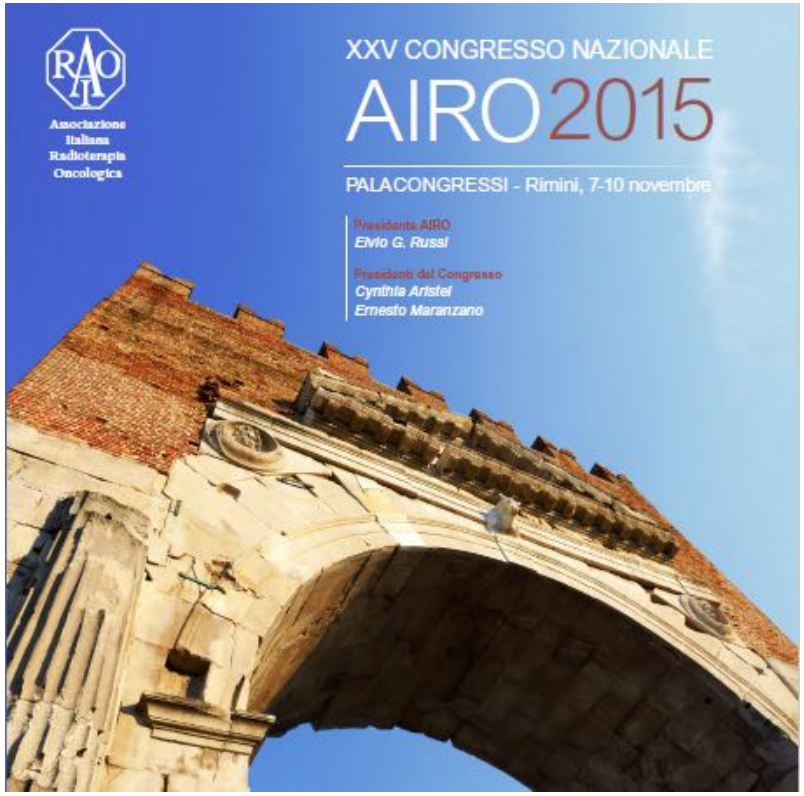


SIMPOSIO:
Neoplasie del cavo orale

Volumi di trattamento del cavo orale

F. Miccichè

Policlinico Agostino Gemelli
Università Cattolica del Sacro Cuore
Gemelli ART
Advanced Radiation Therapy

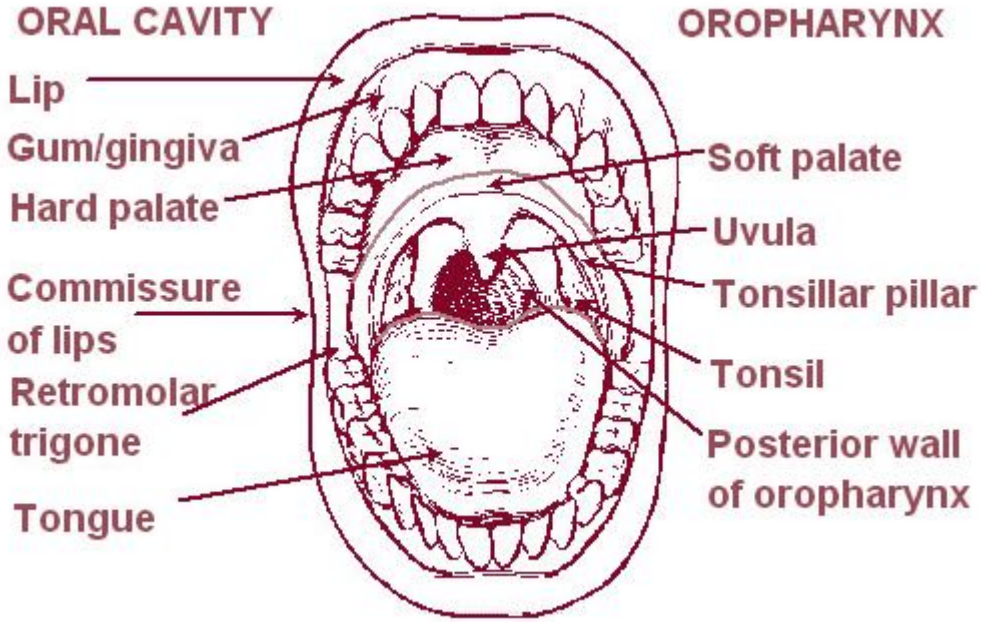
DICHIARAZIONE

Relatore: Francesco Miccichè

Come da nuova regolamentazione della Commissione Nazionale per la Formazione Continua del Ministero della Salute, è richiesta la trasparenza delle fonti di finanziamento e dei rapporti con soggetti portatori di interessi commerciali in campo sanitario.

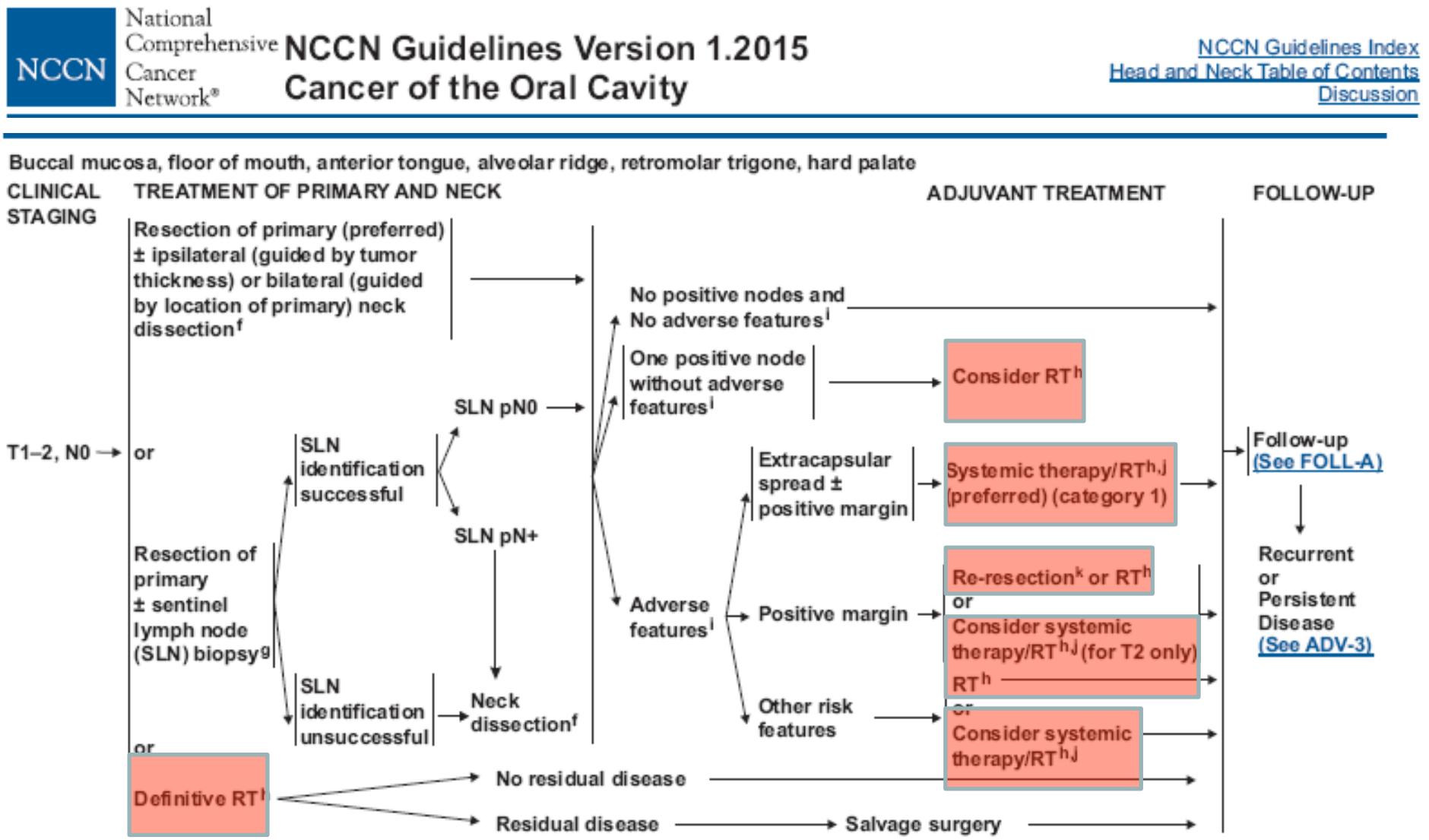
- Posizione di dipendente in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Consulenza ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Fondi per la ricerca da aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazione ad Advisory Board **(Merck Serono)**
- Titolarietà di brevetti in compartecipazione ad aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Partecipazioni azionarie in aziende con interessi commerciali in campo sanitario **(NIENTE DA DICHIARARE)**
- Altro

Oral Cavity subsites

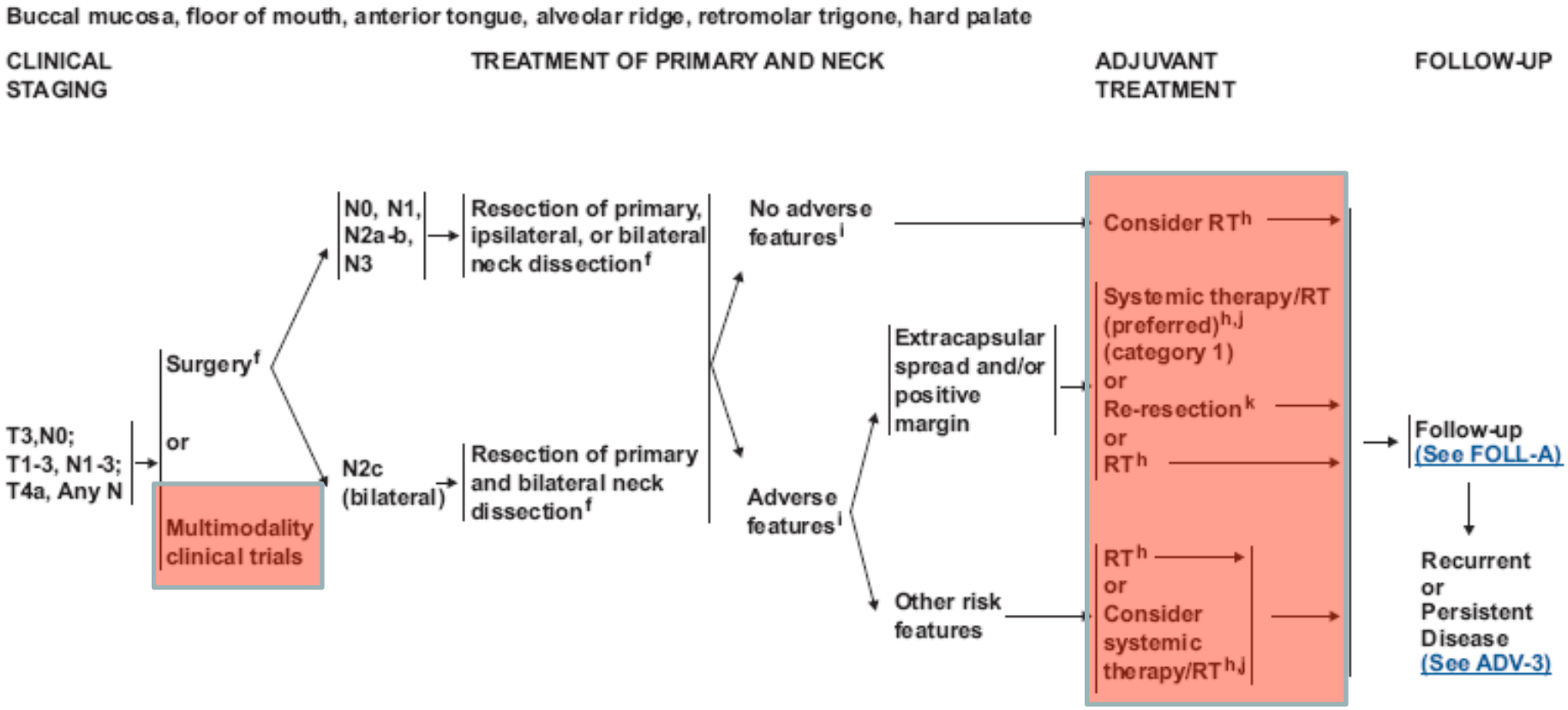


- Buccal mucosa
- Upper/lower alveolar ridge
- Retromolar trigone
- Floor of the mouth
- Hard palate
- Anterior two thirds of the tongue

Guidelines: Early Disease



Guidelines: Advanced Disease



[f] See Principles of Surgery (SURG-A).
[h] See Principles of Radiation Therapy (OR-A).
[i] Adverse risk features: extracapsular nodal spread, positive margins, pT3 or pT4 primary, N2 or N3 nodal disease, nodal disease in levels IV or V, perineural invasion, vascular embolism (lymphovascular invasion) (See Discussion).
[j] See Principles of Systemic Therapy (CHEM-A).
[k] Consider re-resection to achieve negative margins, if feasible.

Guidelines: Definitive RT

PRINCIPLES OF RADIATION THERAPY[1]

DEFINITIVE:
RT Alone

- PTV:
  - High risk: Primary tumor and involved lymph nodes (this includes possible local subclinical infiltration at the primary site and at the high-risk level lymph node(s)):
    - Fractionation:
      - 66 Gy (2.2 Gy/fraction) to 70 Gy (2.0 Gy/fraction); daily Monday–Friday in 6–7 weeks[2]
      - 66–70 Gy (2.0 Gy/fraction; 6 fractions/week accelerated)
      - Concomitant boost accelerated RT: 72 Gy/6 weeks (1.8 Gy/fraction, large field; 1.5 Gy boost as second daily fraction during last 12 treatment days)
      - Hyperfractionation: 81.6 Gy/7 weeks (1.2 Gy/fraction, twice daily)
  - Low to intermediate risk: Sites of suspected subclinical spread
    - 44–50 Gy (2.0 Gy/fraction) to 54–63 Gy (1.6–1.8 Gy/fraction)[3]
- Brachytherapy
  - Interstitial brachytherapy is considered for selected cases.[4,5]
    - LDR brachytherapy (0.4–0.5 Gy per hour):
      - Consider LDR boost 20–35 Gy if combined with 50 Gy EBRT or 60–70 Gy over several days if using LDR as sole therapy.
    - HDR brachytherapy:
      - Consider HDR boost 21 Gy at 3 Gy/fraction if combined with 40–50 Gy EBRT or 45–60 Gy at 3–6 Gy/fraction if using HDR as sole therapy.

For unresectable disease, see ADV-1.

Either IMRT or 3-D conformal RT is recommended.

[1] See Radiation Techniques (RAD-A) and Discussion.
[2] For doses >70 Gy, some clinicians feel that the fractionation should be slightly modified (eg, <2.0 Gy/fraction for at least some of the treatment) to minimize toxicity. An additional 2–3 doses can be added depending on clinical circumstances.
[3] Suggest 44–50 Gy in 3D conformal RT and sequentially planned IMRT or 54–63 Gy with IMRT dose painting technique (dependent on dose per fraction).
[4] Brachytherapy should be performed at centers where there is expertise in this modality. (Nag S, Cano ER, Demanes DJ, et al. The American Brachytherapy Society recommendations for high-dose-rate brachytherapy for head-neck carcinomas. Int J Radiat Oncol Biol Phys. 2001;50:1190-1198; and Mazeron JJ, Ardiet JM, Haie-Meder C, et al.,GEC-ESTRO recommendations for brachytherapy for head and neck squamous cell carcinoma. Radiother Oncol 2009;91:150-156.)
[5] The interval between EBRT and brachytherapy should be as short as possible (1–2 weeks) depending on recovery from acute toxicity. The interval between HDR fractions should be at least 6 hours.

Guidelines: post-op RT

POSTOPERATIVE:

RT

- Preferred interval between resection and postoperative RT is ≤6 weeks.
- PTV
  - High risk: Adverse features such as positive margins (see footnote i on OR-3)
    - 60–66 Gy (2.0 Gy/fraction); daily Monday–Friday in 6–6.5 weeks
  - Low to intermediate risk: Sites of suspected subclinical spread
    - 44–50 Gy (2.0 Gy/fraction) to 54–63 Gy (1.6–1.8 Gy/fraction)[3]

POSTOPERATIVE CHEMORADIATION

- Concurrent single-agent cisplatin at 100 mg/m^2 every 3 weeks is recommended.[6-9]

Either IMRT or 3-D conformal RT is recommended.

French group

Cancer/Radiothérapie 17 (2013) 493–497

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Mise au point

Délinéation des cancers de la cavité buccale et de l'oropharynx

Delineation for oral cavity and oropharyngeal cancers

M. Lapeyre*, G. Loos , J. Biau

Département de radiothérapie, centre Jean-Perrin, 58, rue Montalembert, BP 5026, 63011 Clermont-Ferrand cedex 1, France

Lapeyre M. et Al. Cancer Radiotherapie 2013

T-Intermediate risk

Volume cible anatomoclinique péritumoral à risque intermédiaire (ou à faible risque) des cancers de la cavité buccale et de l'oropharynx (approche schématique) [9]. Ces données doivent être complétés avec celles de Lapeyre et al., publiées en 2005 [14].

Localisation	Volume à traiter
Plancher buccal	Muscles génioglosses et géniohyoïdiens bilatéraux, glandes salivaires sublinguales et sous-mandibulaires homolatérales (bilatérales si tumeur médiane), rebord alvéolaire et mandibule, muscles de la racine de la langue
Langue mobile	Muscles in- et extrinsèques de la langue, base de langue et plancher, sillon amygdaloglosse et pilier antérieur
Face interne de joue	Crânialement : sillon gingivojugal et fosse infratemporale ; caudalement : sillon gingivojugal et glande submandibulaire ; en avant : en arrière de la commissure ; en arrière : trigone rétromolaire
Amygdale	Muqueuse buccale adjacente, voile, base de langue ; mandibule, muscles ptérygoïdiens homolatéraux, espace parapharyngé, nasopharynx adjacents selon l'extension ; repli pharyngo-épiglottique et muscles pharyngiens si le pilier postérieur est atteint
Base de langue	Base de langue en entier ; vallécule ; portion de langue mobile : 2 cm en avant du volume tumoral macroscopique ; épiglotte sus-hyoïdienne si la vallécule est envahie
Voile	Voile en entier, partie supérieure des piliers et fosse amygdalienne, fosse ptérygopalatine, nasopharynx adjacent et muscles ptérygoïdiens selon l'extension ; foramen de la base du crâne et sinus sphénoïde si la fosse ptérygopalatine est atteinte ; trajet du nerf trijumeau jusqu'au sinus caverneux surtout dans les cancers des glandes salivaires

N-Intermediate risk

"Le niveau ganglionnaire infraclinique à proximité de l'adénopathie. Le niveau ganglionnaire de l'adénopathie atteinte en ajoutant *les niveaux de proximité*"

Lapeyre M. et Al. Cancer Radiotherapie 2013

N-low risk

Indications schématiques des volumes cibles anatomocliniques ganglionnaires pour les cancers de la cavité buccale [7,9–12,15,16,30].

Localisation	N0[b]		N1-N2-N3	
	Homolatéral	Controlatéral	Homolatéral	Controlatéral[b]
Langue mobile	I-II-III-IV	I-II-III-IV	I-II-III-IV-V	I-II-III-IV-V
Plancher buccal[a], gencive inférieure[a]	I-II-III	I-II-III	I-II-III-IV-V	I-II-III-IV-V
Face interne de joue[a]	I-II-III	–	I-II-III-IV-V	I-II-III-IV-V
Gencive supérieure[a]	Ib-II-III	Ib-II-III	I-II-III-IV-V	I-II-III-IV-V
Palais dur[a]	Ib-II-III	Ib-II-III	I-II-III-IV-V	I-II-III-IV-V
Toute localisation	Si adénopathie au niveau II : niveaux rétrostyllien, Ib, IV et V Si adénopathie au niveau III : niveaux Ib, IV et V Si adénopathie au niveau IV : niveaux V et supraclaviculaire Si adénopathie au niveau V : niveau supraclaviculaire			

[a] Traitement unilatéral à discuter si la tumeur est latéralisée.

[b] Les niveaux IIb et V peuvent être surveillés en absence d'adénopathie du même côté.

Lapeyre M. et Al. Cancer Radiotherapie 2013

Upgrade node level delineation

Contents lists available at ScienceDirect

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Guidelines

Delineation of the neck node levels for head and neck tumors: A 2013 update. DAHANCA, EORTC, HKNPCSG, NCIC CTG, NCRI, RTOG, TROG consensus guidelines ☆

Vincent Grégoire [a,*], Kian Ang [b], Wilfried Budach [c], Cai Grau [d], Marc Hamoir [e], Johannes A. Langendijk [f], Anne Lee [g], Quynh-Thu Le [h,i], Philippe Maingon [j], Chris Nutting [k], Brian O'Sullivan [l], Sandro V. Porceddu [m], Benoit Lengele [n]

[a] Cancer Center and Department of Radiation Oncology, Clinical and Experimental Research Institute, Université Catholique de Louvain, Cliniques Universitaires St-Luc, Brussels, Belgium; [b] Department of Radiation Oncology, The University of Texas MD Anderson Cancer Center, Houston, USA; [c] Department of Radiation Oncology, University Hospital Düsseldorf, Germany; [d] Department of Oncology, Aarhus University Hospital, Denmark; [e] Cancer Center and Department of Otorhinolaryngology, Head and Neck Surgery, Institut de Recherche Experimentale et Clinique, Université Catholique de Louvain, Cliniques Universitaires St-Luc, Brussels, Belgium; [f] Department of Radiation Oncology, University Medical Center Groningen, University of Groningen, The Netherlands; [g] Department of Clinical Oncology, The University of Hong Kong (Shenzhen) Hospital, China; [h] Department of Radiation Oncology, Stanford University School of Medicine, Stanford Cancer Center, Stanford; [i] Radiation Therapy Oncology Group (RTOG), USA; [j] Department of Radiation Oncology, Centre Georges-François Leclerc, Dijon, France; [k] Department of Radiation Oncology, Royal Marsden Hospital and Institute of Cancer Research, London, UK; [l] Department of Radiation Oncology, Princess Margaret Hospital, University of Toronto, Canada; [m] Cancer Services, Princess Alexandra Hospital, Brisbane, Australia; [n] Cancer Center and Department of Human Anatomy and Plastic & Reconstructive Surgery, Institut de Recherche Experimentale et Clinique, Université Catholique de Louvain, Cliniques Universitaires St-Luc, Brussels, Belgium

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Level Ia: submental nodes

Risk metastases from cancer
arising from:

- Floor of the mouth
- Anterior oral tongue
- Anterior mandibular
- Alveolar ridge

Level Ib: submandibular nodes

Risk metastases from cancer
arising from:

- Oral cavity, anterior nasal cavity, submandibular gland

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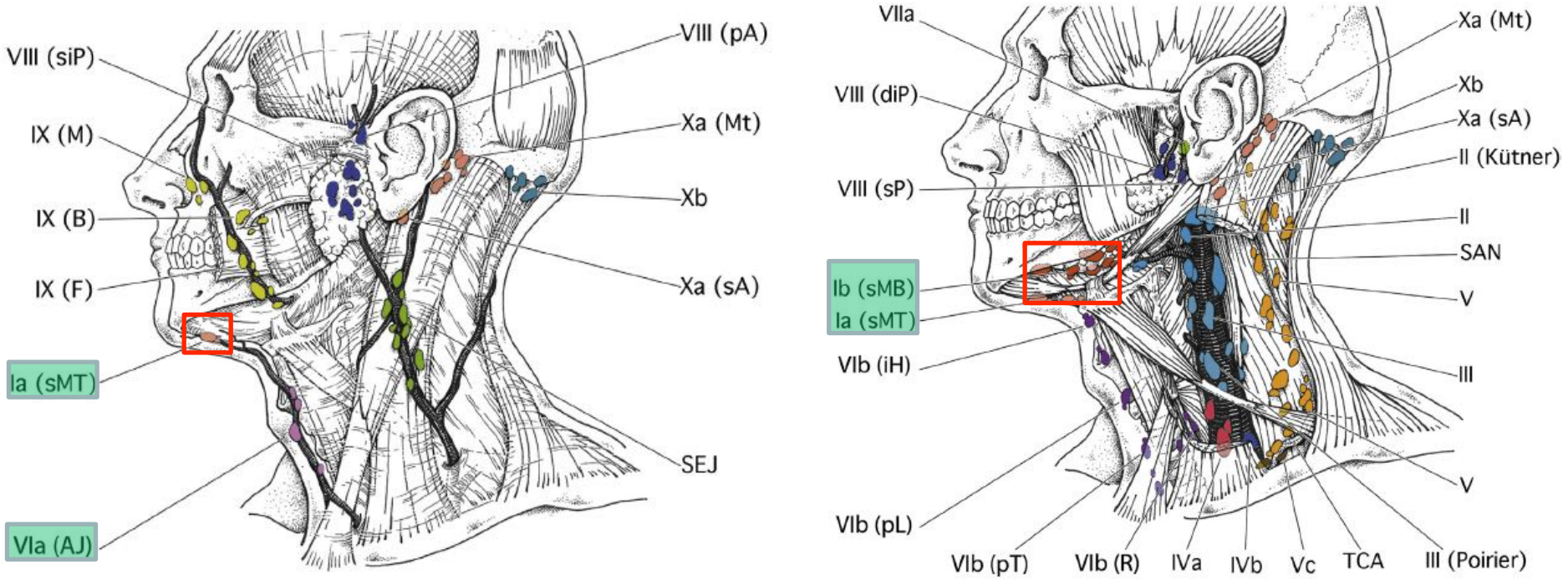
Superficial node

Deep node



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Level IIa: upper jugular nodes

Risk metastases from cancer
arising from:

- Nasal cavity
- Oral cavity
- Pharynx
- Larynx
- Major salivary glands

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Level IIb: upper jugular nodes

Risk metastases from cancer
arising from:

- Nasopharynx
- Oropharynx

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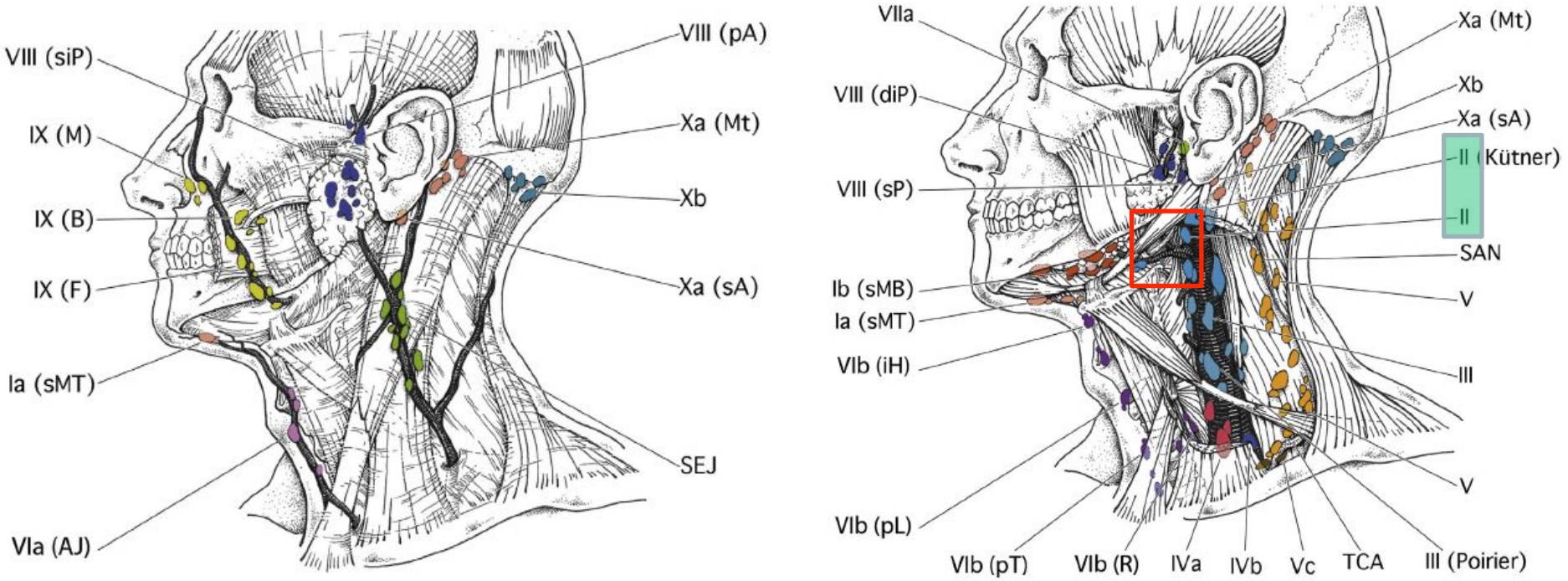
Superficial node

Deep node



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Level III: middle jugular nodes

Risk metastases from cancer
arising from:

- Oral cavity
- Pharynx
- Larynx

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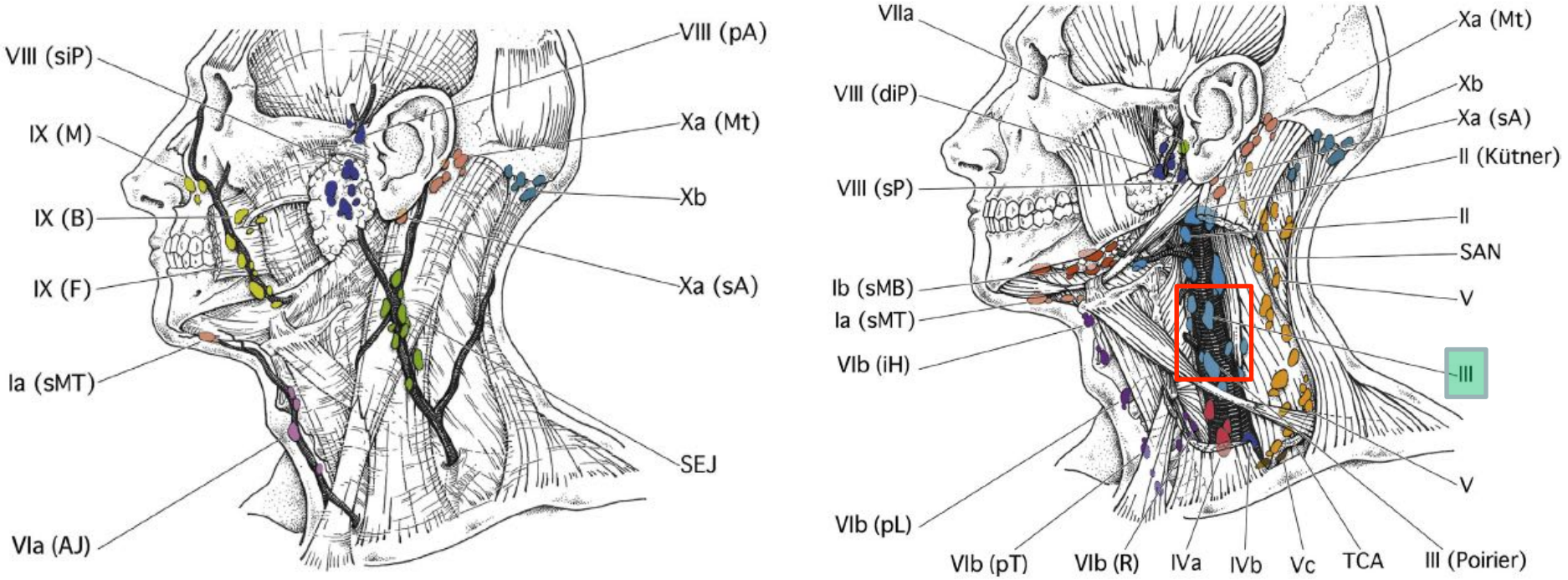
Superficial node

Deep node



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Level IVa: lower jugular nodes

Risk metastases from cancer
arising from:

- Thyroid
- Hypopharynx
- Larynx
- Cervical esophagus
- Rarely oral cavity with minimal nodal disease

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Level IVb: lower jugular nodes

Risk metastases from cancer
arising from:

- Thyroid
- Hypopharynx
- Sub-glottic larynx
- Cervical esophagus
- Trachea

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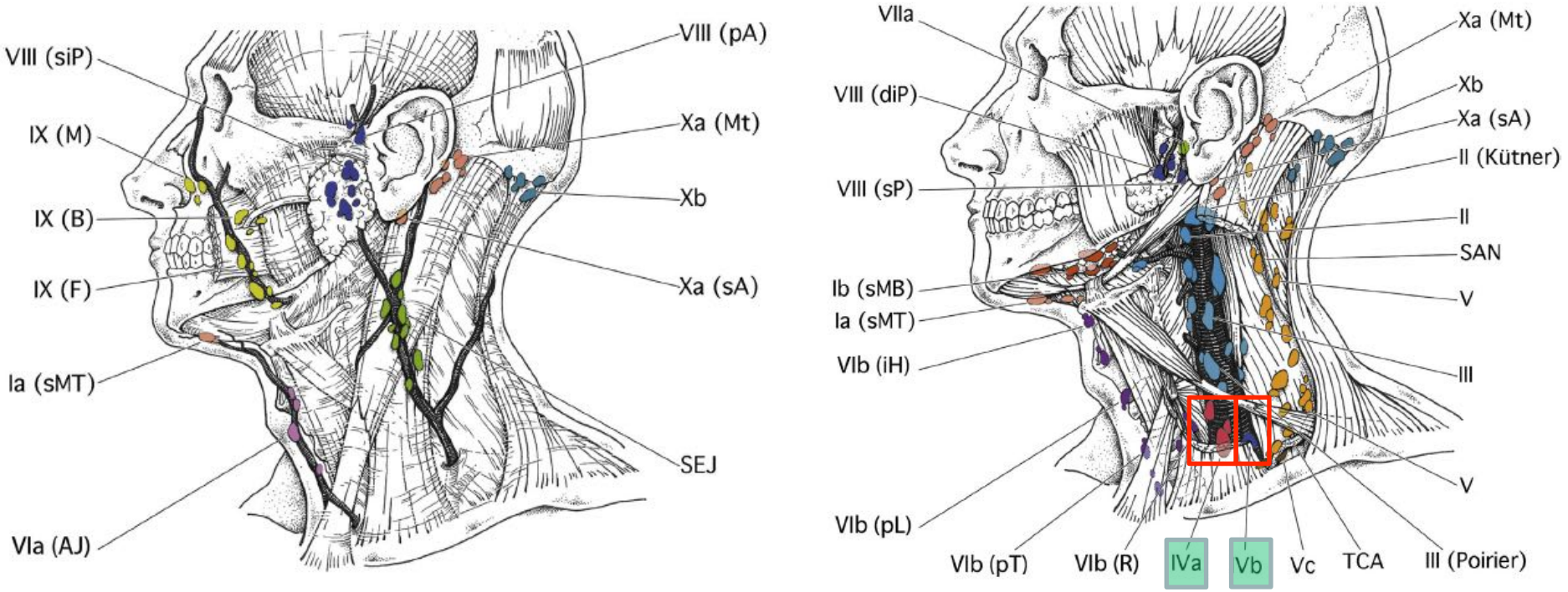
Superficial node

Deep node



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Level Va-b: post. triangle group

Risk metastases from cancer
arising from:

- Thyroid
- Naso-oropharynx
- Cutaneous structures posterior scalp

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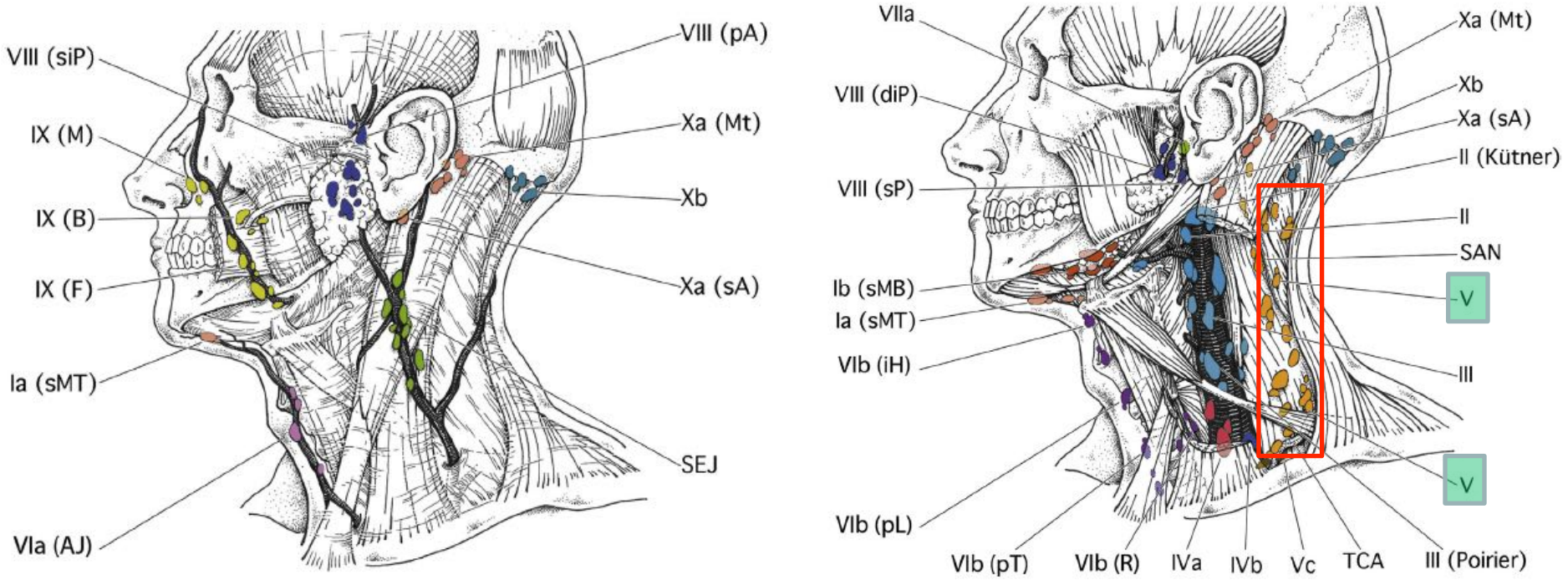
Superficial node

Deep node



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Level VIa-b: ant. compartment nodes

Risk metastases from cancer
arising from:

- Thyroid
- Lower lip
- Oral cavity (floor of mouth/tip tongue)
- Glottic-subglottic larynx
- Apex piriform sinus
- Cervical esophagus

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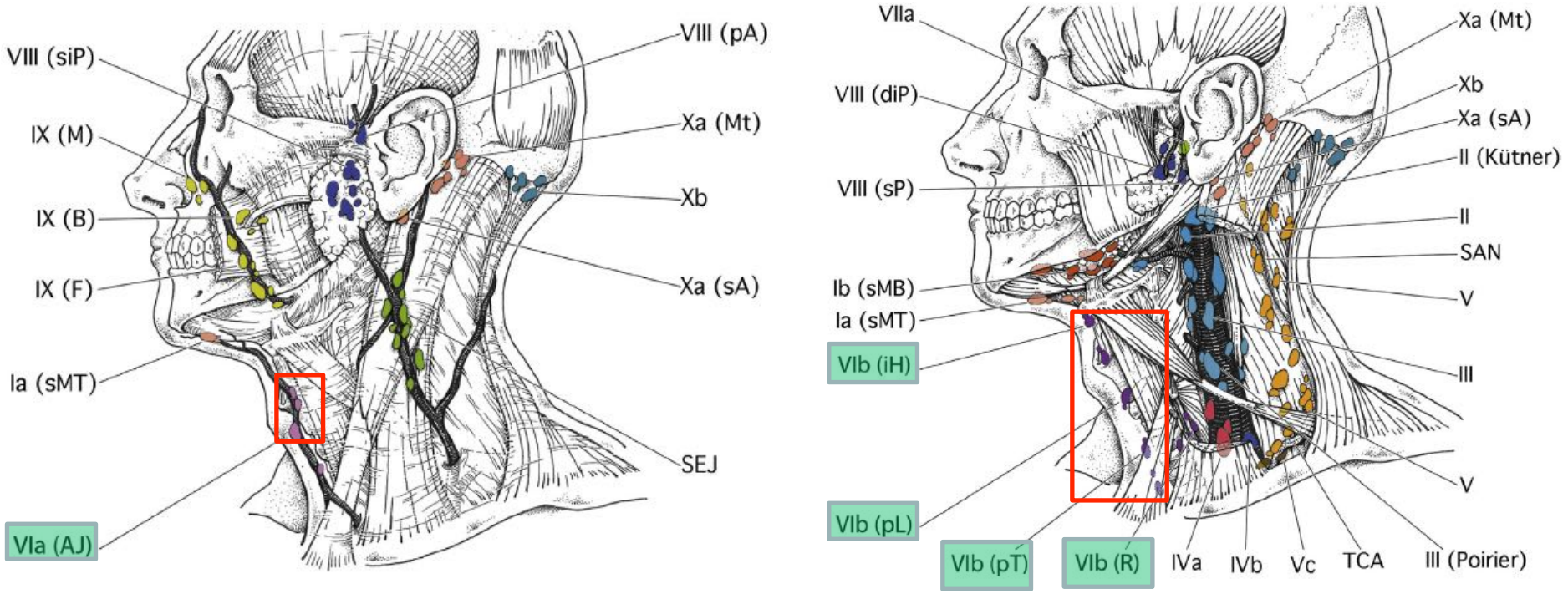
Superficial node

Deep node



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Level VIIa-b: retro-pharyngeal/styloid nodes

Risk metastases from cancer
arising from:

- Naso-oropharynx
- Posterior pharyngeal wall
- Primary cancer with massive nodal level II infiltration

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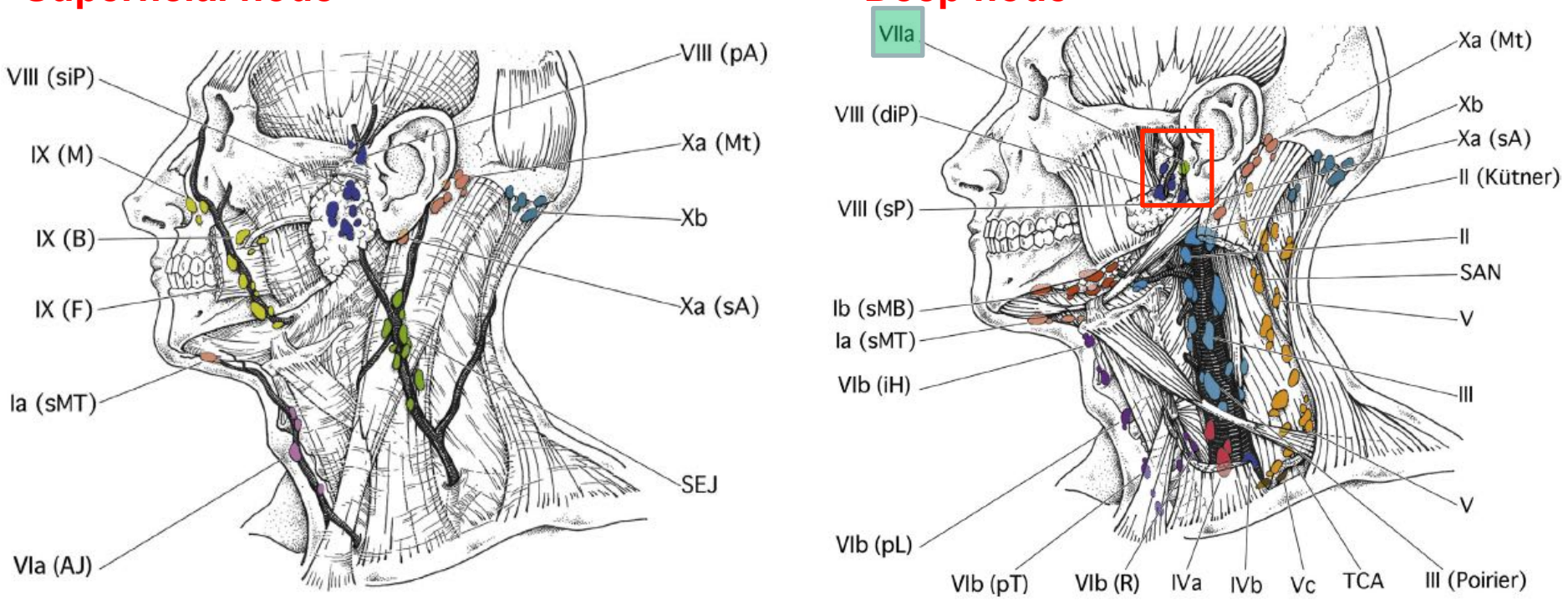
Superficial node

Deep node



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Level VIII: parotid nodes

Risk metastases from cancer arising from:

- Frontal/temporal skin
- Orbit
- External auditory canal
- Nasal cavities
- Parotid gland

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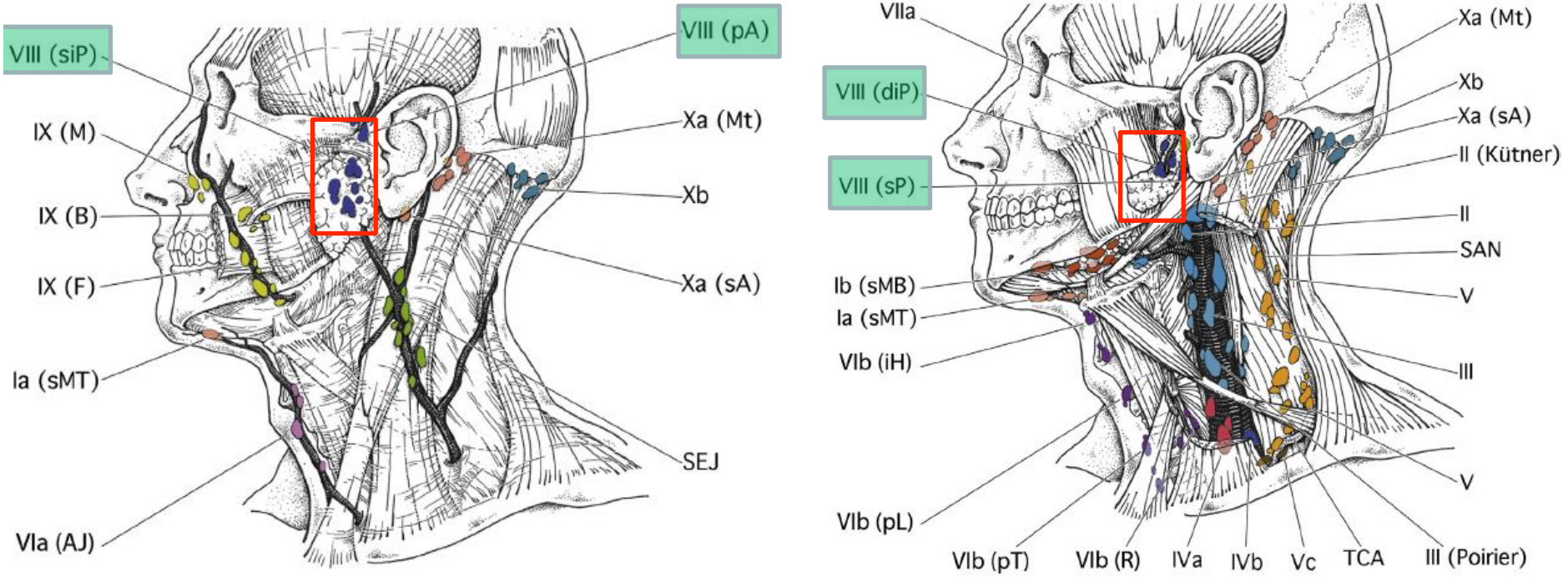
Superficial node

Deep node



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Level IX: bucco-facial nodes

Risk metastases from cancer arising from:

- Skin face
- Nose
- Maxillary sinus (infiltrating the soft tissue of the cheek)
- Buccal mucosa

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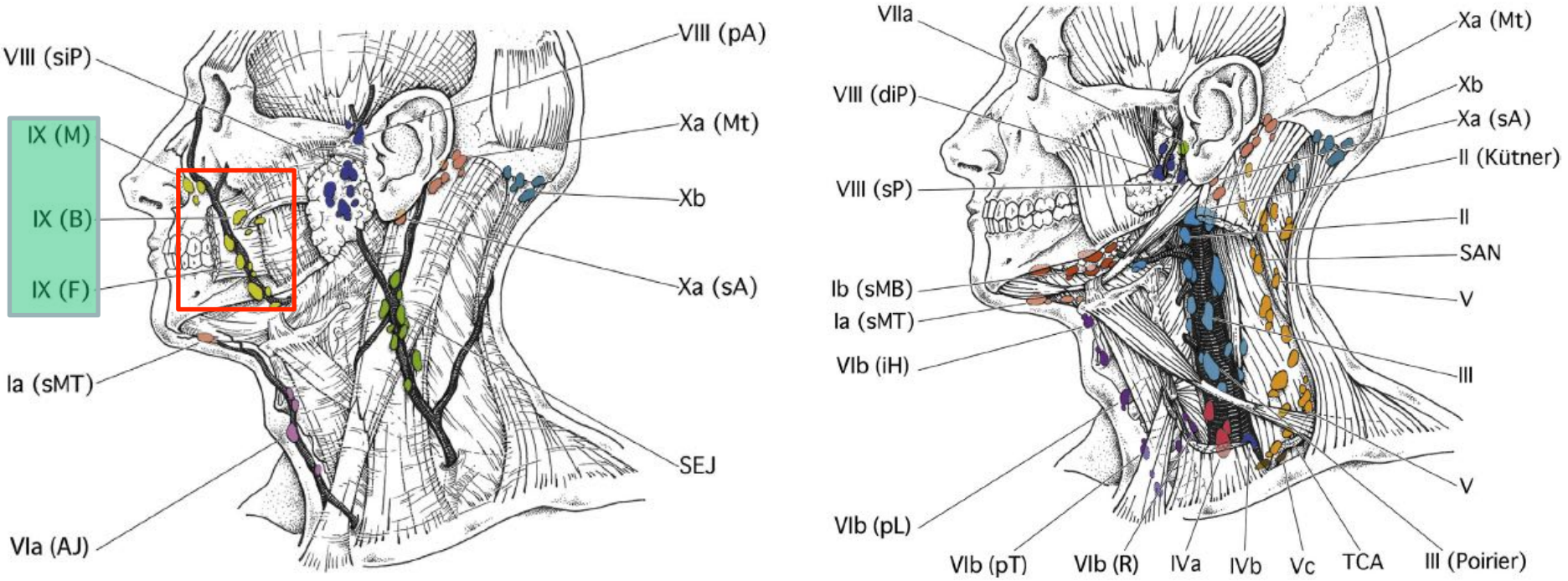
Superficial node

Deep node



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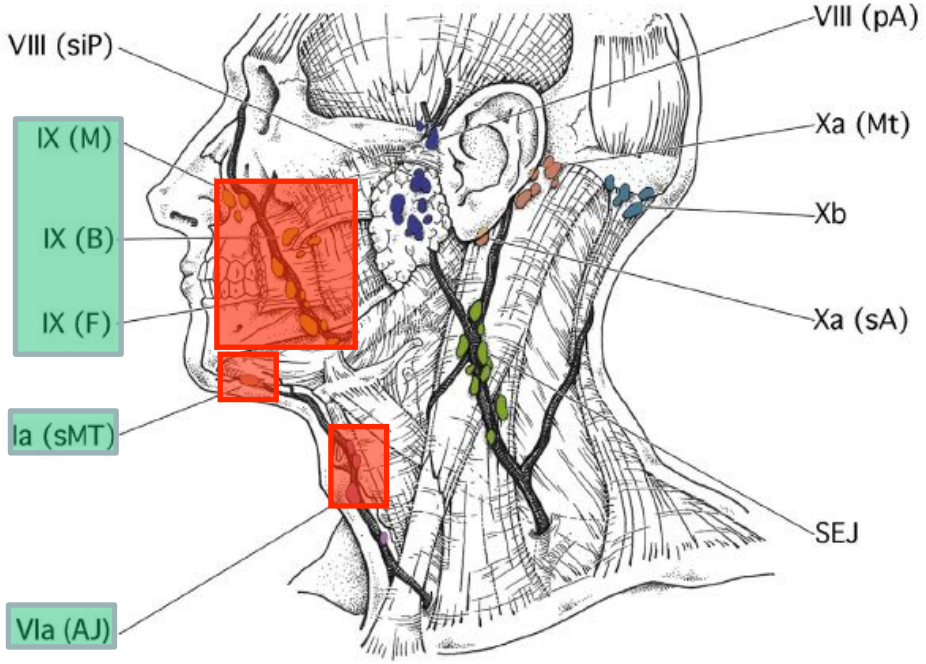
Oral cavity nodes risk metastasis

Superficial node



Deep node

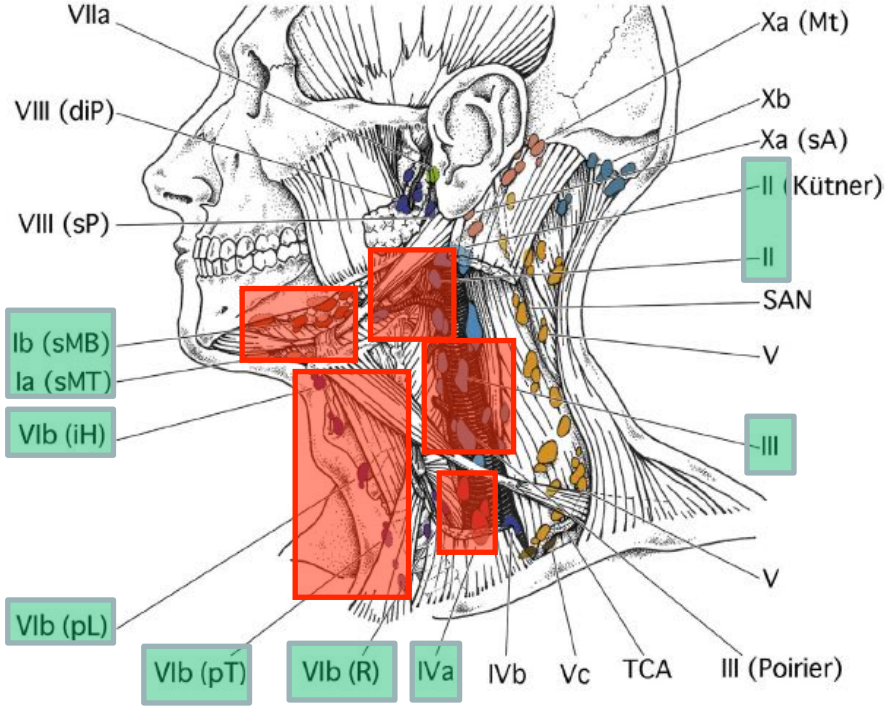


Fig. 1. Superficial (top) and deep (bottom) lymphatic node groups of the head and neck. These groups are named according to the node levels modified from Robbins classification (see Table 1) [modified from Lengelé [11]. AJ: anterior jugular; B: buccal; diP: deep intraparotid; F: facial; iH: infrahyoid; M: malar; Mt: mastoid; pA: preauricular; pL: prelaryngeal; pT: pretracheal; R: recurrent or paratracheal; sA: subauricular; SAN: spinal accessory nerve; SEJ: superficial external jugular; siP: superficial intraparotid; sMb: submandibular; sMt: submental; sP: subparotid; TCA: transverse cervical artery.

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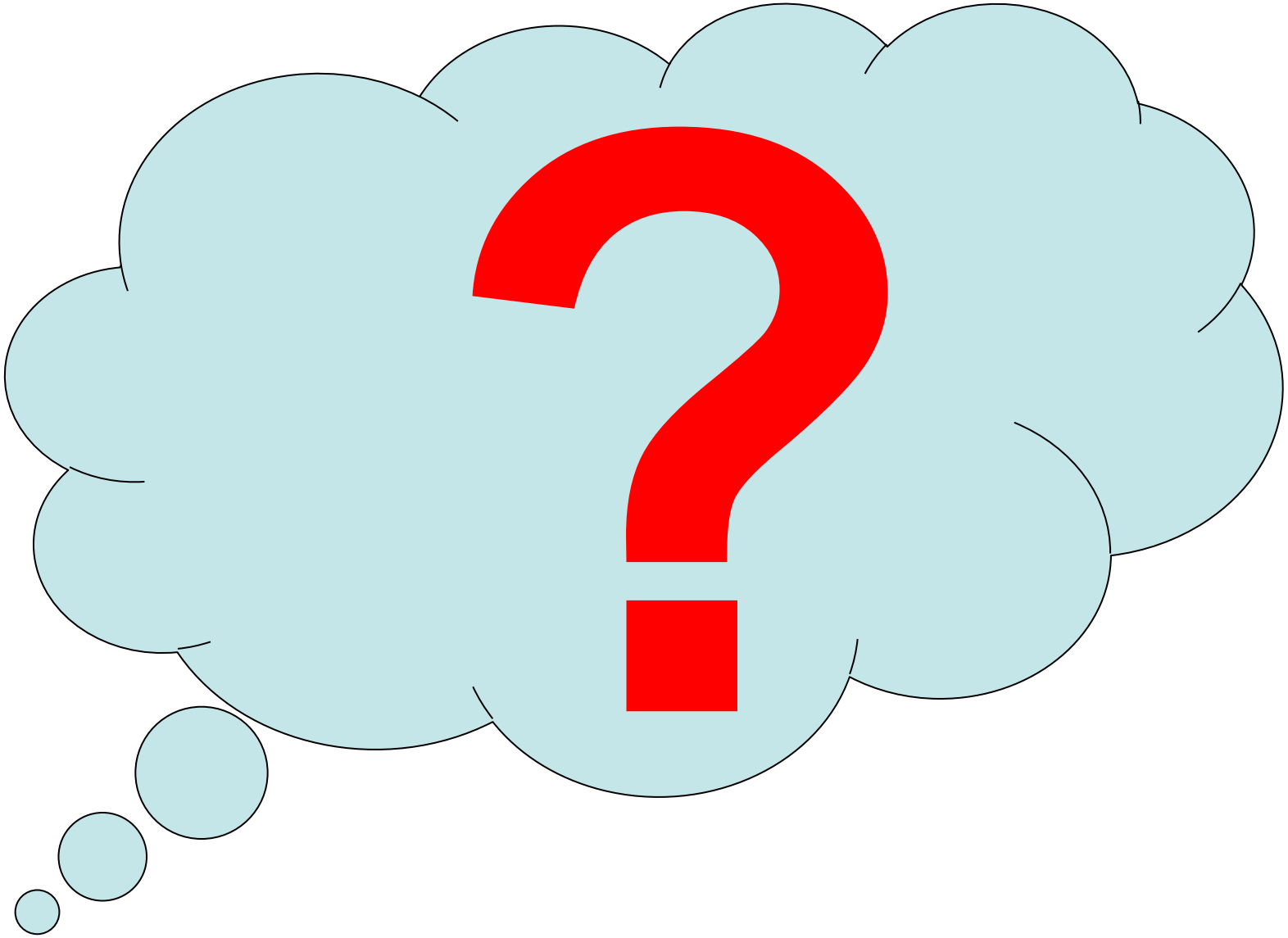

AIRO- H&N

Merlotti *et al. Radiation Oncology* (2014) 9:264
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RADIATION ONCOLOGY

REVIEW Open Access

Technical guidelines for head and neck cancer IMRT on behalf of the Italian association of radiation oncology - head and neck working group

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Oral cavity

Usually upfront surgery and postoperative (chemo)RT

Definitive RT for small T1-T2 (ERT+BRT)

IMRT limit dose to OARs/longer delivery

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Implications of upfront surgery

Extensive surgery disrupt normal anatomy

- **Whole operative bed low risk**
- **Initial site high risk**
- **Include whole flap**

Peculiar lymphnode-invasion pattern

- **Node involvement less predictable**

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Postop RT

- Initial positive margin worse prognosis
- Perineural invasion adverse feature
- Inferior alveolar nerve positive
  - Include in RT field infratemporal fossa
- CTV3: whole operative bed/reconstruction site

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Neck Radiotherapy

Dissected neck > lowest dose level

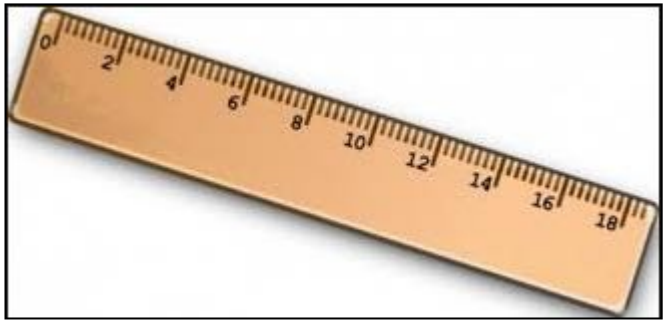
Adjuvant RT:

- **pN >1**
- **Extracapsular invasion**
- **Incomplete level dissection**
- **Atypical node location**

Well lateralize lesions and NOT cN2-3 unilateral neck RT

Mirabile A. et Al. Crit Rev Oncol Hematology 2015

Node and depth



Risk positive nodes strictly correlated with depth primary tumour invasion.

- **3 to 9 mm: 44% positive nodes, 7% local recurrence**
- **>9 mm: 53% positive nodes 24% local recurrence**

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Cut-off risk: definitive vs post-op

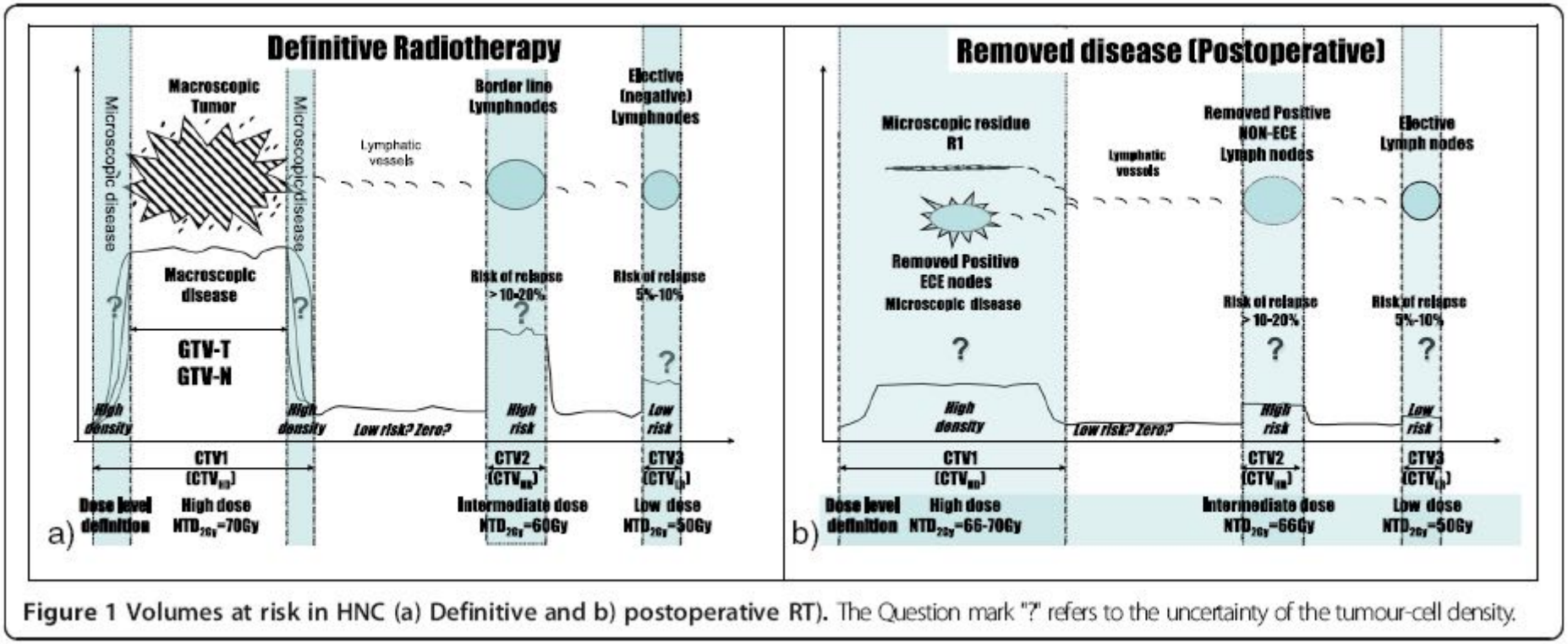

Figure 1 Volumes at risk in HNC (a) Definitive and b) postoperative RT). The Question mark "?" refers to the uncertainty of the tumour-cell density.

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Primary-tumour contour

Table 5 Anatomical landmarks in contouring various oral subsites

Sub-site	Cranial	Caudal	Anterior	Posterior	Lateral	Medial
Oral tongue/ Floor of the Mouth (FoM)	Superior aspect tongue	Hyoid bone	Symphysis menti	Anterior oropharyngeal mucosa	To mandible. Includes ipsilateral parapharyngeal space	Ipsilateral tongue/FoM in well lateralized tumours. Contralateral mandible in midline or advanced tumours
Buccal mucosa	Inferior aspect zygomatic arch/hard palate	Hyoid bone	Angle of mouth	Oropharyngeal mucosa. Infratemporal fossa should be included in HNCPs with involvement or proximity to inferior alveolar nerve	To overlying skin	Oropharyngeal mucosa. Contralateral parapharyngeal space spared
Retromolar Trigone	Superior aspect soft palate/hard palate	Hyoid bone	Junction of posterior third and anterior two thirds of the tongue	Oropharyngealmucosa	To mandible. Includes ipsilateral parapharyngeal space	Oropharyngeal mucosa Contralateral parapharyngeal space spared
Hard palate	Superior aspect of hard palate +10 mm	Hyoid bone	10-15 mm anterior margin on GTV into palate	Anterior aspect oropharyngeal mucosa	To mandible / medial pterygoid muscle on both sides. Includes both Parapharyngeal spaces.	To mandible/medial pterygoid muscle on both sides. Includes both parapharyngeal spaces.

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Neck levels contouring

Table 6 Guidelines for contouring neck levels [57]

	cNo	Ipsilateral N+	Comment
Tongue	Bilateral I-IV	V if N2-3	Excluding IIb
Floor of mouth (well lateralized)	Bilateral I-III	IV and V if N2-3	Excluding IIb
Hard palate	Bilateral Ib, IIa, III, RP	Add bilateral Ia, IV, V if N2-3	Excluding IIb
Upper retromolar trigone	Bilateral Ib, IIa, III, RP, ipsilateral Ia	Add contralateral Ia, bilateral IV and V	Excluding IIb
Lower retromolar trigone	Ipsilateral I, II, III	Add ipsilateral IV, V	Excluding IIb
Buccal mucosa	Ipsilateral Ib, IIa, III	Add ipsilateral Ia, bilateral IV and V	Excluding IIb

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Volumes at risk in HNC

Burden of disease	Description	ICRU definition	Adopted definition	Finality	T – level	N – level	Dose level definition	Dose level NTD	Solution examples (Total-dose Gy/single-fraction Gy/numbers of fractions			
									Definitive		Postoperative	
									Conventional	Slightly accelerated	Conventional	Slightly accelerated
Macroscopic	Known gross disease	GTV	GTV	Definitive	Primary tumor	Each Positive-nodes	High Dose	70 Gy	70/2.35[18]	70/2.12/33 [20]		
High risk of microscopic disease	Risk of relapse > 10-20% [54,55]	CTV	CTV_{HD}^	Definitive	Peri-GTV areas considered to contain potential microscopic disease [38] (T + 10 mm)*	Positive Nodes + 5 [41]-10[53]mm				66/2.2/30 [17,18]		
			(CTV1)							65/2.17/30 [77]		
				Post-S	Surgical bed with soft tissue involvement (Positive or close margins): PTB +0.5-1 cm according to anatomical barriers [41]	Nodal region with extracapsular extension [41]: PTB plus 1 cm up to the skin [56].$^{\varsigma}$		66-70 Gy			≥63/1.8/35 [78]	65/2.17/30 [77]
												66/2/33[79]
			CTV_{HR}	Definitive	Preferential areas of diffusion.(Optional) [56]	Border-line lymph-nodes [51,57]	Intermediate Dose	60 Gy	63/1.8/35[18]	60/2/30 [17,18]		
			(CTV2)	Post-S	Surgical bed without soft tissue involvement [41]	Nodal region without extracapsular extension		66§ Gy		59.4/1.8/33 [20]	≥63/1.8/35 [78]	
Low risk of microscopic disease	Risk of relapse 5-10% [41,80]	CTV	CTV_{LR}	Definitive	Structure or compartment adjacent to tumor [56]	Elective nodal regions, defined for each primary-tumor subsite#	Low dose	50 Gy	58.1/1.66/35 [18]	54/1.8/30 [17,18,77]		54/2/27[79]
			(CTV3)	Post-S				50 Gy		50.4/1.8/28 [20]	57.6/1.8/32 [78]	54/1.8/30 [77]

**Depending from anatomic barrier;§ though one prospective study failed to show a benefit for 66 Gy over 60 Gy in the high risk post-operative region [78], this is the dose recommended by some cooperative groups (EORTC [79]); PTB: postoperative tumour bed; ^ definition of the high-risk region is controversial [18] ; D = Definitive RT; Post-S = postoperative. CTV_{HD}: High Disease; CTV_{HR}: High Risk; LR = Low risk. $^{\varsigma}$ in case of muscular infiltration (i.e. sternocleidomastoid muscle) at least the portion of the muscle surrounding the node [47] should be included. # Similarly, it would be appropriate to include the whole muscle (i.e. sternocleidomastoid muscle) in CTV3/LR or when grossly infiltrated at same level.*

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Dose and Fraction

Table 3 Suggested fractionation regimens for definitive treatment of oral cavity cancers

Author		D (Gy)	d (Gy)	Fxs	OTT (wks)	Comment
Daly et al., [83]	CTV1	66	2.2	30	6	With concurrent CT [83]
Yao et al., [82]		70	2	35	7	Sequential boost [82]
	CTV2	54	1.8	30	6	
Yao et al., [82]	CTV3	54	1.8	30	6	[82]
Daly et al., [83]		50.1	1.67	30	6	[83]

Table 4 Suggested fractionation regimens for postoperative setting of oral cavity cancers

Authors		D (Gy)	d (Gy)	fxs	OTT (wks)	Comment
Daly et al., [83]	CTV2	66	2.2	30	6	For positive margins or ECE
Yao et al., [82]		64-66	2	32-33	6.5	Sequential boost for extracapsular extension, positive or close margins, bone or soft-tissue involvement.
		60	2	30	6	
		63	1.8	30	6	
	CTV3	54	1.8	30	6	
Daly et al., [83]		50.1	1.67	30	6	
		58.1	1.66	35	7	

A surgery-to-RT interval of <6 weeks improves local-regional control.

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Organ at risk

Table 2 Organs at risk

OAR [81]	Priority	Endpoint	Goal	Minor variation	Comment
Cord	PRIM	0.1 cc	Dmax ≤ 44-45 Gy	Dmax 46 Gy	
Cord (PRV)	PRIM	0.1 cc	Dmax 44-48 Gy	Dmax 48–50 Gy	
Brain	PRIM	1 cc	Dmax 60 Gy	Dmax 63 Gy	
Temporal lobes	PRIM	1 cc	Dmax 60 Gy	Dmax 65 Gy	
Brainstem (PRV)	PRIM	0.1 cc	Dmax 54 Gy	Dmax 60 Gy	
Chiasm (PRV)	PRIM	0.1 cc	Dmax 54 Gy	Dmax 60 Gy	
Optic nerve (PRV)	PRIM	0.1 cc	Dmax 54 Gy	Dmax 60 Gy	
Larynx	PRIM	1 cc	Dmax 73.5 Gy	Dmax 77 Gy	
Mandible	PRIM	1 cc	Dmax 70–73.5 Gy	Dmax 75–77 Gy	
Inner ear	SEC	D mean	<50 Gy	<52.5 Gy	
Larynx (without cartilaginous framework)	SEC	V50	<25%	<30%	Oedema
Larynx (supraglottis)	SEC	Dmax	<66 Gy		Dysphonia
Larynx (whole organ)	SEC	Dmax	<50 Gy		Aspiration
Mandible	SEC	V55	<20%		
Esophagus	SEC	1 cc	Dmax 45 Gy	Dmax 55 Gy	
Parotid gland	SEC	V30	<50%	<60%	at least one
	SEC	Dmean	≤26 Gy		at least one
	SEC	V40	<33% (contralat)		
Upper GI mucosa (outside PTV)	SEC	1 cc	<30 Gy	<36 Gy	
Upper GI mucosa (whole volume)	SEC	V66.5	Dmax 64 Gy (<3 %?)	Dmax 70 Gy (<9%)	
Brachial plexus	PRIM	0.1 cc	Dmax 60 Gy	Dmax 66 Gy	SEC in selected
Thyroid Gland	SEC	V45	<50%		
Submandibular gl	SEC	Dmean	<35 Gy		
Constrictor pharyngeal mm	SEC	Dmean	<50 Gy		
Lacrimal gland	PRIM	Dmean	26 Gy		SEC in selected cases
Lens	PRIM	Dmax	<4 Gy	<6 Gy	SEC in selected cases
Retina	PRIM	0.1 cc	Dmax 54 Gy	Dmax 60 Gy	
Pituitary gland	SEC	Dmax	<50 Gy		
TM joints	PRIM	0.1 cc	<70Gy		

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Marginal/out field failures

Oral Oncology 49 (2013) 255–260

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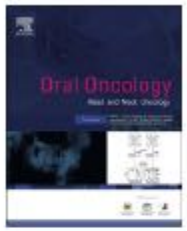

Postoperative intensity-modulated radiotherapy following surgery for oral cavity squamous cell carcinoma: Patterns of failure

Andrew K. Chan [a], Shao Hui Huang [a], Lisa W. Le [b], Eugene Yu [c], Laura A. Dawson [a], John J. Kim [a], B.C. John Cho [a], Andrew J. Bayley [a], Jolie Ringash [a], David Goldstein [d], Kelvin Chan [e], John Waldron [a], Brian O'Sullivan [a], Bernard Cummings [a], Andrew J. Hope [a,*]

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[b] Department of Biostatistics, Princess Margaret Hospital, Toronto, Canada
[c] Department of Medical Imaging, Princess Margaret Hospital, Toronto, Canada
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Conclusions: Nearly a third (12/38) of LR recurrences were marginal or out-of-field following postoperative IMRT for OCSCC. Postoperative IMRT following gross total surgical resection requires careful and comprehensive target volume delineation, and larger volumes may be needed than the primary RT setting.

Chan AK A. et Al. Oral Oncol 2013

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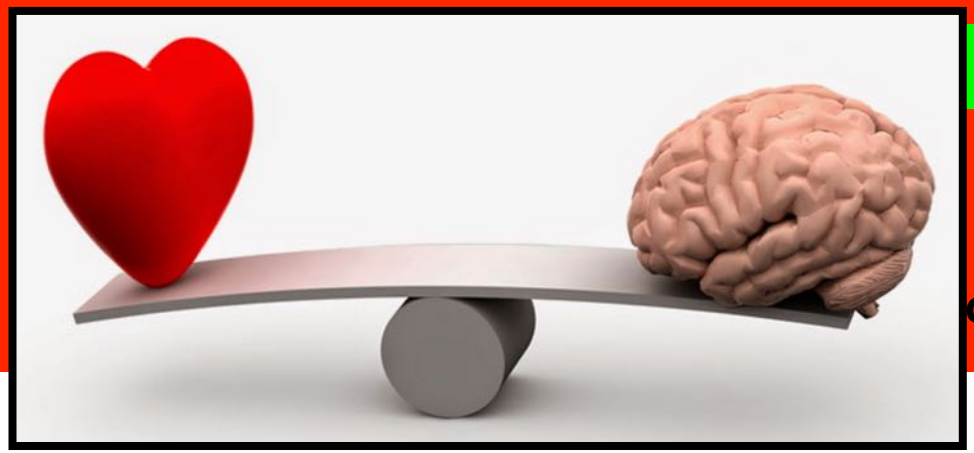

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