

Guideline Based evaluation: US/CT/MRI/PET

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Best Evidence ENT, July 31, 2022

Why is this important?

- 50 years ago → 5-6 month delay from presentation to diagnosis
 - Today → 3-6 month delay
- Surplus imaging costs \$200-250 billion/year
- Inadequate imaging restricts access to other patients in need

Supplement

Clinical Practice Guideline: Evaluation of the Neck Mass in Adults

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Shrestha RB.. *Applied Radiol.* 2013;42:19

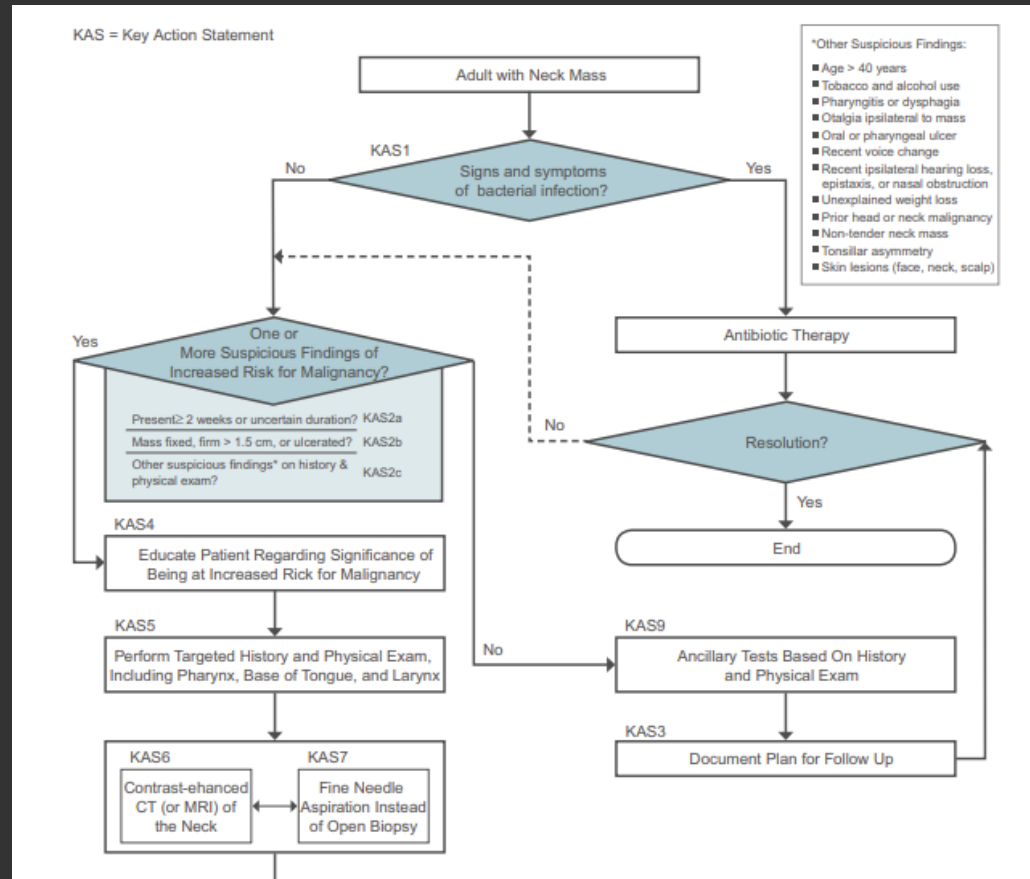
Neck mass in an adult

- Is it benign or is it malignant?
 - Associated with infection
 - Resolving

Table 1. Relative Prevalence of Neck Mass Etiologies

Type	Common	Uncommon	Rare
Acute	Cytomegalovirus infection	Acute sialadenitis	—
	Epstein-Barr virus infection	Arteriovenous fistula	
	Staphylococcal or streptococcal infection	<i>Bartonella henselae</i> infection	
	Toxoplasmosis	Hematoma	
	Viral upper respiratory infection	Human immunodeficiency virus infection	
		<i>Mycobacterium tuberculosis</i> infection	
Subacute	Squamous cell carcinoma of the upper aerodigestive tract	Parotid lymphadenopathy	
		Pseudoaneurysm	
		Amyloidosis	Castleman disease
		Lymphoma	Kikuchi disease
		Metastatic cancer	Kimura disease
		Parotid tumor	Rosai-Dorfman disease
Chronic	Thyroid pathology	Sarcoidosis	
		Sjögren syndrome	
		Branchial cleft cyst	Liposarcoma
		Carotid body tumor	Parathyroid carcinoma
		Glomus jugulare tumor	
		Glomus vagale tumor	
	Laryngocele		
	Lipoma		
	Thyroglossal duct cyst		

Algorithm



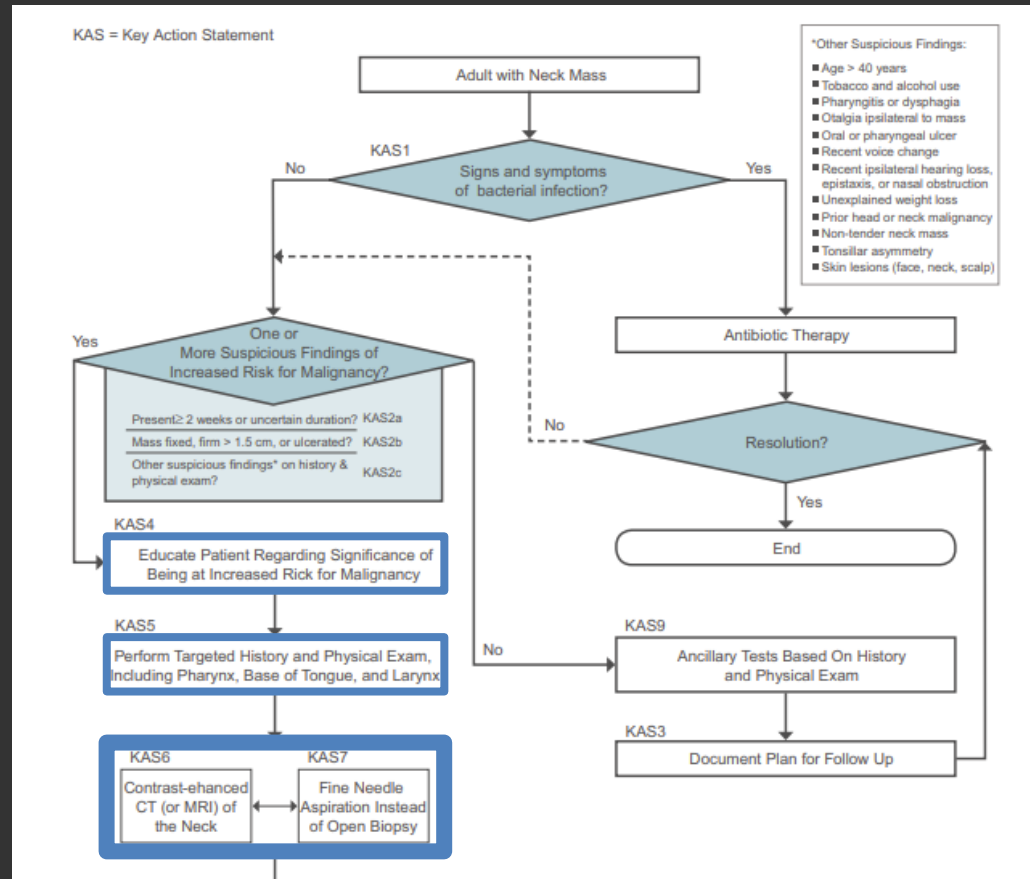
Suspicion for malignancy

- Present \geq 2 weeks, or uncertain
- Mass fixed, firm, > 1.5cm or ulcerated
- Other suspicious findings

*Other Suspicious Findings:

- Age > 40 years
- Tobacco and alcohol use
- Pharyngitis or dysphagia
- Otalgia ipsilateral to mass
- Oral or pharyngeal ulcer
- Recent voice change
- Recent ipsilateral hearing loss, epistaxis, or nasal obstruction
- Unexplained weight loss
- Prior head or neck malignancy
- Non-tender neck mass
- Tonsillar asymmetry
- Skin lesions (face, neck, scalp)

Algorithm





Concern for malignancy?

- Contrast-enhanced CT or MRI
 - Localize and characterize the mass
 - Assess for additional non-palpable masses
 - Screen visualized organs (upper aerodigestive tract) for possible primary sites of disease
 - Other evidence to support alternative diagnosis

CT benefits

- Availability
- Cost (\$240)
- Well tolerated (<5 minutes, larger scanner bore)
- Excellent bone detail

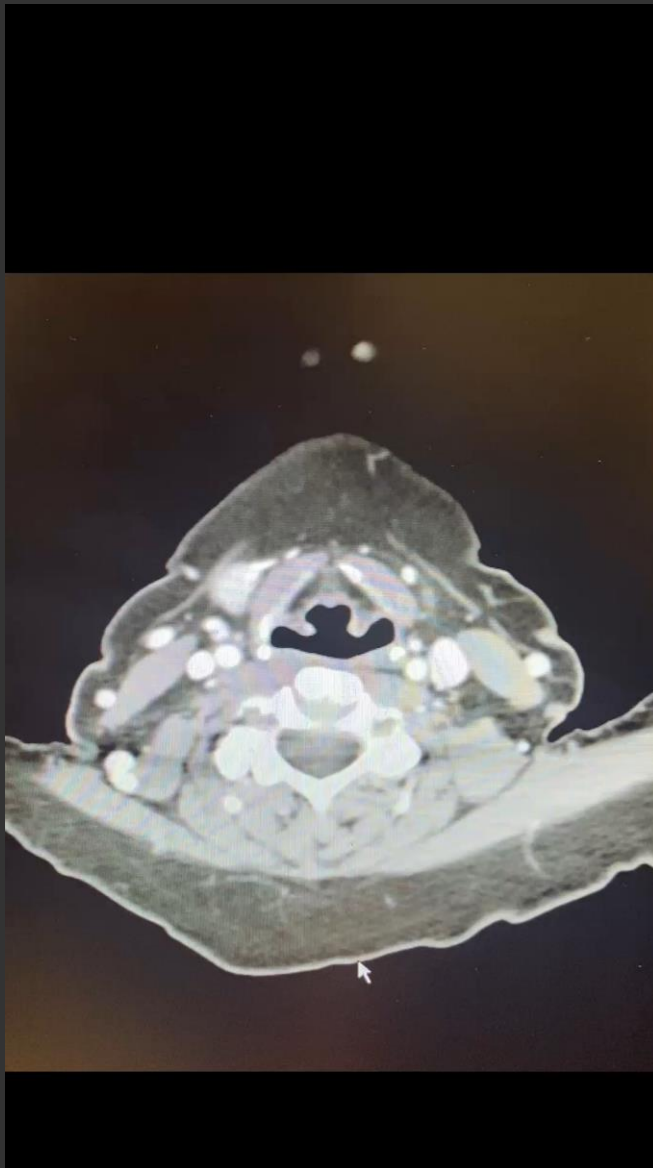


CT benefits

- Availability
- Cost (\$240)
- Well tolerated (<5 minutes, larger scanner bore)
- Excellent bone detail
- Radiation dose: 3-4 mSv = annual background radiation from natural sources in the US = 150 CXR
- Dental artifact

Contrast

- If patient has no contraindications: give it
 - Improves characterization of the mass (cystic vs solid)
 - Helps map lesion borders
 - Improved identification of potentially small primary sites











Contrast

- If patient has no contraindications: give it
 - Improves characterization of the mass (cystic vs solid)
 - Helps map lesion borders
 - Improved identification of potentially small primary sites
- Rarely any added benefit of getting a non-contrasted scan prior to contrast
- Don't order CT with and without contrast (no benefit, double radiation)
- MRI without contrast has small benefit over non-contrasted CT

Kidney Injury

Use of Intravenous Iodinated Contrast Media in Patients with Kidney Disease: Consensus Statements from the American College of Radiology and the National Kidney Foundation

 Matthew S. Davenport   Mark A. Perazella,  Jerry Yee,  Jonathan R. Dillman, Derek Fine, Robert J. McDonald,  Roger A. Rodby,  Carolyn L. Wang,  Jeffrey C. Weinreb

- Contrast-Induced Nephropathy is overstated
- Contrast-associated AKI (CA-AKI): Any AKI occurring within 48 hours after the administration of contrast media.
 - *Postcontrast acute kidney injury* (PC-AKI)
 - Both terms imply correlative diagnosis.
 - Neither term implies a causal relationship between contrast medium administration and an AKI event.
- Contrast-induced acute kidney injury (CI-AKI): subset of CA-AKI that can be causally linked to contrast media administration.
 - formerly termed contrast-induced nephropathy

Kidney Injury

- The risk of CA-AKI (coincident AKI of any cause) increases with each stepwise increase in CKD stage
 - eGFR ≥ 60 = 5%
 - eGFR 45–59 = 10%
 - eGFR 30–44 = 15%
 - eGFR <30 = 30%
- The risk of CI-AKI is substantially less than the risk of CA-AKI, but the actual risk remains uncertain in patients with severe kidney disease
 - eGFR ≥ 45 , 0%
 - eGFR 30–44, 0%–2%
 - eGFR <30 , 0%–17%

Kidney Injury

- Other major patient-related factors increase the risk of CA-AKI
 - diabetes mellitus
 - nephrotoxic agents and exposures
 - hypotension
 - hypovolemia
 - albuminuria
 - impaired kidney perfusion (eg, congestive heart failure)

Kidney Injury

- When to pre-treat
 - AKI
 - eGFR less than 30 mL/min/1.73 m²
 - Not undergoing maintenance dialysis
- Risks of prophylaxis
 - heart failure, other hypervolemic conditions
- In individual high-risk circumstances (eg, numerous risk factors, recent AKI, borderline eGFR), prophylaxis may be considered in patients with eGFR of 30–44 mL/min/1.73 m²
- Planned dialysis

Allergy

- Iodinated contrast media
 - All share a common core structure called a tri-iodinated benzene ring
 - Classified as monomers or dimers; ionic or nonionic
- Severe acute hypersensitivity reactions
 - Occur within 1 hour of administration
 - Higher frequency with use of high-osmolarity agents (5%-15%) vs low-osmolarity agents (0.2%-0.7%)
- Delayed hypersensitivity
 - Occur 1 hour to 1 week after patients receive ICM
 - Incidence as high as 14%
 - Highest risk with nonionic agents
- Paucity of literature supporting true iodine allergy

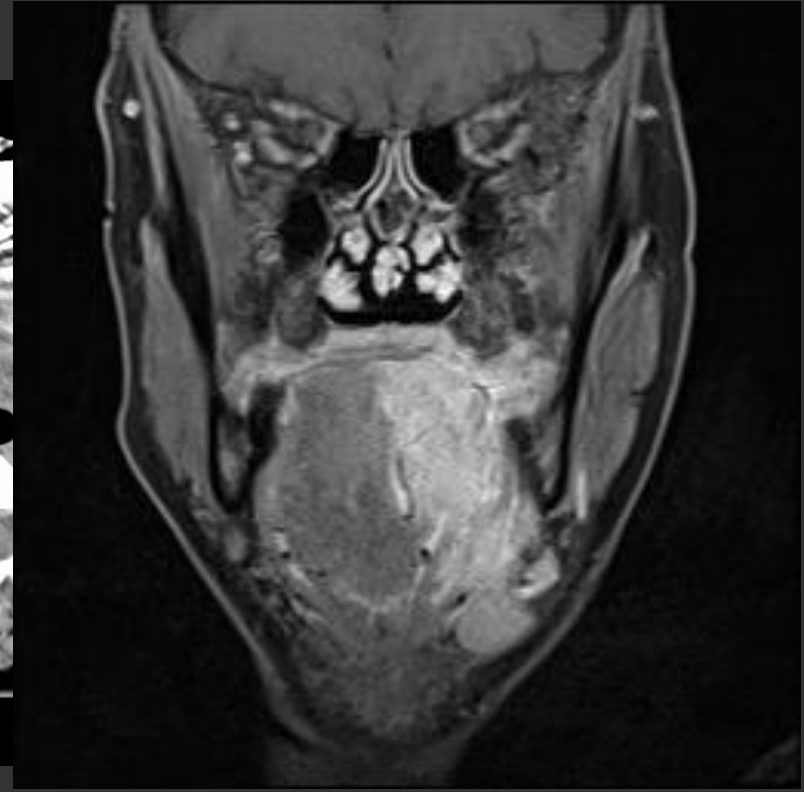
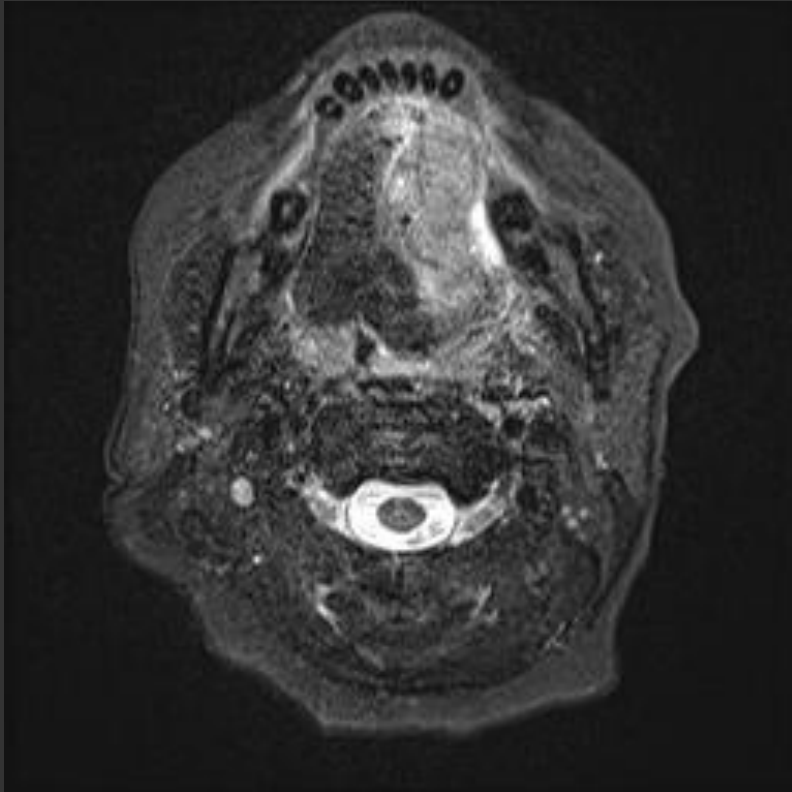
Allergy

- Mythbusters:
 - Iodine is not an allergen
 - Seafood allergy is not an allergy to iodine and not a contraindication for iodine containing compounds
 - Povidone-iodine allergy is likely an allergy to Povidone or contact dermatitis and not a contraindication for contrast
- Management
 - Change ICM agent used
 - Pre-treat (controversial)
 - Non-medicated reactions (unknown but estimated to range 10-35%)
 - Medicated 10%

Allergy- premedication

- Prior mild reaction
 - < 1% chance of moderate or severe reaction
 - No need to pre-treat
- Prior moderate or severe reaction
 - Oral prednisone 50mg at 13, 7 and 1 hour prior to contrast administration
 - Diphenhydramine 50mg (oral, IM or IV) 1 hour prior to administration
 - ED/inpatient:
 - Hydrocortisone 200mg IV at 5 and 1 hours prior to administration
 - Diphenhydramine 50mg IV 1 hour prior to administration
 - Antihistamine commonly included but not specifically studied, optional
 - Can consider H2-blocker for less sedative effects





MRI benefits

- Improved tissue contrast
- Cranial nerve involvement
- Motion artifact
- >30 minutes, claustrophobia
- Lack of ionizing radiation
- Infrequent contrast allergy

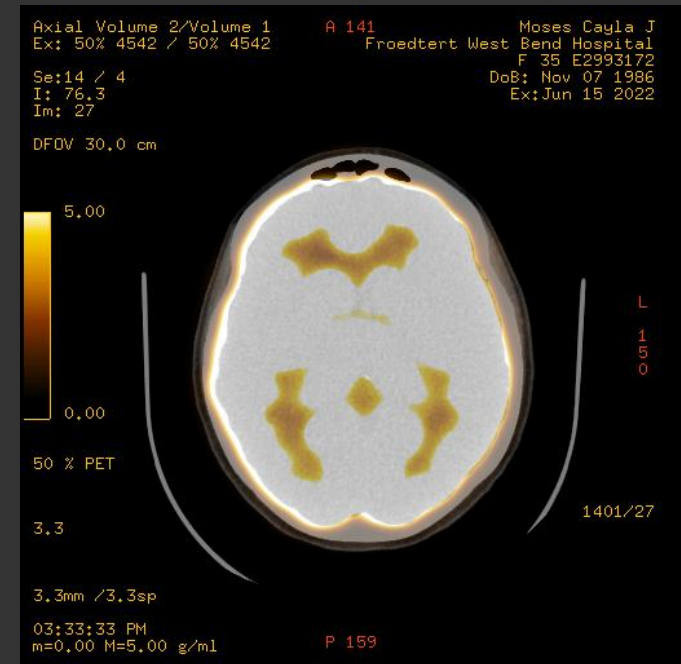


CTA/MRA

- Not part of routine screening or initial imaging protocol
- Used for vascular masses

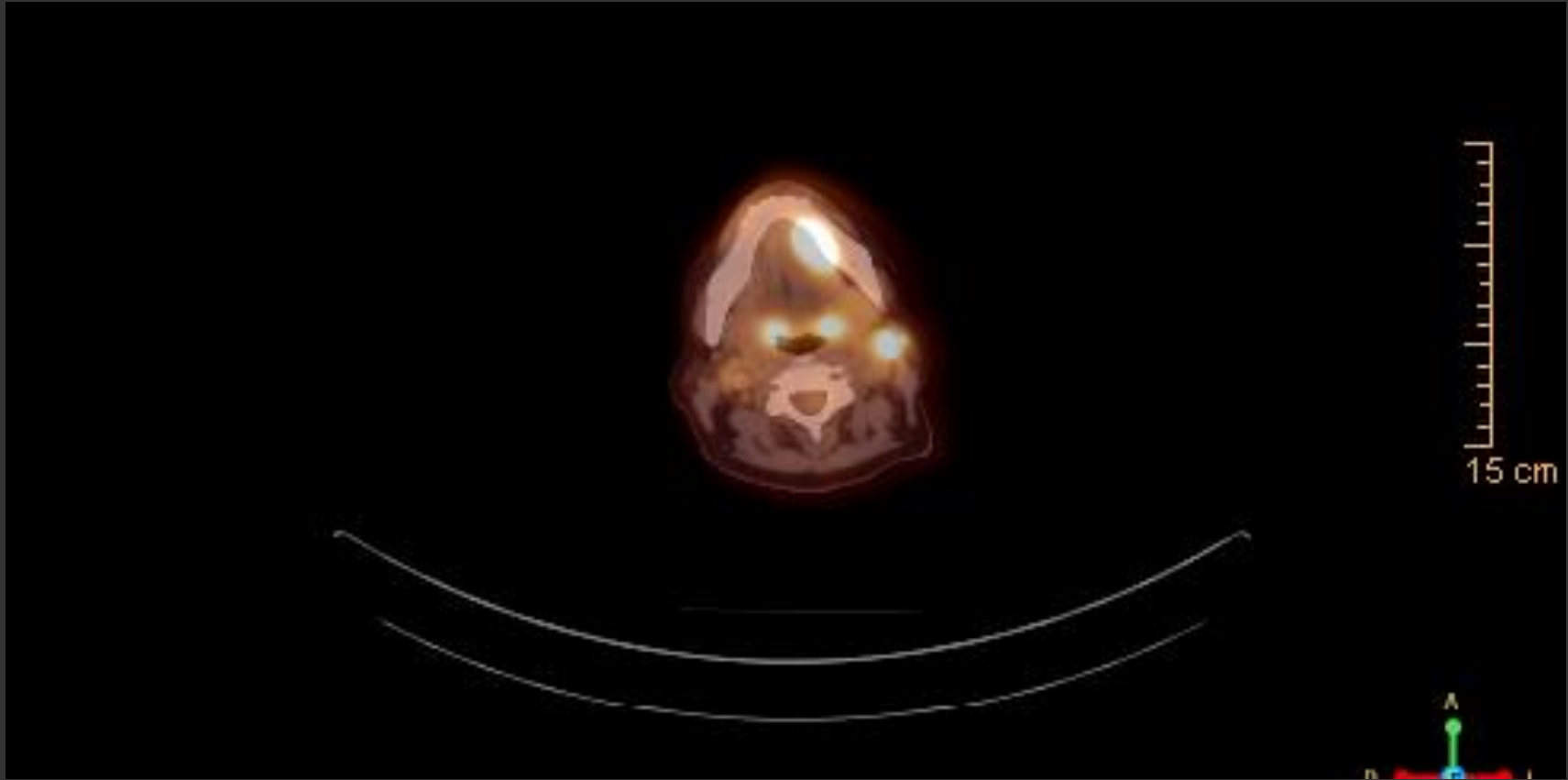
PET/CT

- Positron-emitting radionuclides are injected (flourine-18, flourodeoxyglucose)
- Taken up in different concentrations by metabolically or functionally active tissues
 - Specific for tumors and infection
- Lower spatial resolution- integrated PET/CT
- Higher radiation doses, as high as 32mSv
 - With frequent scanning, can increase lifetime attributable risk of malignancy



PET/CT

- Identification of primary disease
 - Sensitivity 97%
 - Detects primary tumor in up to 50% of patients
 - False-negative in small lesions and primary tumors of the pharyngeal lymphoid tissue with high background physiologic activity.
- Detection of metastatic disease
 - Superior to both CT and MRI for detecting regional nodal metastases, distant metastases and second primaries
- Can change staging and management in 13-33% of patients
- Nodal micrometastases in clinically N0 patients



U/S

- Noninvasive and inexpensive (diagnostic U/S approx. \$120)
- No radiation exposure
- Guide FNA/core biopsies
- First imaging choice for thyroid and salivary masses or low risk of malignant disease
- Useful to distinguish cystic from solid masses, detect nodal size, differentiate high-flow from low-flow vascular malformations
- Limitations
 - Dependence on operator expertise
 - variable interobserver/interfacility reliability
 - limited deep visualization (parapharyngeal and masseteric spaces)

The end