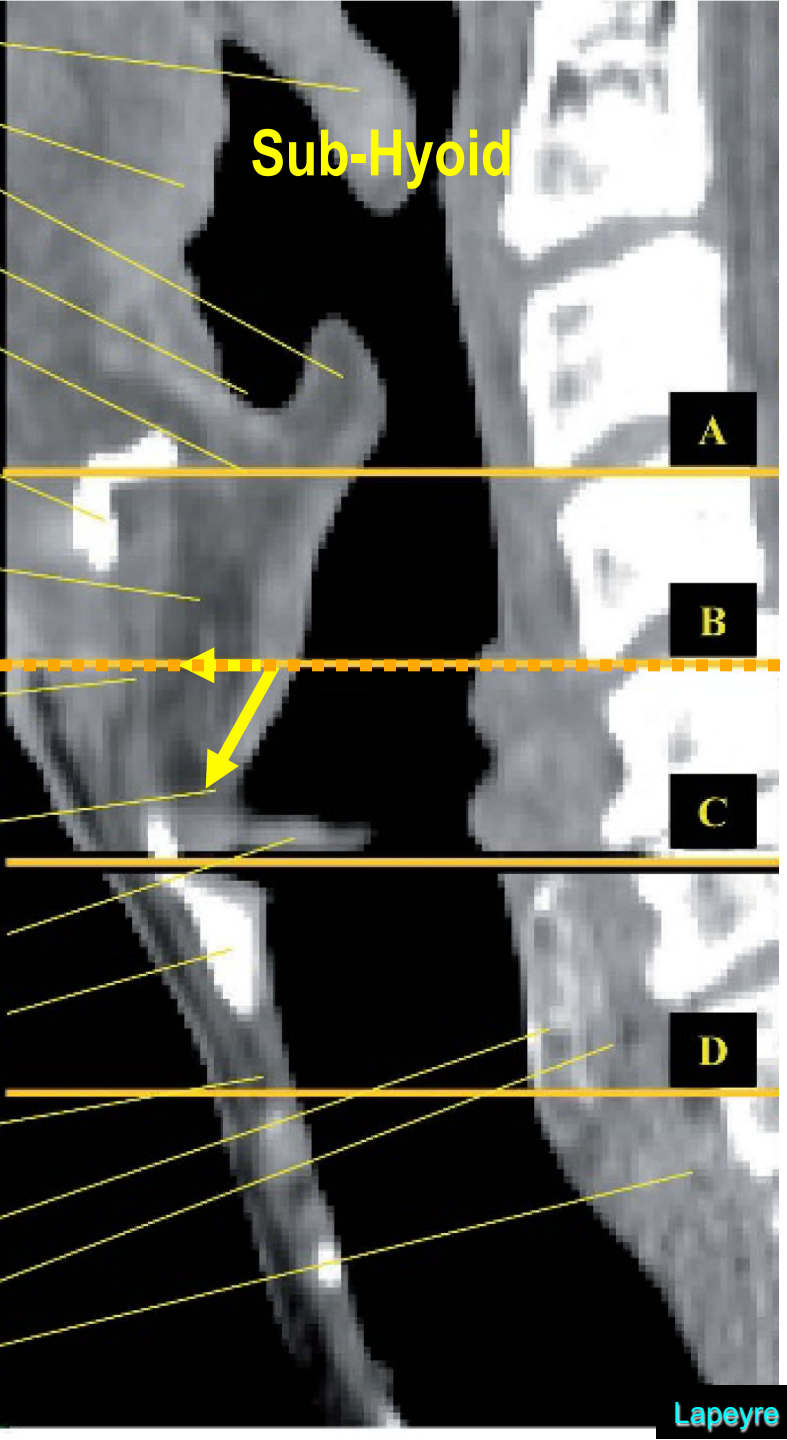
- Three folds areas
  - Plica aryepiglottica,
  - Plica glossoepiglottica,
  - Plica Pharyngoepiglottica

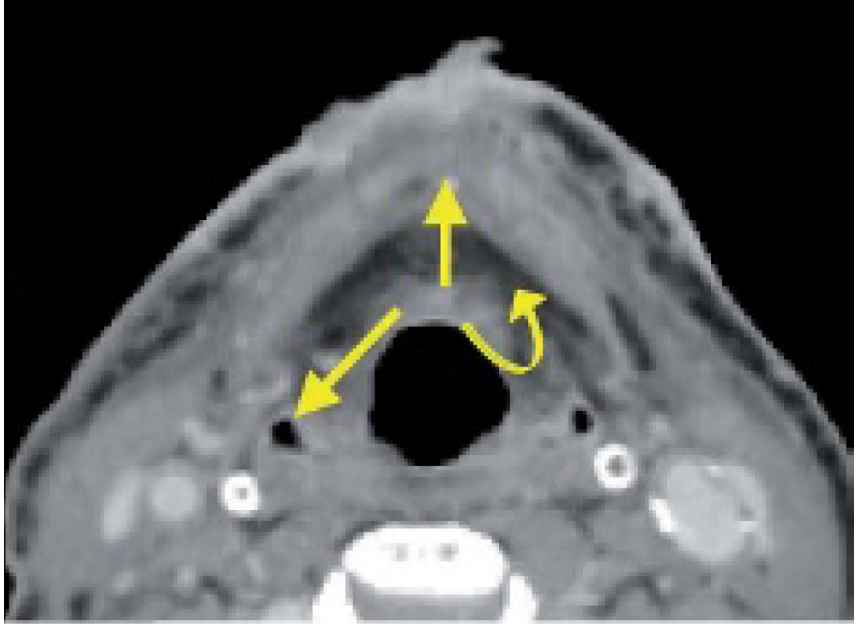
Suprahyoid



GTV= red
CTV70 = Blu
CTV50 = yellow

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

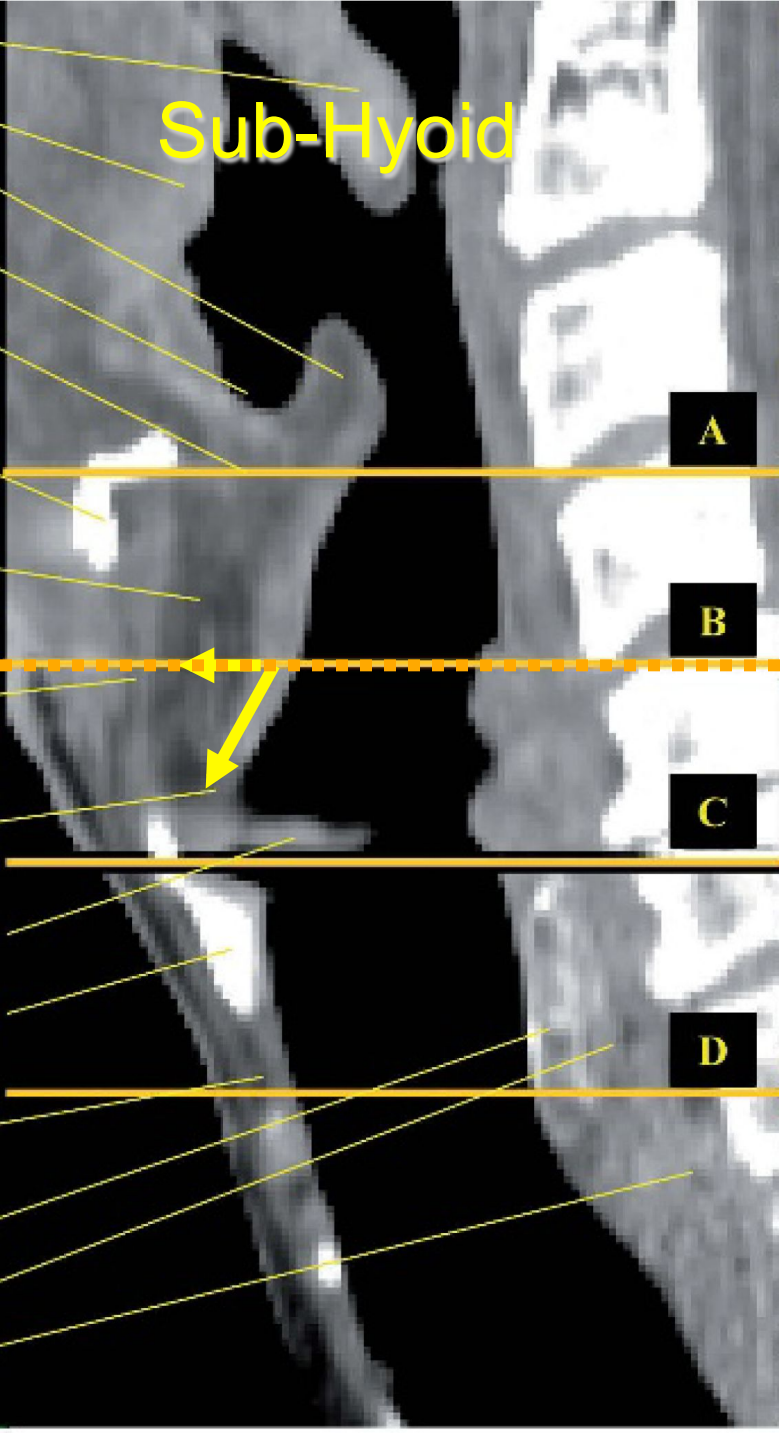


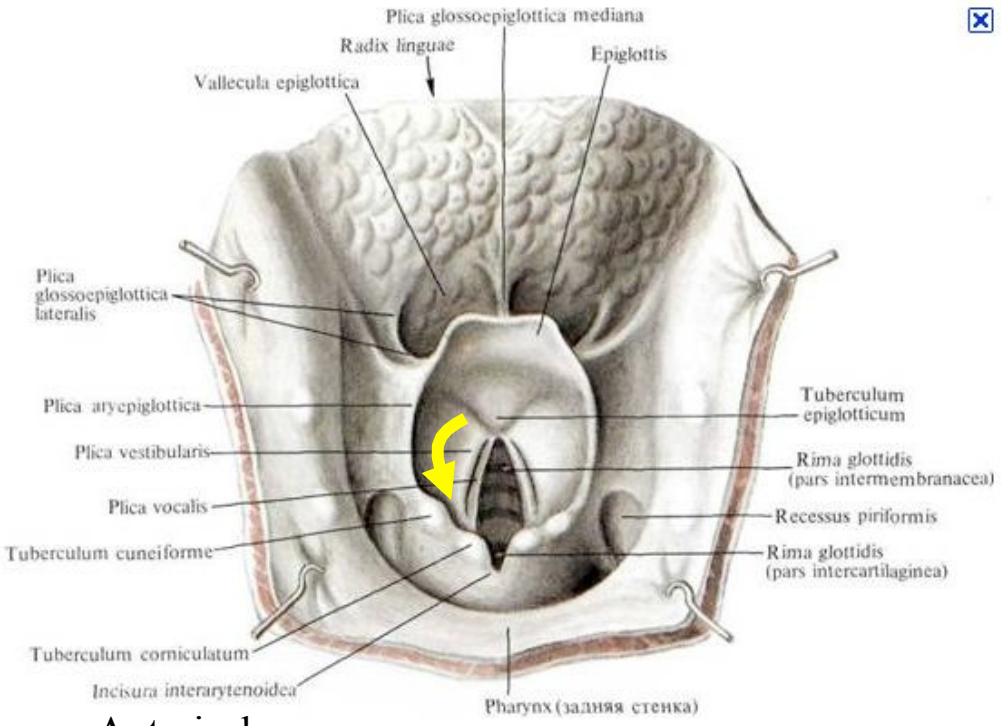


Anteriorly
- Preepiglottic space

Inferiorly
- Anterior commissura

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.





Anteriorly

- Preepiglottic space

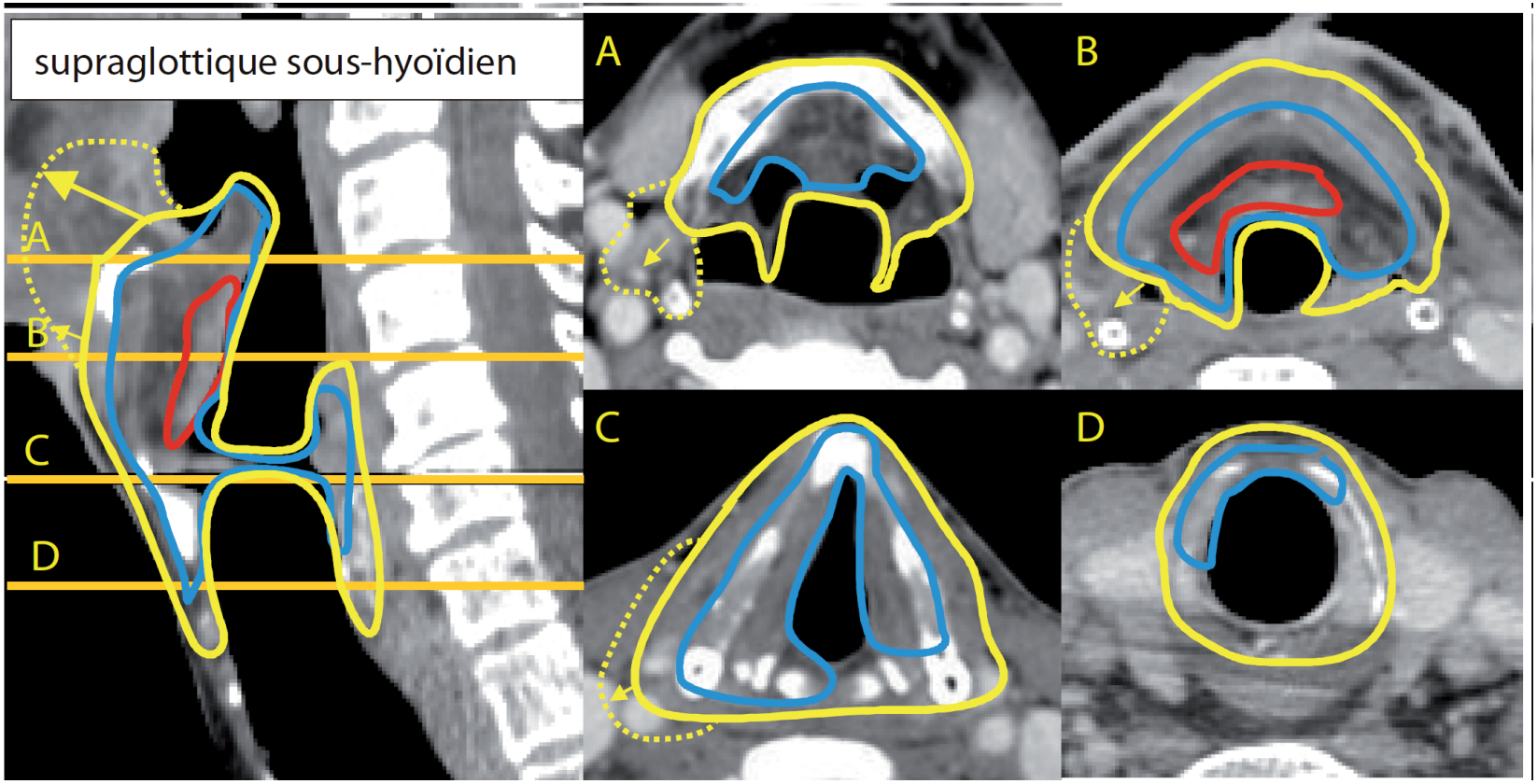
Inferiorly

- Anterior commissura

Laterally

- Plica ventricularis
- ventricle

Sub-Hyoid



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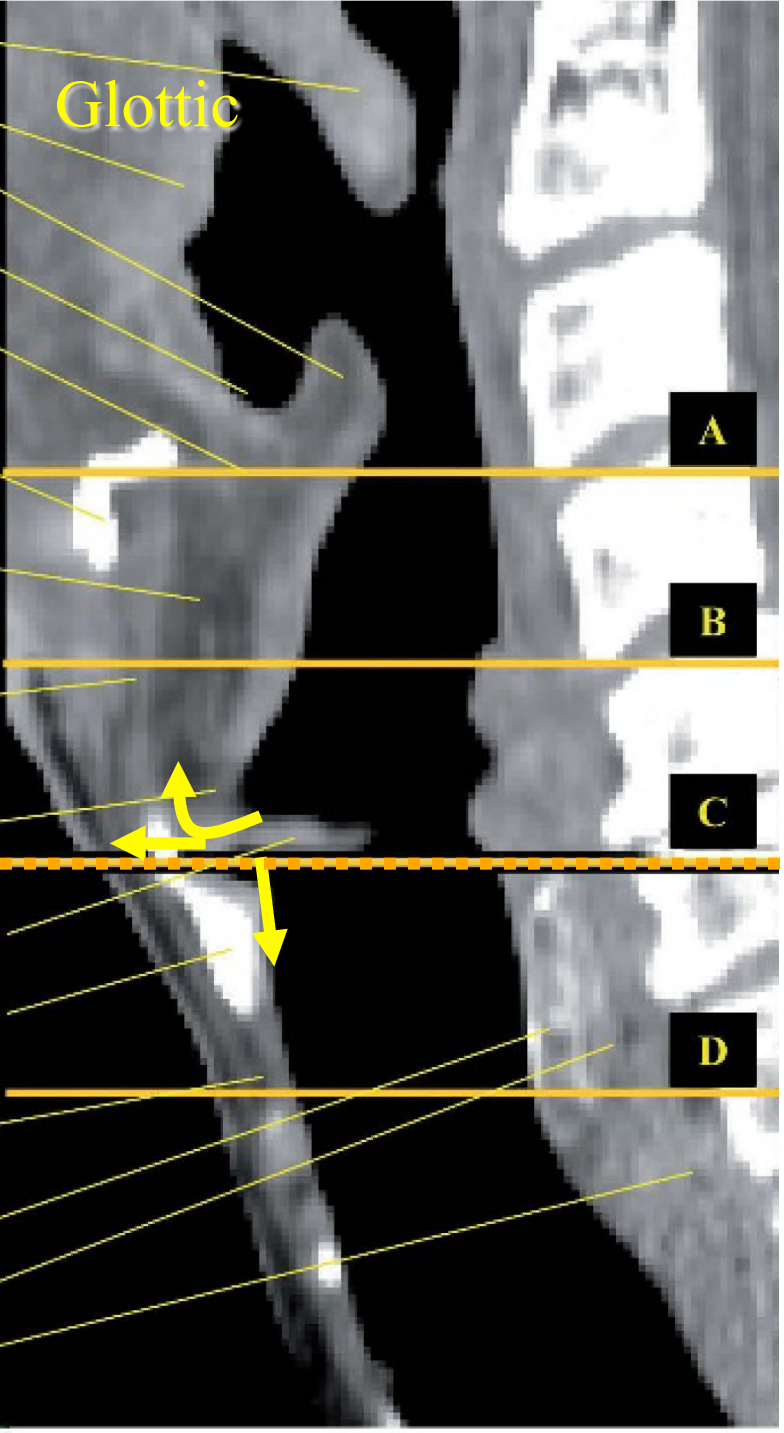
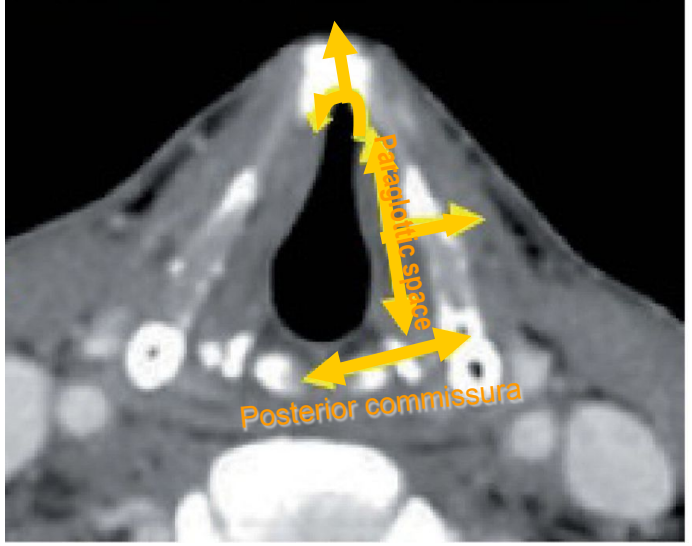
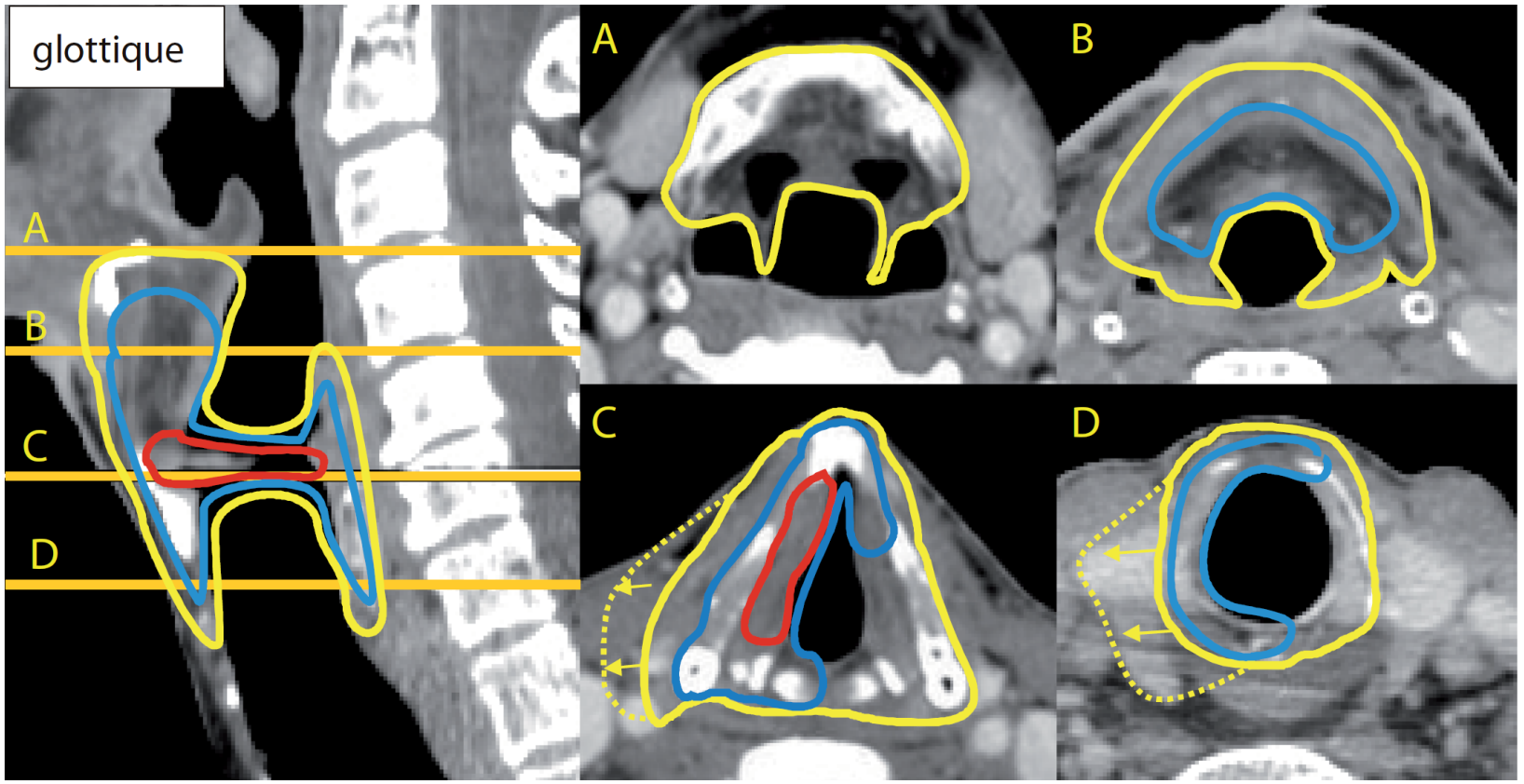
Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.





- Paraglottic space, ventricles
- Droyles' ligament and Anterior commissura
- Controlateral cord
- Posterior commissura
- Subglottic area

Glottic



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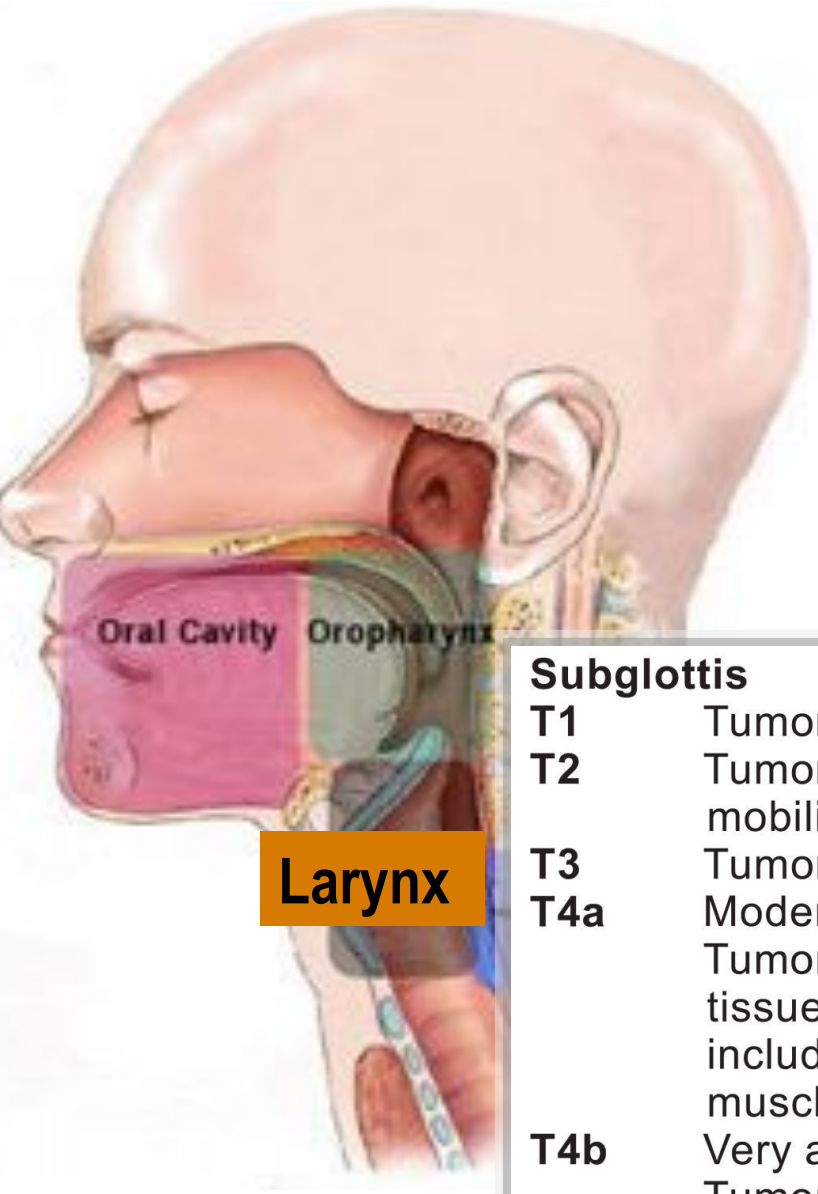
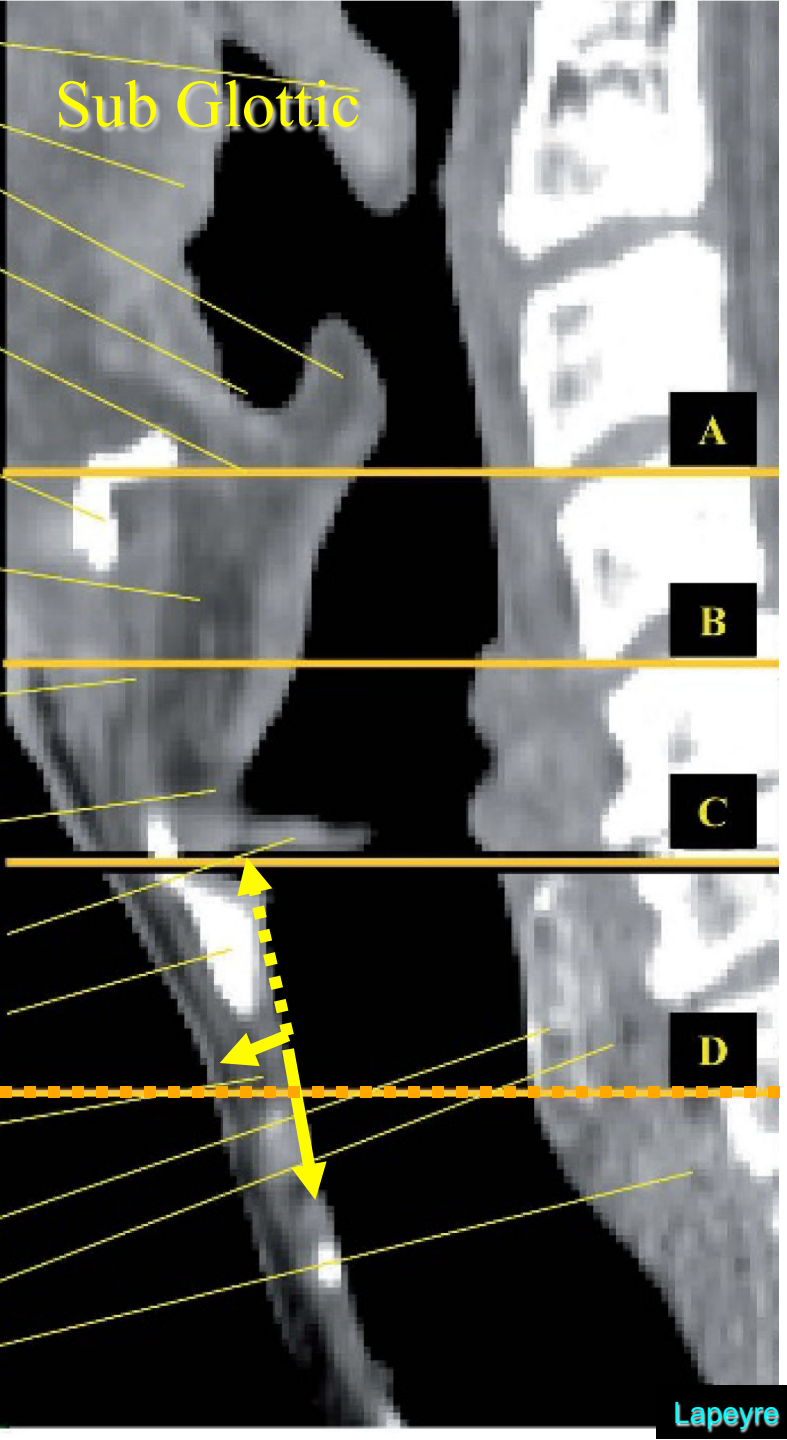
CTV50 = yellow

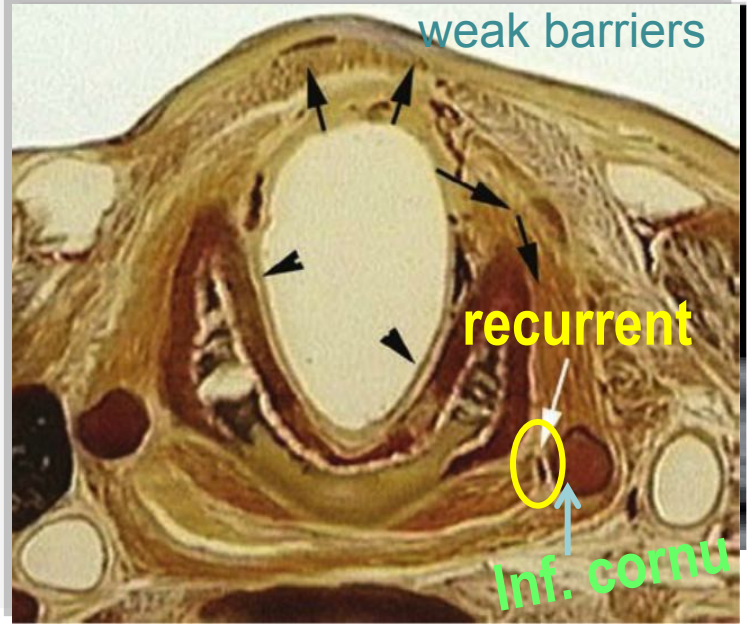
Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.



Subglottis

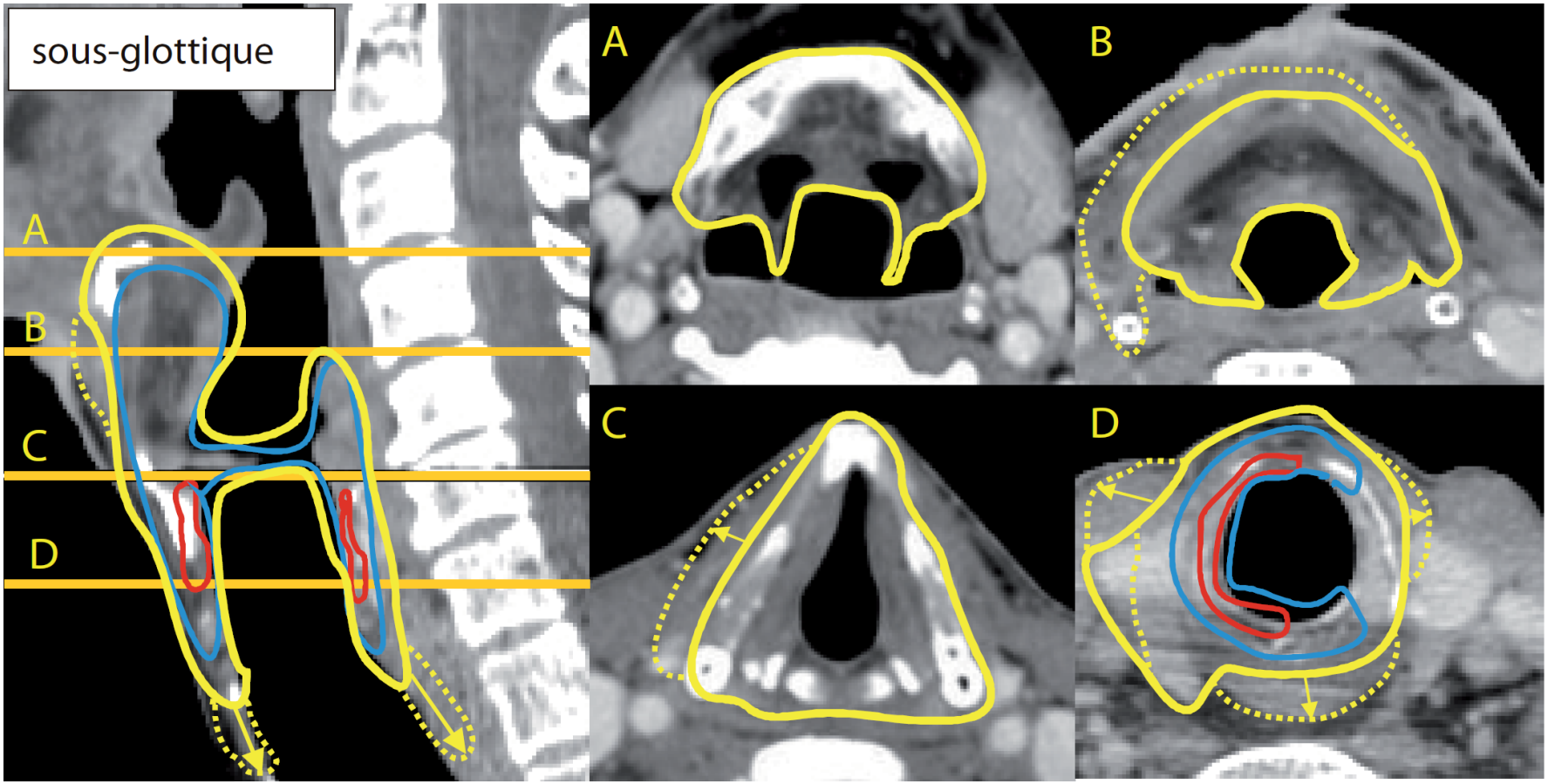
T1	Tumor limited to the subglottis
T2	Tumor extends to vocal cord(s) with normal or impaired mobility
T3	Tumor limited to larynx with vocal cord fixation
T4a	Moderately advanced local disease Tumor invades cricoid or thyroid cartilage and/or invades tissues beyond the larynx (eg, trachea, soft tissues of neck including deep extrinsic muscles of the tongue, strap muscles, thyroid, or esophagus)
T4b	Very advanced local disease Tumor invades prevertebral space, encases carotid artery, or invades mediastinal structures





- Cricoid cartilage
- Cricotyroid ligament
- Trachea
- Glottic plan (rarely considering the barrier effect of conus elasticus)

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.



GTV= red
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Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

The Laryngoscope
Lippincott Williams & Wilkins

Contemporary Review

Selective Neck Dissection (IIA, III): A Rational Replacement for Complete Functional Neck Dissection in Patients With N0 Supraglottic and Glottic Squamous Carcinoma

Alfio Ferlito, MD, DLO; Carl E. Silver, MD, FACS; Alessandra Rinaldo, MD, FACS

Analisi su 10 studi prospettici

Conclusions Supraglottic and glottic

- **SND of sublevel IIA and level III appears to be adequate**
- ***IV lymph nodes may not be justified***
- **Bilateral neck dissection in centrally or bilaterally located tumors.**

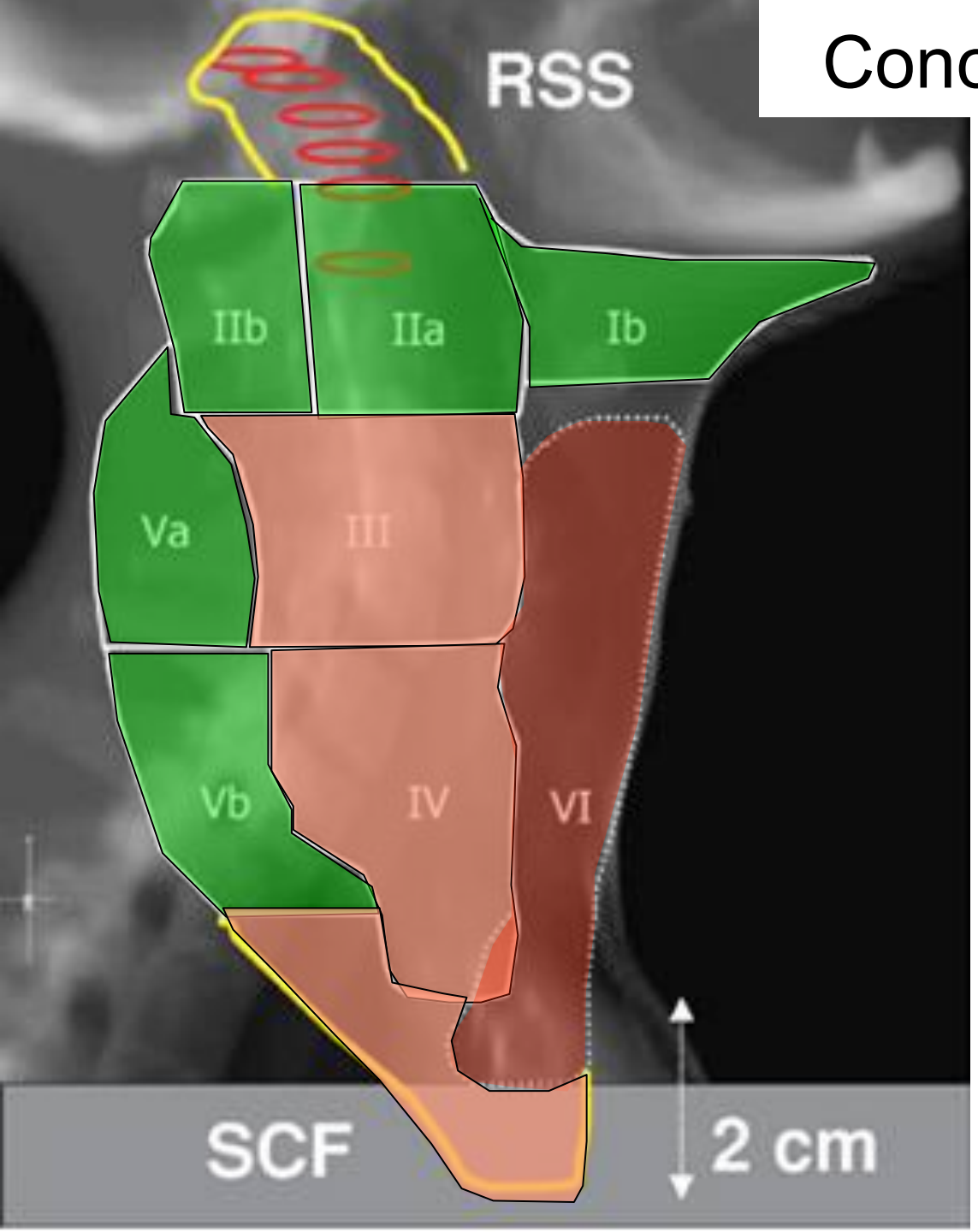
Eur Arch Otorhinolaryngol (2000) 257 : 168–173

HEAD AND NECK ONCOLOGY

Alfio Ferlito · Alessandra Rinaldo

The pathology and management of subglottic cancer

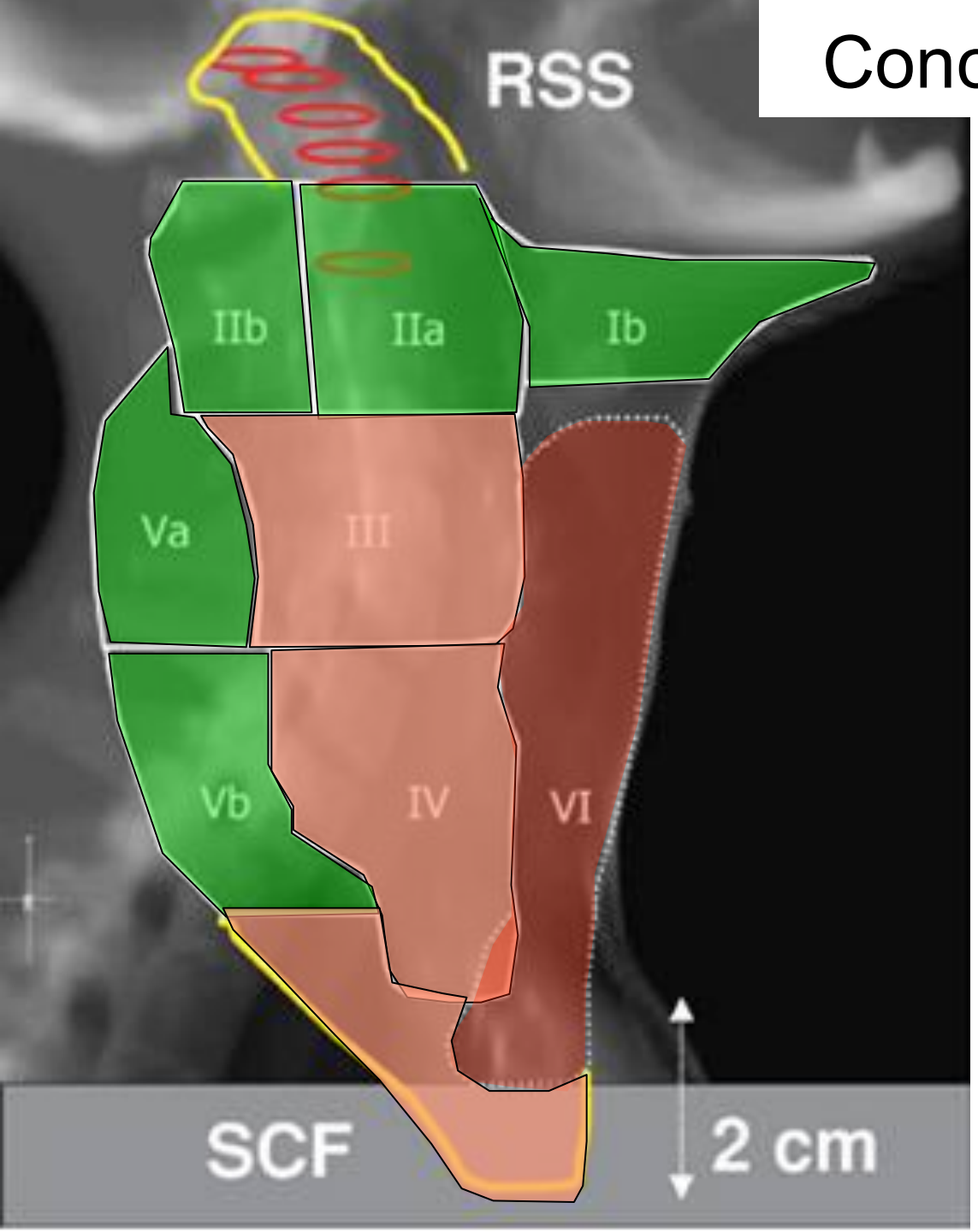
Conclusions Subglottic



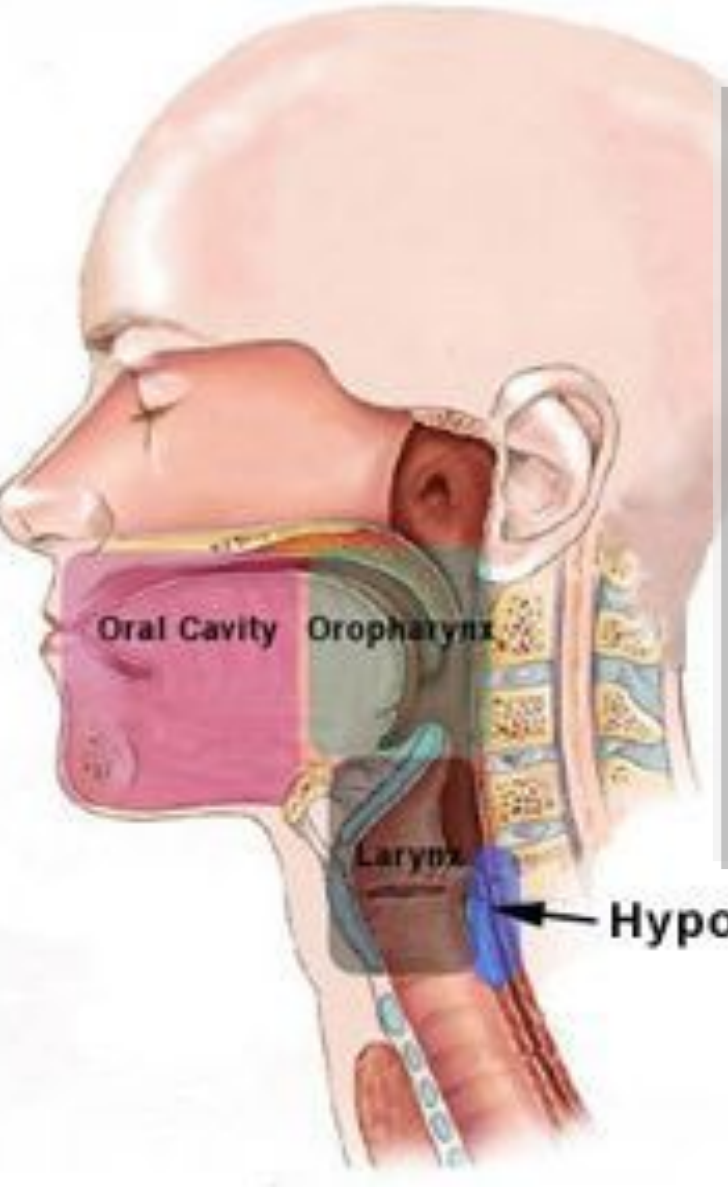
… Harrison found metastases to the paratracheal lymph nodes in 50% of all larynges with primary subglottic carcinoma examined by serial section.

while the incidence of *supraclavicular and middle and lower jugular node metastases*, which are only present after the involvement of the paratracheal nodes, is relatively low.

Conclusions Subglottic



…Furthermore, subglottic cancer can metastasize bilaterally to the cervical lymph nodes



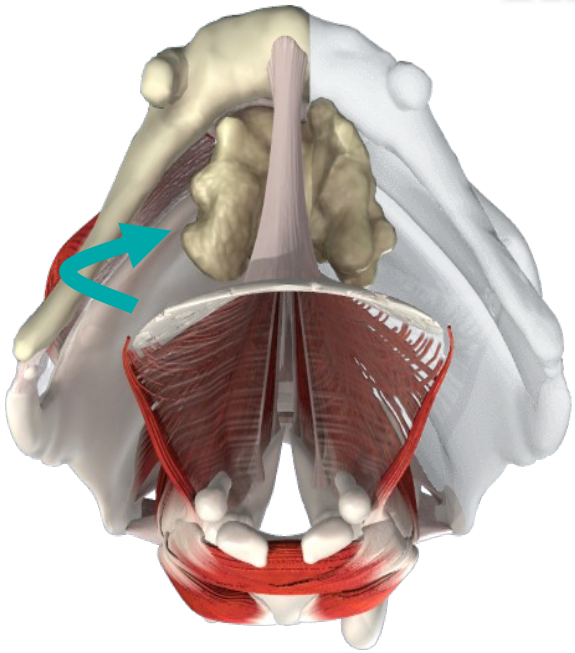
Hypopharynx

T1	Tumor limited to one subsite of hypopharynx and/or 2 cm or less in greatest dimension
T2	Tumor invades more than one subsite of hypopharynx or an adjacent site, or measures more than 2 cm but not more than 4 cm in greatest diameter without fixation of hemilarynx
T3	Tumor more than 4 cm in greatest dimension or with fixation of hemilarynx or extension to esophagus
T4a	Moderately advanced local disease Tumor invades thyroid/cricoid cartilage, hyoid bone, thyroid gland, or central compartment soft tissue**
T4b	Very advanced local disease Tumor invades prevertebral fascia, encases carotid artery, or involves mediastinal structures

**Note: Central compartment soft tissue includes prelaryngeal strap muscles and subcutaneous fat.

Ipofaringe seni piriformi

Diffusione sottomucosa microscopica

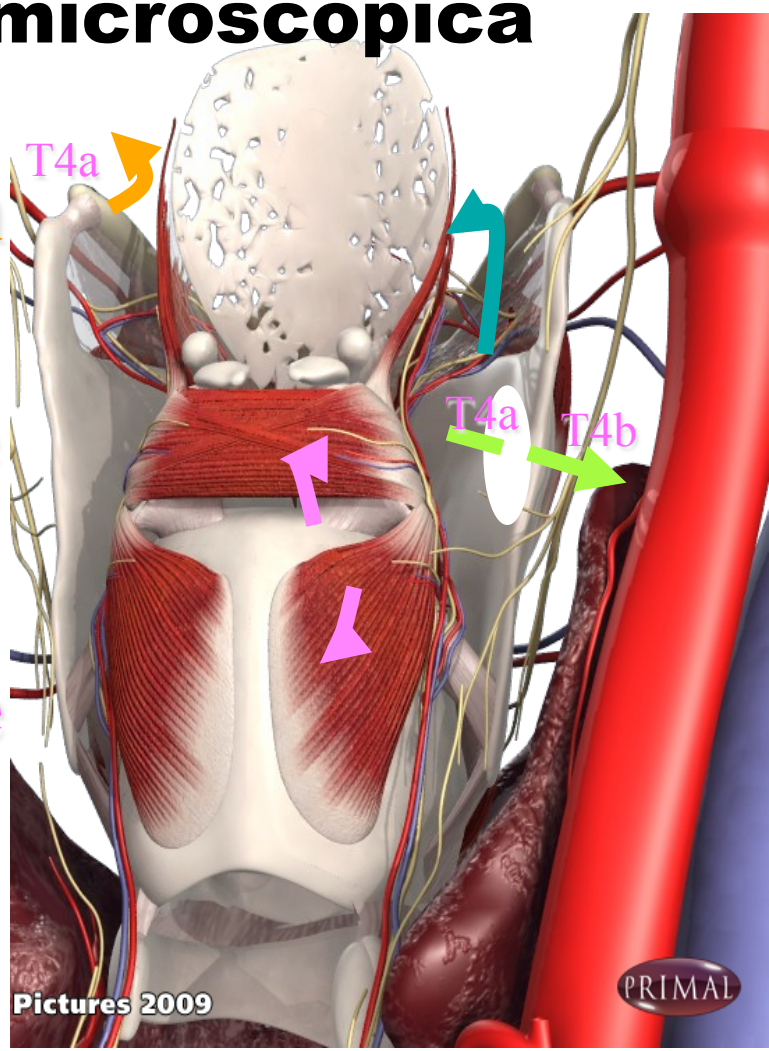


In alto > 10 mm

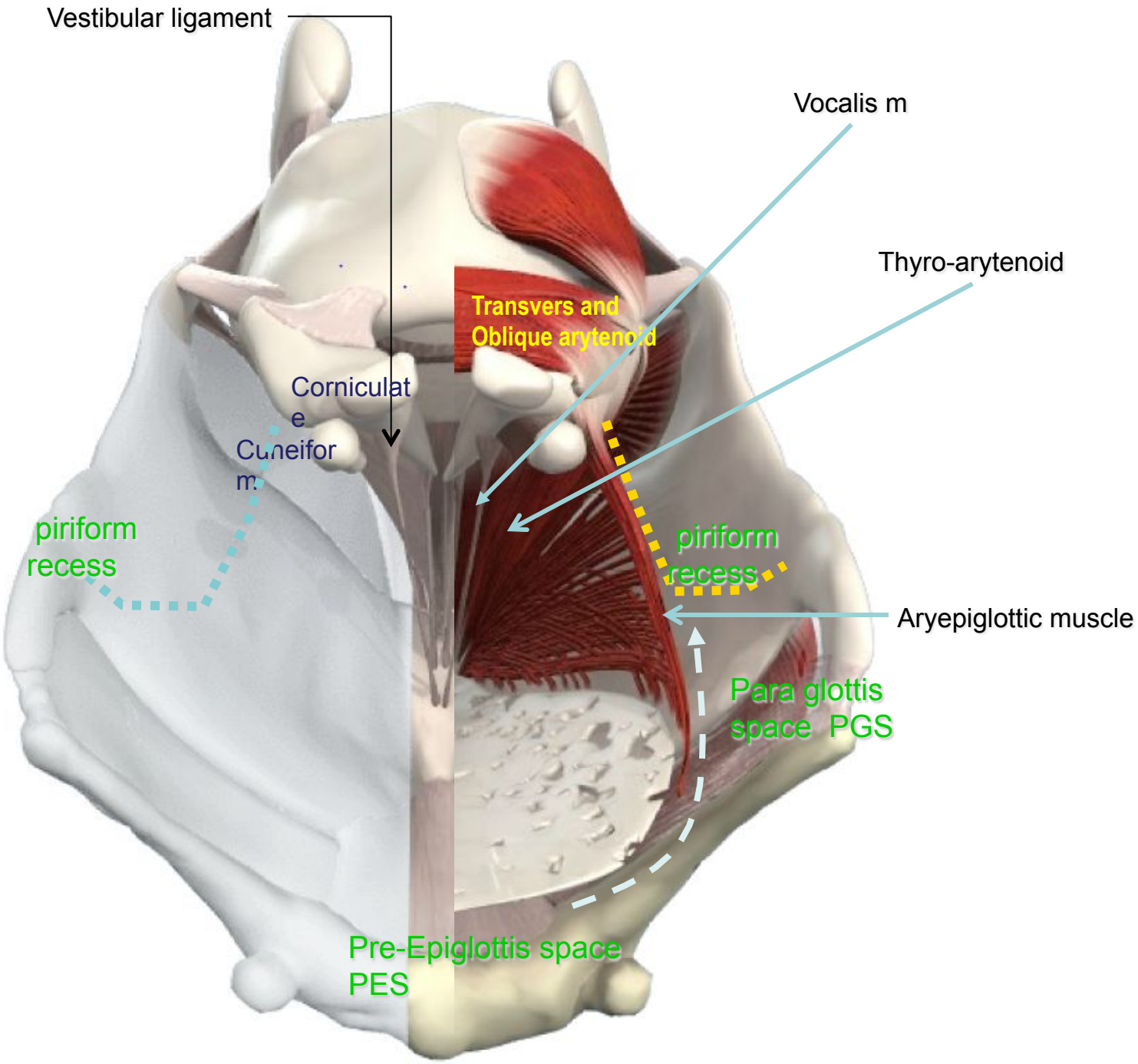
Lateralmente >20mm

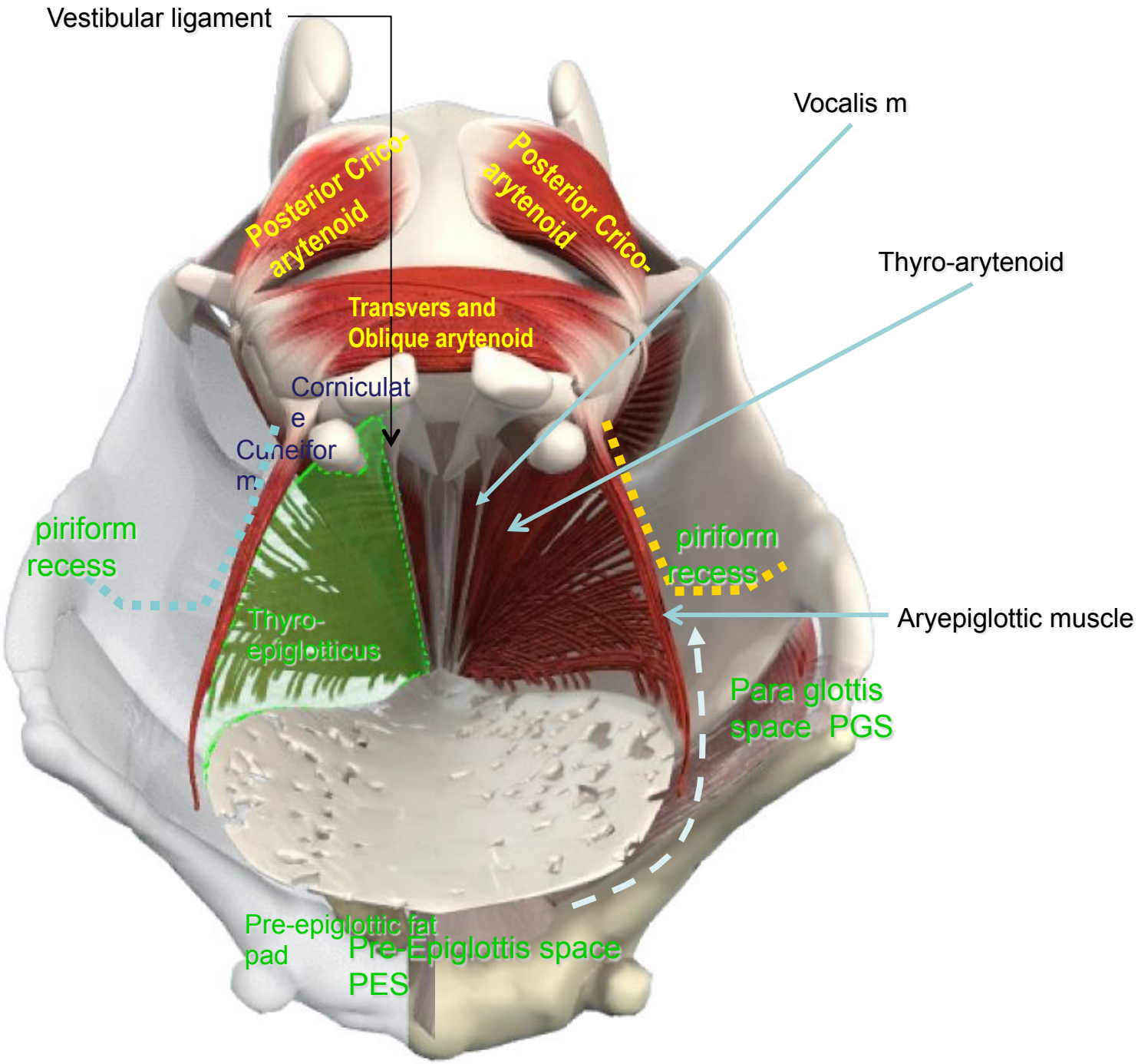
Medialmente >25 mm

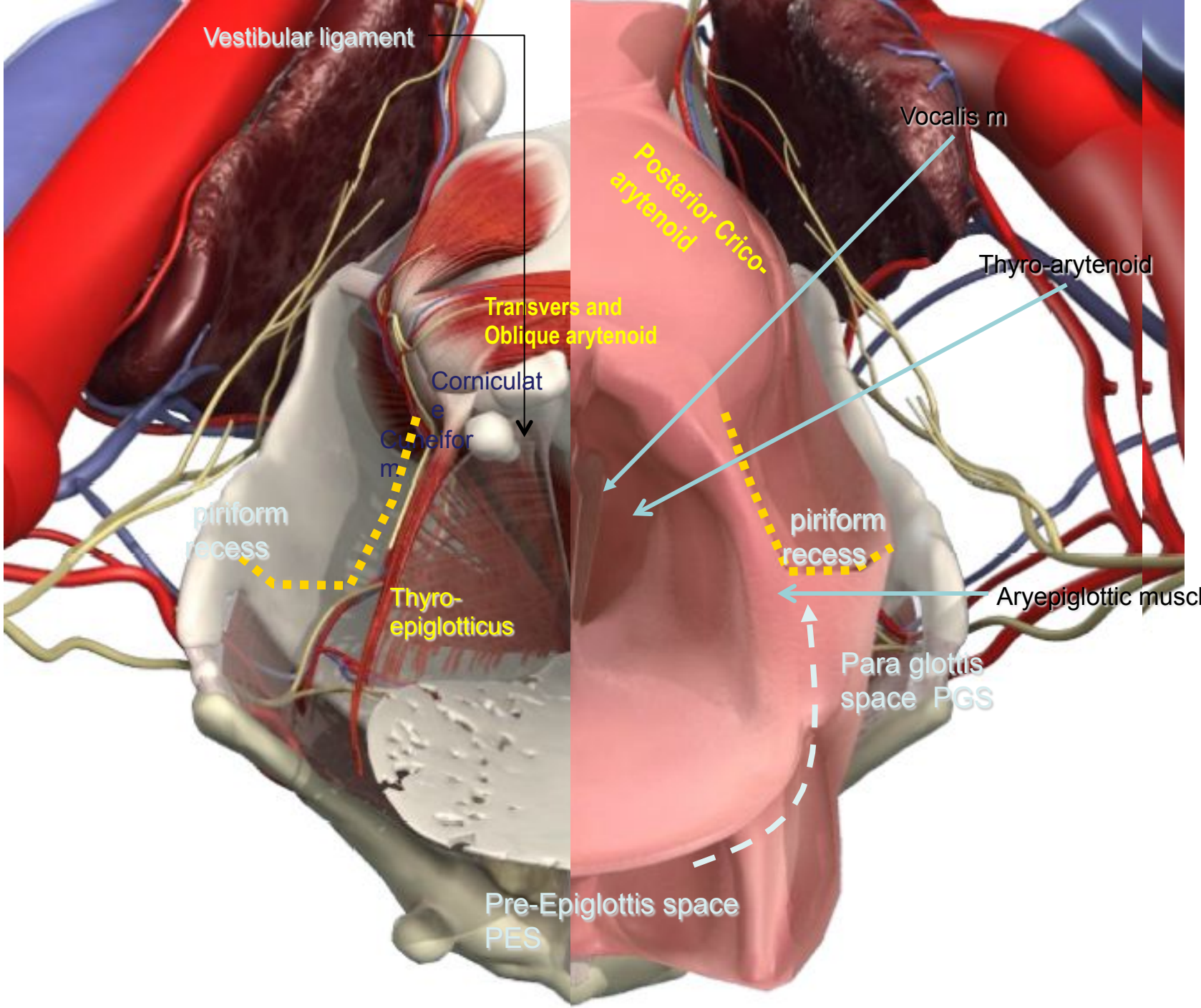
Anteriormente

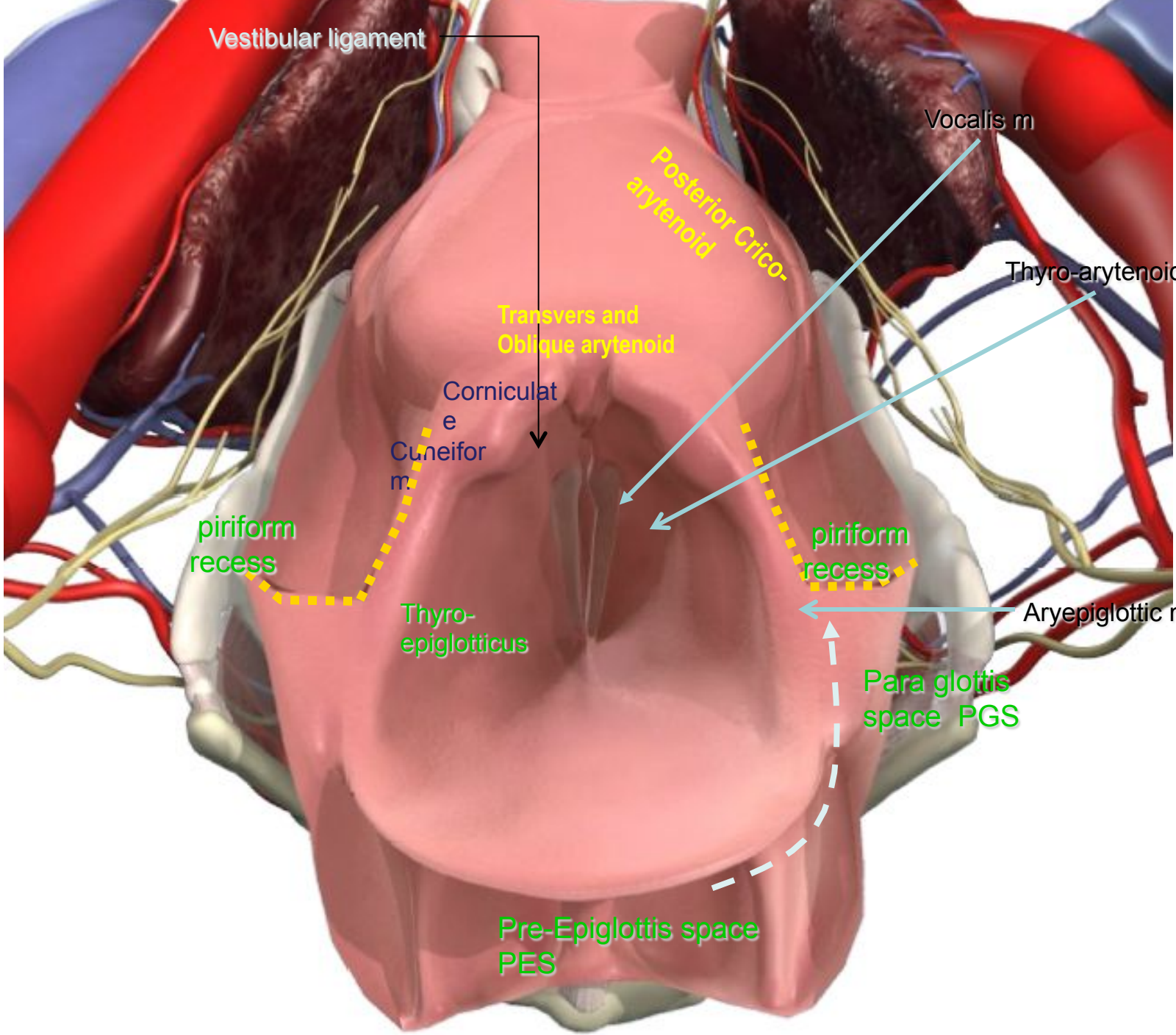


Hoffman Laryngoscope 1997


Vestibular ligament
Vocalis m
Thyro-arytenoid
Transvers and
Oblique aryteno'd
Corniculat
e
Cuneifor
m.
piriform
recess
piriform
recess
Aryepiglottic muscle
Para glottis
space PGS
Pre-Epiglottis space
PES


Vestibular ligament
Vocalis m
Posterior Crico-arytenoid
Posterior Crico-arytenoid
Thyro-arytenoid
Transvers and Oblique arytenoid
Corniculate
Cuneiform
piriform recess
piriform recess
Aryepiglottic muscle
Thyro-epiglotticus
Para glottis space PGS
Pre-epiglottic fat pad
Pre-Epiglottis space PES


Vestibular ligament
Vocalis m
Posterior Crico-arytenoid
Thyro-arytenoid
Transvers and Oblique arytenoid
Corniculate
Cuneiform
piriform recess
piriform recess
Thyro-epiglotticus
Aryepiglottic muscle
Para glottis space PGS
Pre-Epiglottis space PES


Vestibular ligament
Vocalis m
Posterior Crico-arytenoid
Thyro-arytenoid
Transvers and Oblique arytenoid
Corniculate
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piriform recess
piriform recess
Thyro-epiglotticus
Aryepiglottic muscle
Para glottis space PGS
Pre-Epiglottis space PES

Cancer/Radiothérapie 14 Suppl. 1 (2010) S43–S51

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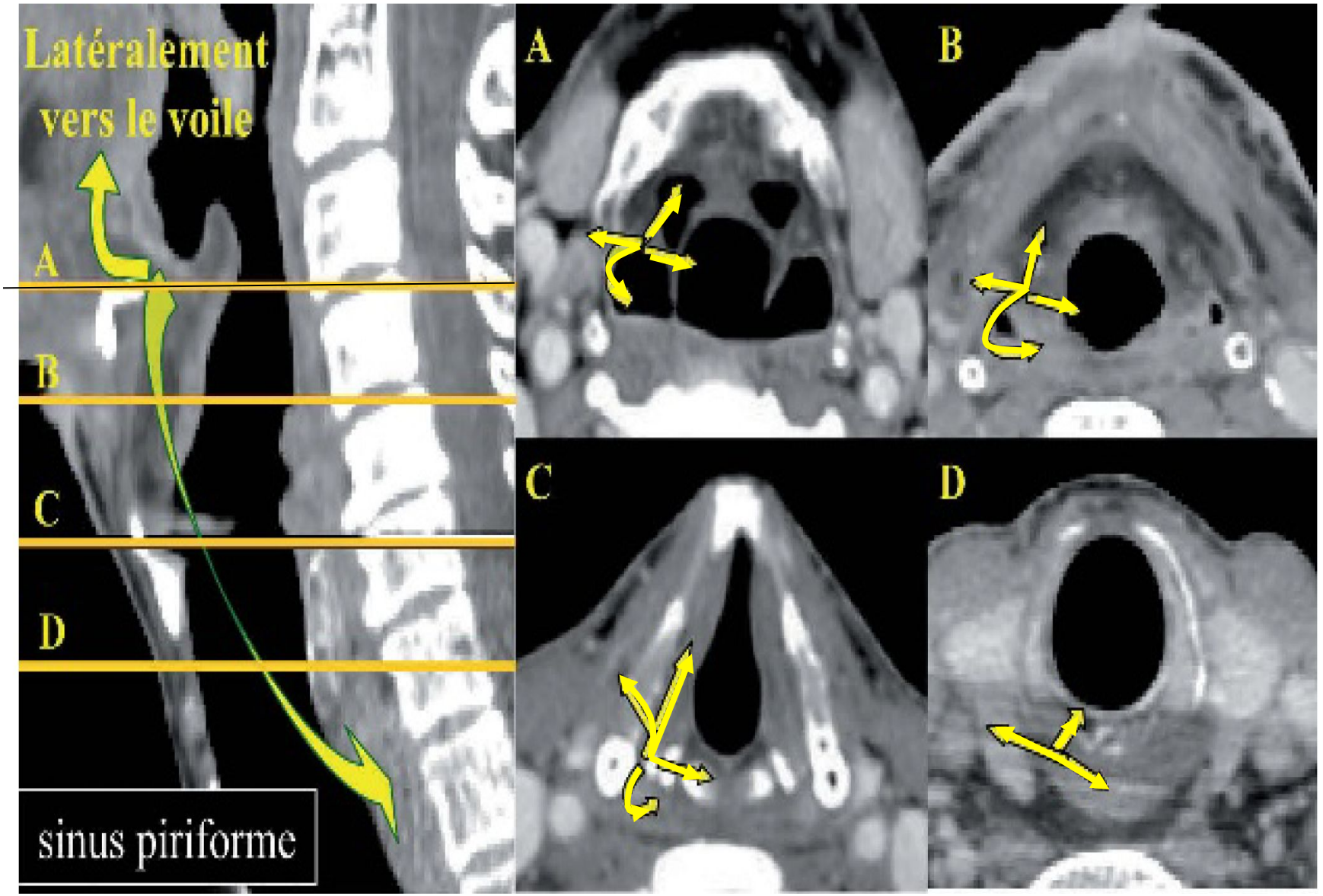
Cancer de l'hypopharynx et du larynx : proposition de sélection et délimitation des volumes cibles microscopiques péri-tumoraux (aires ganglionnaires exclues)

Hypopharynx and larynx cancers: propositions for the selection and the delineation of peritumoral microscopic disease volumes (lymph nodes excluded)

M. Lapeyre[a,*], C. Bailly[b], I. Toledano[a], A. Montalban[c], M. Russier[c]

[a] *Département de radiothérapie, centre Jean-Perrin, 58 rue Montalembert, BP 5026, 63011 Clermont Ferrand cedex 1, France*
[b] *Département de radiodiagnostic, centre Jean-Perrin, 58 rue Montalembert, BP 5026, 63011 Clermont Ferrand cedex 1, France*
[c] *Département de chirurgie ORL, centre Hospitalier universitaire, hôpital Gabriel-Montpied, 58 rue Montalembert, 63003 Clermont Ferrand cedex 1, France*

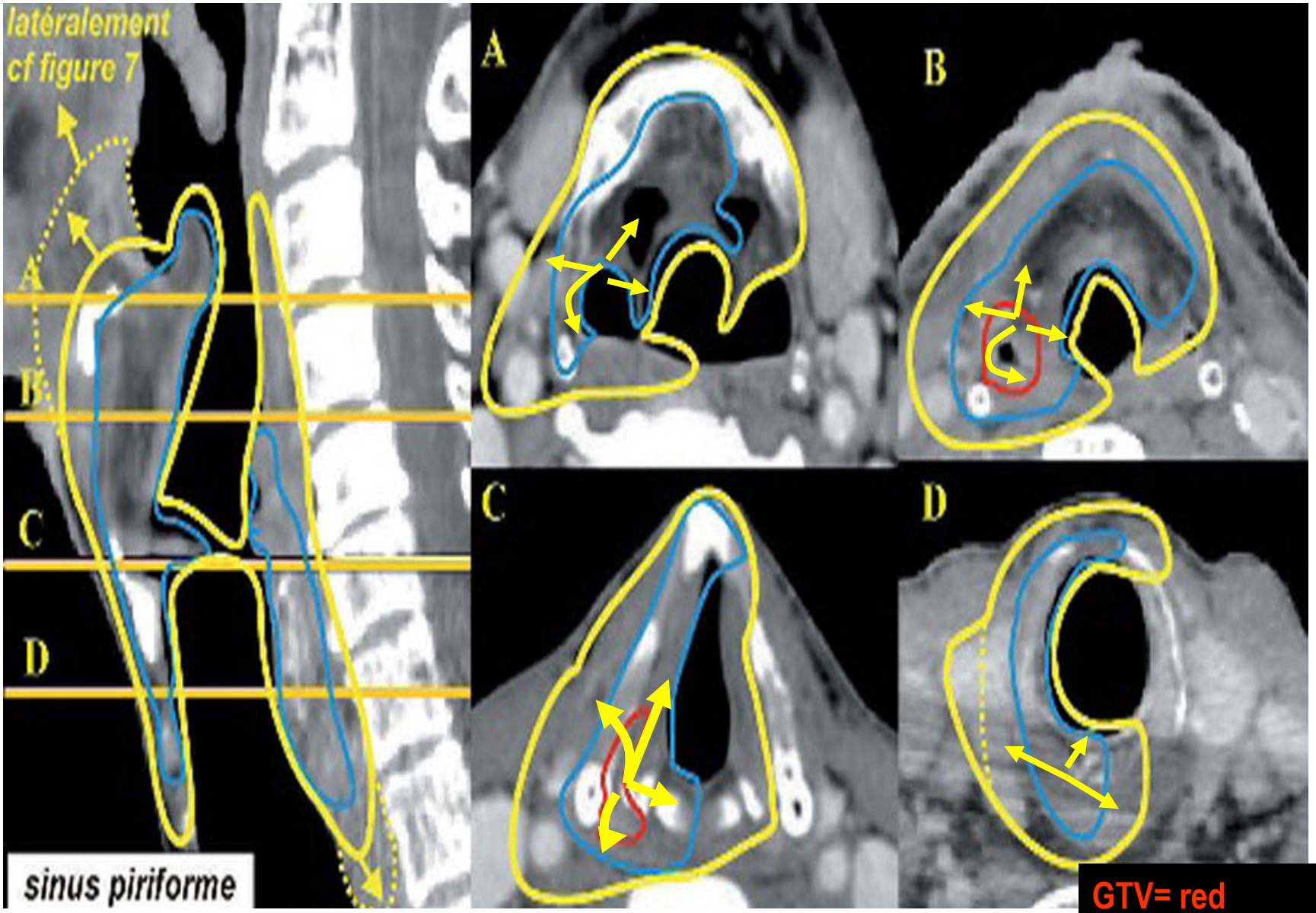
Sinus piriforme



65-85%

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

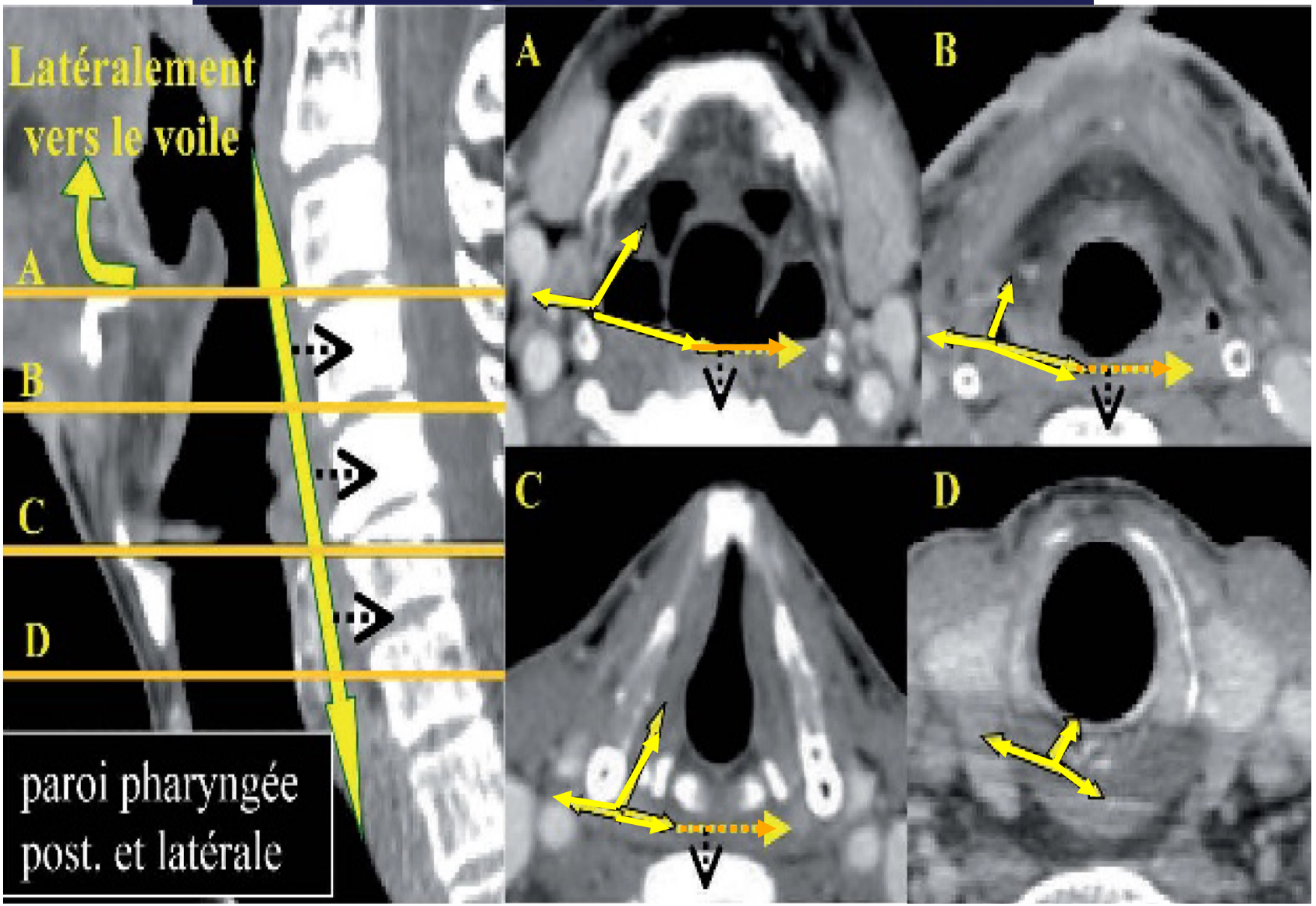
Sinus piriforme



GTV= red
CTV70 = Blu
CTV50 = yellow

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.[cited 2011 Sep 23]

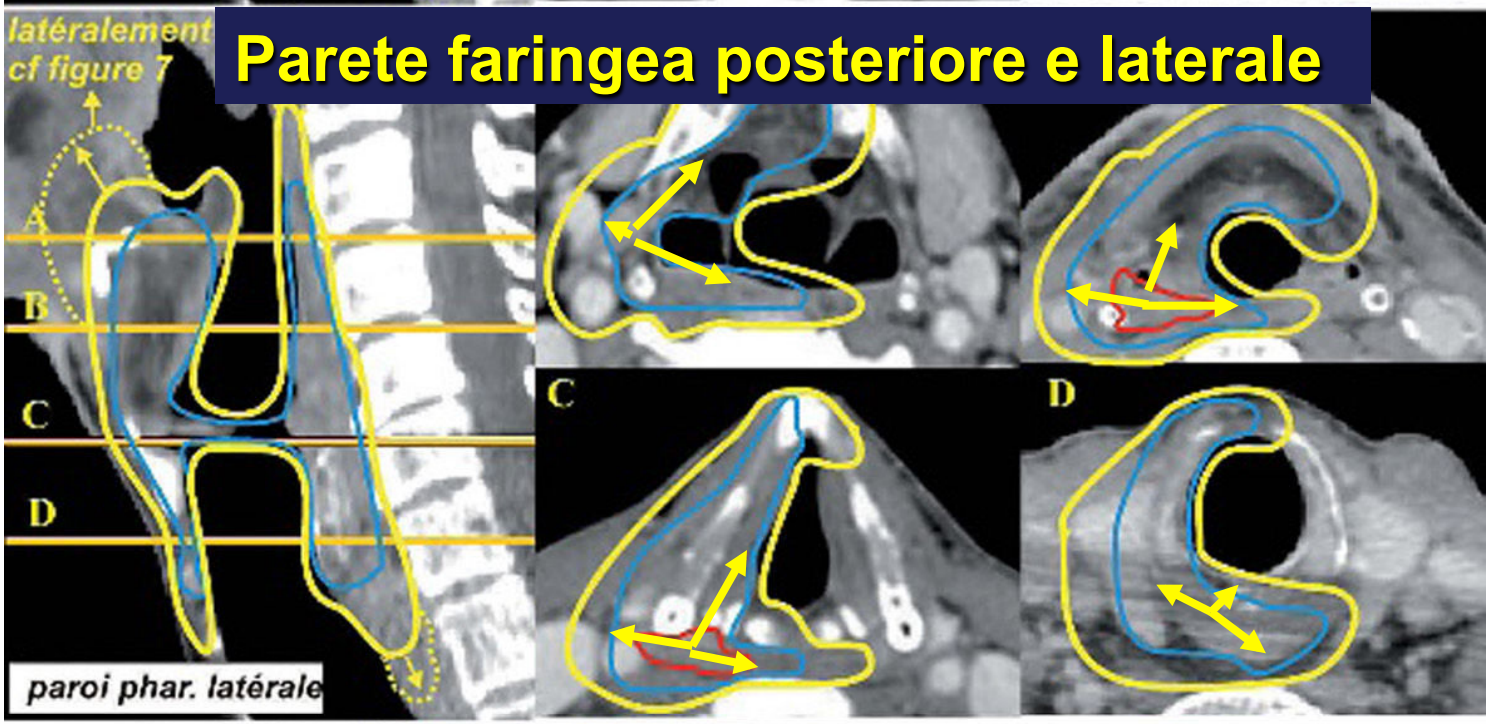
Parete faringea posteriore e laterale

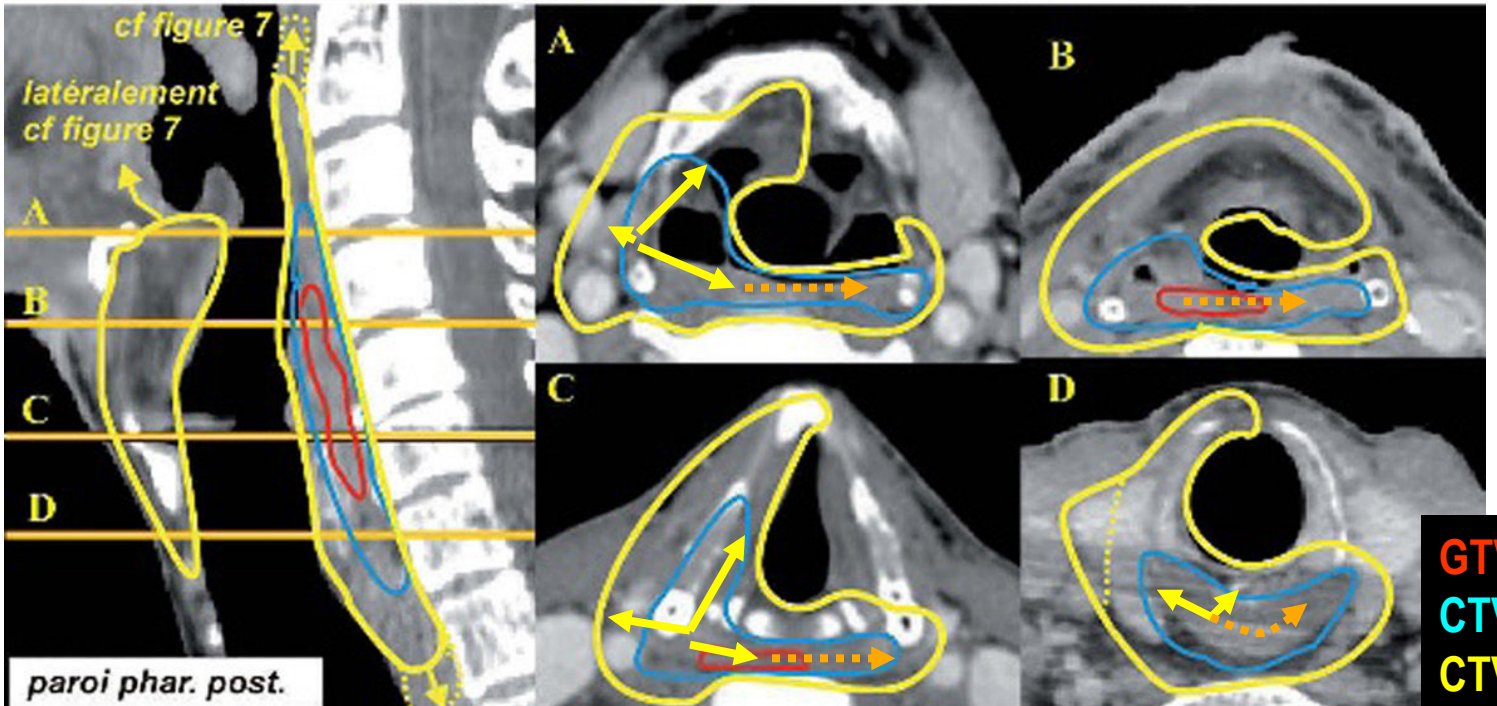


10-20%

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

Parete faringea posteriore e laterale





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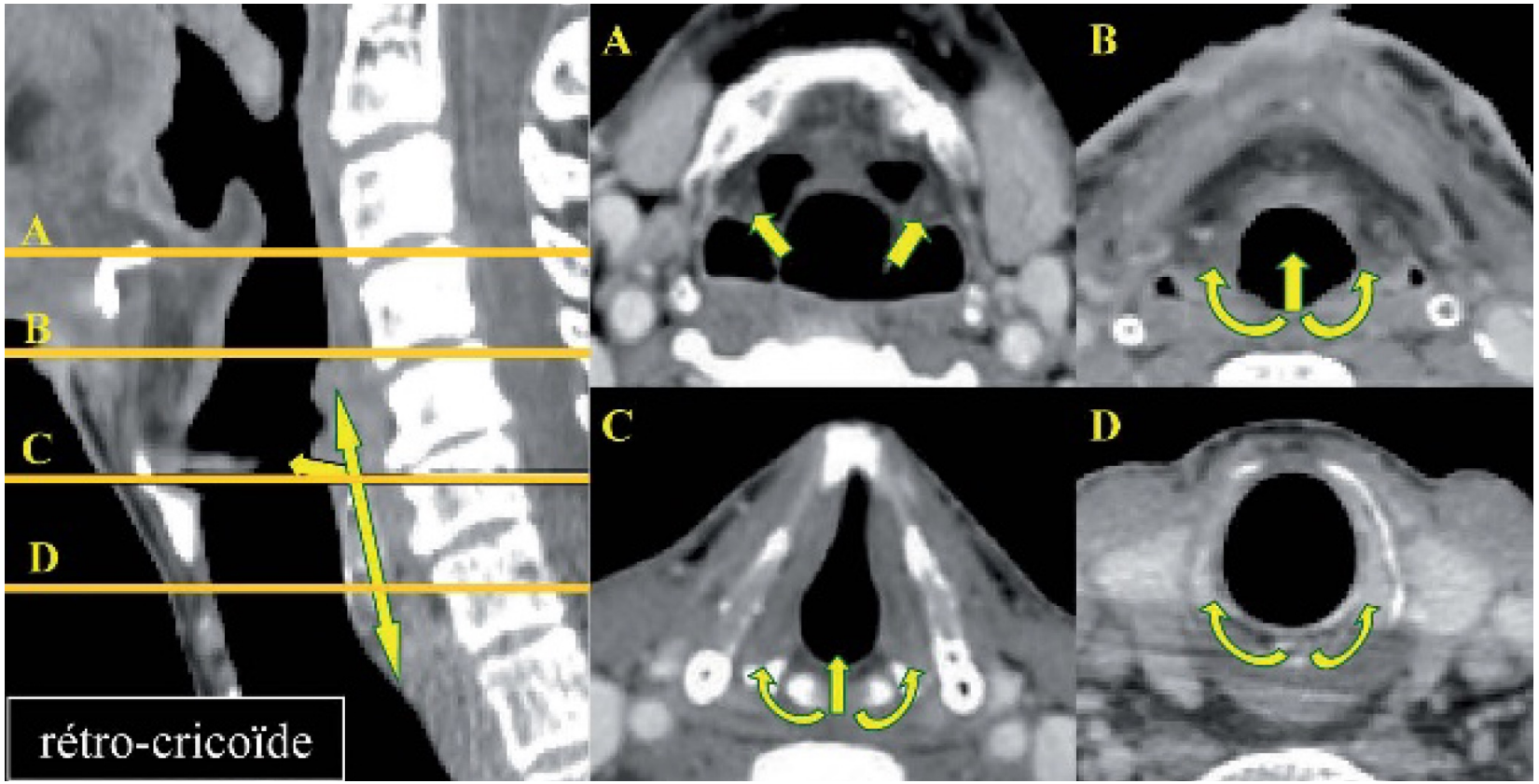
CTV50 = yellow

illy C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.[cited 2011 Sep

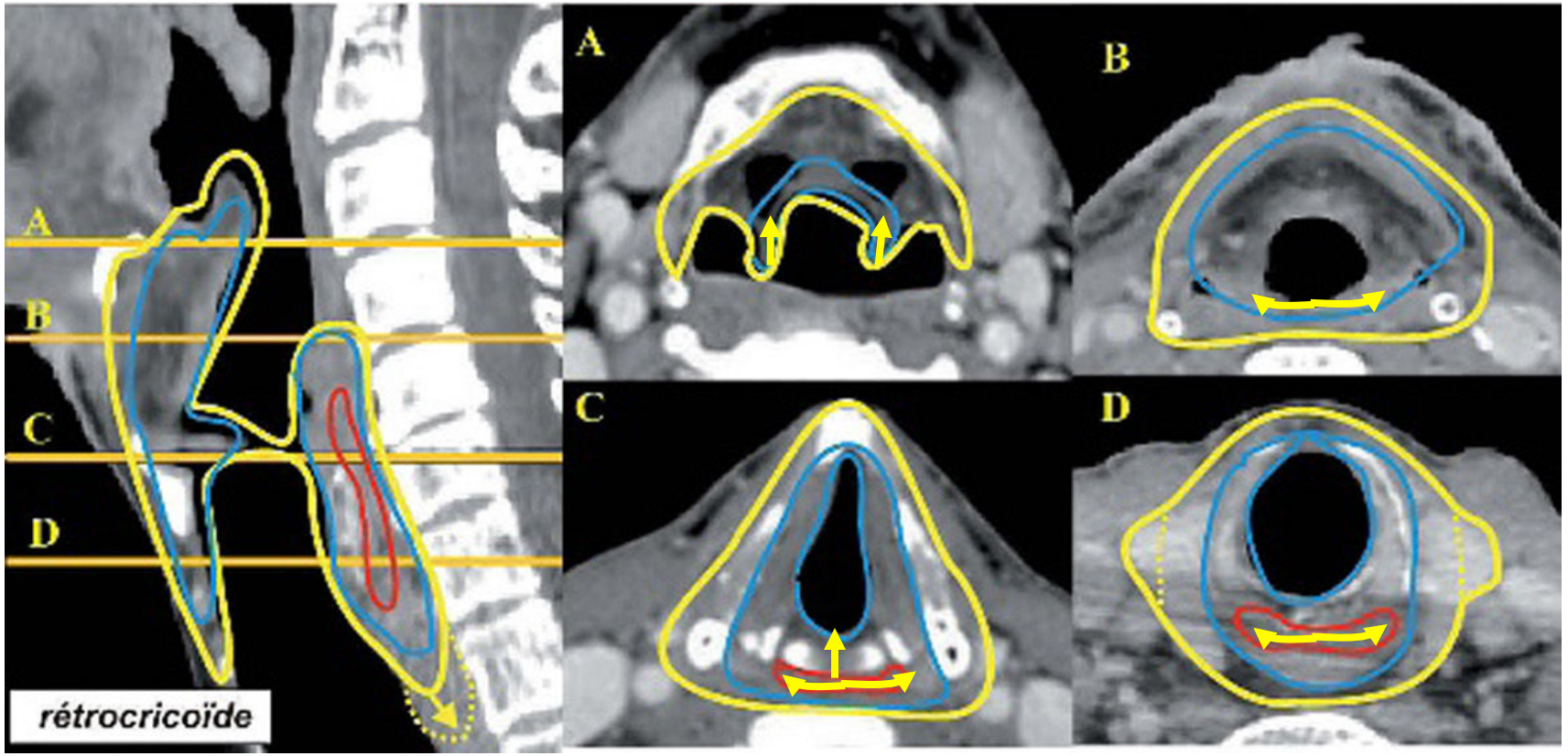
Regione retrocricoidea



5-15%

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

Regione retrocricoidea



GTV= red
CTV70 = Blu
CTV50 = yellow

Lapeyre M, Bailly C, Toledano I, Cancer/Radiothérapie 2010 Nov;14, Supplement 1(0):S43-S51.

Number of pts with **clinically positive neck nodes** found at presentation *(adapted From Gregoire 2000)*

		Level (Percentage of the node+ pts.)									
	N. Pt N+	I		II		III		IV		V	
Oral cavity (n=787)	36	42	3.5	79	8	18	3	5	1	1	0
Oropharynx (n=1497)	64	13	2	81	24	23	5	9	2.5	13	3
Hypopharynx (n=847)	70	2	0	80	13	51	4	20	3	24	2
Supraglottic Larynx (n=428)	55	2	0	71	21	48	10	18	7	15	4
Naspharynx (440 pts)*	80	9	8	71	56	36	32	32	26	15	10

*Sham 1990

Lindberg Cancer 1972

Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Negative** Neck After Elective Radical Neck Dissection

CTV 2) Risk of sublinical involvement greater than15–20%

		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	192	20%	17%	9%	3%	0,5%
Oropharynx	48	2%	25%	19%	8%	2%
Hypopharynx	24	0%	13%	13%	0%	0%
Larynx	79	5%	19%	20%	9%	2,5%

Shah JP, Candela FC, Poddar AK. The patterns of cervical lymph node metastases from squamous carcinoma of the oral cavity. *Cancer* 1990;66(1):109–113.)

Percentage Incidence and Distribution of Pathologically Involved Nodes in a **Clinical Node-Positive** After Therapeutic Radical Neck Dissection

		Level				
	N. Pt	I	II	III	IV	V
Oral cavity	324	46%	43%	33%	15%	3%
Oropharynx	165	14%	71%	42%	28%	9%
Hypopharynx	104	5%	19%	20%	9%	2,5%
Larynx	183	7%	57%	59%	29%	4%

Shah JP, Candela FC, Poddar AK. AJ Surg 1990;160(4):405-409

Quando irradiare IIb?

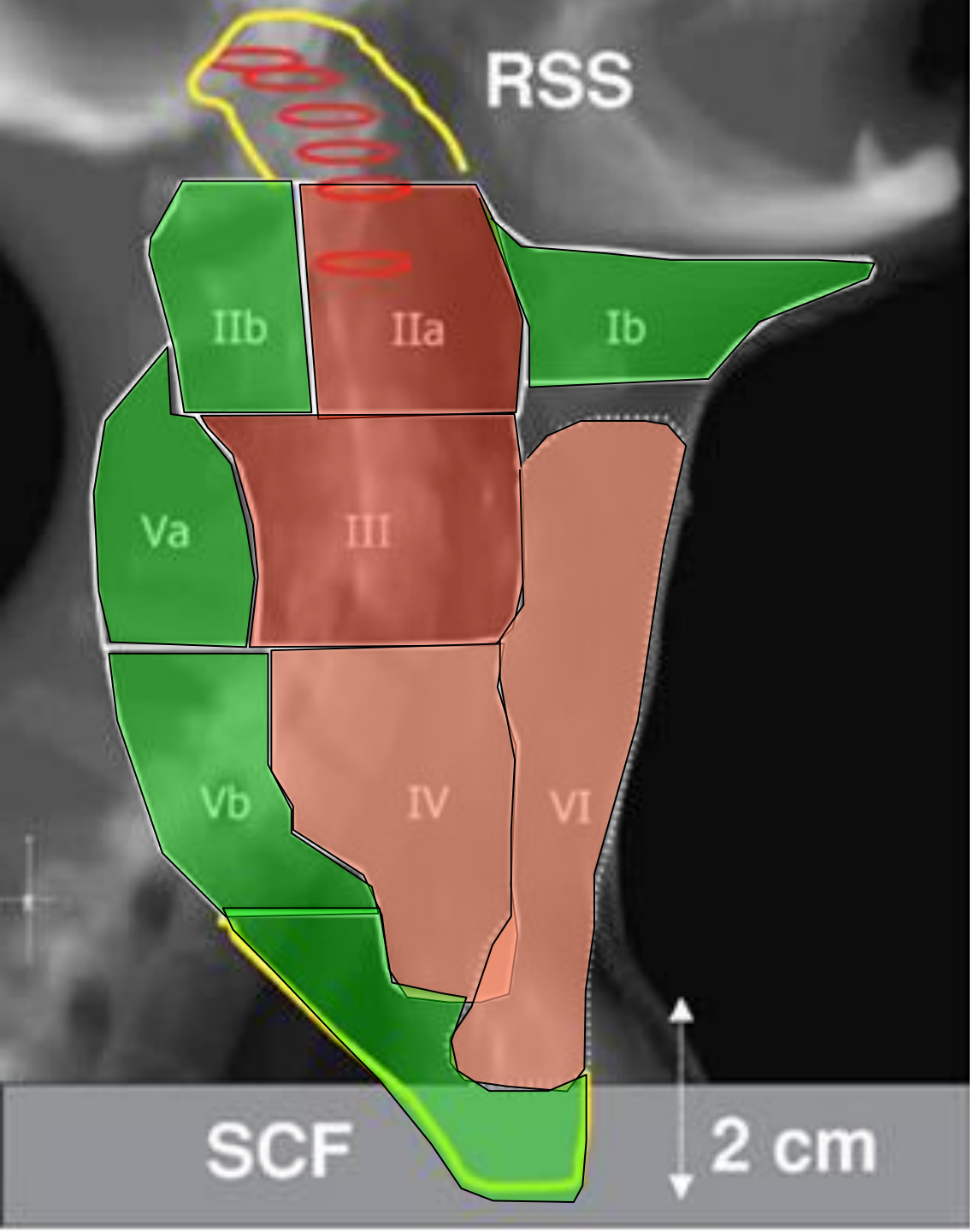
Ipofaringe «N_0»?

Table 2 Lymph node status at sublevel IIB evaluated by prospective studies in hypopharyngeal squamous carcinoma with clinically negative neck

Author(s)	Year	Number of patients	Institutions	Mts detected in sublevel IIB by pathologic analysis
Kim et al. [20]	2006	21	Yonsei University, Seoul, South Korea	1[a]
Bolzoni Villaret et al. [16]	2007	10	Brescia University, Brescia, European Institute of Oncology, Milan, and Regina Elena Institute of Oncology, Rome, Italy	1
Paleri et al. [17]	2008	7	Royal Adelaide Hospital, Adelaide, South Australia and Freeman Hospital, Newcastle upon Tyne, UK	None

[a] The patient also had a positive neck lymph node at level III

Ferlito A., Silver CE, Rinaldo A. Eur Arch Otorhinolaryngol. (2008) 265:62



Conclusions Hypopharynx

- **In cN-**
- **IIa and III**

CTV	Tumor
CTV1	Using anatomic compartment is more adequate than using a uniform expansion (3- 10mm) around the GTV *Eisbruch and Gregoire 2009*
CTV2	Idem CTV3
CTV3	• Paths of preferential diffusion. • Involved anatomical structure + contigual anatomical ones. • If there are false barriers add 2-3 cm

Primary Tumor

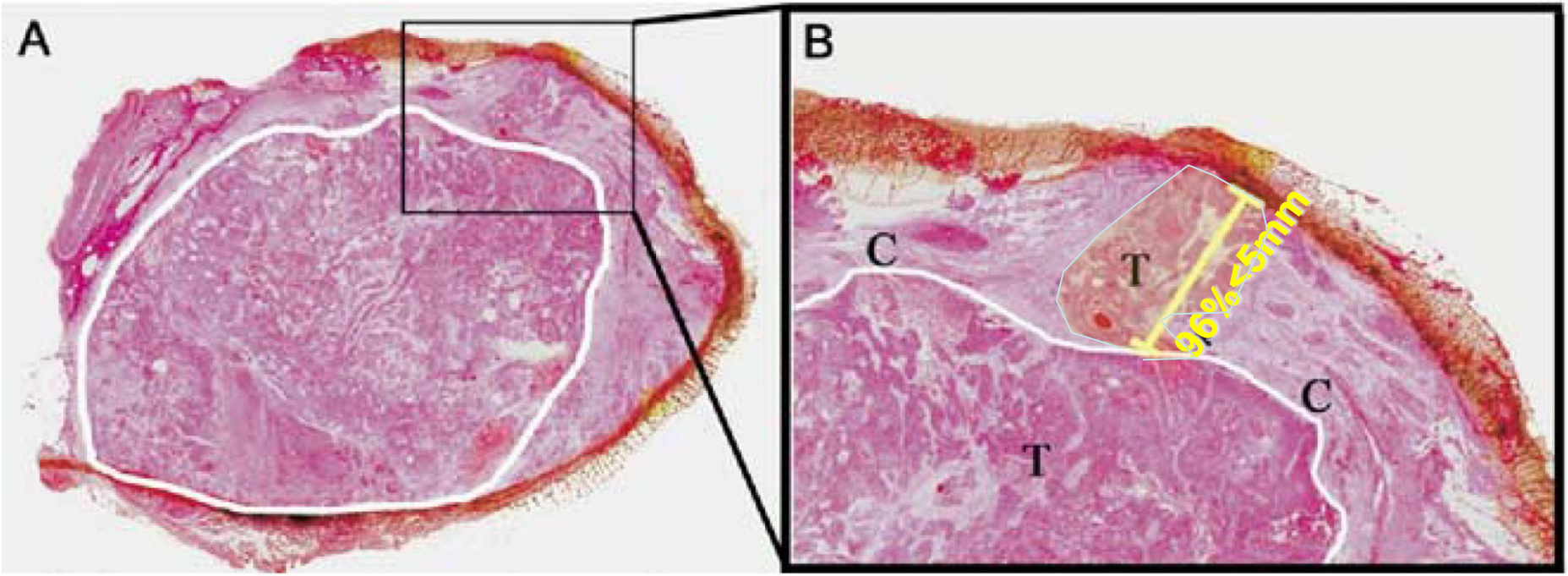
From Lafond Cancer/Radiotherapie 2010 modified

CTV	Postoperation
CTV1	Surgical bed and R+ or close (GTV) + 0.5-1 cm tailored to the anatomical barriers (flaps included)
CTV2	Idem CTV3
CTV3	• Paths of preferential diffusion. • Involved anatomical structure + myocutaneous flaps within concerned region + contigual anatomical ones. • If the that are false barriers add 2-3 cm

Postoperation

From Lafond Cancer/Radiotherapie 2010 modified

Lymph-nodal extracapsular extension



Apisarnthanarax S, et al. IJROBP . 2006 Mar 1;64(3):678–83.

CTV	Tumor
CTV1	Using anatomic compartment is more adequate than using a uniform expansion (3- 10mm) around the GTV *Eisbruch and Gregoire 2009*
CTV2	Idem CTV3
CTV3	• Paths of preferential diffusion. • Involved anatomical structure + contigual anatomical ones. • If there are false barriers add 2-3 cm

Primary tumor

From Lafond Cancer/Radiotherapie 2010 modified

CTV		Lymphnodal levels
CTV1	Postoperation	• The site of previous adenopathies with 0.5-1 cm • If ECE the margin needs being 1 cm and more up to include superficial skin
CTV2		• CTVn + the contiguous level (eg Ia or IIa) included within 3 cm distance usually at high risk of relapse (at risk of relapsing greater than 10-20%*) • The sections of the muscle concerned at the levels where the removed lymphonode with ECE.
CTV3		Levels I to VI, retrostyloid, retropharyngeal, subclavicular fossa, superior mediastinum: volumes at low risk of relapse in base fo the natural hystory of tumor (greater than 5-10%)*

** Sanguineti 2008; Schwartz 2010; Peters 1993; 4 Hu Ks 2009; 5. Candela 1990; 6 Chao 2002;Byers 1998; liendberg 1972*

From Lafond Cancer/Radiotherapie 2010 modified

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CLINICAL INVESTIGATION **Head and Neck**

ARE NECK NODAL VOLUMES DRAWN ON CT SLICES COVERED BY STANDARD THREE-FIELD TECHNIQUE?

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