

# RM Perfusión-Difusión en patología tumoral del cuello ¿cuándo y cómo?

C Tortajada. IDI - H. Vall d'Hebron. Barcelona

*carles.tortajada.idi@gencat.cat*



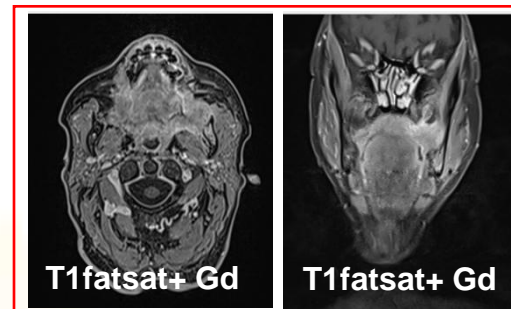
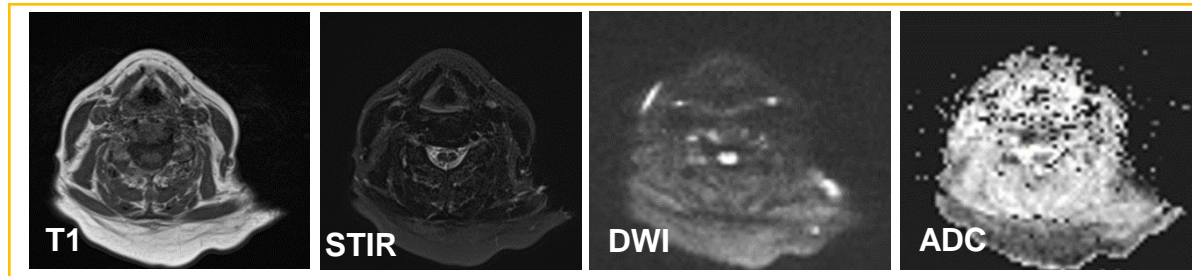
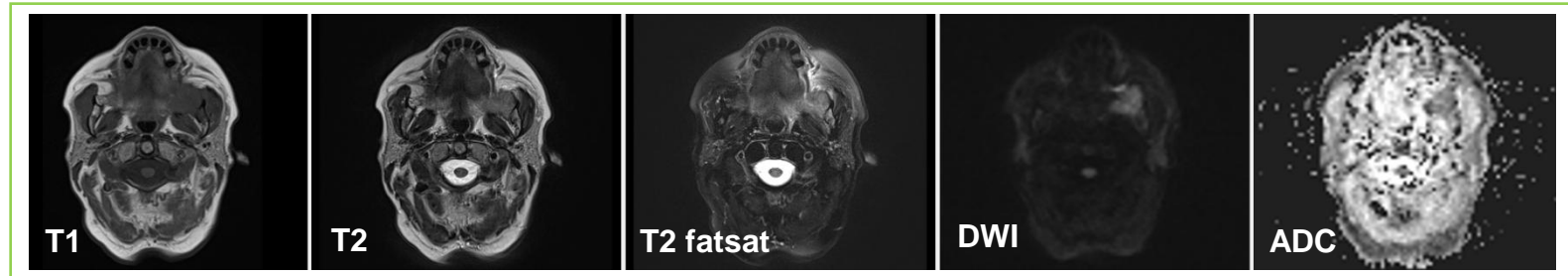
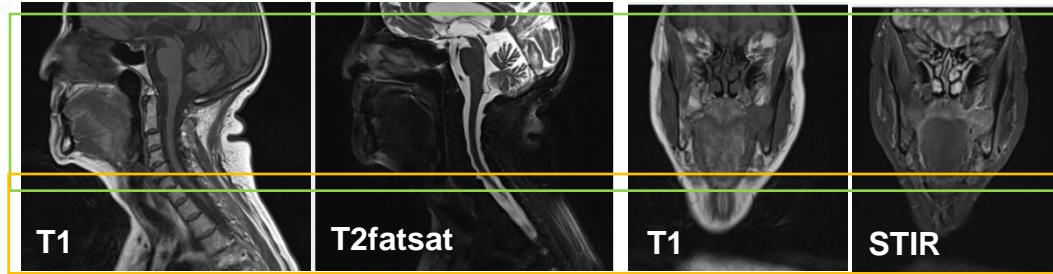
## 1. RM

- ✓ Protocolo.
- ✓ Conceptos básicos de **DWI** (difusión) y **DCE** (contraste dinámico).
- ✓ Ejemplos diagnóstico /seguimiento.

## 3. Adenopatías

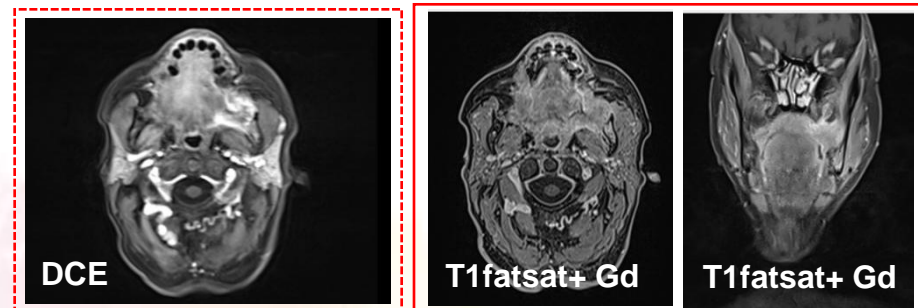
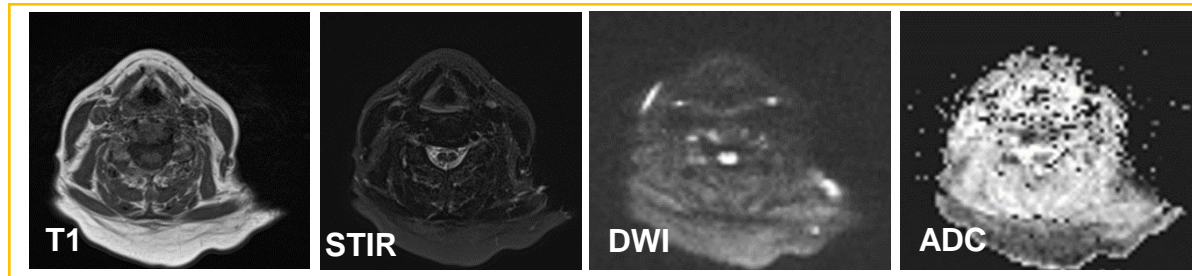
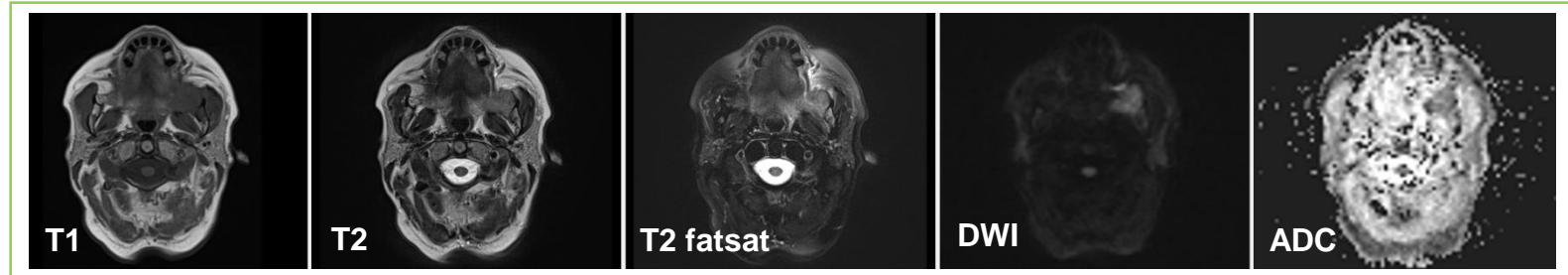
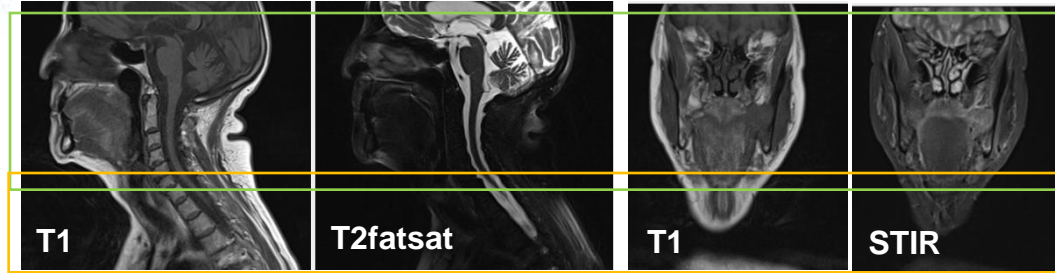
## 4. Conclusión.





contraste





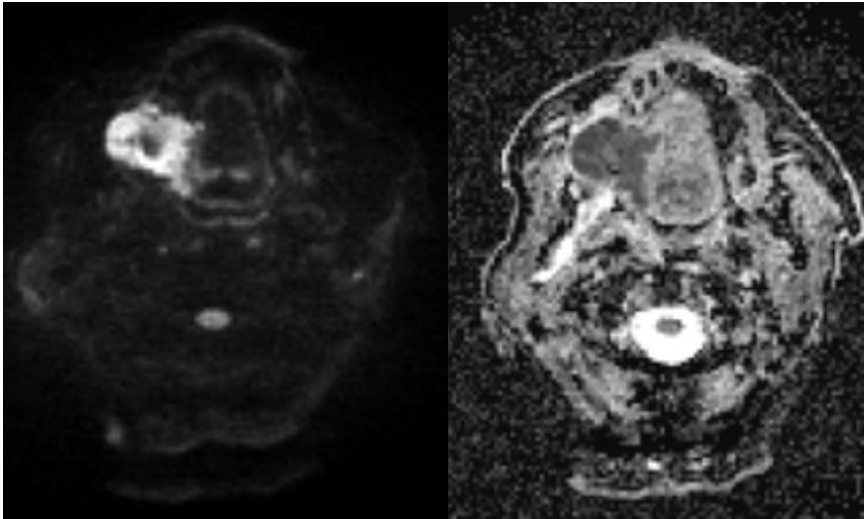
**contraste**

Añadimos la perfusión T1 (DCE)  
en:

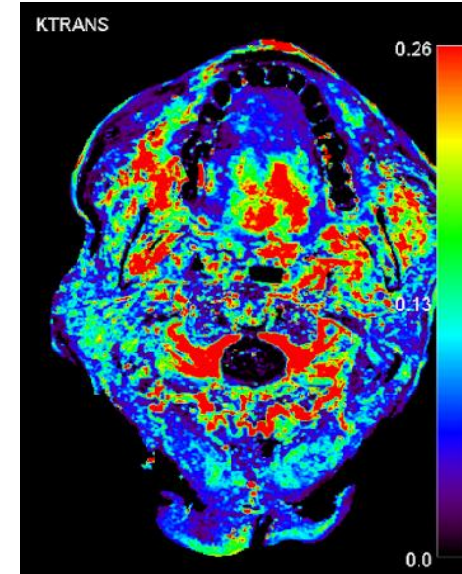
- 1r diagnóstico.
- Valoración de respuesta.
- Sospecha de recidiva.

## SECUENCIAS BÁSICAS

### DWI-ADC



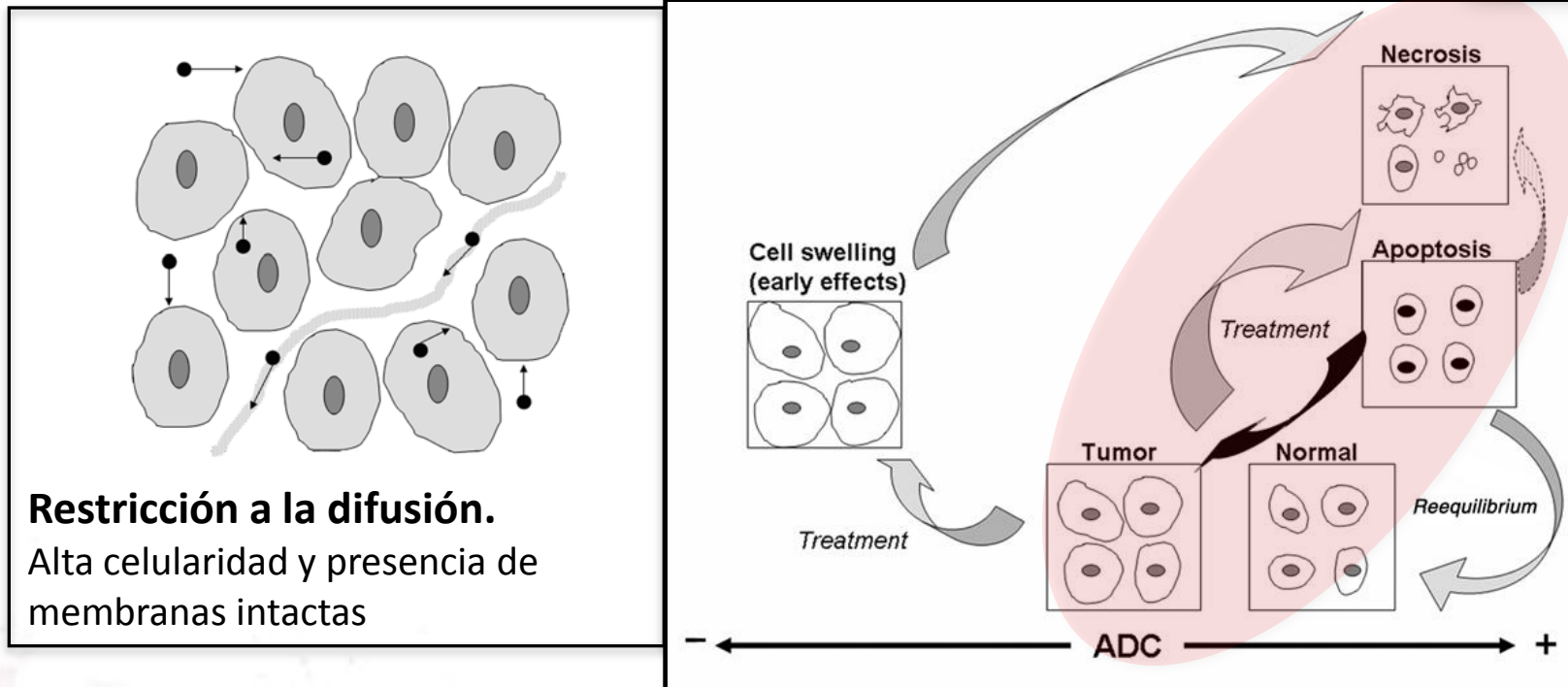
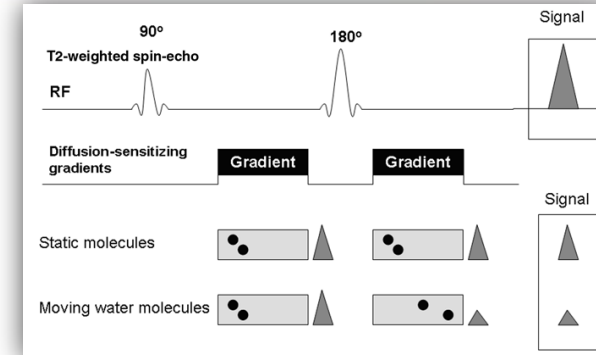
## DCE-MRI

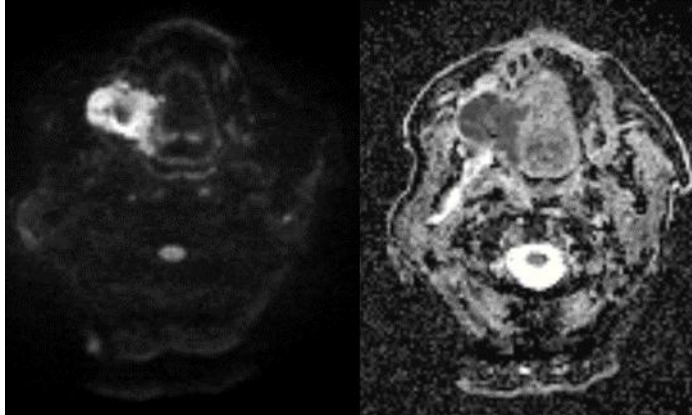


Cualitativos: **Curva de IS**

Semi-cuantitativos: AUC, TTP, Washin, Washout

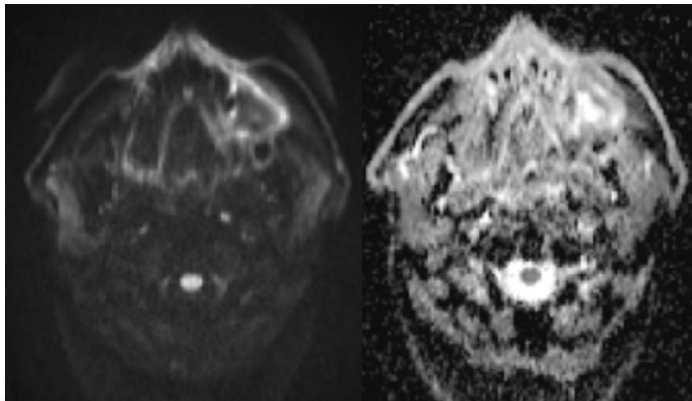
Cuantitativos: **Ktrans**, **Kep**, **Ve**, **Vp**





## ↓ADC

- **Alta celularidad**
- SCC probablemente diferenciados.

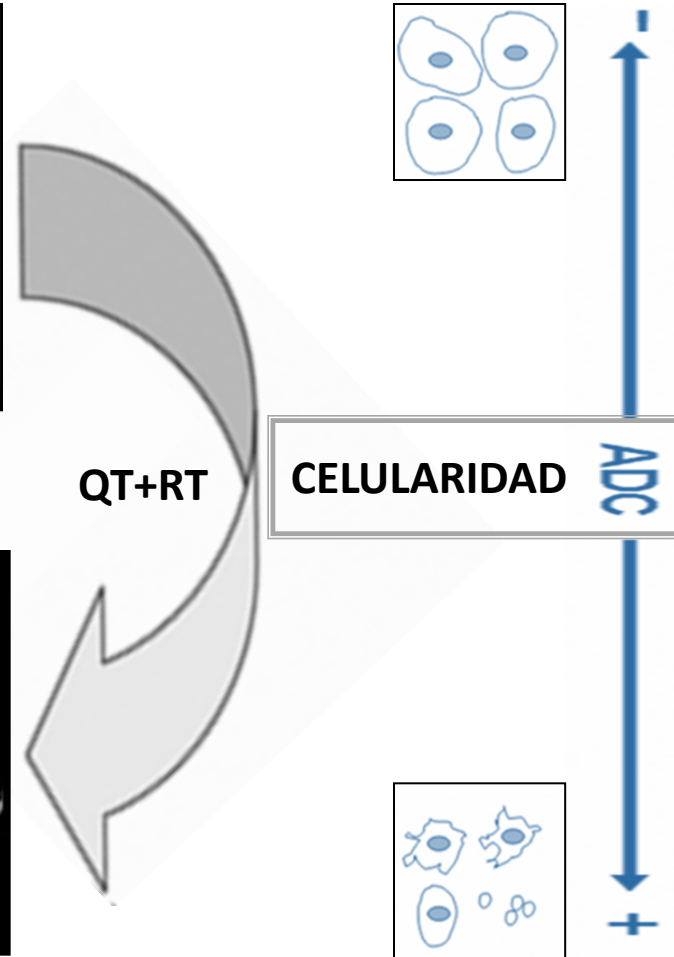
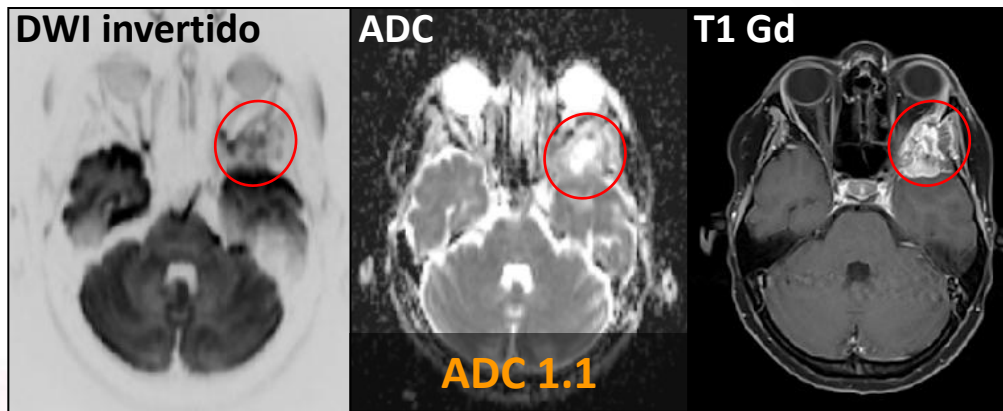
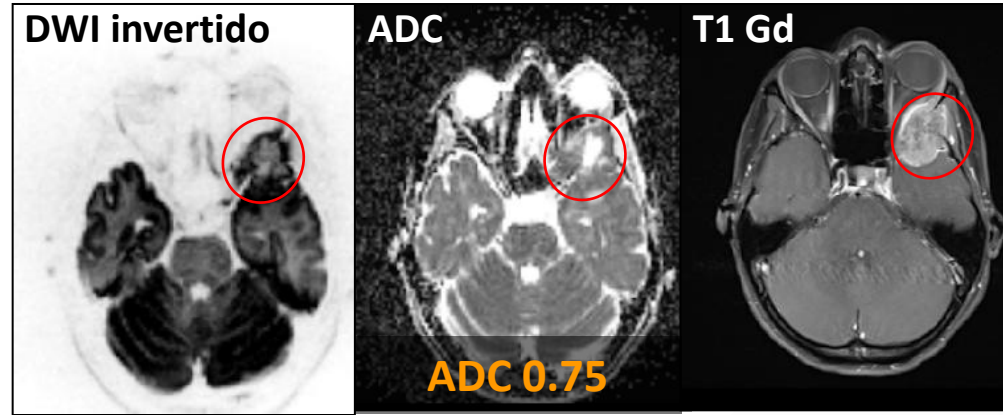


## ↑ADC

- **Baja celularidad**
- Alto componente de estroma tumoral
- Necrosis

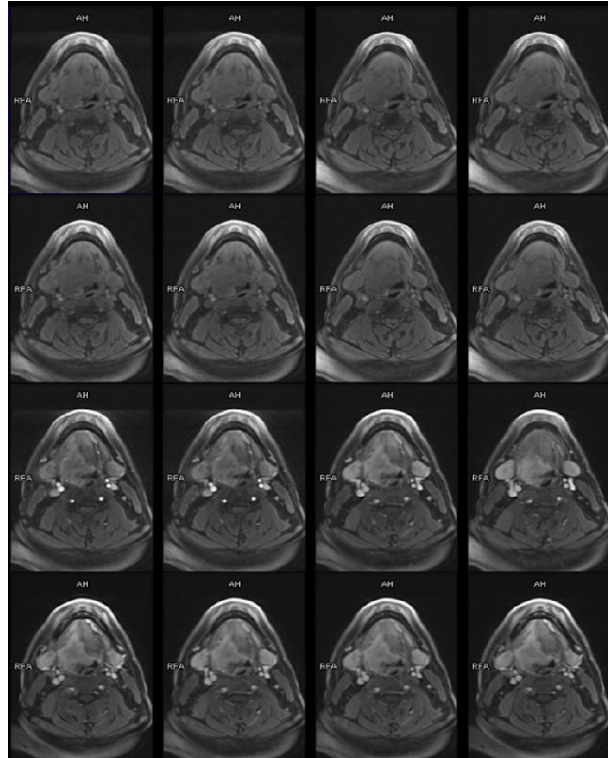


## DIAGNÓSTICO Y RESPUESTA : TAMAÑO /CELULARIDAD

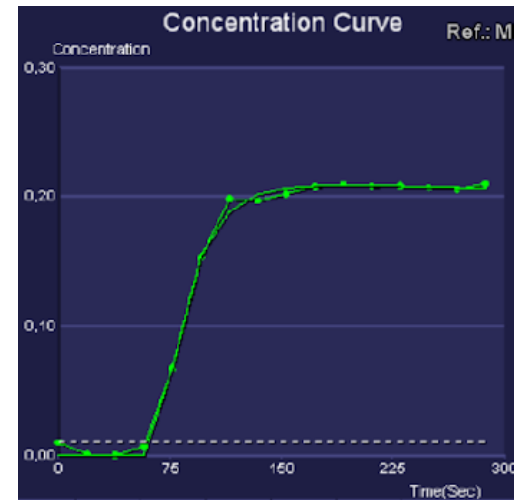
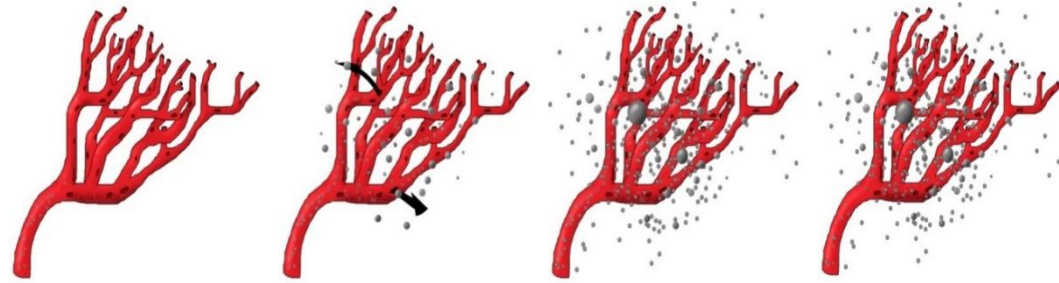




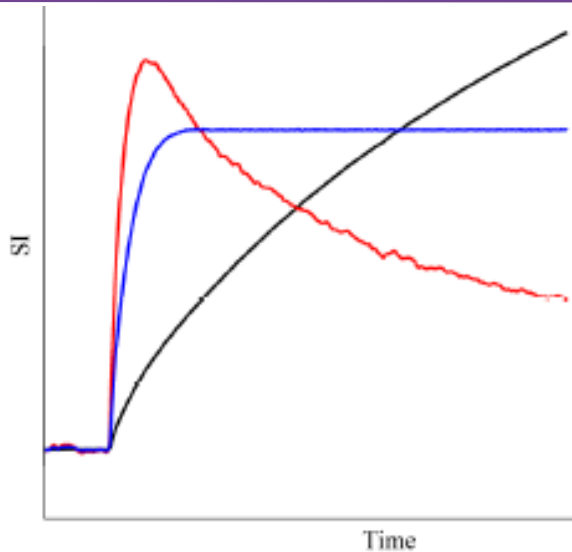
## Dynamic contrast enhanced (DCE)



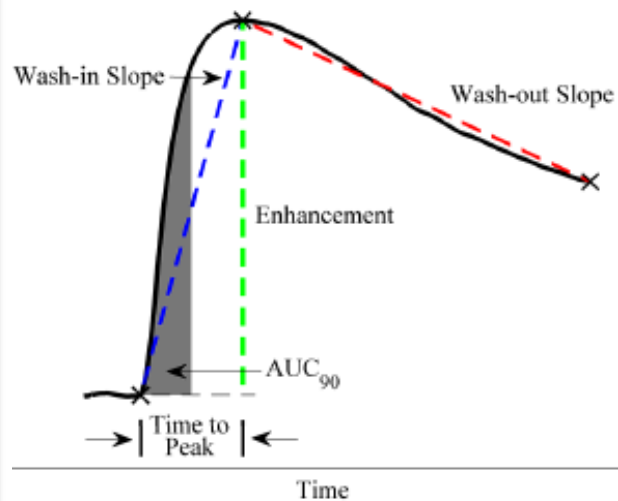
T1 fast GE



## Curva de intensidad



## Parámetros semi-cuantitativos

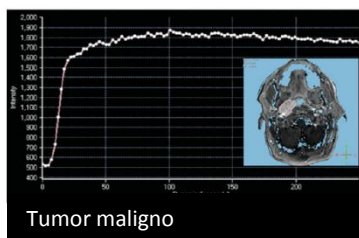


**Washin** : porcentaje de incremento

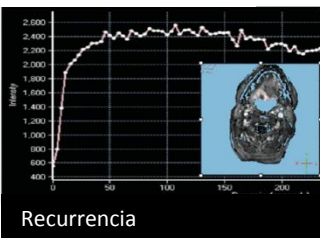
**Washout** : porcentaje de lavado

**TTP**: tiempo al pico máximo

**AUC**: Area bajo la curva



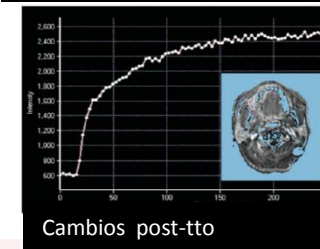
Tumor maligno



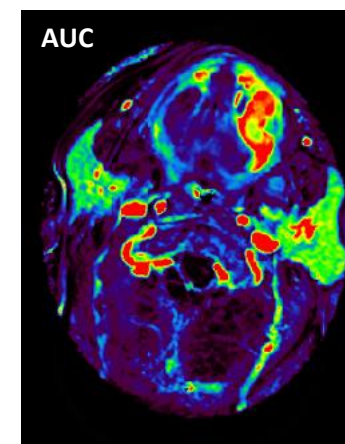
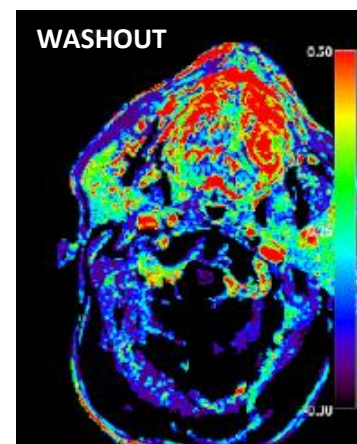
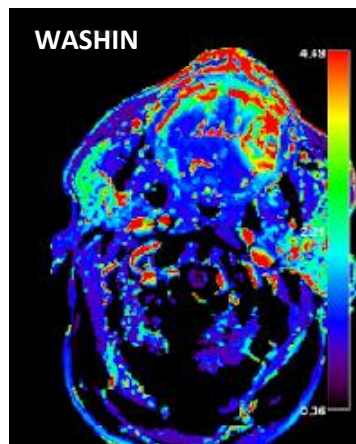
Recurrencia



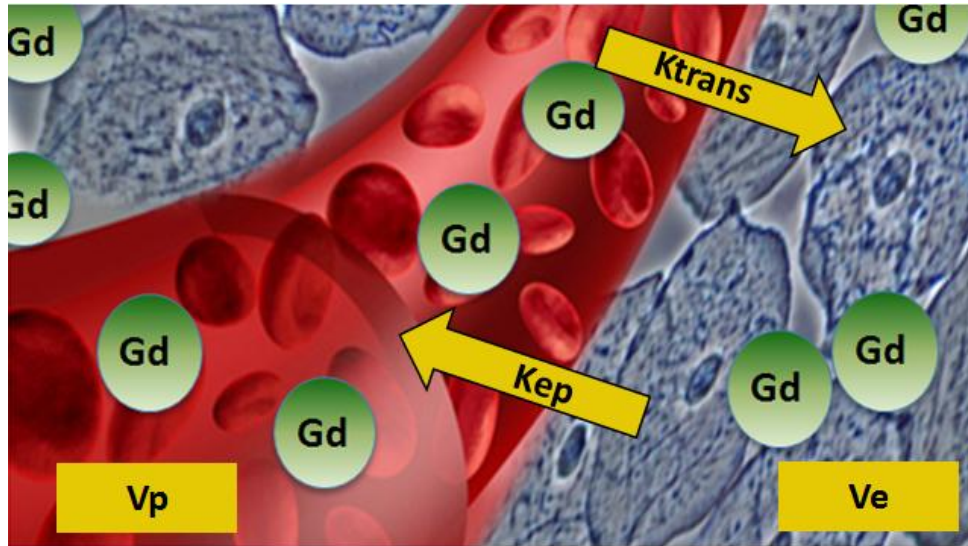
Tumor benigno



Cambios post-tto



## Parámetros cuantitativos *(Tof et al. 1999)*

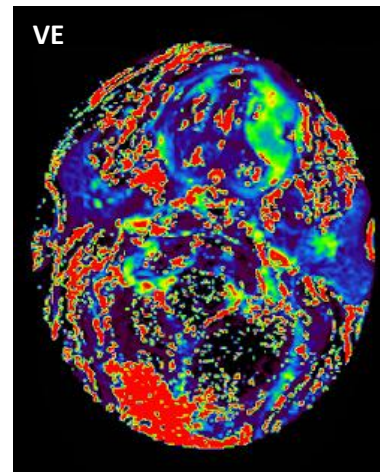
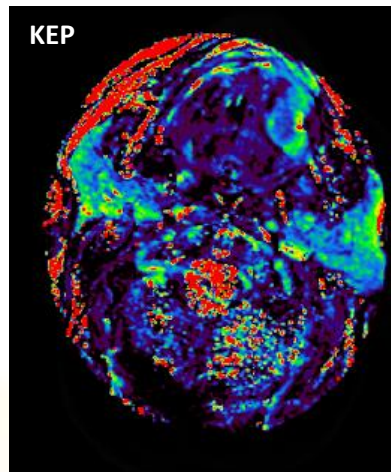
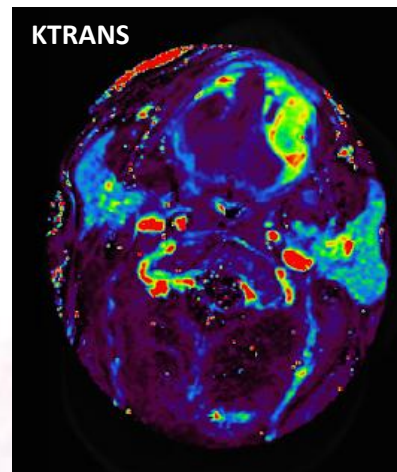


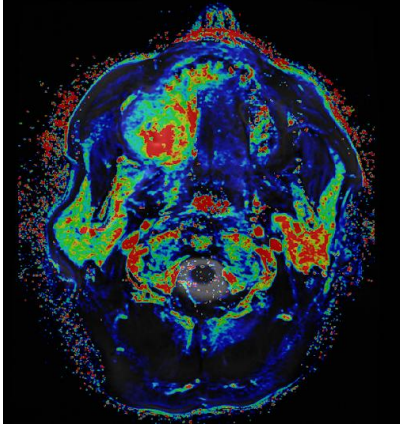
**Ktrans** = constante de transferencia de volumen del plasma al parénquima.

**Ve** = fracción del volumen extravascular-extracelular.

**Kep** = constante de transferencia de volumen del parénquima al espacio vascular.

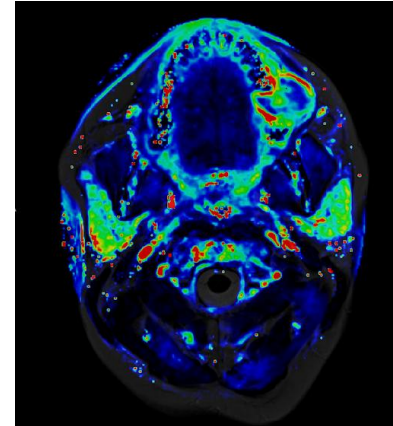
*"Efflux constant"*  $Kep = Ktrans / Ve$





## Alta Perfusión

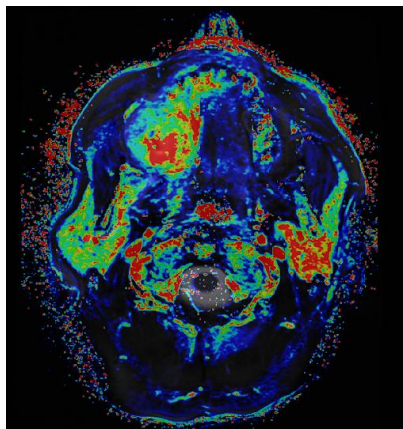
- Alta perfusión
- **Mayor quimioradiosensibilidad**



## Baja Perfusión

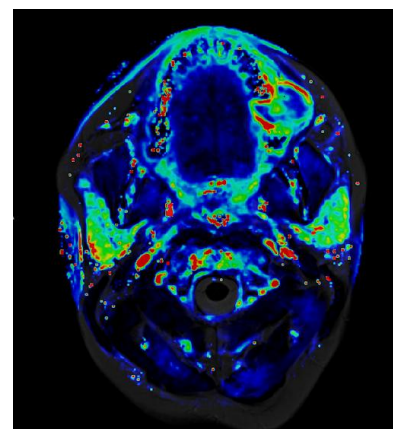
- Baja perfusión <--> hipoxia
- **Menor quimioradiosensibilidad**





## Alta Perfusión

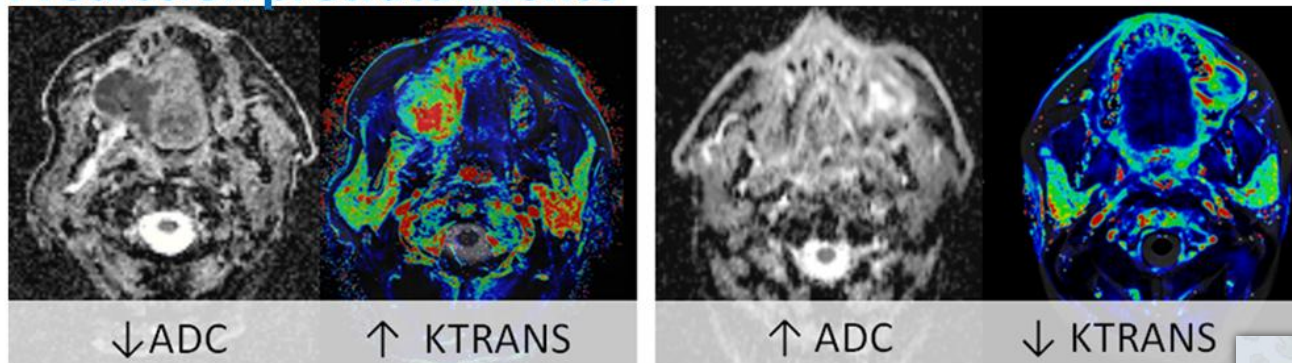
- Alta perfusión
- Mayor quimioradiosensibilidad**



## Baja Perfusión

- Baja perfusión <--> hipoxia
- Menor quimioradiosensibilidad**

## Predicción pretratamiento



↓ADC

↑ KTRANS



↑ ADC

↓ KTRANS



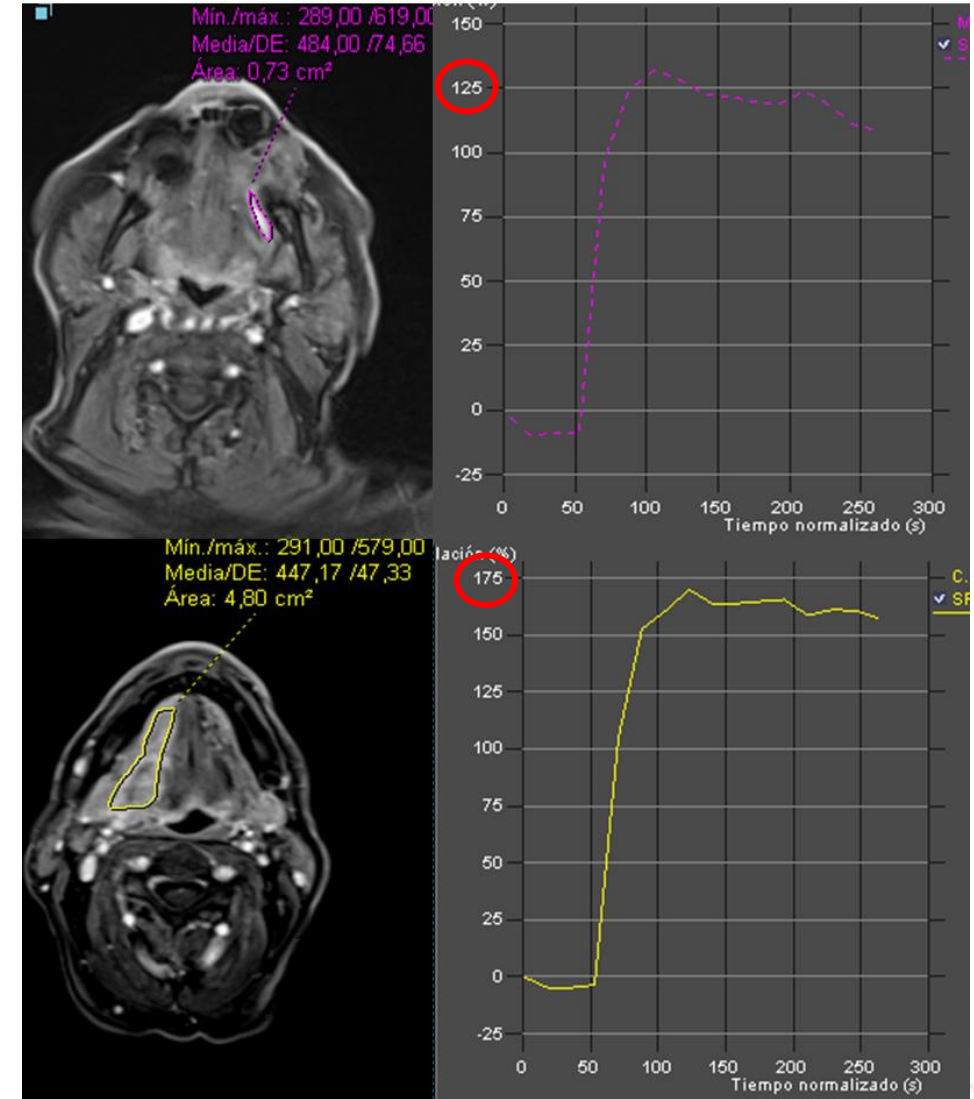
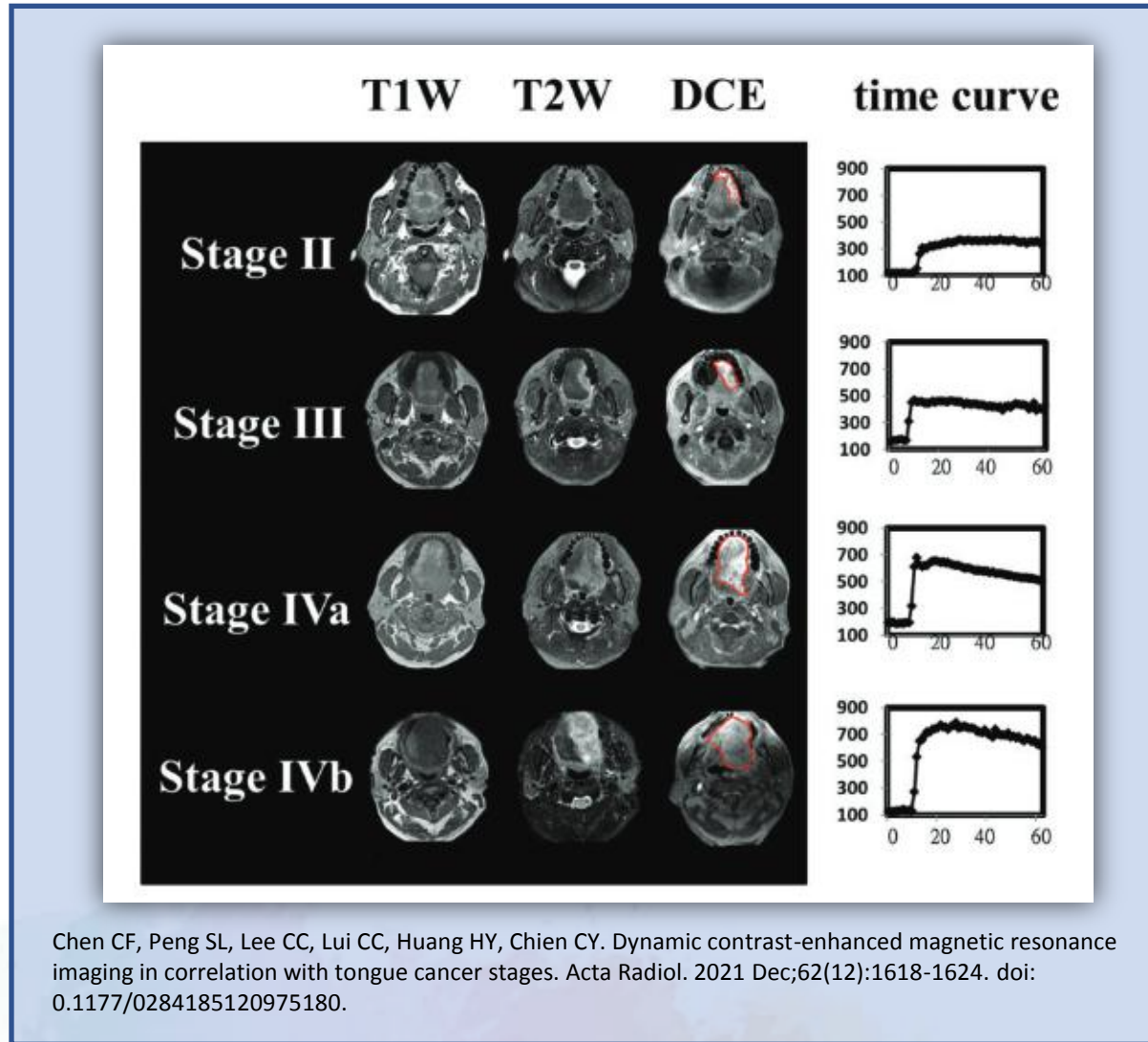
$K_{trans} > 0,45 \text{ min}^{-1}$  -- control local \*  
 $ADC \pm < 0,80 \times 10^{-3} \text{ mm}^2/\text{s}$  -- respuesta

\*Ng SH, PloS One 2013

Bernstein JM, Homer JJ, West CM. Dynamic contrast-enhanced magnetic resonance imaging biomarkers in head and neck cancer: potential to guide treatment? A systematic review. Oral Oncol. 2014 Oct;50(10):963-70. doi: 10.1016/j.oraloncology.2014.07.011.

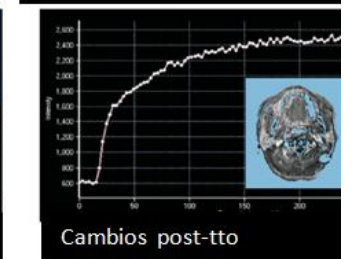
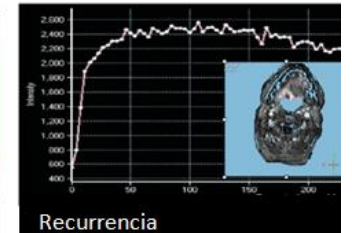
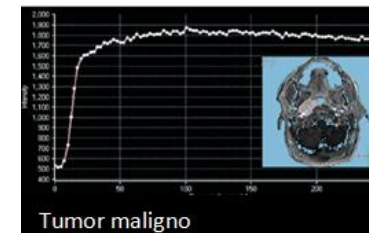
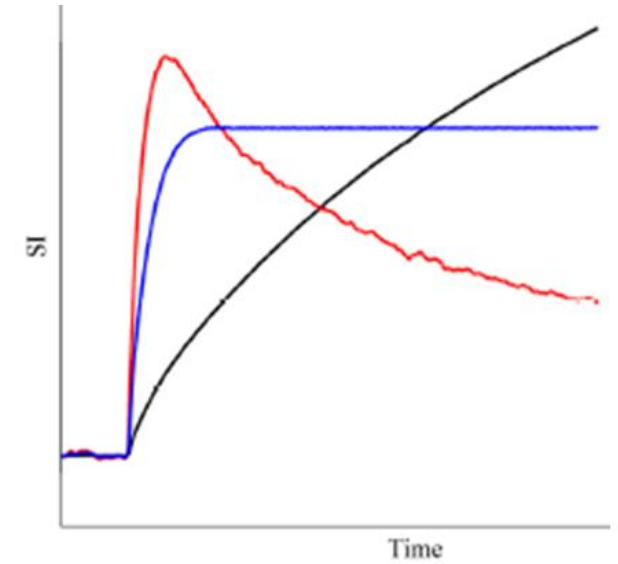
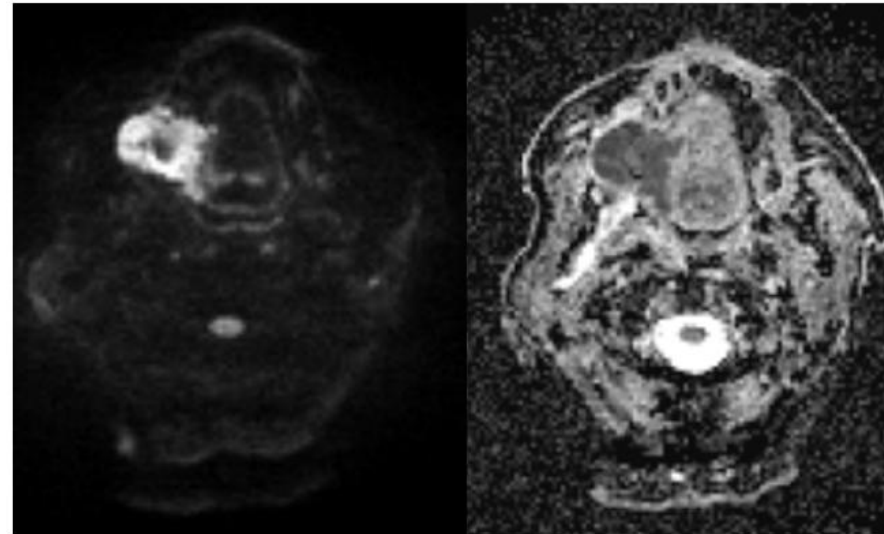
Garbajs M, Strojan P, Surlan-Popovic K. Prognostic role of diffusion weighted and dynamic contrast-enhanced MRI in loco-regionally advanced head and neck cancer treated with concomitant chemoradiotherapy. Radiol Oncol. 2019 Mar 3;53(1):39-48. doi: 10.2478/raon-2019-0010.

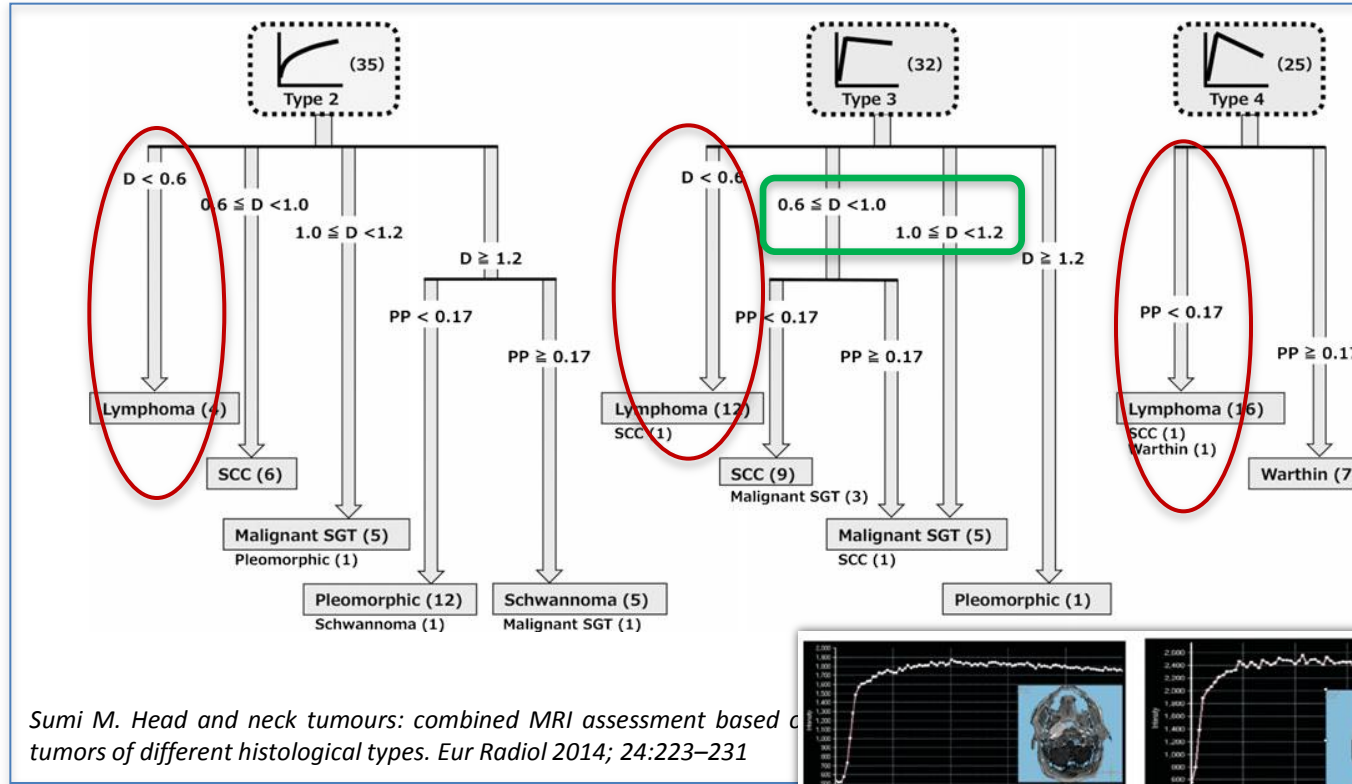
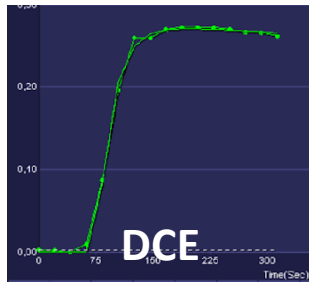
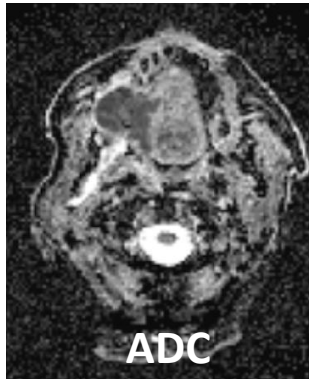
## Tamaño tumoral (T) < ---- > DCE / Ktrans





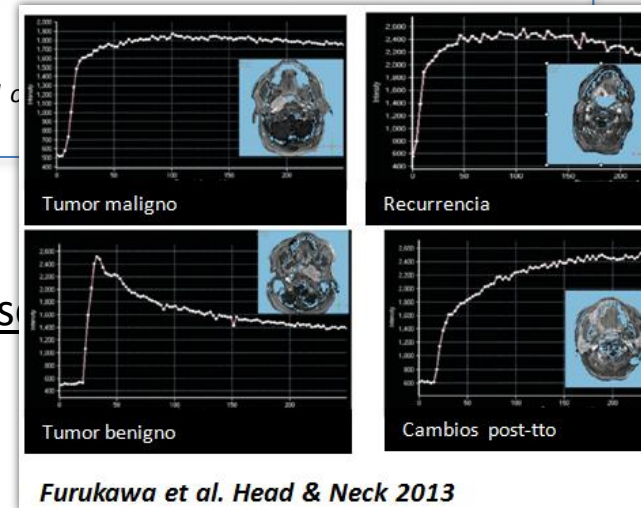
## DWI-ADC





**Ca escamosos** 66% son curvas de tipo 3 y el 33% de tipo 2  
ADC Tumores malignos de 0.6-1.2 y el Ca es

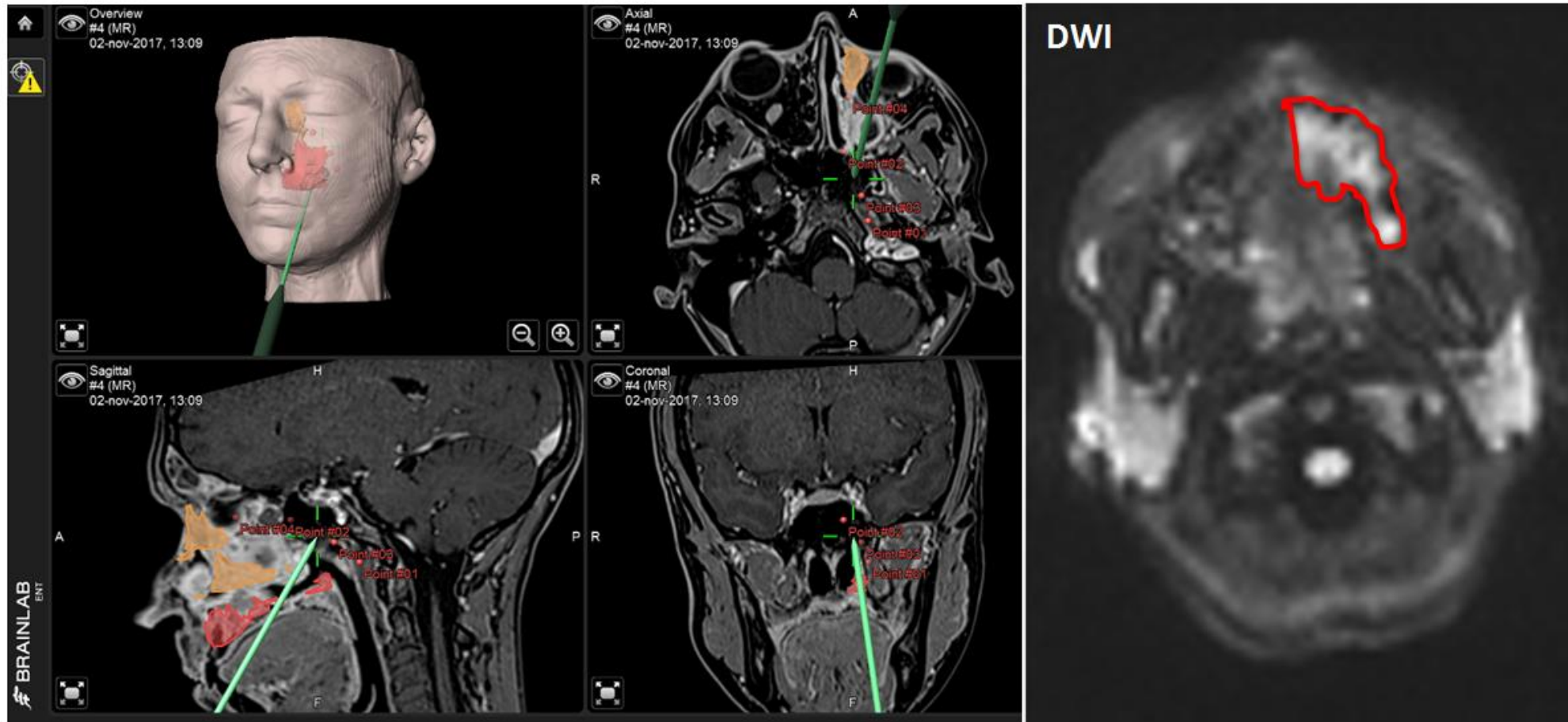
**Linfoma** ADC <0.6





## Delimitación de la tumoración

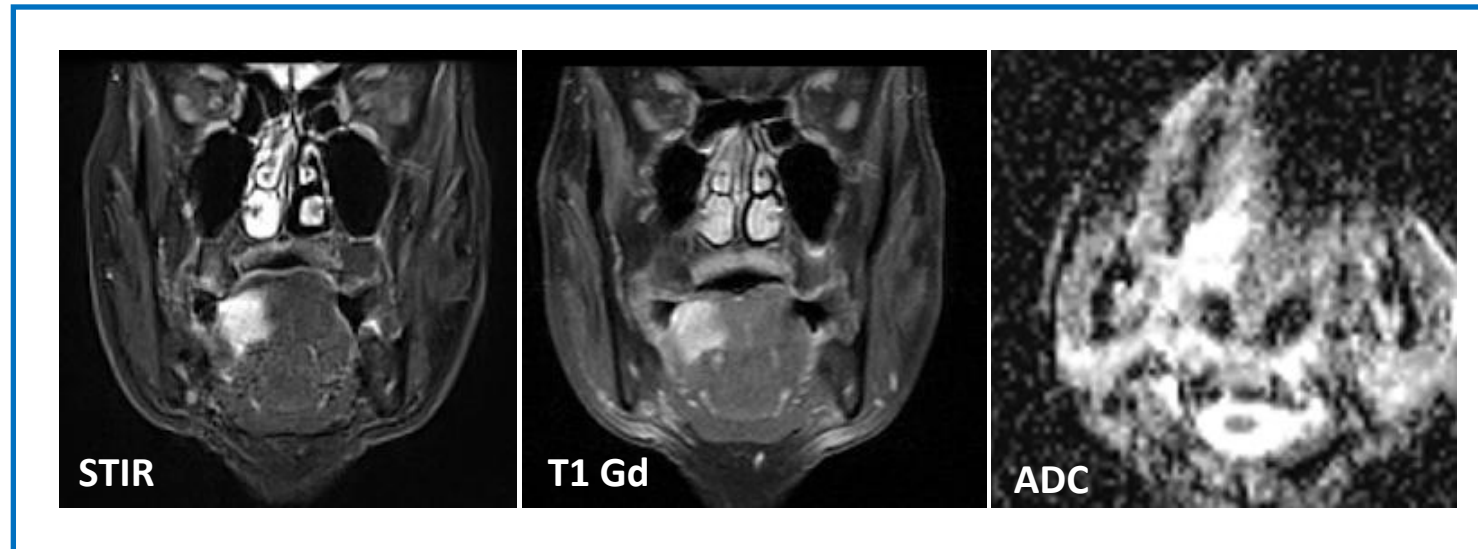
Planificación: es de ayuda para la planificación quirúrgica.



## Delimitación de la tumoración

Planificación: es de ayuda para la planificación quirúrgica.

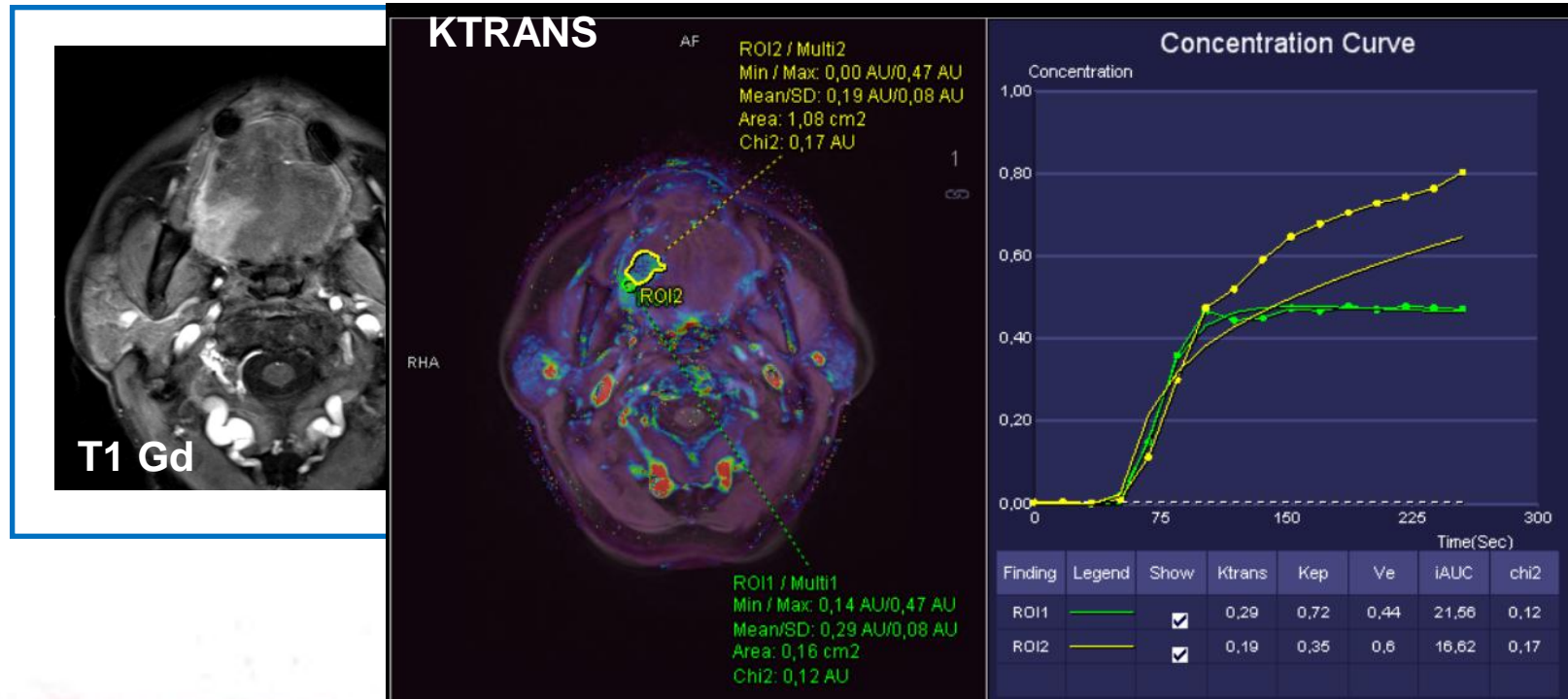
### Cambios post-biopsia



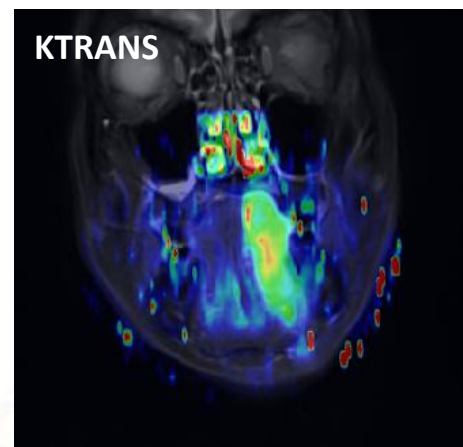
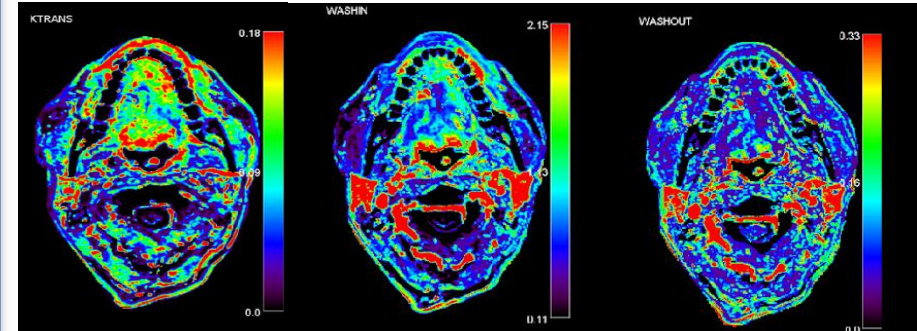
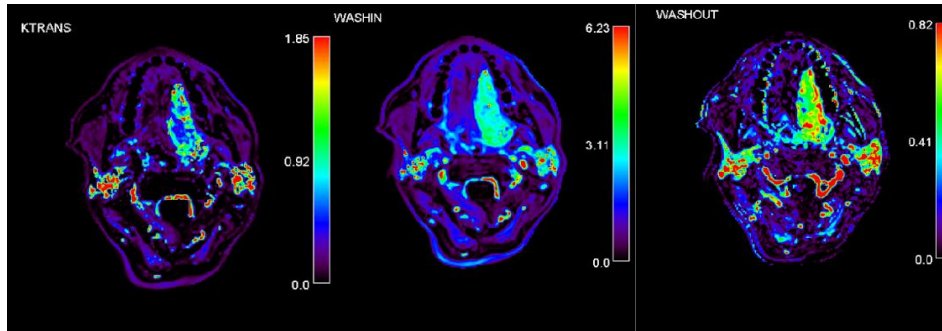
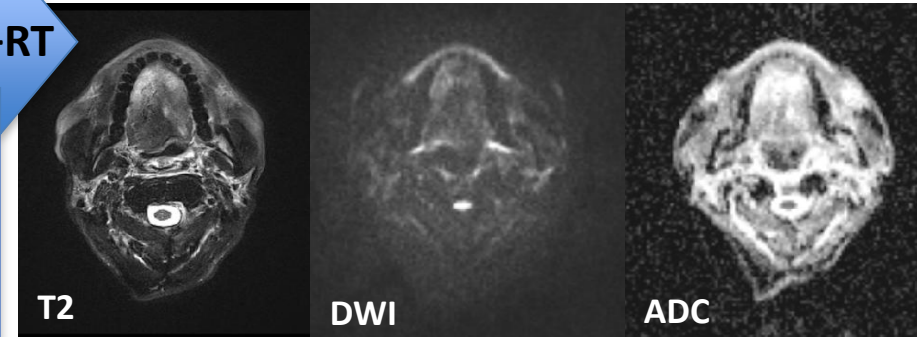
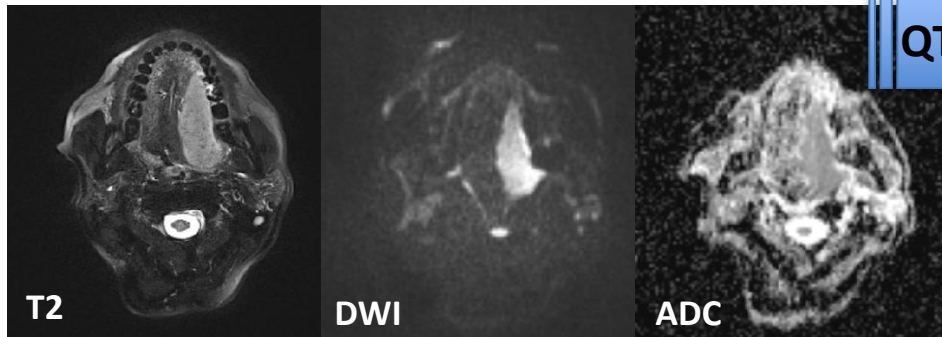
## Delimitación de la tumoración

Planificación: es de ayuda para la planificación quirúrgica.

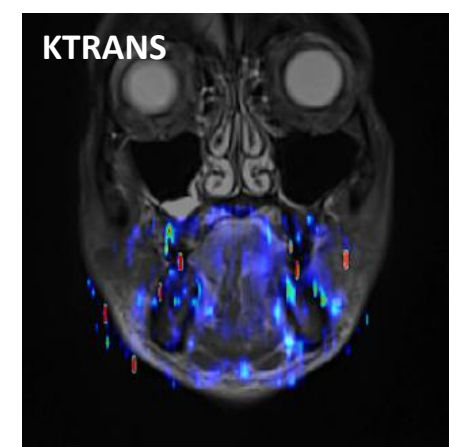
## Cambios post-biopsia



# Diagnóstico y Seguimiento

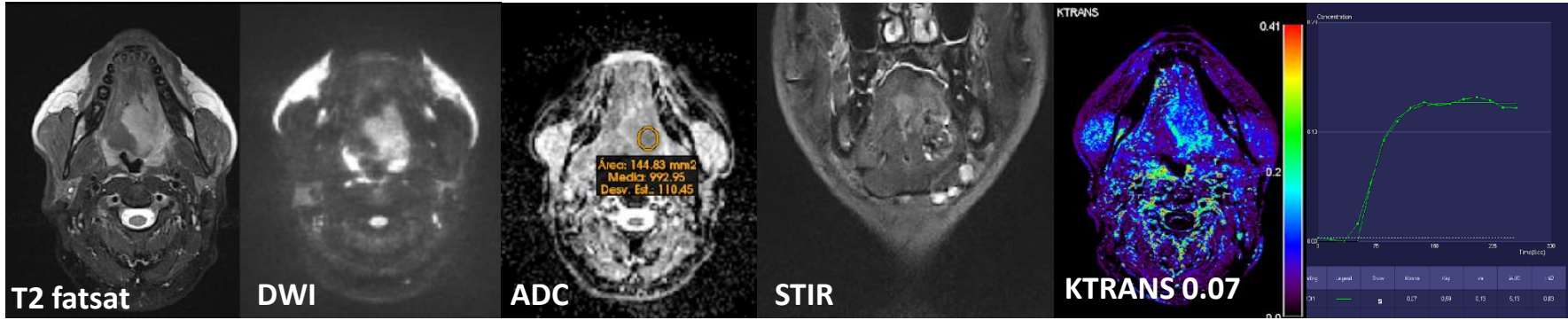


KTRANS 0.25

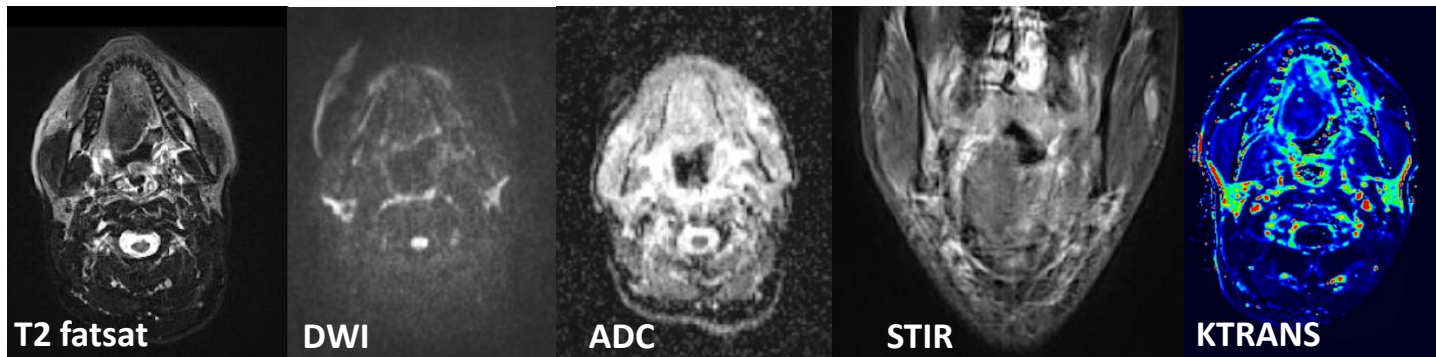


# Diagnóstico y Seguimiento

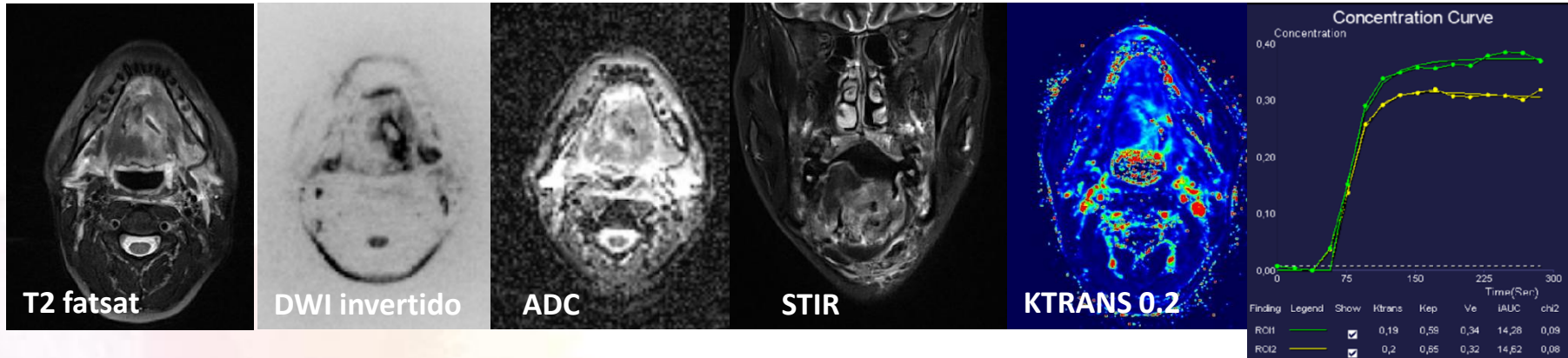
## 1 Diagnóstico



## 2 RC Post-QT/RT

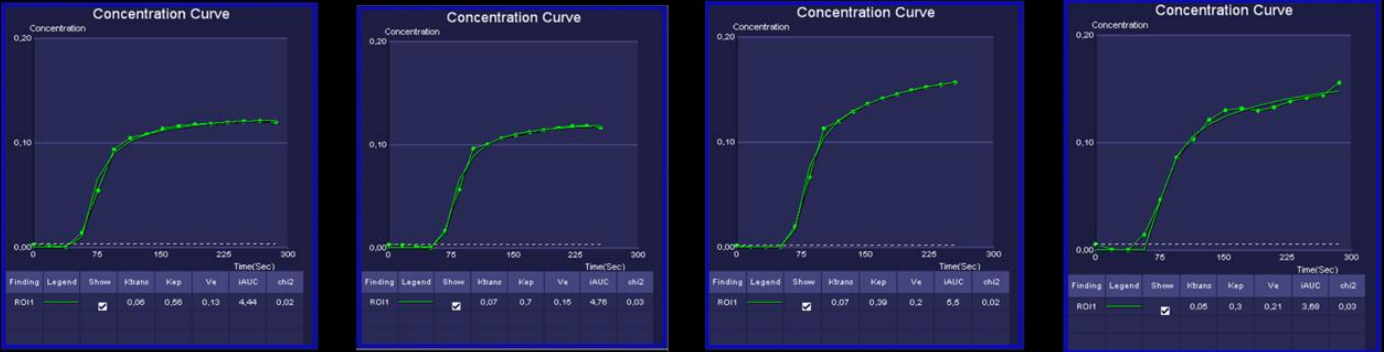


## 3 Recidiva precoz

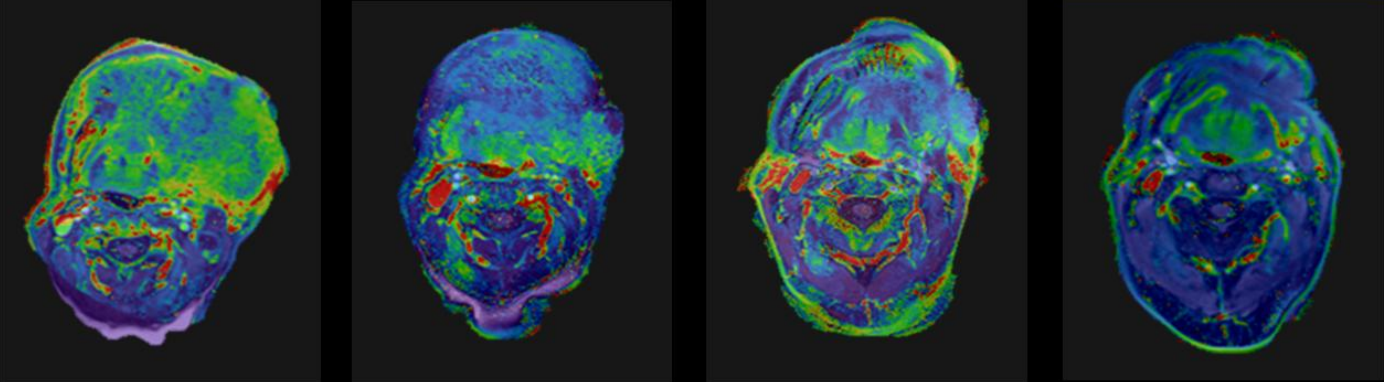


# Diagnóstico y Seguimiento

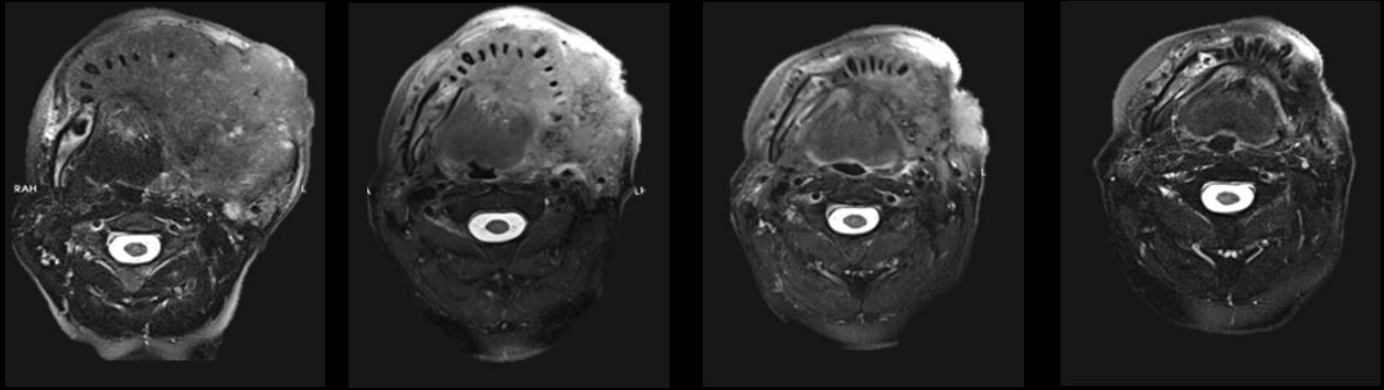
Curva



KTRANS



T2 fatsat

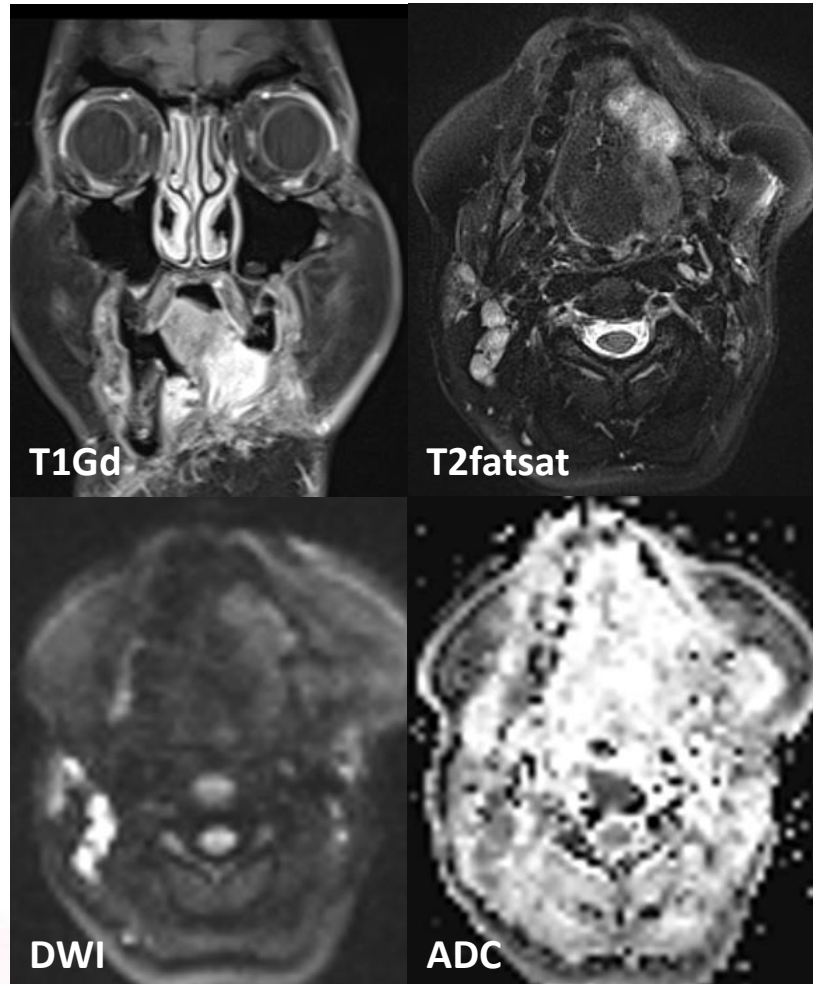


Diagnóstico

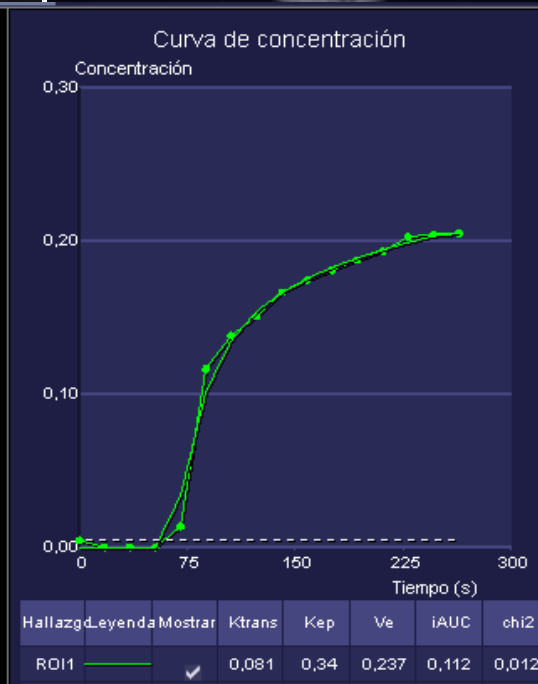
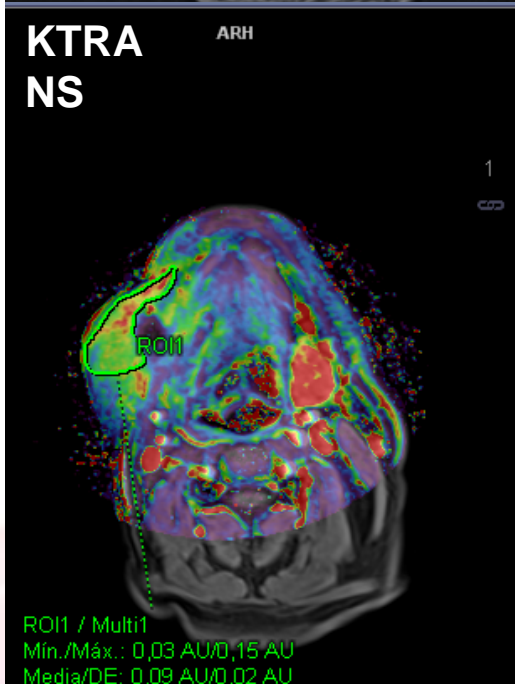
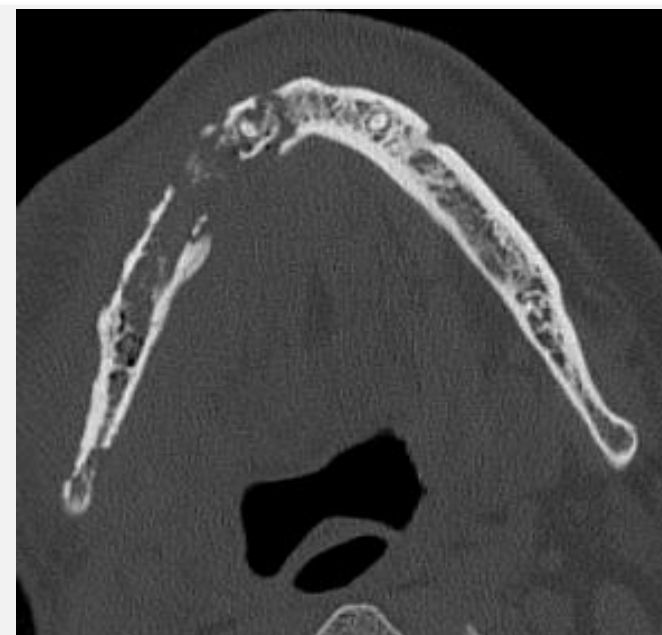
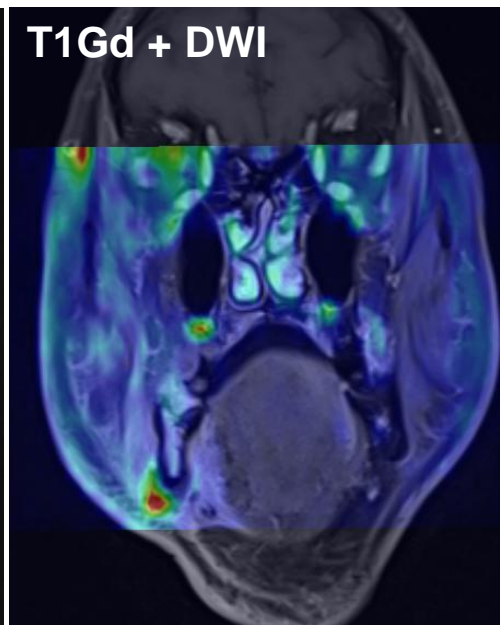
RT y Cetuximab



## 1. EDEMA DE DENERVACIÓN

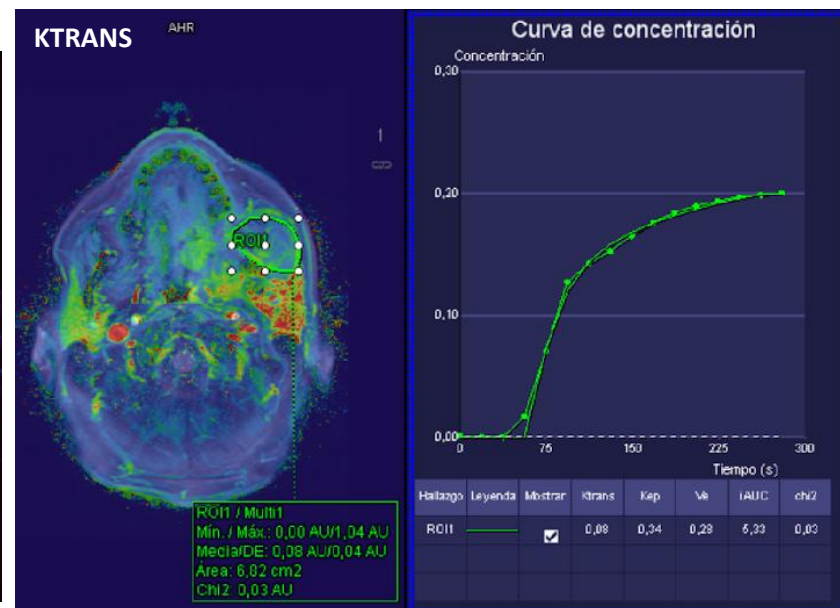
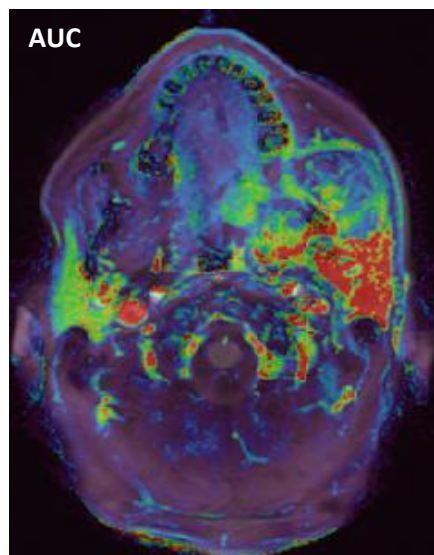
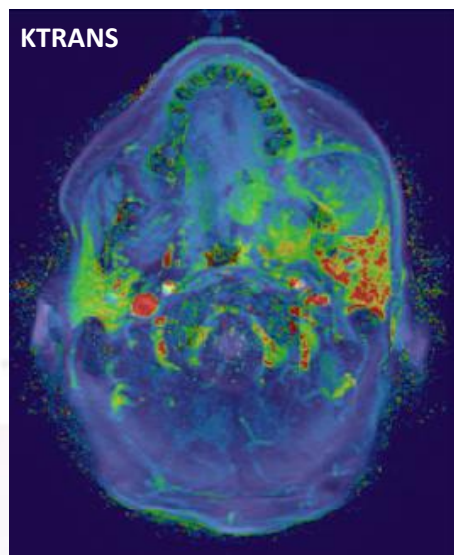
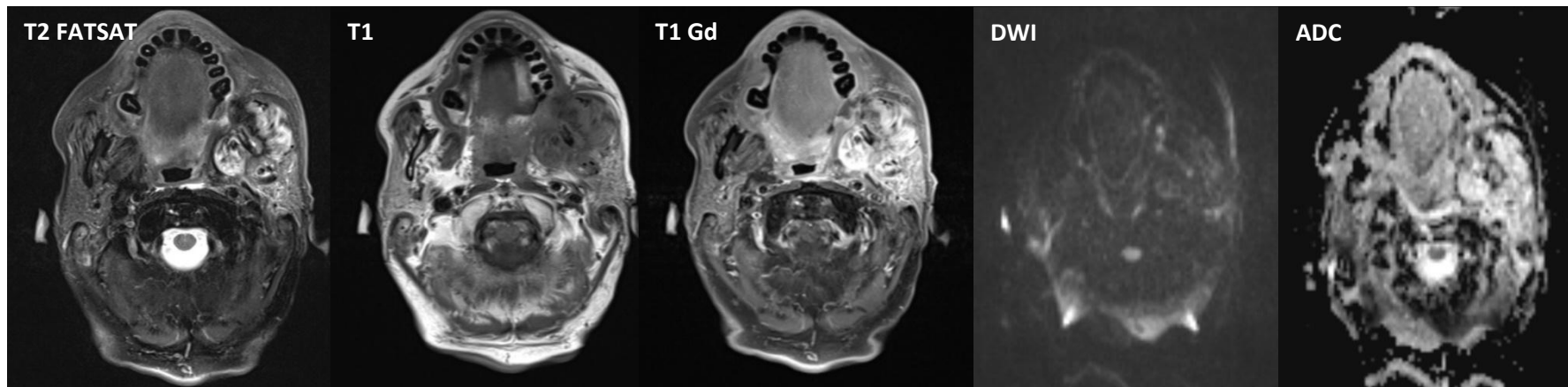


2. OSTEOMIELITIS





### 3. INFECCIÓN (aspergillus)



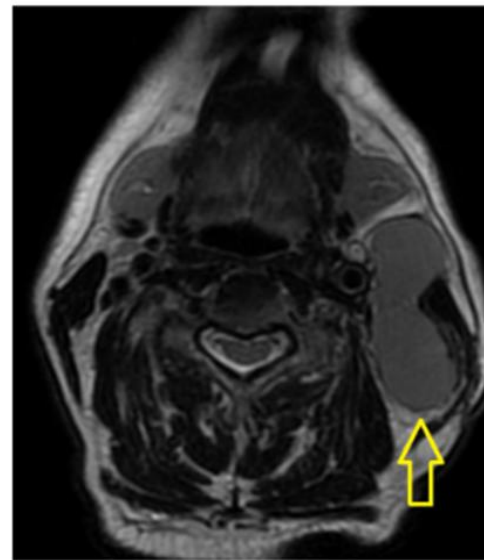
## DCE-MRI

**Ktrans , Ve , iAUC**

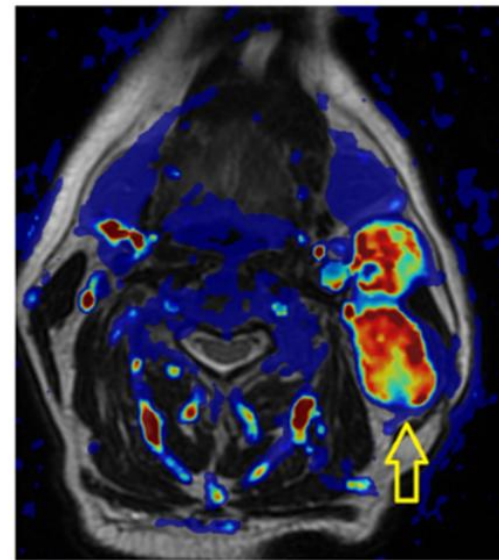
Yan S, Wang Z, Li L, Guo Y, Ji X, Ni H, Shen W, Xia S. Characterization of cervical lymph nodes using DCE-MRI: Differentiation between metastases from SCC of head and neck and benign lymph nodes. Clin Hemorheol Microcirc. 2016 Nov 25;64(2):213-222. doi: 10.3233/CH-162065

**Ktrans, Ve, Kep**

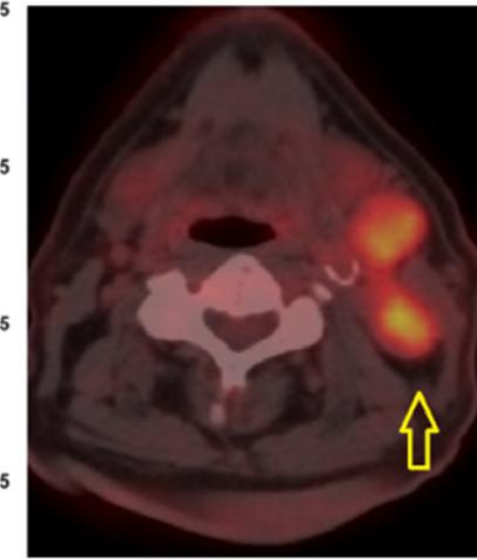
Chen L, et al. Dynamic Contrast-enhanced Magnetic Resonance Imaging for Differentiating Between Primary Tumor, Metastatic Node and Normal Tissue in Head and Neck Cancer. Curr Med Imaging Rev. 2018 Jun;14(3):416-421. doi: 10.2174/1573405614666171205105236.



a. T2



b. Ktrans



c. PET

Vidiri A, Gangemi E, Ruberto E, Pasqualoni R, Sciuto R, Sanguineti G, Farneti A, Benevolo M, Rollo F, Sperati F, Spasiano F, Pellini R, Marzi S. Correlation between histogram-based DCE-MRI parameters and 18F-FDG PET values in oropharyngeal squamous cell carcinoma: Evaluation in primary tumors and metastatic nodes. PLoS One. 2020 Mar 2;15(3):e0229611. doi: 10.1371/journal.pone.0229611.

1

## TAMAÑO

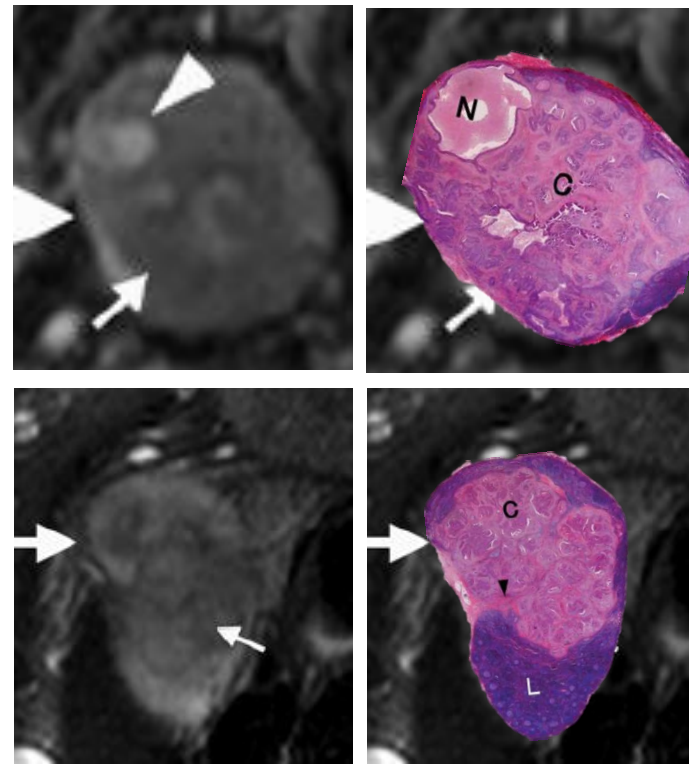
Eje corto en plano axial > 1cm

2

## ARQUITECTURA INTERNA



Hilio graso



**T2 fatsat** → heterogeneo y/o focos de hiperseñal.

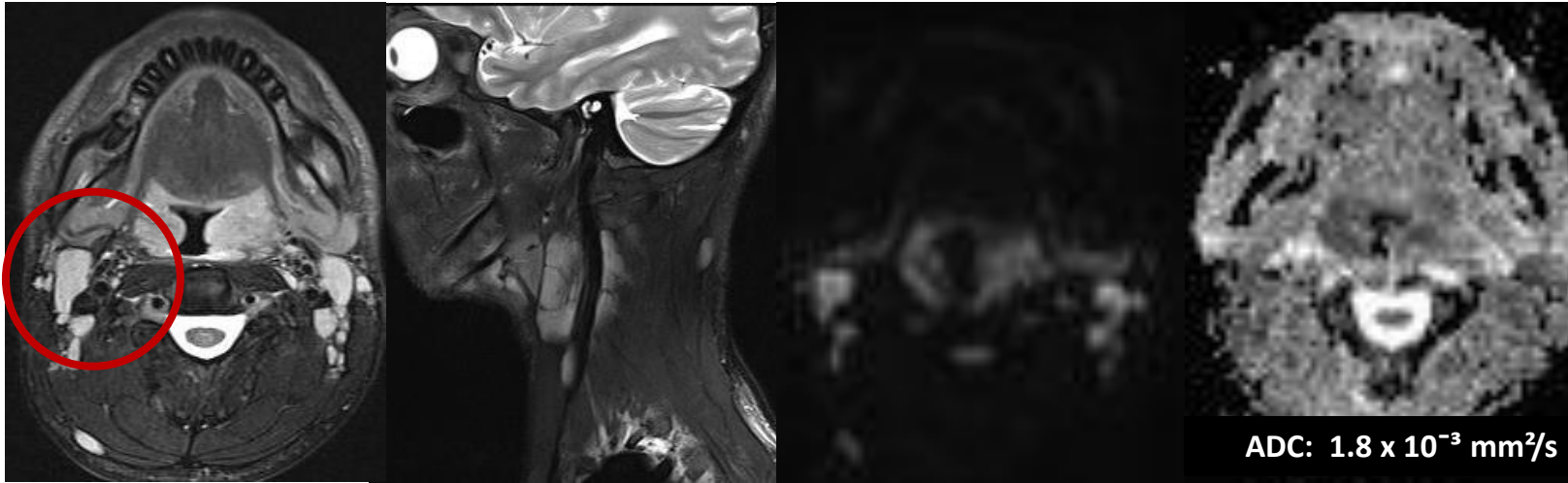
**T1Gd** → focos de hiposeñal que no realzan.



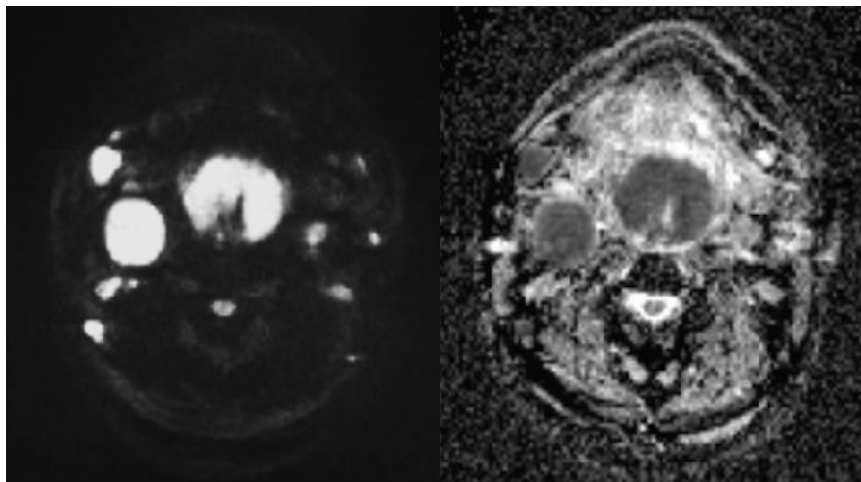
3

DWI-RM

Adenopatías reactivas



Linfoma



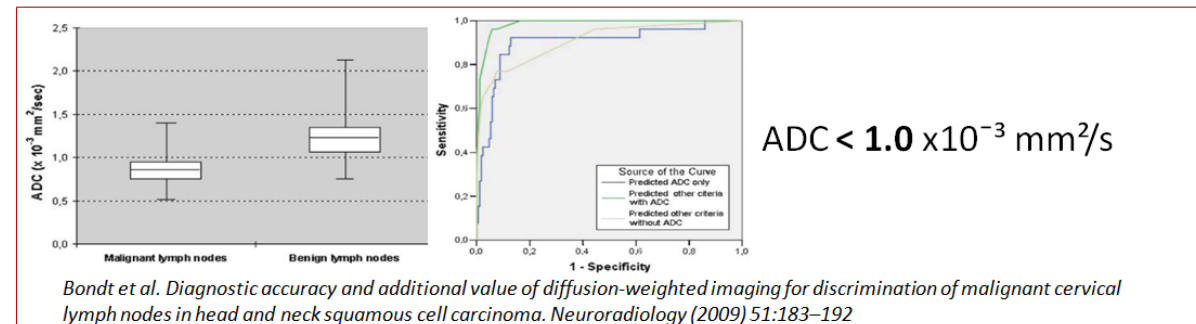
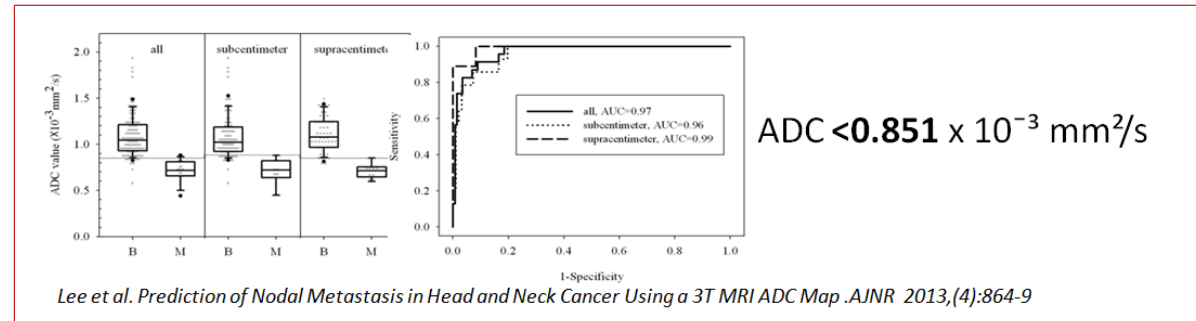
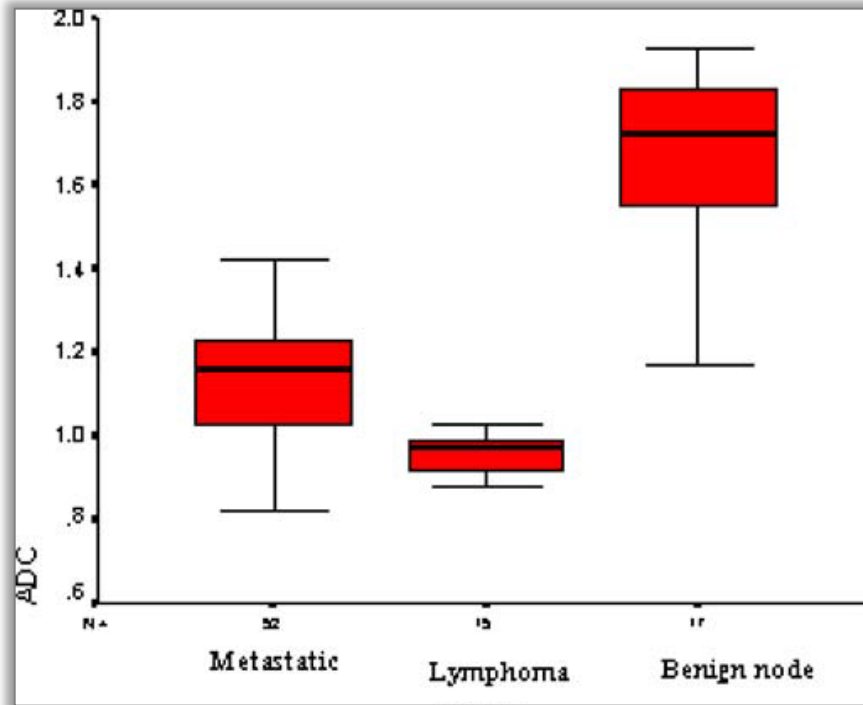
ADC  $< 0.6 \times 10^{-3} \text{ mm}^2/\text{s}$



## 3

## DWI-RM

### ADC como predictor de presencia de metástasis



**Diagnóstico** DWI-ADC

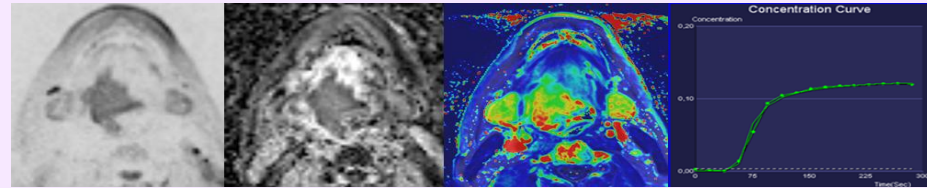
**ADC**  $\leftrightarrow$  celularidad (SCC ADC 0.6-1)

Limitar el tumor (tumor/edema)

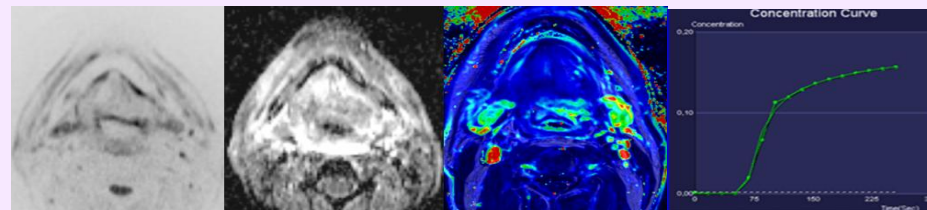
*Predicción respuesta/control local*

- $K_{trans} > 0,45$
- $ADC \pm < 0,80$

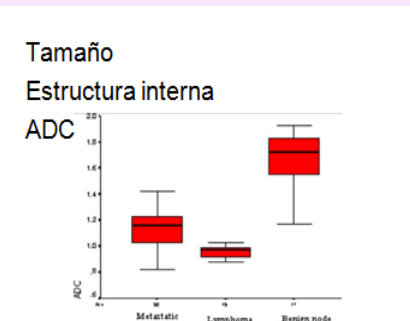
**Falta aún más consistencia científica**



DWI-ADC / DCE-MRI (Ktrans)  $\rightarrow$  **Monitorización respuesta / recidiva**



**Adenopatías:** Estructura interna /  $ADC < 0.85$



# GRACIAS

