

ACR Neuroradiology Course

Neck Nodal Disease

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No relevant disclosures



55 yo man, felt “neck mass” while shaving



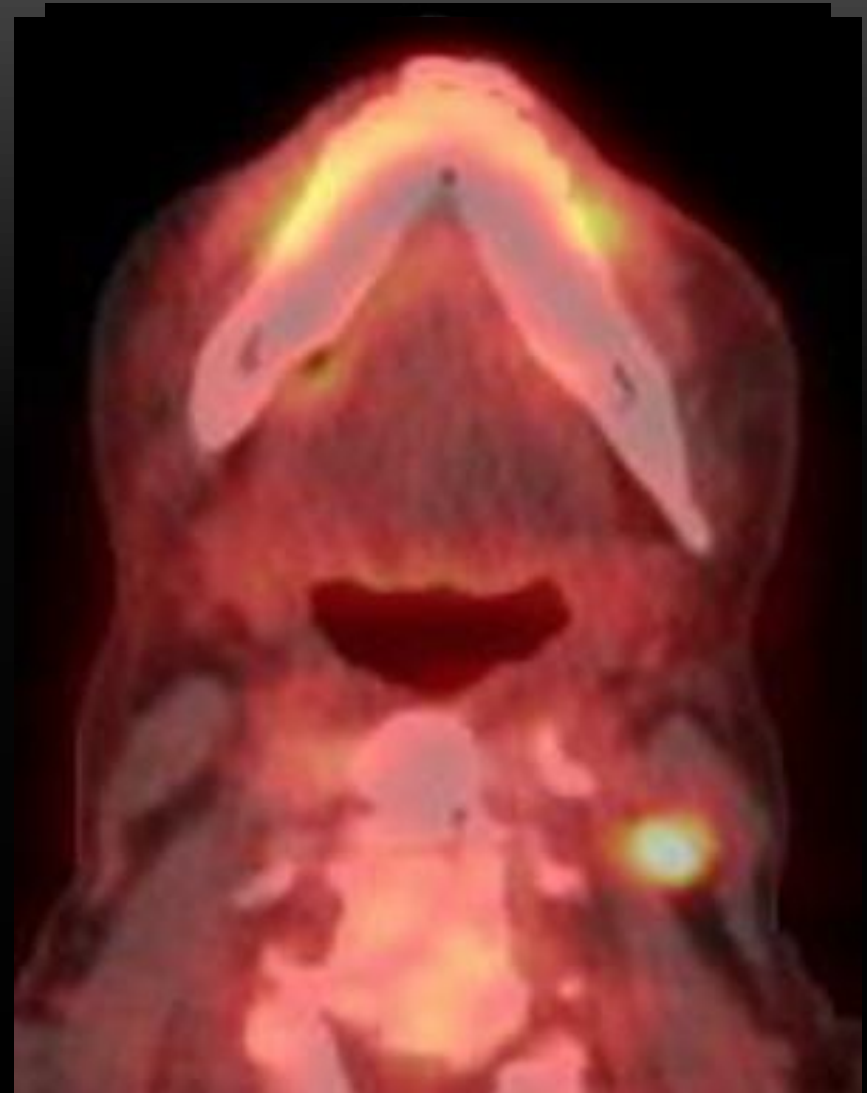
- Where is this finding?
How do you describe it to your referrers?
- What is the likely cause of this problem?
- Where should you search next?

Need to understand...

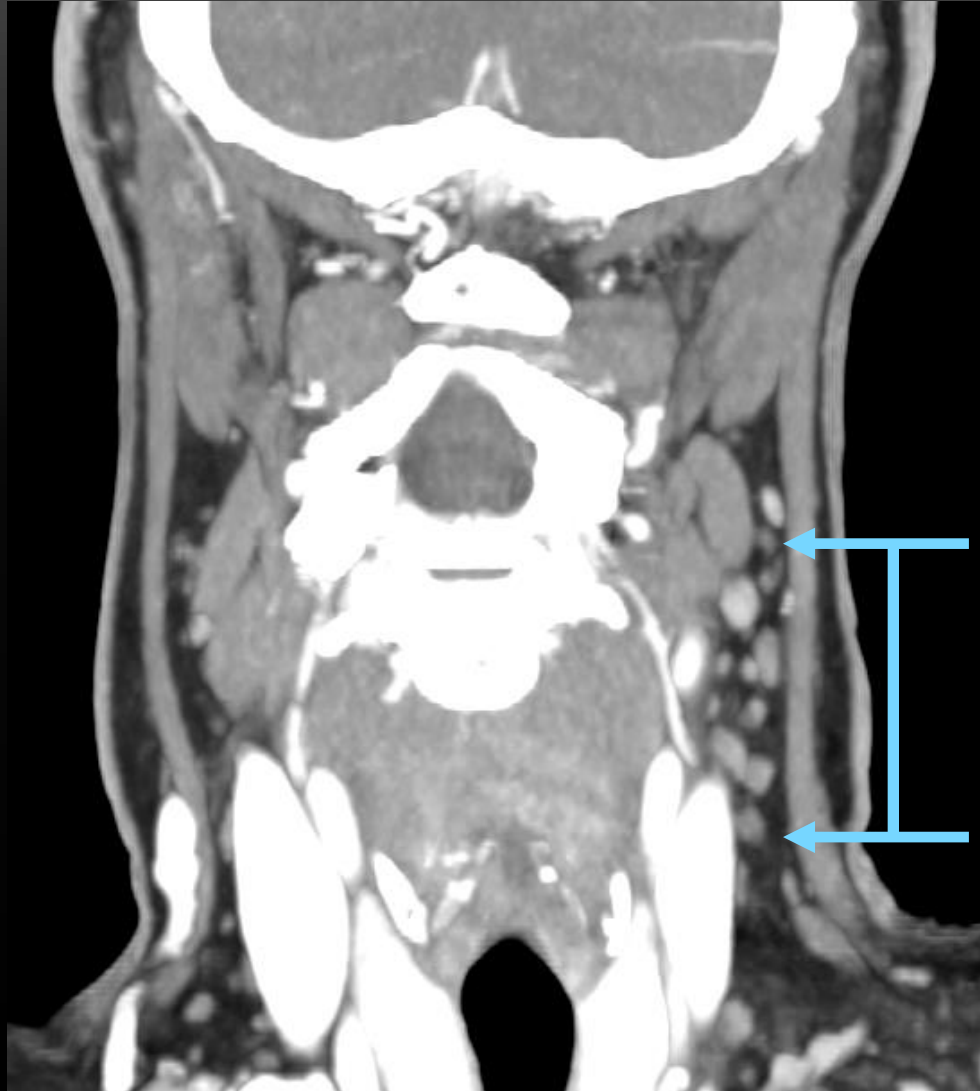
- Knowledge of **HN nodal levels** is important for accurate anatomic characterization, communication, & dz staging
- **Nodes not within levels** are still important! Esp in eval cutaneous malignancies
- Understanding **nodal drainage pathways of HN subsites** aids recognition of pathologic nodes & primary tumors
- Causes of lymphadenopathy other than SCCa

A Pathologic Node

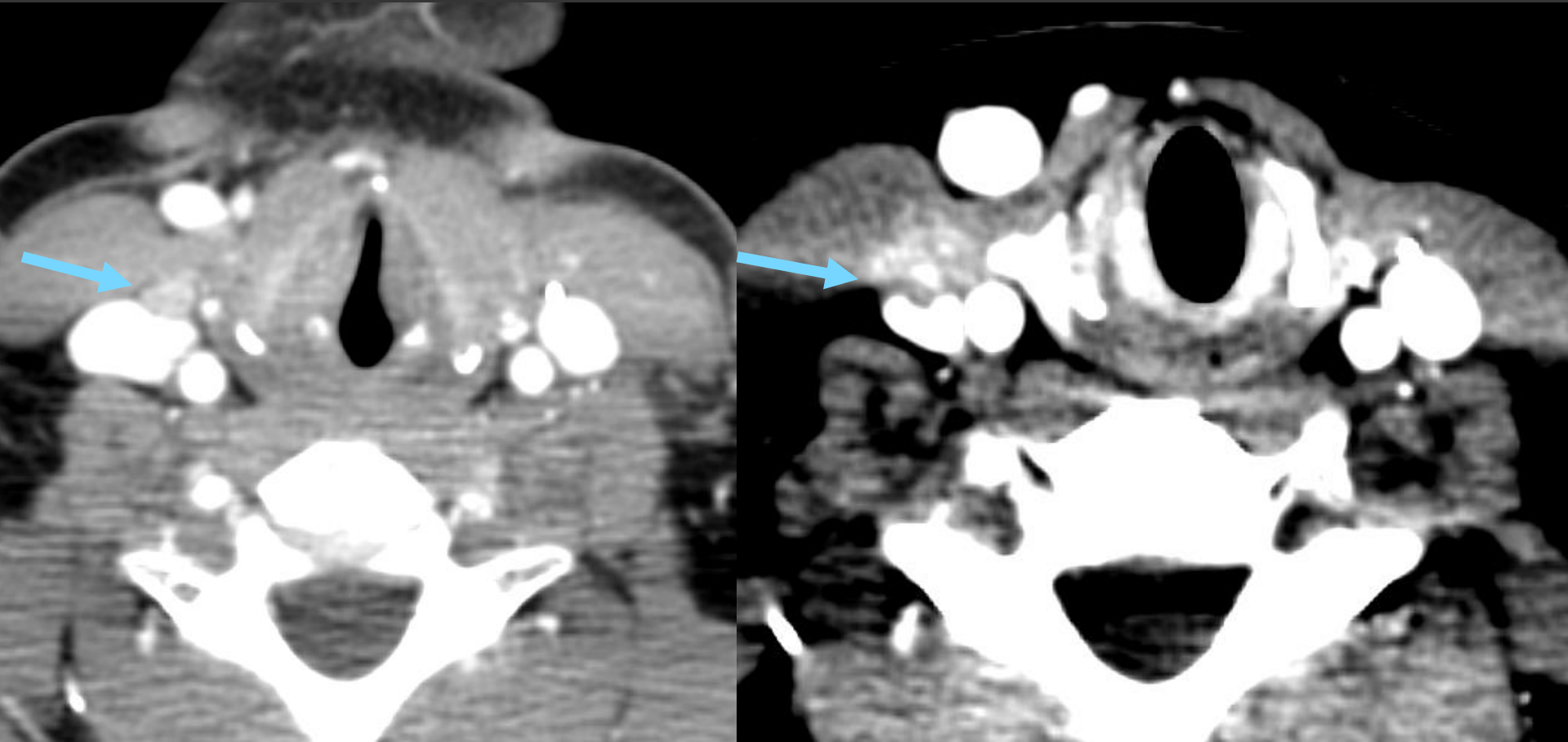
- Morphology >>> Size
 - Necrotic or cystic
 - Hyperenhancing
 - Round
- High FDG uptake
- Clustered
- Asymmetric



Melanoma Patient (Clustered Nodes)



Early Recognition of Pathologic Node: Oral Tongue SCCa



Oropharyngeal Carcinoma p16/HPV+



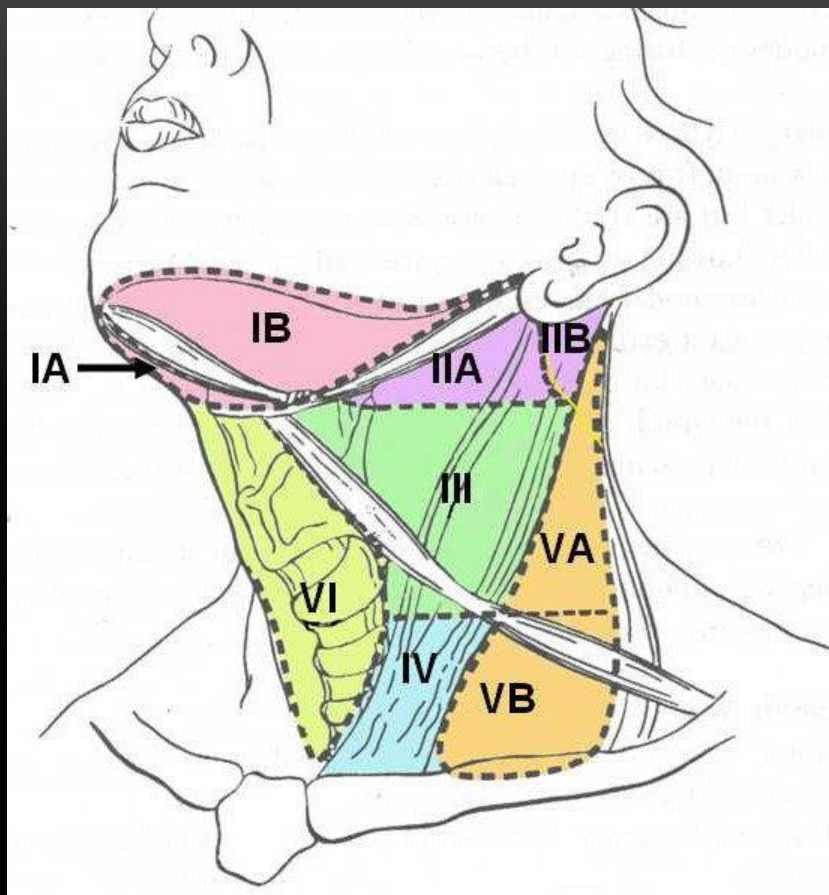
T	T CRITERIA
T0	No primary tumor identified
T1	Tumor $\leq$ 2 cm in greatest dimension
T2	Tumor $>$ 2 cm, but $\leq$ 4 cm in greatest dimension
T3	Tumor $>$ 4 cm in greatest dimension, or extends to the lingual surface of the epiglottis
T4	Moderately advanced local disease, with tumor invading any of: Larynx, Extrinsic muscles of the tongue, Medial pterygoid muscle, Hard palate, Mandible, Or beyond
N	CLINICAL N CRITERIA
cNx	Regional lymph nodes cannot be assessed
cN0	No regional lymph node metastasis
cN1	One or more ipsilateral nodes, none $>$ 6cm in greatest dimension
cN2	Contralateral or bilateral lymph node(s), none $>$ 6cm
cN3	Lymph node(s) $>$ 6cm in greatest dimension

Chart courtesy of Dr. Christine Glastonbury

Nodal Levels: A Historical Perspective

- Driven by need to refine description of **surgical** neck dissections to reduce morbidity and spare nodal groups when suspicion of metastasis to those levels is low: **1991**
- **2002** modifications included sublevels, w radiology input (**Robbins**)

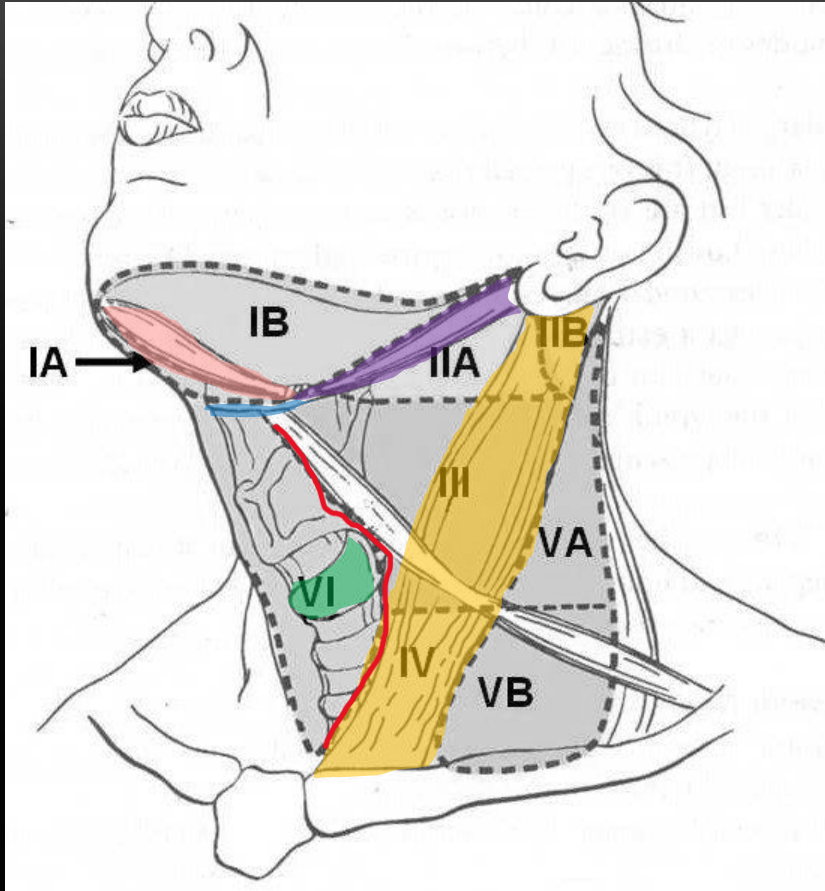
Nodal Levels



- IA: submental
- IB: submandibular
- IIA: anterior upper jugular
- IIB: posterior upper jugular
- III: middle jugular
- IV: lower jugular
- VA: upper posterior triangle
- VB: lower posterior triangle
- VI: anterior compartment

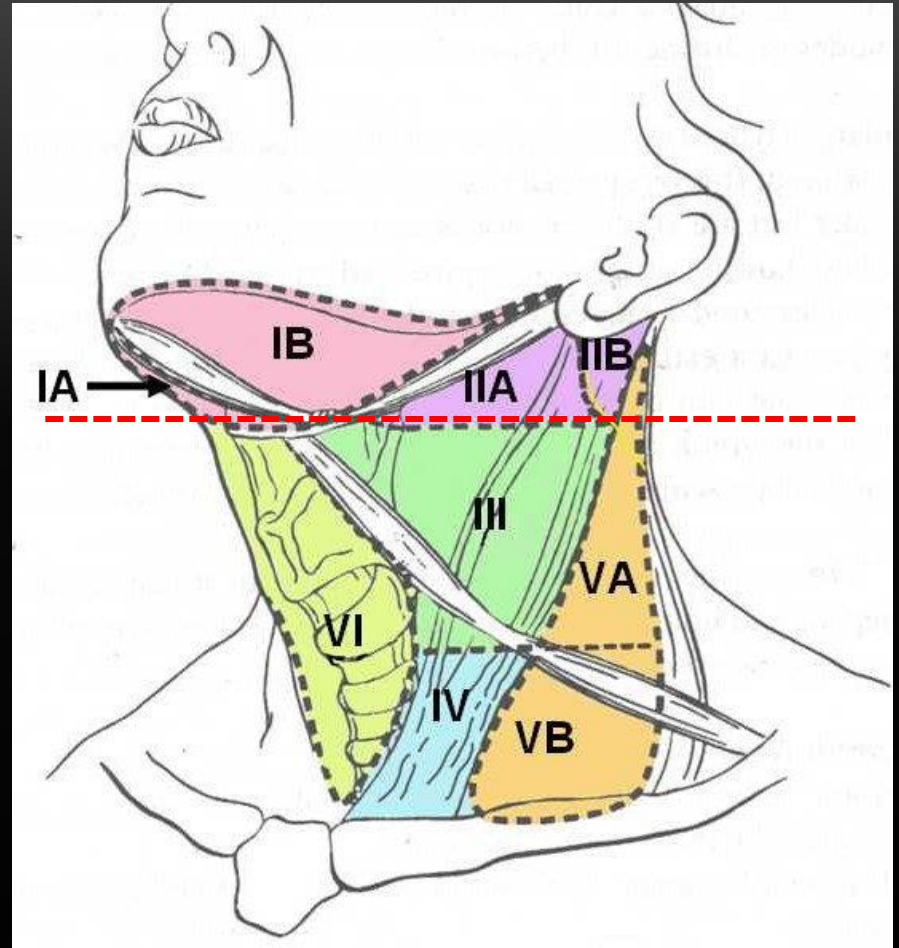
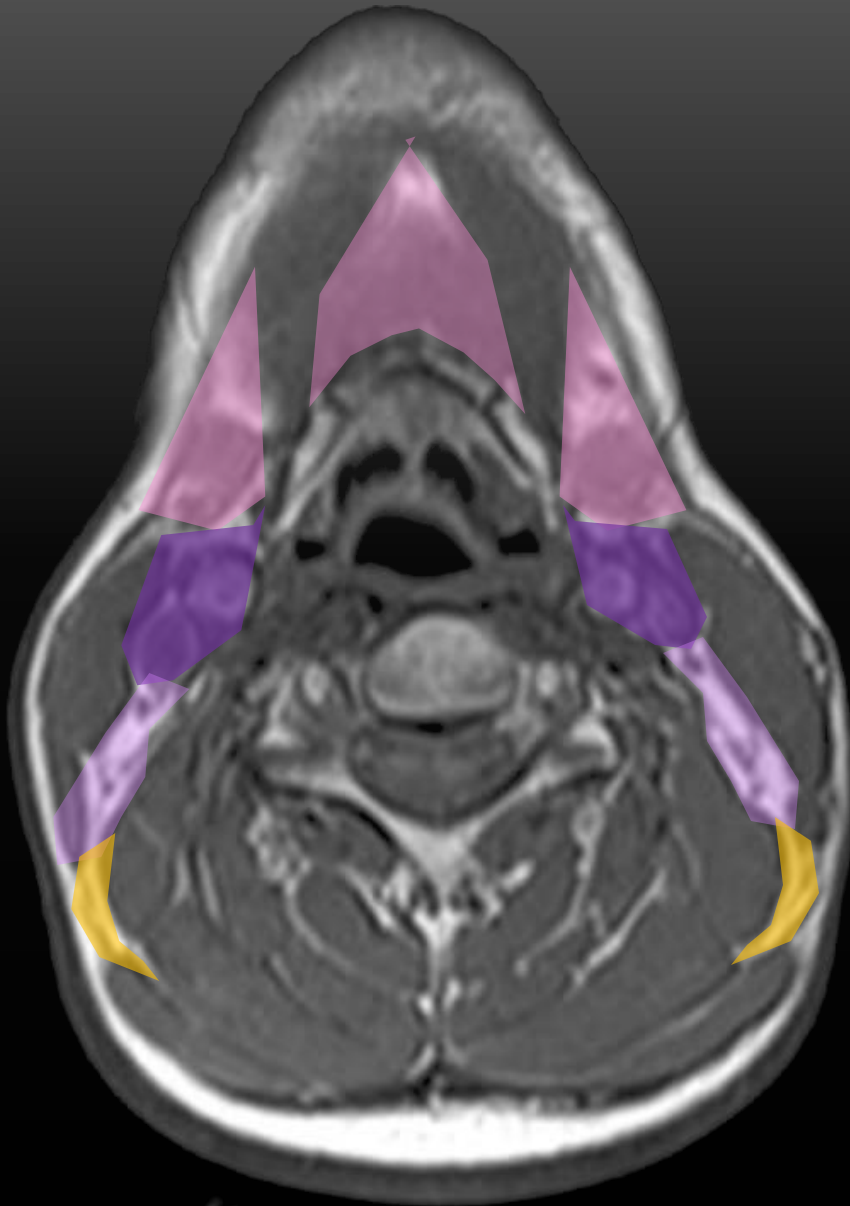
Graphic from Harish, Krishnamachar. (2005). Neck dissections: Radical to conservative. World journal of surgical oncology. 3. 21. 10.1186/1477-7819-3-21. after Robbins KT, Shaha AR, Medina JE, et al. Consensus statement on the classification and terminology of neck dissection. Arch Otolaryngol Head Neck Surg. 2008 May. 134(5):536-8.

Important Boundary Landmarks

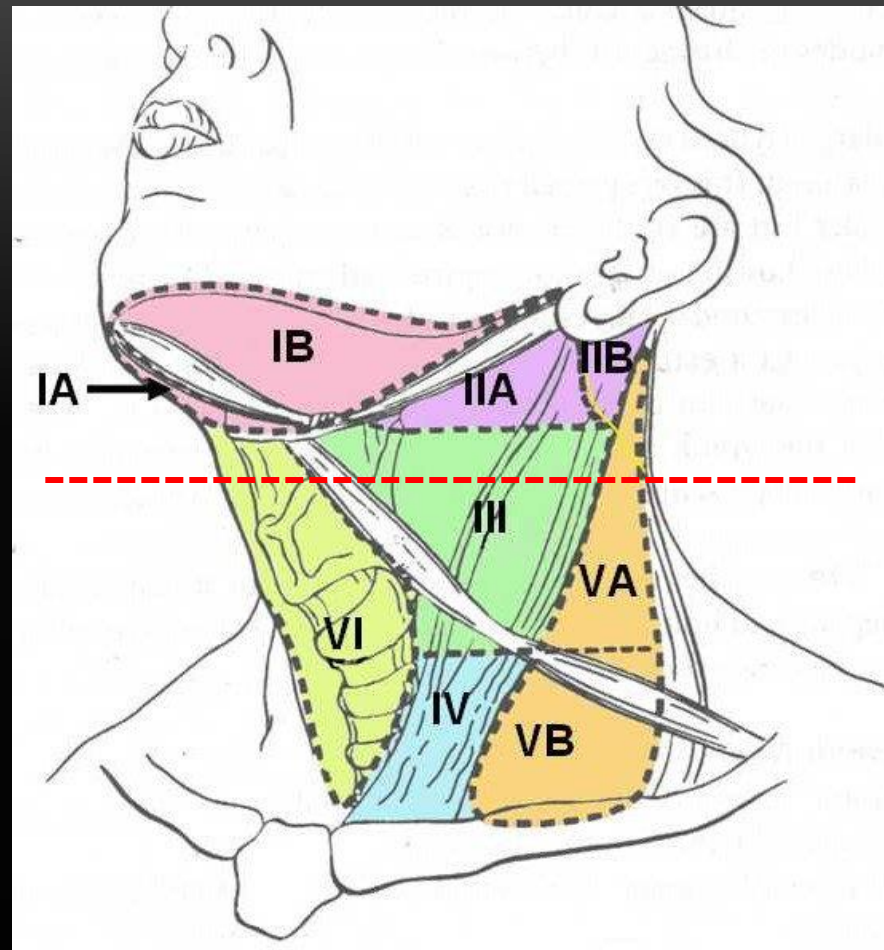
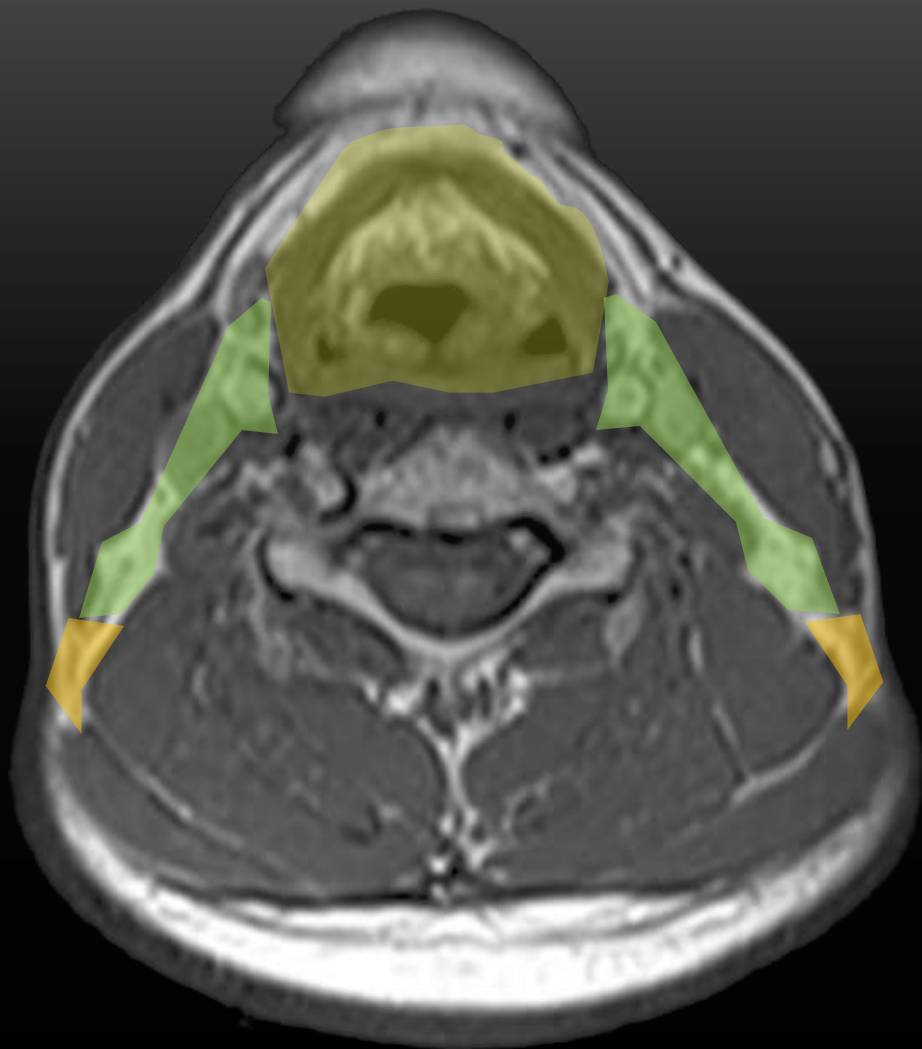


- Anterior belly of digastric
- Stylohyoid (Posterior belly of digastric)*
- Sternocleidomastoid
- Hyoid
- Cricoid
- Carotid

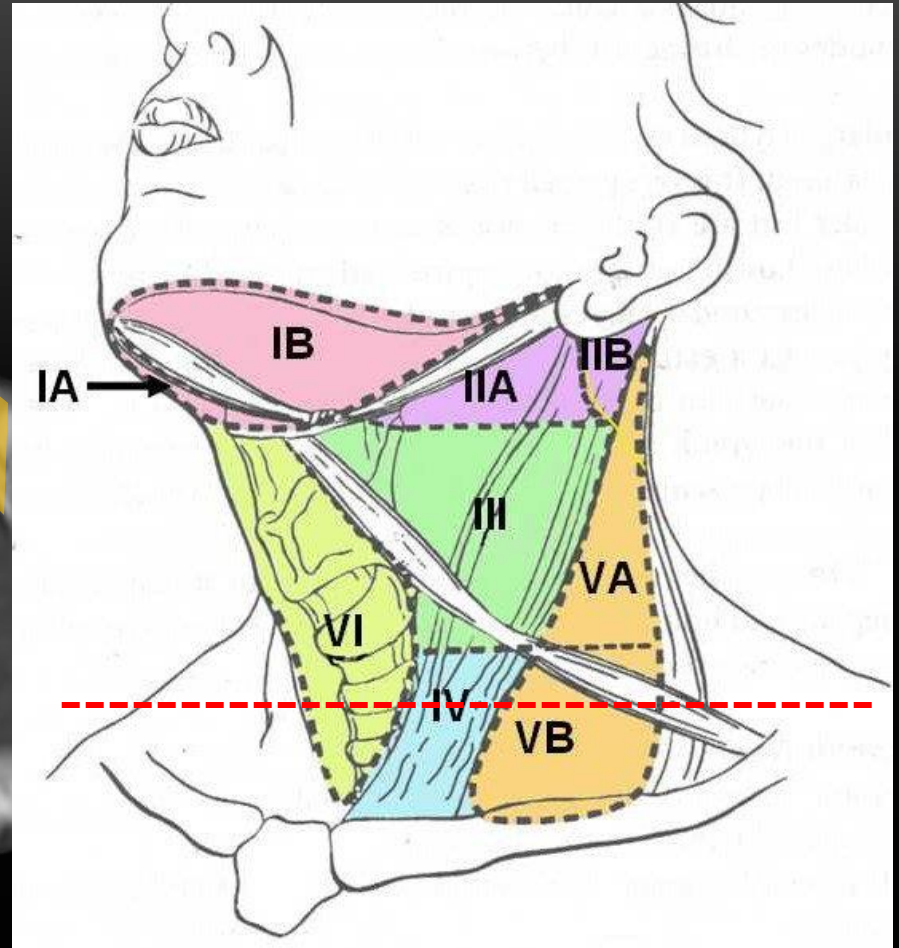
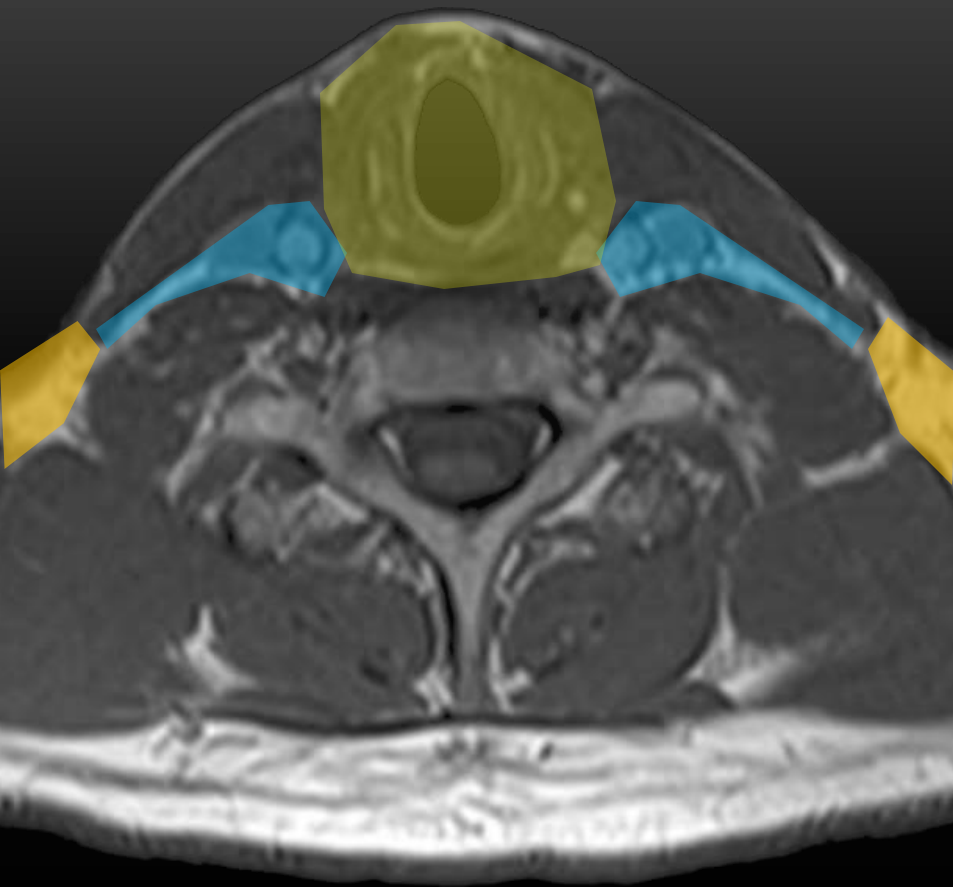
Nodal Levels



Nodal Levels



Nodal Levels



Nodes Outside of Levels

- Periauricular
- Intraparotid
- Posterior cervical
- Retropharyngeal
- Preclavicular
- (Supraclavicular)

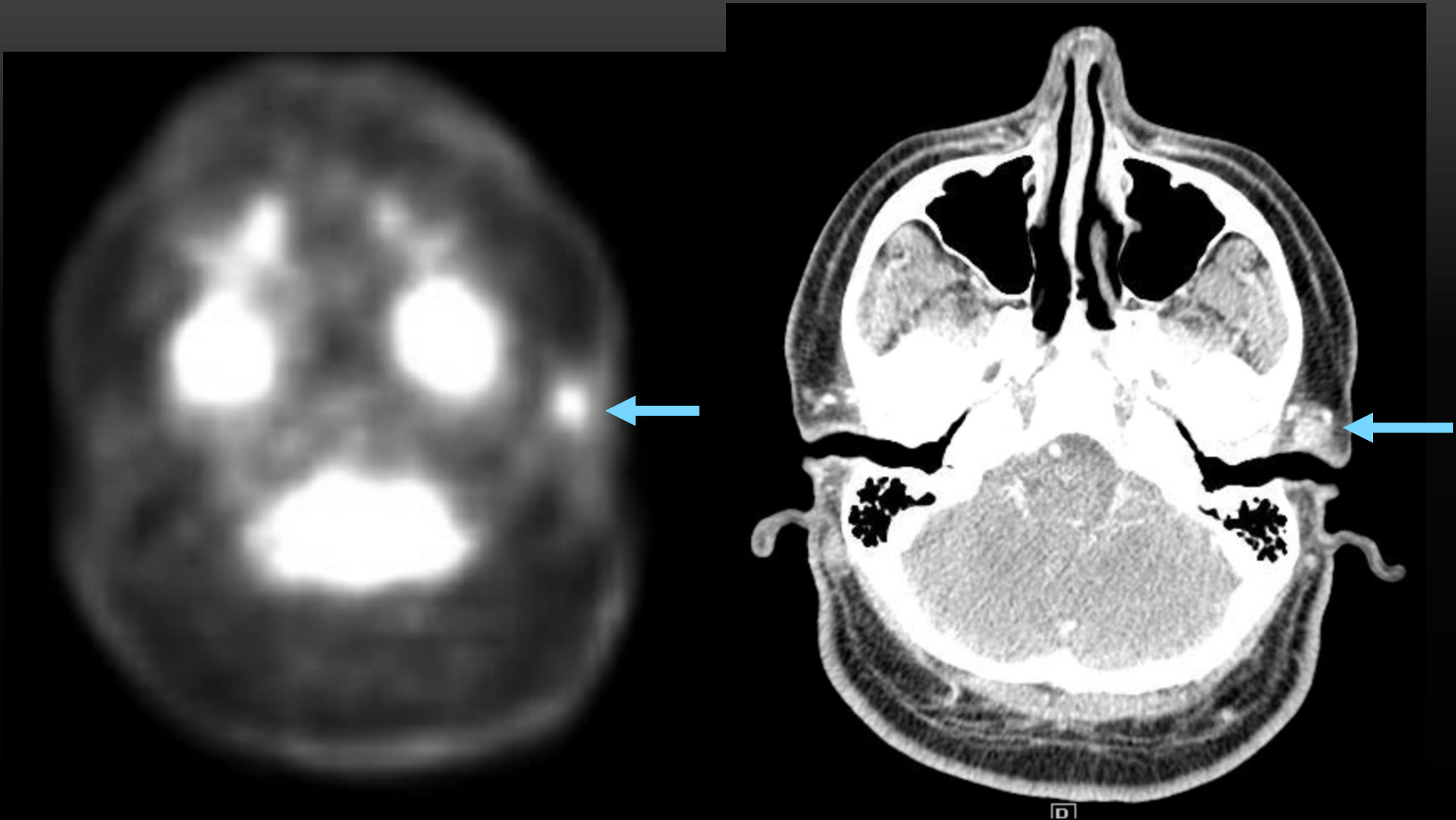
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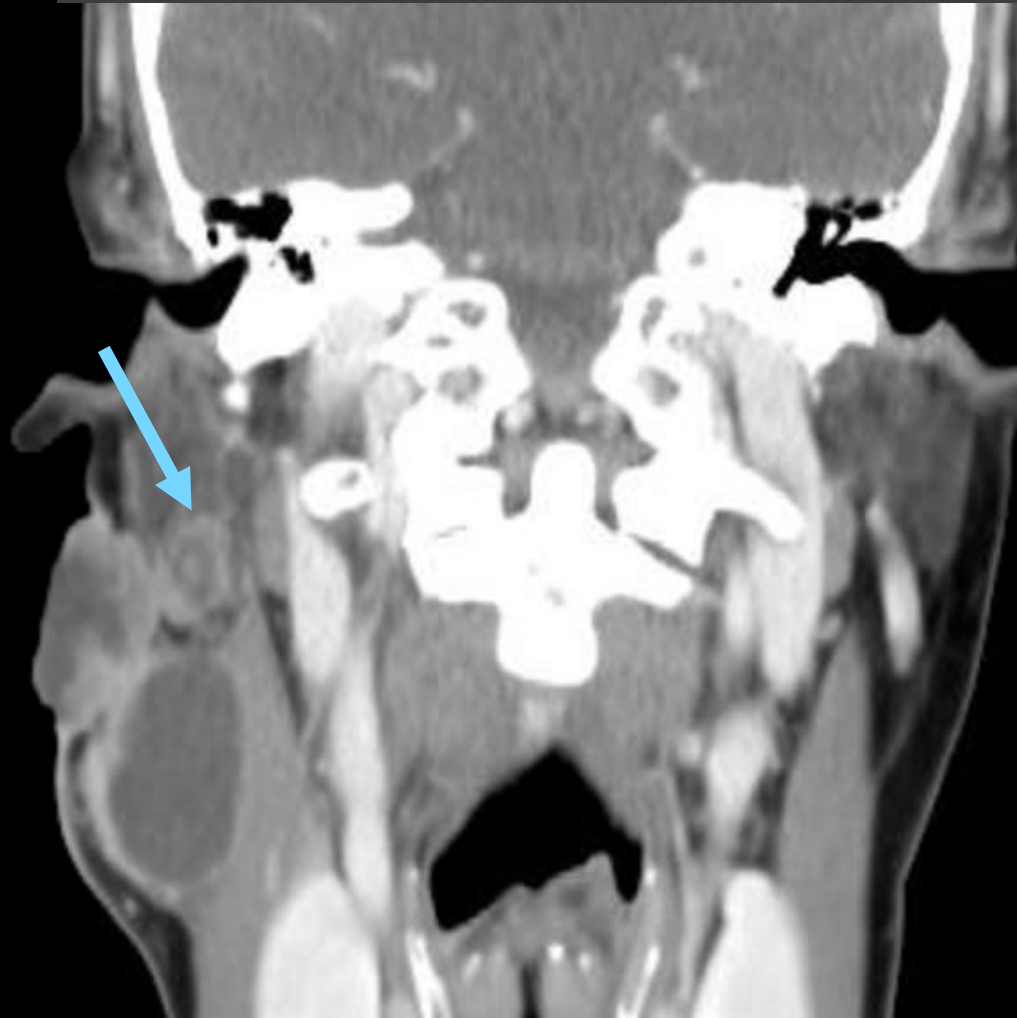
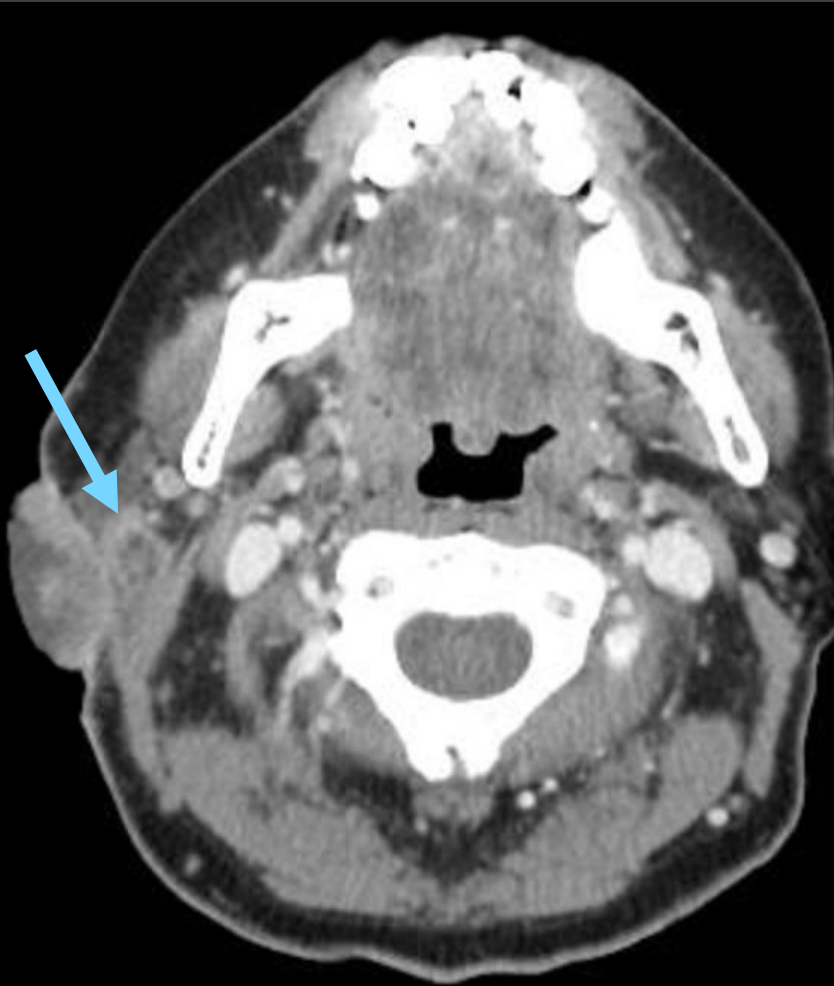


Cutaneous Primary

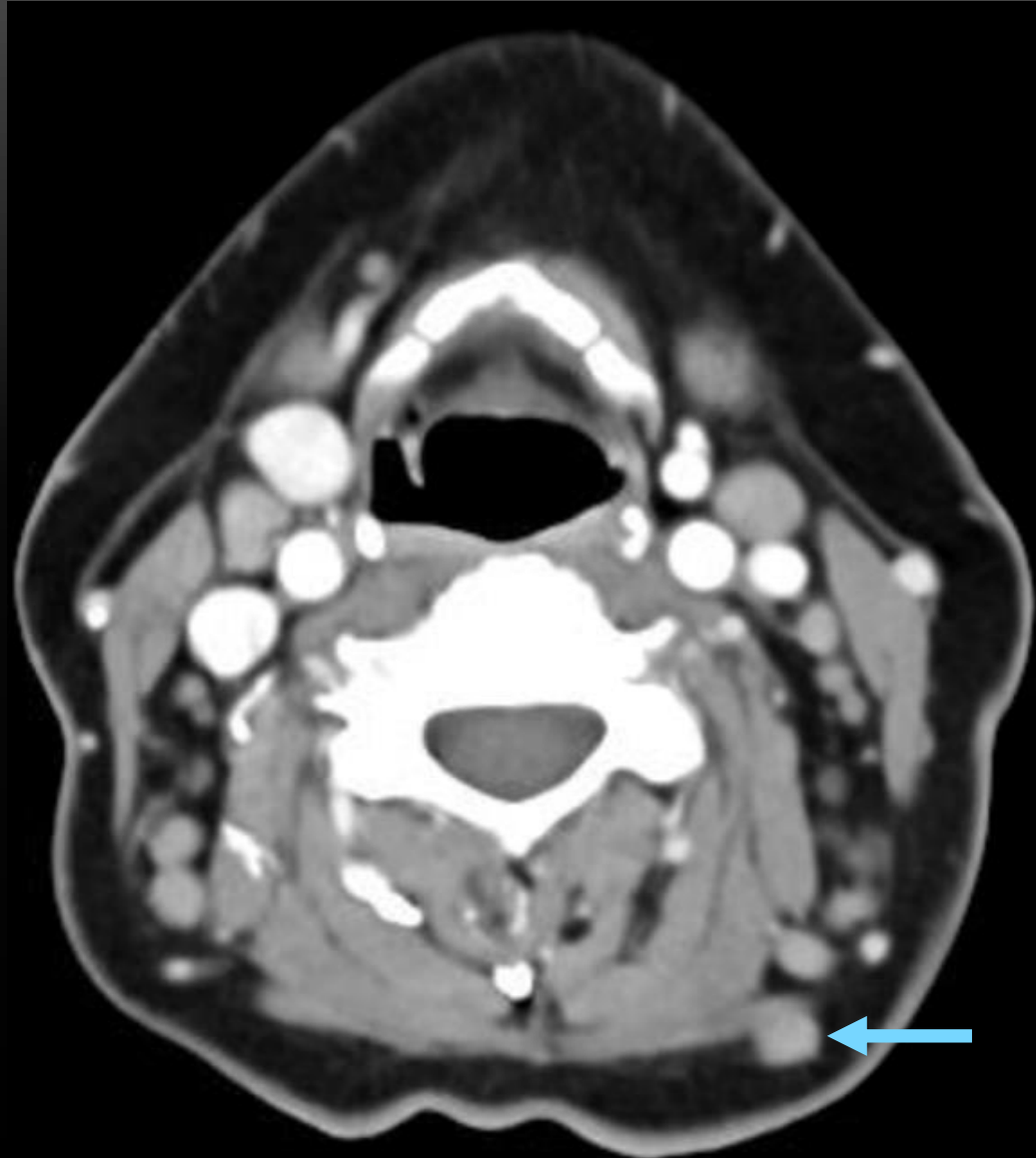
Preauricular node



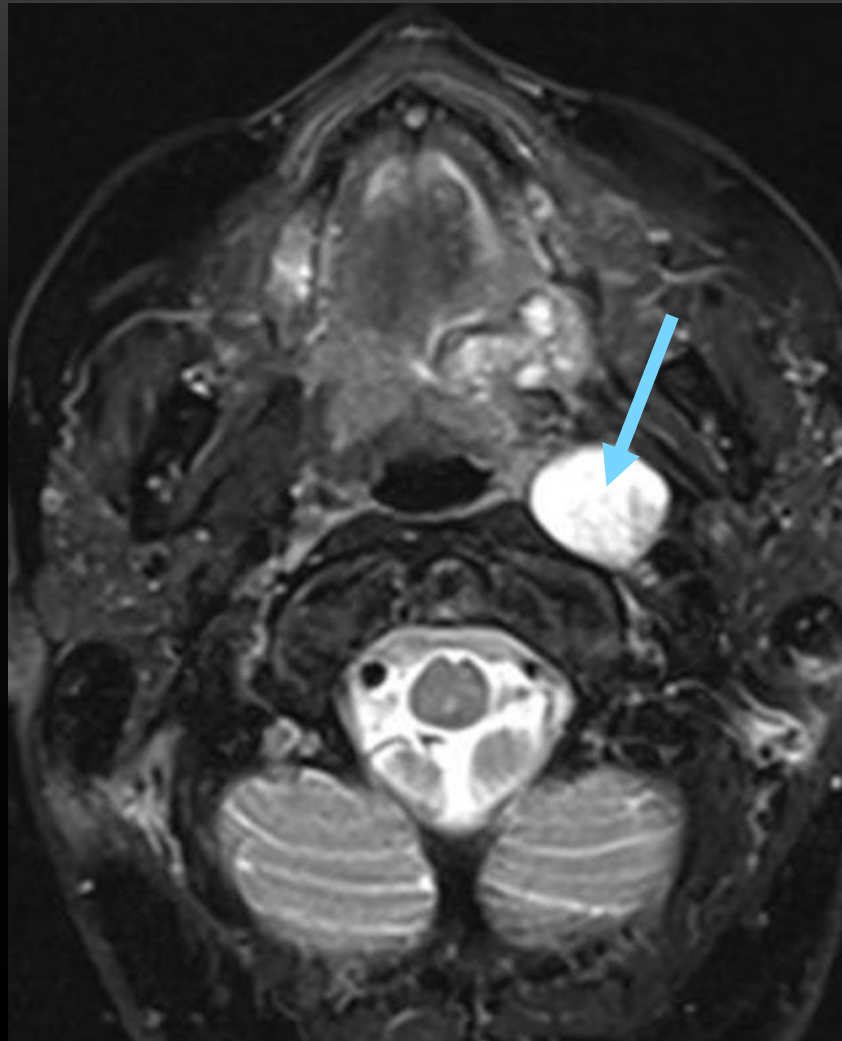
Intraparotid node



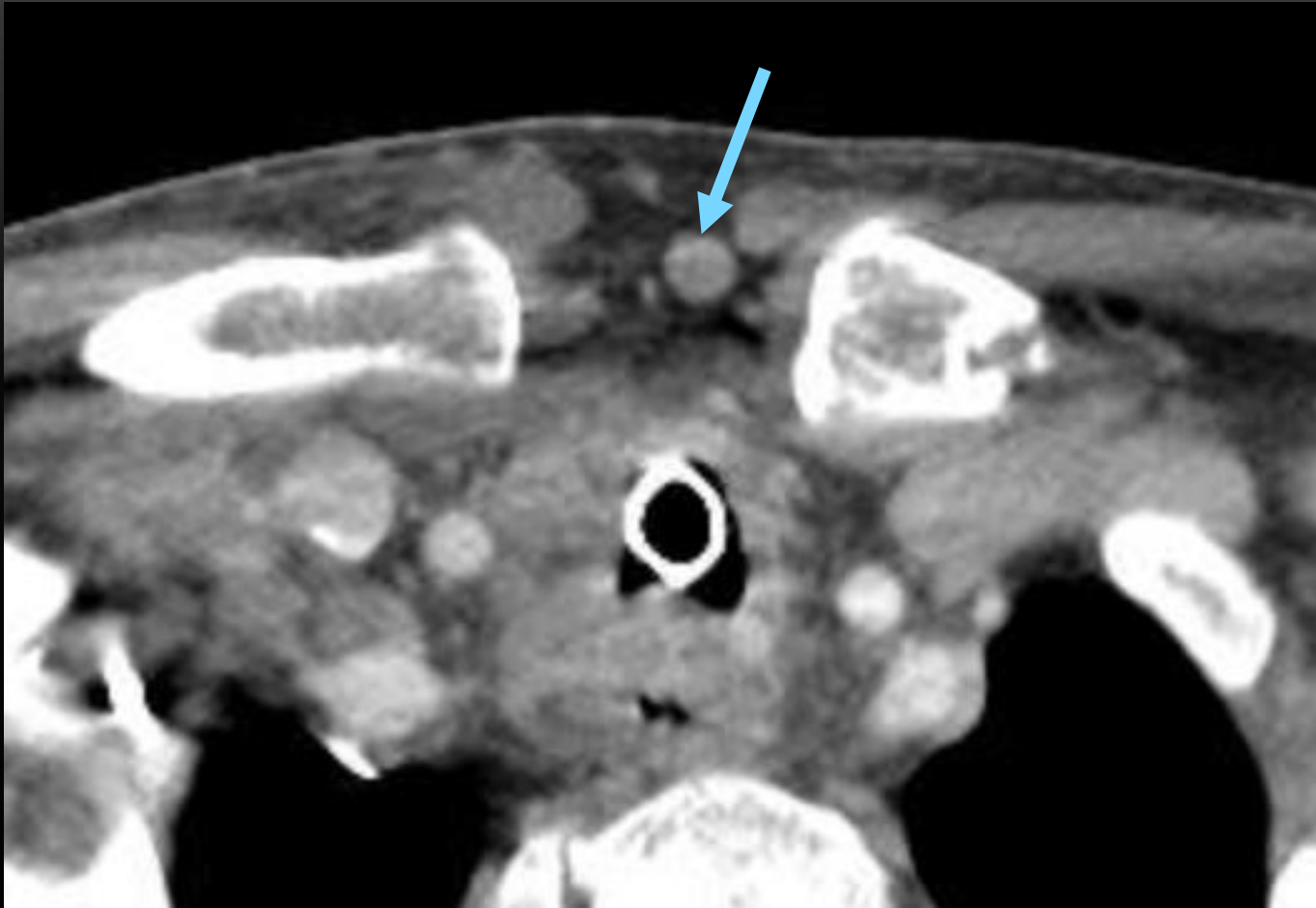
Posterior Cervical Node



Retropharyngeal Node



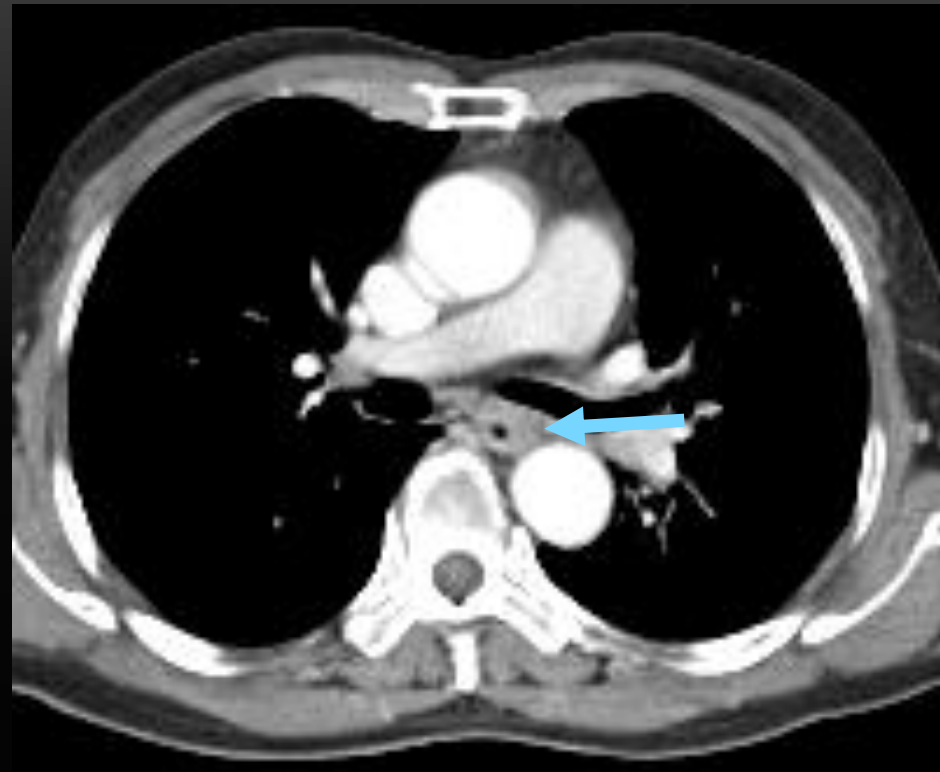
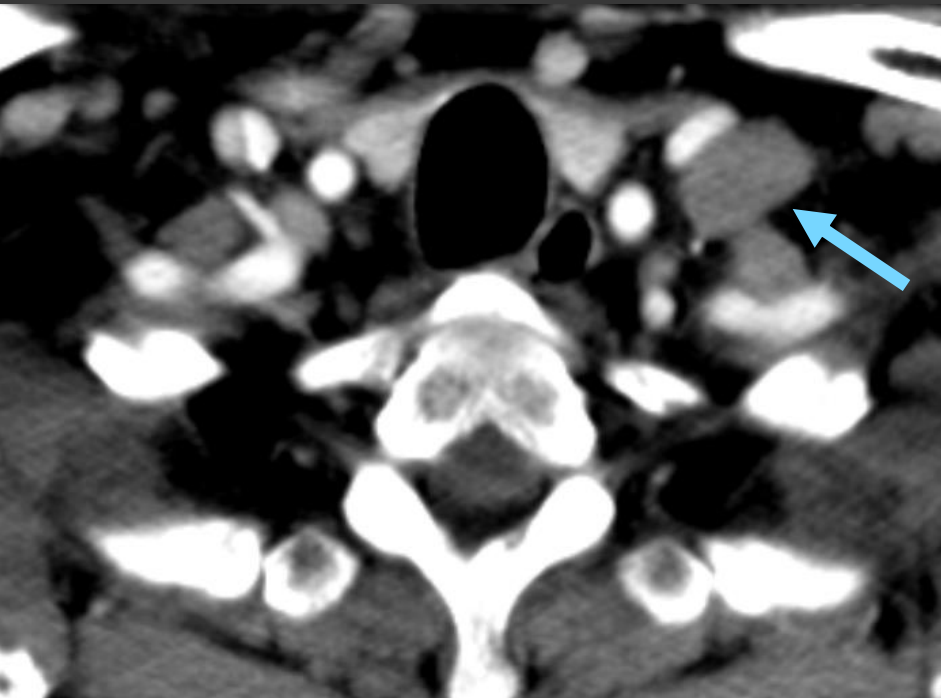
Rounded Preclavicular Node



Understanding Nodal Drainage

- Is tumor subsite **anterior**, **posterior**, **superior**, **inferior**?
 - **Anterior** (Anterior sinonasal, OC): **I**, **IIA**
 - **Posterior** (Posterior ethmoid, sphenoid, pharyngeal): **RP**, **IIA**, **IIB**, **V**
 - **Superior** (NC, NP, OC, OP): **II**→**III**
 - **Inferior** (Larynx, HP): **III**, **IV**, **mediastinal**, **VI**
- If **isolated** nodal mass
 - **IA/IB**: oral cavity
 - **IIA/IIB**: oropharynx
 - **RP**: nasopharynx, hypopharynx, thyroid
- If isolated **supraclavicular** node: primary likely elsewhere

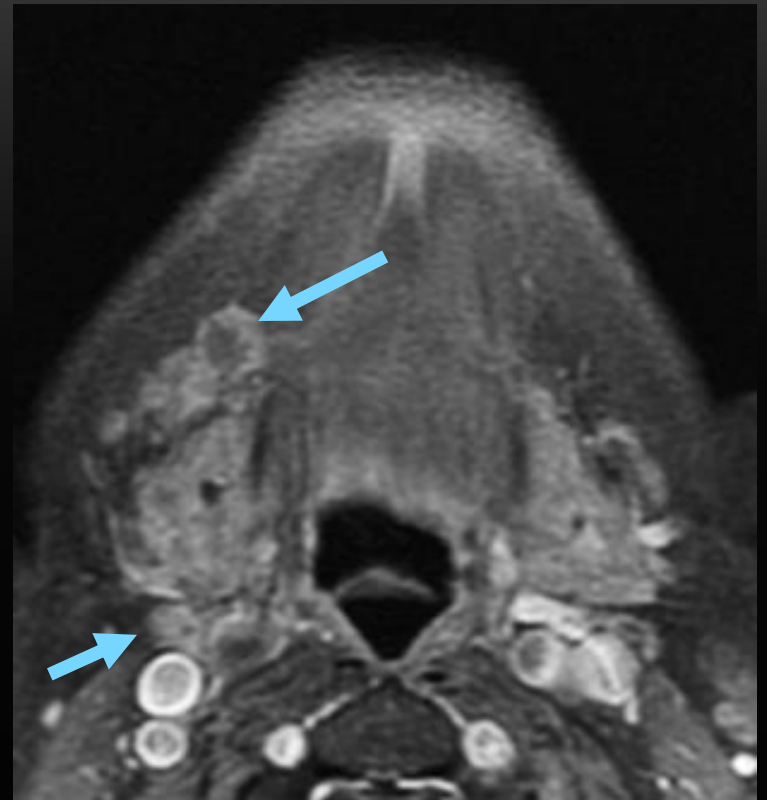
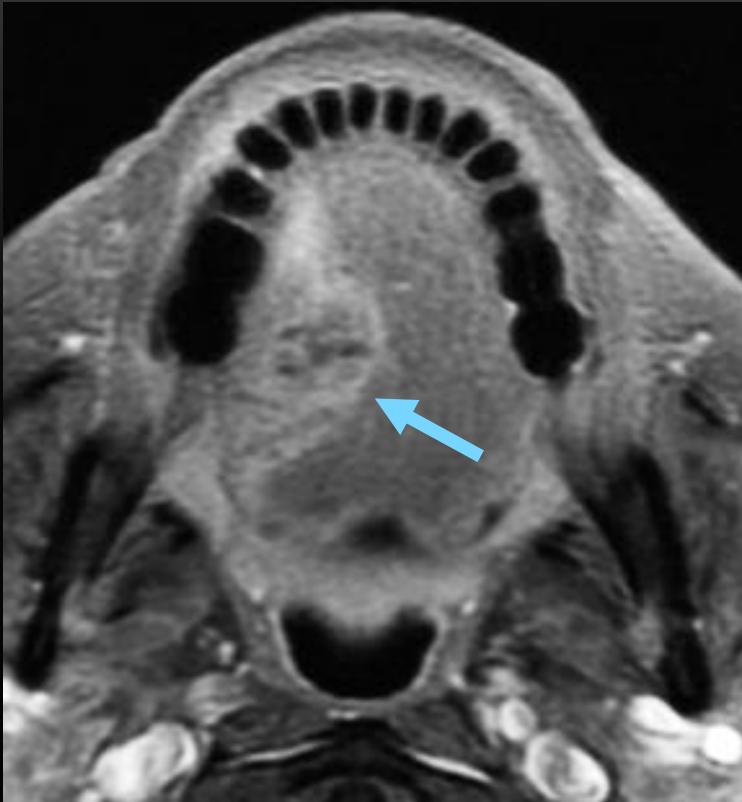
Isolated Supraclavicular (Virchow's) Node



Esophageal Cancer Metastasis

Oral Cavity (Oral Tongue) SCCa

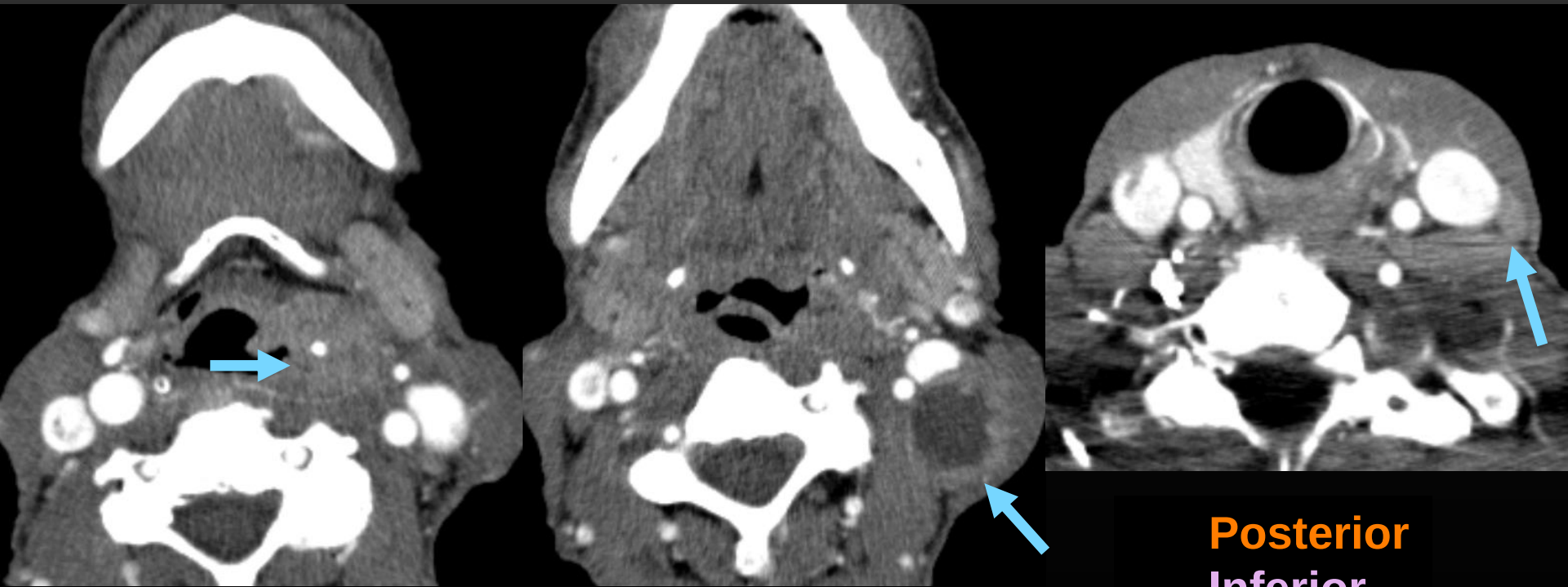
IB & IIA Lymphadenopathy



Anterior
Superior

Hypopharyngeal (Piriform Sinus) SCCa

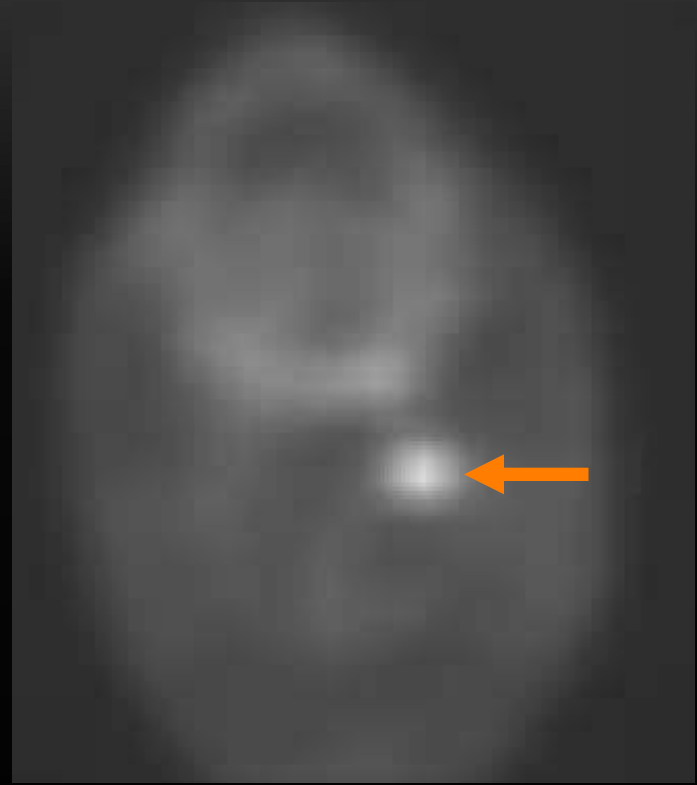
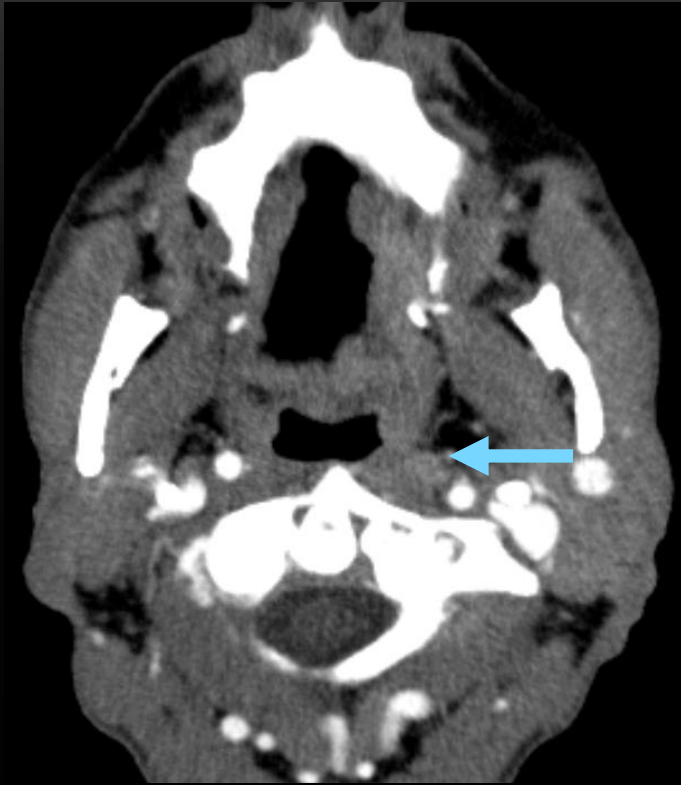
Level IIB & III Lymphadenopathy



Posterior
Inferior

Hypopharyngeal (Piriform Sinus) SCCa

Is this **RP** Node Significant?



AJCC8 Nodal Staging for H&N Cancer

- For most subsites, nodal staging scheme is the same
- EXCEPT FOR
 - Nasopharynx
 - P16+, HPV associated oropharynx cancer

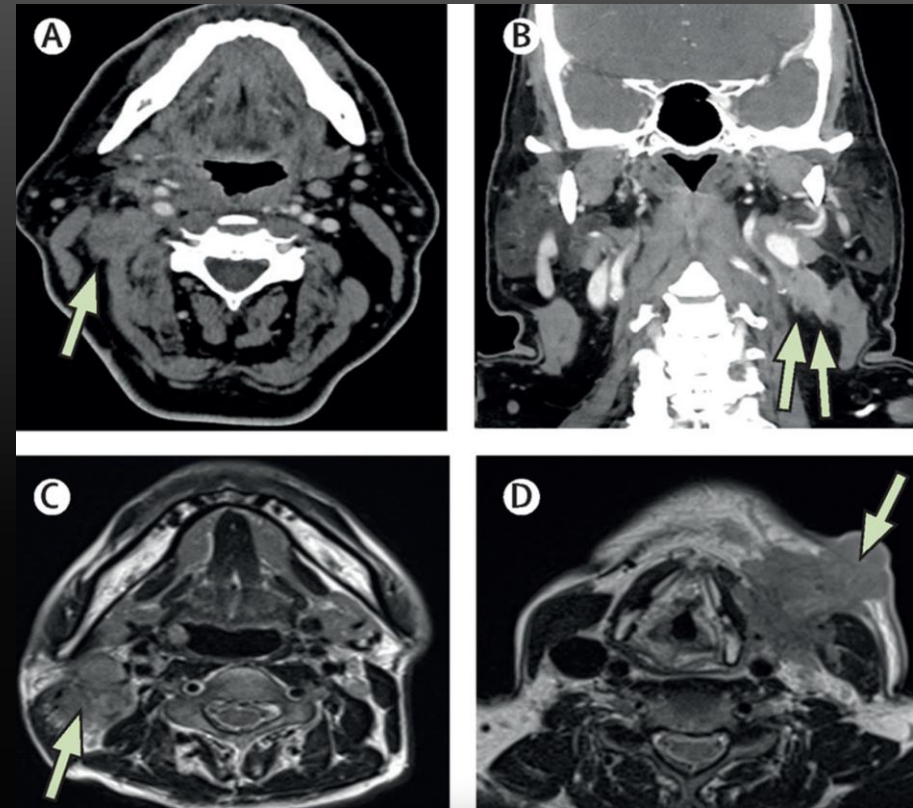
Nodal Staging for Most H&N Cancers

N CATEGORY	CLINICAL N CRITERIA
cNX	Regional lymph nodes cannot be assessed
cN0	No regional lymph node metastasis
cN1	Metastasis in single ipsilateral node, ≤ 3 cm in greatest dimension & ENE-
cN2a	Single ipsilateral node > 3 cm but ≤ 6 cm in greatest dimension & ENE-
cN2b	Multiple ipsilateral nodes, none > 6 cm in greatest dimension & ENE-
cN2c	Bilateral or contralateral node(s), none > 6 cm in greatest dimension & ENE-
cN3a	Metastasis in a lymph node > 6 cm in greatest dimension & ENE-
cN3b	Any node with clinically overt ENE+ [ENEc*]

ENE = Extranodal Extension

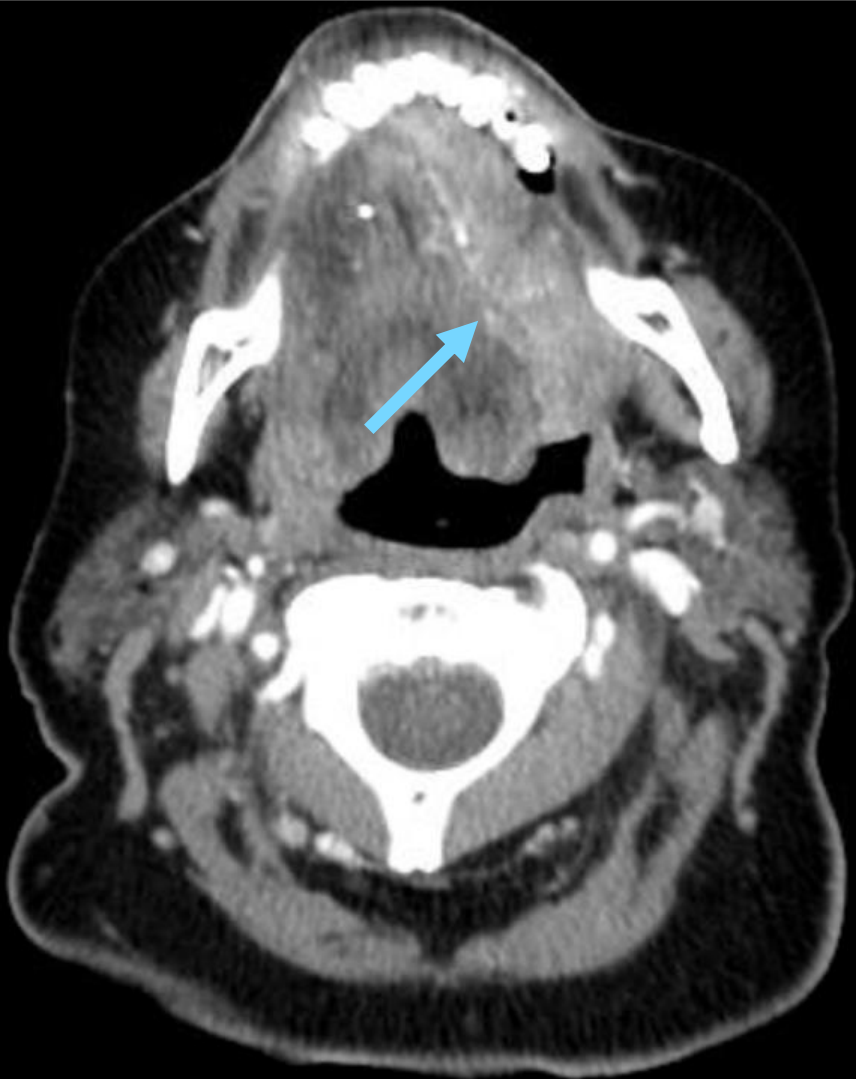
A Note on Extranodal Extension

- ENE important in nodal staging
- Imaging evidence of ENE=bad prognostic factor
- Proposed international consensus grading
 - 0: No features
 - 1: Indistinct borders and/or extension to perinodal fat (A, B)
 - 2: Conglomerate/matted (C)
 - 3: Clear invasion into surrounding structures (D)



<https://www.sciencedirect.com/science/article/pii/S1470204524000664>

Oral Cavity Cancer



Nodal stage?

N2C

Extranodal Extension



Nodal Staging for Nasopharyngeal Cancer

N	N CRITERIA
Nx	Regional lymph nodes cannot be assessed
N0	No regional lymph node metastasis
N1	Ipsilateral metastasis in cervical node(s) $\leq 6\text{cm}$ in greatest dimension and above caudal border of cricoid cartilage and/or uni/bilateral retropharyngeal $\leq 6\text{cm}$ in greatest dimension
N2	Bilateral metastasis in cervical lymph node(s), $\leq 6\text{cm}$ in greatest dimension, above caudal border of cricoid cartilage
N3	Uni/bilateral metastasis in cervical lymph node(s) $>6\text{cm}$ in greatest and/or extension below caudal border of cricoid cartilage.

Nasopharynx Cancer

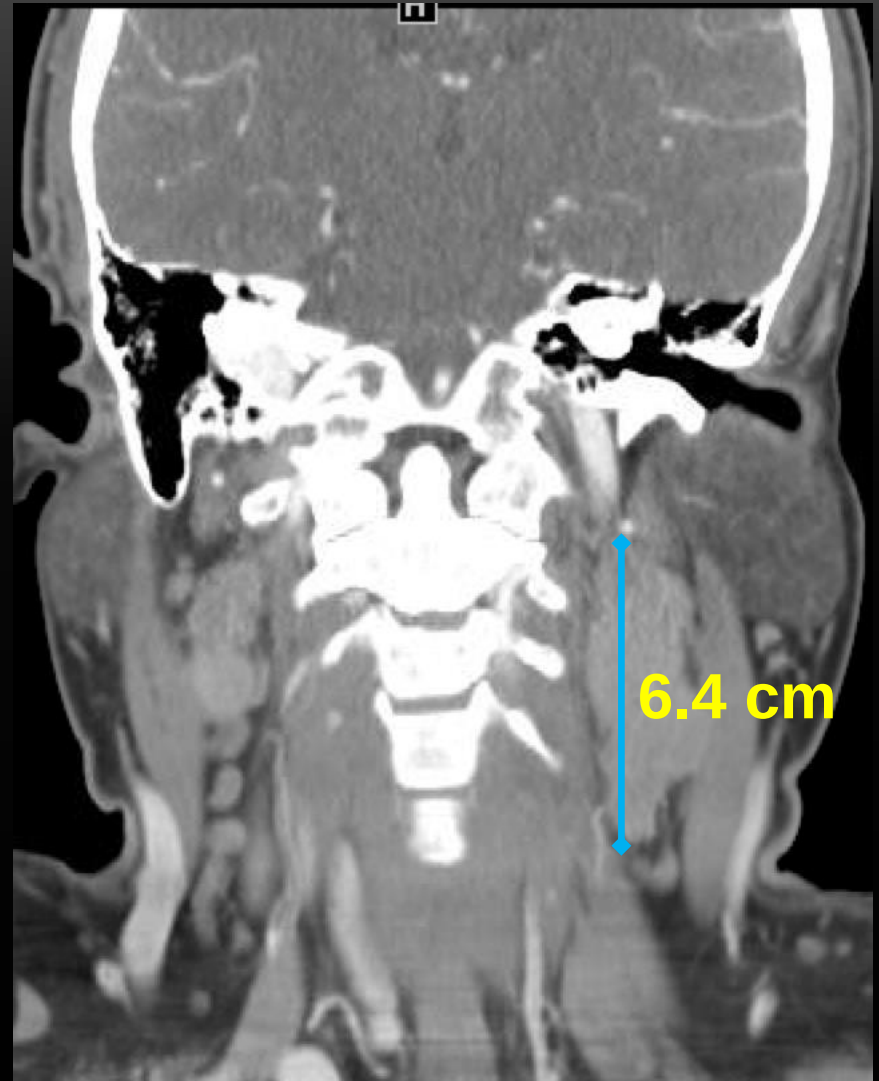


Nodal stage?



N1

Nasopharynx Cancer



Nodal stage?

N3

Nodal Staging for p16+ Oropharyngeal Cancer

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cN1	One or more ipsilateral nodes, none >6cm in greatest dimension
cN2	Contralateral or bilateral lymph node(s), none>6cm
cN3	Lymph node(s) >6cm in greatest dimension

Nodal Met with Unknown Primary

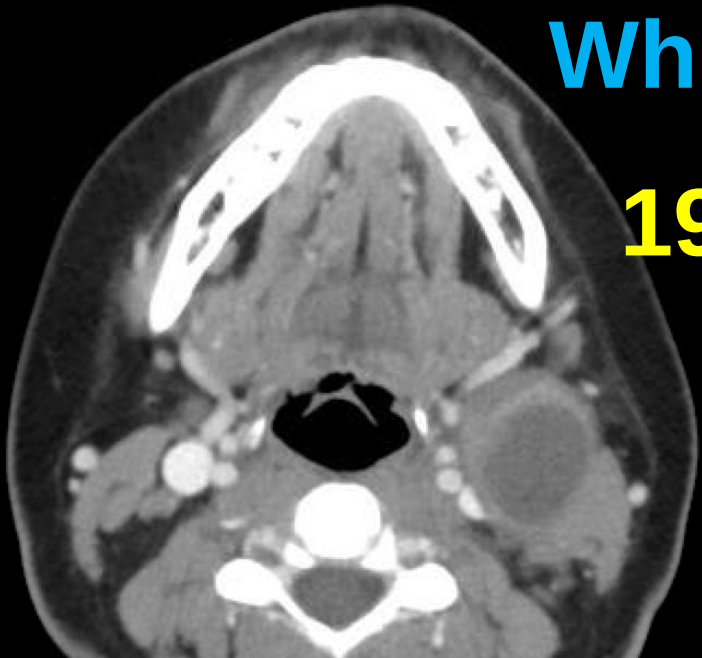
- In most cases, primary will be oropharyngeal (tonsils or tongue base)
- Biopsy node
 - P16+: Must test by HPV PCR, if +, presume oropharyngeal
 - Biopsy ipsilateral OP or total lingual/palatine tonsillectomy
 - EBV+: Presume nasopharyngeal
 - P16/HPV-: True unknown origin

Cystic Neck Masses

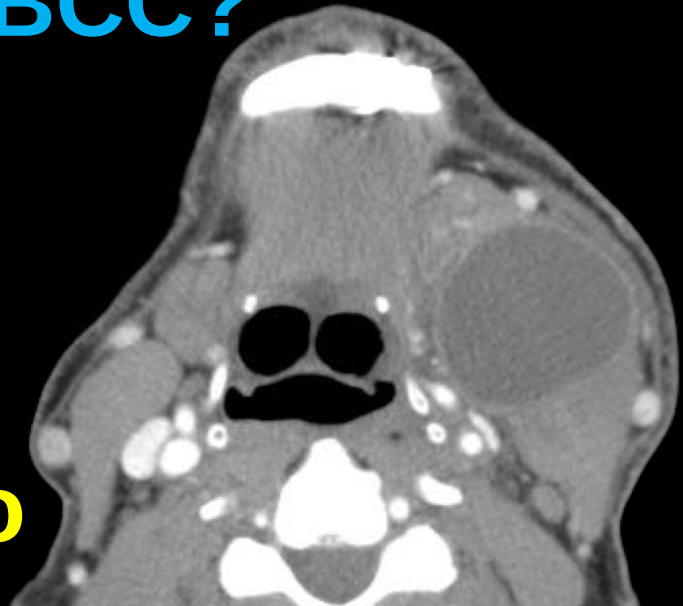
- For adults, cystic neck mass is almost never branchial cleft cyst
- P16+ OPC nodes and papillary thyroid Ca
- Must presume it's a cystic/necrotic node until proven otherwise by excision

Which one is BCC?

19 yo



55 yo



Other Causes of Cervical Lymphadenopathy

- Reactive? Any H&N primary SCCa?
- Lymphoma/sarcoid?
- Hyperenhancing?
- Calcified?
- Low density/inflammatory?
- You will likely need biopsy

Lymphoma

- Usually solid, bulky
- Can become cystic/necrotic after treatment or with infection
- Can be unilateral



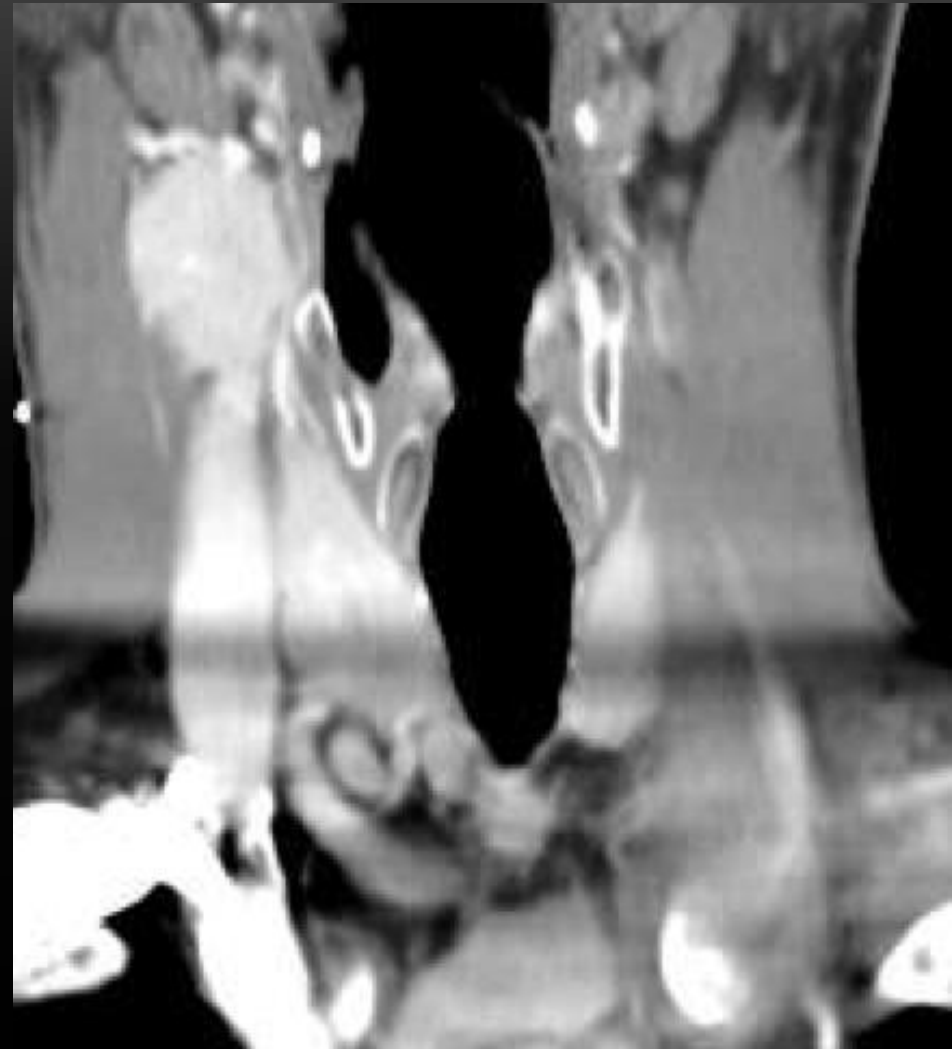
Sarcoidosis

- Systemic granulomatous disease
- Usually symmetric
- Check for parotid involvement
- Lymphoma mimic



Hyperenhancing Nodes

- Thyroid cancer mets



Hyperenhancing Nodes

- Thyroid cancer mets
- Kaposi's sarcoma



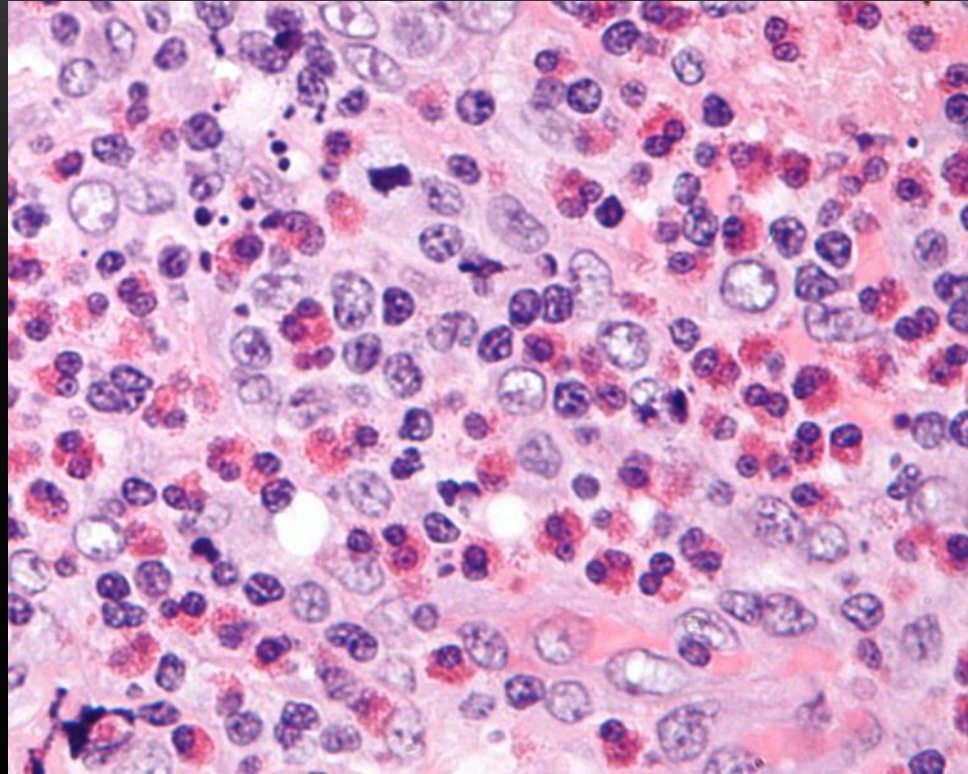
Hyperenhancing Nodes

- Thyroid cancer mets
- Kaposi's sarcoma
- Castleman disease
 - Angiofollicular lymph node hyperplasia
 - Benign B-cell lymphoproliferation
 - Unicentric: young adults
 - Multicentric: HIV/HHV associated



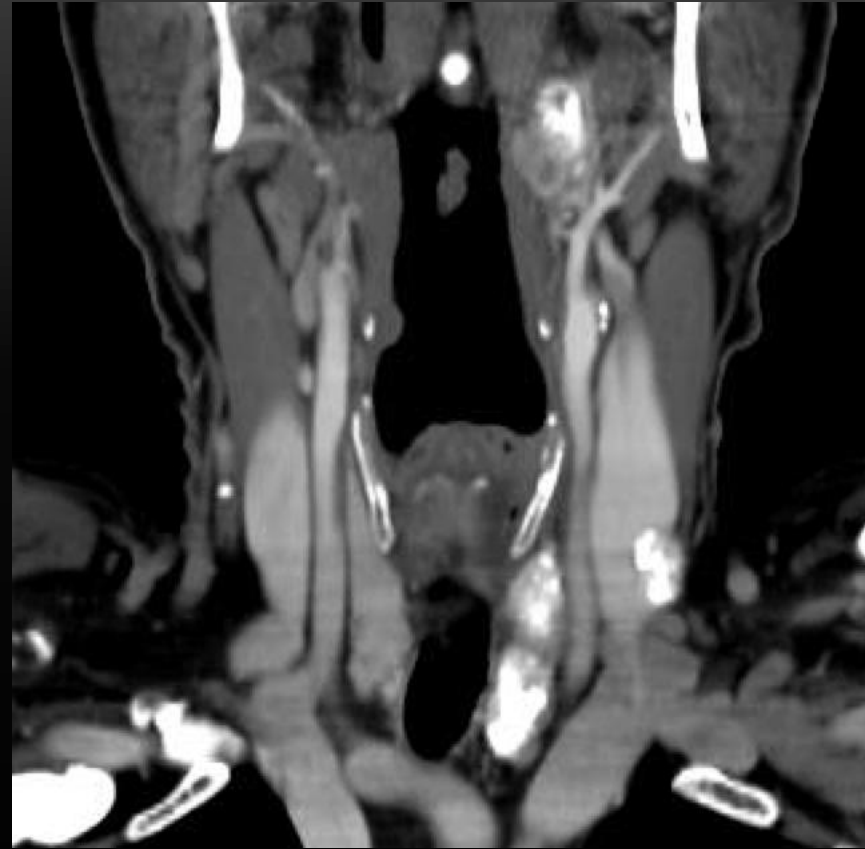
Hyperenhancing Nodes

- Thyroid cancer mets
- Kaposi's sarcoma
- Castleman disease
- Kikuchi Disease
- Kimura Disease



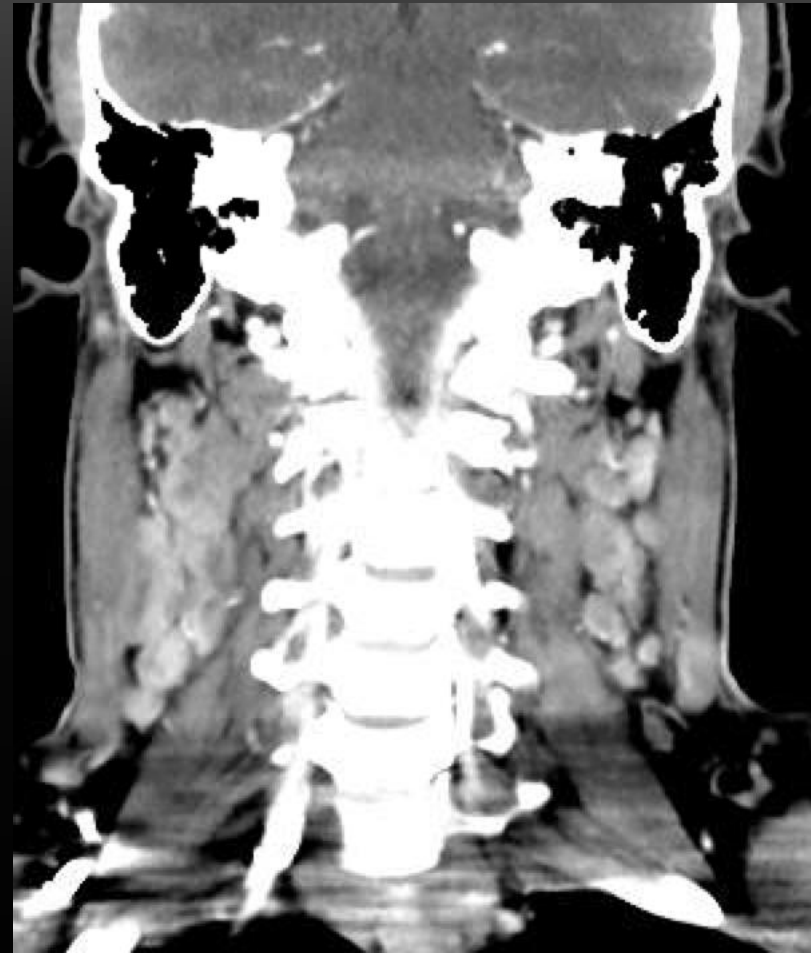
Calcified Nodes

- Medullary thyroid Ca met
- Granulomatous disease
 - TB
 - Sarcoid
- Treated infection/lymphoma



Low Density Nodes

- Lymphoma
- SCCa Met
- Atypical infection
 - Tb/Mycobacteria
 - Cat-scratch disease
 - Others



Histoplasmosis!

Conclusion

- New neck mass in adult = **cancer** until proven otherwise
- Systemic understanding of **HN nodal levels** and **drainage pathways** of various **mucosal subsites** aids recognition of pathologic nodes and primary tumor
- Recognition of **HN nodes not within levels** is important, esp for evaluation of **cutaneous** cancers
- Differential for cervical LAD can be wide w overlapping features, often need **biopsy**

Thank you!



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