

Diagnostica RMN

cavo orale-orofaringe-ipofaringe-laringe

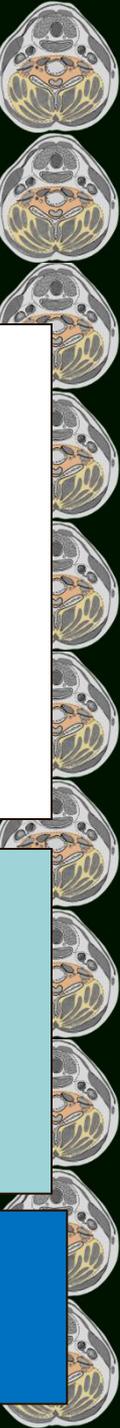


Elisa Botturi

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MRI VS CT



- **Differenziazione tessuti superiore**
- **Minori artefatti da amalgama**
- **Assenza di radiazioni ionizzanti**

- **Rapidità**
- **Risoluzione spaziale**
- **Manovre dinamiche studio ipofaringe e laringe**

- **Lunga durata sequenze**

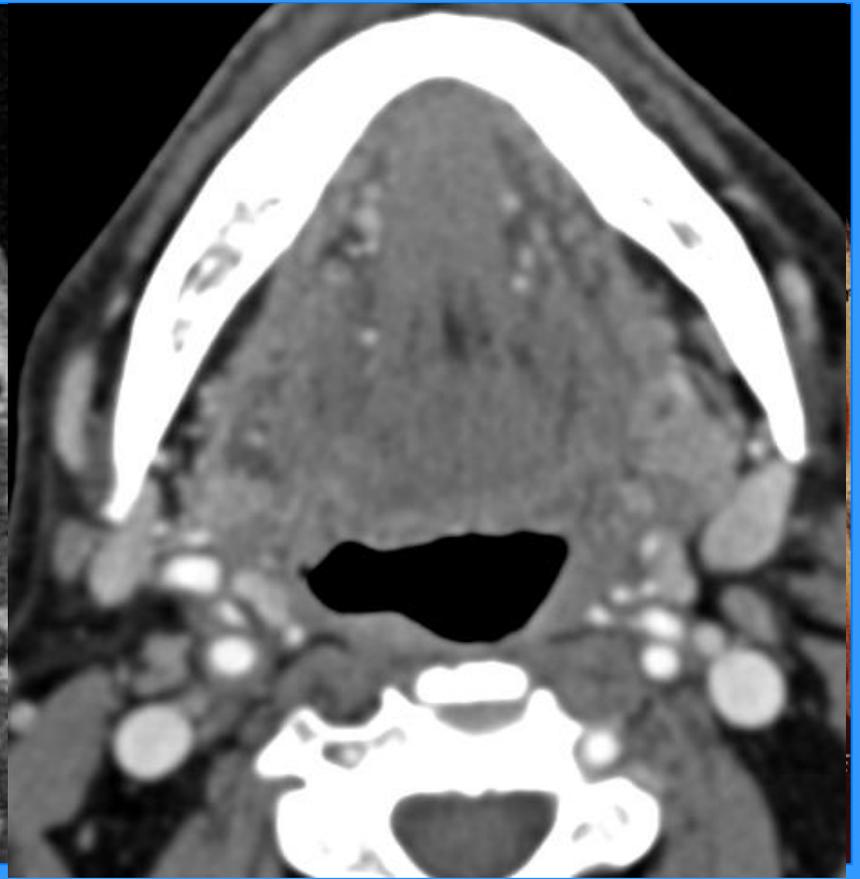
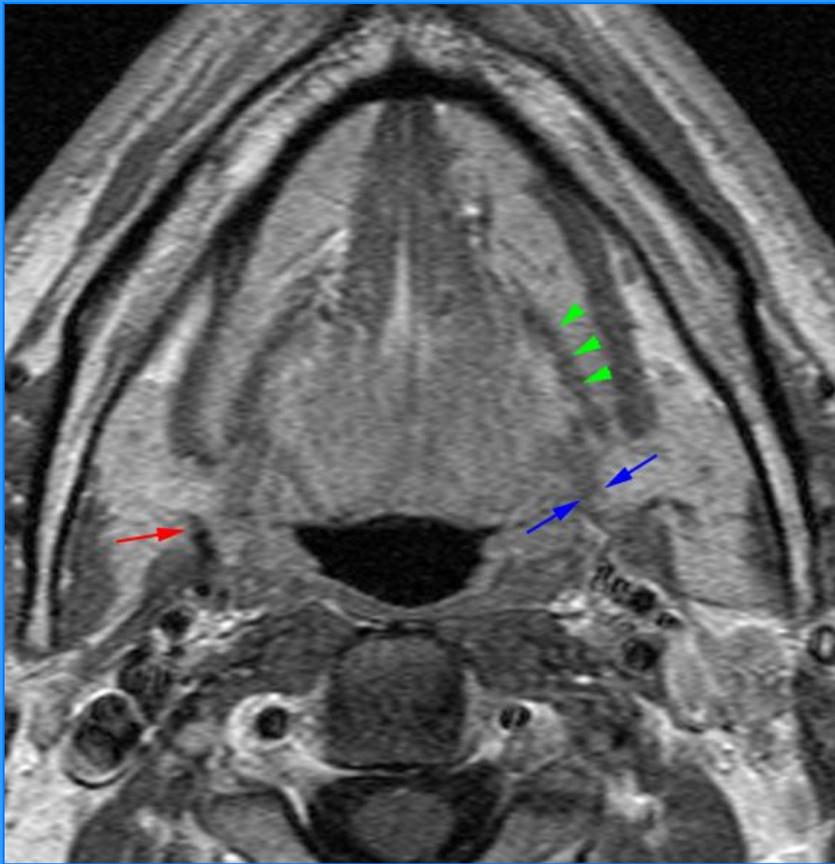
- **Artefatti da amalgama**
- **Radiazioni ionizzanti**
- **Bassa risoluzione tissutale**

- **Pz claustrofobico/non collaborante**
- **PM**

- **Allergia mdc**
- **IRC**

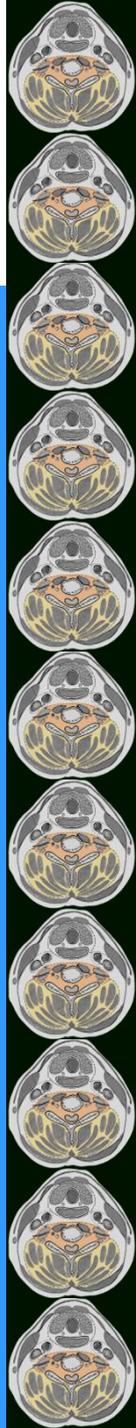
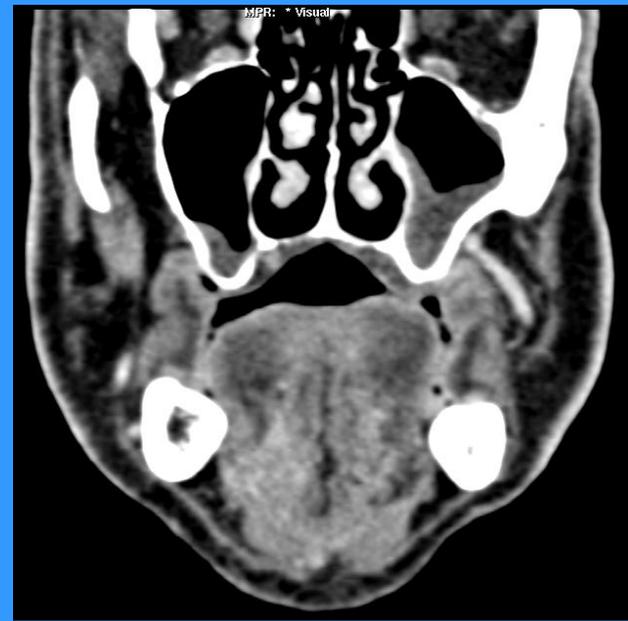
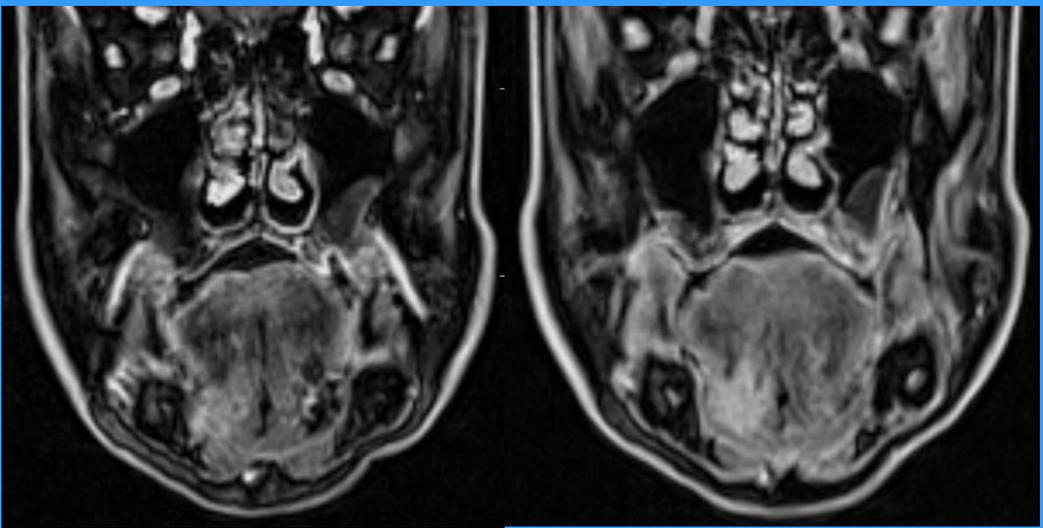
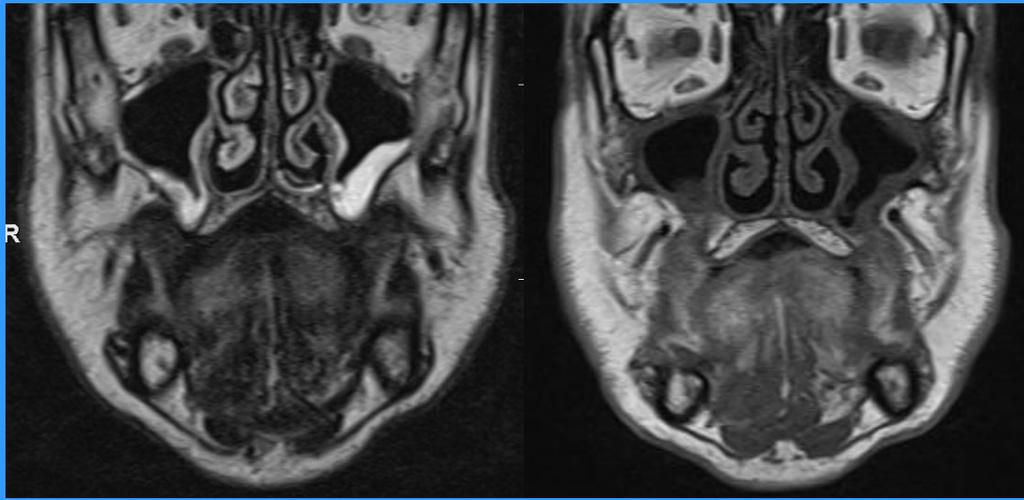


MRI VS CT





MRI VS CT





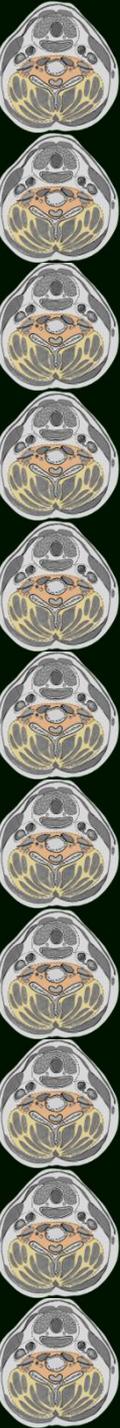
Protocollo di studio MRI

Sequenze morfologiche

- TSE T2 ax
- TSE T2 cor/sag
- SE T1 ax o cor
- SE T1 Gd ax+cor
- VIBE (isotropiche-ricostruzioni multiplanari)

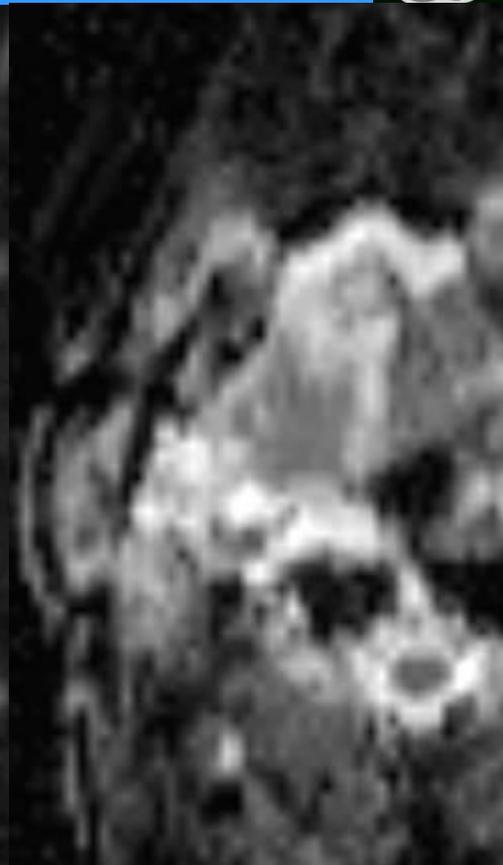
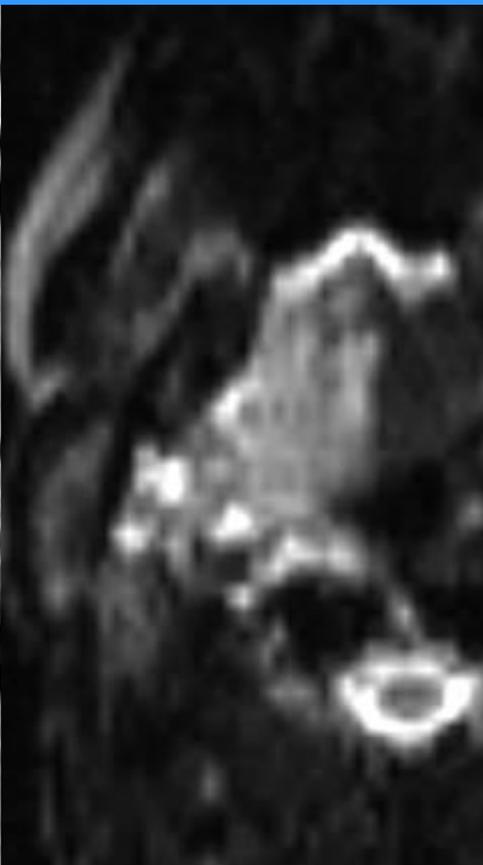
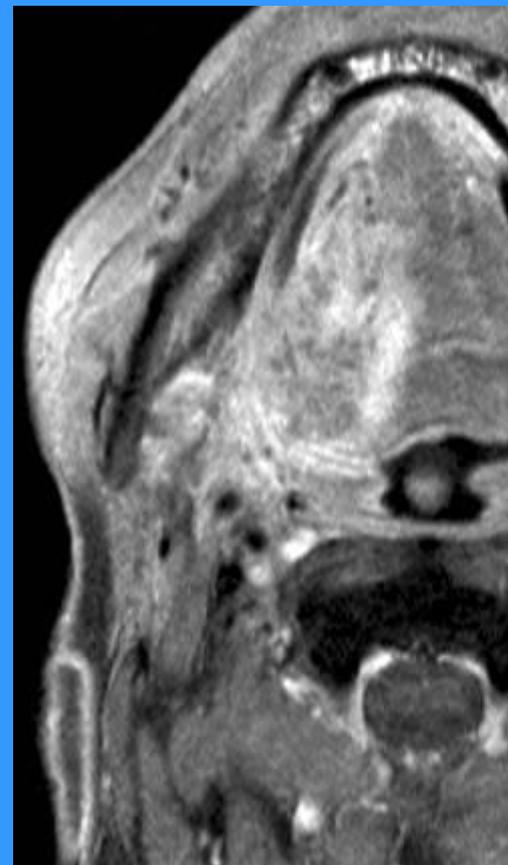
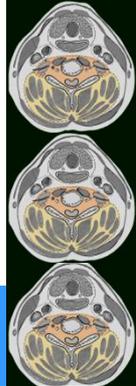
Sequenze “funzionali”

- DCE MRI (perfusione)
- DWI (diffusione)





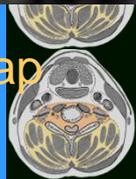
Diffusion-weighted MRI



$b = 0$

$b = 1000$

ADC-map



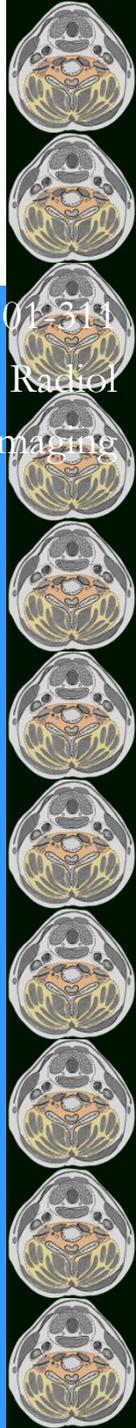


DCE-MRI e neoangiogenesi

Bisdas S (2010) Eur Radiol 24(3):301-314

Brasch R(2000) Eur Radiol

Padhani AR (2005) Abdom Imaging



- **Studio non invasivo del microcircolo tumorale**

- metodo semiquantitativo (curva enhancement)
- *metodo quantitativo (modello farmacocinetico):*

K-trans

K-ep

Ve

iAUC

- **Correlazione con microvessel density/espressione di VEGF/ossigenazione/proliferazione cellulare**
- **Promettente nell'ambito della predizione di risposta a chemioterapia.**



**Imaging con RM del cavo orale e
dell'orofaringe**

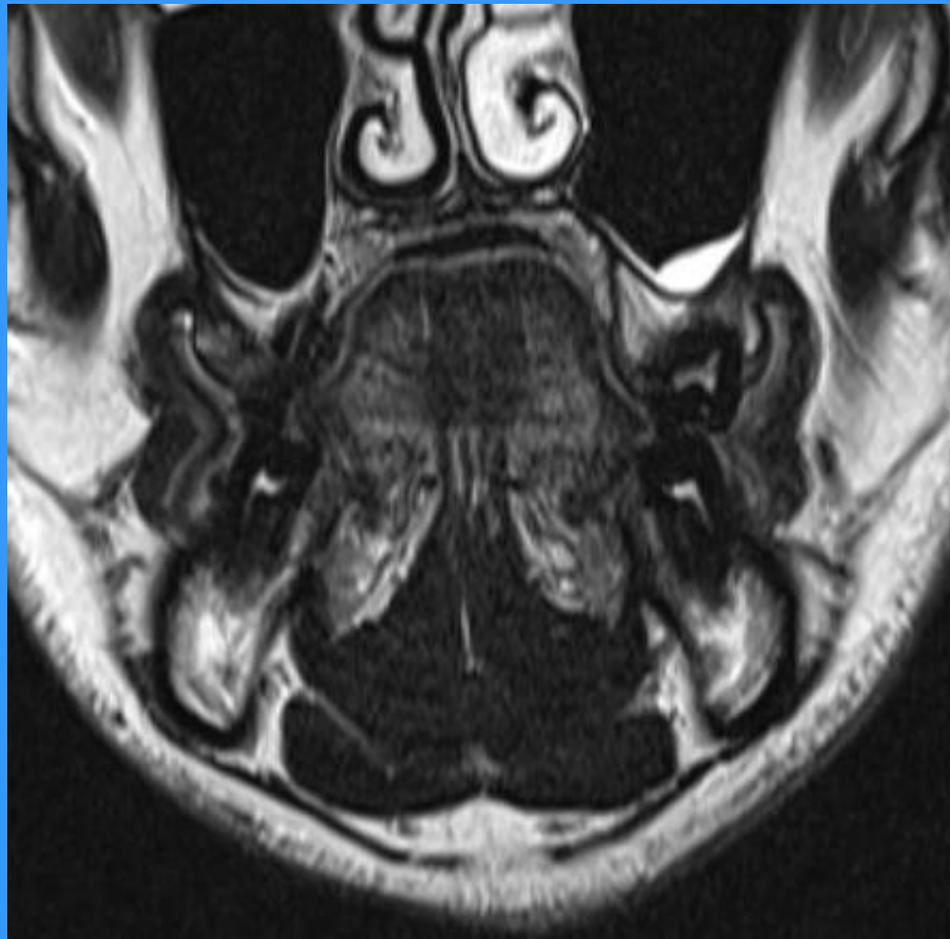


Protocollo di studio MRI: scelta dei piani di acquisizione



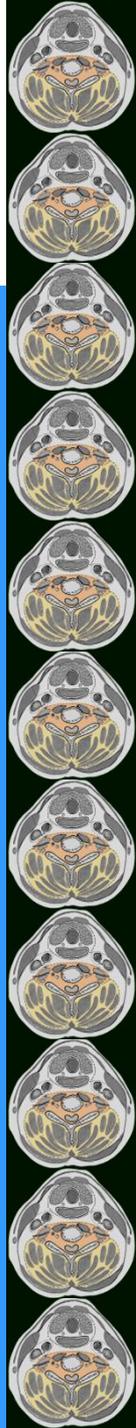
CAVO ORALE

- Pavimento (ghiandole salivari, mucosa, muscoli)
- Lingua (2/3 anteriori)
- Palato duro
- Creste alveolari
- Gengiva
- Guancia
- Trigono retromolare
- Labbra





Protocollo di studio MRI: scelta dei piani di acquisizione



OROFARINGE

- Base della lingua
- Tonsille palatine
- Solco amidaloglosso
- Palato molle
- Parete posteriore del faringe
- Vallecole glosso-epiglottiche



Patologia maligna

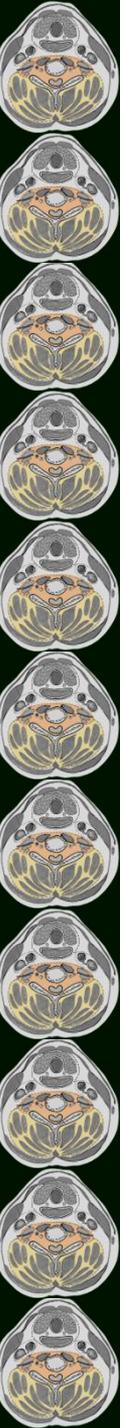
SCC >90%

ACC
Mucoepidermoide
Linfomi
Metastasi
Sarcomi



Aspetti critici della patologia neoplastica

- **valutazione clinica relativamente semplice**
- **geometria complessa**
base lingua, palato molle, trigono retromolare
- **molteplicità di strutture e sottosedimenti**
- **strutture di confine diverse**
ipofaringe/rinofaringe, seni paranasali, spazio masticatorio
- **soluzioni terapeutiche molteplici e integrate**
cht+rt, cht+ch, ricostruzione con lembi

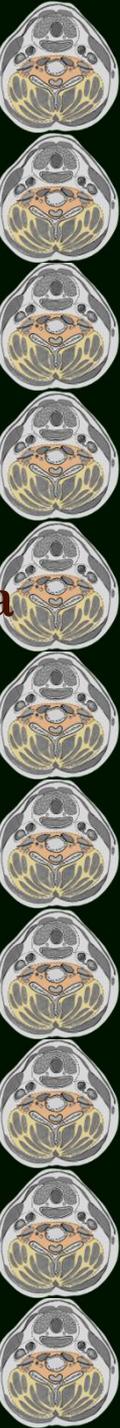




Indicazioni all'imaging

a. Questi pretrattamento

- stadiazione T (estensione profonda di neoplasia identificata all'esame clinico/invasione strutture critiche che modificano il trattamento)
- stadiazione N (dimensioni, livelli, lato, diffusione extracapsulare)
- unknown primary





Metodiche a confronto

T	Sens	Spec	Acc
TC	61%	100%	66%
RM	92%	63%	88%
PET	87%	63%	84%

N	Sens	Spec	Acc
TC	80%	93%	92%
RM	93%	95%	94%
PET	85%	98%	96%

$p < 0.005$

Florian Dammann¹
Marius Horger
Marcus Mueller-Berg

AJR 2005;184:1326–1331

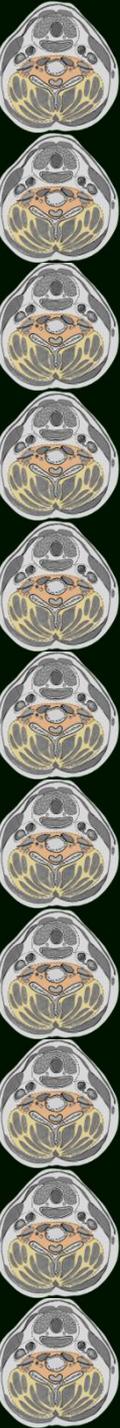
Rational Diagnosis of Squamous Cell Carcinoma of the Head and Neck Region: Comparative Evaluation of CT, MRI, and ¹⁸F FDG PET





Staging SCC cavo orale/orofaringe clinical blind spot

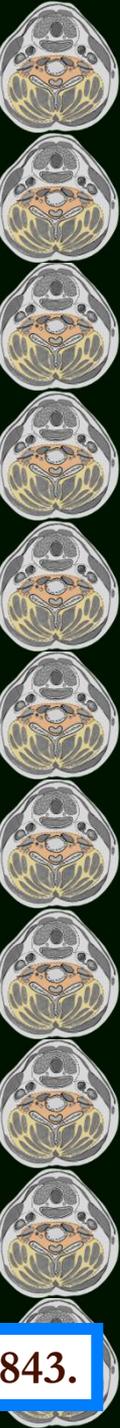
- **Dimensioni: T1 (<2 cm)**
 T2 (2-4 cm)
 T3 (>4 cm)
- **Infiltrazione osso (mandibola/mascella/ioide): T4/RT(?)**
- **Diffusione perineurale (ACC)**
- **Diffusione agli spazi PF e masticatorio (trigono/tonsilla)**
- **Linfonodi retrolaterofaringei**





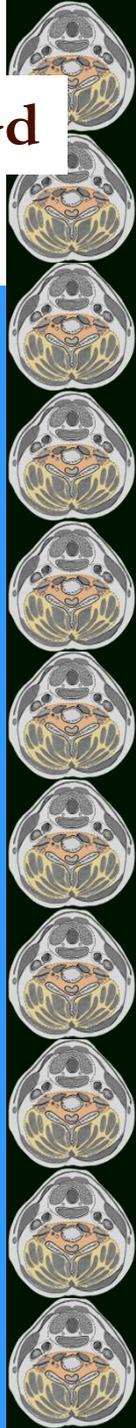
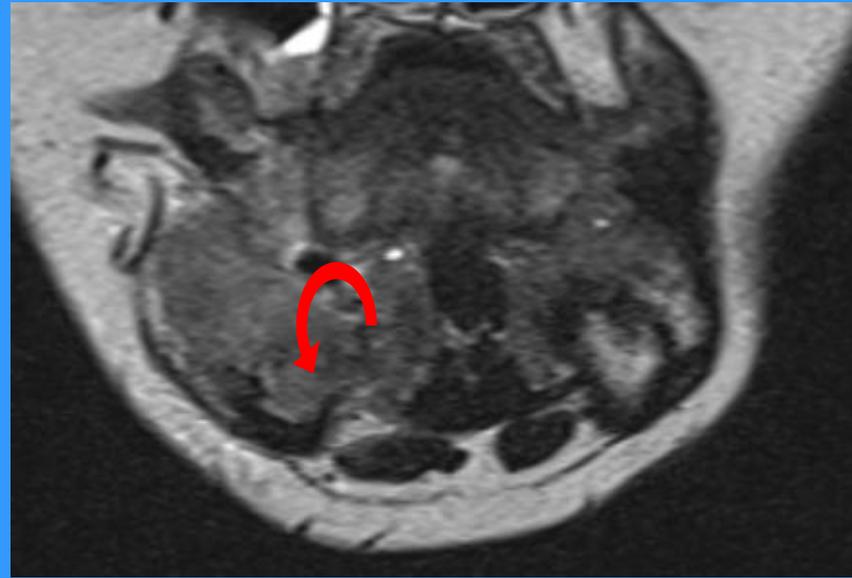
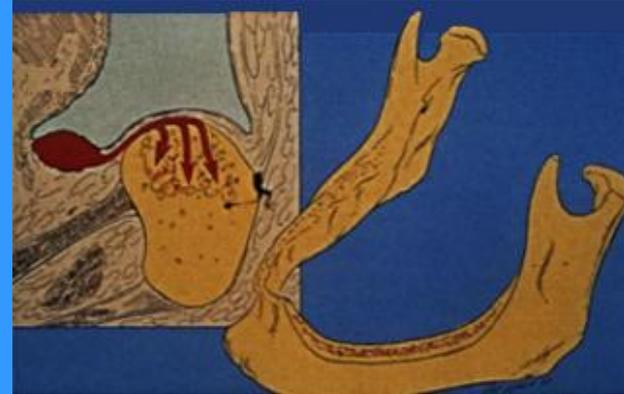
MRI e l'invasione ossea

- Studio prospettico MRI su 43 pts con SCC cavo orale/orofaringe sottoposti a mandibulectomia marginale (28/43) o segmentaria (15/43)
- Confronto tra MRI e dato istologico sul pezzo chirurgico sulla presenza di infiltrazione dell'osso corticale e/o della midollare ossea.
- Sensibilità 93%; specificità, 93%; accuracy, 93%; **NPV 96%**, PPV 87.5%.





MRI: ax+cor T2, ax T1 senza mdc, ax+cor T1 Gd, ax VIBE Gd



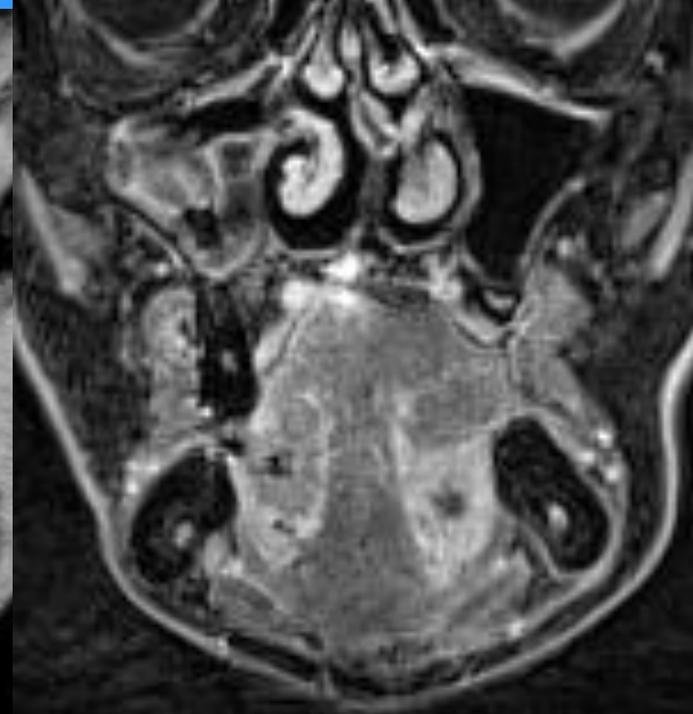
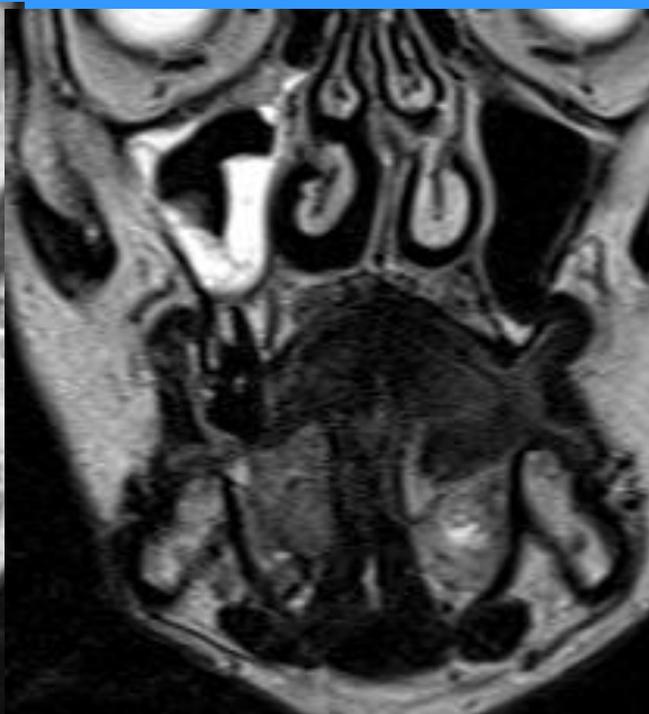
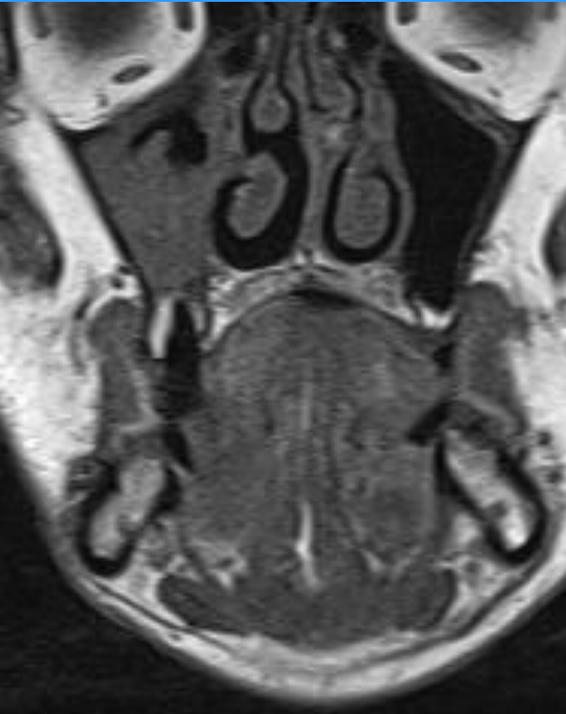
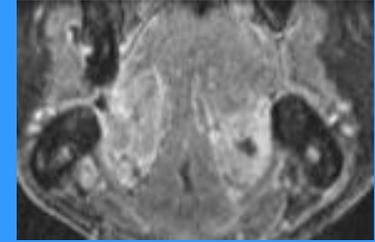


MRI e diffusione del SCC cavo orale

Invasione del pavimento orale

-ghiandola sottomandibolare

-muscoli



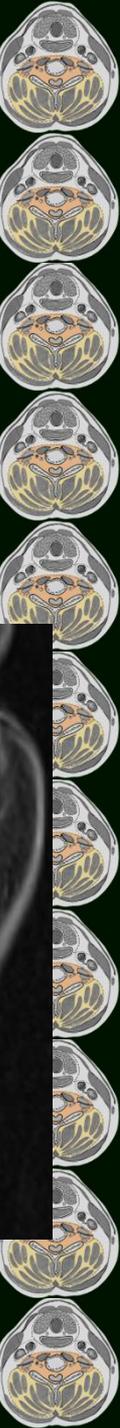
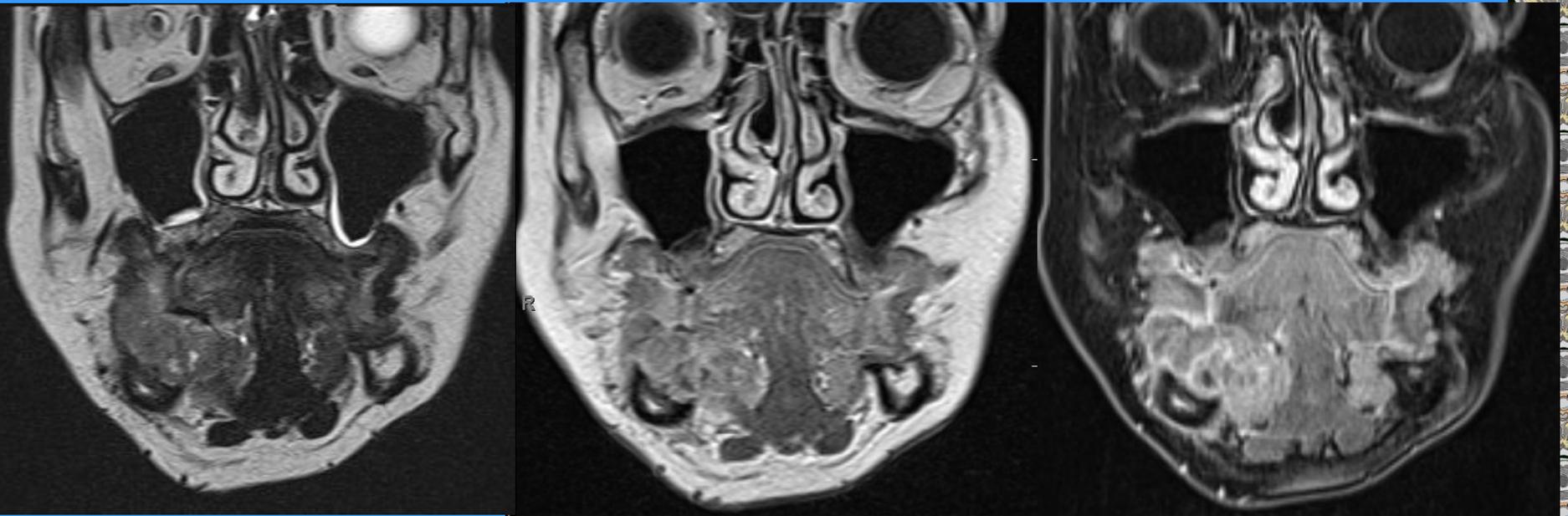


MRI e diffusione del SCC cavo orale

Invasione del pavimento orale

-ghiandola sottomandibolare

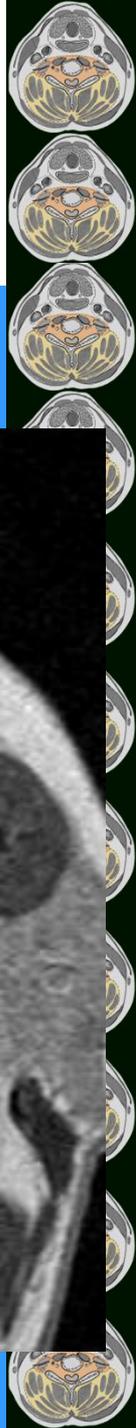
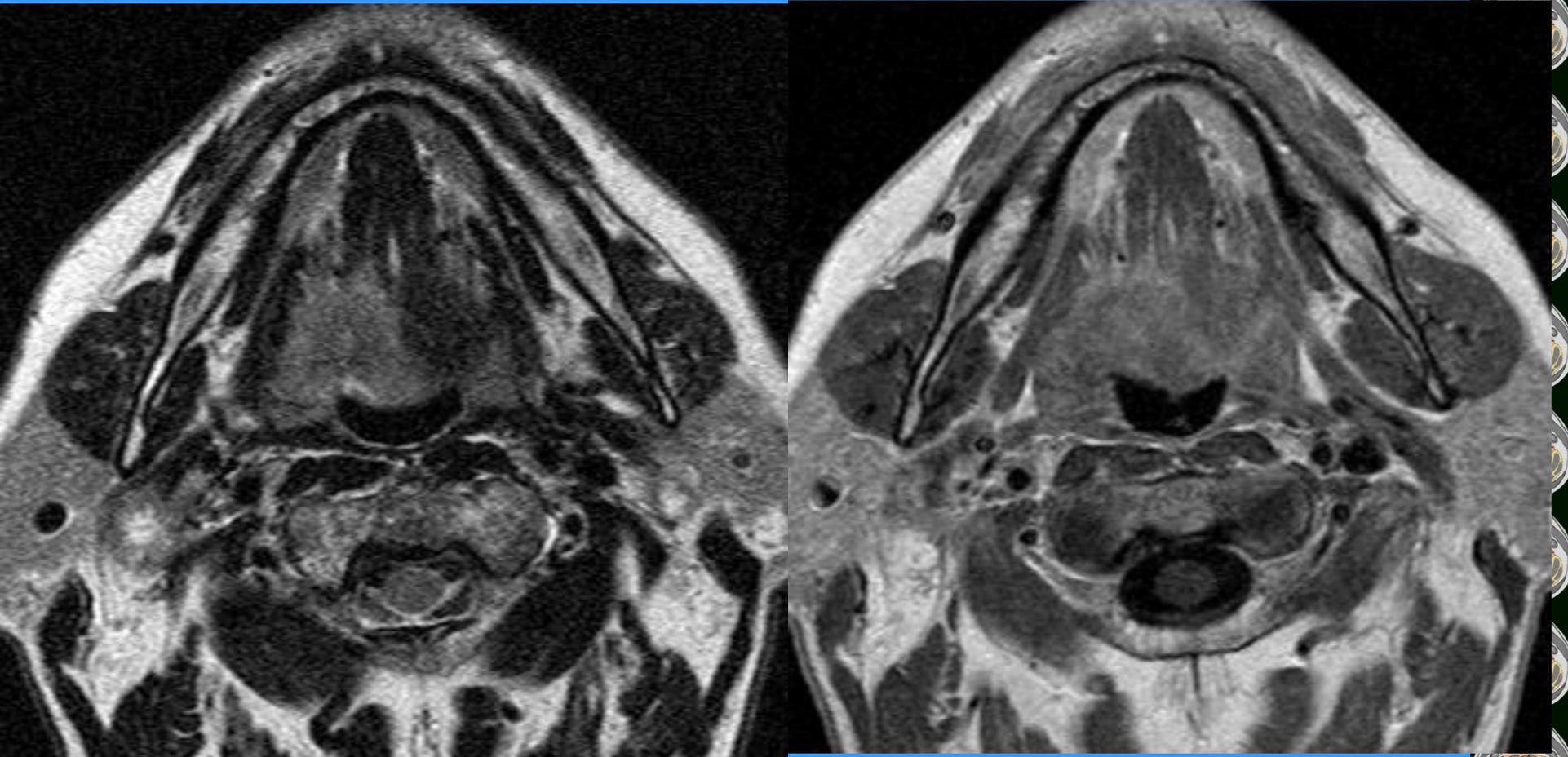
-muscoli





Lo SCC della base lingua

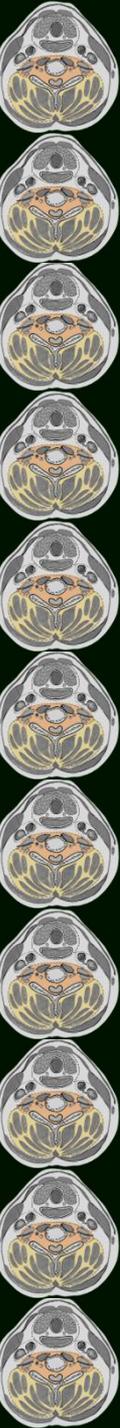
-muscoli radice lingua





Infiltrazione muscoli

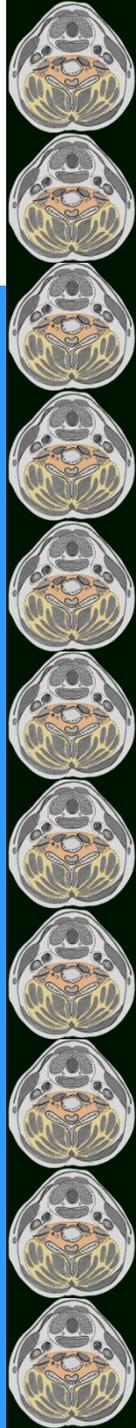
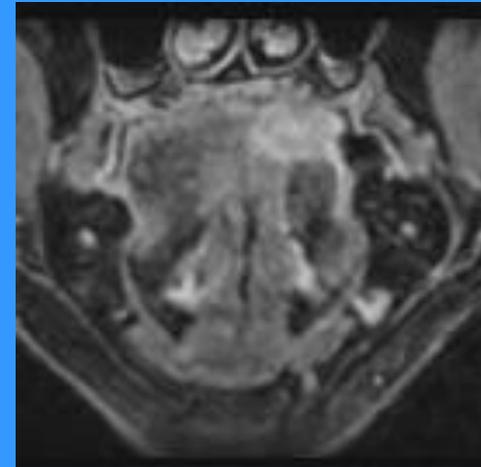
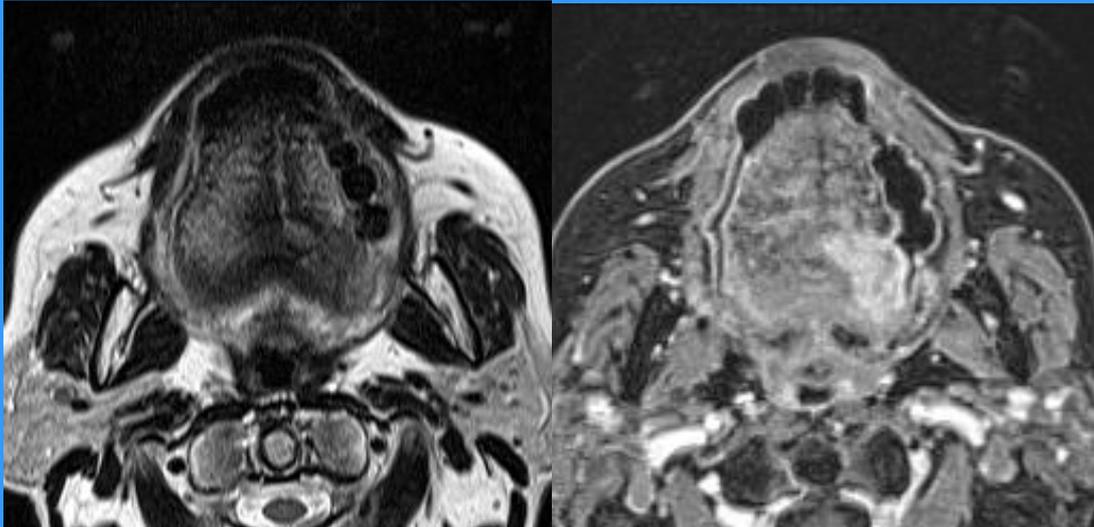
	Pz 32	MRI vs istologia
genioglosso	SE (%)	91
	SP (%)	95
	PPV (%)	91
	NPV (%)	95
ioglosso	SE (%)	100
	SP (%)	95
	PPV (%)	91
	NPV (%)	100
buccinatore	SE (%)	100
	SP (%)	92
	PPV (%)	80
	NPV (%)	100





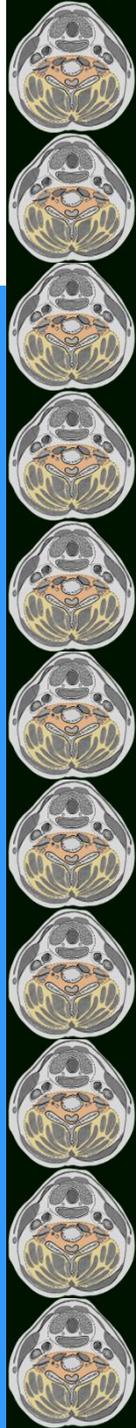
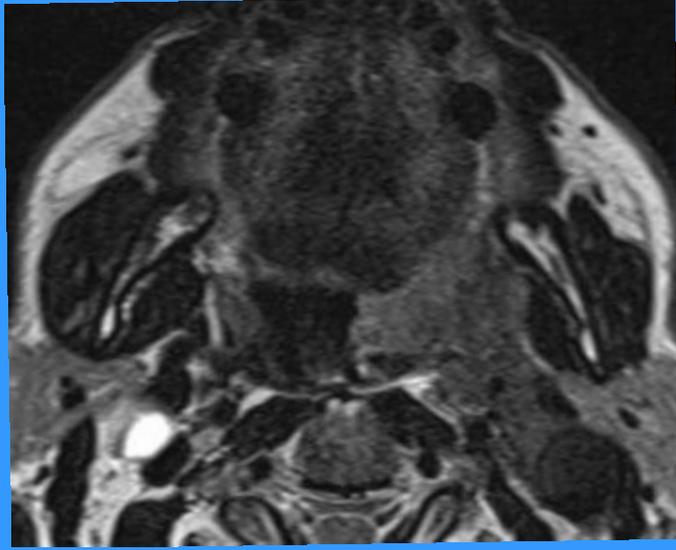
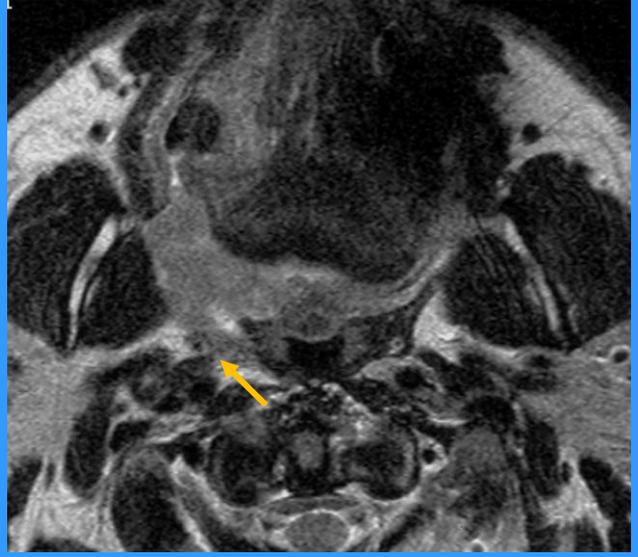
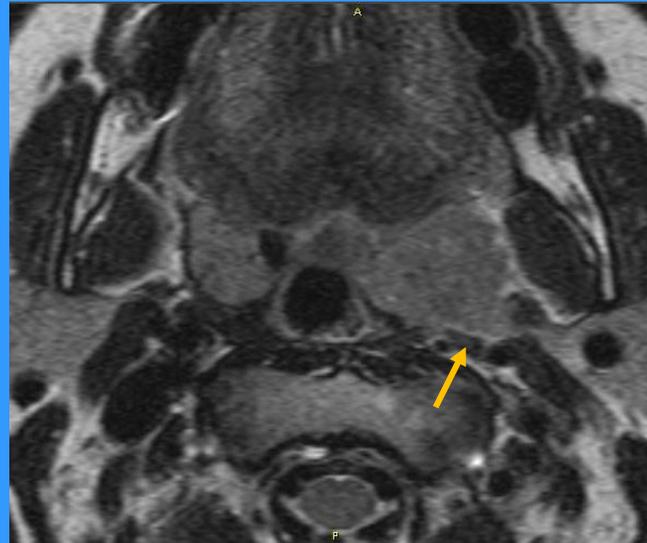
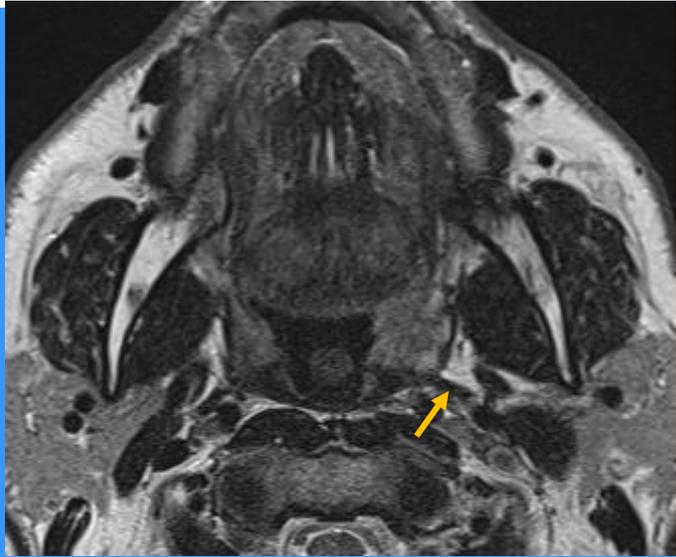
MRI linea mediana

-la linea mediana



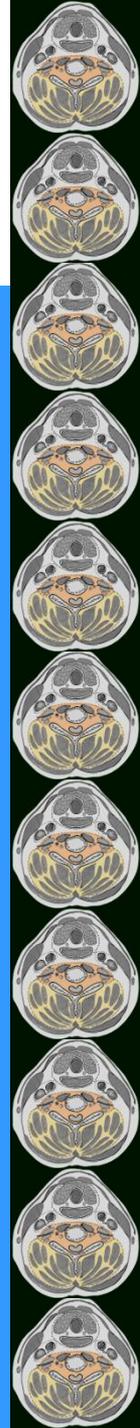
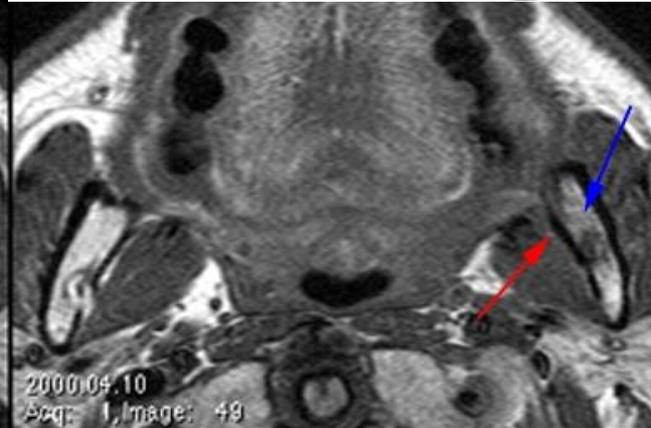
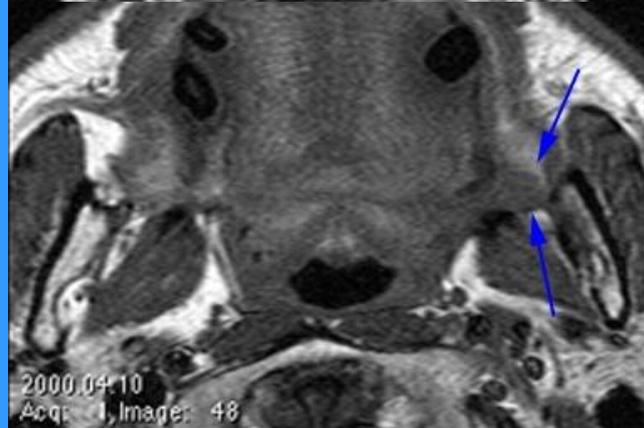
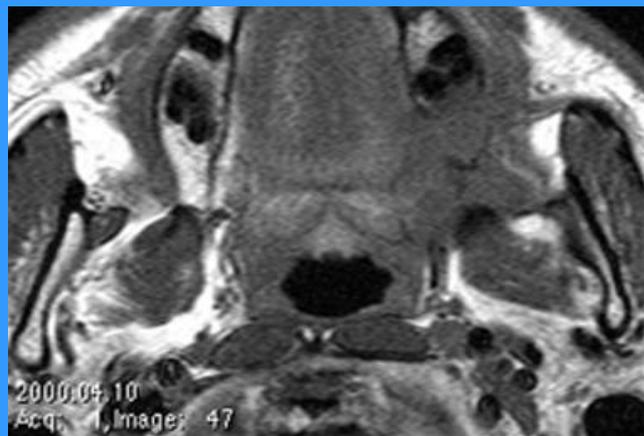
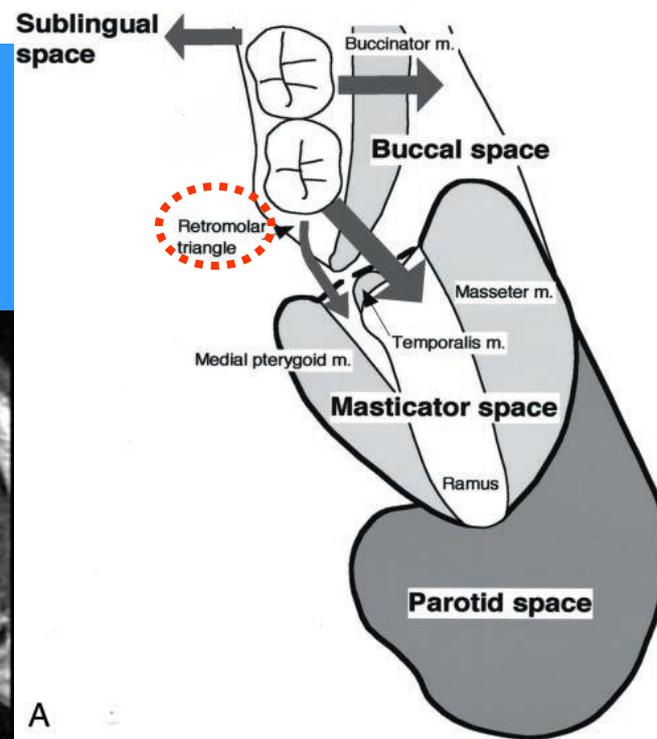


Tonsilla: m. costringitore; m.stilofaringeo; spazio parafaringeo



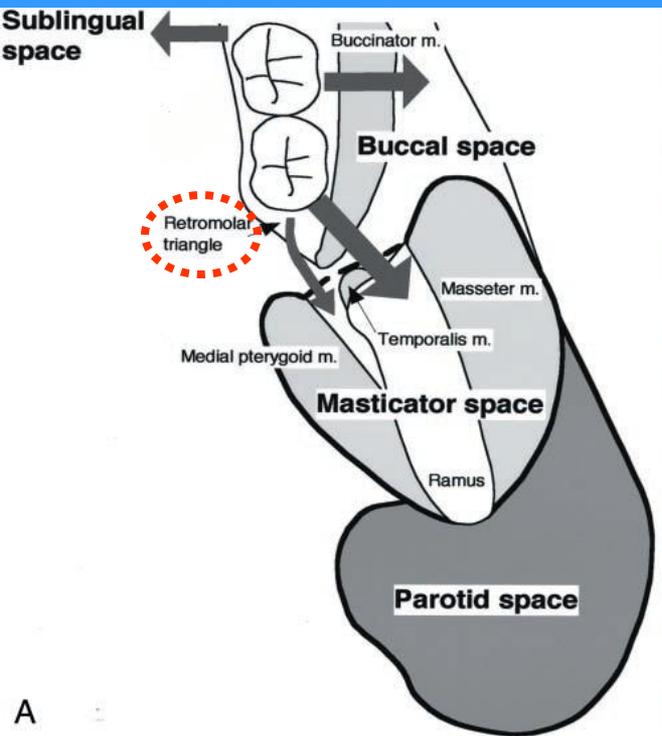
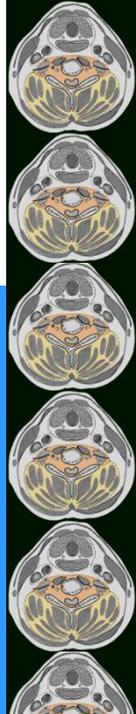


Lo SCC del trigono retromolare

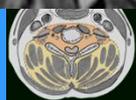
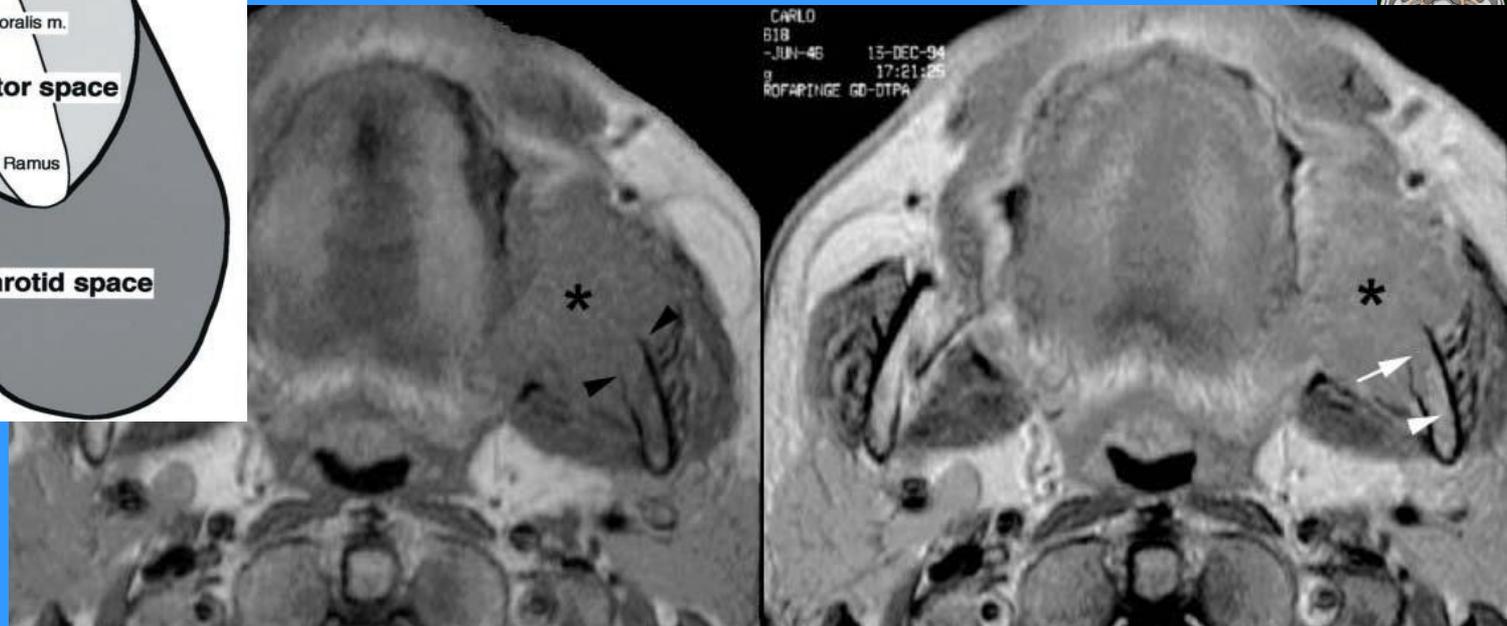




Lo SCC del trigono retromolare



l'estensione in profondità





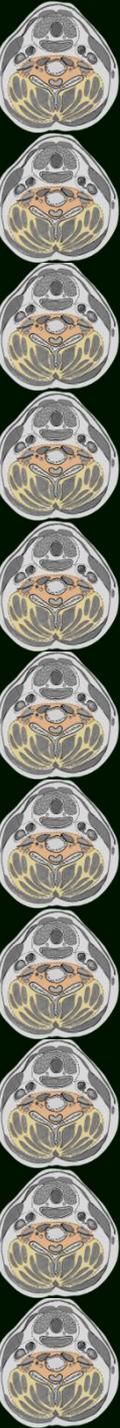
MRI dell'ipofaringe

Seno piriforme 60%

Area retrocricoidea 25%

Parete posteriore 15%

- .Diffusione sottomucosa
- .Multifocalità
- .Stadio avanzato alla diagnosi
- .Metastasi a distanza
- .Tumori sincroni-metacroni



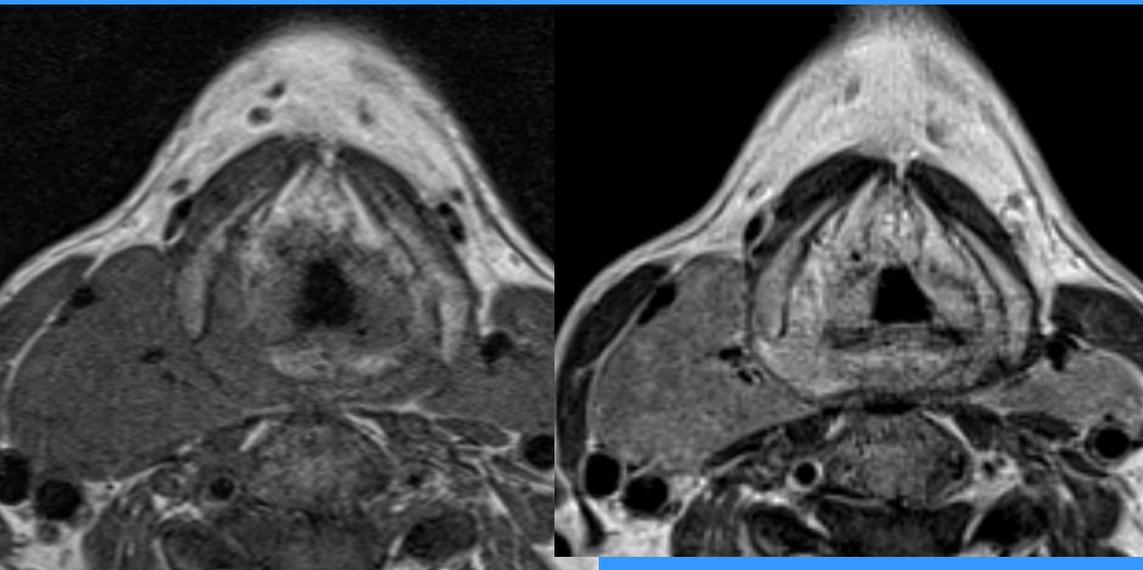


MRI ipofaringe

Domande al radiologo: stadiazione

- Sottosedi diverse/apice del seno piriforme/cartilagine/N/estensione tessuti molli collo/spazio prevertebrale
- Spazio tiro-aritenoideo/paraglottico posteriore (DWI)
- Corde vocali
- Invasione del costrittore

MIGLIORE RISOLUZIONE TISSUTALE



•Incidentaloma in stadiazione neoplasia linguale (gozzo)

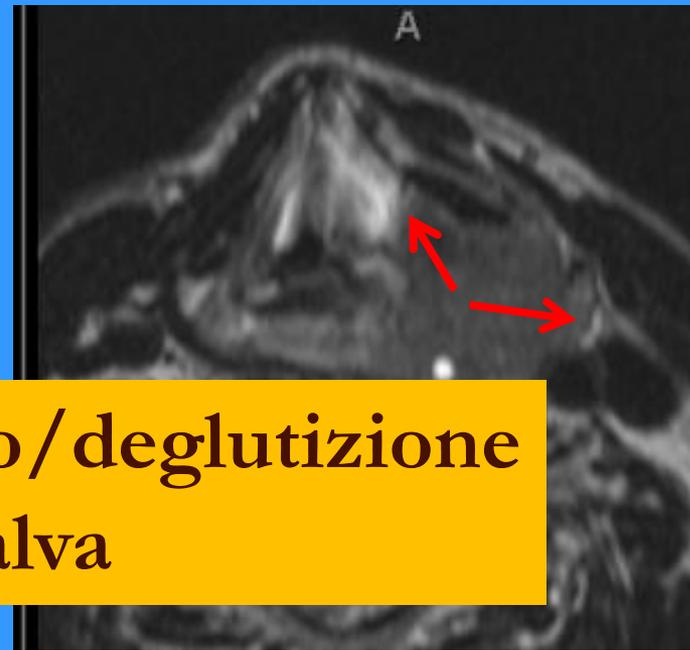




MRI ipofaringe



**CONTRO: Respiro/deglutizione
no valsalva**



**Seno piriforme tipico:
costrittore/tiroide/cricoide/dislocazione falsa e vera
corda**



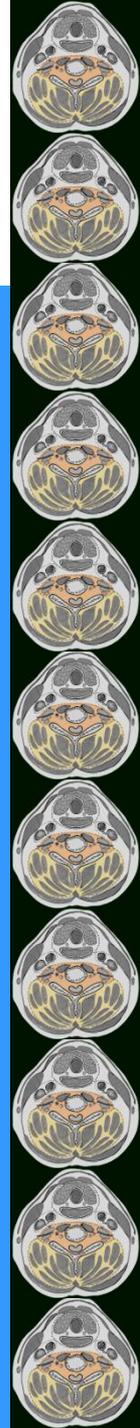


MRI laringe?

- **Artefatti da deglutizione**
- **Insufficiente risoluzione spaziale**
- **Basso rapporto segnale rumore**
- **Tempi di esame lunghi**

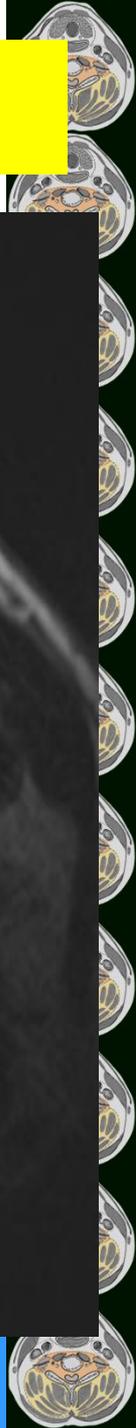
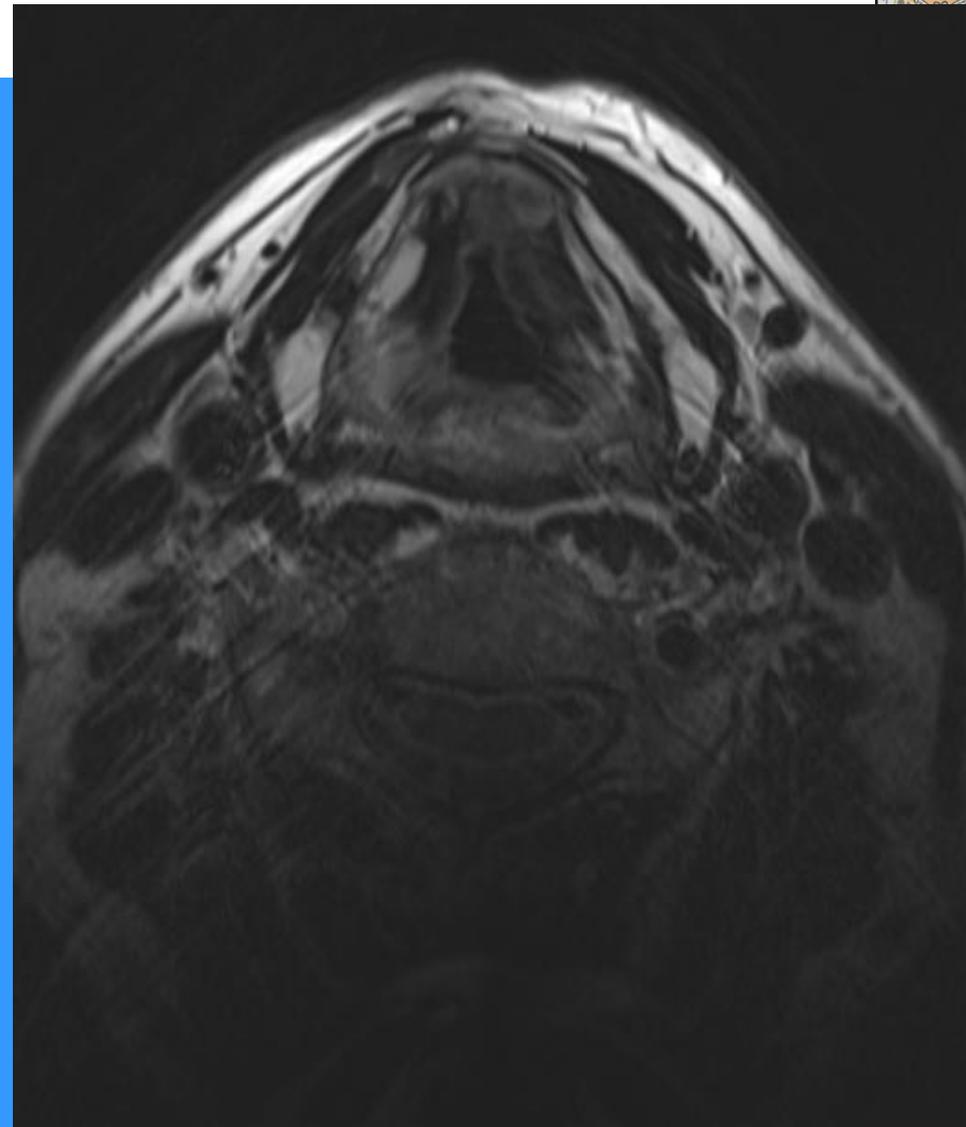
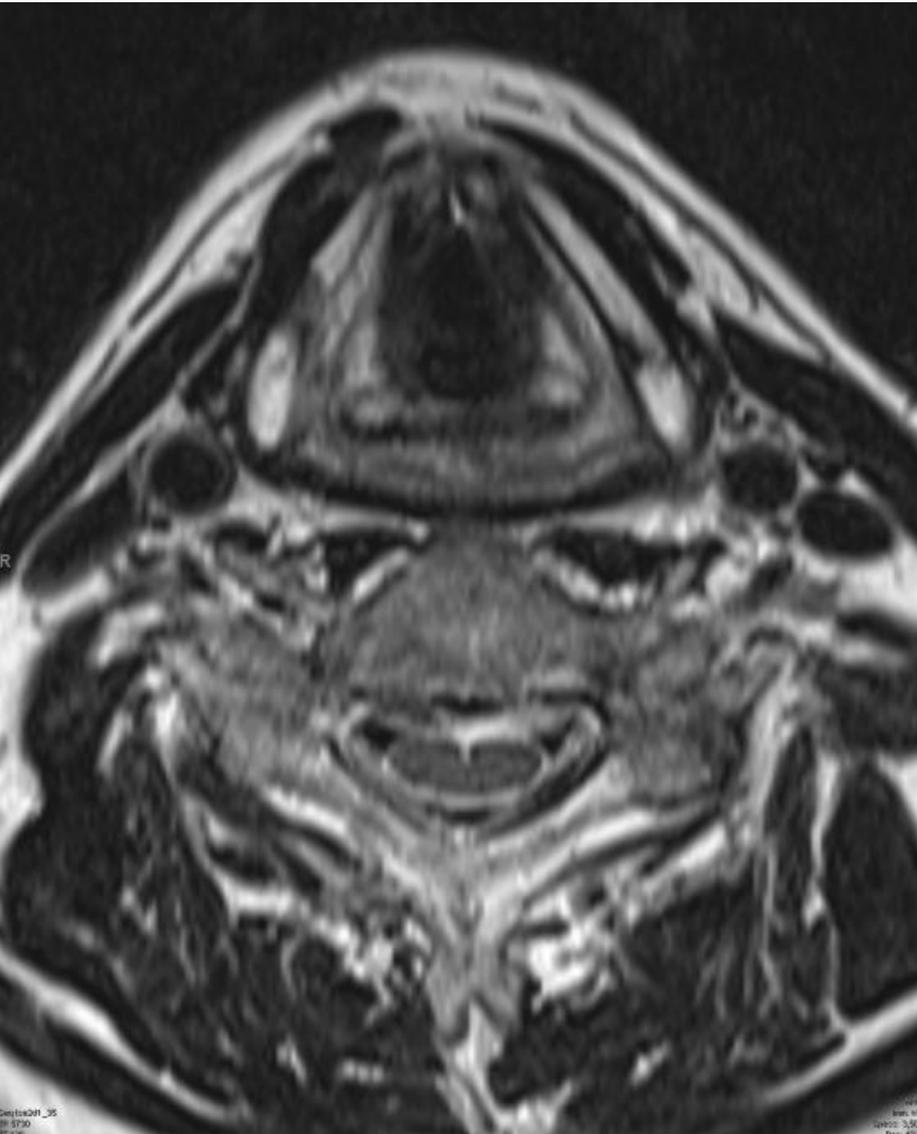
bobine di superficie

- **Aumento rapporto segnale rumore**
- **Sequenze più brevi (piccole aree da studiare)**
- **Ridimensionamento del problema del paziente non collaborante**

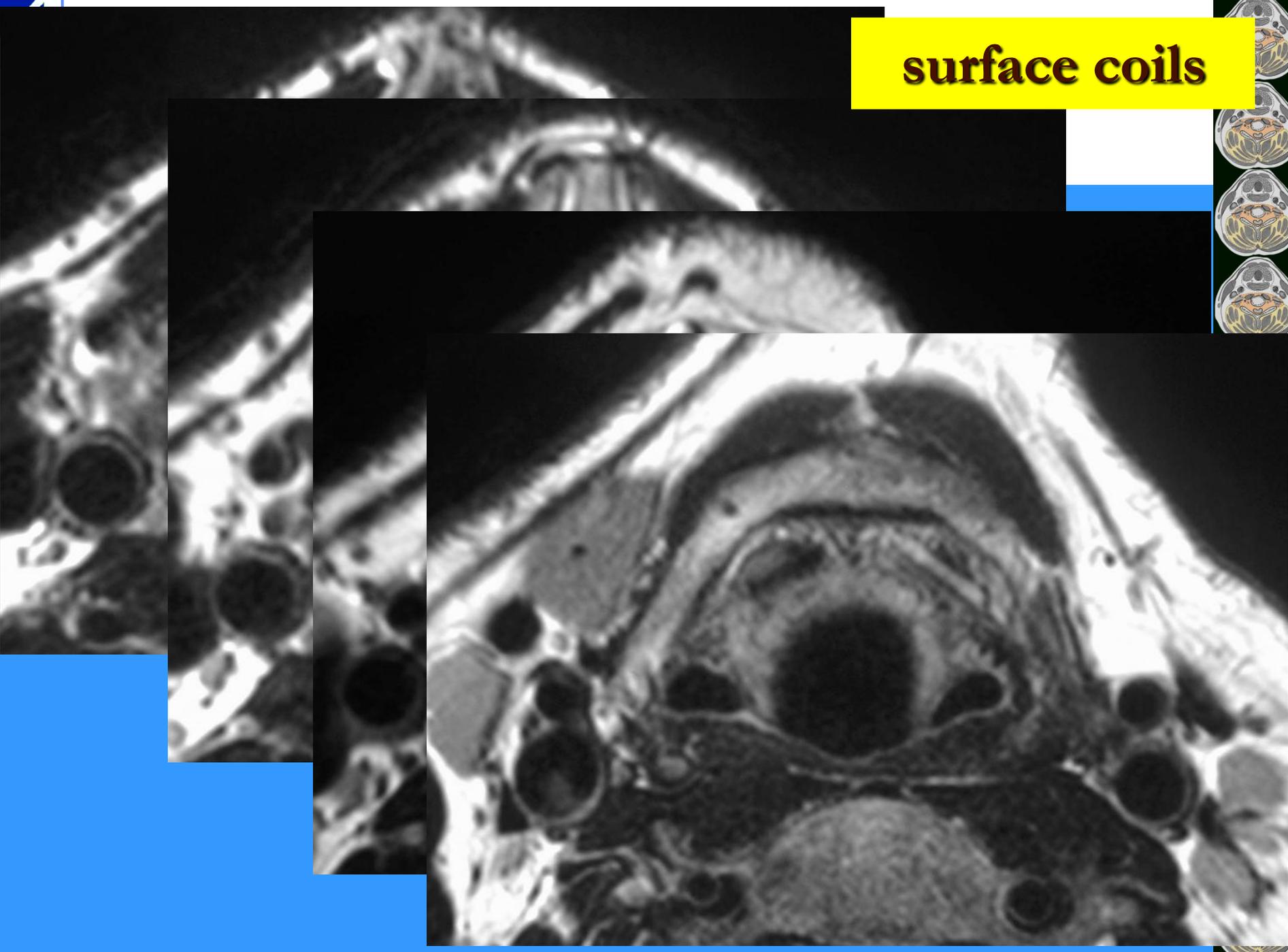




surface coils

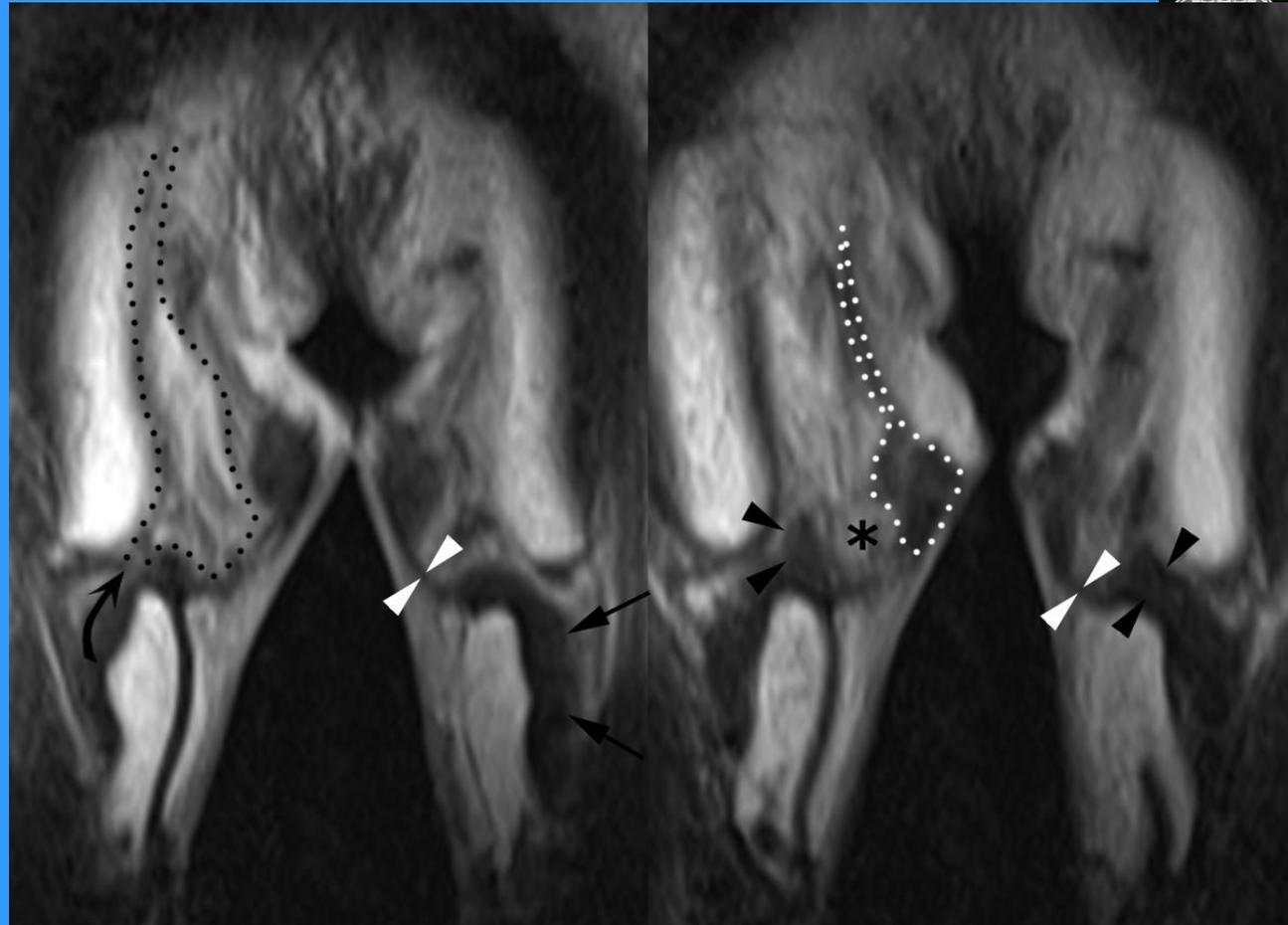
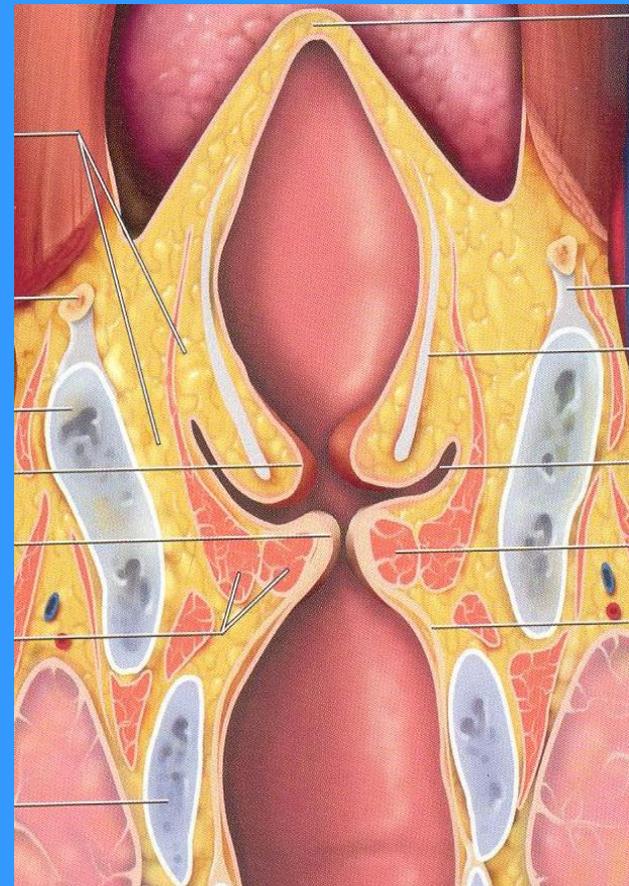


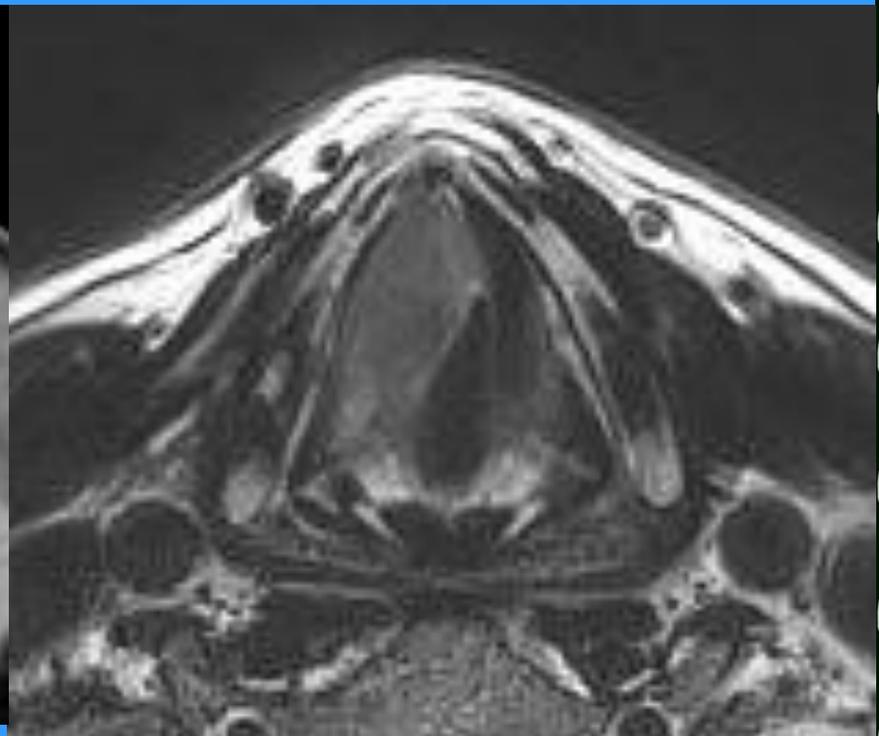
surface coils





surface coils

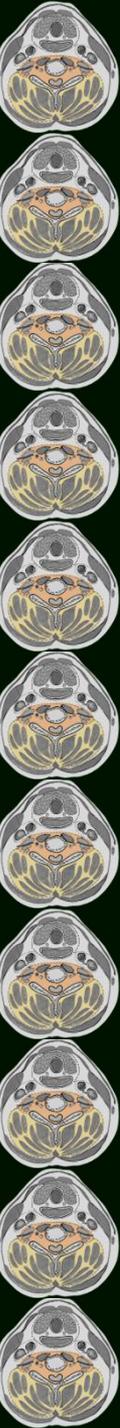






Limiti della stadiazione endoscopica

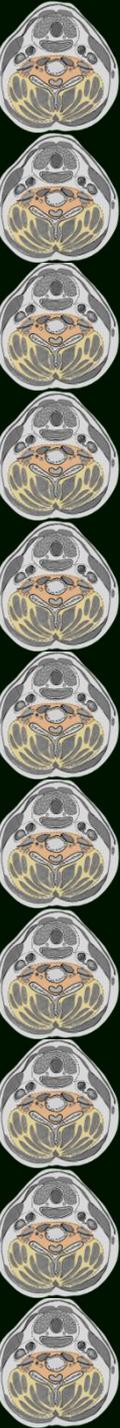
- Invasione dello **spazio paraglottico**
- Lisi/erosione **cartilagine**
- Estensione alla commissura anteriore con **diffusione profonda**
- Invasione del **PES** nel tumore con **diffusione sovraglottica**
- Estensione alla commissura posteriore con **diffusione all'articolazione crico-aritenoidea**





Chirurgica laser: quesiti specifici

- Estesa infiltrazione dello spazio paraglottico (spazio PG posteriore)
- Invasione dello spazio tiroaritenoidico
- PES (estesa infiltrazione)
- L'infiltrazione della cartilagine





MRI e infiltrazione cartilagine

OLD CRITERIA (M.Becker 99)

- Cartilagine ialina con segnale T2 più elevato che di norma
- Midollare con riduzione del segnale nelle sequenze T1 senza mdc (simile al tumore)
- Enhancement dopo mdc della cartilagine

MRI old criteria	SPECIFICITA' (%)
TIROIDE	56
CRICOIDE	87
ARITENOIDE	95

OVERALL: 74%

BASSA SPECIFICITÀ: overlap tra infiltrazione neoplastica e flogosi peritumorale





MRI e infiltrazione cartilagine

NEW CRITERIA (M.Becker 2009 Radiology)

- Segnale basale in T2 simile a quello della neoplasia adiacente
- Enhancement dopo mdc simile a quello della neoplasia

I nuovi criteri migliorano la SP della RM:

- Overall SP da 74 ad **82%**
- SP invasione cart.tioride dal 56 al **75%**

	TC	RM
Sensitivity	90%	92%
Specificity	67%	82%
PPV	48%	62%
NPV	95%	97%



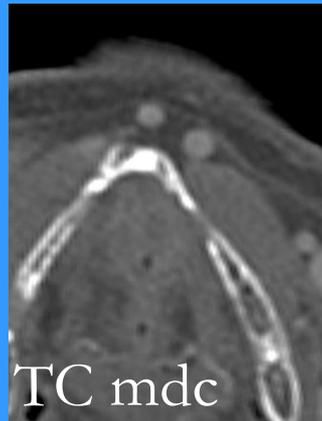
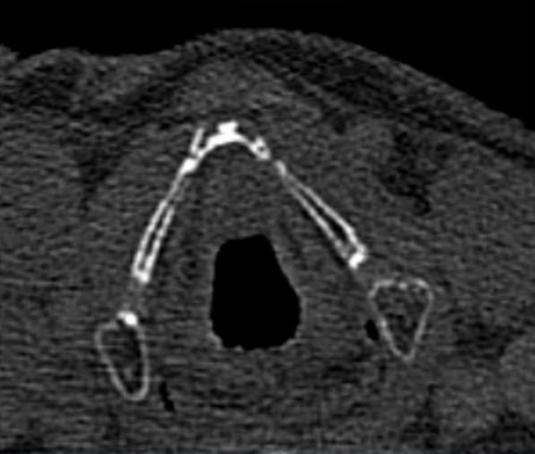


RM e invasione cartilaginea

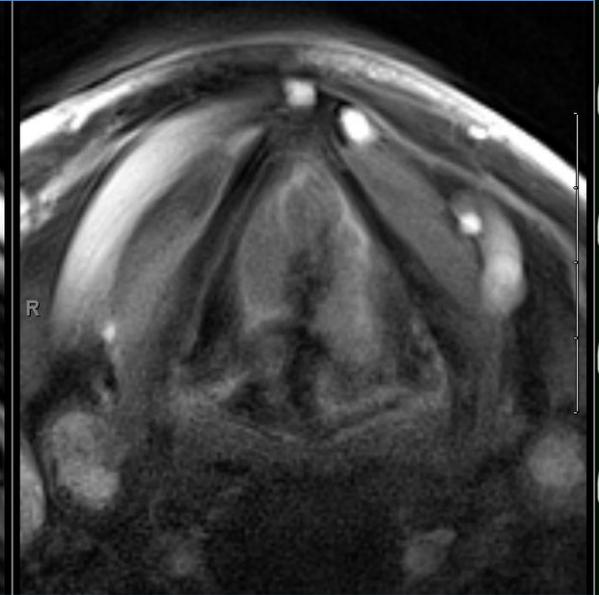
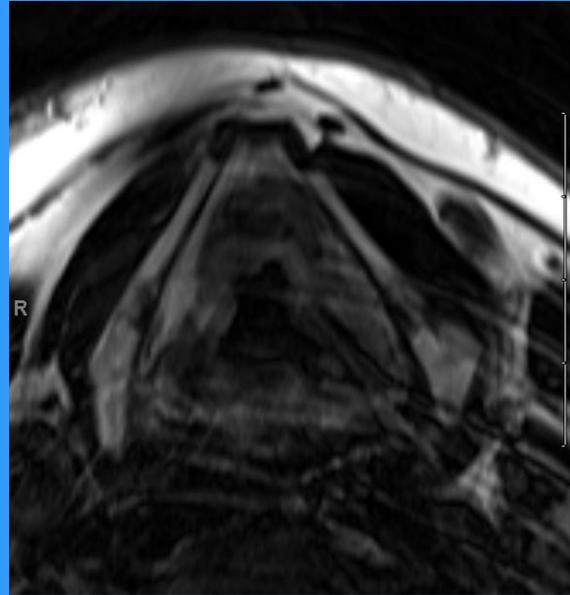
TSE T2

VIBE apnea

TC mdc INSPIRIO



TC mdc

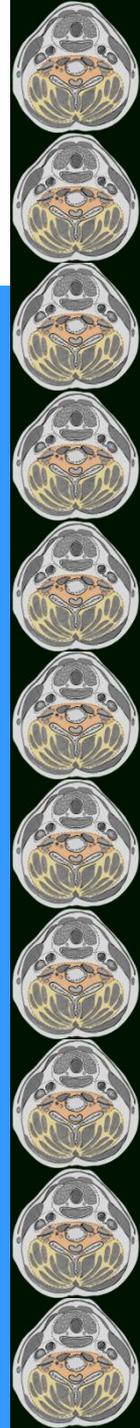




LE ADENOPATIE

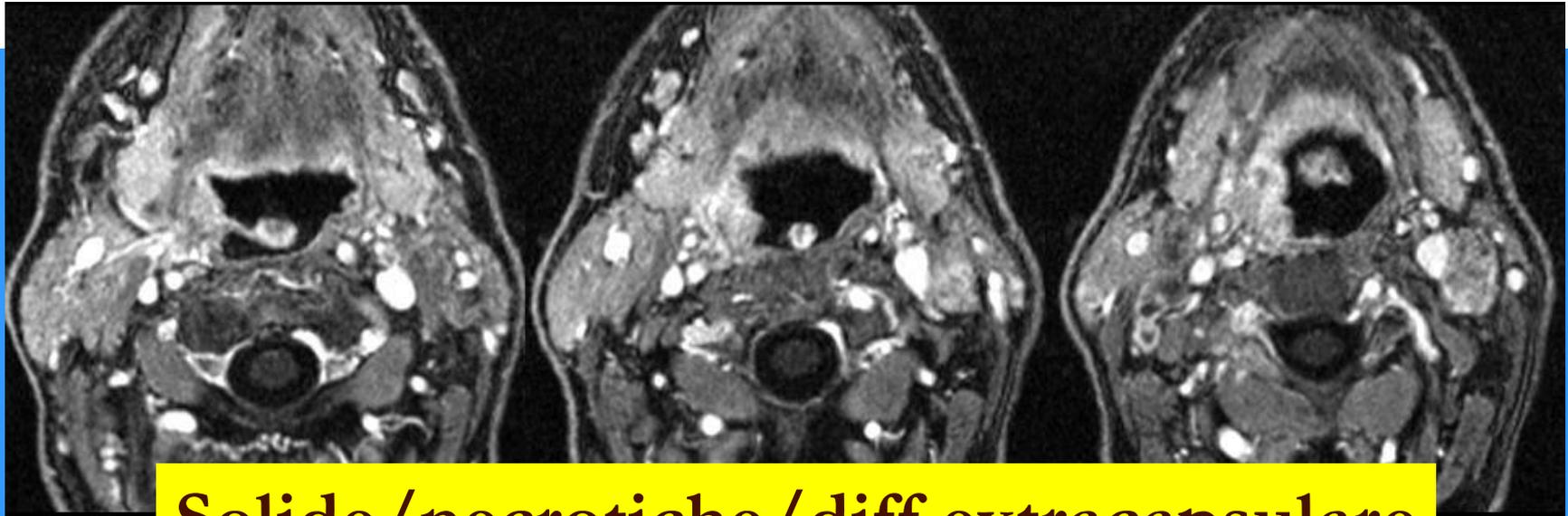
- Singoli (N1)/multipli (N2b/N3)
- Dimensioni: <3 cm (N1); 3-6 cm (N2); >6 cm (N3)
- Lato: ipsilaterali o bilaterali/controlaterali (N3)
- Definizione livelli per planning terapeutico
- Rapporti con ACC/ACI
- Blind spot: retrolaterofaringei

Ipofaringe > orofaringe > cavo orale >> laringe

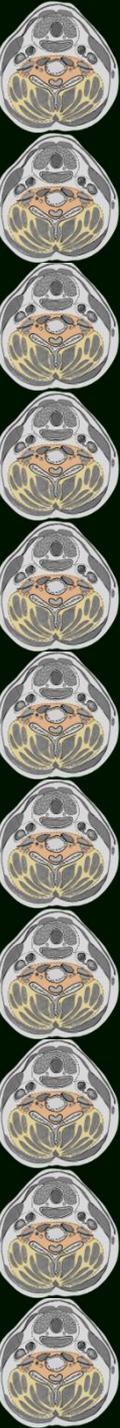
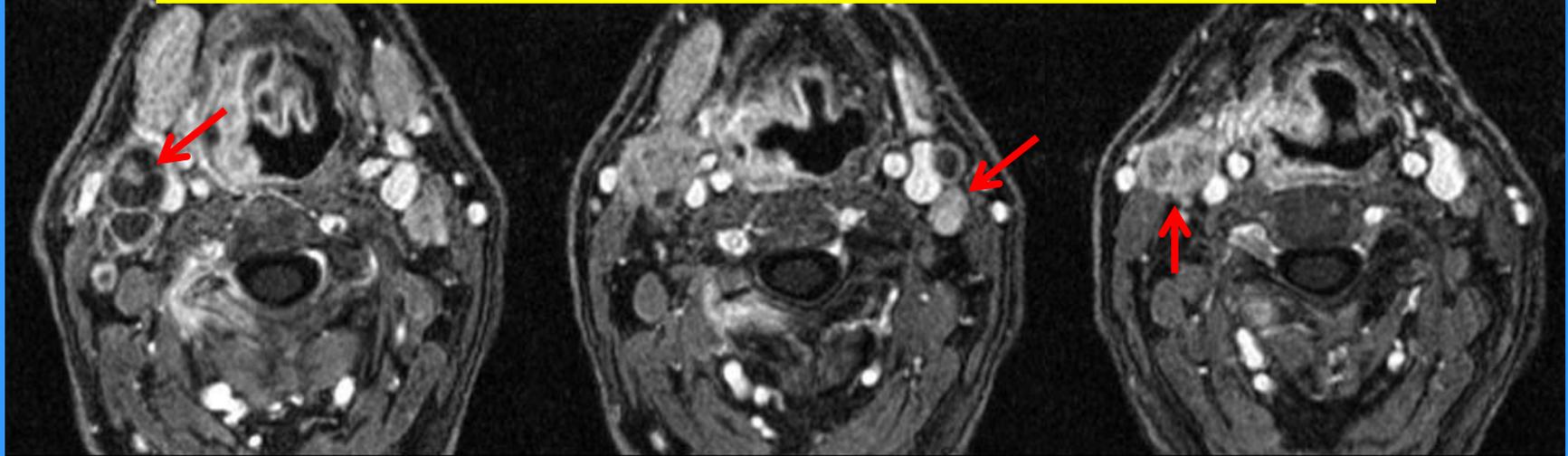




LE ADENOPATIE: tipologie

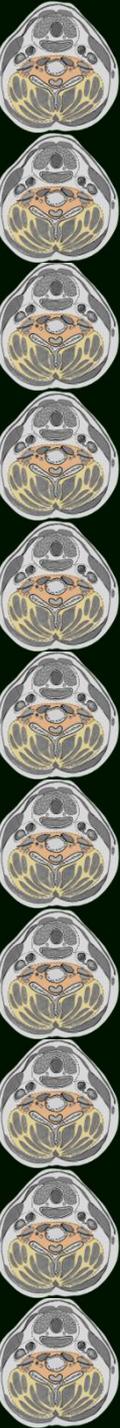
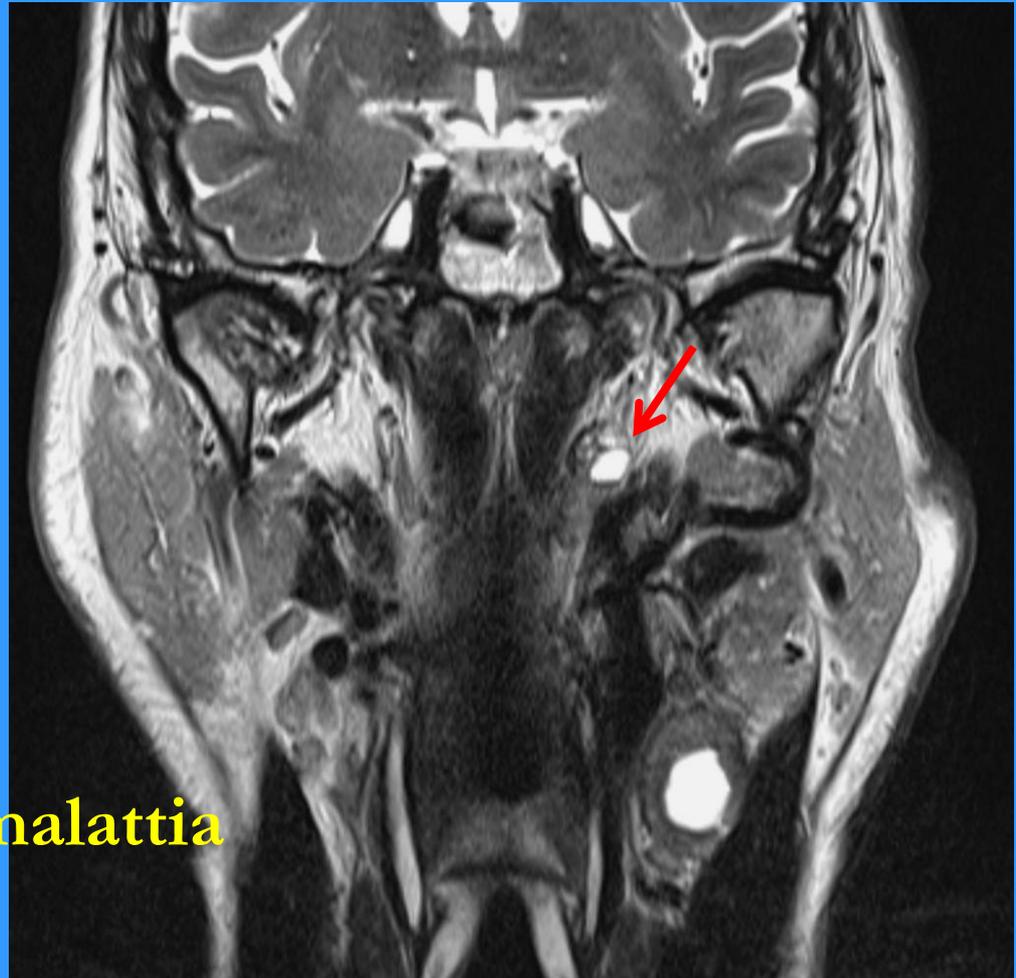
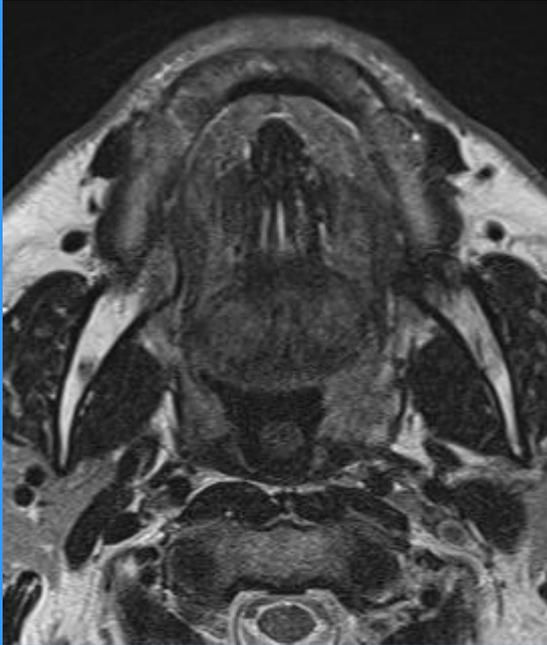


Solide/necrotiche/diff.extracapsulare





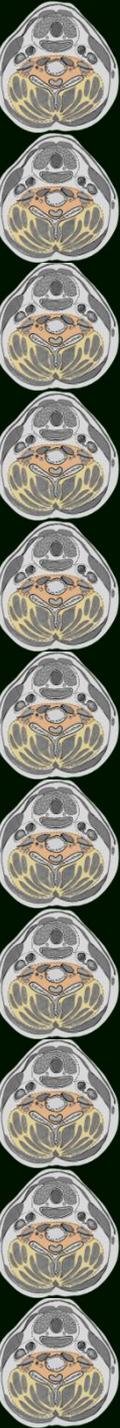
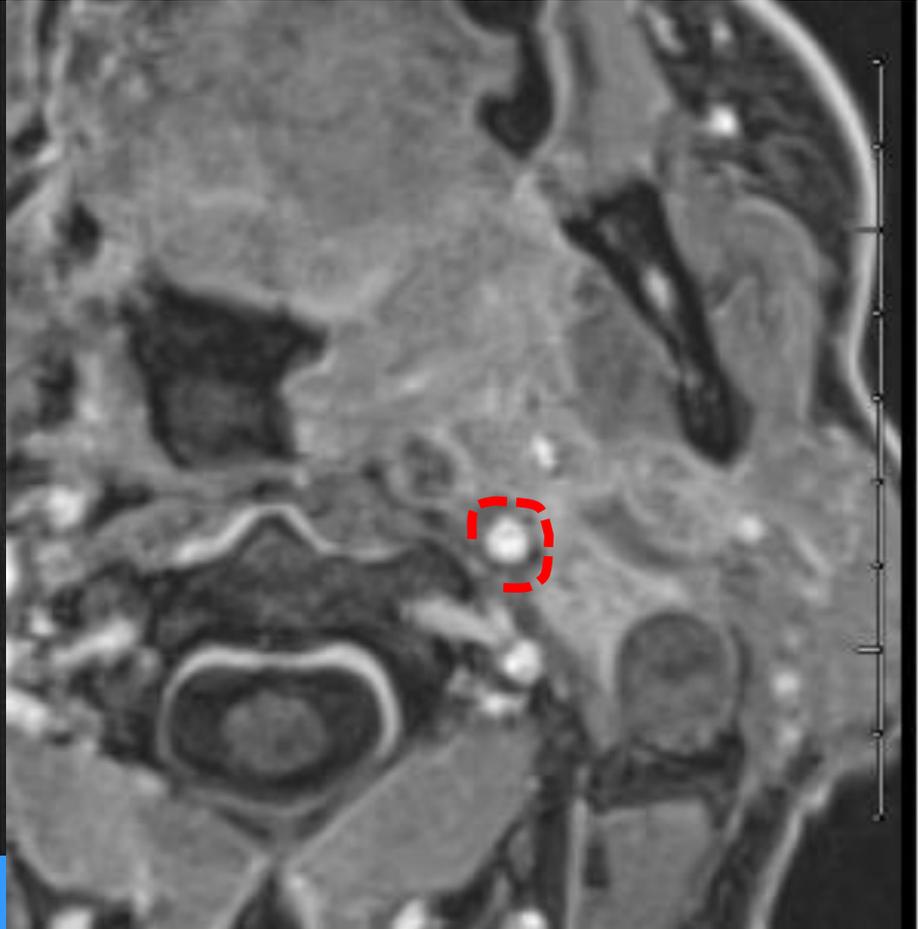
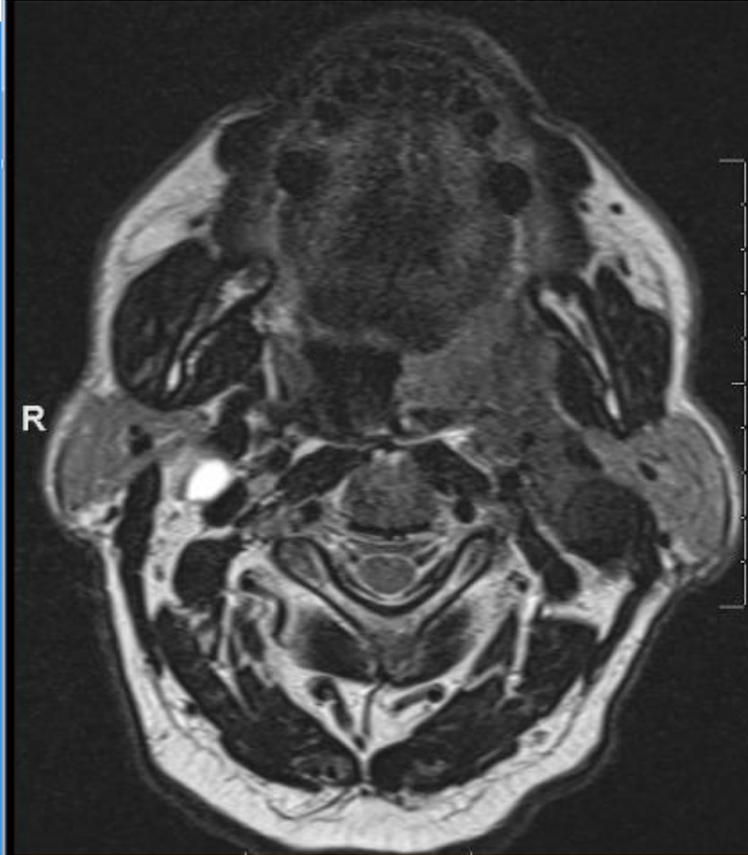
LE ADENOPATIE: retrolaterofaringee



**Piccola neoplasia con malattia
linfonodale avanzata**



LE ADENOPATIE: retrolaterofaringee



Neoplasia avanzata N3b rc



ADENOPATIE CONTRIBUTO DWI

[Acad Radiol](#), 2011 Dec 6.

Value of Magnetic Resonance Imaging for Nodal Staging in Patients with Head and Neck Squamous Cell Carcinoma: A Meta-analysis.

[Wu LM](#) et al

- 16 studies
- SEensitivity and specificity of MRI for cervical lymph node status: 76% (70%-82%) and 86% (73%-93%), respectively.
- The comparison of MRI with that of CT and PET/CT suggested no major differences
- The Subgroup by using diffusion-weighted imaging had higher sensitivity =86% (78%-92%) than the subgroup without diffusion-weighted imaging.

		DWI
SE (%)	76%	86%
SP (%)	86%	





ADENOPATIE: DWI

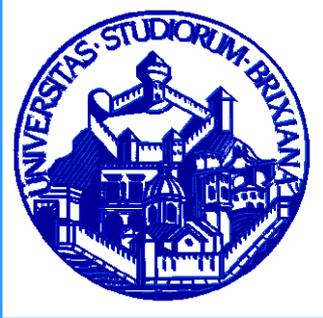
Radiology. 2009

Head and neck squamous cell carcinoma: value of diffusion-weighted MR imaging for nodal staging.

Vandecaveye V

- *Ottimizzazione tecnica (sequenze EPI)/bobine di superficie*
- *SE 87%; SP 94%; acc 91 % per linfondo; (94%, 97%, 97% per livello)*
- *Criteri morfologici fallaci per linfonodi <1 cm*
- *Incremento SE detezione da 7 a 76% per linfonodi 4-9 mm*
- *FN linfonodi necrotici (riconoscibili con altre sequenze)*



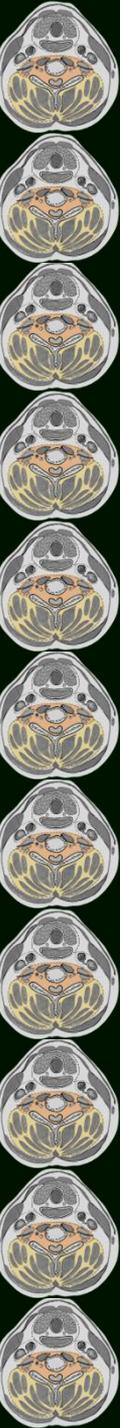


Follow up



I punti critici

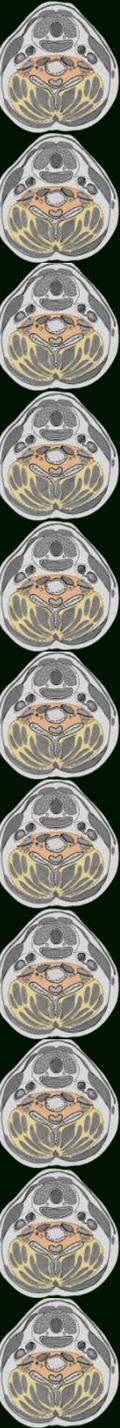
- **Le modificazioni post-trattamento vs la recidiva**
 - **Le ricostruzioni con lembo**
 - **Gli svuotamenti linfonodali**
 - **La RT**
- **Recidive subcliniche: dalla morfologia alla funzione?**
 - **RM dinamica**
 - **DWI**
 - **PET PET/CT**





La radioterapia

- *Primo controllo dopo 3-4 mesi*
- *Tessuto cicatriziale spesso con enhancement (cicatrice vascolarizzata)*
- *Valore aggiunto DWI*
- *Le complicanze VS recidiva*

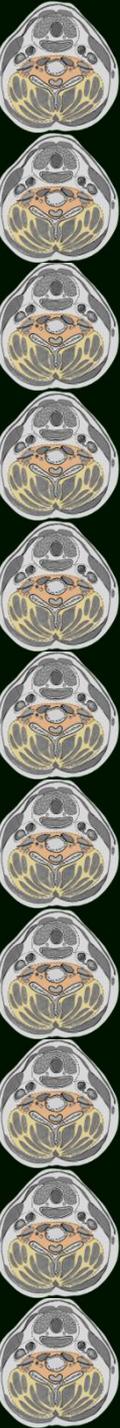




DWI e recidiva

DWI recidiva	SE (%)	SP (%)	Accuratezza (%)
Abdel Razek (2007)- 32pts	85	90	87
Vandecaveye (2007)-26 pts	95	95	95

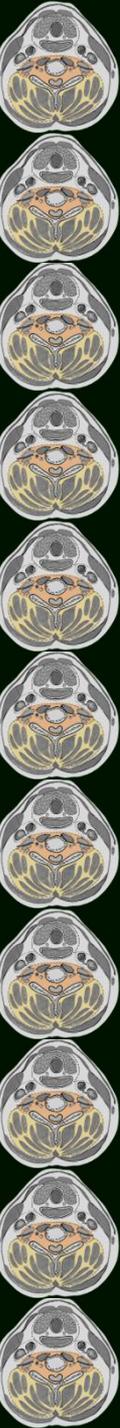
Post RT o chemioradioterapia





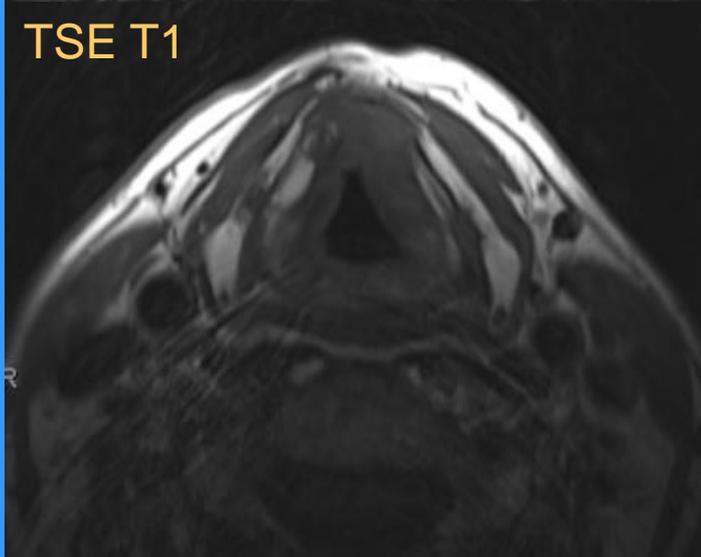
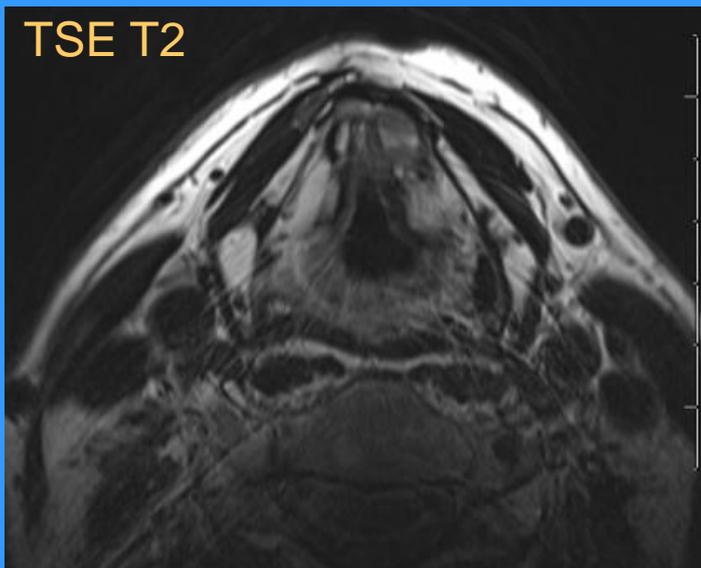
Recidive subcliniche: ruolo della MRI

- **OROFARINGE/CAVO ORALE/IPOFARINGE**
-recidive gravate da elevata mortalità anche quando la diagnosi radiologica anticipa quella clinica.
- **LARINGE (diffusione chirurgia laser)**
- più frequente recidiva sottomucosa/subclinica

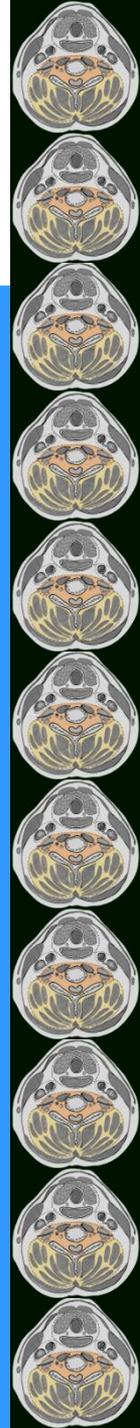
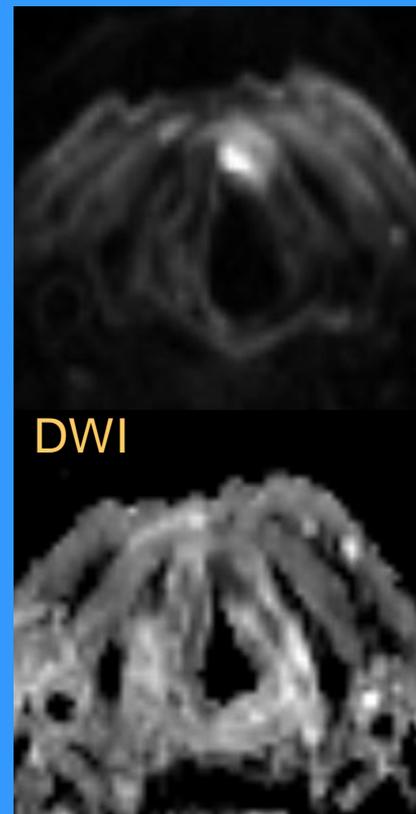




Recidiva sottomucosa endoscopia negativa

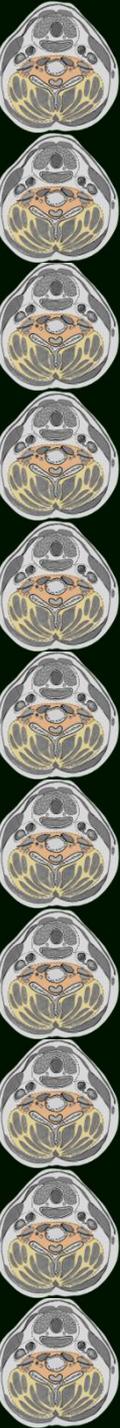
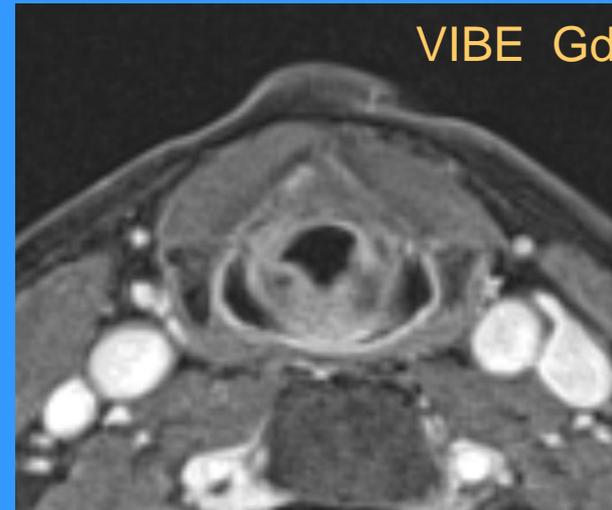
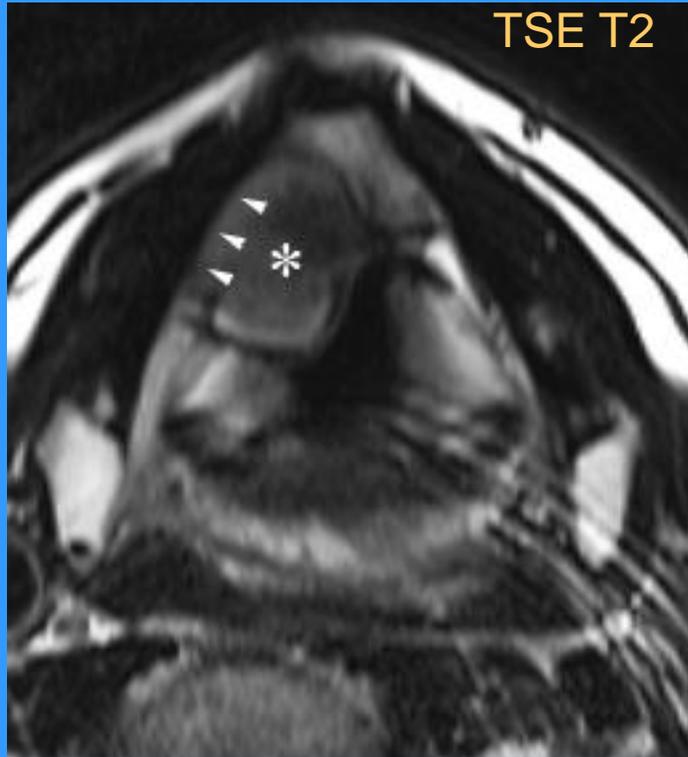


NO MDC





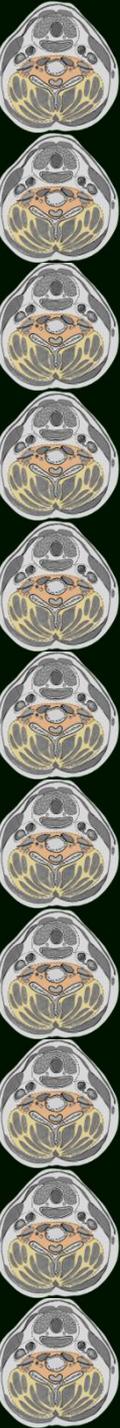
Recidiva sottomucosa VS cicatrice





Recidive subcliniche

- L'Imaging morfologico spesso non consente di discriminare con efficacia le alterazioni post-trattamento dalla recidiva
- *Molecular* non-morphologic Imaging is the most promising solution (PET, CT-PET).
- RM dinamica e diffusion-weighted: un **ponte** tra morfologia e funzione?





Vie aeree digestive superiori

MRI: QUANDO?

OROFARINGE/CAVO ORALE

- Stadiazione T ed N
- Follow up:
 - risposta alla terapia
 - identificazione recidiva

LARINGE

- Selezione candidati al laser
- Sorveglianza dei pts trattati con laser (T2-T3) e T1 sospetti (la recidiva sottomucosa)

