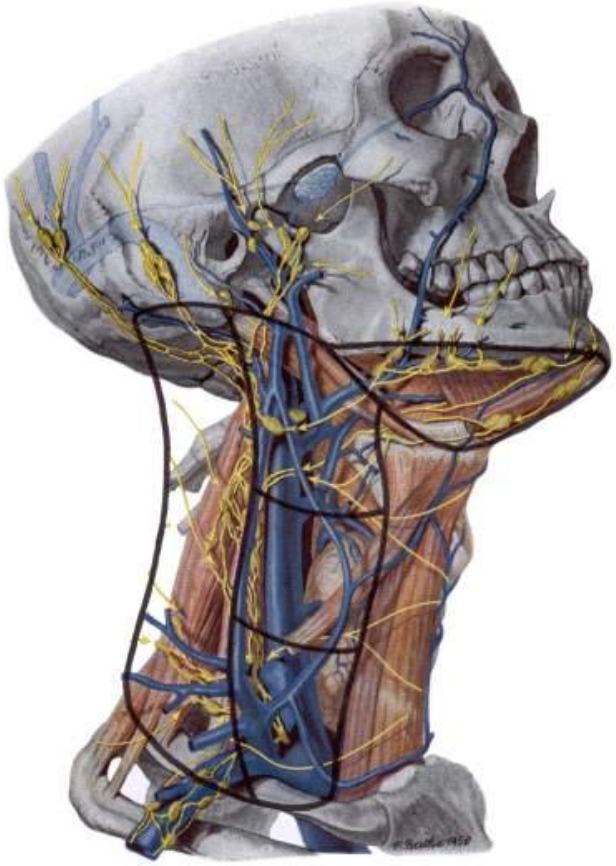
ØNH-anatomi
”Det du bør vite om lymfedrenasje”



…og litt mer…..

på 20 min (?)

Kirsten Marienhagen
Seksjonsoverlege ved stråle
UNN, Tromsø

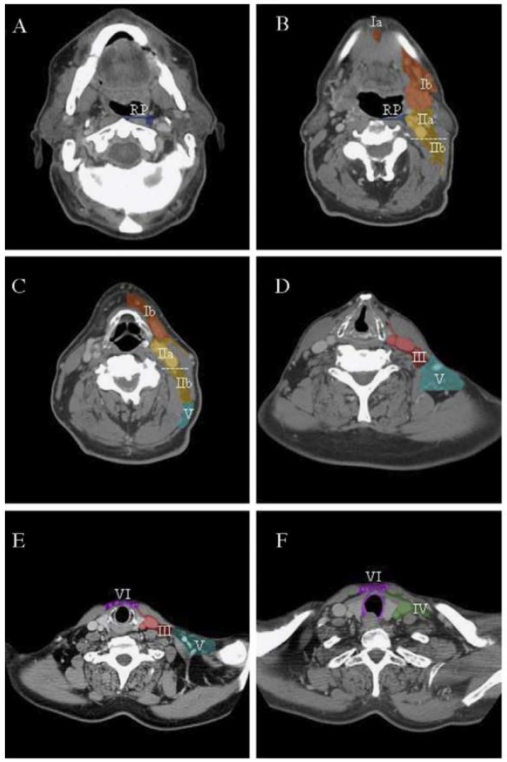
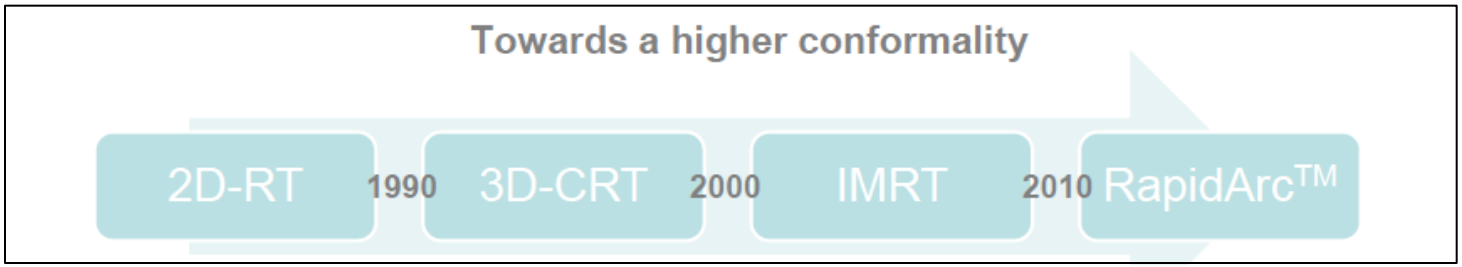


Fig. 2. CT imaging of a patient with a T1N0M0 glottic SCC (see tumor in panel D). The examination was performed on a dual-detector spiral CT (Elscint Twin, Haifa, Israel) using a slice thickness of 2.7 mm, an interval reconstruction of 2 mm and a pitch of 0.7.Contrast medium was injected intravenously at a rate of 2 ml/s with a total amount of 100 ml. Sections were taken at the level of the bottom edge of C1 (panel A), the upper edge of C3 (panel B), mid C4 (panel C), the bottom edge of C6 (panel D), the bottom edge of C7 (panel E), and mid D1 (panel F). Neck node levels were drawn on each CT slice using the radiological boundaries detailed in

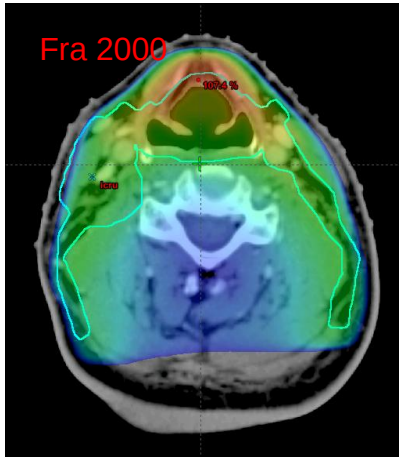
Endringer siste 10-15 år

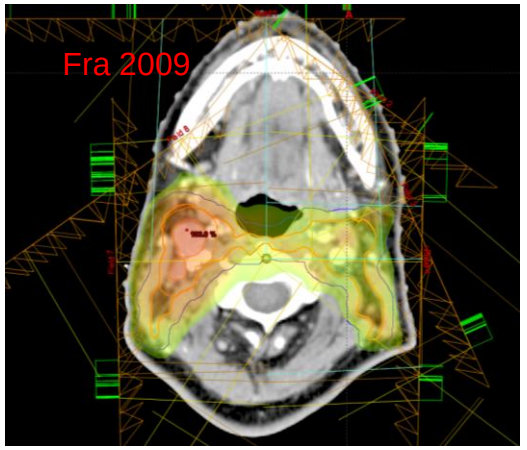


Simulatorinnstilling

3D-CRT

IMRT / VMAT





IMRT /VMAT:

Gir individuelt tilpassede konkave dosefordelinger

IMRT-ØNH

Stiller ekstra krav til inntegning

Krever større bevissthet på hva som er målvolum og hva som skal spares

”Missing the target with higher precision”

➡ raskere dosegradient, skarpere grenser

➡ økt fare for kantresidiver (???)

IMRT – forutsetninger…

- Anatomikunnskaper
- Kunnskap om lymfedrenasje / risiko for subklinisk sykdom

Radiotherapy and Oncology 103 (2012) 92–98

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Head and neck IMRT

Heterogeneity in head and neck IMRT target design and clinical practice

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ABSTRACT

Purpose: To assess patterns of H&N IMRT practice with particular emphasis on elective target delineation.
Materials and methods: Twenty institutions with established H&N IMRT expertise were solicited to design clinical target volumes for the identical H&N cancer case. To limit contouring variability, a primary tonsil GTV and ipsilateral level II node were pre-contoured. Participants were asked to accept this GTV, and contour their recommended CTV and PTV. Dose prescriptions, contouring time, and recommendations regarding chemotherapy were solicited.
Results: All 20 institutions responded. Remarkable heterogeneity in H&N IMRT design and practice was identified. Seventeen of 20 centers recommended treatment of bilateral necks whereas 3/20 recommended treatment of the ipsilateral neck only. The average CTV volume was 250 cm^3 (range 37–676 cm^3). Although there was high concordance in coverage of ipsilateral neck levels II and III, substantial variation was identified for levels I, V, and the contralateral neck. Average CTV expansion was 4.1 mm (range 0–15 mm). Eight of 20 centers recommended chemotherapy (cisplatin), whereas 12/20 recommended radiation alone. Responders prescribed on average 69 and 68 Gy to the tumor and metastatic node GTV, respectively. Average H&N target volume contouring time was 102.5 min (range 60–210 min).
Conclusion: This study identifies substantial heterogeneity in H&N IMRT target definition, prescription, neck treatment, and use of chemotherapy among practitioners with established H&N IMRT expertise. These data suggest that continued efforts to standardize and simplify the H&N IMRT process are desirable for the safe and effective global advancement of H&N IMRT practice.
 Radiotherapy and Oncology 103 (2012) 92–98

Intensity modulated radiation therapy (IMRT) affords opportunity to alter the spectrum and severity of toxicities experienced by head and neck (H&N) cancer patients [1]. The ability to conform radiation dose distribution is particularly useful in the H&N region due to the tight proximity of gross disease and "at-risk" nodal regions to normal structures including salivary glands, spinal cord, auditory apparatus, optic apparatus, mandible, larynx and others.

Target definition for H&N IMRT is particularly complex and requires a detailed knowledge of H&N anatomy and pathways of tumor spread. Several guidelines have been proposed in an effort to help standardize the H&N target delineation process [2–7]. These guidelines translate surgically and radiographically defined neck nodal levels for the practicing radiation oncologist. Site-specific treatment recommendations regarding nodal station coverage are thus provided from historical surgical data and from patterns of locoregional failure.

The overall complexity of H&N target delineation, coupled with strong dependence on physics support and rigorous quality assurance, leaves open the possibility of considerable heterogeneity in IMRT practice across institutions. Additionally, optimal dose and fractionation schedules for H&N IMRT have not been uniformly adopted [8]. Indeed, general H&N cancer management issues, such as the use of chemotherapy or neck dissection, also remain ill-defined for the IMRT patient. This study was therefore undertaken to assess current international patterns of H&N IMRT practice with particular emphasis on elective target delineation.

Materials and methods

Following Institutional Review Board approval, 20 centers from the USA, Europe, Australia, and Asia were solicited to design H&N IMRT target volumes for the identical H&N cancer case (T2 N1 M0, Stage III squamous cell carcinoma of the tonsil). Seventeen academic institutions were selected based on established expertise in H&N IMRT including publication track record in H&N radiation oncology, and three private US centers were selected based on experience with community H&N IMRT practice. The participating physicians and institutions are listed in Appendix A.

All participants received a DICOM RT file containing the same anonymous H&N CT file with a pre-designated GTV contour file.

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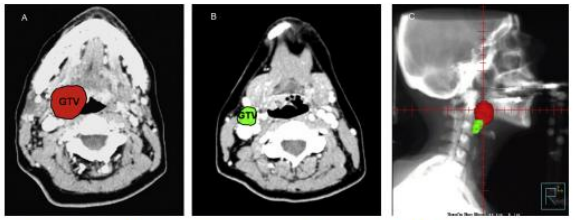


Fig. 1. T2 N1 M0 sample tonsil cancer. Panels A and B depict representative CT images through the tonsil and nodal GTV respectively. Panel C shows lateral radiograph with tonsil GTV (red) and nodal GTV (green).

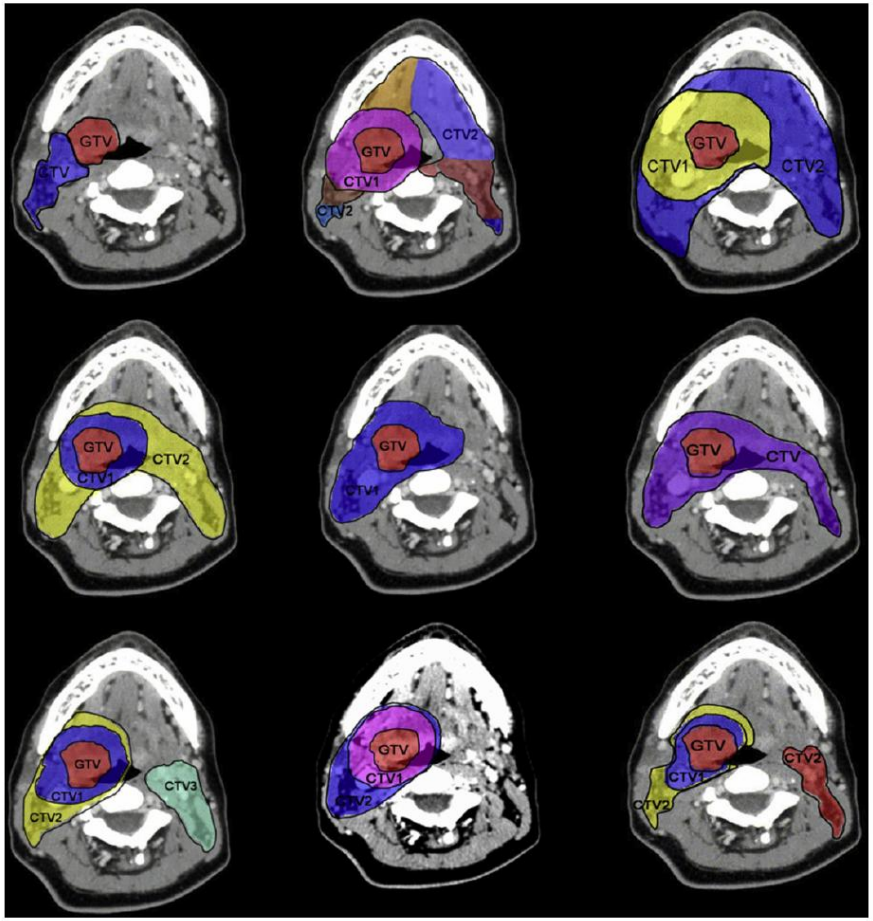
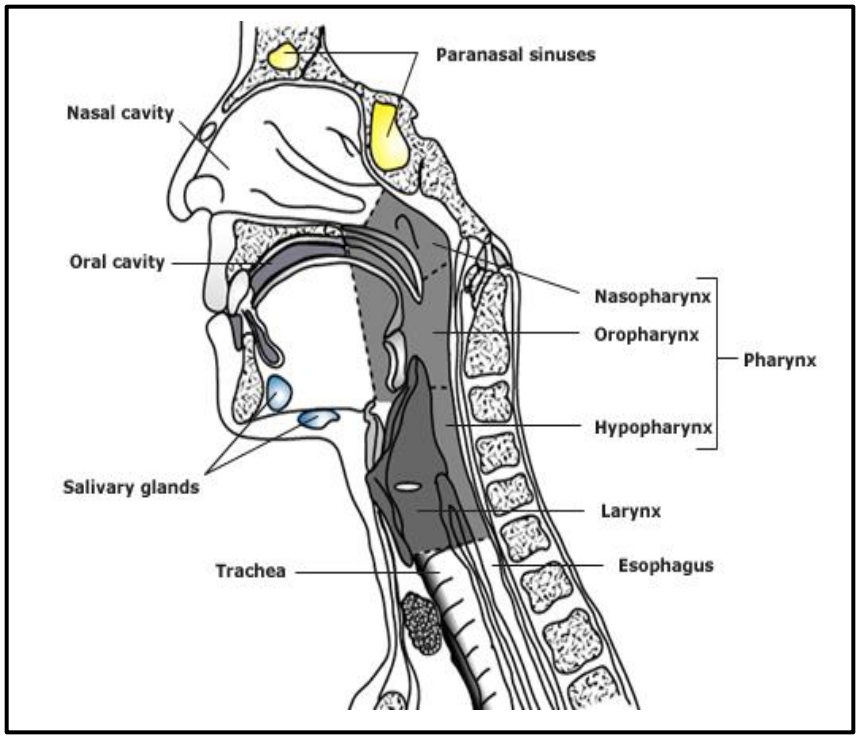


Fig. 2. Heterogeneity in H&N target delineation. Nine distinct CTV designs which illustrate broad practitioner-dependent variation in target delineation strategies for the identical tonsil cancer case.

Anatomi

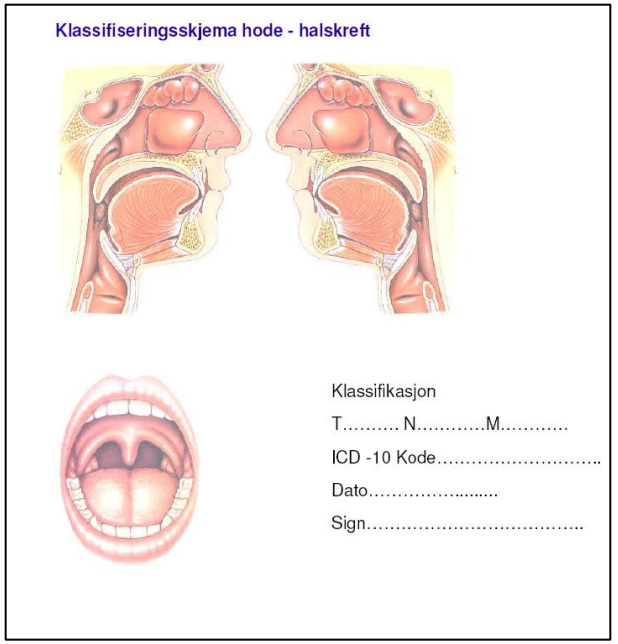


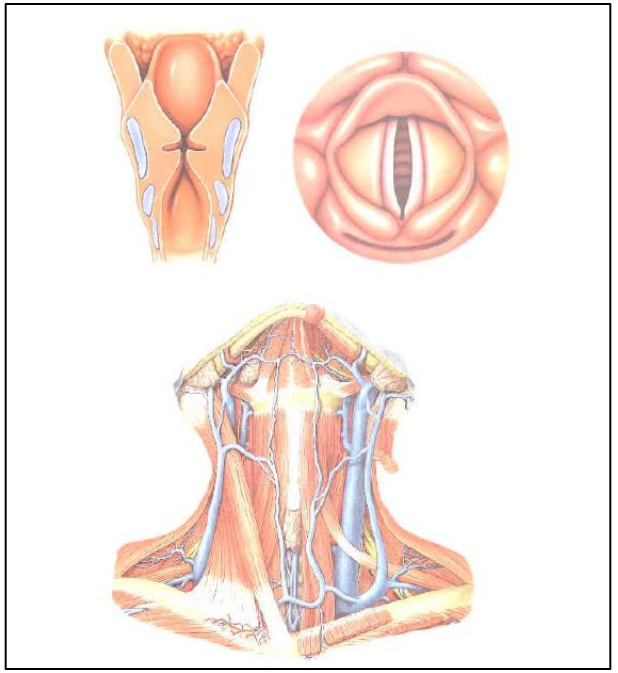
- Epifarynx (= nasofarynx / NPC)
- Orofarynx
- Hypofarynx

- Nese og bihuler
- Munnhule (cavum oris)
  - Laterale tumores
    - Kinn, gingiva, trigonum retromolare
  - Midtlinjetumores
    - Oral tunge (fremre 2/3 del), munngulv, hard gane, gingiva sentralt, bucca anterior
- Larynx

TNM-klassifikasjon

- Avgjørende for
  - Behandlingsvalg
  - Valg av målvolum/planlegging av strålebehandlingen
- Fastsettes i tverrfaglig team
  - Funn ved klinisk undersøkelse / endoskopi
  - Radiologisk vurdering (CT / MR / PET)
- Gjerne dokumentasjon med
  - Foto av tumorutbredelsen / slimhinneaffeksjon
  - Evt. skisser





T-stadie ØNH-cancer (AJCC 7th ed.)

National Comprehensive Cancer Network®

NCCN Guidelines™ Version 2.2011 Staging Head and Neck Cancers

NCCN Guidelines Index
Head and Neck Table of Contents
Discussion

Table 2:
American Joint Committee on Cancer (AJCC)
TNM Staging System for the Pharynx (7th ed., 2010)
(Nonepithelial tumors such as those of lymphoid tissue, soft tissue, bone, and cartilage are not included)

Primary Tumor (T)

TX	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Tis	Carcinoma *in situ*

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

*Note: Parapharyngeal extension denotes posterolateral infiltration of tumor.

Oropharynx

T1	Tumor 2 cm or less in greatest dimension
T2	Tumor more than 2 cm but not more than 4 cm in greatest dimension
T3	Tumor more than 4 cm in greatest dimension or extension to lingual surface of epiglottis
T4a	Moderately advanced local disease Tumor invades the larynx, extrinsic muscle of tongue, medial pterygoid, hard palate, or mandible*
T4b	Very advanced local disease Tumor invades lateral pterygoid muscle, pterygoid plates, lateral nasopharynx, or skull base or encases carotid artery

*Note: Mucosal extension to lingual surface of epiglottis from primary tumors of the base of the tongue and vallecula does not constitute invasion of larynx.

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.

Continued...

Eksempel: T-stadie Nasofarynxancer (NPC)

Obs Endring fra 6. til 7. AJCC !!

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

*Note: Parapharyngeal extension denotes posterolateral infiltration of tumor.

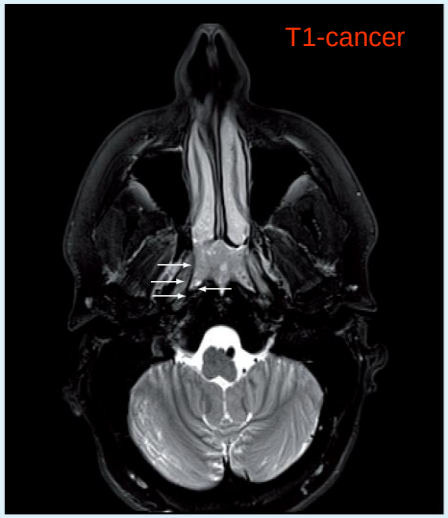


Figure 2. Pharyngobasilar fascia. This structure is normally appreciated on axial T2-weighted images as a dark signal line extending from the medial pterygoid plate, following the contour of the lateral and posterior walls of the nasopharynx (arrows). Stage T1 tumors are those that have not breached this normal anatomic structure.

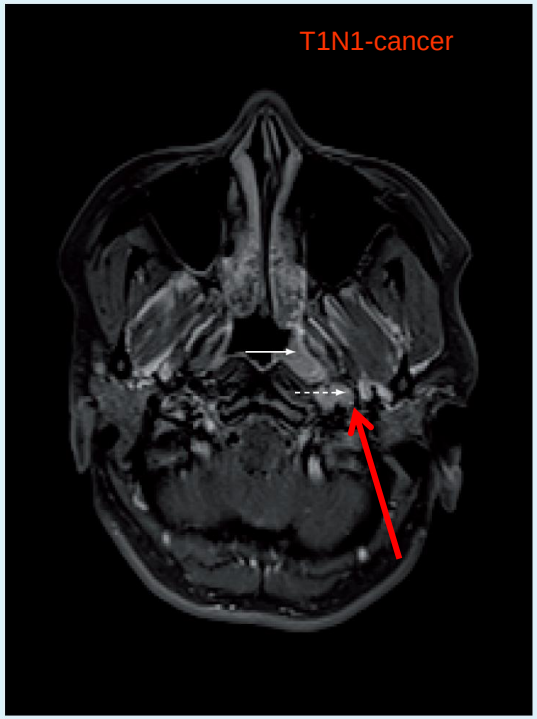


Figure 3. Early nasopharyngeal carcinoma. Axial postgadolinium-enhanced image shows a small enhancing nasopharynx cancer located in the left fossa of Rosenmuller (top arrow). An ipsilateral retropharyngeal node is also present (dashed arrow).

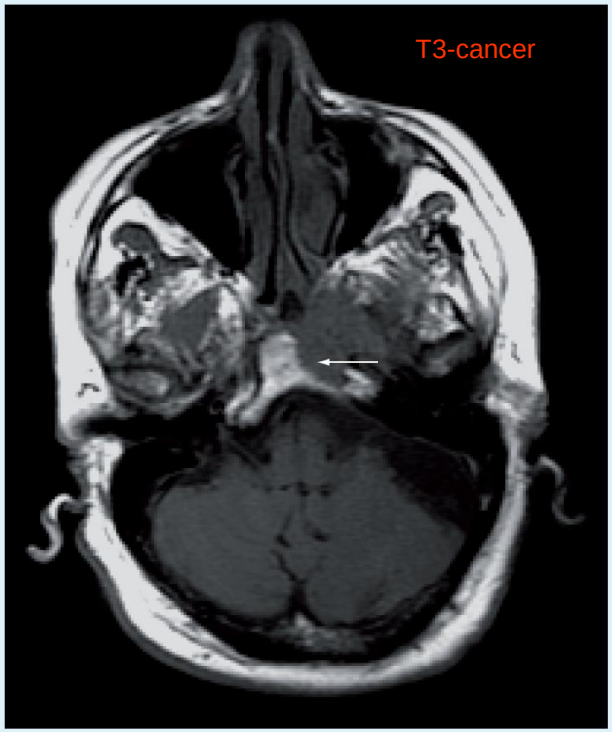
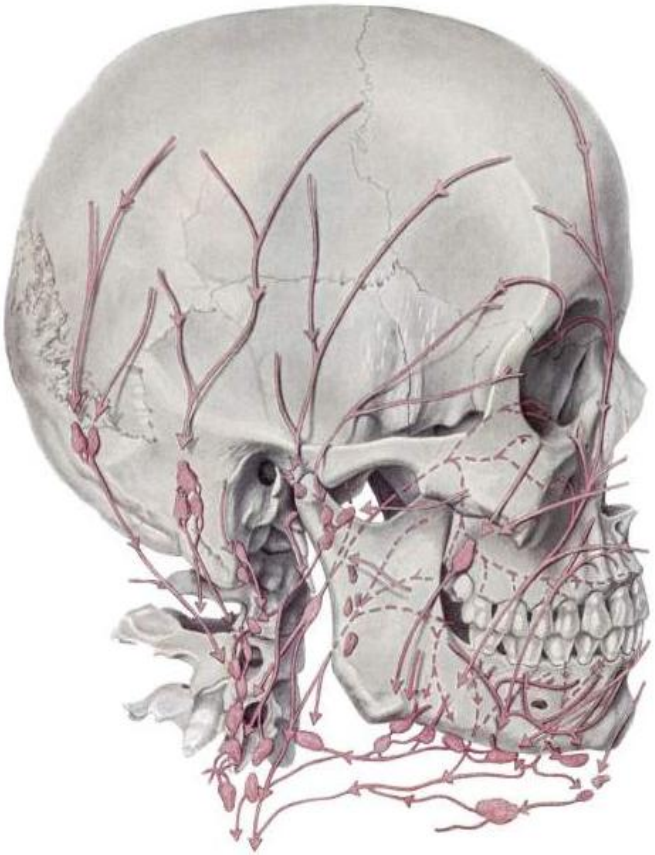


Figure 8. Clival disease. Axial T1 study shows intermediate signal tumor having extended in to the left aspect of the clivus. The normal bright marrow signal is lost in the affected region.

N-status



- N-status har stor betydning for behandlingsvalg og prognose, 5-årsoverlevelse:
  - Ved N1: 50%
  - Ved N2c: 33%

- Korrekt staging av N-status utfordrende:
  - Uklare kriterier: Hva er patologisk?
  - Vanlige lokalisasjoner må sjekkes!

En må kunne drenasjeveiene!

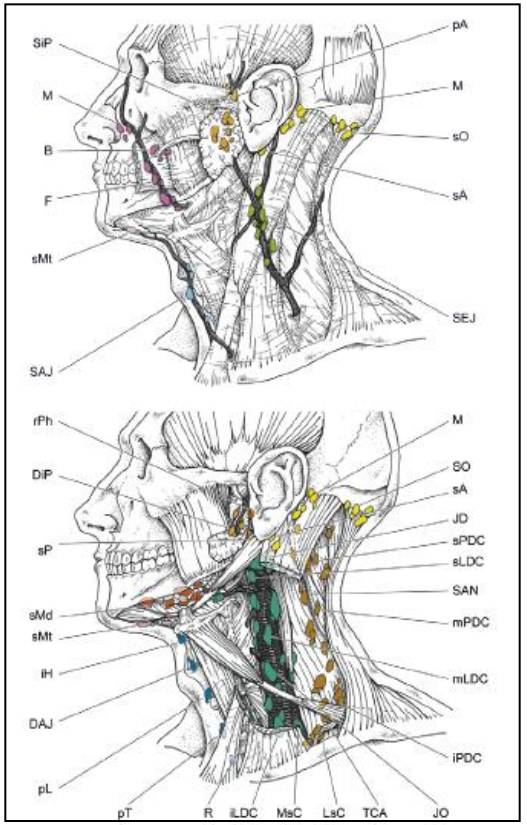
Glandelstasjoner på hals

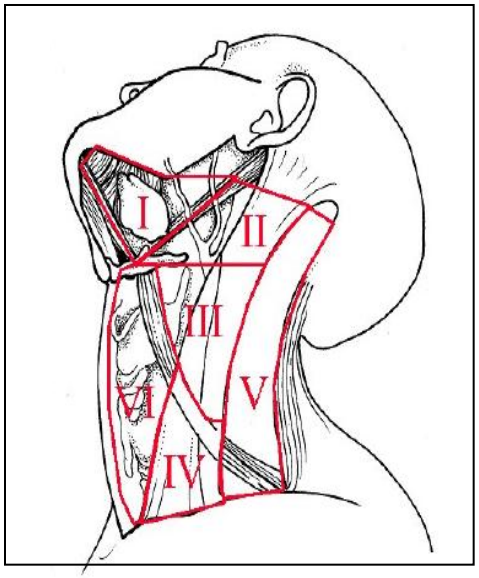
- Halsen har rik lymfatisk nettverk
- ØNH-cancer metastaserer ofte til regionale lymfeknuter, også i tidlige stadier

➢ Behov for felles klassifikasjon av glandelstasjoner på hals

Mest brukt : ***Robbins classification***

➢ 6 level ut fra synlige strukturer, opprinelig kirurgisk





Ia	submental group
Ib	submandibular group
II	upper jugular group
III	middle jugular group
IV	lower jugular group
V	posterior triangle group
VI	anterior compartment group

IV. DEFINITION OF LYMPH NODE GROUPS (FIGURE 1)

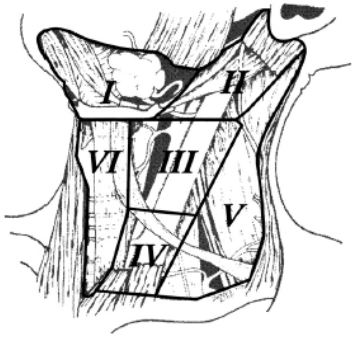
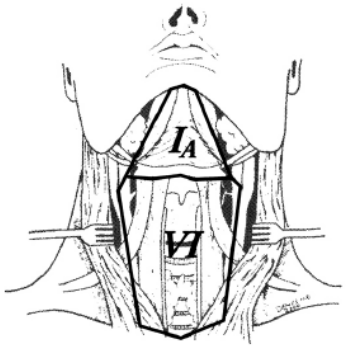


Fig. 1—The level system is used for describing the location of lymph nodes in the neck: Level I, submental and submandibular group; Level II, upper jugular group; Level III, middle jugular group; Level IV, lower jugular group; Level V, posterior triangle group; Level VI, anterior compartment.

Level IA: Submental Group

Lymph nodes within the triangular boundary of the anterior belly of the digastric muscles and the hyoid bone. These nodes are at greatest risk for harboring metastases from cancers arising from the floor of the mouth, anterior oral tongue, anterior mandibular alveolar ridge, and lower lip (Figure 2).

Fig. 2—Dark lines depict the boundaries of the submental (IA) and anterior compartment (VI) lymph nodes.



Level IB: Submandibular Group

Lymph nodes within the boundaries of the anterior and posterior bellies of the digastric muscles, the stylohyoid muscle, and the body of the mandible. Radiographically, the vertical plane at the posterior aspect of the submandibular gland forms a use means of demarcating the posterior aspect of Level IB from IIA.The group includes the pre- and postglandular nodes, and the pre- and postvascular nodes. The submandibular gland is included in the specimen when the lymph nodes within this triangle are removed. These nodes are at greatest risk for harboring metastases from the cancers arising from the oral cavity, anterior nasal cavity, soft tissue structures of the midface, and submandibular gland (Figure 3).

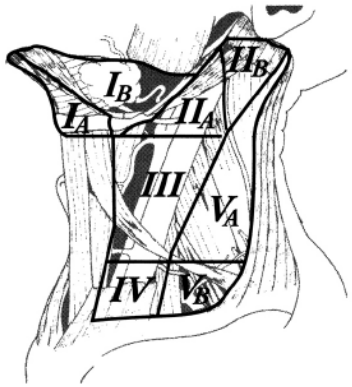


Fig. 3—The boundaries dividing levels I, II, and V into sublevels A and B. See text for details.

Levels IIA & IIB: Upper Jugular Group

Lymph nodes located around the upper third of the internal jugular vein and adjacent spinal accessory nerve extending from the level of the skull base (above) to the level of the inferior border of the hyoid bone (below). The anterior (medial) boundary is the lateral border of the sternohyoid muscle and the stylohyoid muscle (or posterior aspect of the submandibular gland when assessed radiographically), and the posterior (lateral) boundary is the posterior border of the ster-

nocleidomastoid muscle.* Sublevel IIA nodes are located anterior (medial) to the vertical plane defined by the spinal accessory nerve. Sublevel IIB nodes are located posterior (lateral) to the vertical plane defined by the spinal accessory nerve. The upper jugular nodes are at greatest risk for harboring metastases from cancers arising from the oral cavity, nasal cavity, nasopharynx, oropharynx, hypopharynx, larynx, and parotid gland (Figure 3).

Level III: Middle Jugular Group

Lymph nodes located around the middle third of the internal jugular vein extending from the inferior border of the hyoid bone (above) to the inferior border of the cricoid cartilage (below). The anterior (medial) boundary is the lateral border of the sternohyoid muscle, and the posterior (lateral) boundary is the posterior border of the sternocleidomastoid muscle.* (Included in this group is the jugulo-omohyoid node, which lies immediately above the superior belly of the omohyoid muscle as it crosses the internal jugular vein.) These nodes are at greatest risk for harboring metastases from cancers arising from the oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx (Figure 3).

Level IV: Lower Jugular Group

Lymph nodes located around the lower third of the internal jugular vein extending from the inferior border of the cricoid cartilage (above) to the clavicle (below). The anterior (medial) boundary is the lateral border of the sternohyoid muscle, and the posterior (lateral) boundary is the posterior border of the sternocleidomastoid muscle.* These nodes are at greatest risk for harboring metastases from cancers arising from the hypopharynx, cervical esophagus, and larynx (Figure 3).

Levels VA & VB: Posterior Triangle Group

This group is comprised predominantly of the lymph nodes located along the lower half of the spinal accessory nerve and the transverse cervical artery. The supraclavicular nodes are also included in the posterior triangle group. The superior boundary is the apex formed by a convergence of the sternocleidomastoid and the trapezius muscles, the inferior boundary is the clavicle, the anterior (medial) boundary is the posterior border of the sternocleidomastoid muscle,* and the posterior (lateral) boundary is the anterior border of the trapezius muscle. Sublevel VA is separated from Sublevel VB by a horizontal plane marking the inferior border of the arch of the cricoid cartilage. Sublevel VA includes the spinal accessory nodes, and Sublevel VB includes the nodes following the transverse cervical vessels and the supraclavicular nodes. (The Virchow is located in Level IV.) The posterior triangle nodes are at greatest risk for harboring metastases from cancers arising from the nasopharynx and oropharynx (Sublevel VA), and the thyroid gland (Sublevel VB) (Figure 3).

*The surgical landmark that defines the lateral boundary of Levels II, III, and IV and the corresponding medial boundary of the posterior triangle (Level V) is the plane that parallels the sensory branches of the cervical plexus.

Level VI: Anterior (Central) Compartment Group

Lymph nodes in this compartment include the pre- and paratracheal nodes, the precricoid (Delphian) node, and the perithyroidal nodes, including the lymph nodes along the recurrent laryngeal nerves. The superior boundary is the hyoid bone, the inferior boundary is the suprasternal notch, and the lateral boundaries are the common carotid arteries. These nodes are at greatest risk for harboring metastases from cancers arising from the thyroid gland, glottic and subglottic larynx, apex of the piriform sinus, and cervical esophagus (Figure 2).

I 2003: *"Consensus for CT-based neck node classification"*

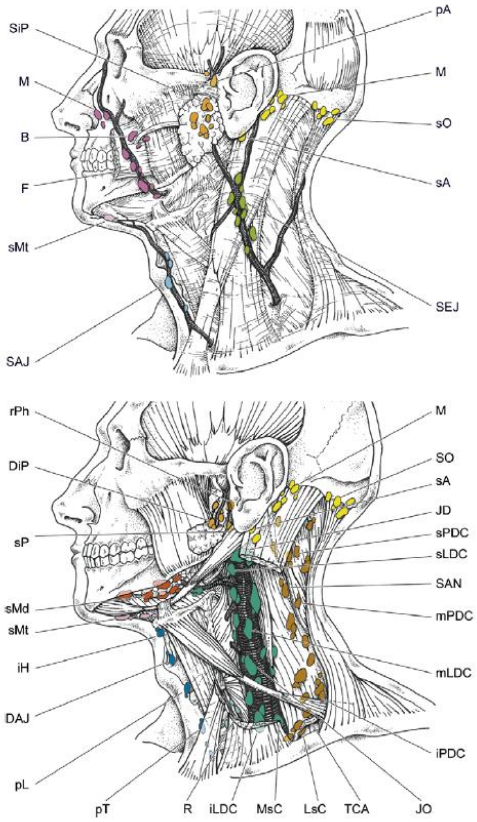
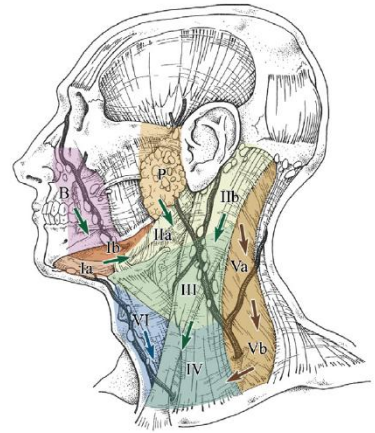
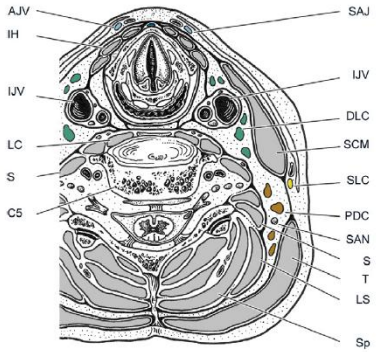


Fig. 2. Lymphatic nodes of the head and neck. Lateral view of the superficial and deep node groups of the cervicocephalic region. Node groups are identified by different colours corresponding to the surgical and radiological classification given in Fig. 3. B, buccal n.; DAJ, deep anterior jugular n.; DiP, deep intraparotid n.; F, facial n.; iH, infrahyoid n.; JD, jugulodigastric n. (Kütner's); JO, jugulo-omohyoid n. (Poirier's); LDC, superior (s), middle (m) and inferior (i) lateral deep cervical n.; LsC, lateral supraclavicular n.; M, malar n.; MsC, medial supraclavicular n.; PDC, superior (s), middle (m) and inferior (i) posterior deep cervical n.; M, mastoid n.; pA, preauricular n.; pL, prelaryngeal n.; pT, pretracheal n.; R, recurrent n.; SAJ, superficial anterior jugular n.; sA, subauricular n.; SEJ, superficial external jugular n.; SiP, superficial intraparotid n.; sMd, submandibular n.; sMt, submental n.; sO, suboccipital n.; sP, subparotid n.; rPh, retropharyngeal n.





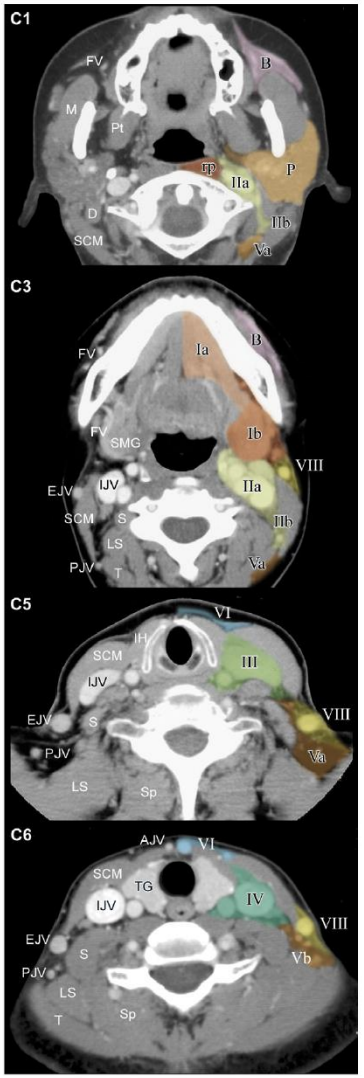


TABLE 1: Site Classification for Lymph Nodes From American Head and Neck Society and American Academy of Otolaryngology-Head and Neck Surgery

Level	Anatomic Name	Key Borders and Landmarks	Primary Drainage Site
I	IA = submental; IB = submandibular	Hyoid bone Posterior margin of submandibular gland IA or IB—anterior belly of digastric muscle	Anterior oral cavity, lip, sinonasal
II	Anterior cervical or upper jugular	Inferior margin of hyoid Posterior margin of submandibular gland Posterior margin of sternocleidomastoid IIA or IIB—posterior margin of internal jugular vein	Oropharynx, posterior oral cavity, supraglottic larynx, parotid gland
III	Middle jugular	Inferior margin of hyoid Inferior margin of cricoid	Glottic, subglottic, and hypopharyngeal regions
IV	Lower jugular	Inferior margin of cricoid Clavicle	Subglottic, thyroid, and cervical esophagus
V	Posterior compartment or spinal accessory	Posterior border of sternocleidomastoid Clavicle VA or VB—inferior margin of cricoid	Nasopharynx; skin carcinomas of the neck or occipital scalp
VI	Visceral or central compartment	Medial margins of carotid arteries Inferior margin of hyoid Superior aspect of manubrium	Subglottic; thyroid and cervical esophagus
VII	Superior mediastinal	Superior aspect of manubrium Innominate vein	Subglottic; thyroid and cervical esophagus
→	Retropharyngeal	Medial margin of internal carotid arteries to the level of hyoid	Nasopharynx, oral cavity, sinonasal, thyroid, and pharyngeal and laryngeal tumors with posterior wall involvement
→	Parotid	Within parotid gland	Skin of scalp, orbit, nasopharynx
→	Supraclavicular fossa[a]	On axial images at or below the clavicle, lateral to the medial edge of the common carotid artery, and medial to clavicle; includes some level IV and V nodes	Any head and neck cancer and cancers of the thorax and abdomen, including lung, breast, esophageal, gastric, pancreatic, gynecologic, and prostate cancers

Note—See Figure 1 for description of levels I–V.

[a]The supraclavicular fossa is better defined on palpation as the Ho triangle, a triangular plane defined by three points: upper sternal end of the clavicle, upper lateral end of the clavicle, and point at which the posterior portion of the neck meets the shoulder. On imaging, the clavicle can be elevated, leading to erroneously high classification of the supraclavicular fossa node.

N-stadie(AJCC 7th ed.)

TABLE 3: Nodal Staging in Nasopharyngeal Carcinoma

N Stage	Criteria	Key Feature That Upstages From Lower Nodal Stage
N0	No regional lymph node metastasis	
N1	Unilateral lymph node(s) ≤ 6 cm in greatest dimension and above supraclavicular fossa[a]	
	Unilateral or bilateral retropharyngeal node(s) measuring ≤ 6 cm in greatest dimension	
N2	Bilateral lymph node(s) ≤ 6 cm in greatest dimension and above supraclavicular fossa	Laterality
N3a	Unilateral or bilateral lymph node(s) measuring > 6 cm in maximal dimension	Size
N3b	Lymph node(s) extending into supraclavicular fossa	Special site: supraclavicular fossa

[a]The supraclavicular fossa is better defined on palpation as the Ho triangle, a triangular plane defined by three points: upper sternal end of the clavicle, upper lateral end of the clavicle, and point at which the posterior portion of the neck meets the shoulder. On imaging, the clavicle can be elevated, leading to erroneously high classification of the supraclavicular fossa node.

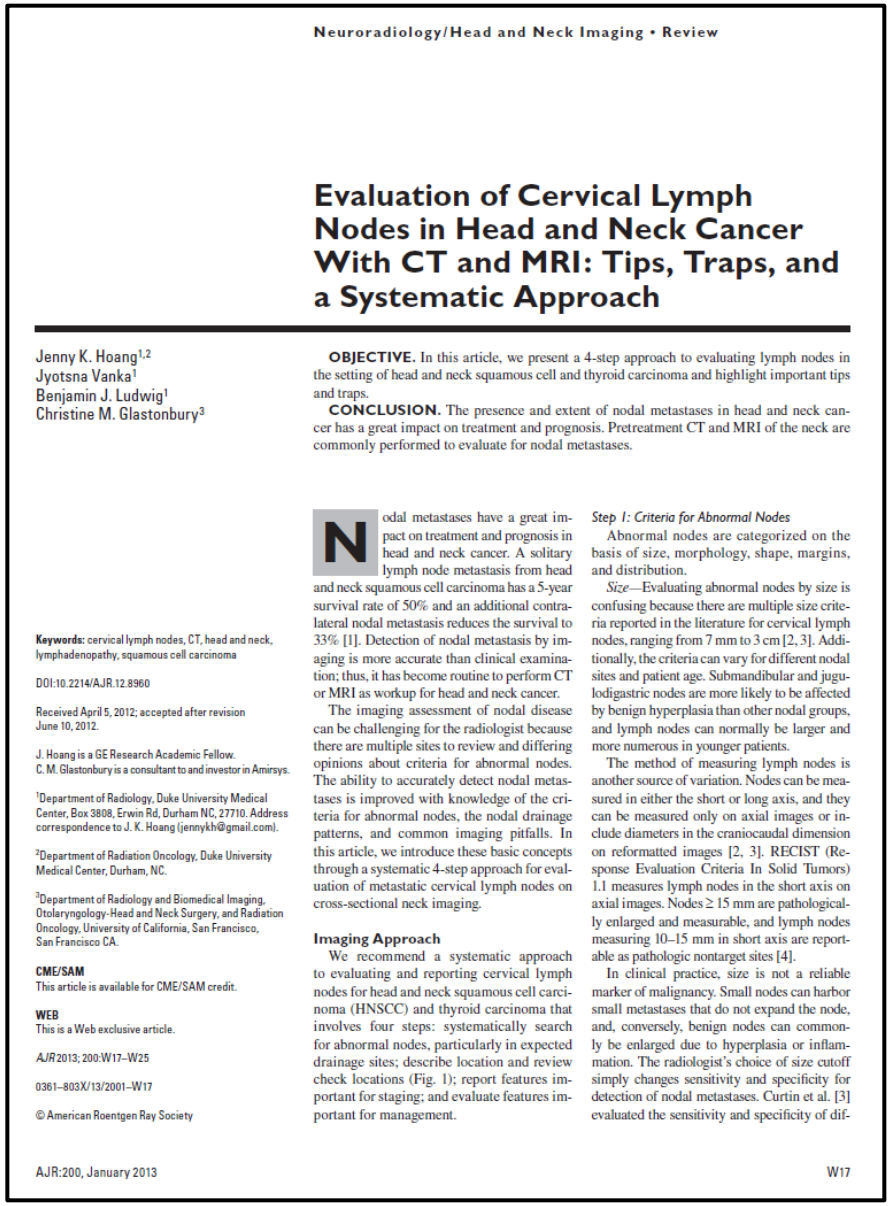
TABLE 2: Nodal Staging in Oropharyngeal, Hypopharyngeal, Laryngeal, Oral Cavity and Sinonasal Carcinoma

N Stage	Criteria	Key Feature That Upstages From Lower Nodal Stage
N0	No regional lymph node metastasis	
N1	Single, ipsilateral lymph node < 3 cm in greatest dimension	
N2a	Single ipsilateral lymph node, 3–6 cm in greatest dimension	Size
N2b	Multiple ipsilateral lymph nodes, ≤ 6 cm in greatest dimension	Number
N2c	Bilateral or contralateral lymph nodes ≤ 6 cm in greatest dimension	Laterality
N3	Lymph node(s) > 6 cm in greatest dimension	Size

Evaluation of Cervical Lymph Nodes

”4 Step Imaging Approach”

- Step 1: ”Criteria for Abnormal Nodes”
  - Størrelse
  - Morfologi
  - Form og begrensning
  - Fordeling
- Step 2
  - Site classification”
  - Check Sites
- Step 3: Features Important for Staging
- Step 4: Features Important for Management



Evaluation of Cervical Lymph Nodes in Head and Neck Cancer With CT and MRI: Tips, Traps, and a Systematic Approach

Jenny K. Hoang[1,2]
Jyotsna Vanka[1]
Benjamin J. Ludwig[1]
Christine M. Glastonbury[3]

OBJECTIVE. In this article, we present a 4-step approach to evaluating lymph nodes in the setting of head and neck squamous cell and thyroid carcinoma and highlight important tips and traps.

CONCLUSION. The presence and extent of nodal metastases in head and neck cancer has a great impact on treatment and prognosis. Pretreatment CT and MRI of the neck are commonly performed to evaluate for nodal metastases.

Keywords: cervical lymph nodes, CT, head and neck, lymphadenopathy, squamous cell carcinoma

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AJR 2013; 200:W17–W25

0361–803X/13/2001–W17

Nodal metastases have a great impact on treatment and prognosis in head and neck cancer. A solitary lymph node metastasis from head and neck squamous cell carcinoma has a 5-year survival rate of 50% and an additional contralateral nodal metastasis reduces the survival to 33% [1]. Detection of nodal metastasis by imaging is more accurate than clinical examination; thus, it has become routine to perform CT or MRI as workup for head and neck cancer.

The imaging assessment of nodal disease can be challenging for the radiologist because there are multiple sites to review and differing opinions about criteria for abnormal nodes. The ability to accurately detect nodal metastases is improved with knowledge of the criteria for abnormal nodes, the nodal drainage patterns, and common imaging pitfalls. In this article, we introduce these basic concepts through a systematic 4-step approach for evaluation of metastatic cervical lymph nodes on cross-sectional neck imaging.

Imaging Approach

We recommend a systematic approach to evaluating and reporting cervical lymph nodes for head and neck squamous cell carcinoma (HNSCC) and thyroid carcinoma that involves four steps: systematically search for abnormal nodes, particularly in expected drainage sites; describe location and review check locations (Fig. 1); report features important for staging; and evaluate features important for management.

Step 1: Criteria for Abnormal Nodes

Abnormal nodes are categorized on the basis of size, morphology, shape, margins, and distribution.

Size—Evaluating abnormal nodes by size is confusing because there are multiple size criteria reported in the literature for cervical lymph nodes, ranging from 7 mm to 3 cm [2, 3]. Additionally, the criteria can vary for different nodal sites and patient age. Submandibular and jugulodigastric nodes are more likely to be affected by benign hyperplasia than other nodal groups, and lymph nodes can normally be larger and more numerous in younger patients.

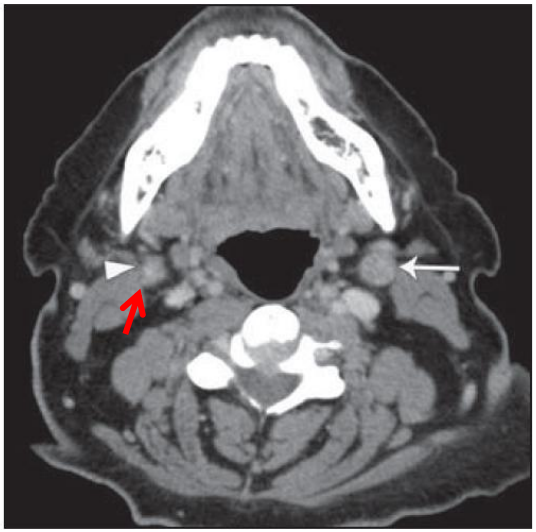
The method of measuring lymph nodes is another source of variation. Nodes can be measured in either the short or long axis, and they can be measured only on axial images or include diameters in the craniocaudal dimension on reformatted images [2, 3]. RECIST (Response Evaluation Criteria In Solid Tumors) 1.1 measures lymph nodes in the short axis on axial images. Nodes ≥ 15 mm are pathologically enlarged and measurable, and lymph nodes measuring 10–15 mm in short axis are reportable as pathologic nontarget sites [4].

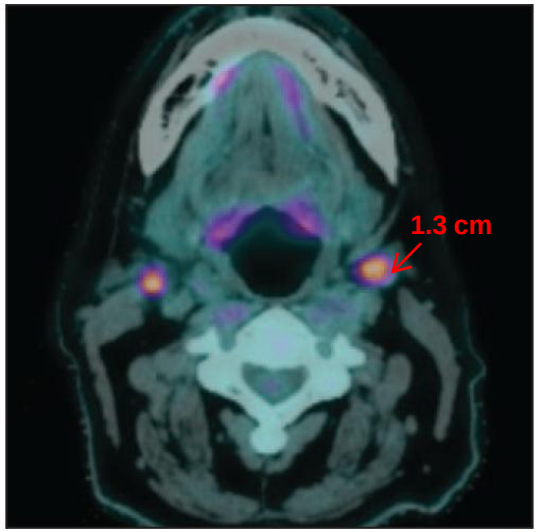
In clinical practice, size is not a reliable marker of malignancy. Small nodes can harbor small metastases that do not expand the node, and, conversely, benign nodes can commonly be enlarged due to hyperplasia or inflammation. The radiologist's choice of size cutoff simply changes sensitivity and specificity for detection of nodal metastases. Curtin et al. [3] evaluated the sensitivity and specificity of dif-

Step 1: Størrelse og morfologi + form og begrensning

- Patologiske lymfeknuter
  - Kortakse-diameter > 10mm (?)
  - PET-positive LK uansett størrelse (?)
  - Nekrotiske lymfeknuter uansett størrelse

Tip—Nodes less than 1 cm in size can still be malignant and should be carefully evaluated for other abnormal features, particularly if in expected drainage sites of the primary tumor (Fig. 2).





A B

Fig. 2—63-year-old man with soft palate squamous cell carcinoma and clinical N0 neck.
A, Axial CT image shows enlarged rounded left level IIA node (*arrow*) measuring 1.3 cm in axial plane. Because midline tumors can drain bilaterally, contralateral neck should be reviewed with attention. There is also small right level IIA node that has rounded shape and irregular margins suggesting extracapsular spread (*arrowhead*). Although it measured only 8 mm in diameter, these features are very concerning.
B, Axial fused PET/CT image shows that both level IIA nodes have increased ^{18}F-FDG uptake. Detecting bilateral nodal disease changed N stage from N1 (single and < 3 cm) to N2c disease. FDG PET is most commonly performed functional imaging modality and has higher sensitivity and specificity for metastatic nodal disease compared with CT and MRI alone.

Men… sentral nekrose eller fetthilus i normal LK?

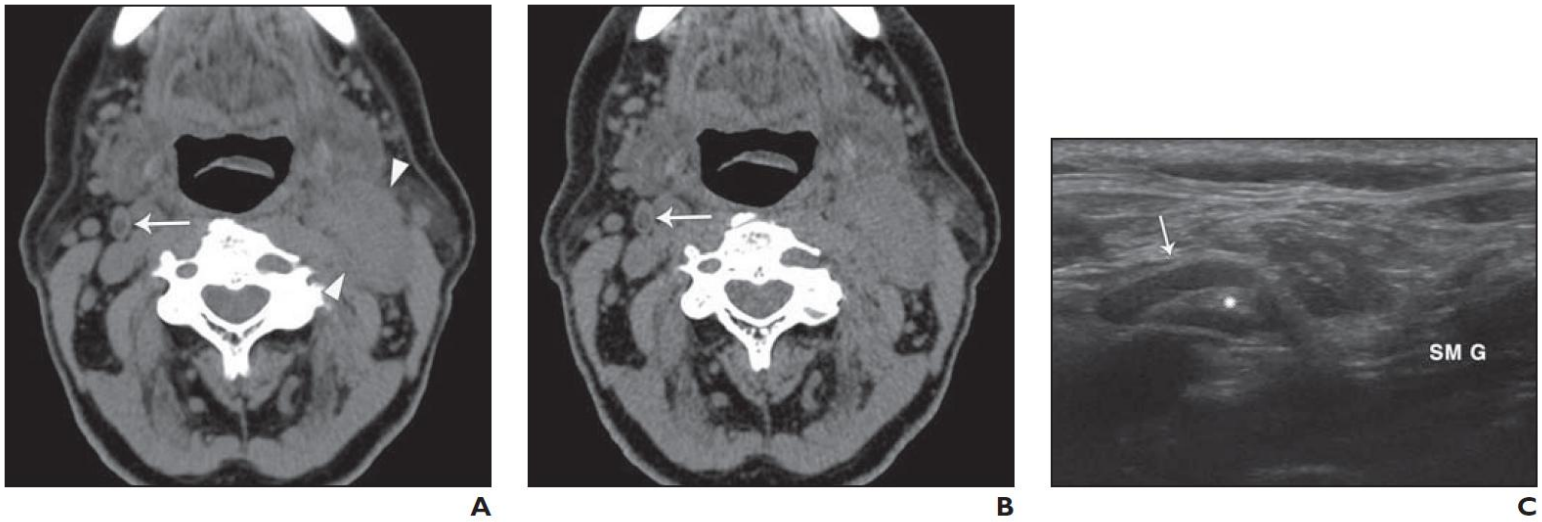
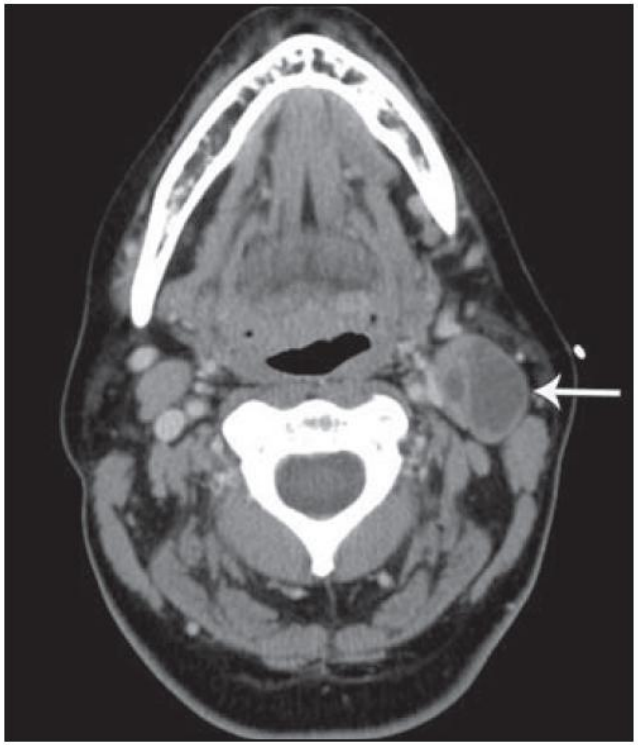


Fig. 3—75-year-old man with invasive squamous cell carcinoma of left tonsil and mimic of necrotic metastasis. CT was performed for nodal staging.
A, Axial unenhanced CT image with slice thickness of 3 mm shows large conglomerate left level IIA nodal mass (*arrowheads*). Prior CT reported subcentimeter necrotic right level IIA node (*arrow*).
B, Axial unenhanced CT image at same level reformatted to 0.6-mm thickness shows that node (*arrow*) is not necrotic but has fatty hilum with central density, representing feeding vessel.
C, Ultrasound image shows normal appearing lymph node (*arrow*) with bean-shape and central echogenic fatty hilum (*asterisk*). Ultrasound is excellent problem-solving tool for equivocal nodes when there might be significant alteration in treatment and allows fine-needle aspiration guidance for these small nodes. SM G = submandibular gland

Tip—In the setting of head and neck cancer, necrotic or cystic change, even in small nodes, is a specific marker of malignancy.

Trap—Partial volume artifact of normal fatty hila may mimic nodal necrosis (Fig. 3).

Kongenital cyste eller nekrotisk LK?

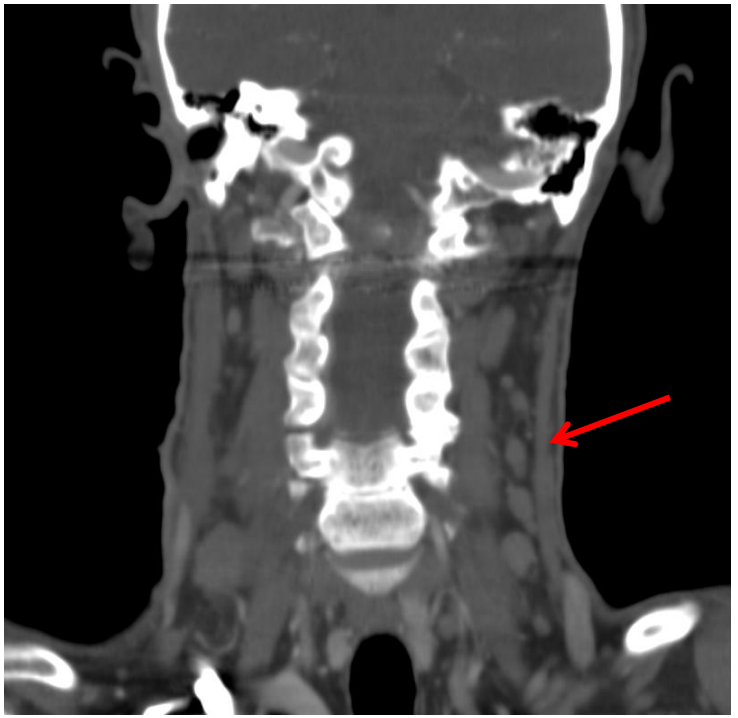


Trap—Do not dismiss cystic neck lesions as congenital cysts in adults. HPV-associated HNSCC and thyroid malignancy may have purely cystic metastases, and both can occur in young adults (Fig. 4).

Trap: Cystic or necrotic nodes can be large with a small or occult primary tumor. In particular, small tumors of the base of tongue and tonsil are frequently not symptomatic and can be overlooked on imaging (Fig. 4).

Step 1: Distribution

- Klar sideasymmetri
- Lymfeglandlet langs en perlekjede
  - ➢ Suspekt!!!



Distribution—Asymmetrically prominent nodes or three or more contiguous and confluent lymph nodes along the drainage chain of a primary tumor should be viewed with a high degree of suspicion [9].

Step 2: ”Site Classification”

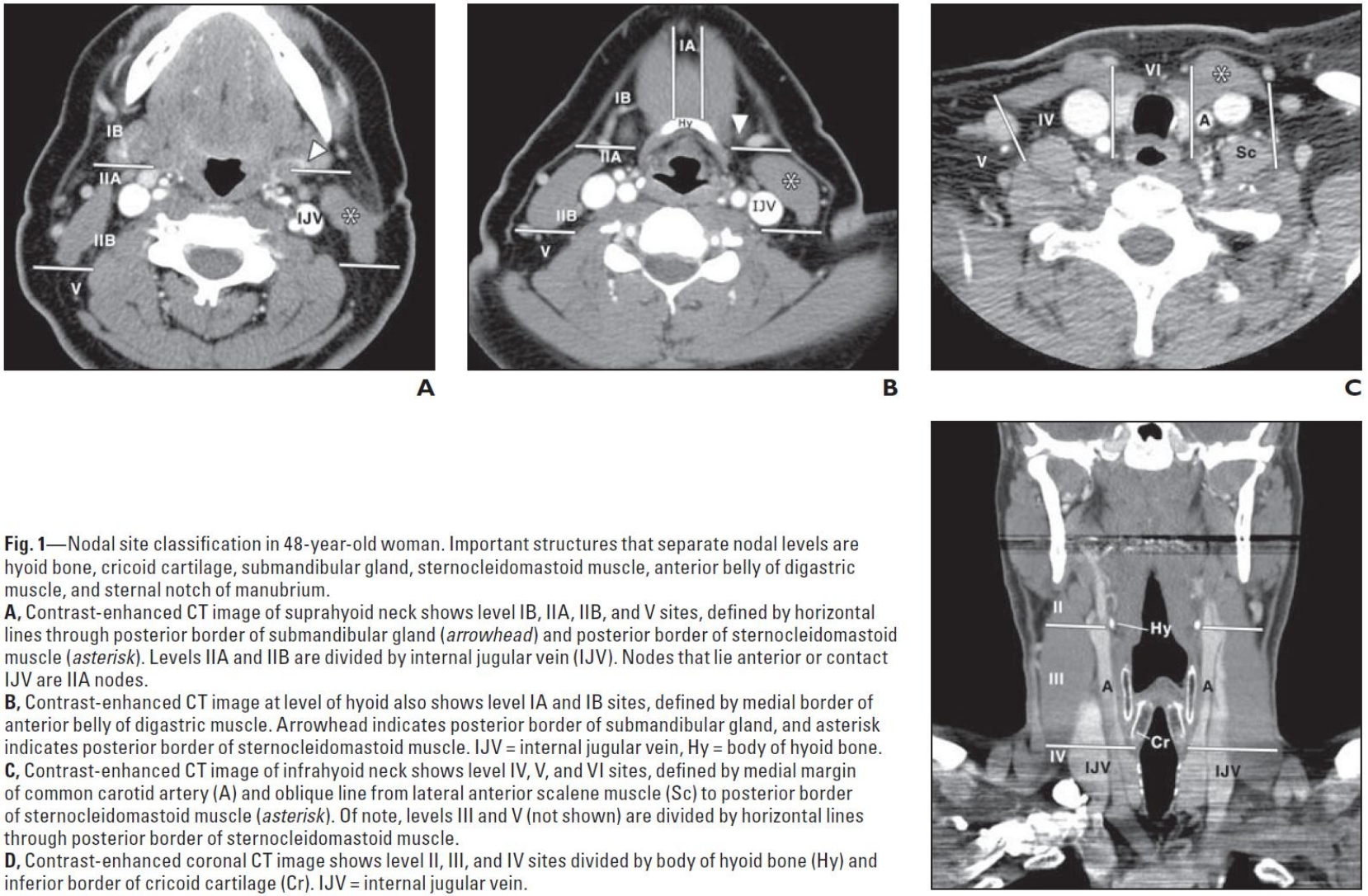
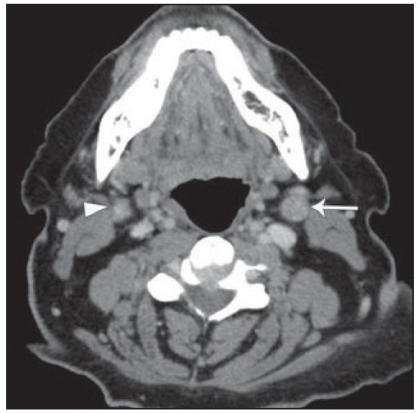
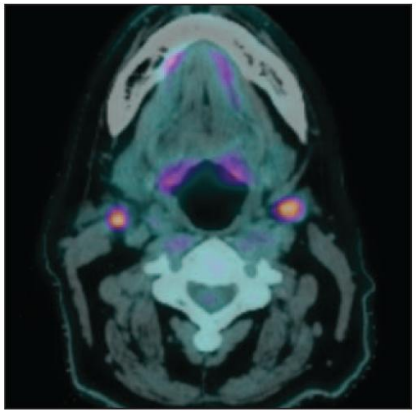


Fig. 1—Nodal site classification in 48-year-old woman. Important structures that separate nodal levels are hyoid bone, cricoid cartilage, submandibular gland, sternocleidomastoid muscle, anterior belly of digastric muscle, and sternal notch of manubrium.
A, Contrast-enhanced CT image of suprahyoid neck shows level IB, IIA, IIB, and V sites, defined by horizontal lines through posterior border of submandibular gland (*arrowhead*) and posterior border of sternocleidomastoid muscle (*asterisk*). Levels IIA and IIB are divided by internal jugular vein (IJV). Nodes that lie anterior or contact IJV are IIA nodes.
B, Contrast-enhanced CT image at level of hyoid also shows level IA and IB sites, defined by medial border of anterior belly of digastric muscle. Arrowhead indicates posterior border of submandibular gland, and asterisk indicates posterior border of sternocleidomastoid muscle. IJV = internal jugular vein, Hy = body of hyoid bone.
C, Contrast-enhanced CT image of infrahyoid neck shows level IV, V, and VI sites, defined by medial margin of common carotid artery (A) and oblique line from lateral anterior scalene muscle (Sc) to posterior border of sternocleidomastoid muscle (*asterisk*). Of note, levels III and V (not shown) are divided by horizontal lines through posterior border of sternocleidomastoid muscle.
D, Contrast-enhanced coronal CT image shows level II, III, and IV sites divided by body of hyoid bone (Hy) and inferior border of cricoid cartilage (Cr). IJV = internal jugular vein.

Step 2: ”Check Sites”



A



B

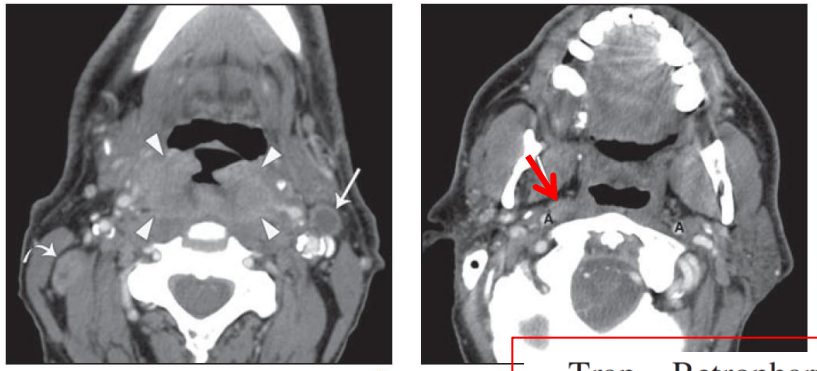
Fig. 2—63-year-old man with soft palate squamous cell carcinoma and clinical N0 neck.
A, Axial CT image shows enlarged rounded left level IIA node (*arrow*) measuring 1.3 cm in axial plane. Because midline tumors can drain bilaterally, contralateral neck should be reviewed with attention. There is also small right level IIA node that has rounded shape and irregular margins suggesting extracapsular spread (*arrowhead*). Although it measured only 8 mm in diameter, these features are very concerning.
B, Axial fused PET/CT image shows that both level IIA nodes have increased ^{18}F-FDG uptake. Detecting bilateral nodal disease changed N stage from N1 (single and < 3 cm) to N2c disease. FDG PET is most commonly performed functional imaging modality and has higher sensitivity and specificity for metastatic nodal disease compared with CT and MRI alone.

Tip—Midline tumors, nasopharyngeal carcinoma (NPC), and epiglottic and oral cavity tumors frequently drain bilaterally (Fig. 2).

Tip—If a lower level neck node is abnormal, a higher level should be carefully evaluated.

Step 2: ”Check Sites”

Fig. 8—58-year-old man with squamous cell carcinoma (SCC) of posterior wall of hypopharynx and oropharynx with subtle retropharyngeal nodal metastasis. He presented with progressive weight loss and difficulty swallowing.
A, Axial contrast-enhanced CT image shows irregularly enhancing mass along posterior wall of oropharynx (*arrowheads*). Tumor also extends to posterior wall of hypopharynx. There is cystic left level IIA node (*straight arrow*) and necrotic right level IIB node (*curved arrow*).
B, Axial contrast-enhanced CT image shows small right retropharyngeal node (*arrow*). Note location medial to internal carotid artery (A). SCC of pharynx is more likely to metastasize to retropharyngeal nodes when there is posterior pharyngeal wall involvement.



Trap—Retropharyngeal and parotid nodes may be overlooked when they drain primary tumors that are remote in location. Thyroid and nasopharyngeal cancers can drain to the retropharyngeal nodes and NPC can drain to the parotid (Figs. 8 and 9 and Table 1).

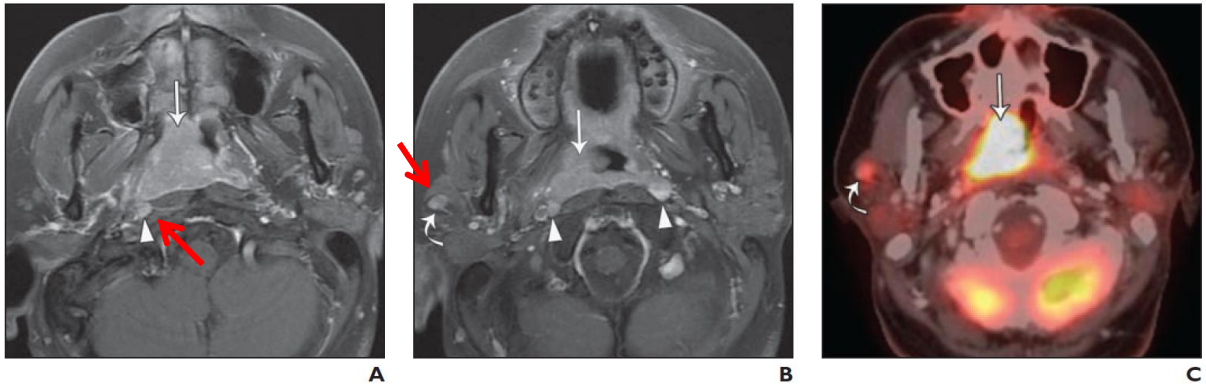


Fig. 9—22-year-old man who presented with nasopharyngeal mass determined to be nasopharyngeal carcinoma.
A and **B,** Axial contrast-enhanced T1-weighted MR images show enhancing right nasopharyngeal mass (*straight arrows*). Enlarged retropharyngeal nodes were evident and proved to be ^{18}F-FDG avid (*arrowheads*). Note rounded right parotid lymph node (*curved arrow,* **B**) without fatty hilum. This parotid node is suspicious because it is potential drainage site for nasopharyngeal carcinoma.
C, Fused axial PET/CT image shows avid uptake in primary tumor (*straight arrow*) as well as in right parotid node (standardized uptake value = 4) (*curved arrow*). Parotid glands are also important potential drainage site for skin neoplasms, including external auditory canal, nasopharynx, and orbit.

Step 2: ”Check Sites”

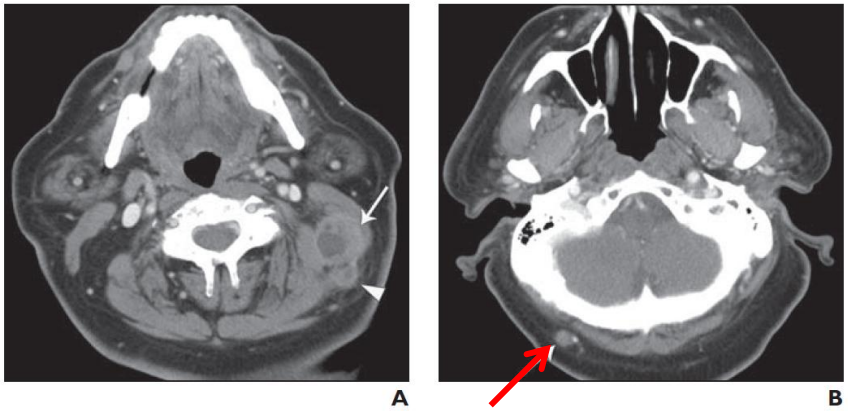


Fig. 7—73-year-old man with skin squamous cell carcinoma of scalp vertex with extracapsular spread of nodal metastases. CT was performed for nodal staging. **A,** Axial contrast-enhanced CT image shows enlarged left level IIB (*arrow*) and V (*arrowhead*) nodes that have focal necrosis as well as irregular margins and fat stranding, suggestive of extracapsular spread. Extracapsular spread was confirmed pathologically after neck dissection.
B, Axial contrast-enhanced CT image shows right occipital node (*arrow*) that also proved to be nodal metastasis. Scalp primary tumors have high tendency for bilateral drainage to occipital, intraparotid and facial nodes as well as level V. Although this occipital node was < 1 cm, it is large for this location and is expected drainage site.

Trap—Skin cancer metastasizes to level V and superficial nodes, such as parotid, posterior auricular, facial, and occipital nodes (Figs. 7 and 10).

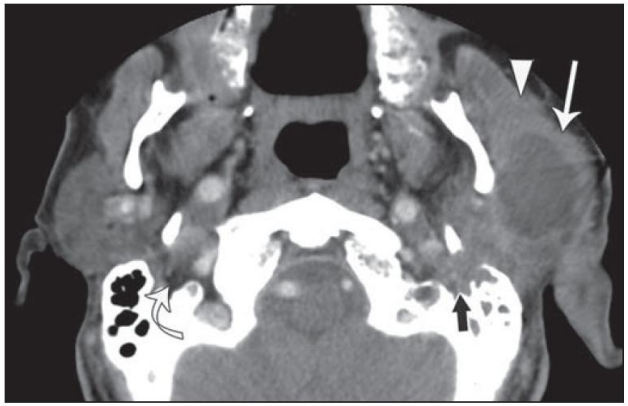


Fig. 10—68-year-old man with perineural and bone invasion from parotid node metastasis. Patient had history of skin squamous cell carcinoma (SCC) of left cheek and presented with left preauricular swelling. Axial contrast-enhanced CT image shows large necrotic left intraparotid lymph node (*straight white arrow*). There is loss of fat plane delineation from masseter muscle suggesting extracapsular spread and muscle invasion (*arrowhead*). There is also soft-tissue density at stylomastoid foramen with associated osseous erosion (*black arrow*). This is highly suggestive of perineural tumor spread from nodal metastasis along facial nerve. Contralateral stylomastoid foramen contains normal fat (*curved arrow*). Biopsy confirmed SCC metastasis within left parotid gland.

Step 3: Features Important for Staging

Tip—Look for small metastases that will upstage the N stage. If there is a single node, look for another node. If there is ipsilateral disease, evaluate contralateral nodes (Fig. 2).

Tip—If there are no clearly abnormal nodes, carefully reexamine the expected first-order draining nodes before reporting N0 disease.

TABLE 3: Nodal Staging in Nasopharyngeal Carcinoma

N Stage	Criteria	Key Feature That Upstages From Lower Nodal Stage
N0	No regional lymph node metastasis	
N1	Unilateral lymph node(s) ≤ 6 cm in greatest dimension and above supraclavicular fossa[a]	
	Unilateral or bilateral retropharyngeal node(s) measuring ≤ 6 cm in greatest dimension	
N2	Bilateral lymph node(s) ≤ 6 cm in greatest dimension and above supraclavicular fossa	Laterality
N3a	Unilateral or bilateral lymph node(s) measuring > 6 cm in maximal dimension	Size
N3b	Lymph node(s) extending into supraclavicular fossa	Special site: supraclavicular fossa

[a]The supraclavicular fossa is better defined on palpation as the Ho triangle, a triangular plane defined by three points: upper sternal end of the clavicle, upper lateral end of the clavicle, and point at which the posterior portion of the neck meets the shoulder. On imaging, the clavicle can be elevated, leading to erroneously high classification of the supraclavicular fossa node.

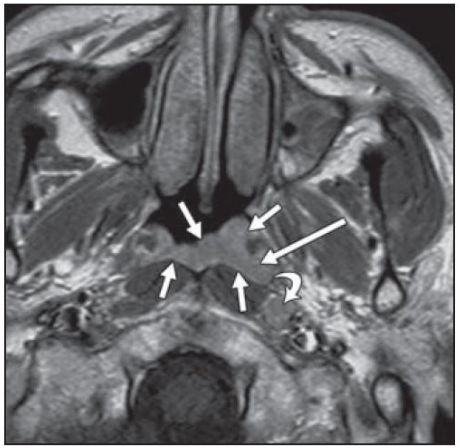


Fig. 1—49-year-old woman with nasopharyngeal carcinoma (NPC) localized to nasopharynx (T1). Axial contrast-enhanced T1-weighted image shows small NPC (*short arrows*) centered in left Rosenmüller fossa (*long arrow*), which is the most common site for this cancer, and involving posterior wall. Tumor is confined to nasopharynx, and there is small metastatic left retropharyngeal node (*curved arrow*).

Step 4: ”Features Important for Management”

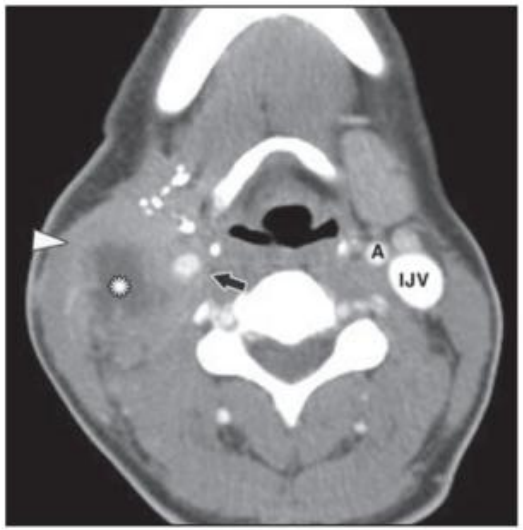


Fig. 11—48-year-old woman with vascular invasion from squamous cell carcinoma (SCC) nodal metastasis. Patient was initially treated for right tongue SCC with partial glossectomy and right level I–III neck dissection. All nodes were negative on pathology. Five months after surgery, patient presented with right neck mass that was positive for SCC at biopsy. Axial contrast-enhanced CT image shows right level IIA node with necrosis (*asterisk*), extracapsular spread, and encasement of common carotid artery of 360° (*arrow*). There is also invasion of adjacent sternocleidomastoid muscle (*arrowhead*). A = common carotid artery, IJV = internal jugular vein.

Ekstrakapsulær vekst

Imaging findings of extracapsular spread are irregular margins, fat stranding, and loss of fat planes with adjacent structures. Extracapsular spread is more likely in larger nodes. It is present in the majority of squamous cell carcinoma nodes > 3 cm, but 25% of nodes measuring < 1 cm may still have pathologic extracapsular spread [16] (Fig. 7).

Trap—Biopsied or infected lymph nodes may mimic extracapsular spread.

Stadieinndeling

National Comprehensive Cancer Network®

NCCN Guidelines™ Version 2.2011 Staging
Head and Neck Cancers

NCCN Guidelines Index
Head and Neck Table of Contents
Discussion

Table 2 - Continued
American Joint Committee on Cancer (AJCC)
TNM Staging System for the Pharynx (7th ed., 2010)
(Nonepithelial tumors such as those of lymphoid tissue, soft tissue, bone, and cartilage are not included)

Anatomic Stage/Prognostic Groups: Nasopharynx

Stage 0	Tis	N0	M0
Stage I	T1	N0	M0
Stage II	T1	N1	M0
	T2	N0	M0
	T2	N1	M0
Stage III	T1	N2	M0
	T2	N2	M0
	T3	N0	M0
	T3	N1	M0
	T3	N2	M0
Stage IVA	T4	N0	M0
	T4	N1	M0
	T4	N2	M0
Stage IVB	Any T	N3	M0
Stage IVC	Any T	Any N	M1

Histologic Grade (G)
GX Grade cannot be assessed
G1 Well differentiated
G2 Moderately differentiated
G3 Poorly differentiated
G4 Undifferentiated

Anatomic Stage/Prognostic Groups: Oropharynx, Hypopharynx

Table 1. TNM categories for squamous cell head and neck cancer (TNM seventh edition 2009)

Stage I	T1	N0	M0
Stage II	T2	N0	M0
Stage III	T3	N0	M0
	T1, T2, T3	N1	M0
Stage IVA	T1, T2, T3	N2	M0
	T4a	N0, N1, N2	M0
Stage IVB	Tb	Any N	M0
	Any T	N3	M0
Stage IVC	Any T	Any N	M1

- Stadium avgjørende for prognose (og behandlingsopplegg)

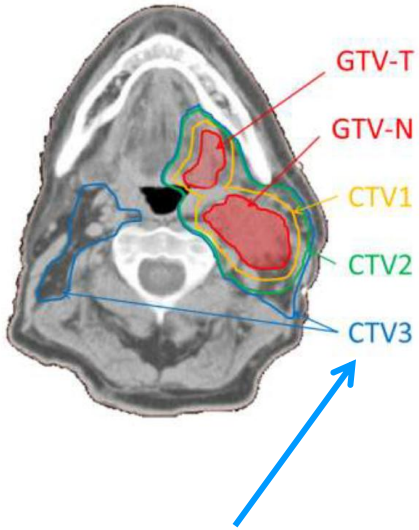
DAHANCA 2013

Retningslinjer for strålebehandling i DAHANCA - 2013

Retningslinjer
for strålebehandling
i DAHANCA

2013

DAHANCA



Følgende overordnede principper anvendes i DAHANCA:

GTV: Makroskopisk tumor i T og N position vurderet ud fra klinisk undersøgelse og billeddiagnostiske procedurer. Hvis tumor ikke er synlig på CT-terapi-skanning indtegnes det involverede område ud fra den tilgængelige information, inklusiv klinisk undersøgelse, MR og PET skanning.

CTV1: Omfatter primærtumor (GTV-T) og makroskopisk involverede lymfeknuder (GTV-N) med en koncentrisk margin, der som udgangspunkt er 5 mm i alle retninger, dog større hvis primærtumor er dårlig defineret, og mindre hvis den adderede margin går ud i fri luft, eller hvis margin overskrider naturlige barrierer som f.eks. knoglevæv. Såfremt der ikke er knogleindvækst skal knoglevæv altså ikke inkluderes.

CTE-E inntegnes på bakgrunn av atlas

Se dahanca.dk

Klinisk N0-hals…..

ELSEVIER

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CT-based delineation of lymph node levels and related CTVs in the node-negative neck: DAHANCA, EORTC, GORTEC, NCIC, RTOG consensus guidelines

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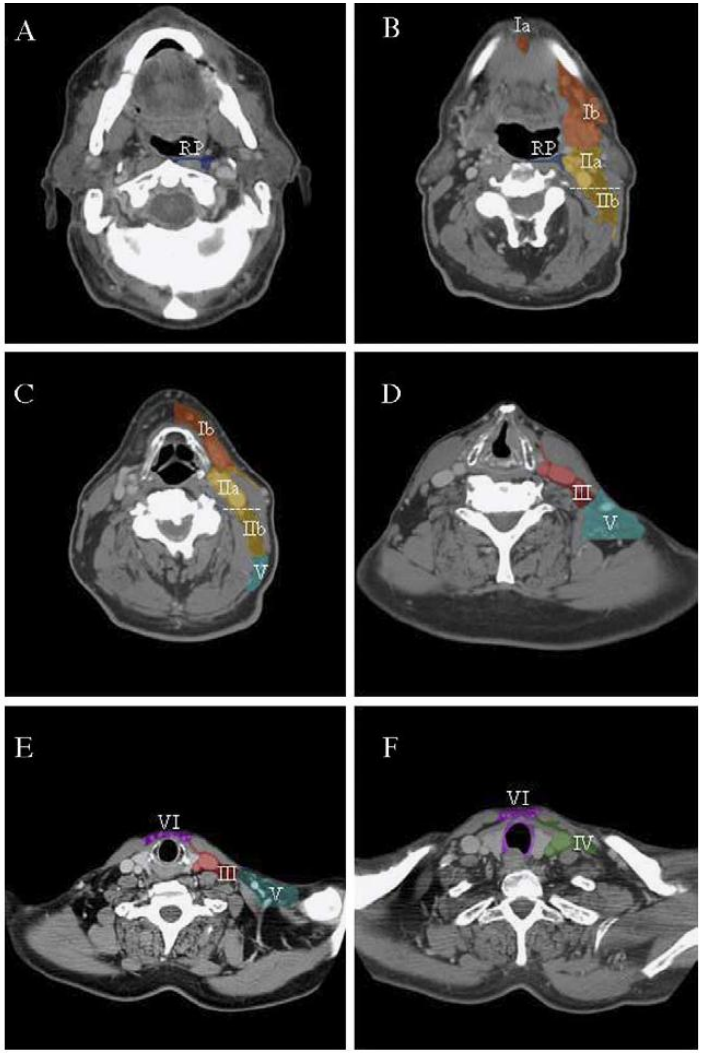


Fig. 2. CT imaging of a patient with a T1N0M0 glottic SCC (see tumor in panel D). The examination was performed on a dual-detector spiral CT (Elscint Twin, Haifa, Israel) using a slice thickness of 2.7 mm, an interval reconstruction of 2 mm and a pitch of 0.7.Contrast medium was injected intravenously at a rate of 2 ml/s with a total amount of 100 ml. Sections were taken at the level of the bottom edge of C1 (panel A), the upper edge of C3 (panel B), mid C4 (panel C), the bottom edge of C6 (panel D), the bottom edge of C7 (panel E), and mid D1 (panel F). Neck node levels were drawn on each CT slice using the radiological boundaries detailed in Table 1. Each node level corresponds to the CTV, and thus does not include any security margin for organ motion or set-up inaccuracy.

Table 1
Consensus guidelines for the radiological boundaries of the neck node levels

Level	Anatomical boundaries					
	Cranial	Caudal	Anterior	Posterior	Lateral	Medial
Ia	Geniohyoid m., plane tangent to basilar edge of mandible	Plane tangent to body of hyoid bone	Symphysis menti, platysma m.	Body of hyoid bone	Medial edge of ant. belly of digastric m.	n.a.[a]
Ib	Mylohyoid m., cranial edge of submandibular gland	Plane through central part of hyoid bone	Symphysis menti, platysma m.	Posterior edge of submandibular gland	Basilar edge/innerside of mandible, platysma m., skin	Lateral edge of ant. belly of digastric m.
IIa	Caudal edge of lateral process of C1	Caudal edge of the body of hyoid bone	Post. edge of sub-mandibular gland; ant. edge of int. carotid artery; post. edge of post. belly of digastric m.	Post. border of int. jugular vein	Medial edge of sternocleidomastoid	Medial edge of int. carotid artery, paraspinal (levator scapulae) m.
IIb	Caudal edge of lateral process of C1	Caudal edge of the body of hyoid bone	Post. border of int. jugular vein	Post. border of the sternocleidomastoid m.	Medial edge of sternocleidomastoid	Medial edge of int. carotid artery, paraspinal (levator scapulae) m.
III	Caudal edge of the body of hyoid bone	Caudal edge of cricoid cartilage	Postero-lateral edge of the sternohyoid m.; ant. edge of sternocleidomastoid m.	Post. edge of the sternocleidomastoid m.	Medial edge of sternocleidomastoid	Int. edge of carotid artery, paraspinal (scalenius) m.
IV	Caudal edge of cricoid cartilage	2 cm cranial to sternoclavicular joint	Anteromedial edge of sternocleido-mastoid m	Post. edge of the sternocleidomastoid m.	Medial edge of sternocleidomastoid	Medial edge of internal carotid artery, paraspinal (scalenius) m.
V	Cranial edge of body of hyoid bone	CT slice encompassing the transverse cervical vessels[b]	Post. edge of the sternocleidomastoid m.	Ant-lateral border of the trapezius m.	Platysma m., skin	Paraspinal (levator scapulae, splenius capitis) m.
VI	Caudal edge of body of thyroid cartilage[c]	Sternal manubrium	Skin; platysma m.	Separation between trachea and esophagus[d]	Medial edges of thyroid gland, skin and ant.-medial edge of sternocleidomastoid m.	n.a.
Retro-pharyngeal	Base of skull	Cranial edge of the body of hyoid bone	Fascia under the pharyngeal mucosa	Prevertebral m. (longus colli, longus capitis)	Medial edge of the internal carotid artery	Midline

[a] Midline structure lying between the medial borders of the anterior bellies of the digastric muscles.
[b] For NPC, the reader is referred to the original description of the UICC/AJCC 1997 edition of the Ho's triangle. In essence, the fatty planes below and around the clavicle down to the trapezius muscle.
[c] For paratracheal and recurrent nodes, the cranial border is the caudal edge of the cricoid cartilage.
[d] For pretracheal nodes, trachea and anterior edge of cricoid cartilage.

Hvilke regioner skal inkluderes?

- Hvilke regioner som skal ha elektiv bestråling er avhengig av sykdomslokalisasjon
  - ➢ Se DAHANCA sine retningslinjer

Fra DAHANCA 2013: Eksempel Orofarynxcancer

Elektive lymfeknuderegioner er

- N0: Bilateral level II, III samt laterale retropharyngeale lymfeknuder ved tumor i pharynx bagvæg. Level 1b ved indvækst i cavum oris.
- N1-3: Bilateral level II, III, IV og lymfeknudeområder mindst 2 cm kranielt og kaudalt for GTV-N. Ved indvækst af patologiske lymfeknuder i muskel inkluderes på samme vis hele musklen mindst 2 cm over og under GTV-N. Laterale retropharyngeale lymfeknuder ved tumor i svælgets bagvæg. Level 1b ved indvækst i cavum oris.

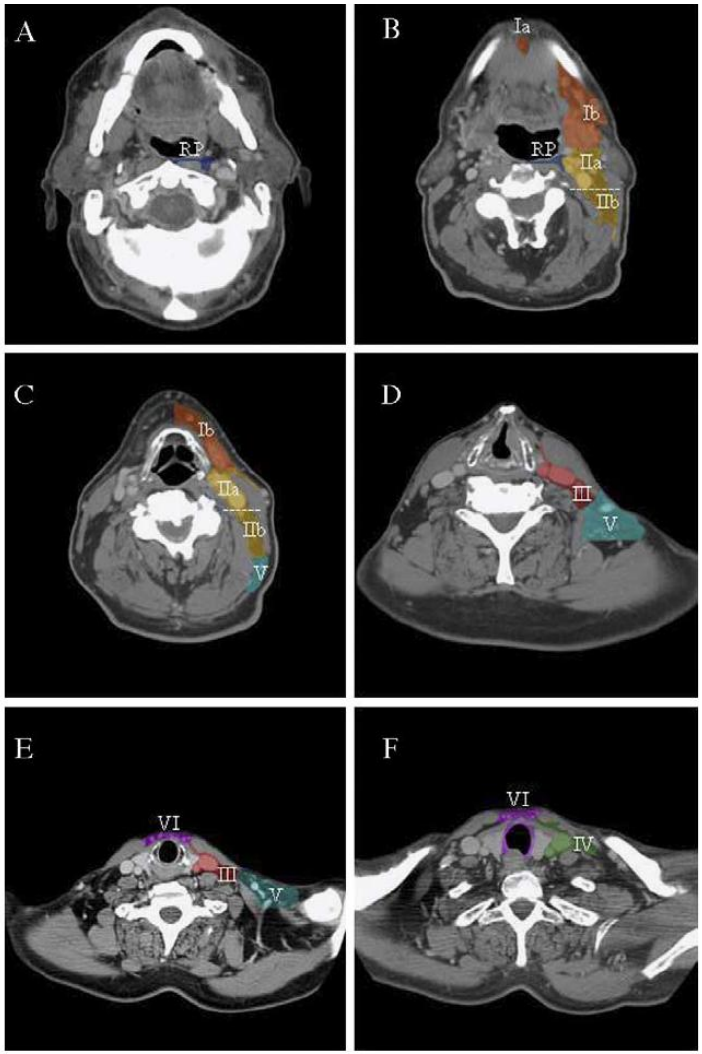
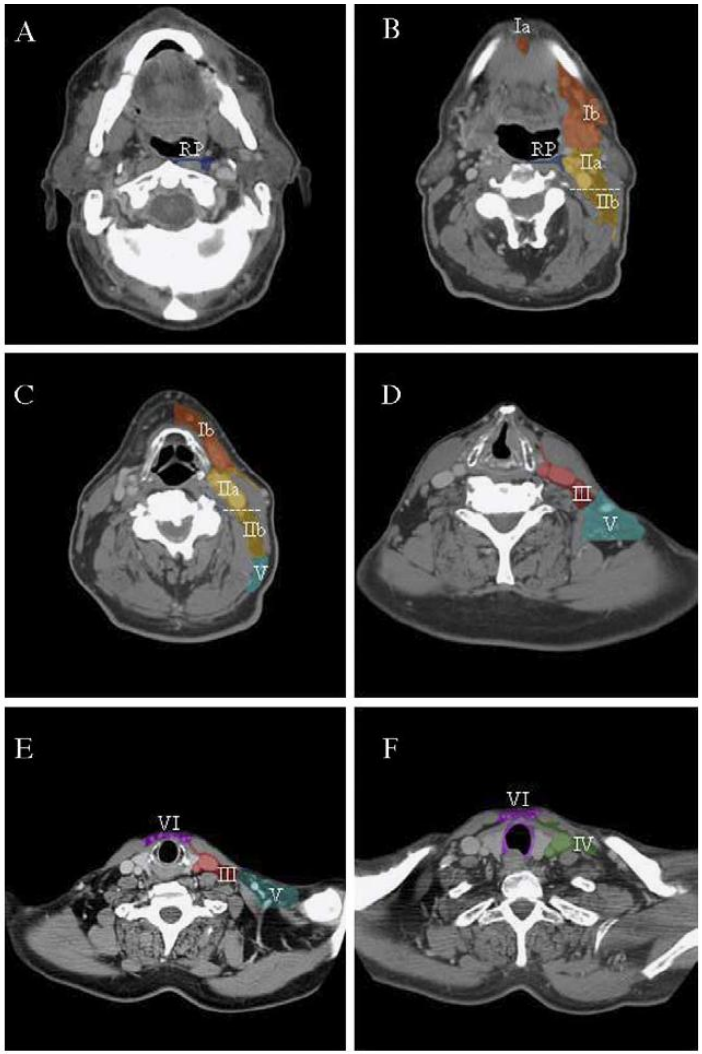


Fig. 2. CT imaging of a patient with a T1N0M0 glottic SCC (see tumor in panel D). The examination was performed on a dual-detector spiral CT (Elscint Twin, Haifa, Israel) using a slice thickness of 2.7 mm, an interval reconstruction of 2 mm and a pitch of 0.7.Contrast medium was injected intravenously at a rate of 2 ml/s with a total amount of 100 ml. Sections were taken at the level of the bottom edge of C1 (panel A), the upper edge of C3 (panel B), mid C4 (panel C), the bottom edge of C6 (panel D), the bottom edge of C7 (panel E), and mid D1 (panel F). Neck node levels were drawn on each CT slice using the radiological boundaries detailed in Table 1. Each node level corresponds to the CTV, and thus does not include any security margin for organ motion or set-up inaccuracy.



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OBS!!

- Gjelder primært N_0-sykdom
- Gjelder ikke N2 og N3-sykdom !!!

Utvidelse 2006: N+-sykdom

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Target volume delineation

Proposal for the delineation of the nodal CTV in the node-positive and the post-operative neck

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Abstract

Background and purpose: In 2003, a panel of experts published a set of consensus guidelines regarding the delineation of the neck node levels (Radiother Oncol, 2003; 69: 227-36). These recommendations were applicable for the node-negative and the N1-neck, but were found too restrictive for the node-positive and the post-operative neck.

Patients and methods: In this framework, using the previous recommendations as a backbone, new guidelines have been proposed taking into account the specificities of the node-positive and the post-operative neck.

Results: Inclusion of the retrostyloid space cranially and the supra-clavicular fossa caudally is proposed in case of neck nodes (defined radiologically or on the surgical specimen) located in levels II, and IV or Vb, respectively. When extra-capsular rupture is suspected (on imaging) or demonstrated on the pathological specimen, adjacent muscles should also be included in the CTV. For node(s) located at the boundary between contiguous levels (e.g. levels II and Ib), these two levels should be delineated. In the post-operative setting, the entire 'surgical bed' should be included. Last, the retropharyngeal space should be delineated in case of positive neck from pharyngeal tumors.

Conclusions: The objective of the manuscript is to give a comprehensive description of the new set of guidelines for CTV delineation in the node-positive neck and the post-operative neck, with a complementary atlas of the new anatomical structures to be included.

Keywords: Radiotherapy; Head neck; Node levels; Guidelines; CTV

Elektiv halsfelt (CTV-E) ved N+-sykdom

- Hva er nytt?
  - Perinodal vekst
  - Muskelinfiltrasjon
  - Inklusjon av nærmeste lymfeknutestasjon
  - Nye regioner

Lymfeknute med perinodal vekst (ECE)

Fig. 3. Axial CT slice at mid level II of a patient with a T2N3M0 SCC of the right base of tongue treated by concomitant chemo-radiation. The right level II necrotic lymph node (solid line) showed typical features of extra-capsular spread with likely infiltration of the sterno-cleido-mastoid muscle. The CTV included the ipsilateral levels Ib–V. Due to the likely infiltration of the SCM muscle, the CTV was enlarged to included this muscle at the entire level II (dashed line).

- Muskelfascier er vanligvis solide barrierer mot muskelinfiltrasjon, men når denne er brutt er hele muskelen ”at risk”

Inkluder neste nivå ved manifest LK-metastase

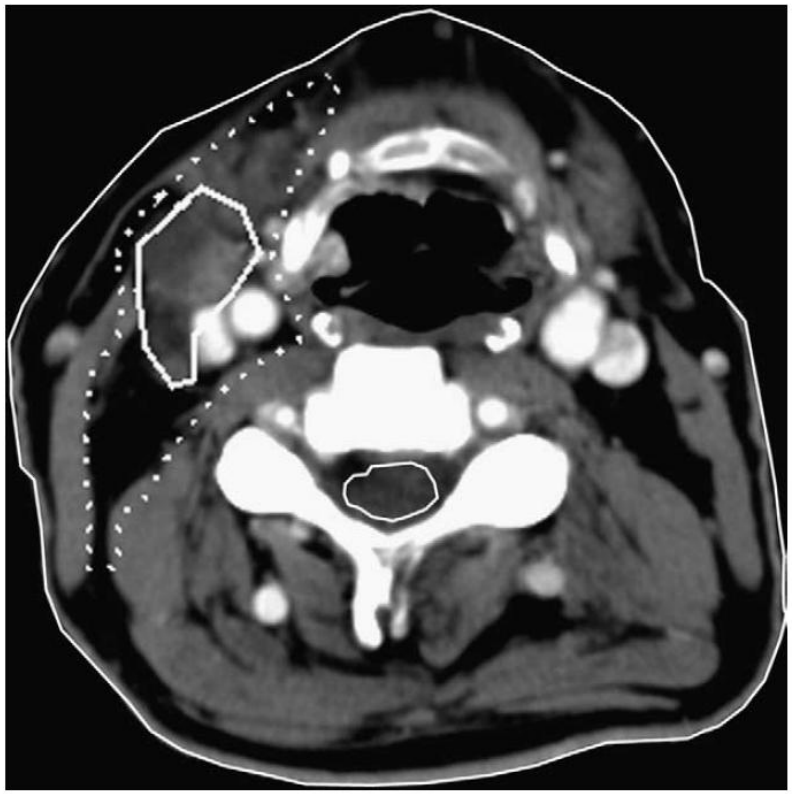

Fig. 4. Axial CT slice at the caudal edge of the sub-mandibular gland of a patient with a T2N1M0 SCC of the right base of tongue. Although only node levels II–IV were selected on the ipsilateral neck, the level Ib was also included in the CTV (dashed line) due to the close proximity of the node (solid line) to the sub-mandibular gland.

- Neste nivå kaudalt?
- Eller er det også risiko for retrograd spredning?

➢ I følge Gregoire både kranialt og kaudalt pga endret / retrograd lymfedrenasje ved LK-affeksjon

Nye regioner….

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
Supraclavicular fossa	Lower border of level IV/Vb	Sterno-clavicular joint	SCM m.; skin; clavicle	Anterior edge of posterior scalenus m.	Lateral edge of posterior scalenus m.	Thyroid gland/ trachea

SCM, sterno-cleido-mastoid; RP, retropharyngeal.

Retrostyloid space

- Affeksjon
  - via retrograd lymfedrenasje fra regio II-lymdeknuter
  - direkte infiltrasjon fra retrofaryngeal lymfeknute
- Anses som ”high-risk region” selv om NPC ikke er kjent til å drenere dit

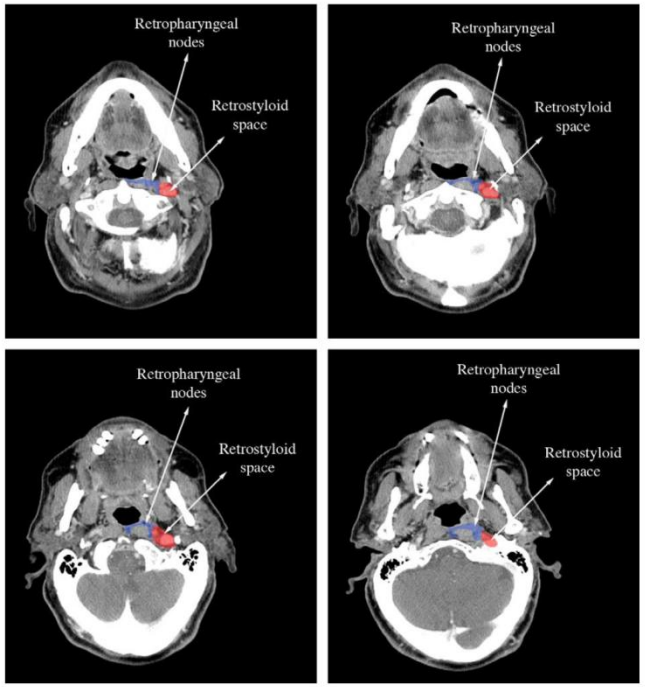

Fig. 1. Axial CT images of the upper neck of a patient with a T1N0M0 glottic SCC. The examination was performed on a dual-detector spiral CT (Elscint Twin, Haifa, Israel) using a slice thickness of 2.7 mm, an interval reconstruction of 2 mm and a pitch of 0.7. Contrast medium was injected intravenously at a rate of 2 ml/s with a total amount of 100 ml. Sections were taken from the level of C1 (cranial limit of level II) to the base of skull. The retrostyloid space was drawn using the radiological boundaries detailed in Table 1. The retropharyngeal nodes were delineated as already published (Grégoire, 2003). The delineated areas correspond to the CTV, and thus do not include any security margin for organ motion or set-up inaccuracy.

Supraclavikulære lymfeknuter

- Supraclaviculær affeksjon defineres som N3-sykdom ved NPC
  - meget dårlig prognostisk tegn

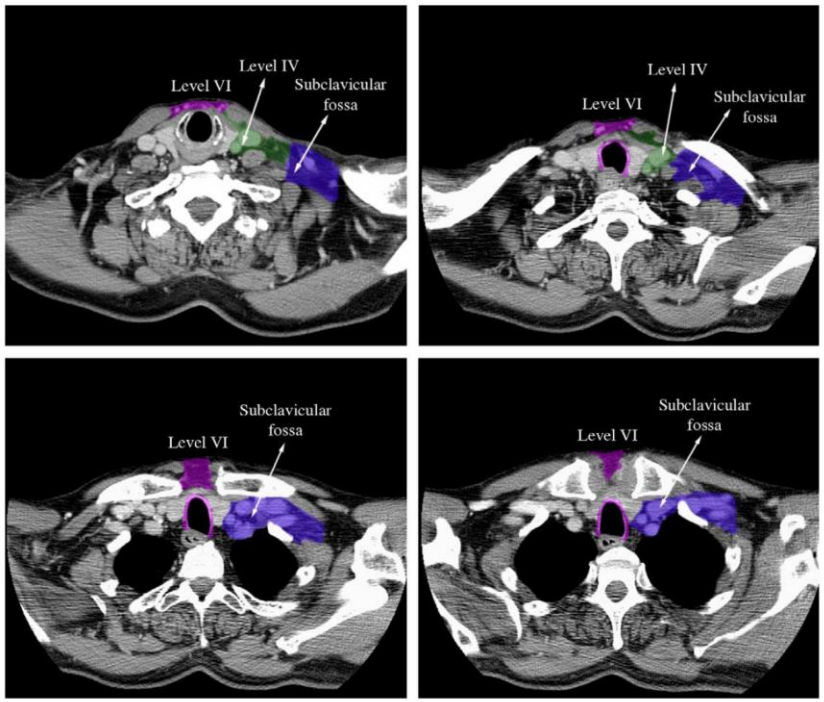

Fig. 2. Axial CT images of the lower neck of a patient with a T1N0M0 glottic SCC. The examination was performed on a dual-detector spiral CT (Elscint Twin, Haifa, Israel) using a slice thickness of 2.7 mm, an interval reconstruction of 2 mm and a pitch of 0.7. Contrast medium was injected intravenously at a rate of 2 ml/s with a total amount of 100 ml. Sections were taken from the caudal end of level IV to the cranial aspect of the sterno-clavicular joint. The supraclavicular fossa was drawn using the radiological boundaries detailed in Table 1. Levels IV and VI nodes were delineated as already published (Grégoire, 2003). The delineated areas correspond to the CTV, and thus do not include any security margin for organ motion or set-up inaccuracy.

Noen konklusjoner

- Det kreves gode anatomikunnskaper inkludert drenasjeveier
- Viktig med så nøyaktig som mulig kartlegging av
  - Tumorutbredelse
  - Affiserte lymfeknuter

  } TNM
- Tett samarbeid med nevroradiolog og ØNH-lege
- Vurdering av sannsynlighet for subklinisk sykdom og valg av regioner krever klinisk erfaring