CORSO DI LAUREA
TECNICHE DI RADIOLOGIA MEDICA, PER IMMAGINI E RADIOTERAPIA

**ADO RMX102**
***«Corso Monografico»***

ANNO ACCADEMICO 2022/2023


Gemelli


**Insegnamento:**
**«ANGIO-RM IN NEURORADIOLOGIA»**
**12 ore MED/50 CFU 1**

Formazione per l'eccellenza

apr. '23

3° anno II semestre

**Fondazione Policlinico Universitario Agostino Gemelli IRCCS**
**Università Cattolica del Sacro Cuore**

BEST HOSPITALS 2022 Newsweek statista
L' OSPEDALE IN ITALIA
POLICLINICO UNIVERSITARIO A. GEMELLI

**Insegnamento:**
**ADO «ANGIO-RM  IN NEURORADIOLOGIA»**
**RMX102 – 12 ore MED/50 CFU 1**


*TSRM Marino Gentile*
*Radiographer*

Formazione per l'eccellenza

Gemelli

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apr. '23
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Fondazione Policlinico Universitario Agostino Gemelli IRCCS
Università Cattolica del Sacro Cuore

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TECNICHE DI RADIOLOGIA MEDICA, PER IMMAGINI E RADIOTERAPIA

**ADO RMX102**
***«Angio-RM in neuroradiologia»***

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# IN PRATICA:
# IMPOSTAZIONE DELLE SEQUENZE

Formazione per l'eccellenza

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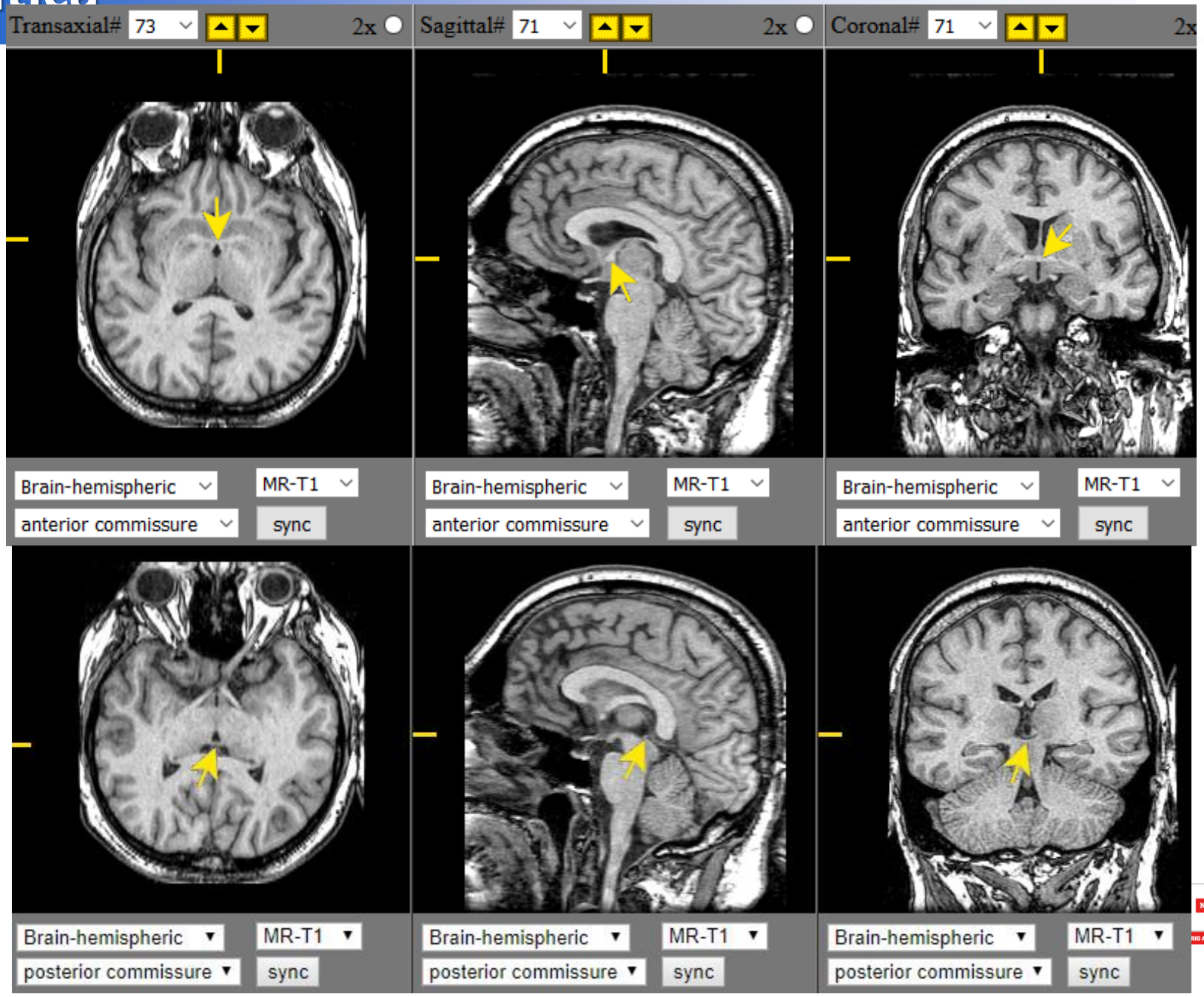
POLICLINICO UNIVERSITARIO A. GEMELLI

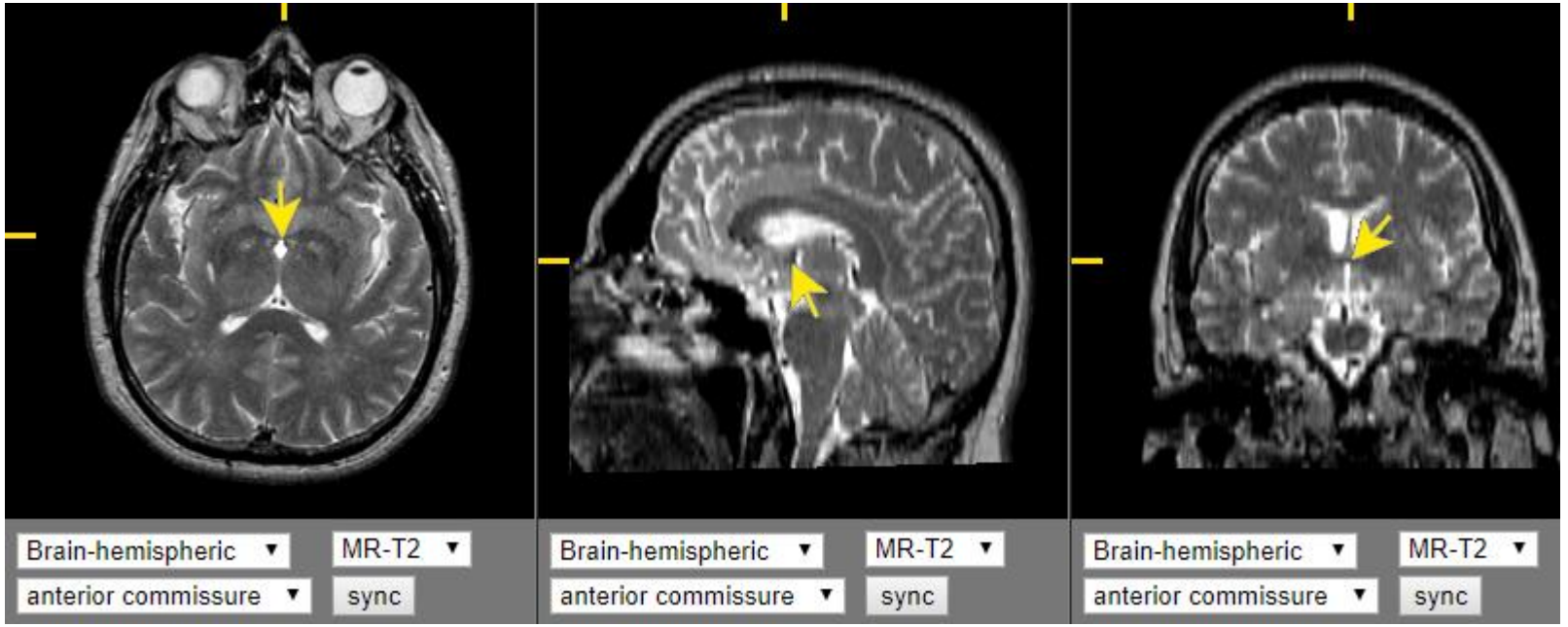
# Argomenti del Corso

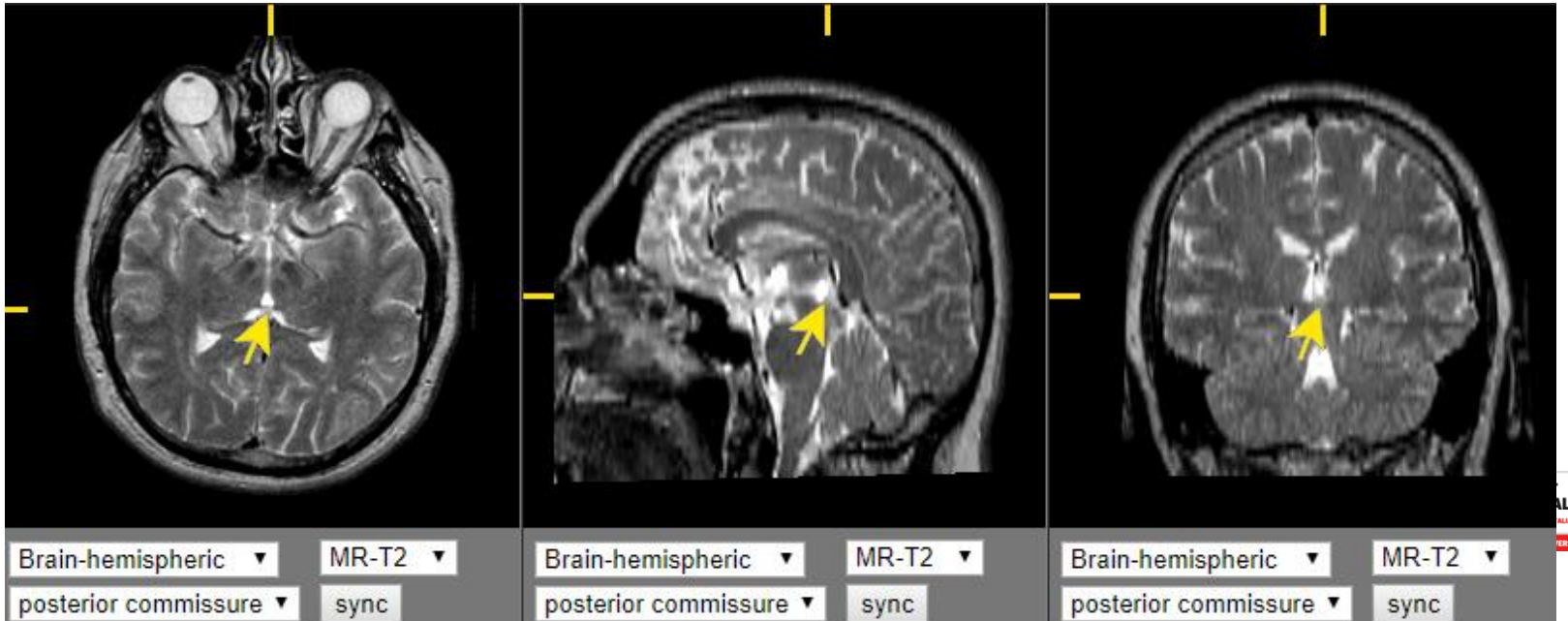
- **Introduzione e cenni di Anatomia**
- **Mezzi di contrasto in RM**
- **Sequenze senza MdC**
  - Sequenze Time of Flight (TOF)
  - Sequenze Phase Contrast (PC-2D, 3D INHANCE)
  - Perfusione ASL
- **Sequenze con MdC**
  - Sequenze 3D FSPGR – 3DFFE
  - 4D/sequenziali: Tricks, Baleriaux, CE-MRA, 4D Track
  - Perfusione T2* (DSC), T1 (DCE)
- **Modalità di rilevamento del MdC**
- **In Pratica: impostazione delle sequenze**

# Pratica

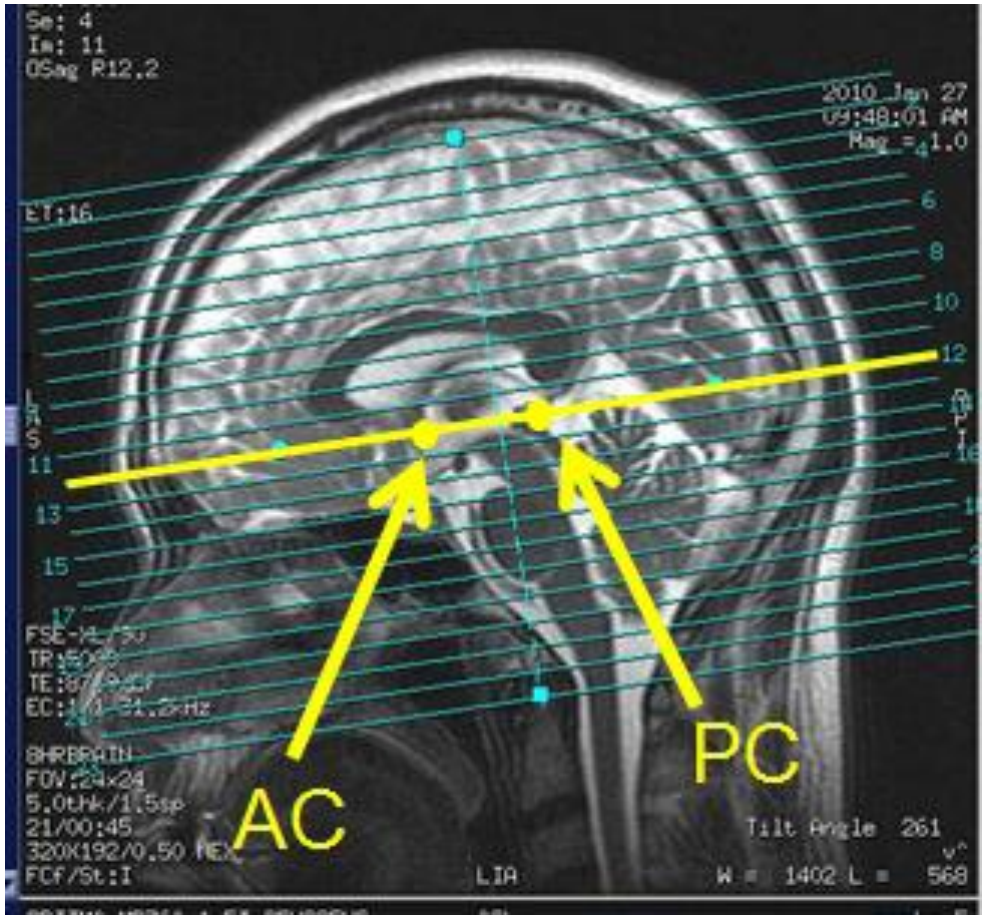

Transaxial# 73
2x
Sagittal# 71
2x
Coronal# 71
2x
Brain-hemispheric
MR-T1
anterior commissure
sync
Brain-hemispheric
MR-T1
anterior commissure
sync
Brain-hemispheric
MR-T1
anterior commissure
sync
Brain-hemispheric
MR-T1
posterior commissure
sync
Brain-hemispheric
MR-T1
posterior commissure
sync
Brain-hemispheric
MR-T1
posterior commissure
sync

# Pratica


Brain-hemispheric
MR-T2
anterior commissure
sync
Brain-hemispheric
MR-T2
anterior commissure
sync
Brain-hemispheric
MR-T2
anterior commissure
sync

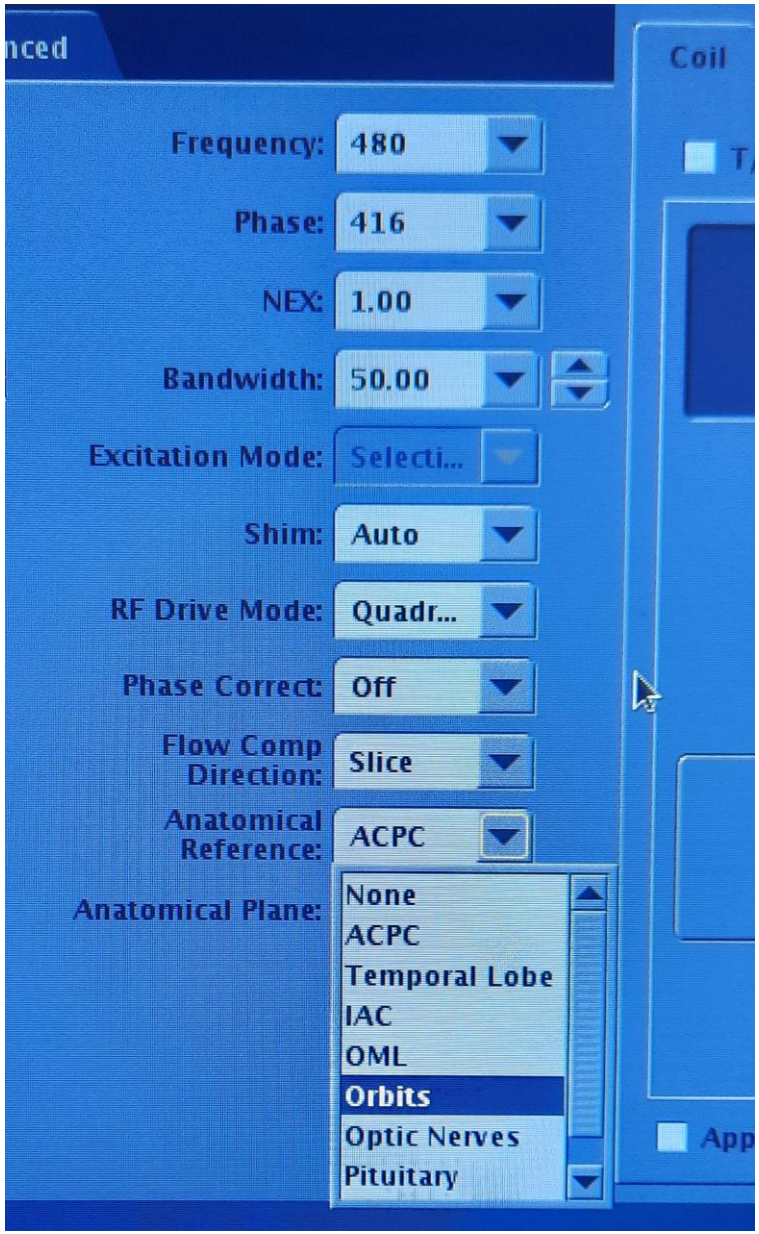

Brain-hemispheric
MR-T2
posterior commissure
sync
Brain-hemispheric
MR-T2
posterior commissure
sync
Brain-hemispheric
MR-T2
posterior commissure
sync

# Pratica – linea bicommissurale



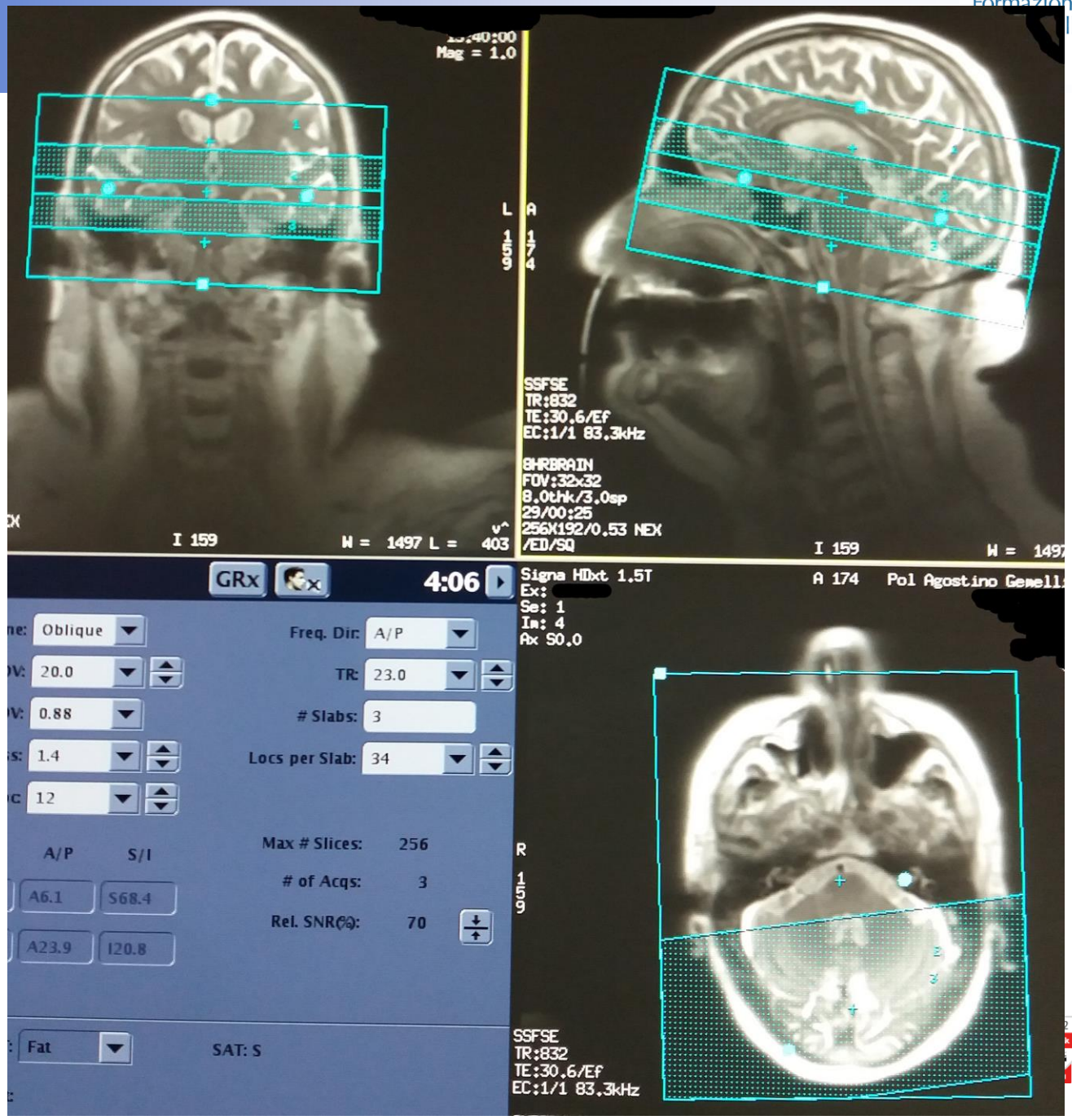

Imposta la linea ACPC, che si estende dalla superficie superiore della commessura anteriore al centro della commessura posteriore.

# Pratica – linea bicommissurale

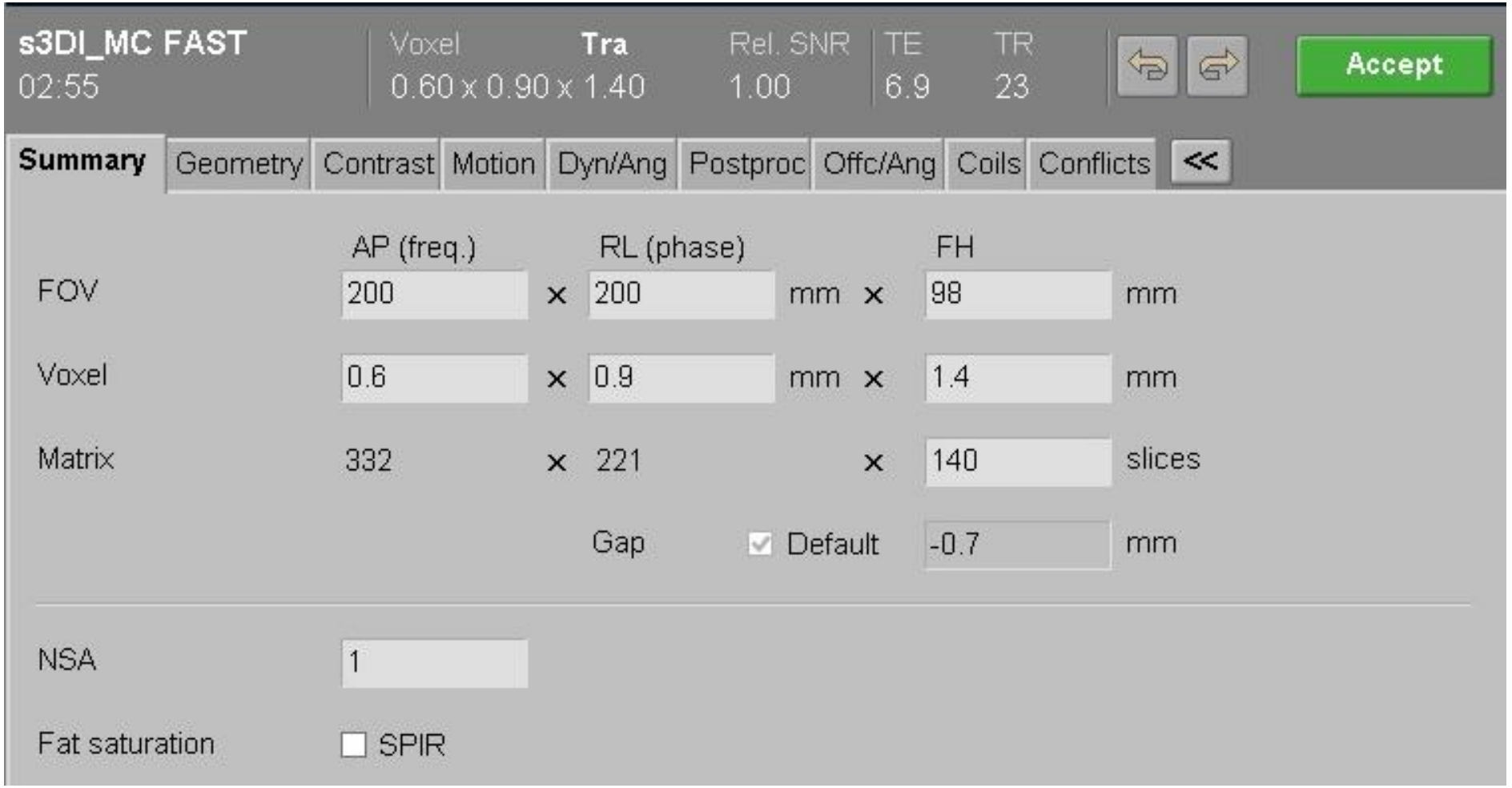



Deep Learning

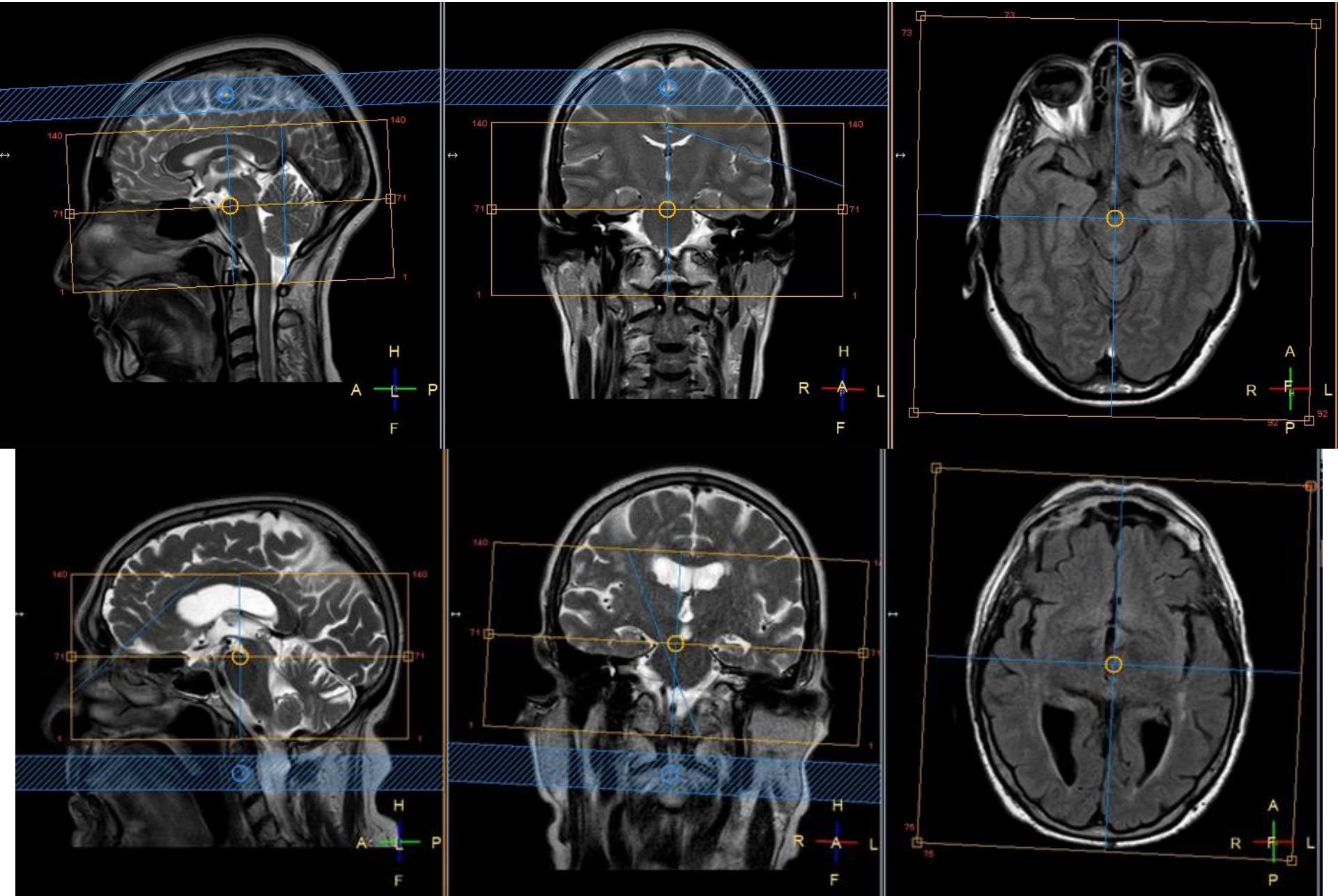
# Pratica: TOF


Mag = 1.0
L A
I 159
W = 1497 L = 403
SSFSE
TR:832
TE:30.6/Ef
EC:1/1 83.3kHz
8HRBRAIN
FOV:32x32
8.0thk/3.0sp
29/00:25
256X192/0.53 NEX
/ED/SQ
I 159
GRx
4:06
Oblique
Freq. Dir: A/P
20.0
TR: 23.0
0.88
# Slabs: 3
1.4
Locs per Slab: 34
12
A/P S/I
Max # Slices: 256
A6.1 S68.4
# of Acqs: 3
A23.9 I20.8
Rel. SNR(%): 70
Fat
SAT: S
Signa HDxt 1.5T
Ex:
Se: 1
Im: 4
Ax S0.0
A 174
Pol Agostino Gemelli
R
SSFSE
TR:832
TE:30.6/Ef
EC:1/1 83.3kHz

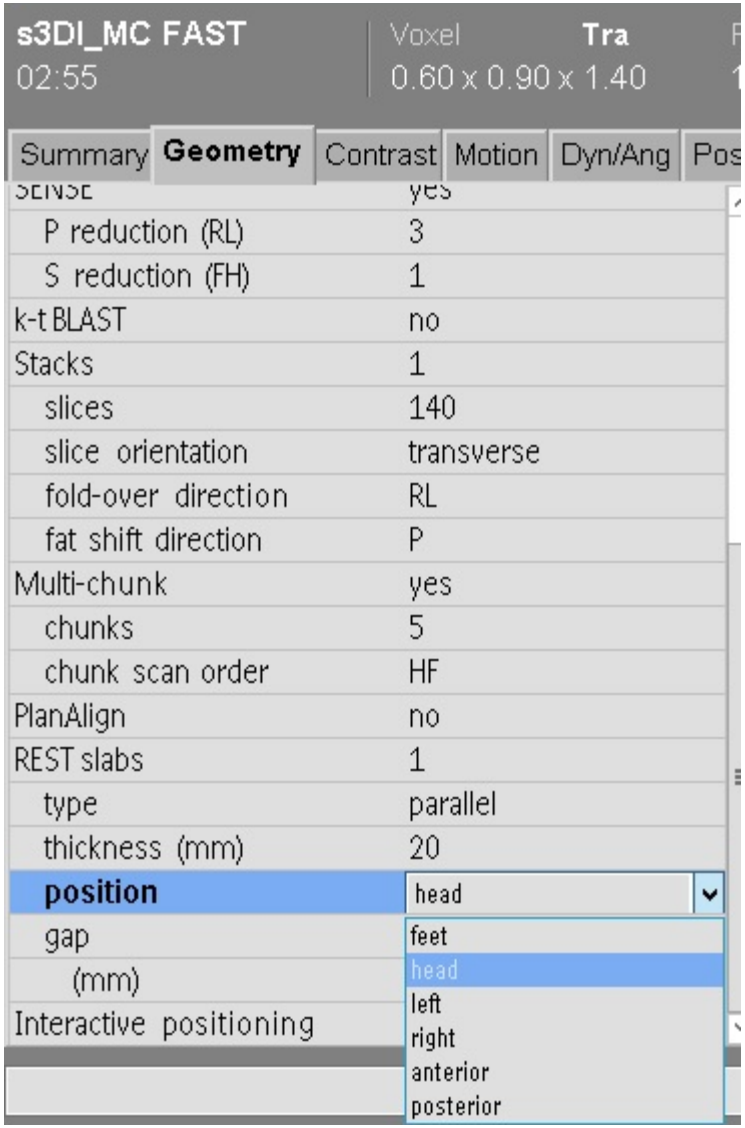
# Pratica: TOF

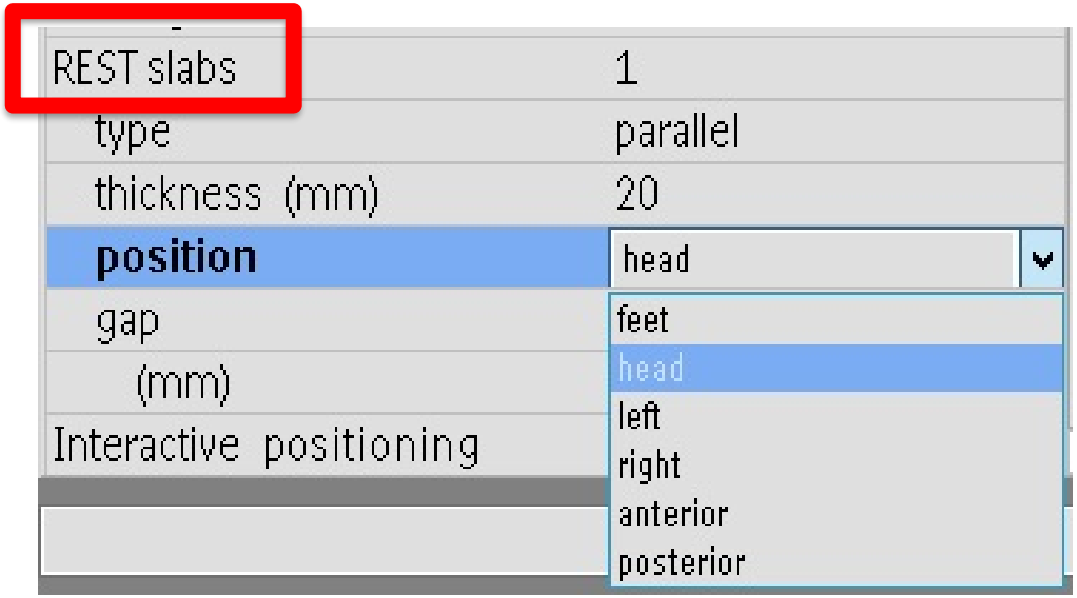

s3DI_MC FAST
02:55
Voxel
0.60 x 0.90 x 1.40
Tra
Rel. SNR
1.00
TE
6.9
TR
23
Accept
Summary
Geometry
Contrast
Motion
Dyn/Ang
Postproc
Offc/Ang
Coils
Conflicts
<<
AP (freq.)
RL (phase)
FH
FOV
200
x
200
mm
x
98
mm
Voxel
0.6
x
0.9
mm
x
1.4
mm
Matrix
332
x
221
x
140
slices
Gap
Default
-0.7
mm
NSA
1
Fat saturation
SPIR

# Pratica: TOF


140
140
71
71
1
1
H
A
L
P
F
140
140
71
71
1
1
H
R
A
L
F
73
73
A
R
F
L
P
92
92
140
140
71
71
1
1
H
A
L
P
F
140
71
71
1
1
H
R
A
L
F
75
75
A
R
F
L
P

# Pratica: TOF


s3DI_MC FAST
02:55
Voxel
0.60 x 0.90 x 1.40
Tra
Summary
Geometry
Contrast
Motion
Dyn/Ang
Pos
SENSE
yes
P reduction (RL)
3
S reduction (FH)
1
k-t BLAST
no
Stacks
1
slices
140
slice orientation
transverse
fold-over direction
RL
fat shift direction
P
Multi-chunk
yes
chunks
5
chunk scan order
HF
PlanAlign
no
REST slabs
1
type
parallel
thickness (mm)
20
position
head
gap
(mm)
Interactive positioning
feet
head
left
right
anterior
posterior


REST slabs
1
type
parallel
thickness (mm)
20
position
head
gap
(mm)
Interactive positioning
feet
head
left
right
anterior
posterior

# Pratica: TOF

**s3Di_MC**

**Three dimensional Multi chunk inflow sequence**

Multi chunk sequence that makes use of the inflow effects of blood to visualize vessels.

**Info:**
Avoid saturation effects within large volumes by dividing the large volume into overlapping sub volumes (*Chunks*).

Decrease saturation effects within a chunk by *TONE*.

*CHARM* is used to eliminate or reduce Venetian Blind artifacts (in background).

*REST-slab* is used to suppress the venous flow

*SENSE* is used to improve the speed of the sequence.

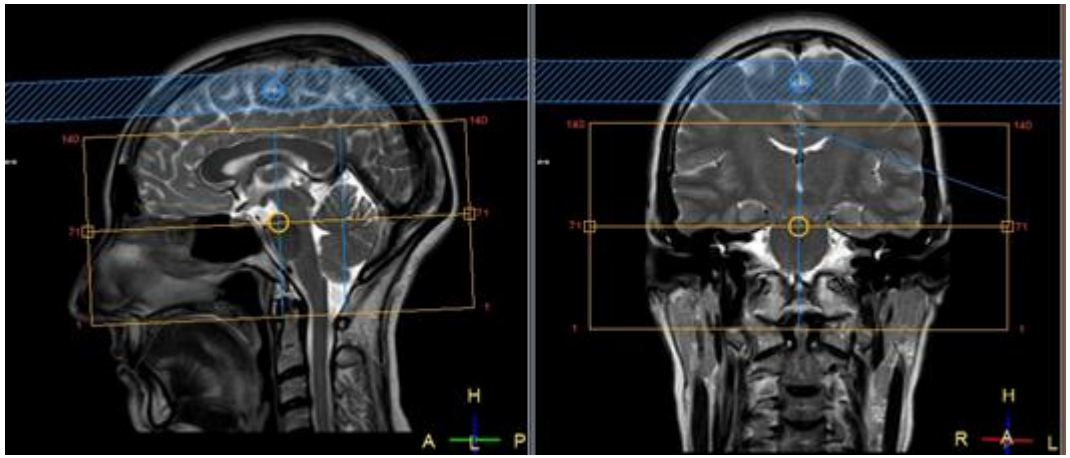
**Tips:**
Always use an *out of phase* echo time. This will minimize the amount of fat signal within the images.

The number of *chunks* in combination with *TONE* and *CHARM* are optimized. The easiest way to extend your volume package is by adding a chunk with the same amount of slices per chunk as in the original preset procedure.

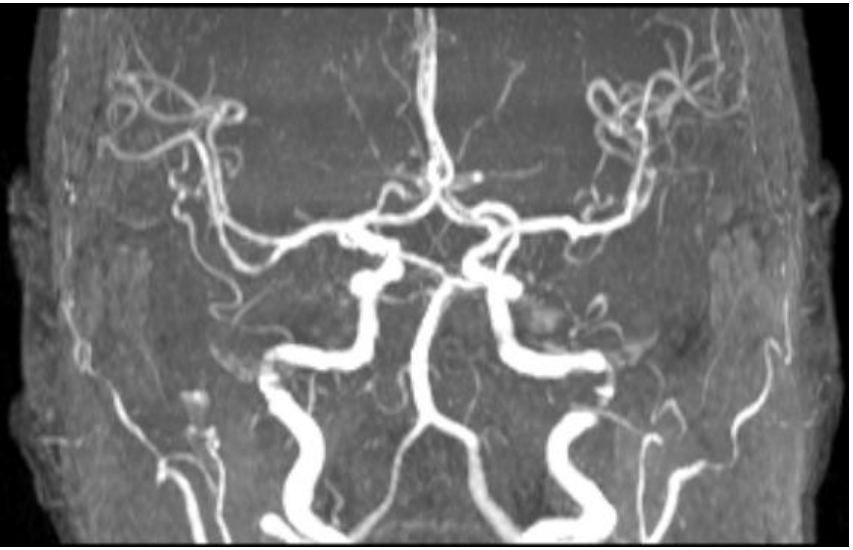
Chunk order must be chosen against the blood flow.

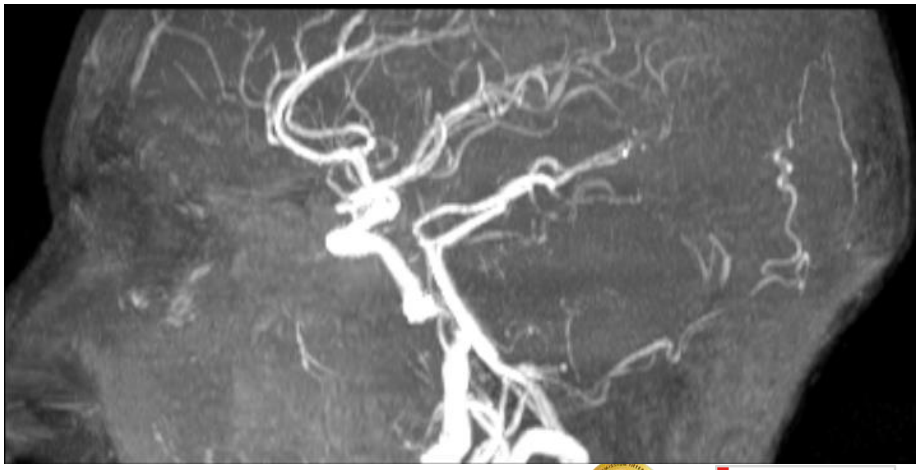
**Per gli artefatti vedi presentazione 10 – MRI - ARTEFATTI**

# Pratica: TOF



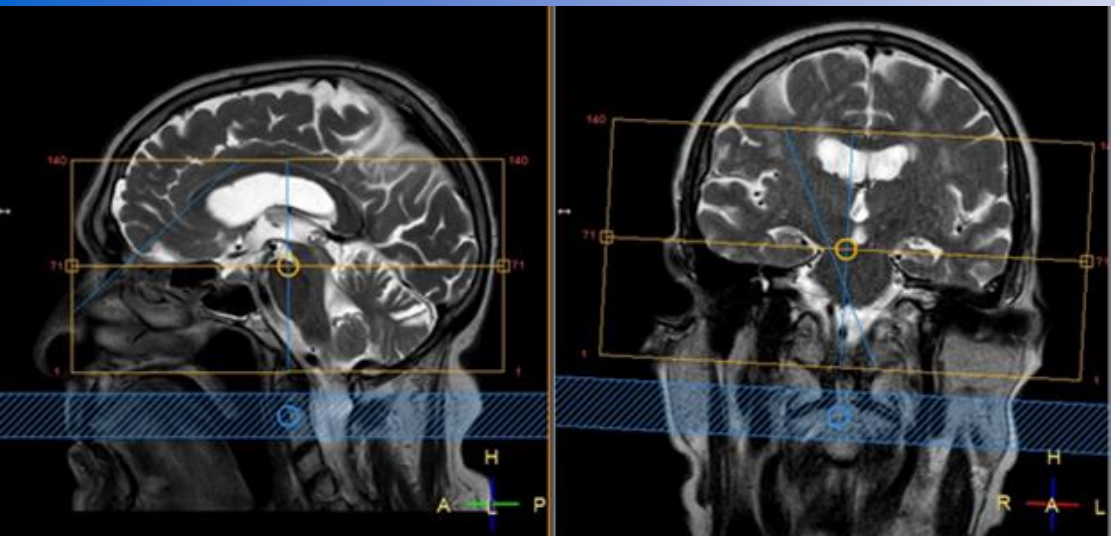


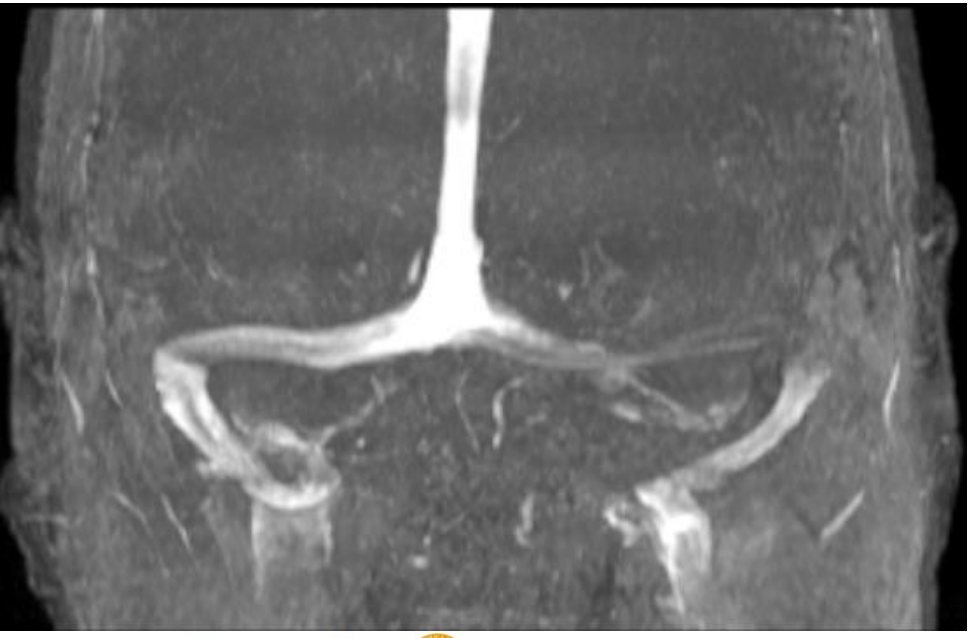




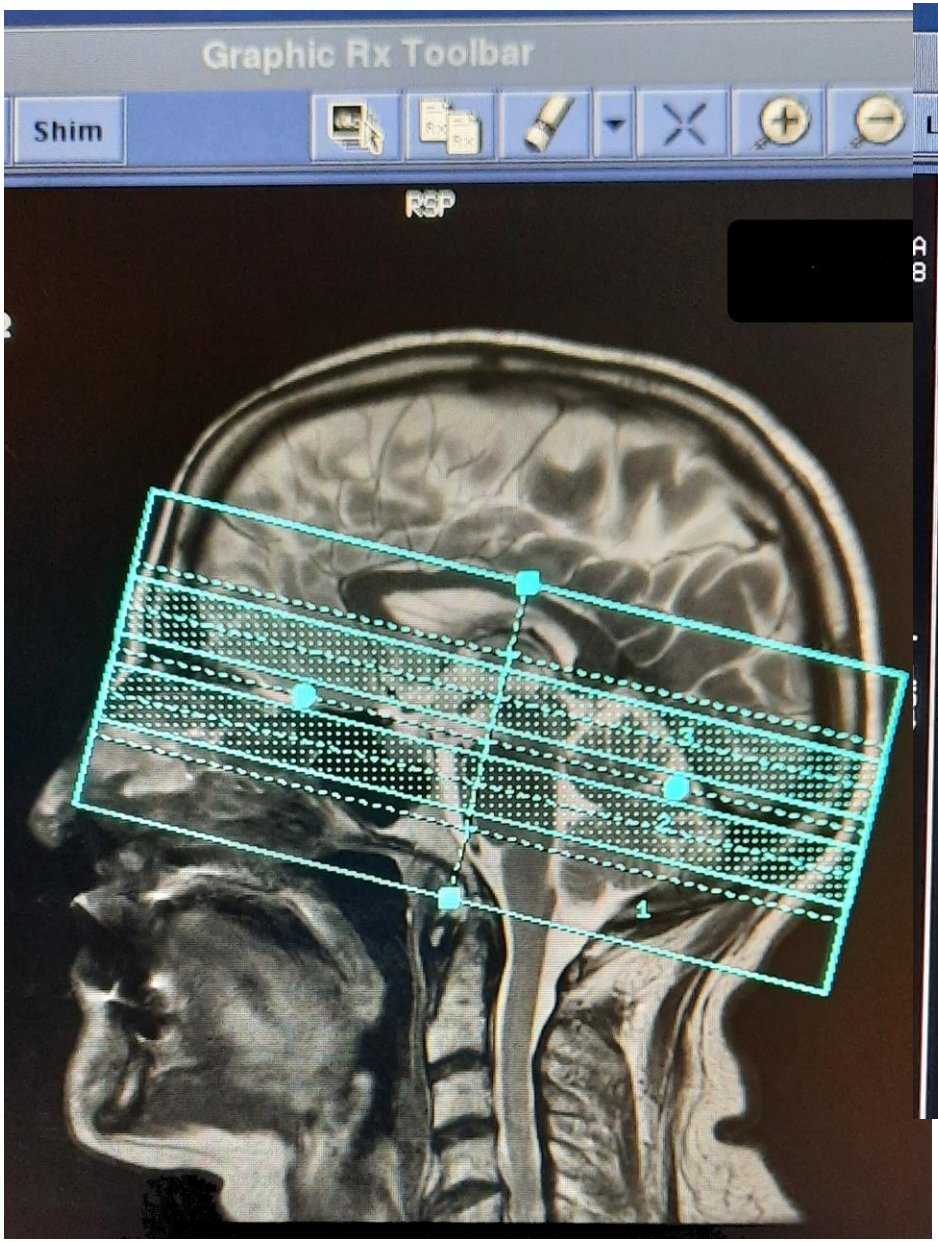
# Pratica: TOF

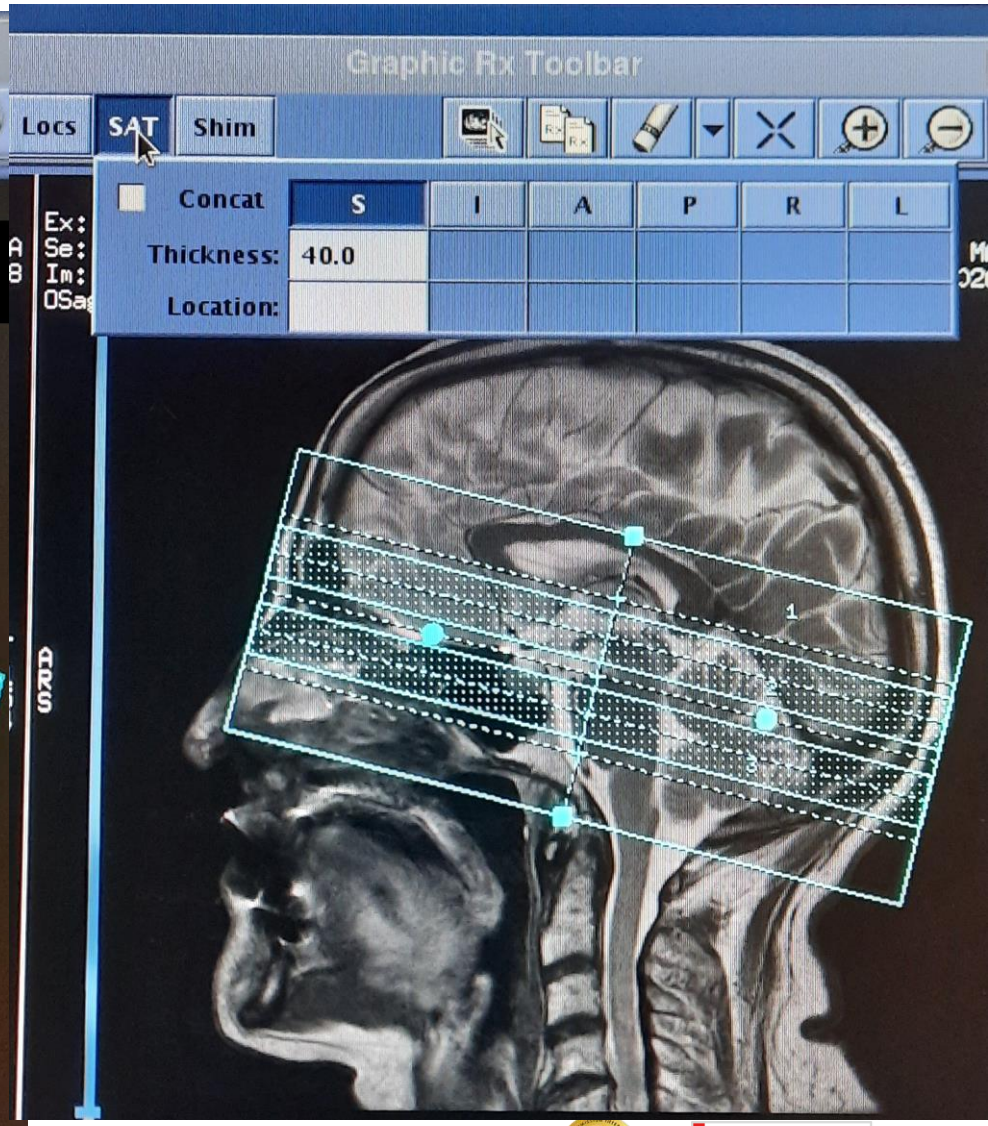




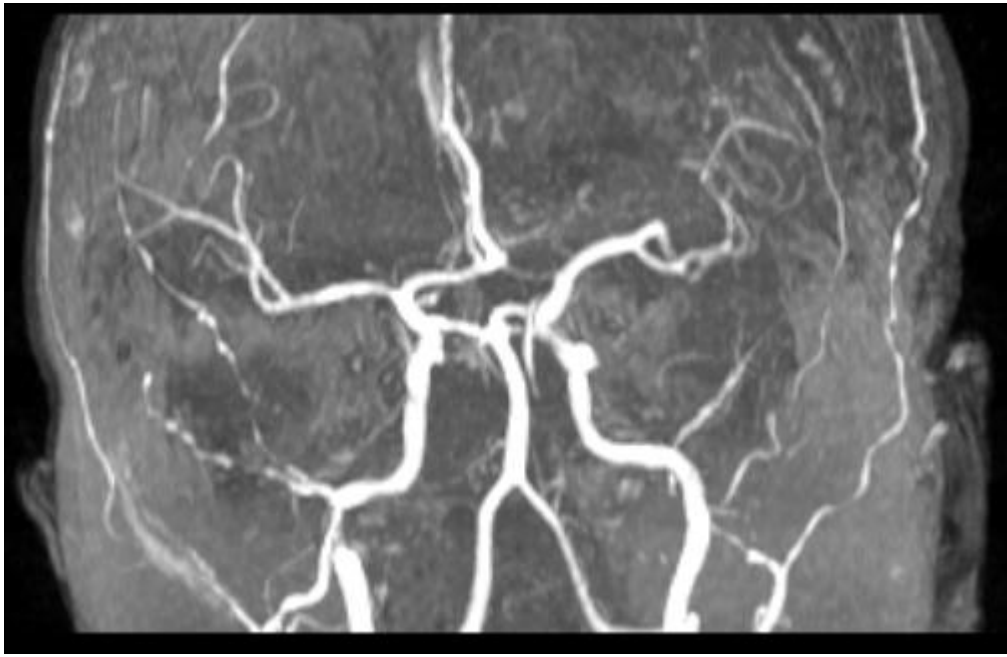



# Pratica: TOF


Graphic Rx Toolbar
Shim
RSP

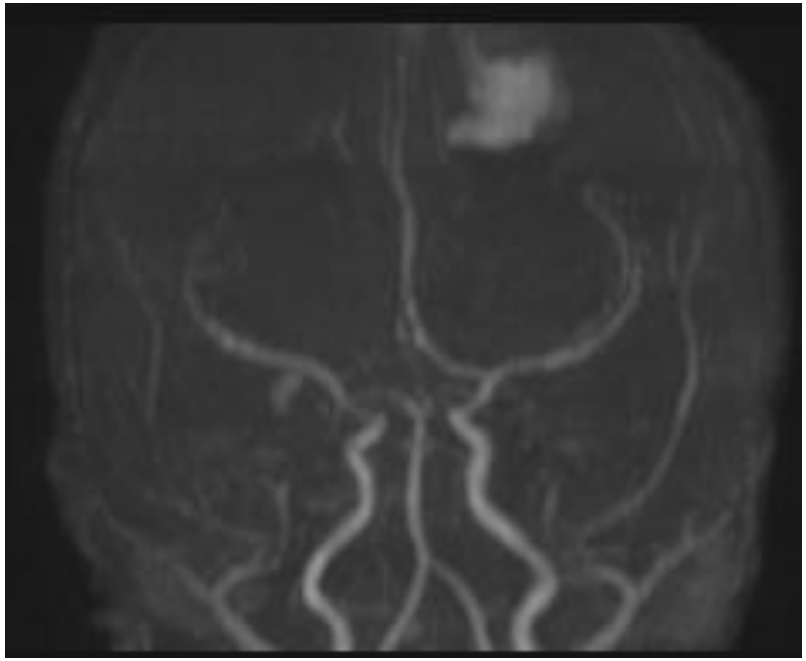

Graphic Rx Toolbar
Locs
SAT
Shim
Concat
S
I
A
P
R
L
Thickness:
40.0
Location:
Ex:
Se:
Im:
ORS

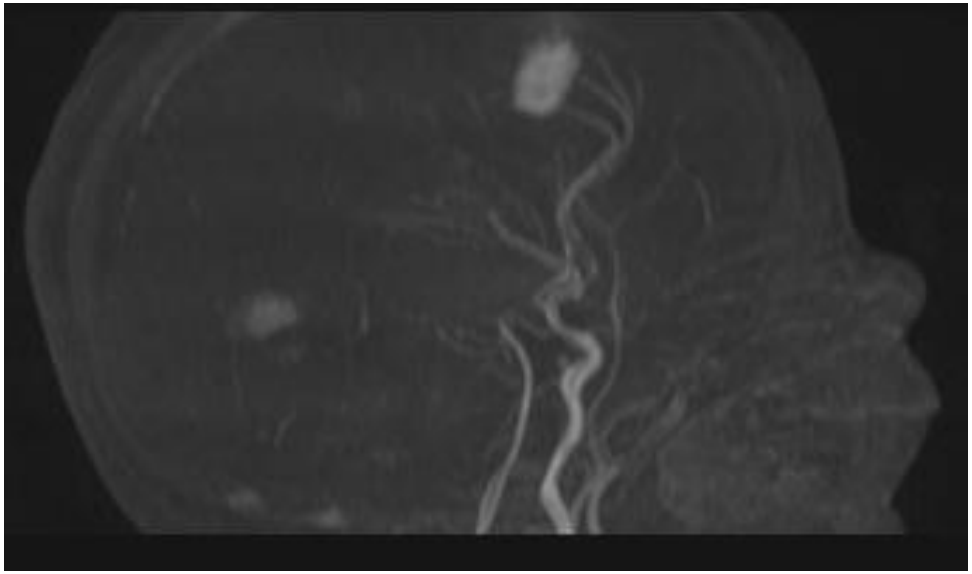
# Pratica: TOF

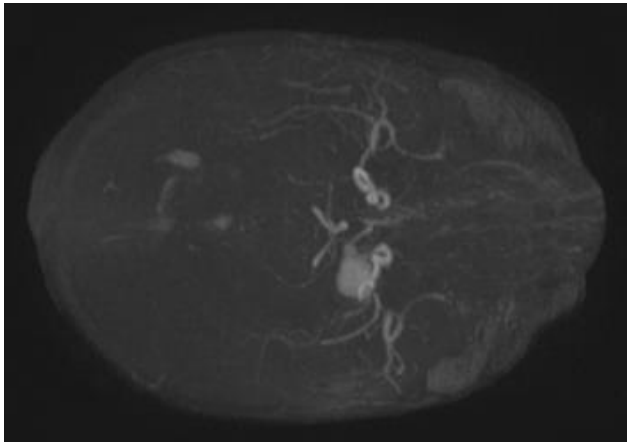


# Pratica: TOF

## 2021: Neonato 10gg – ipossica-ischemica





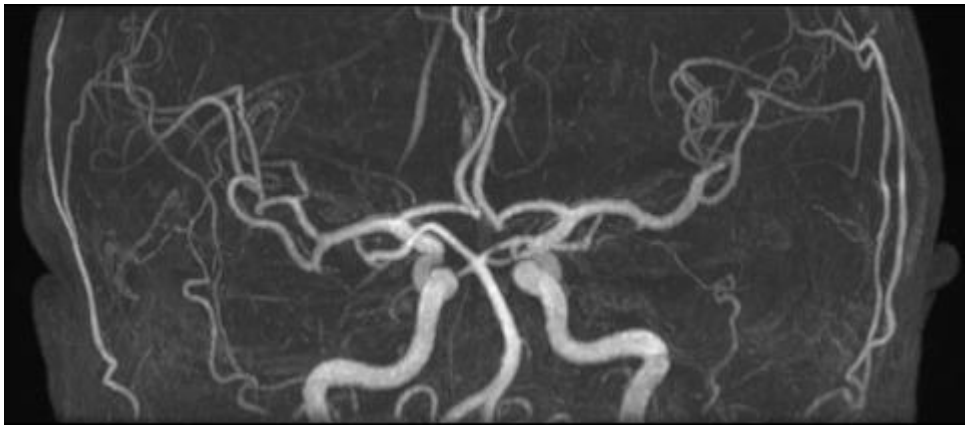


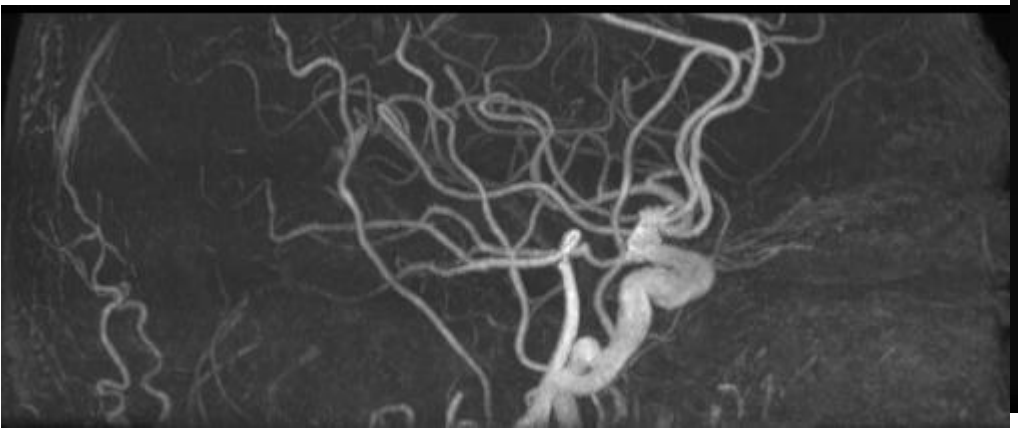
Ricostruzioni MIP

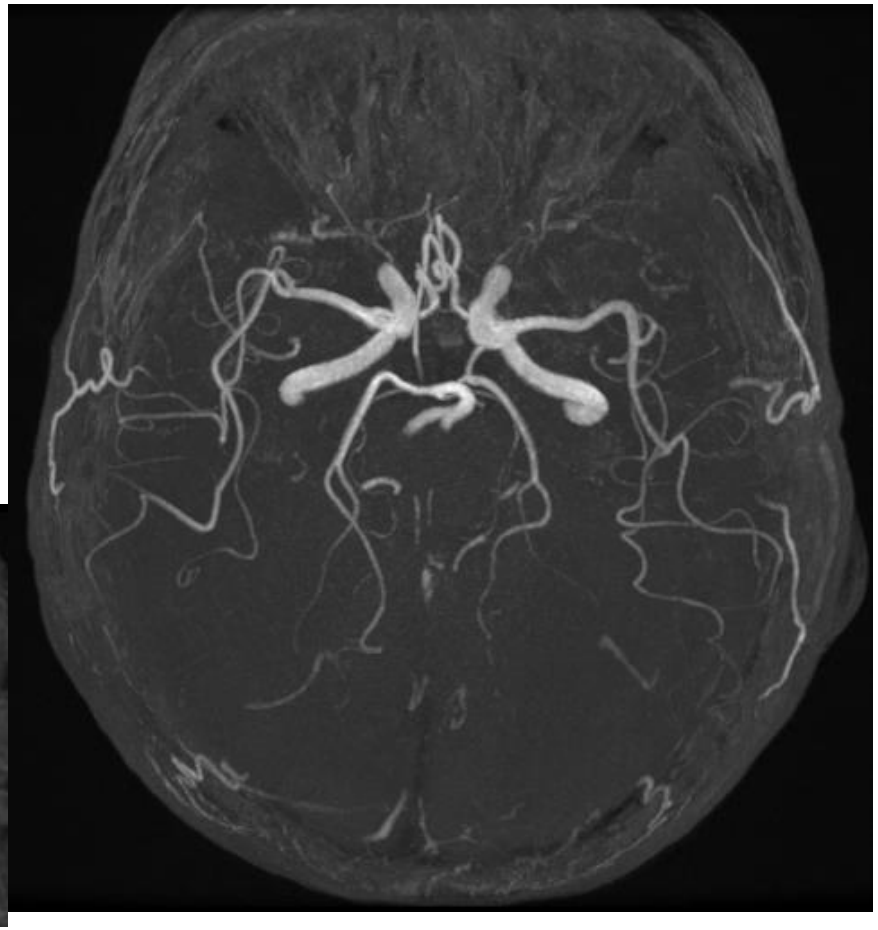
# Pratica: TOF


ANGIO-RM DINAMICA (1 DISTRETTO) CON MDC
3D Ax TOF SPGR FS
SIGNA Premier
15-April-2022 15:50:35
ST: 1.00 SL: 4.87
RT: 19.00 ET: 3.40
FS: 3.00
MR
LittleEndianExplicit
Images: 1/168
Series: 5
WL: 292 WW: 585

# Pratica: TOF







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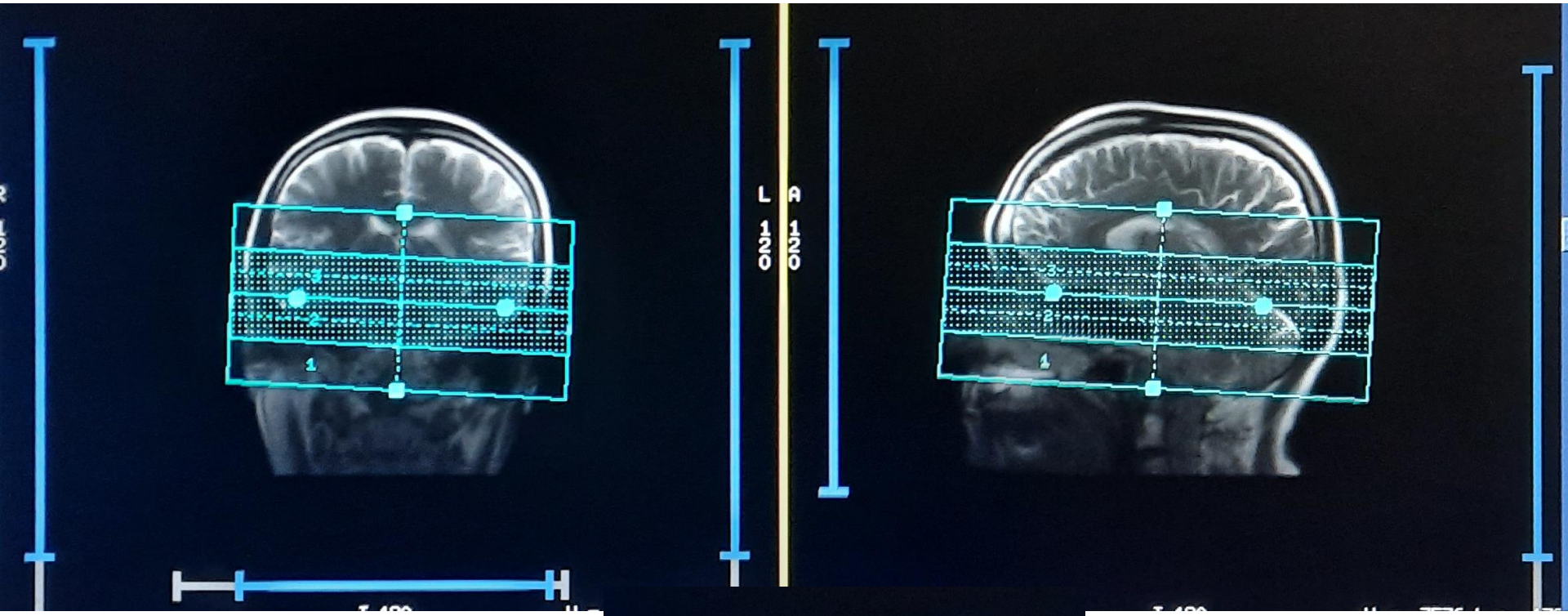


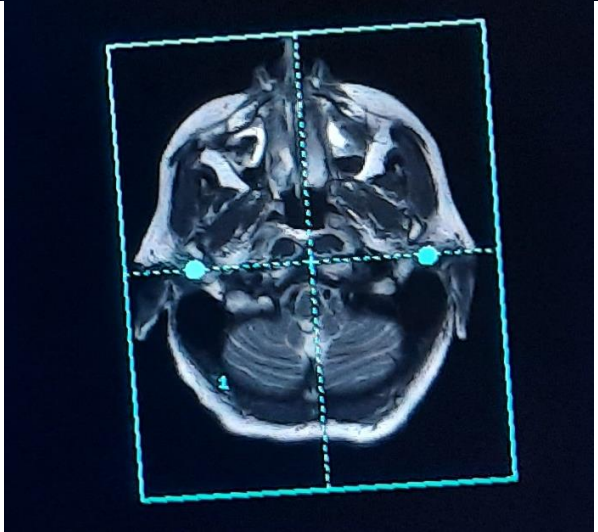

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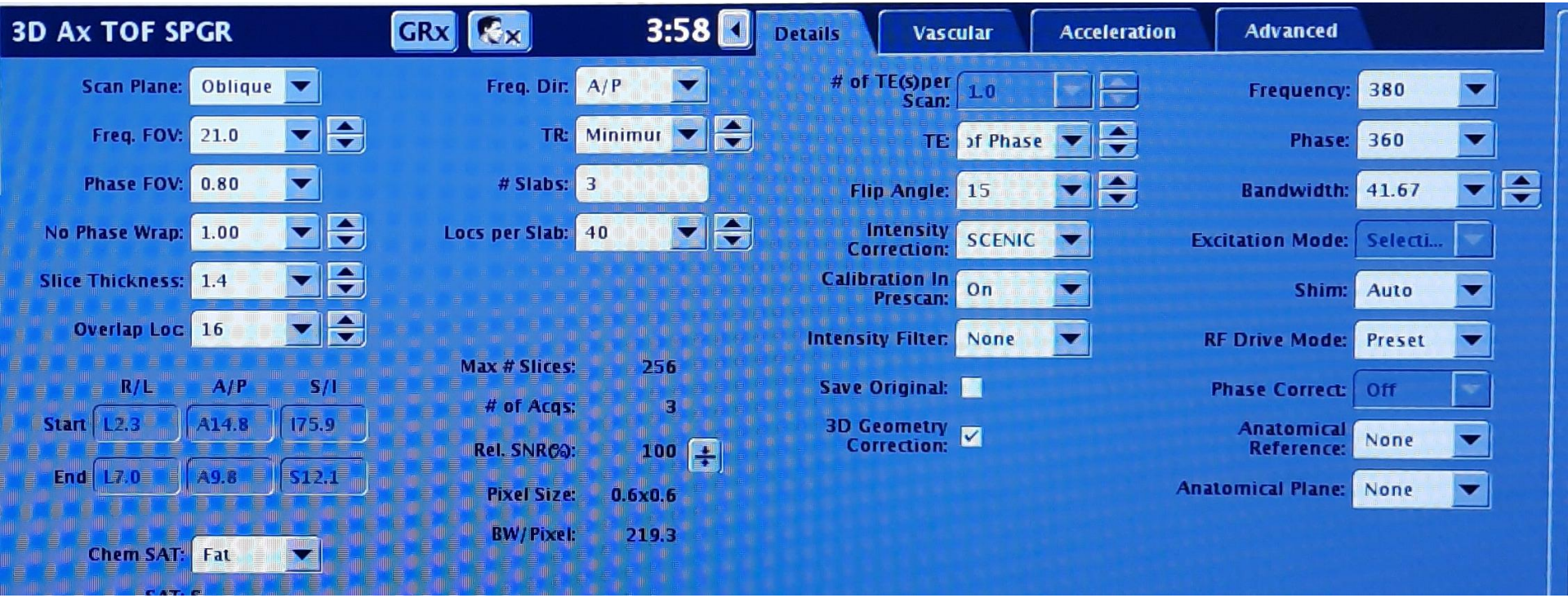
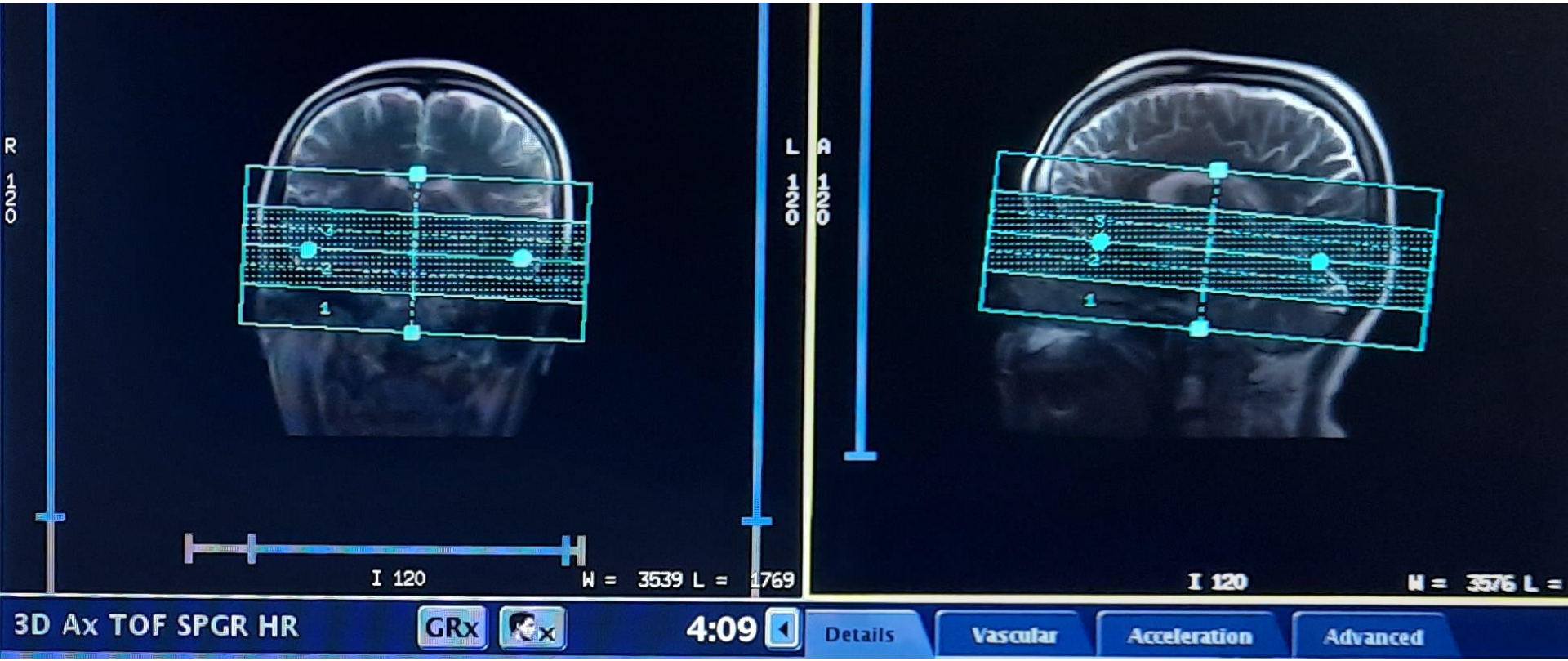
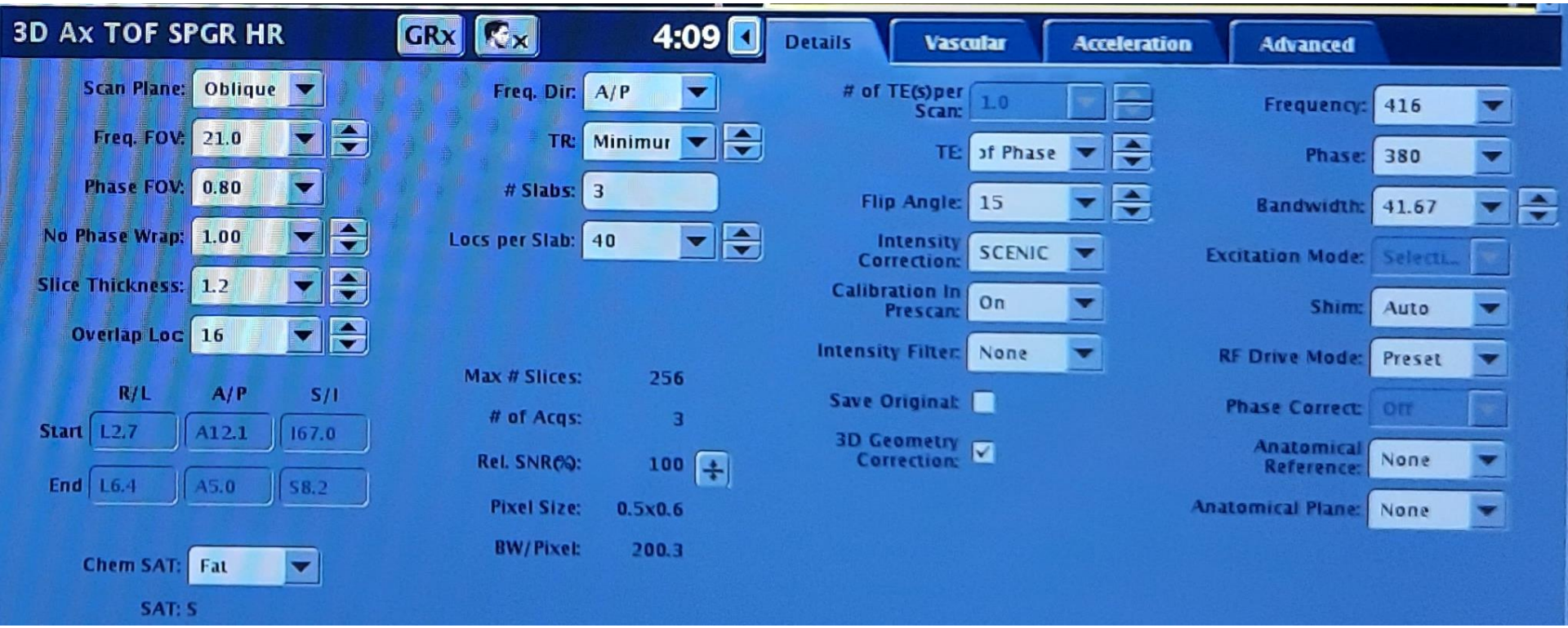

3D Ax TOF SPGR
GRx
3:58
Details
Vascular
Acceleration
Advanced
Scan Plane: Oblique
Freq. FOV: 21.0
Phase FOV: 0.80
No Phase Wrap: 1.00
Slice Thickness: 1.4
Overlap Loc 16
R/L A/P S/I
Start L2.3 A14.8 I75.9
End L7.0 A9.8 S12.1
Chem SAT: Fat
Freq. Dir: A/P
TR: Minimur
# Slabs: 3
Locs per Slab: 40
Max # Slices: 256
# of Acqs: 3
Rel. SNR(%): 100
Pixel Size: 0.6x0.6
BW/Pixel: 219.3
# of TE(s)per Scan: 1.0
TE: of Phase
Flip Angle: 15
Intensity Correction: SCENIC
Calibration In Prescan: On
Intensity Filter: None
Save Original:
3D Geometry Correction:
Frequency: 380
Phase: 360
Bandwidth: 41.67
Excitation Mode: Selecti...
Shim: Auto
RF Drive Mode: Preset
Phase Correct: Off
Anatomical Reference: None
Anatomical Plane: None

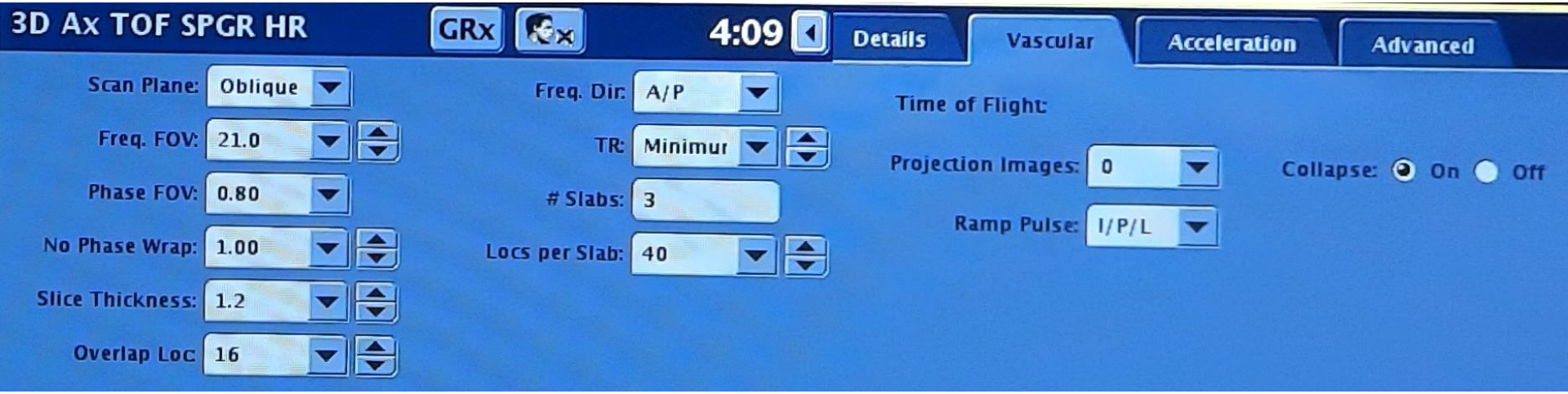
# Pratica: TOF HR

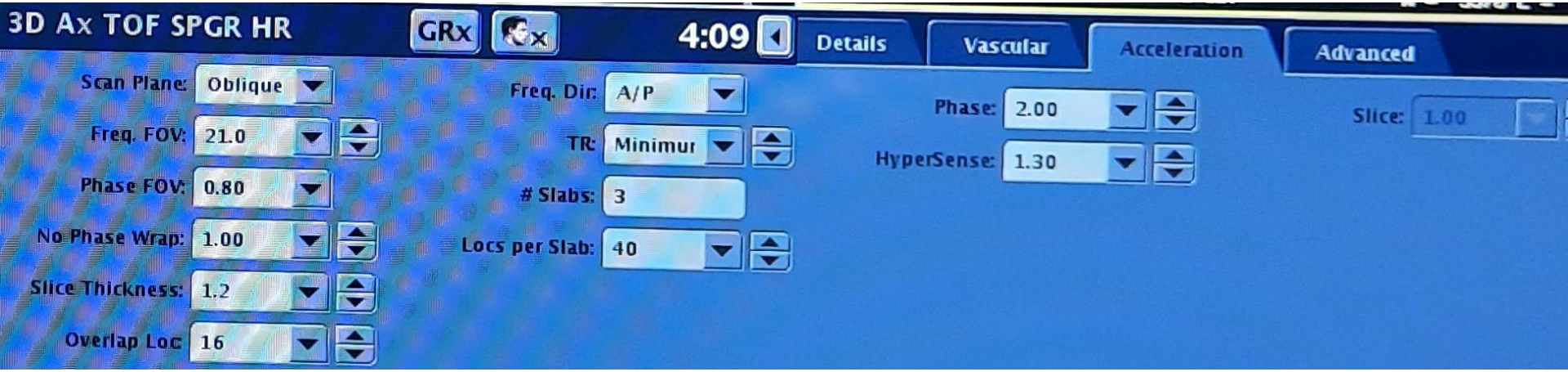


# Pratica: TOF HR

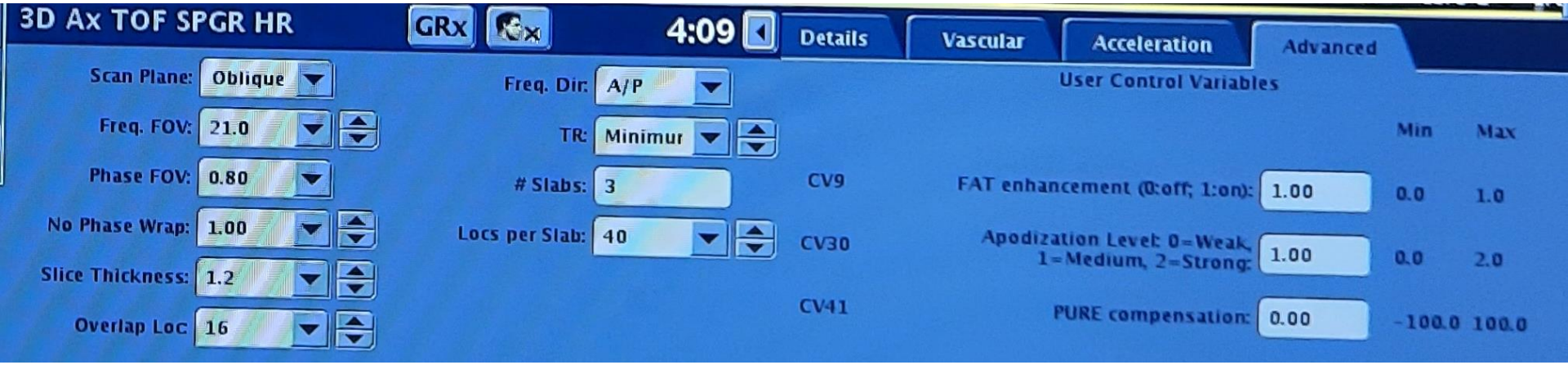


# Pratica: TOF HR

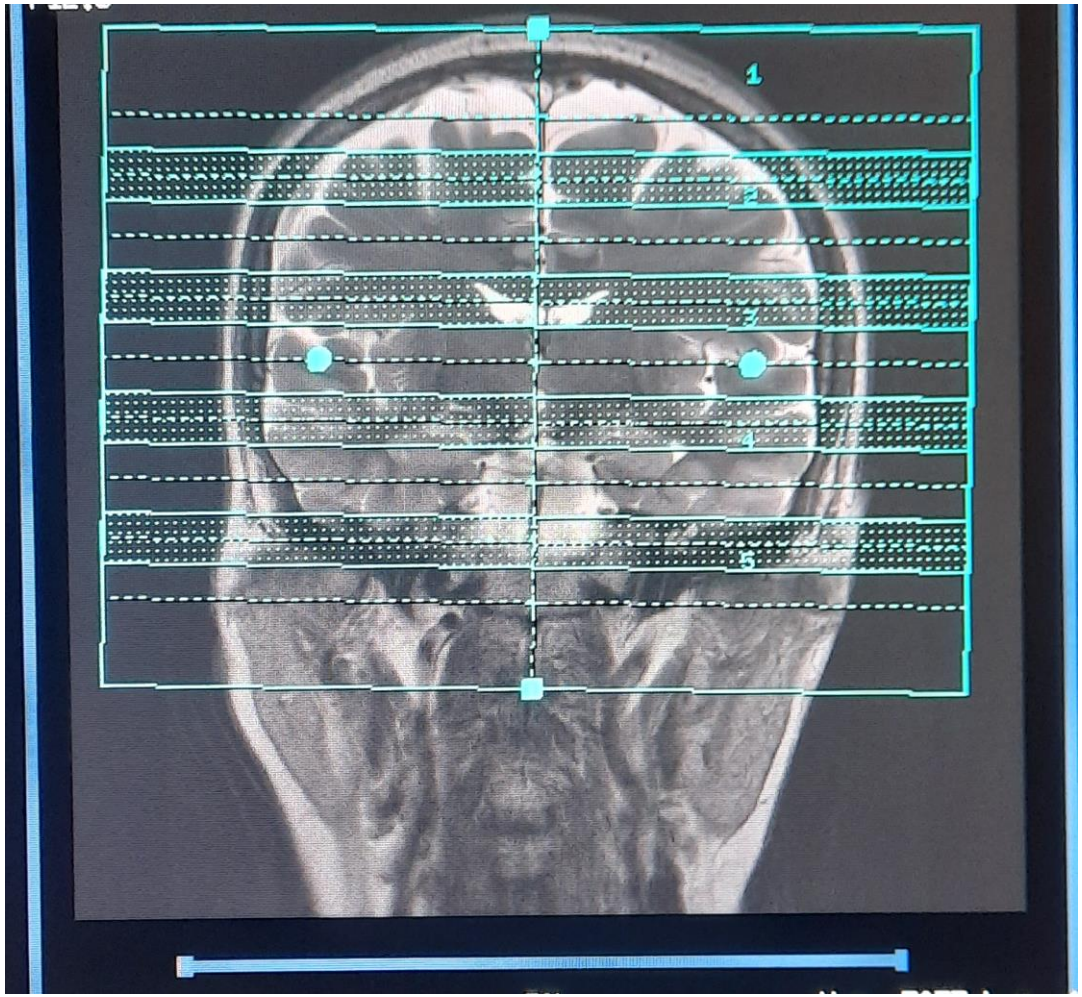


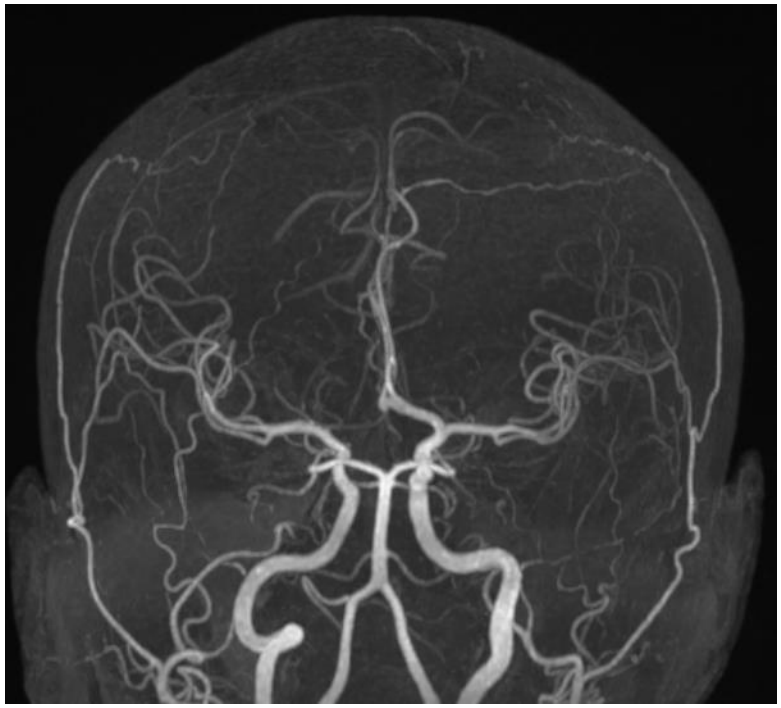



# Pratica: TOF HR

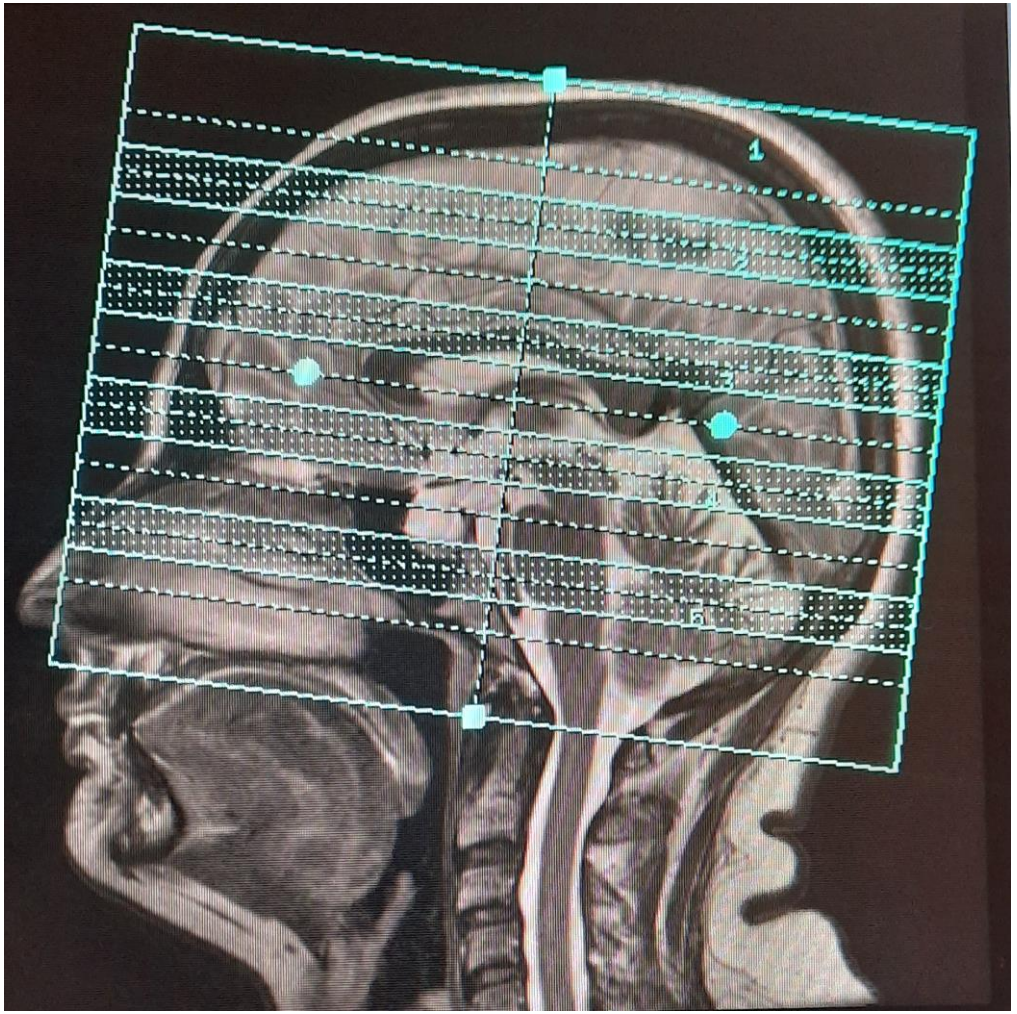


# Pratica: 3D AX TOF SPGR FS whole head

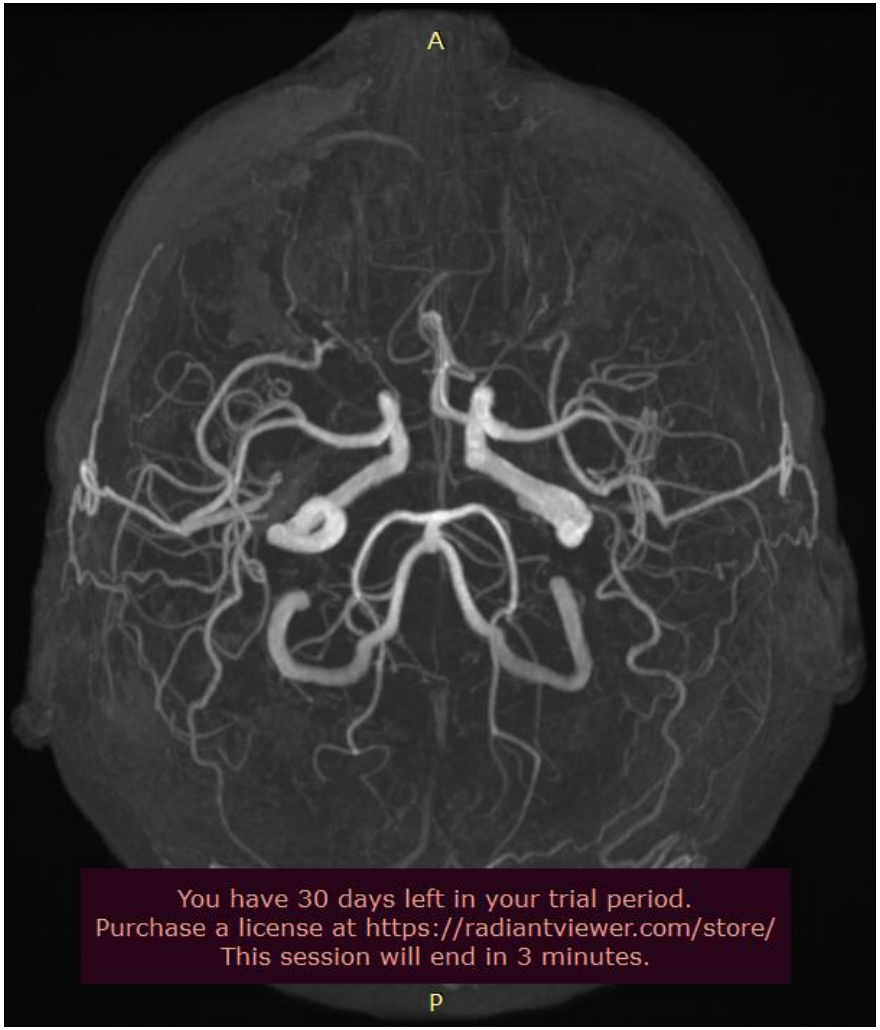


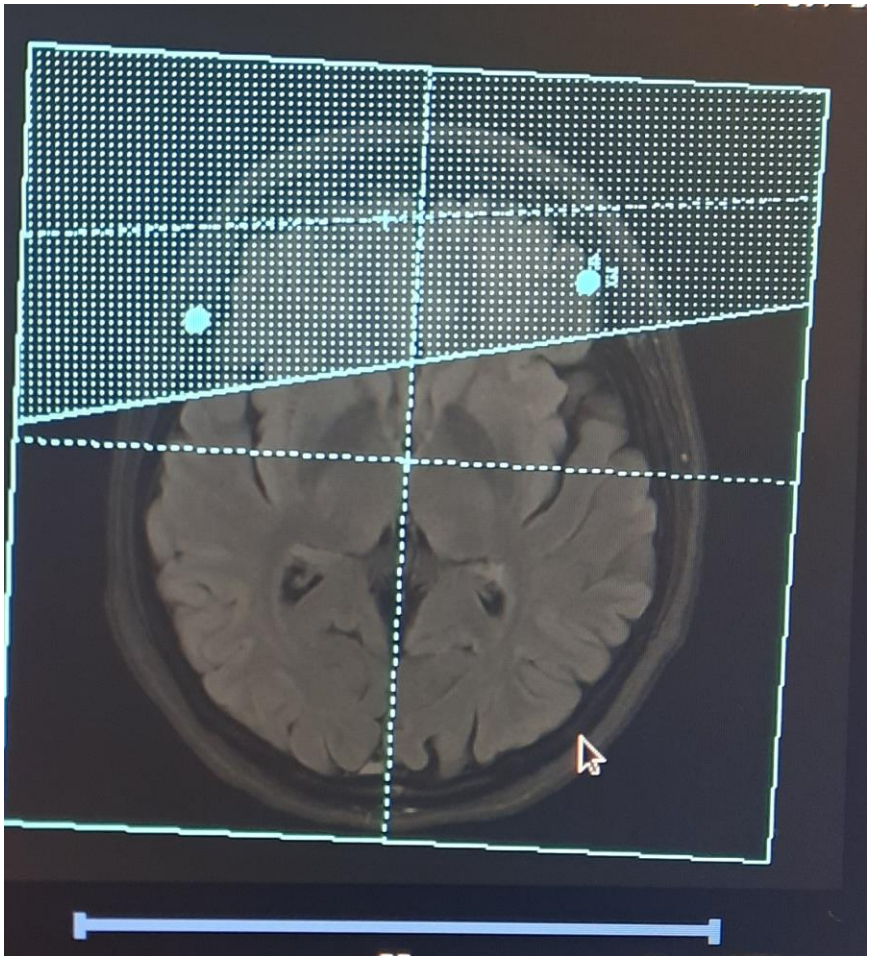



# Pratica: 3D AX TOF SPGR FS whole head

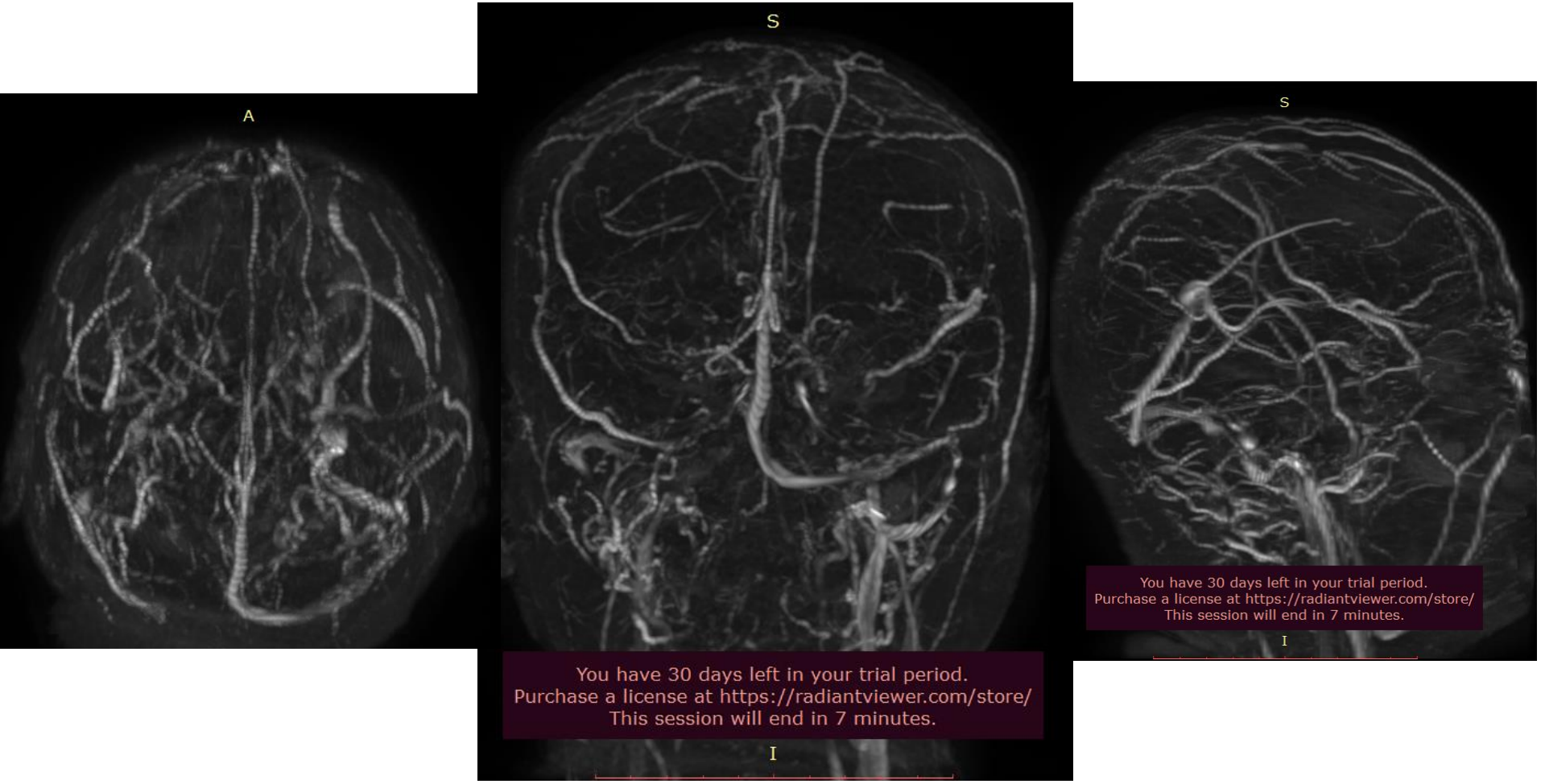



# Pratica: 3D AX TOF SPGR FS whole head

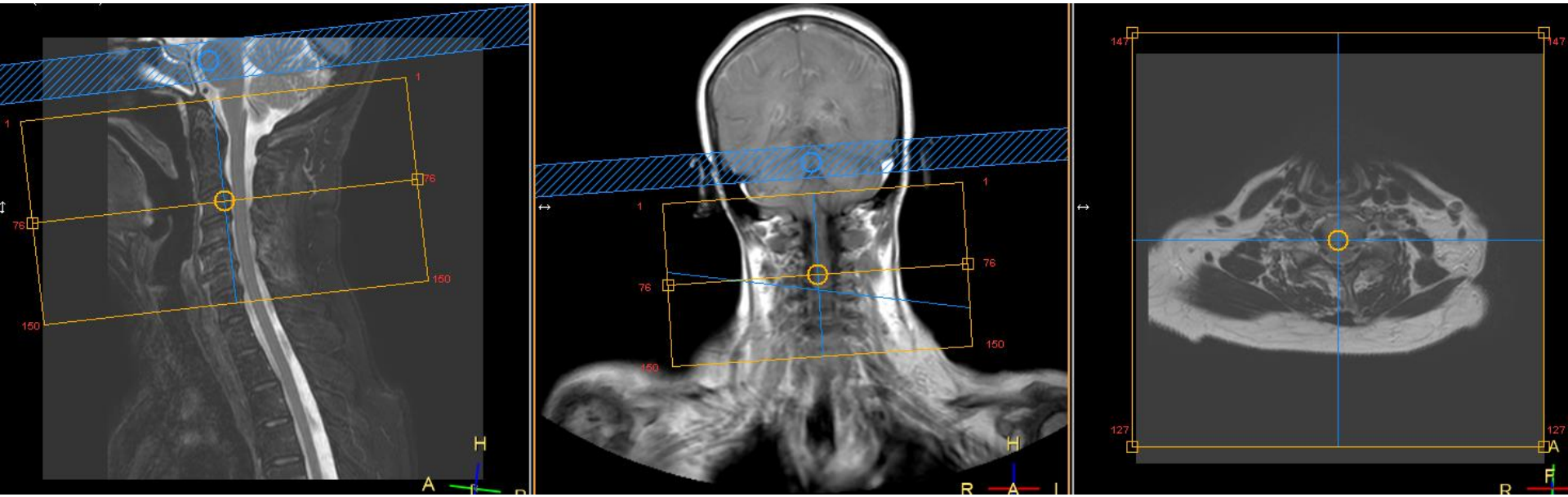


# Pratica: COR 2D TOF MRV



# Pratica: TOF COLLO



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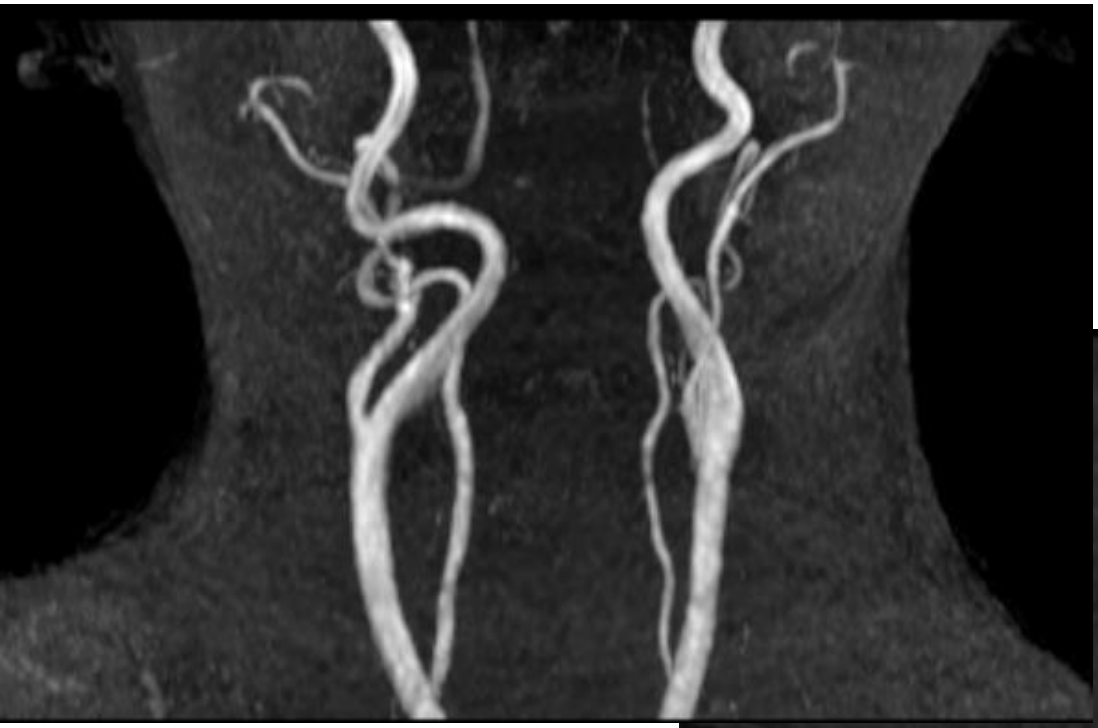
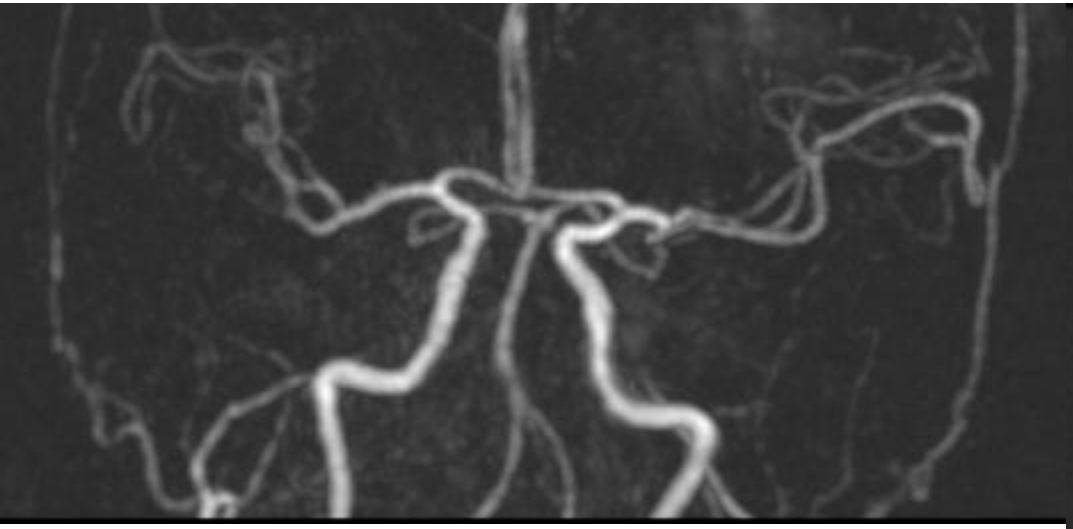
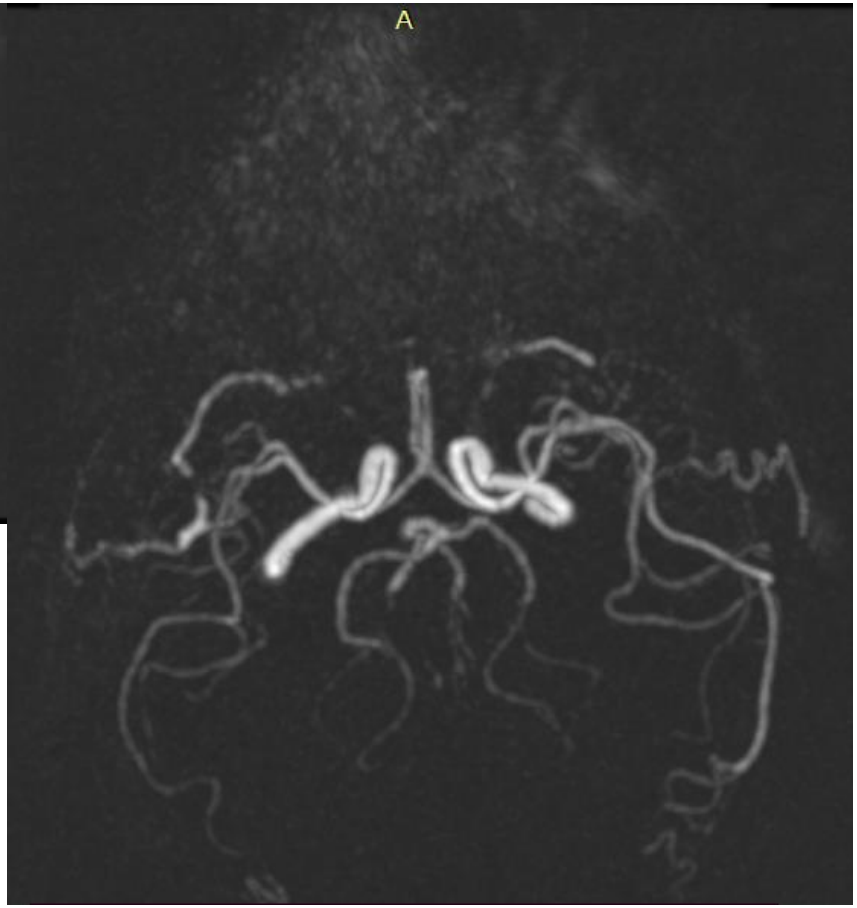
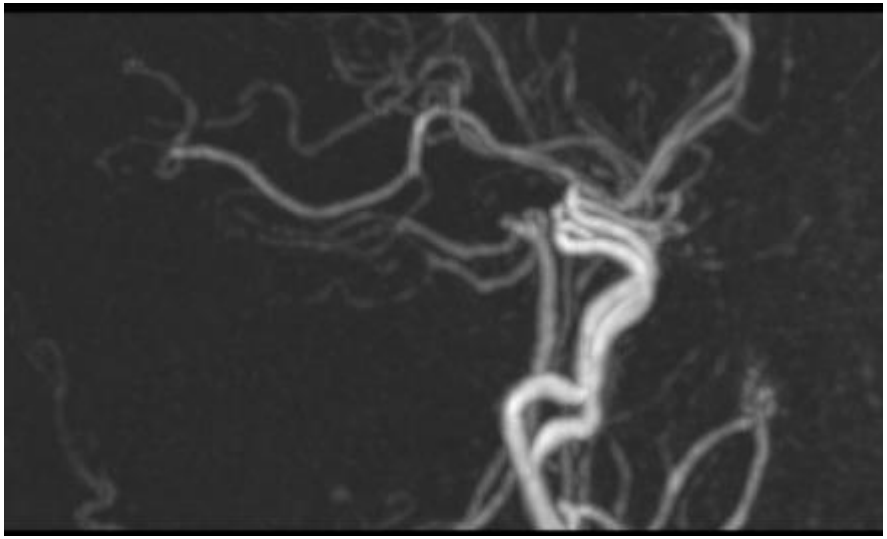


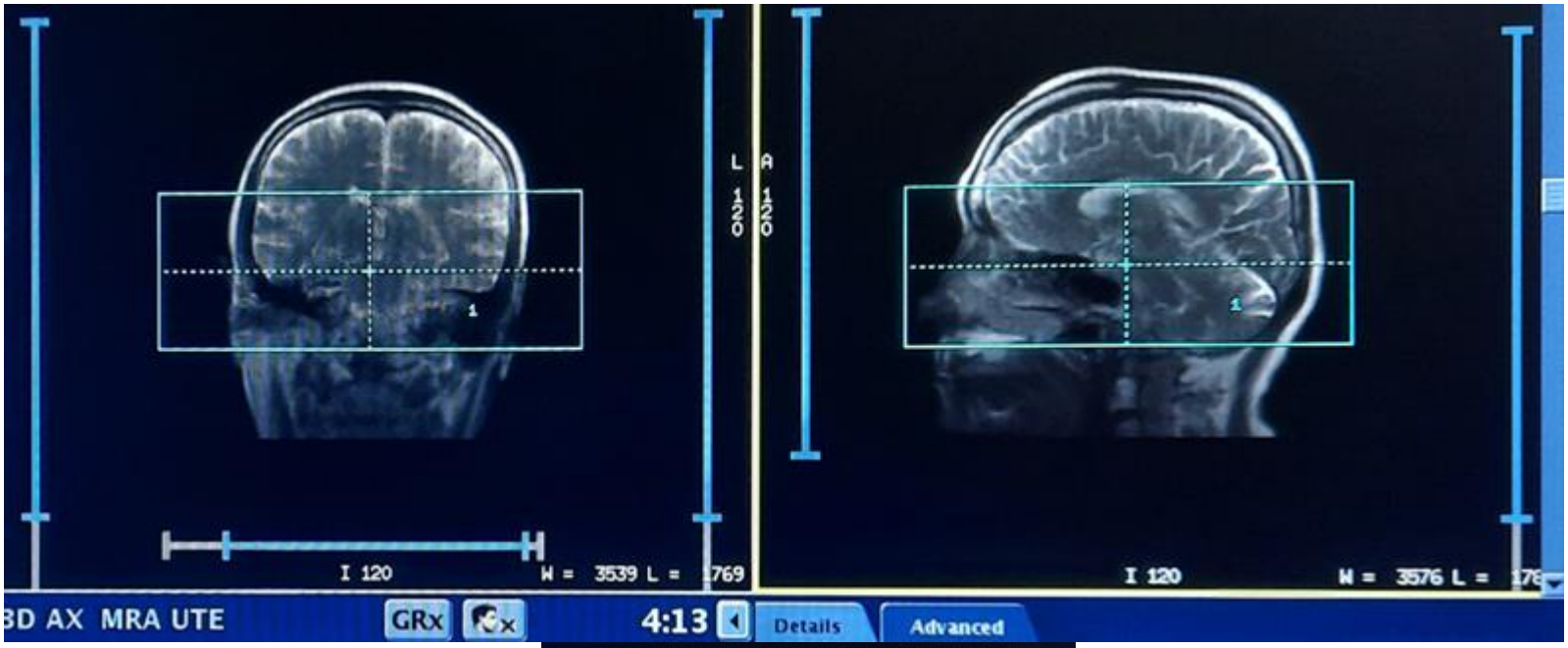
# Pratica: 3D AX  MRA UTE

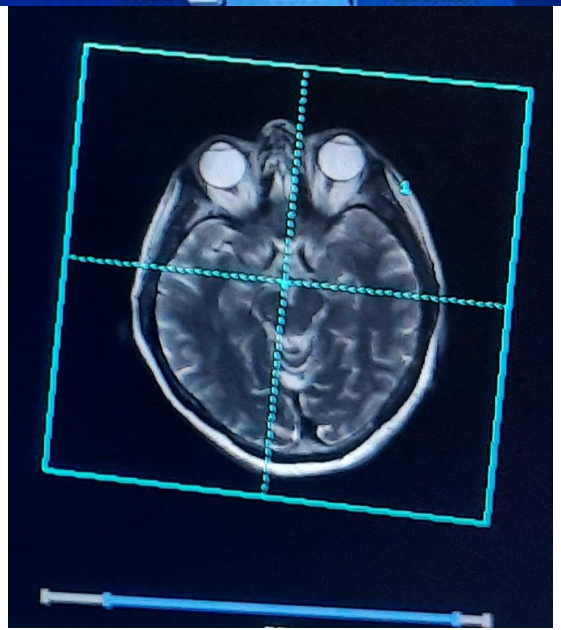




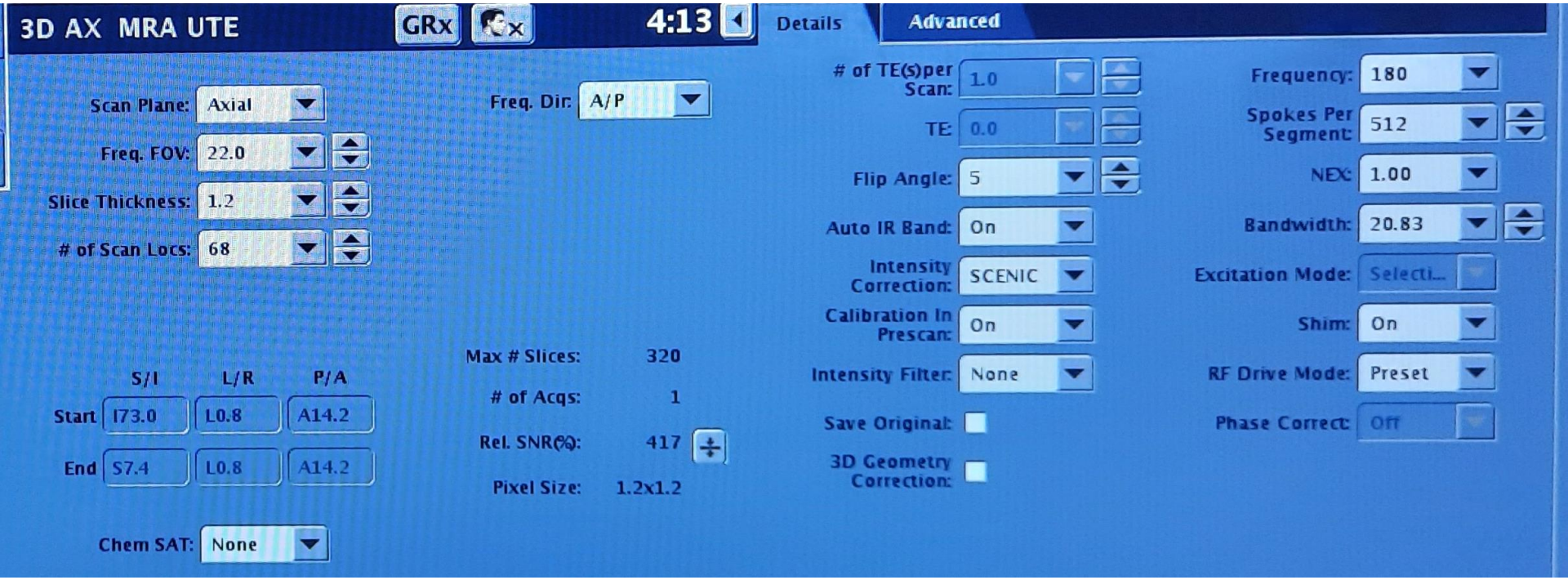



# Pratica: 3D AX MRA UTE

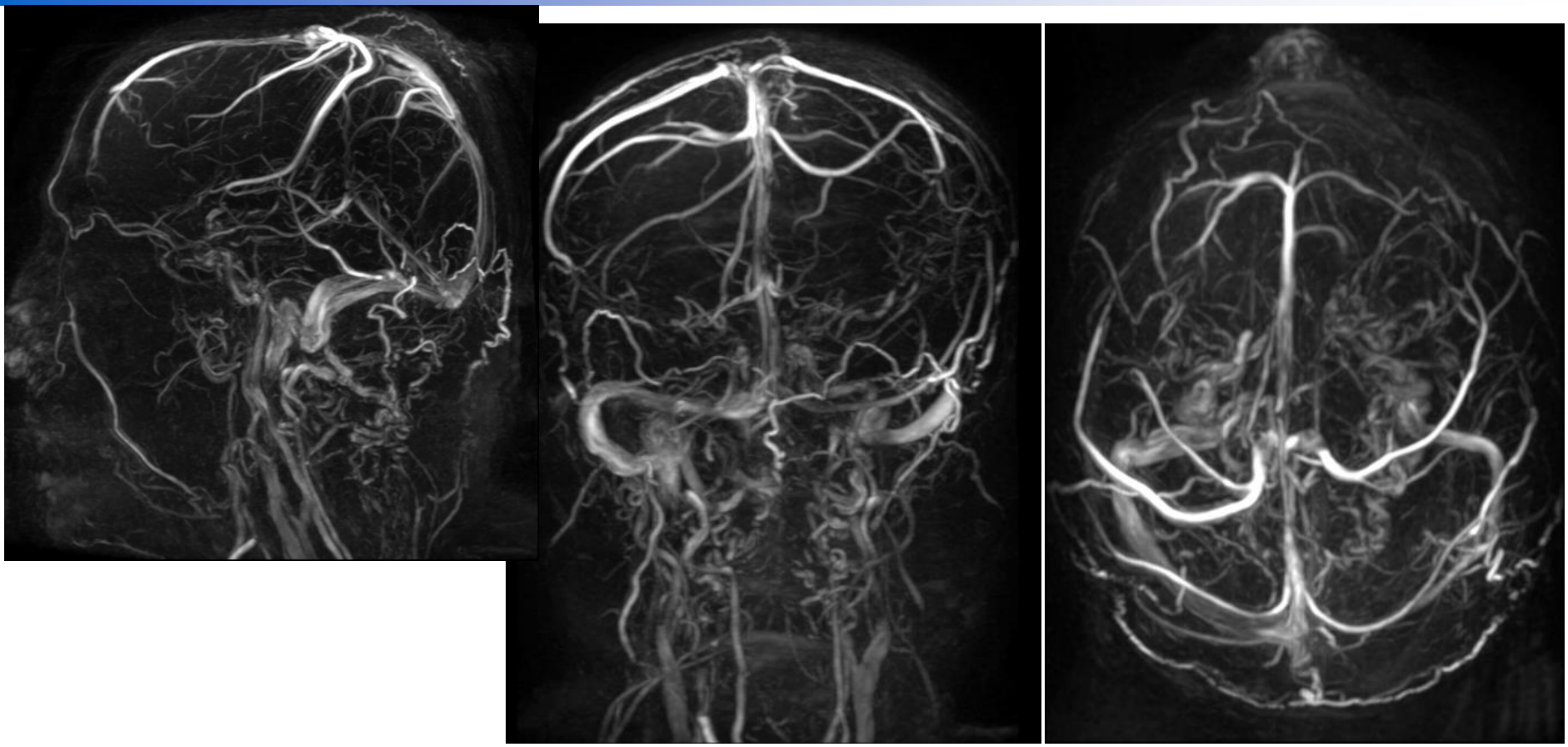


# Pratica: 3D AX MRA UTE

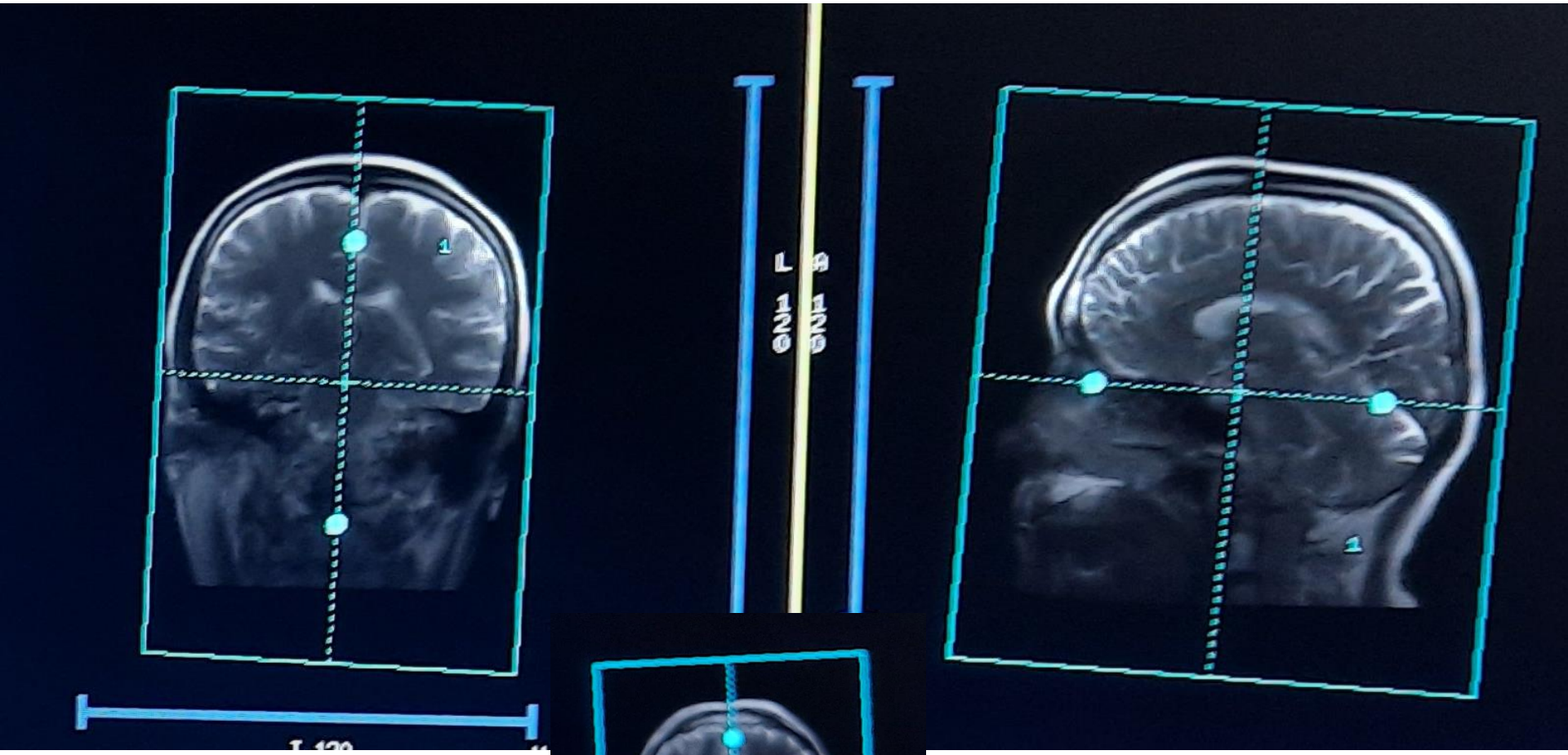


# Pratica: 3D sag Inhance Venosa

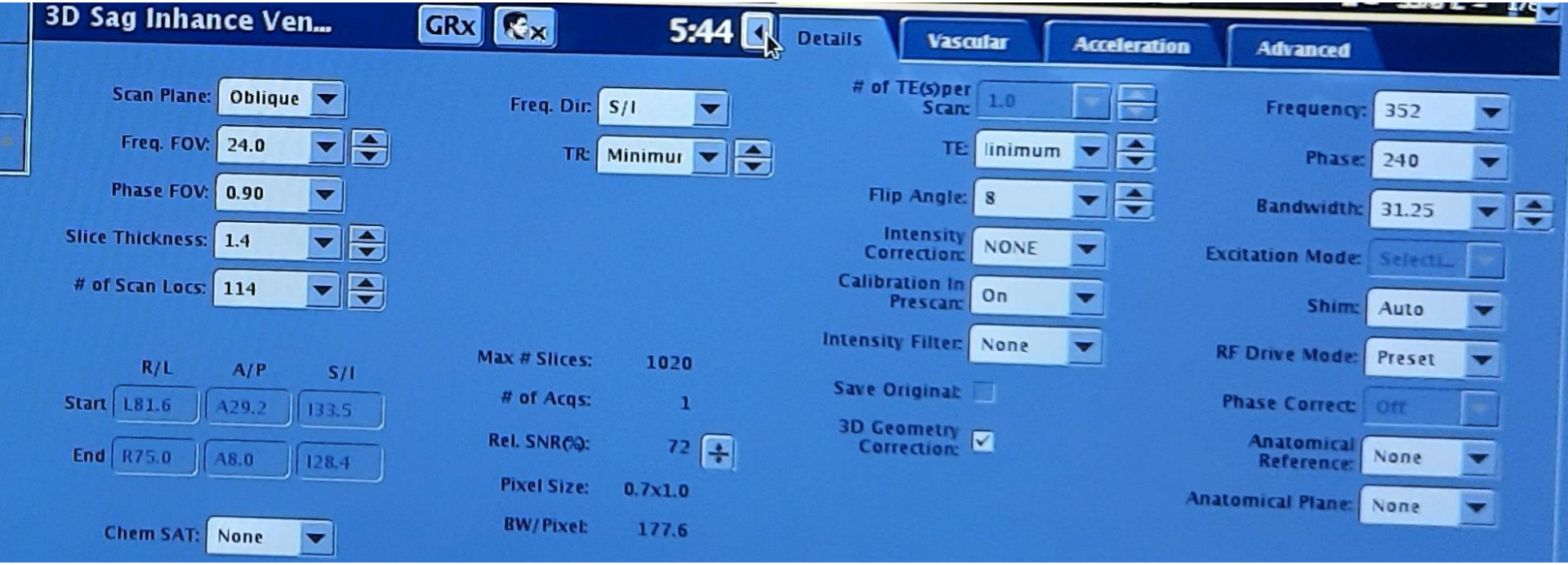


3T: 3D SAG INHANCE
Velocity encoding: 7

# Pratica: 3D sag Inhance Venosa

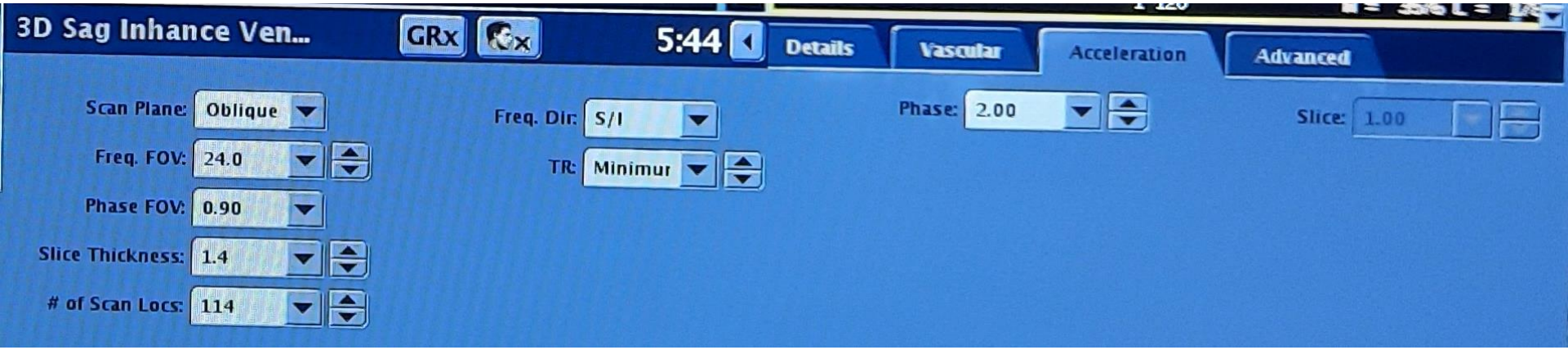


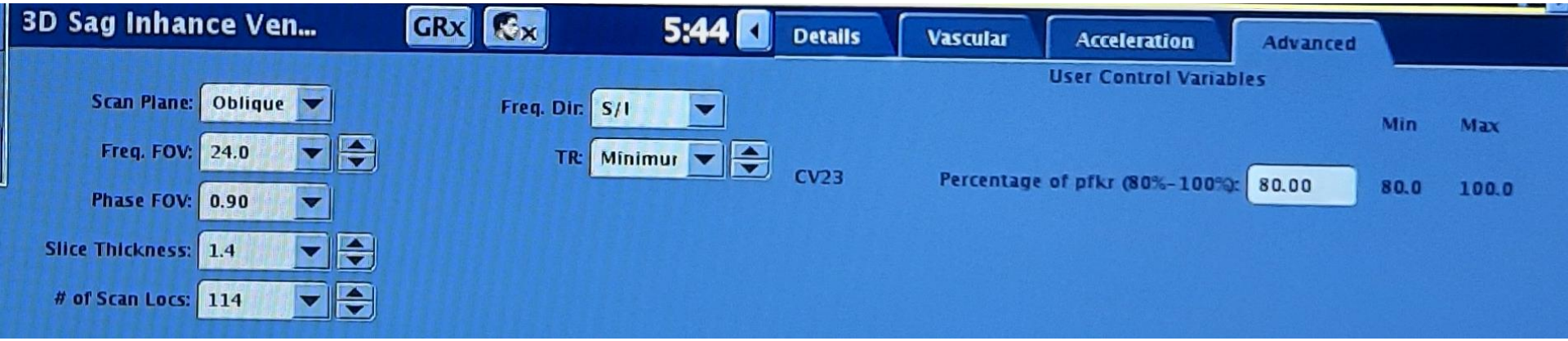
# Pratica: 3D sag Inhance Venosa



# Pratica: 3D sag Inhance Venosa

# Pratica: 3D sag Inhance Venosa



# Pratica: TOF VENOSA COR RM3

# Pratica: TOF

Formazione per l'eccellenza

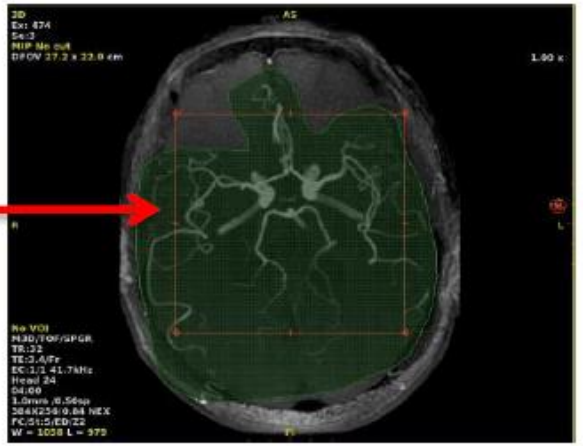
## 3D MIP Workflow

1. Select an appropriate series from the Series List and open **Reformat**


2. From the Review Steps, select the ***3D MIP***


3. On the 3D image, middle-click and drag to adjust the window and level.

4. Use the Anatomic Orientation icons on the **Visualization** toolbar to change the plane of the 3D image, or hover over the 3D image and use the red box to manipulate the image orientation

# Pratica: TOF

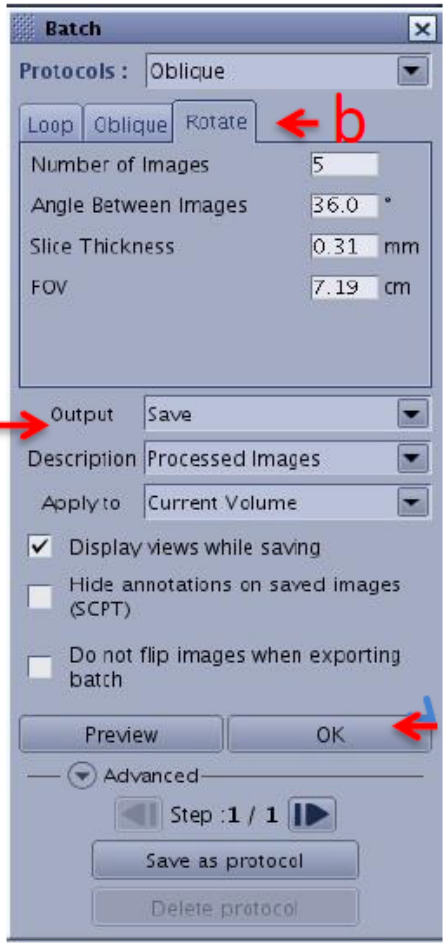
5. Define a MIP cut.


a. From the **Segmentation** toolbar, click the ***Scalpel*** icon 
b. Move the cursor to the start location of your cut
c. Click and drag around the anatomy of interest
d. To edit a trace, place the cursor over the trace edge and drag it to a new location
e. To completely erase the trace and start over, click Clear on the Scalpel screen.
f. Click ***Cut Outside*** or ***Cut Inside*** on the Scalpel screen.
g. Repeat this process until the undesired anatomy is removed

# Pratica: TOF

Formazione per l'eccellenza

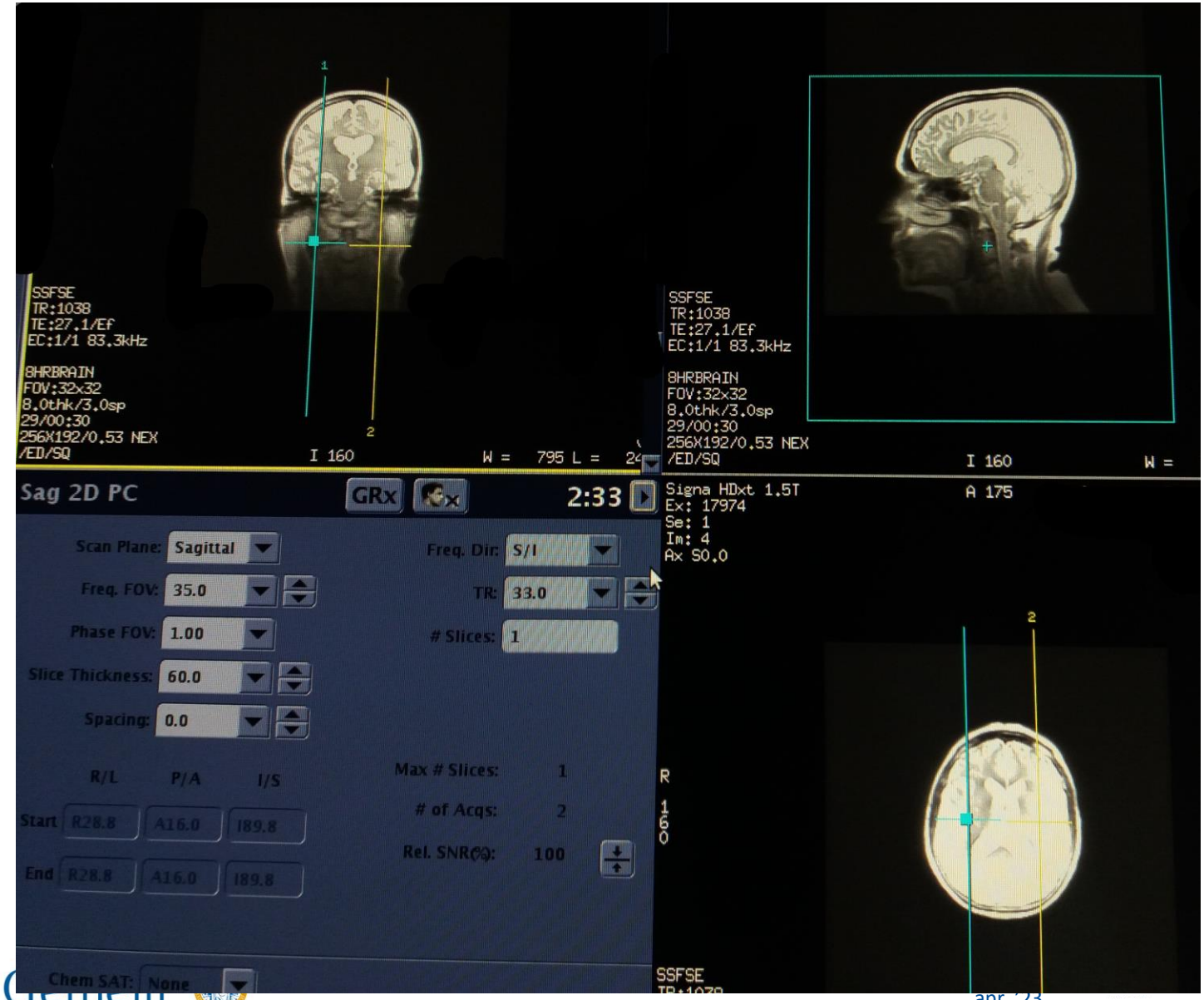
6. From the **Export Toolbar**, click the ***Batch***  icon to view the Batch screen
   a. Click on the view to be used as a reference
   b. From the Batch screen, click the ***Rotate*** tab
   c. Click on a direction arrow  to set the direction of rotation
   d. Change the number of views or rotations
   e. Make sure Output field is set to ***Save***
   f. Click on ***OK*** to save as a new series in the Patient List



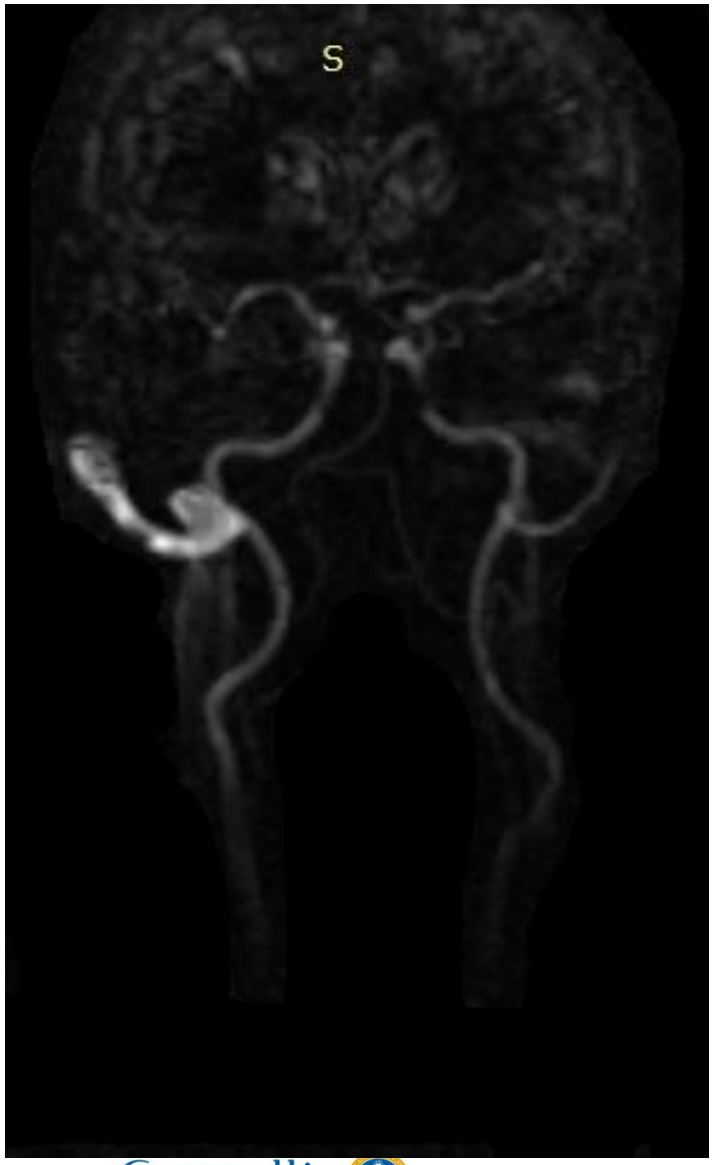

Imagination at work.

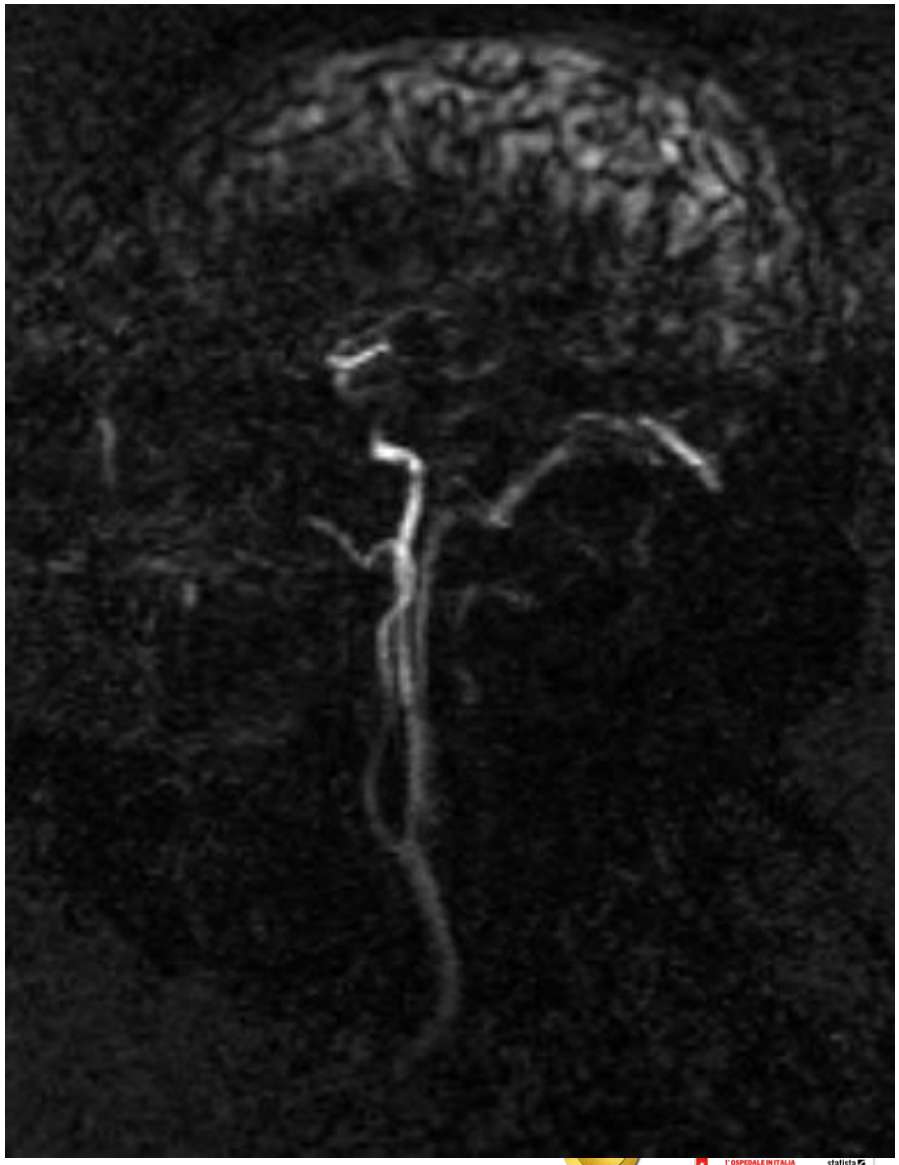
DOC1896112

# Sag 2D PC


SSFSE
TR:1038
TE:27.1/Ef
EC:1/1 83.3kHz
8HRBRAIN
FOV:32x32
8.0thk/3.0sp
29/00:30
256X192/0.53 NEX
/ED/SQ
I 160
W = 795 L =
Sag 2D PC
GRx
2:33
Scan Plane: Sagittal
Freq. Dir: S/I
Freq. FOV: 35.0
TR: 33.0
Phase FOV: 1.00
# Slices: 1
Slice Thickness: 60.0
Spacing: 0.0
R/L P/A I/S
Start R28.8 A16.0 I89.8
End R28.8 A16.0 I89.8
Max # Slices: 1
# of Acqs: 2
Rel. SNR(%): 100
Chem SAT: None
SSFSE
TR:1038
TE:27.1/Ef
EC:1/1 83.3kHz
8HRBRAIN
FOV:32x32
8.0thk/3.0sp
29/00:30
256X192/0.53 NEX
/ED/SQ
I 160
W =
Signa HDxt 1.5T
Ex: 17974
Se: 1
Im: 4
Ax SO.0
A 175
R
160
SSFSE

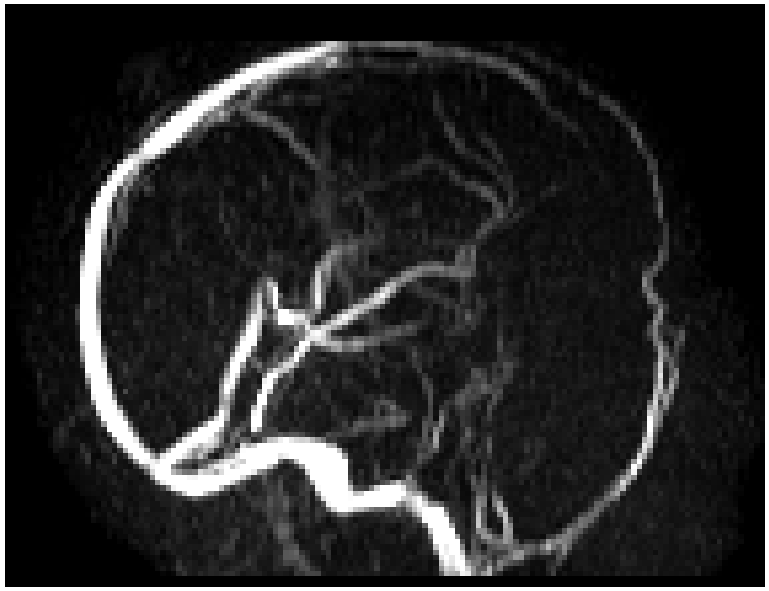
# Cor-Sag 2D PC

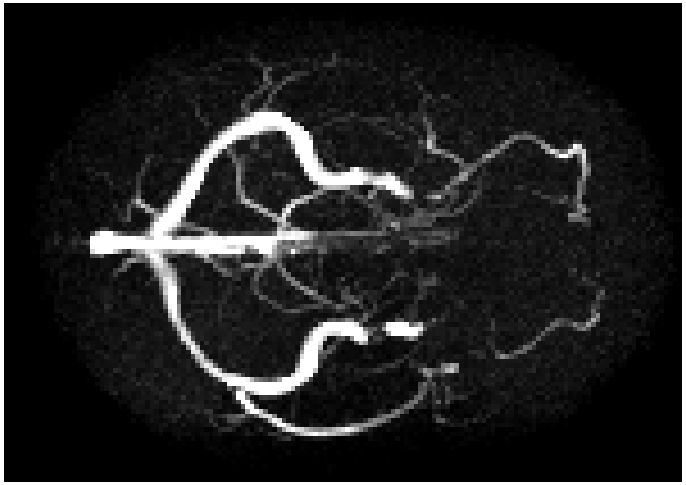


# Pratica: PHASE CONTRAST

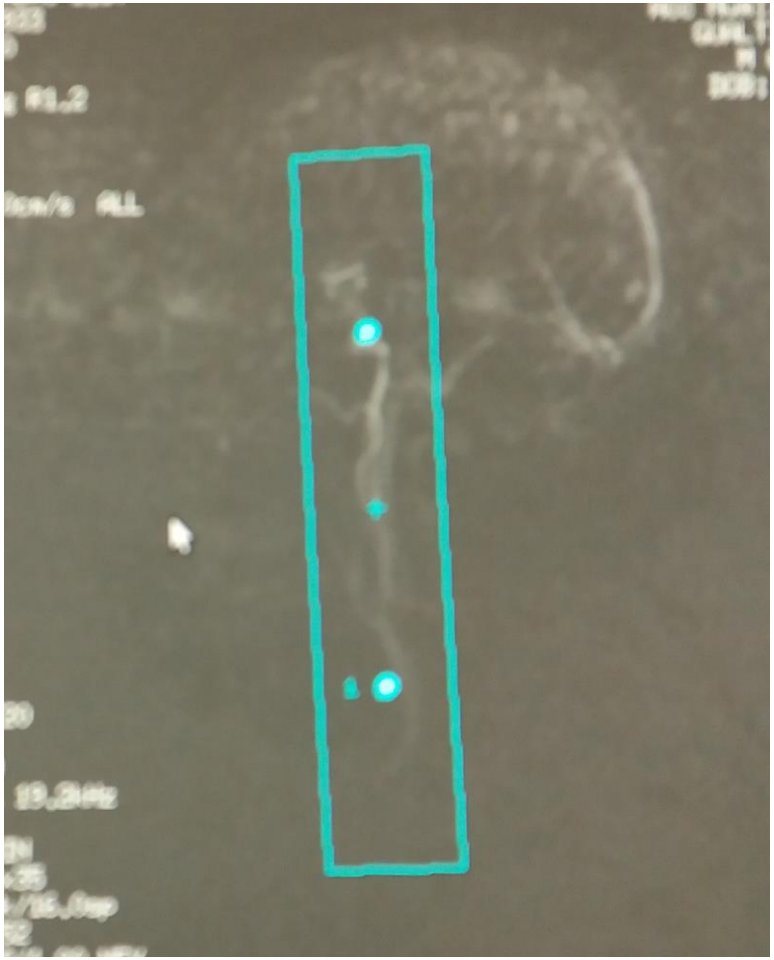
## 2021: Neonato 10gg – ipoissica-ischemica



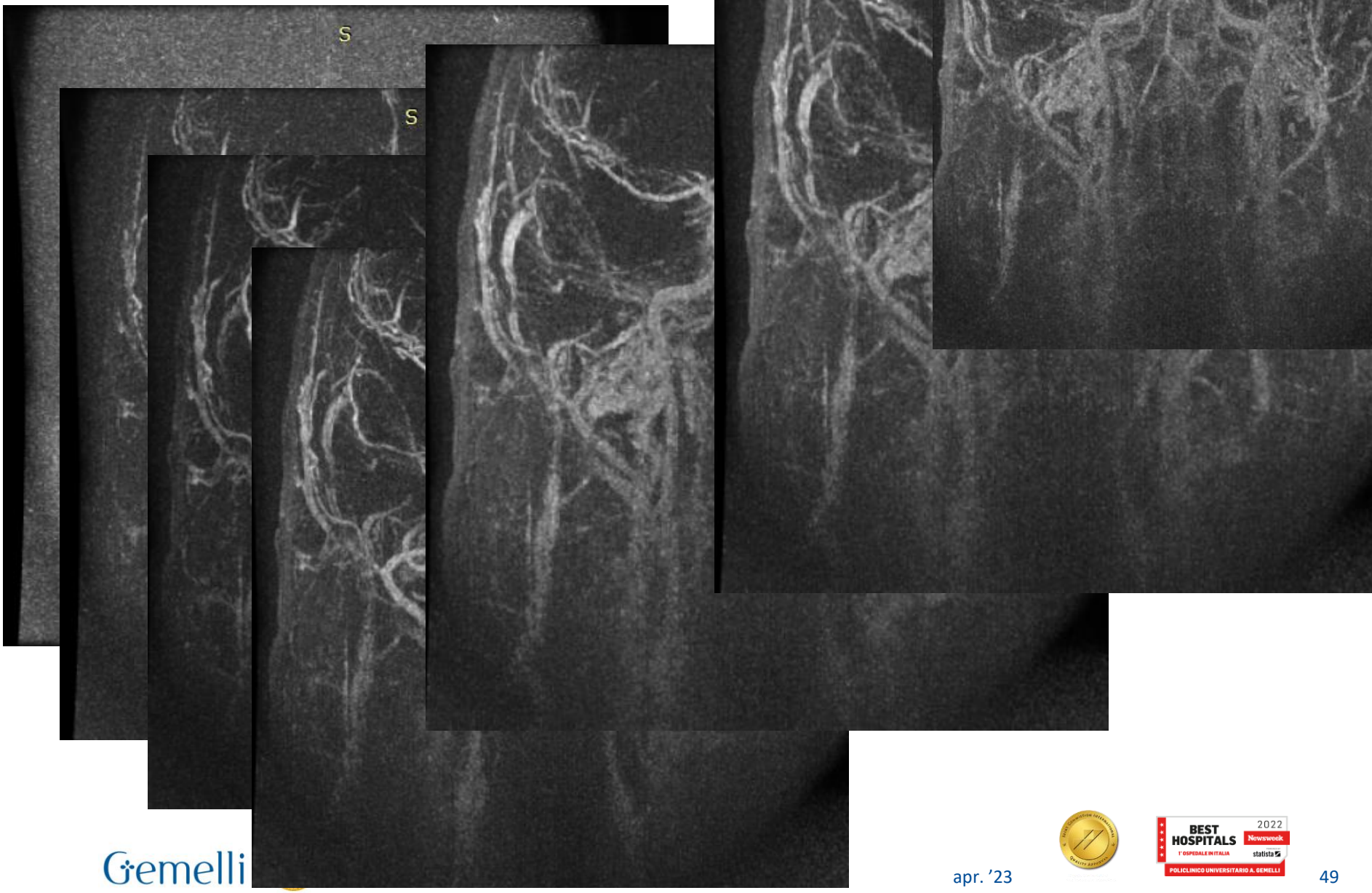


Ricostruzioni MIP

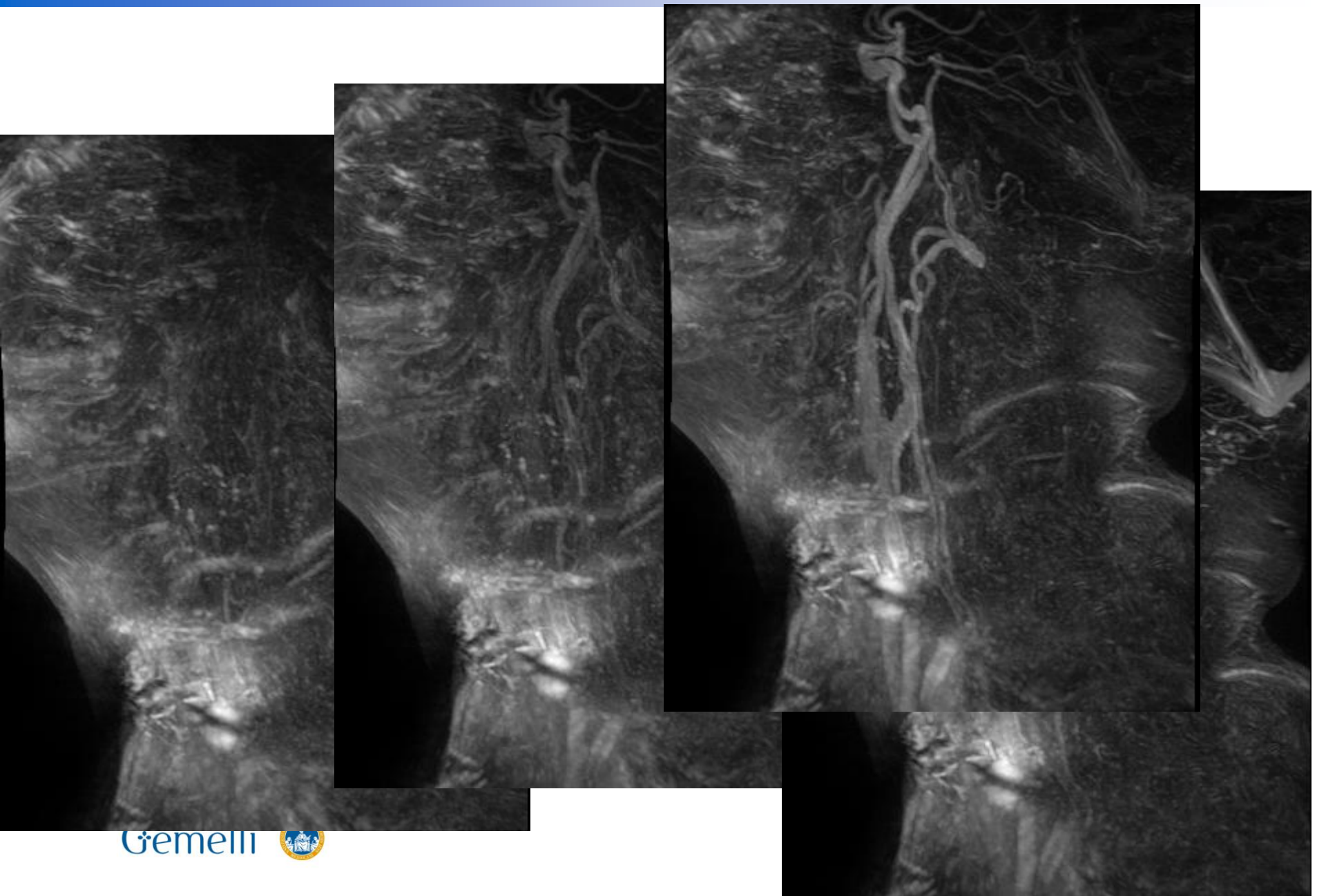
# Tricks: 7 fasi



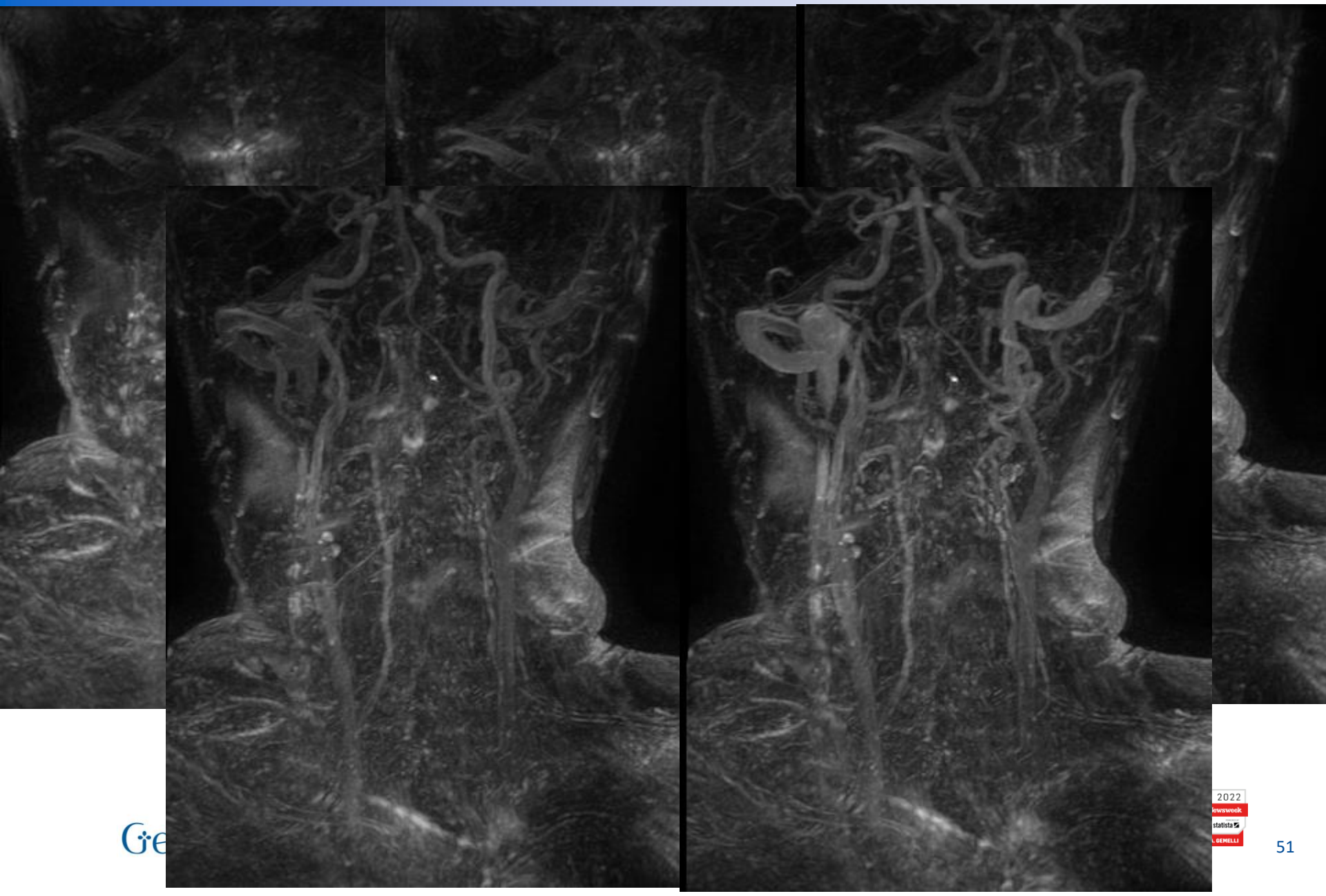
# Tricks: 7 fasi



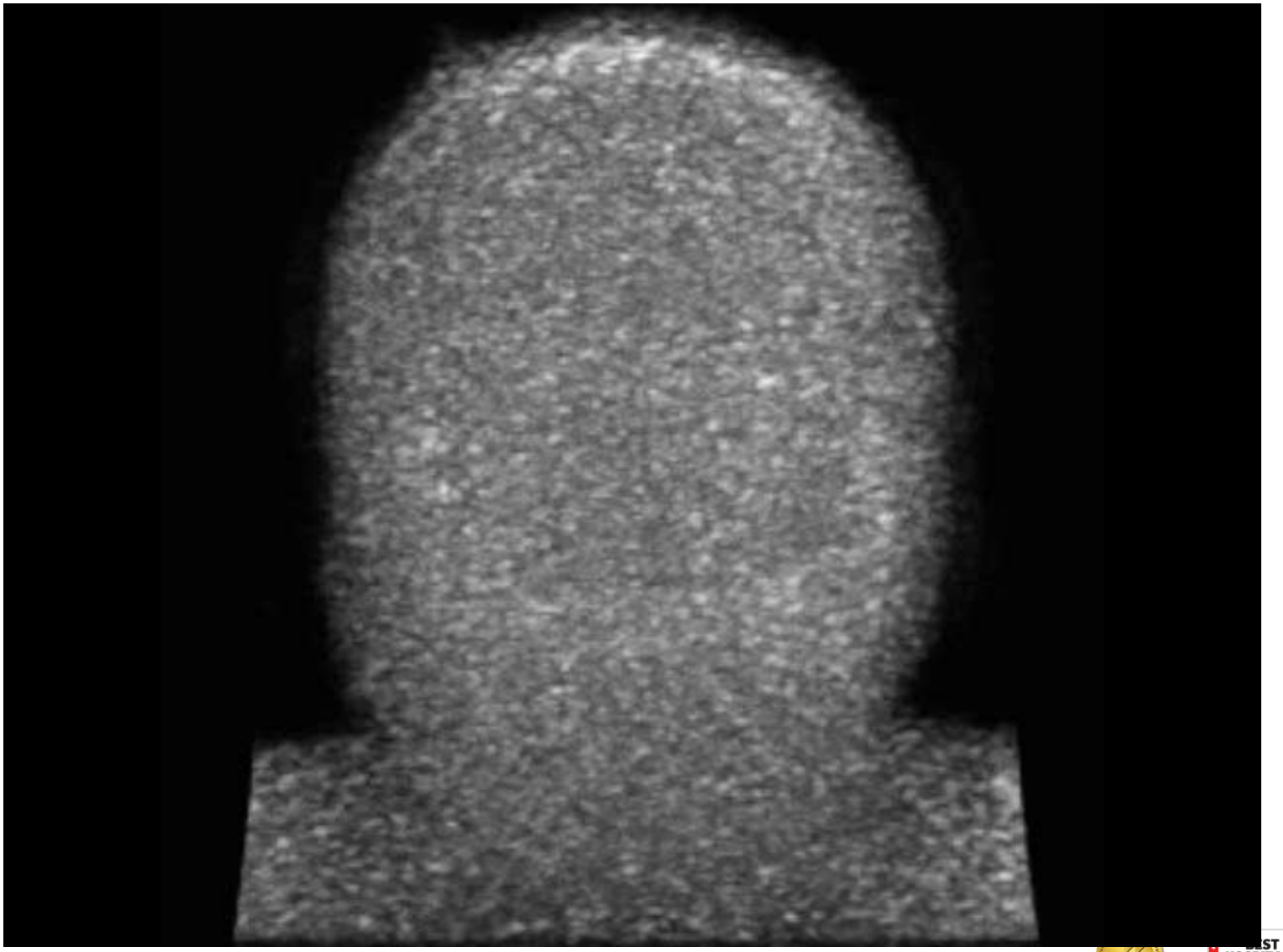
# Tricks: Carotidi SAG



# Tricks: Carotidi Cor

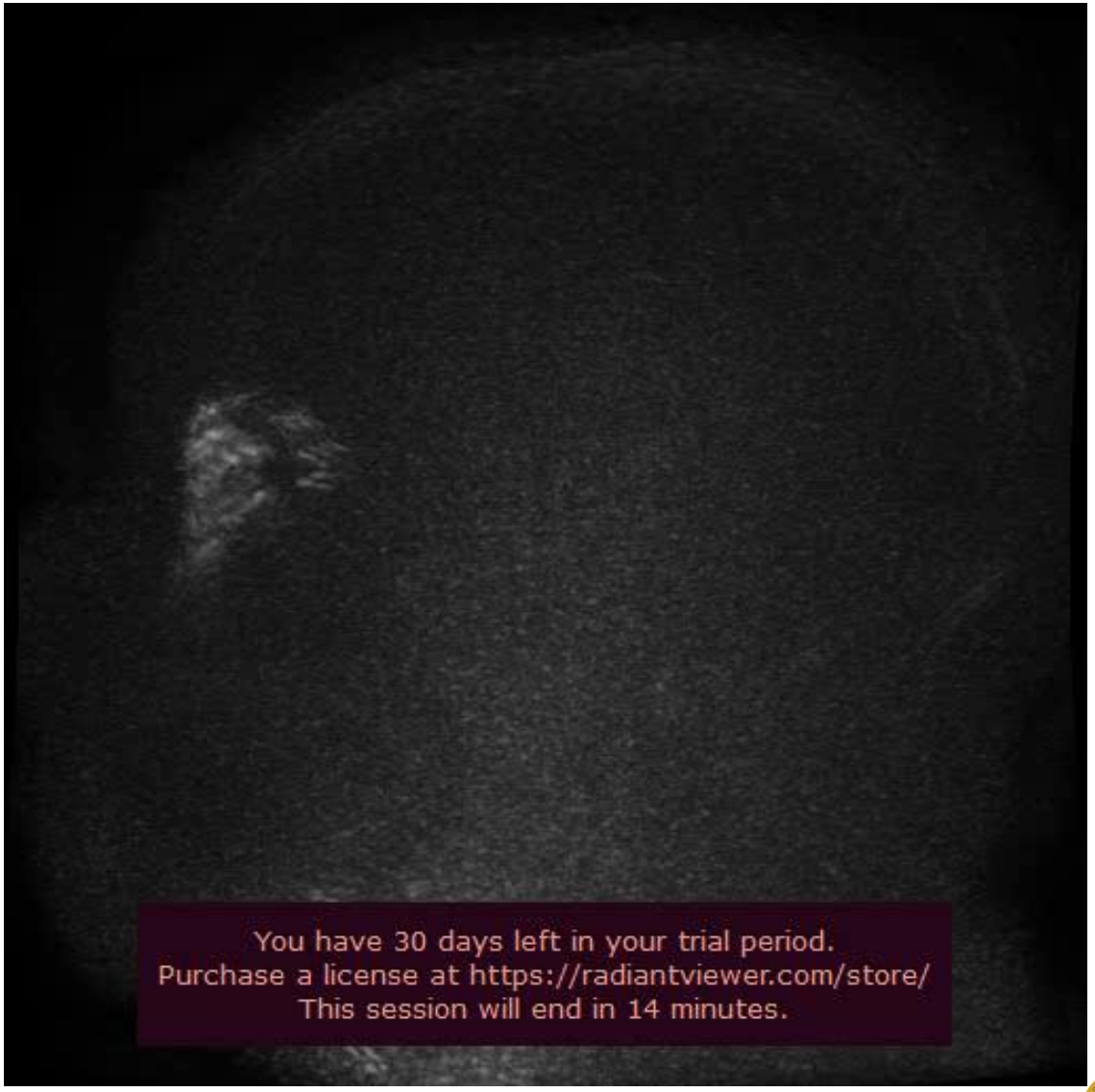


# Tricks: 48 fasi



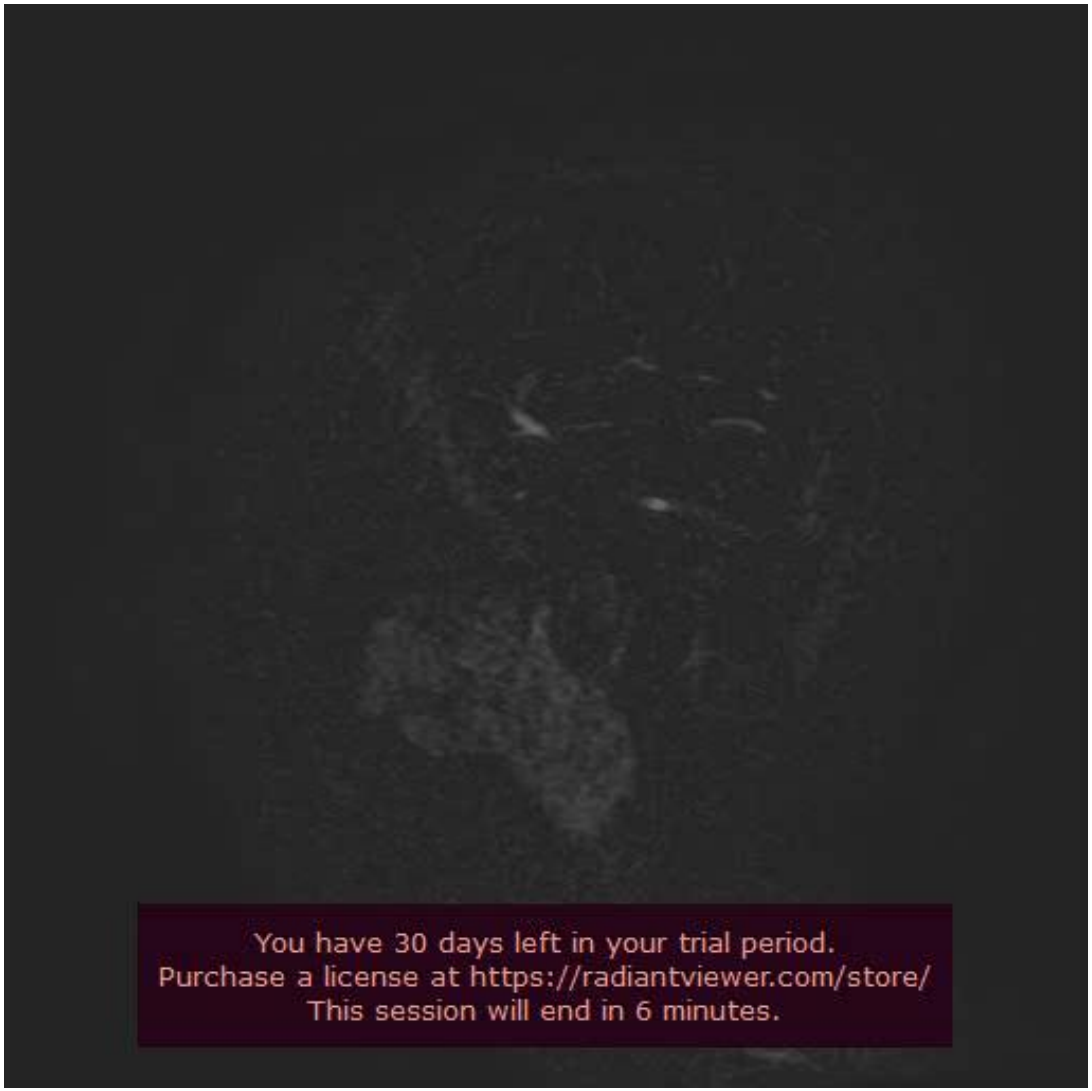
# 3D SAG MRV TRICKS +C

Signa Premiere 3T



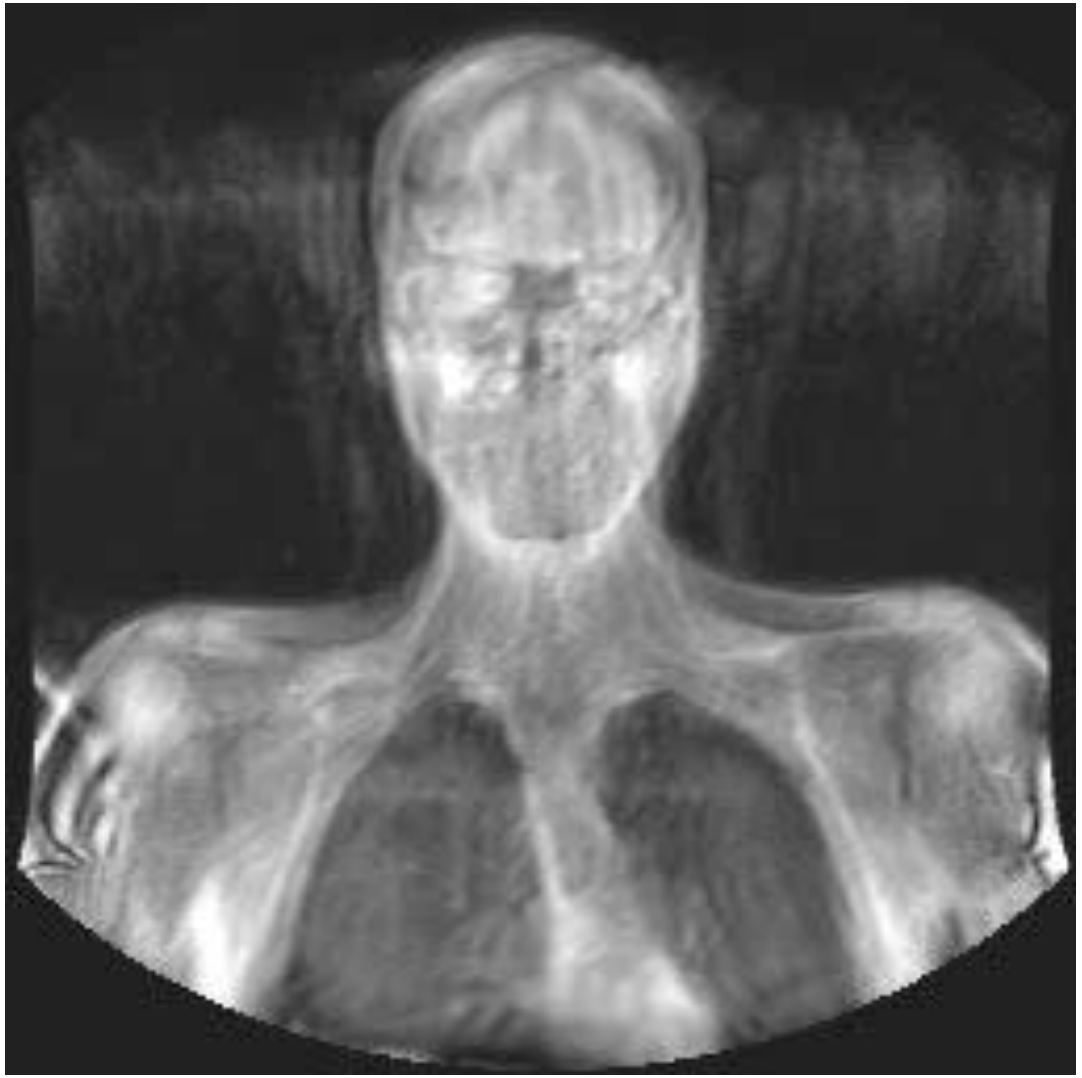
# 3D SAG MRV TRICKS +C

Signa Premiere 3T

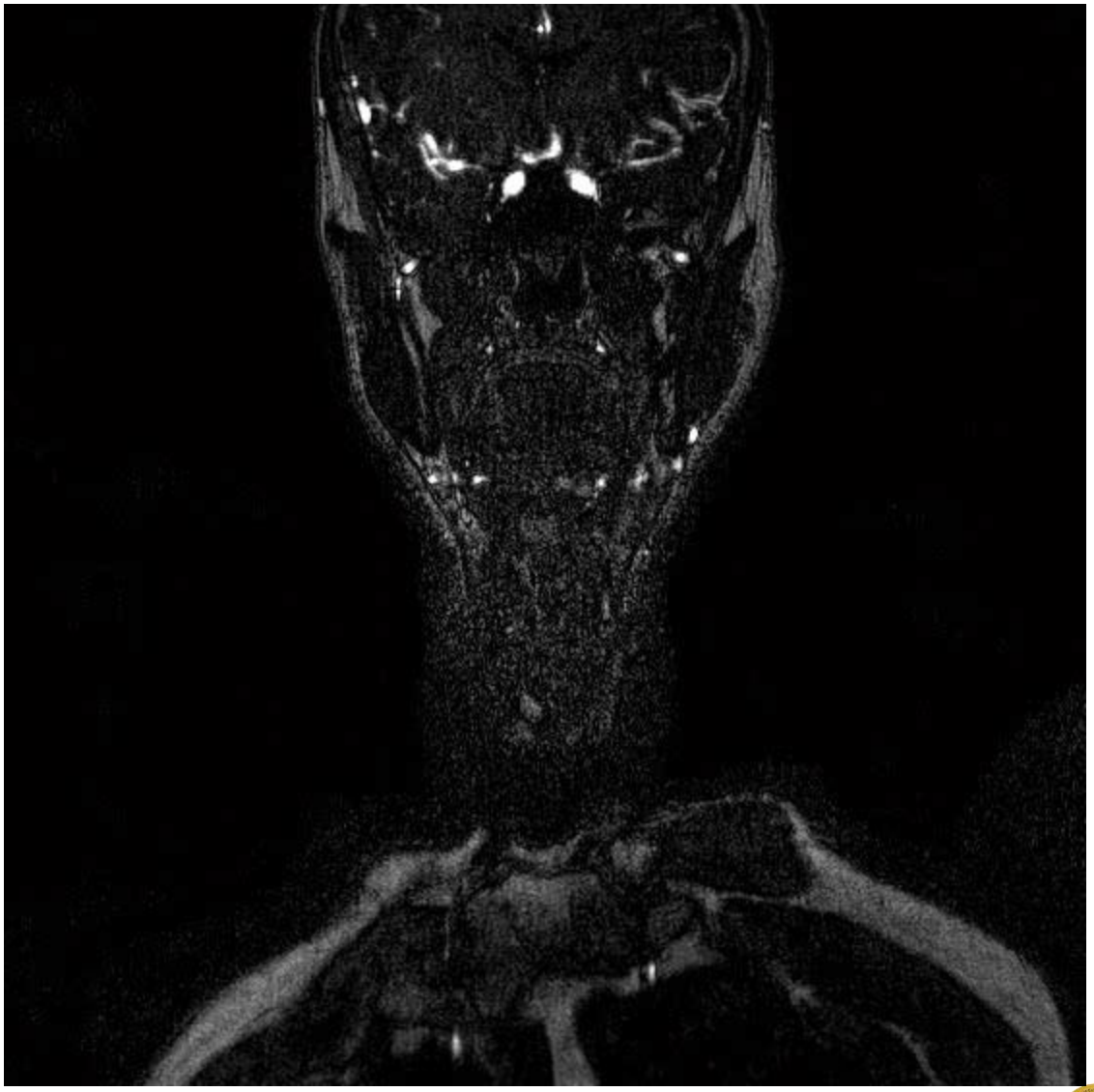



ph6:SUB:3D Sag MRV TRICKS+C

# 2D-Bolus Track Angio Collo



# Angio Collo



# ANGIO-RM TSA

## Cfr .Tutorial ANGIO-RM TSA

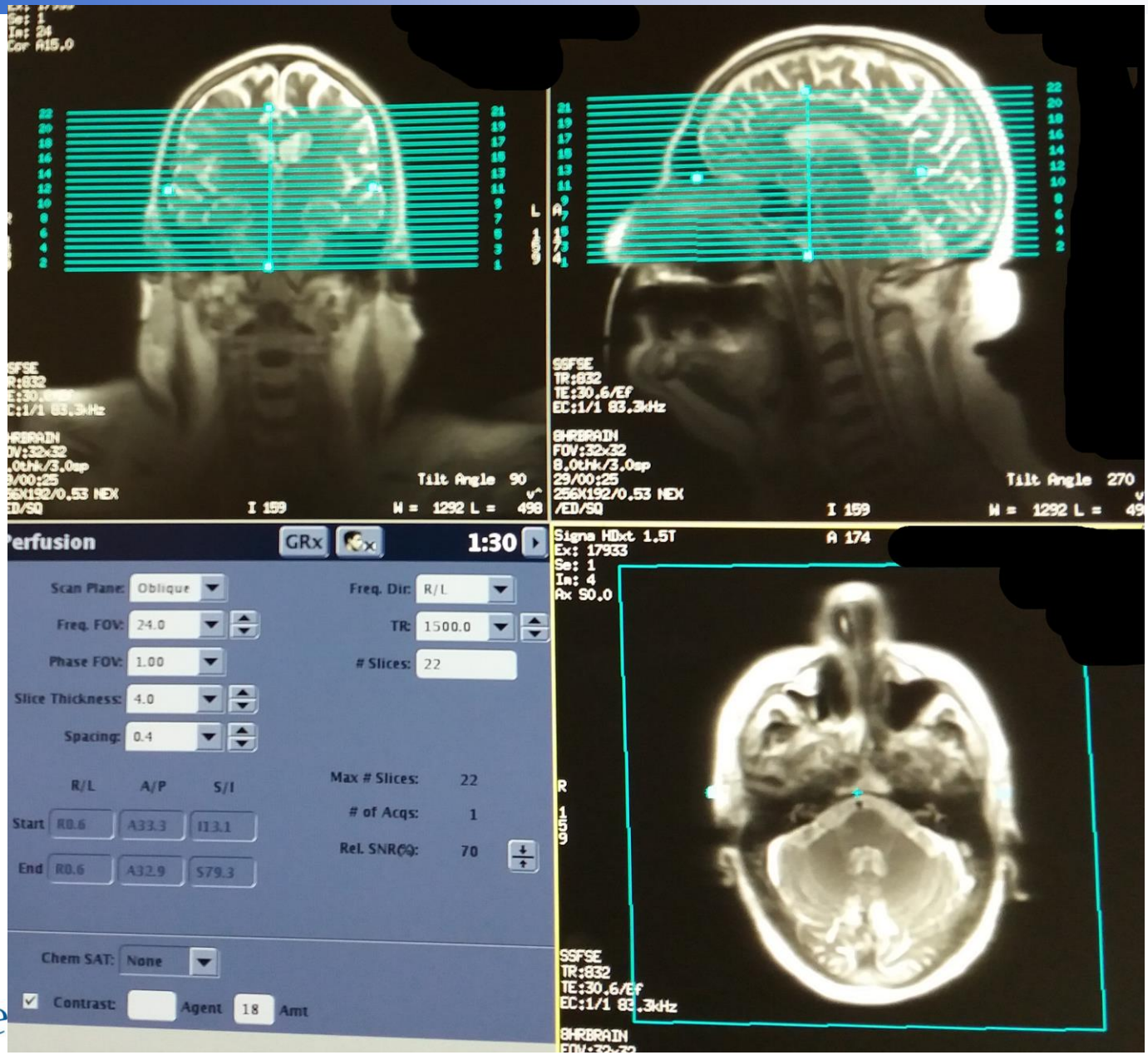
# Angio Collo

# Angio Collo

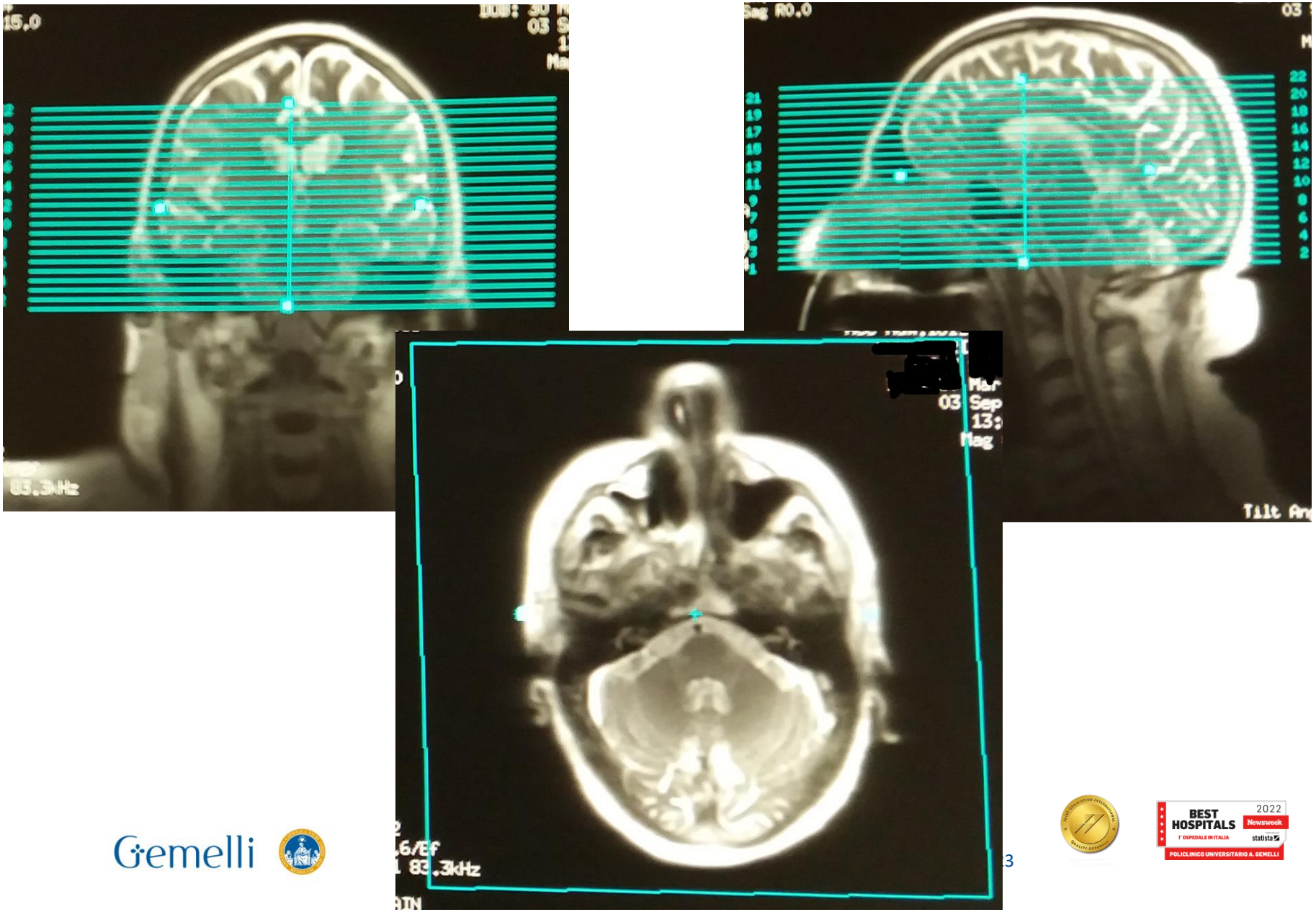
# Angio Collo

# Angio Collo 3T 12/2021

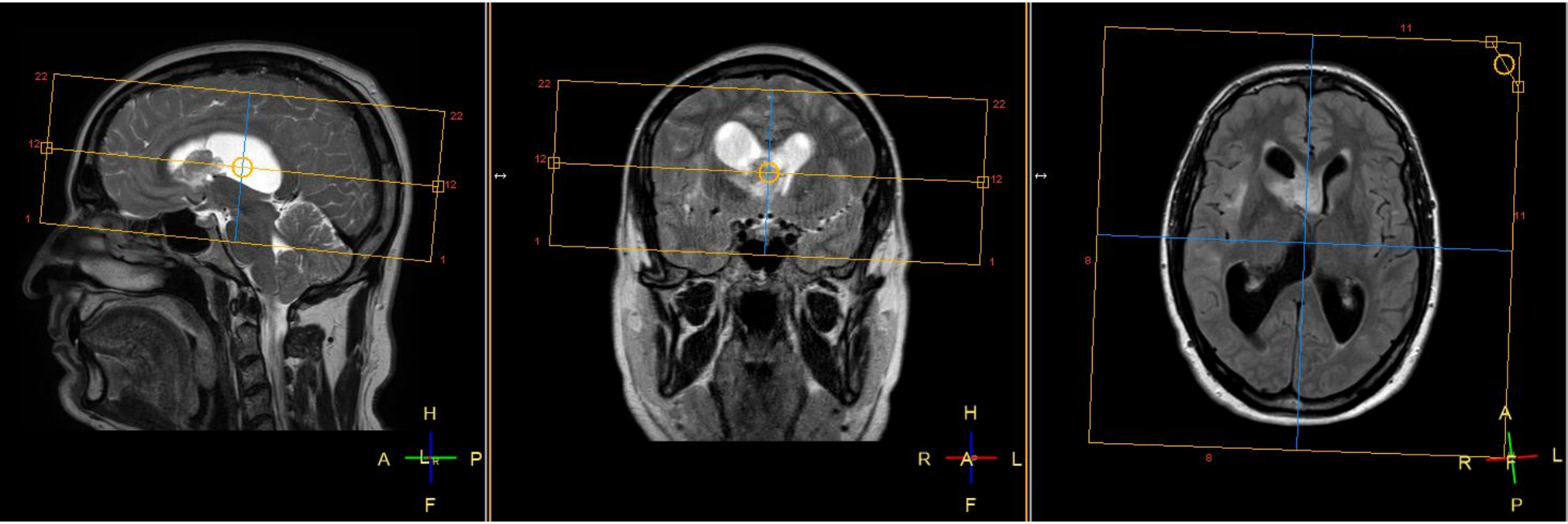

# Pratica: perfusione DSC



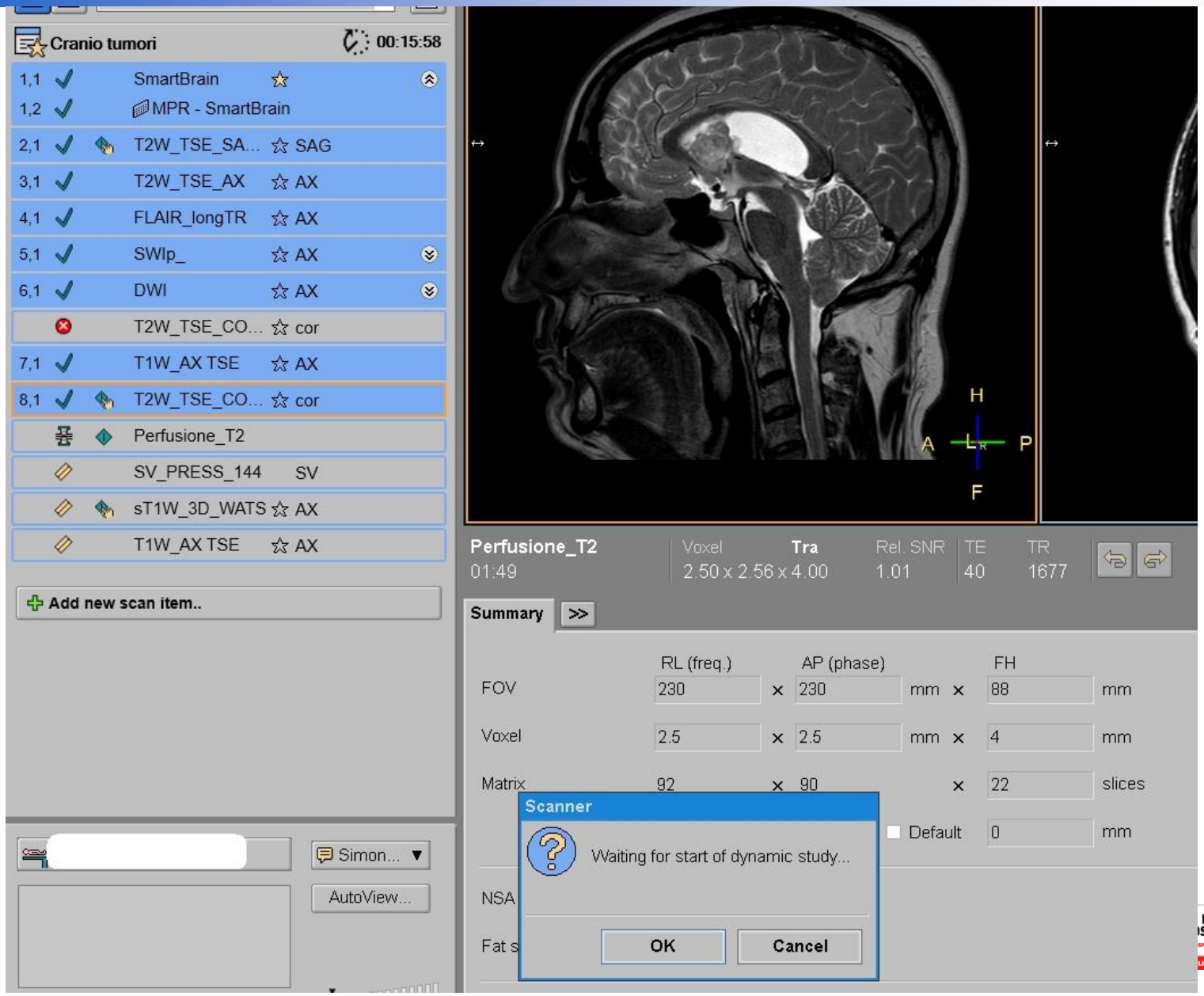
# Pratica: perfusione DSC



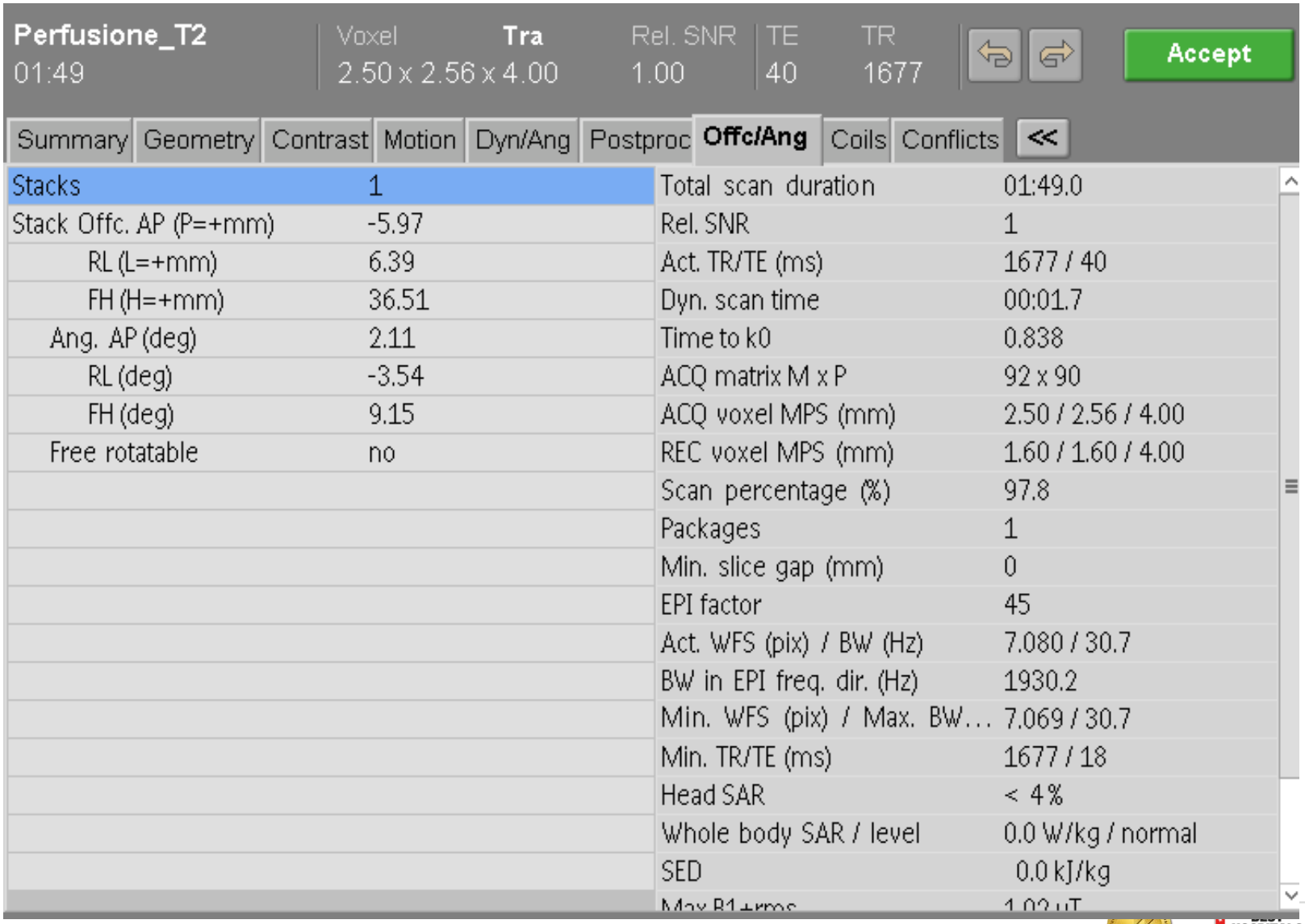
# Pratica: perfusione DSC



# Pratica: perfusione DSC



# Pratica: perfusione DSC



| Perfusione_T2 | Voxel | Tra | Rel. SNR | TE | TR |
|---|---|---|---|---|---|
| 01:49 | 2.50 x 2.56 x 4.00 | | 1.00 | 40 | 1677 |

Accept

Summary | Geometry | Contrast | Motion | Dyn/Ang | Postproc | **Offc/Ang** | Coils | Conflicts | <<

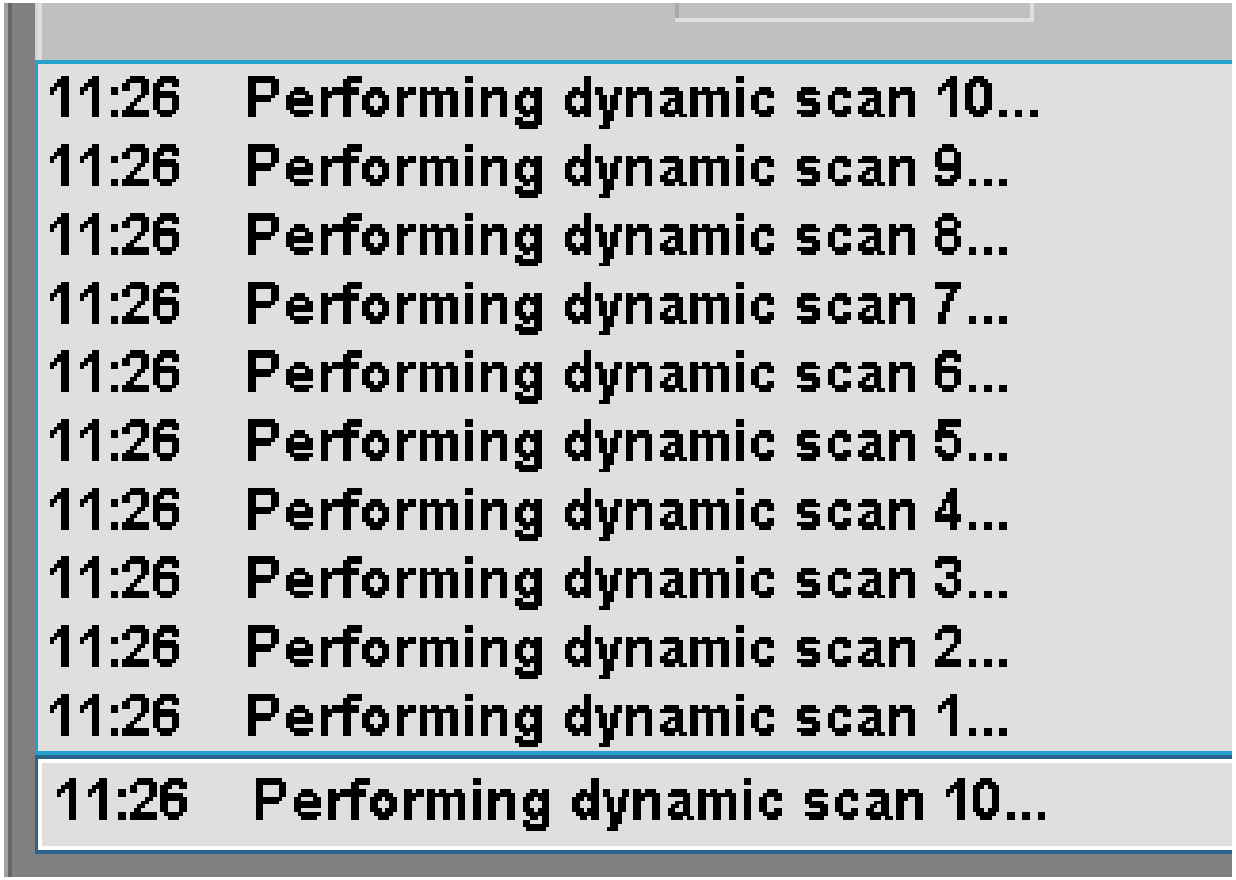
| | |
|---|---|
| Stacks | 1 |
| Stack Offc. AP (P=+mm) | -5.97 |
| RL (L=+mm) | 6.39 |
| FH (H=+mm) | 36.51 |
| Ang. AP (deg) | 2.11 |
| RL (deg) | -3.54 |
| FH (deg) | 9.15 |
| Free rotatable | no |

| | |
|---|---|
| Total scan duration | 01:49.0 |
| Rel. SNR | 1 |
| Act. TR/TE (ms) | 1677 / 40 |
| Dyn. scan time | 00:01.7 |
| Time to k0 | 0.838 |
| ACQ matrix M x P | 92 x 90 |
| ACQ voxel MPS (mm) | 2.50 / 2.56 / 4.00 |
| REC voxel MPS (mm) | 1.60 / 1.60 / 4.00 |
| Scan percentage (%) | 97.8 |
| Packages | 1 |
| Min. slice gap (mm) | 0 |
| EPI factor | 45 |
| Act. WFS (pix) / BW (Hz) | 7.080 / 30.7 |
| BW in EPI freq. dir. (Hz) | 1930.2 |
| Min. WFS (pix) / Max. BW... | 7.069 / 30.7 |
| Min. TR/TE (ms) | 1677 / 18 |
| Head SAR | < 4 % |
| Whole body SAR / level | 0.0 W/kg / normal |
| SED | 0.0 kJ/kg |
| Max B1+rms | 1.02 µT |

# Pratica: perfusione DSC

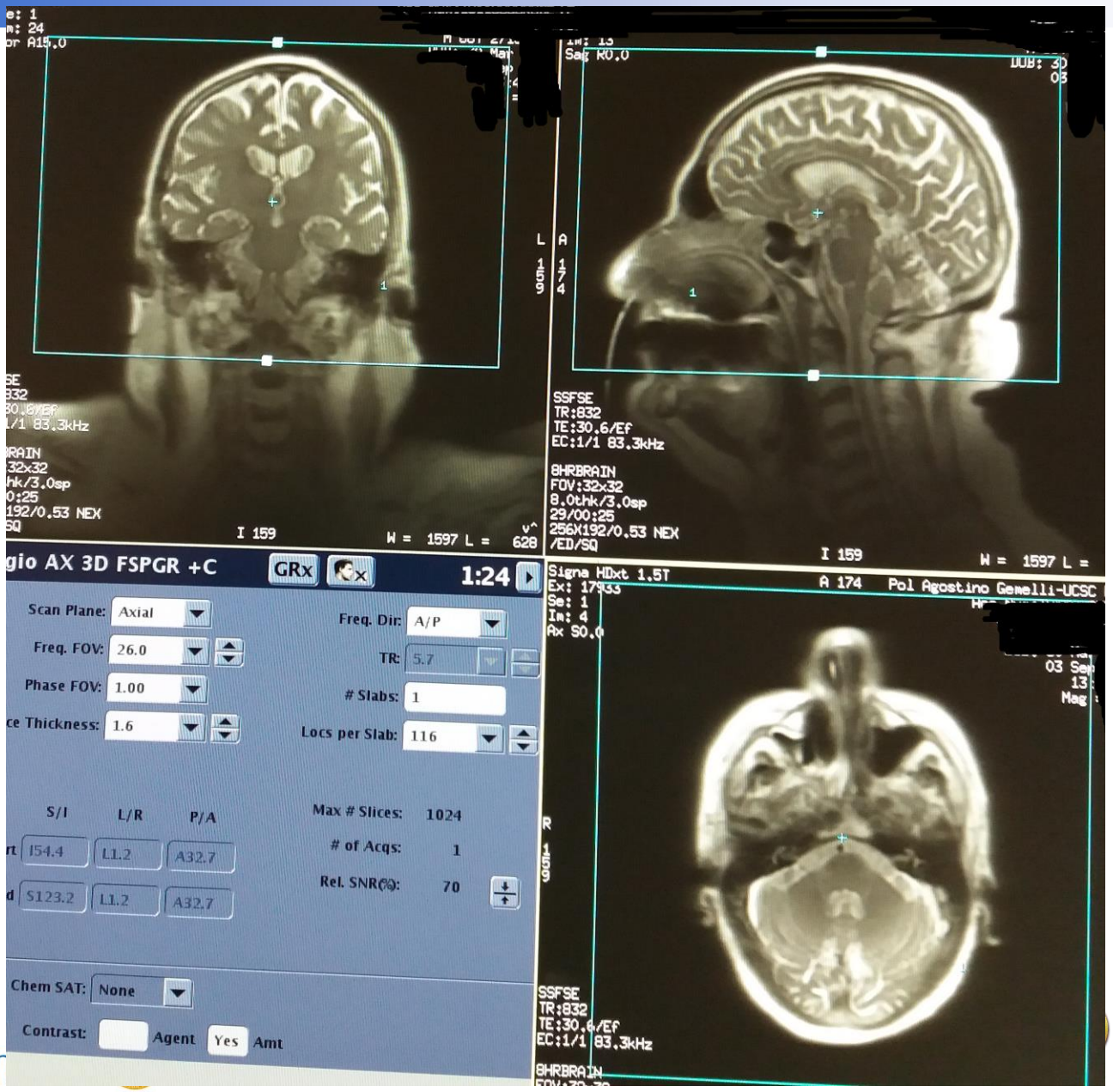
Quante dinamiche???

# Pratica: perfusione DSC

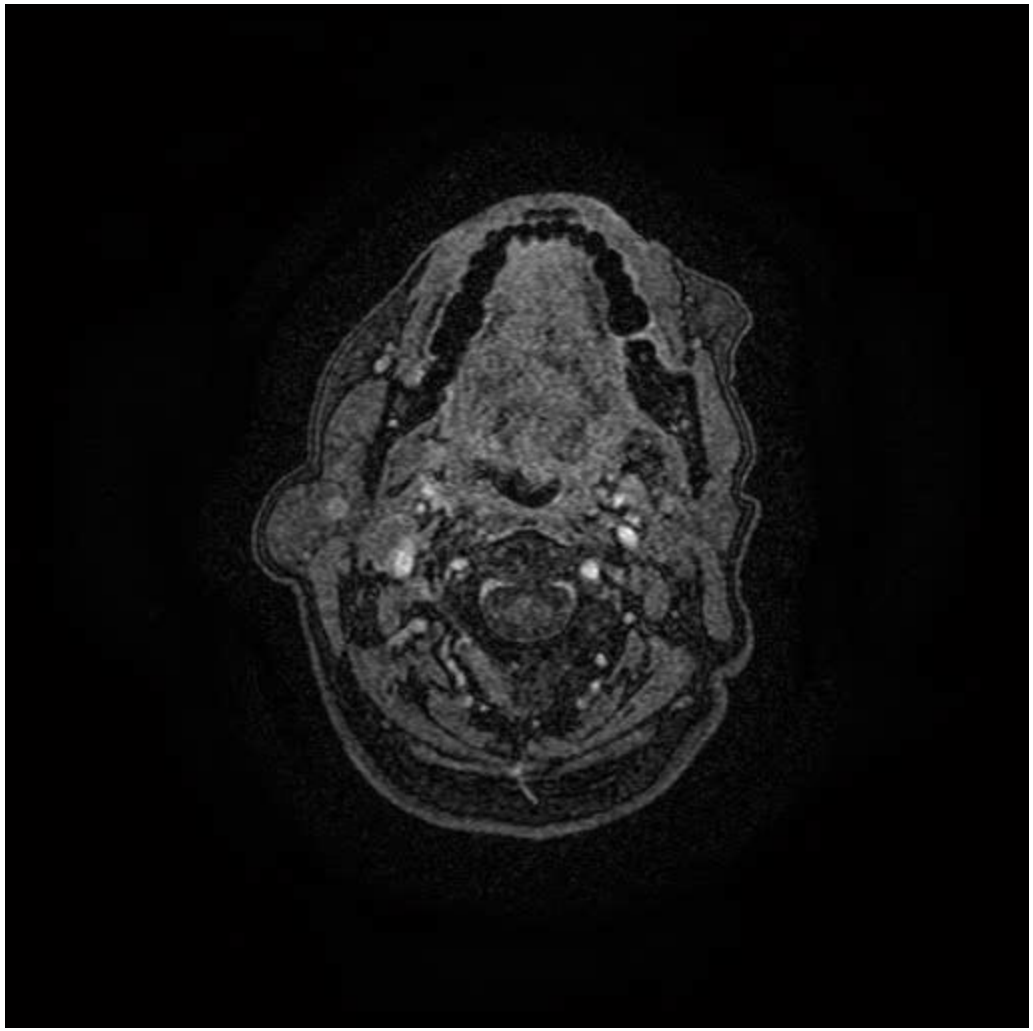



Dopo l'acquisizione delle prime 10 scansioni dinamiche basali, iniettare il mezzo di contrasto…

# Pratica: ANGIORM VENOSA

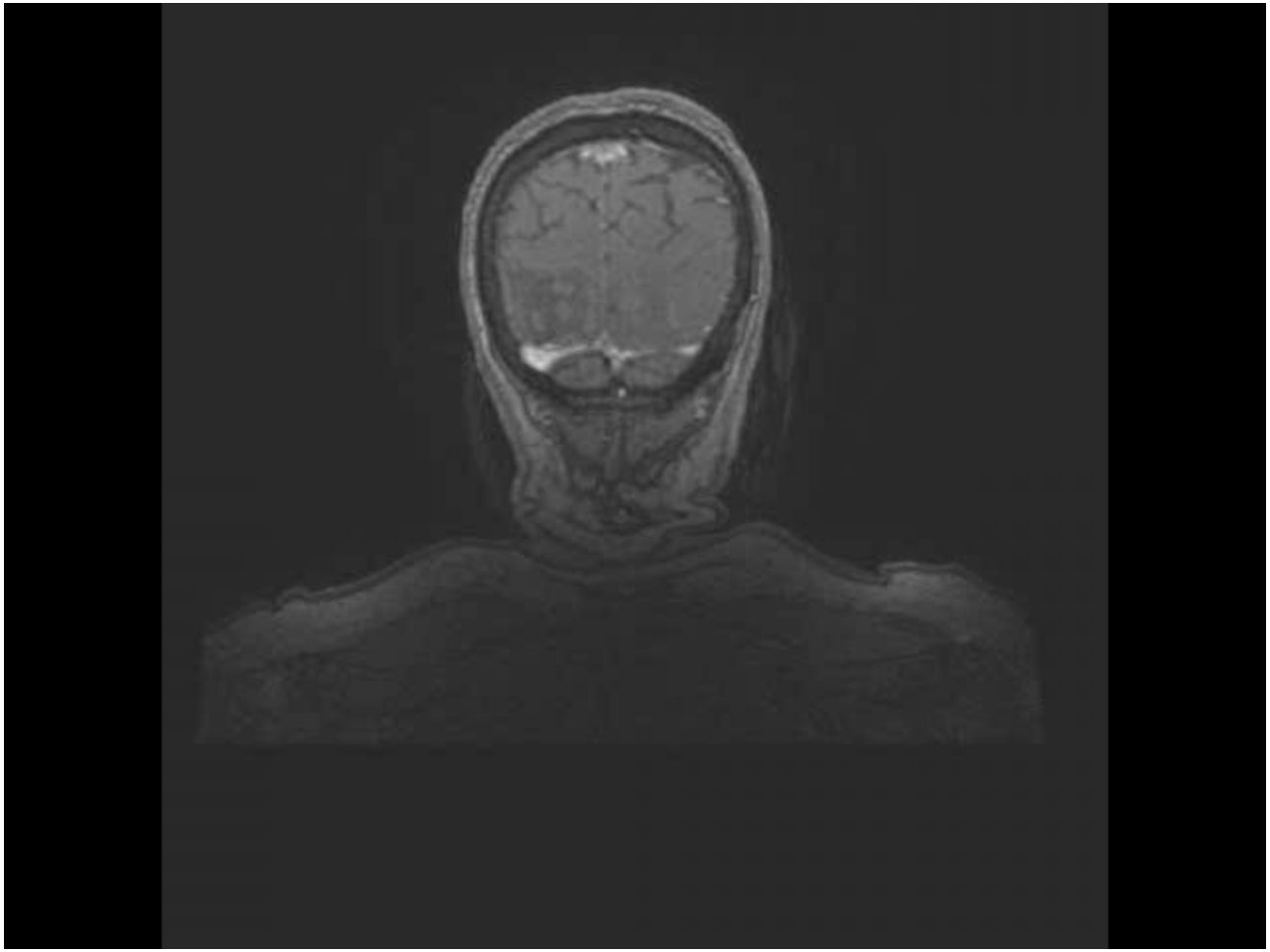


# Pratica: Angio AX 3D FSPGR +MdC

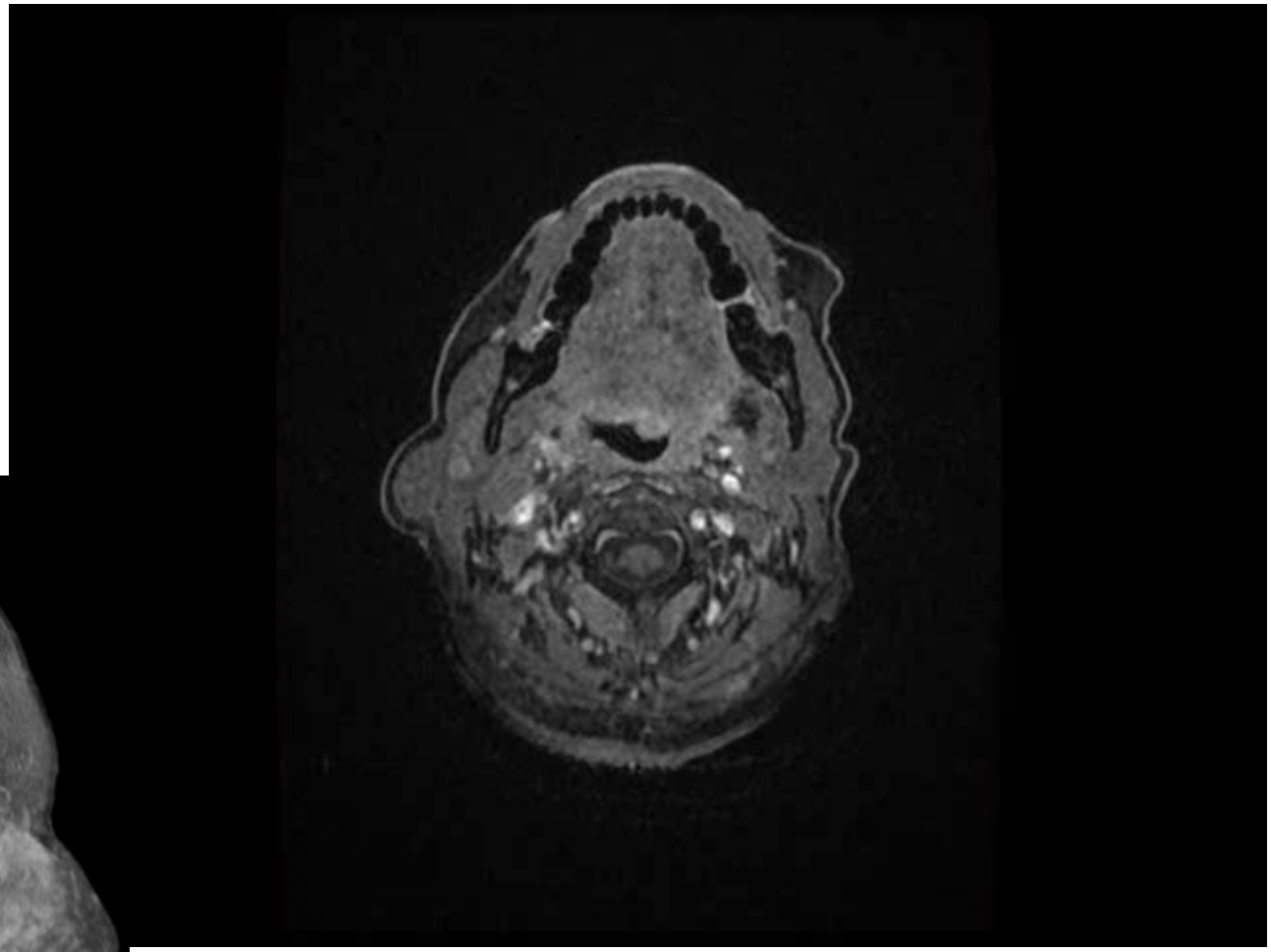


# Pratica: Angio AX 3D FSPGR +MdC

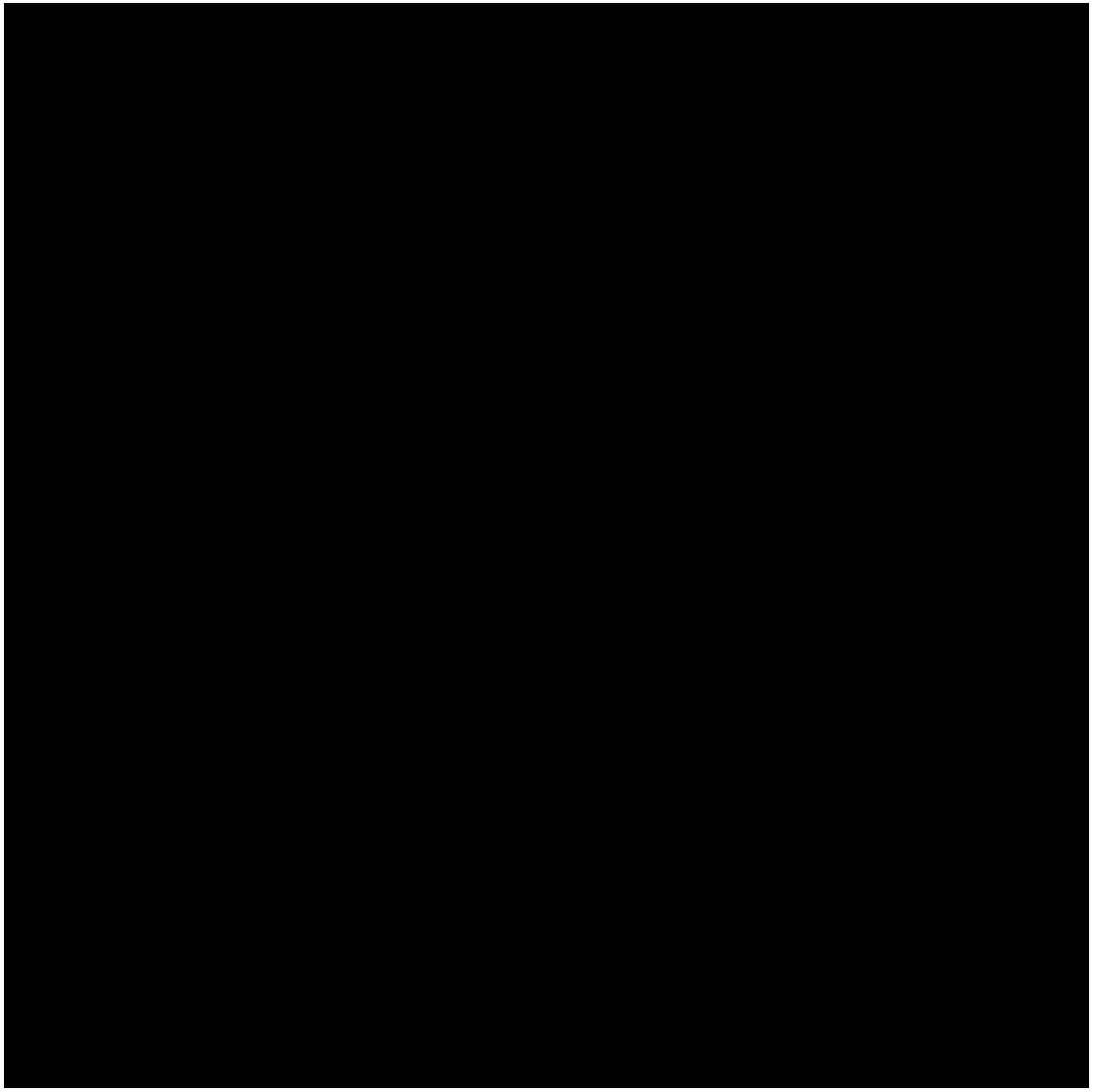
# Pratica: COR CEMRA TARDIVA



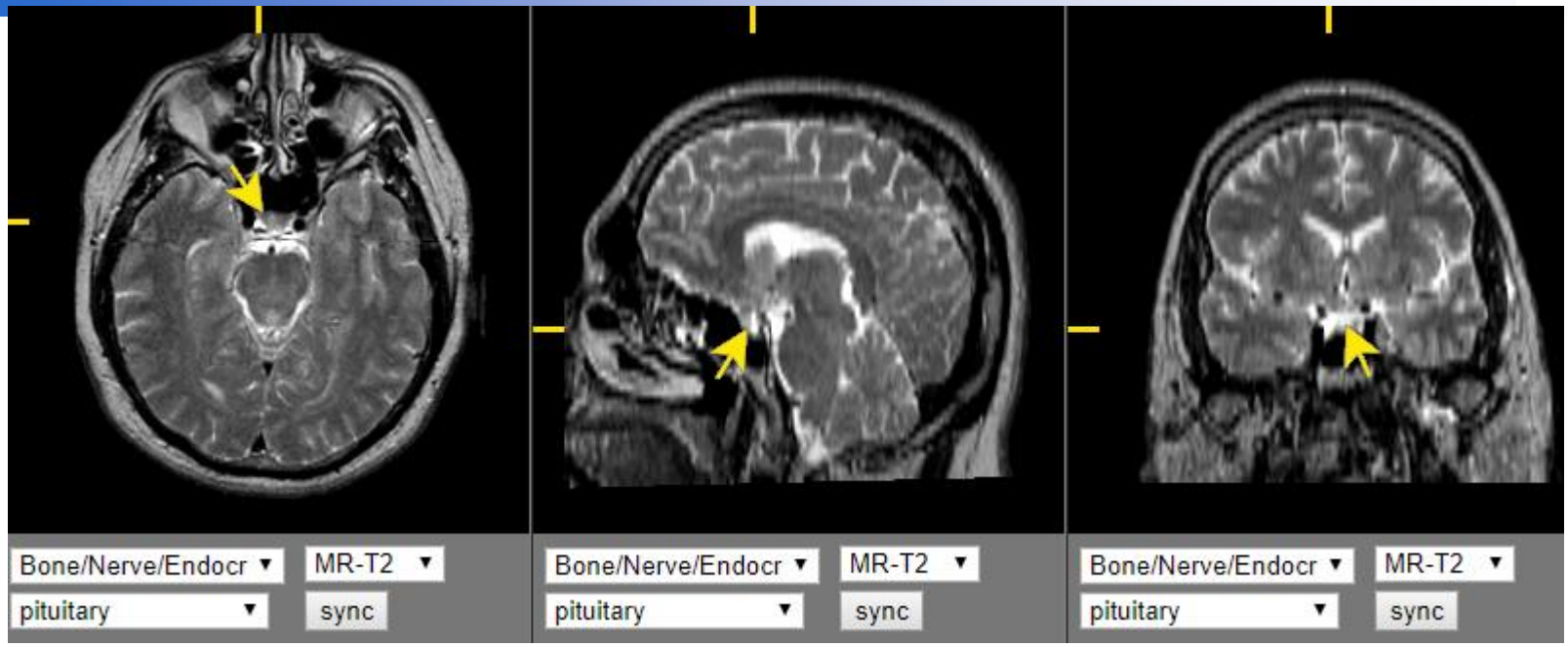
# Pratica: AX 3D FSPGR +MdC

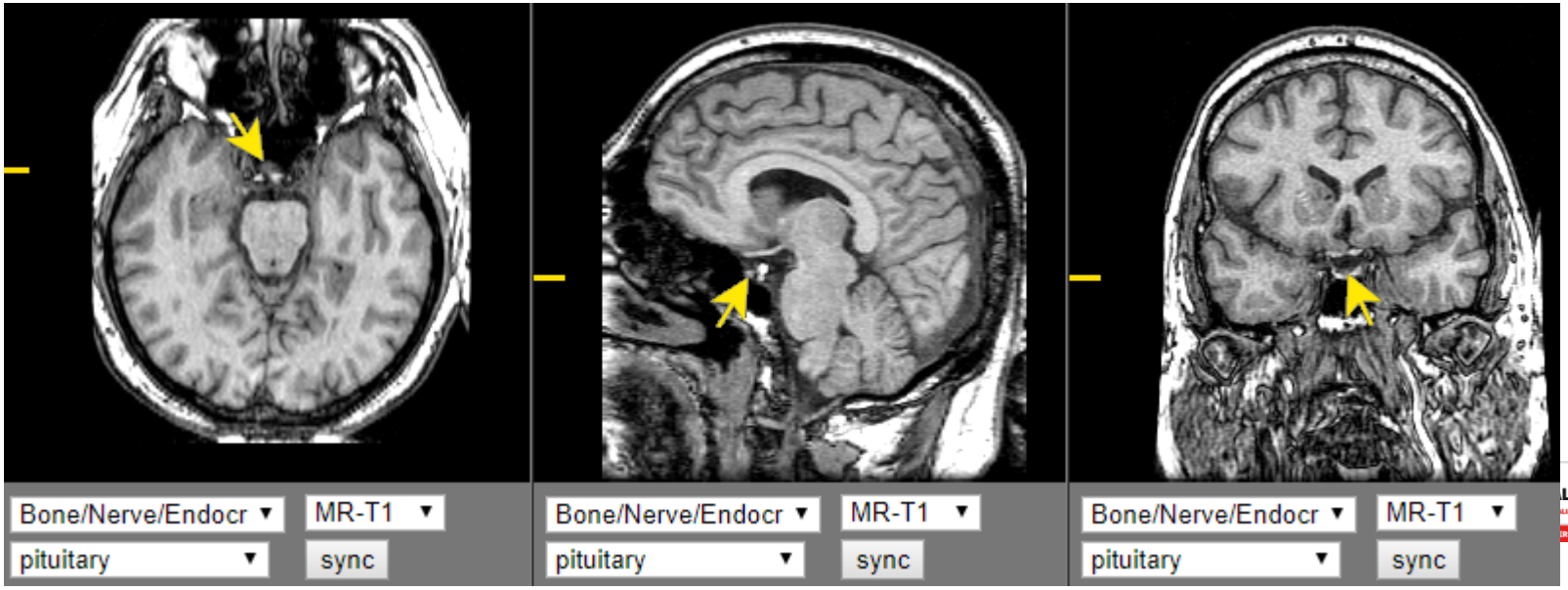


# Pratica: AX T1 3D WATS +MdC

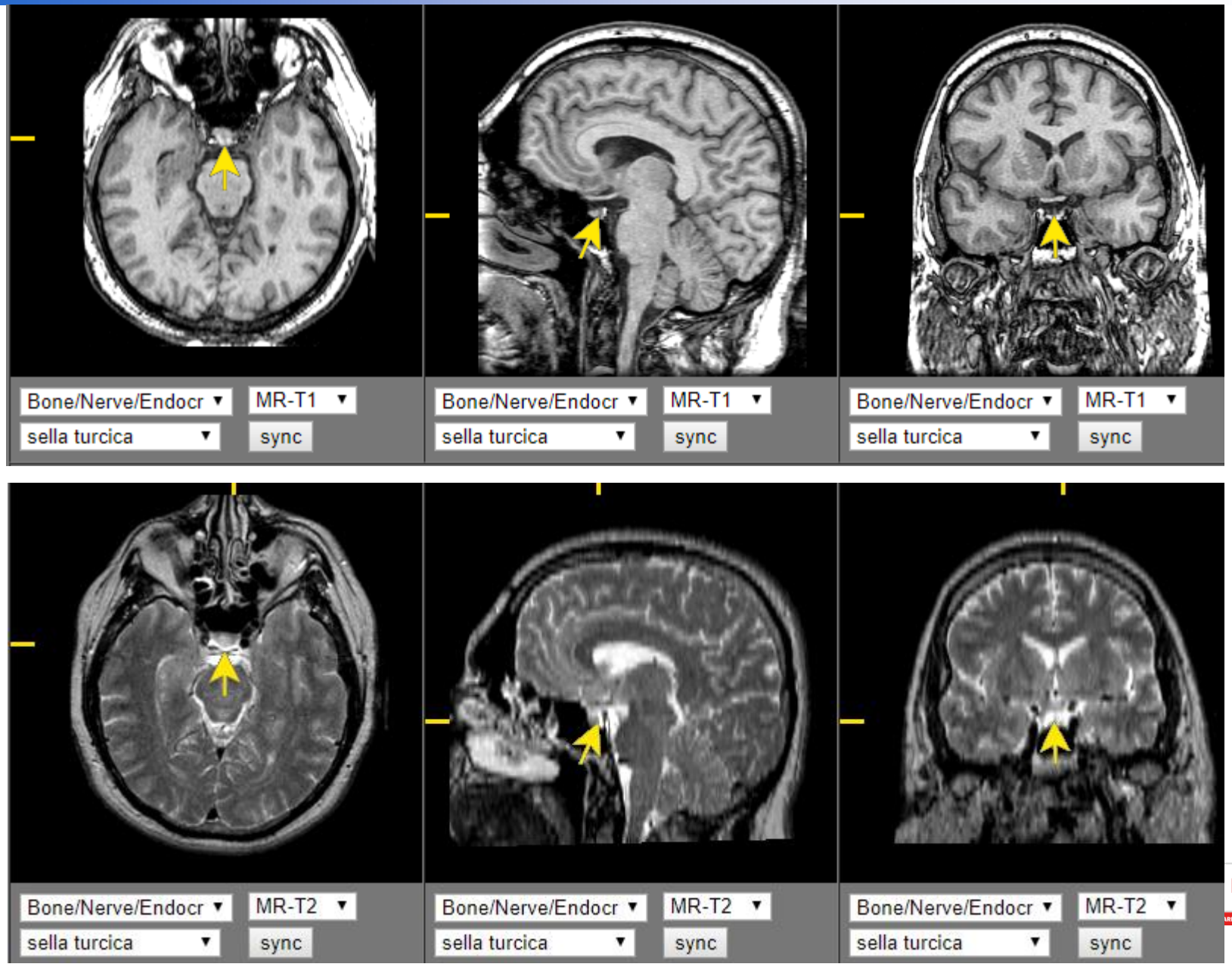


# Pratica: IPOFISI



# Pratica: IPOFISI



# Pratica: IPOFISI

Formazione per l'eccellenza

## Pituitary Gland

**eBook** for Undergraduate **Education in Radiology**

The pituitary gland lies in the sella turcica (**figure 13**), below the hypothalamus and optic chiasm; it is divided into **anterior (adenohypophysis)** and **posterior (neurohypophysis) lobes**. The **pituitary stalk** connects the pituitary gland to the brain. The **cavernous sinuses** are located lateral to the pituitary gland, they contain the cranial nerves III, IV, V1, V2,VI and the cavernous segment of the internal carotid artery (ICA).

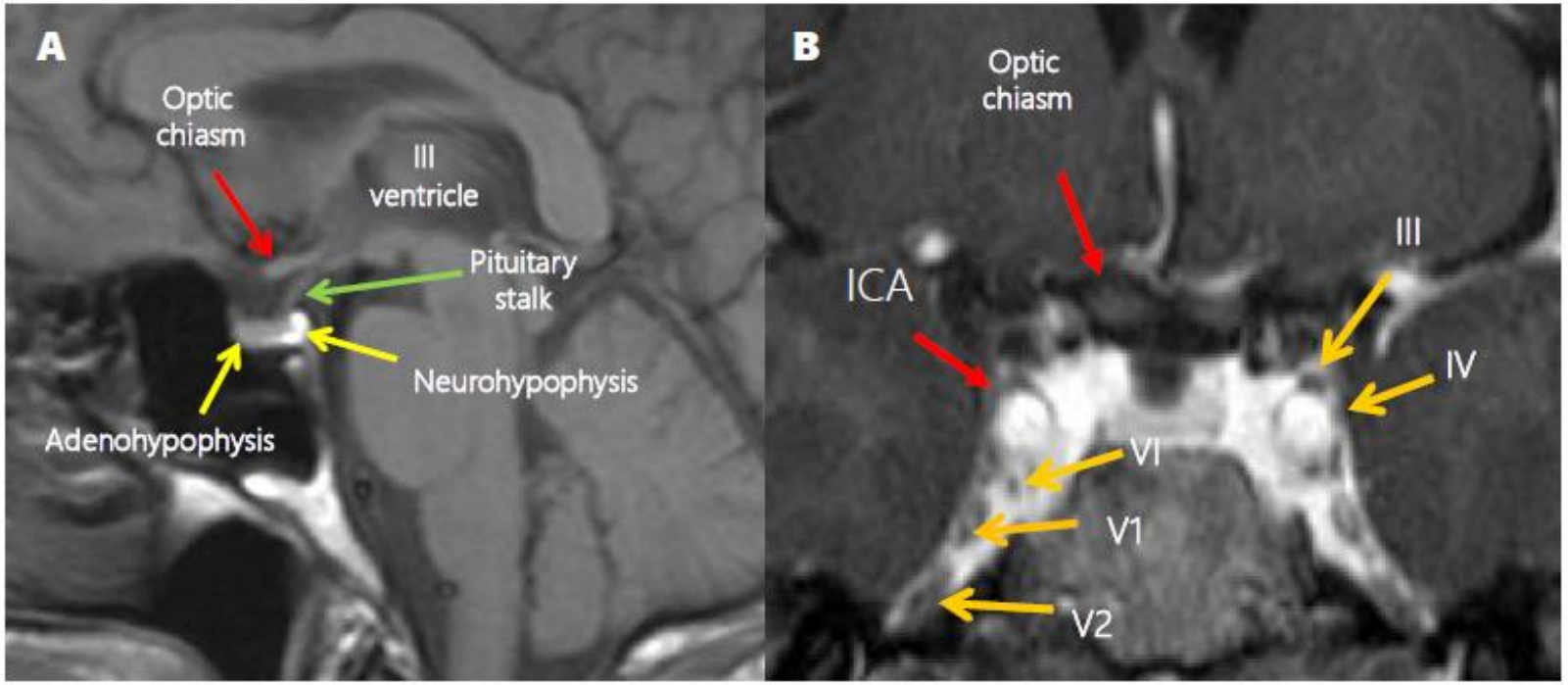
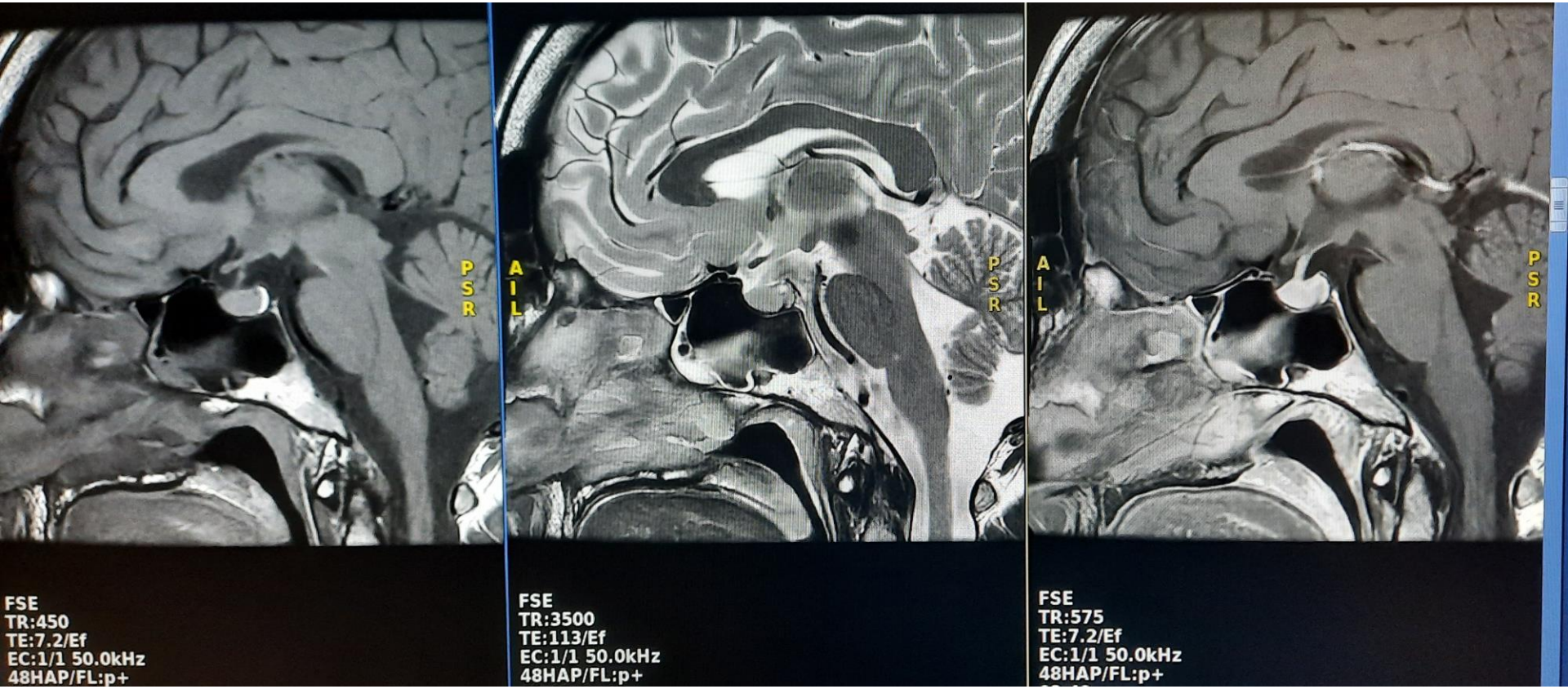
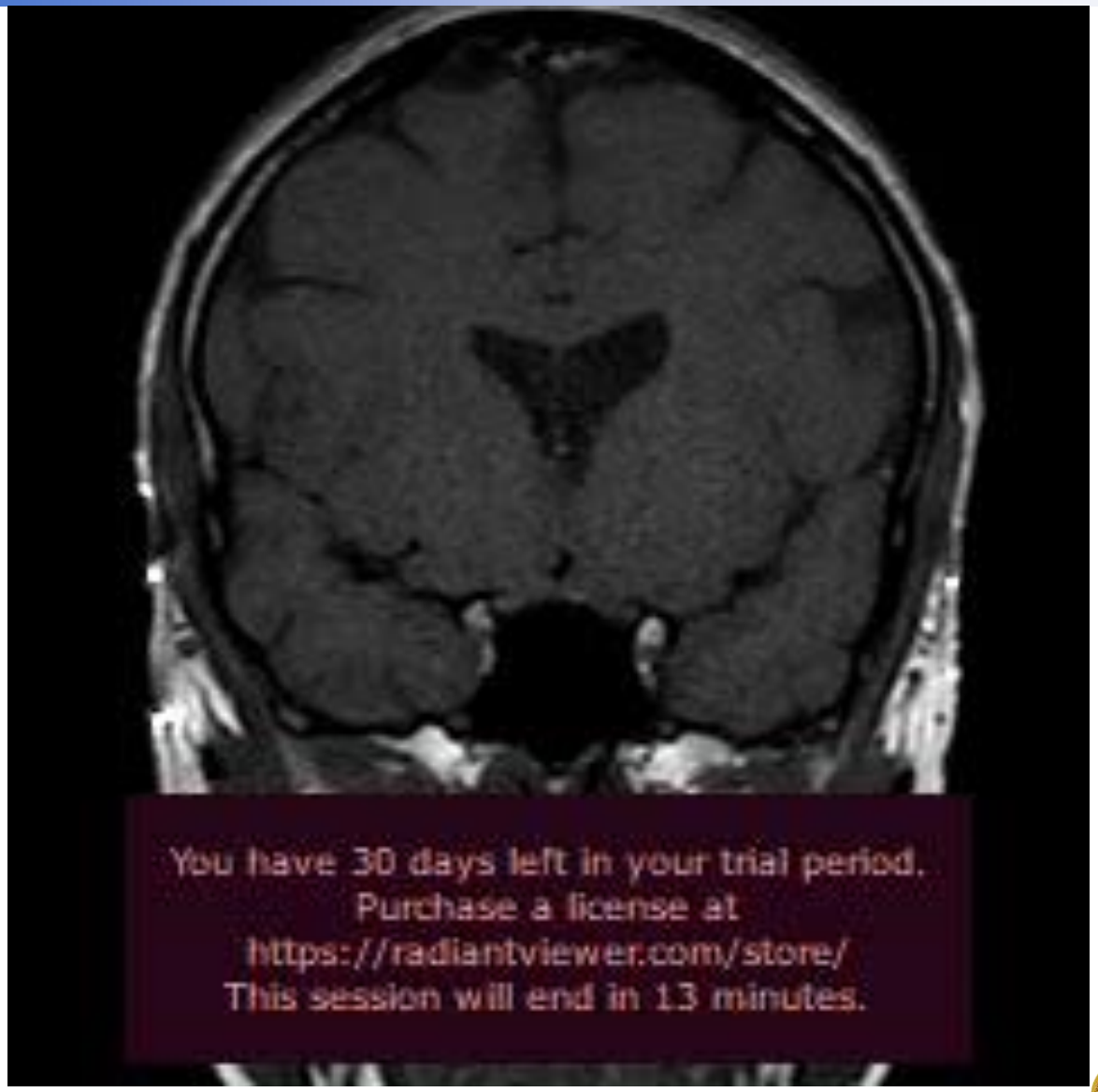



Fig. 13. Anatomy of the pituitary fossa and cavernous sinuses as seen on sagittal T1- weighted (A) and contrast-enhanced coronal T1-weighted (B) images.

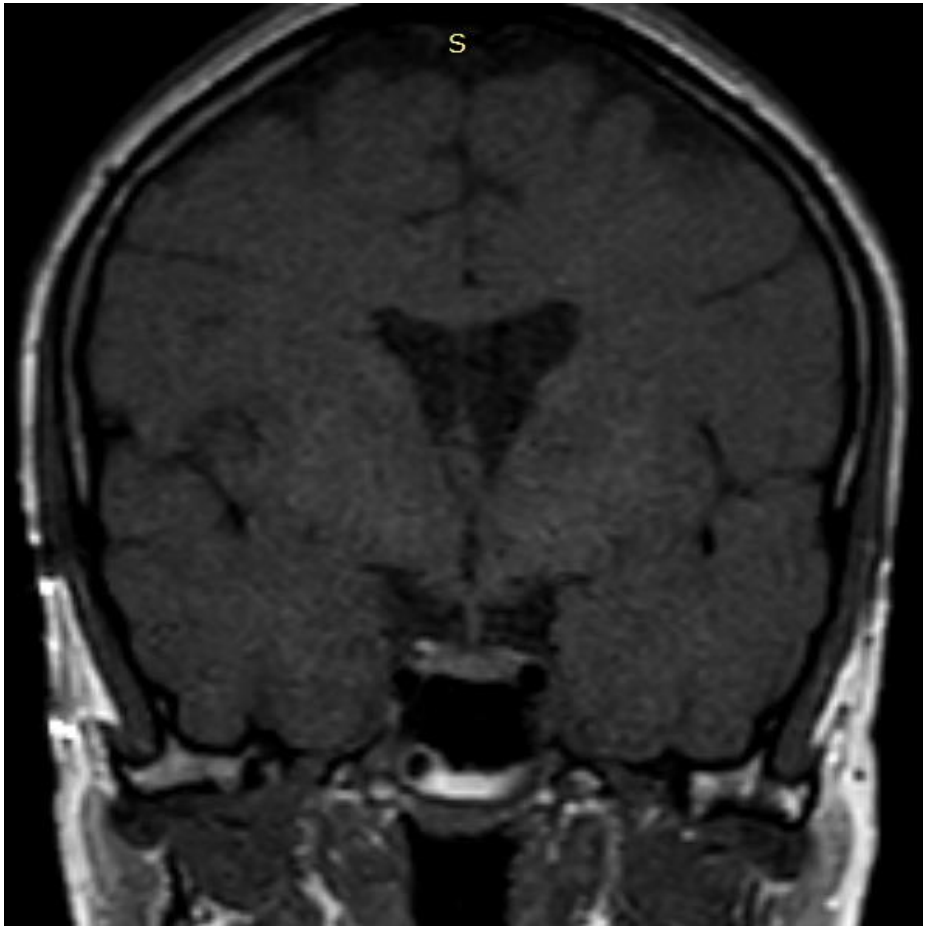
# Pratica: IPOFISI

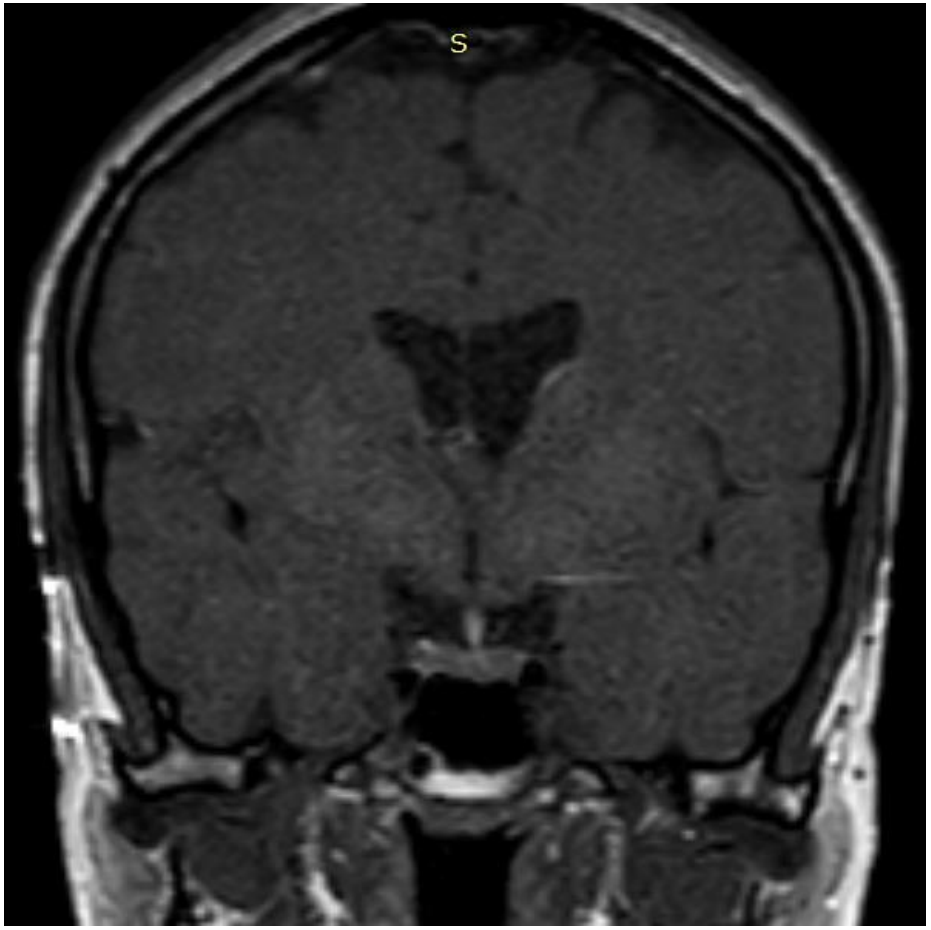


# Pratica: Dinamica dell'Ipofisi

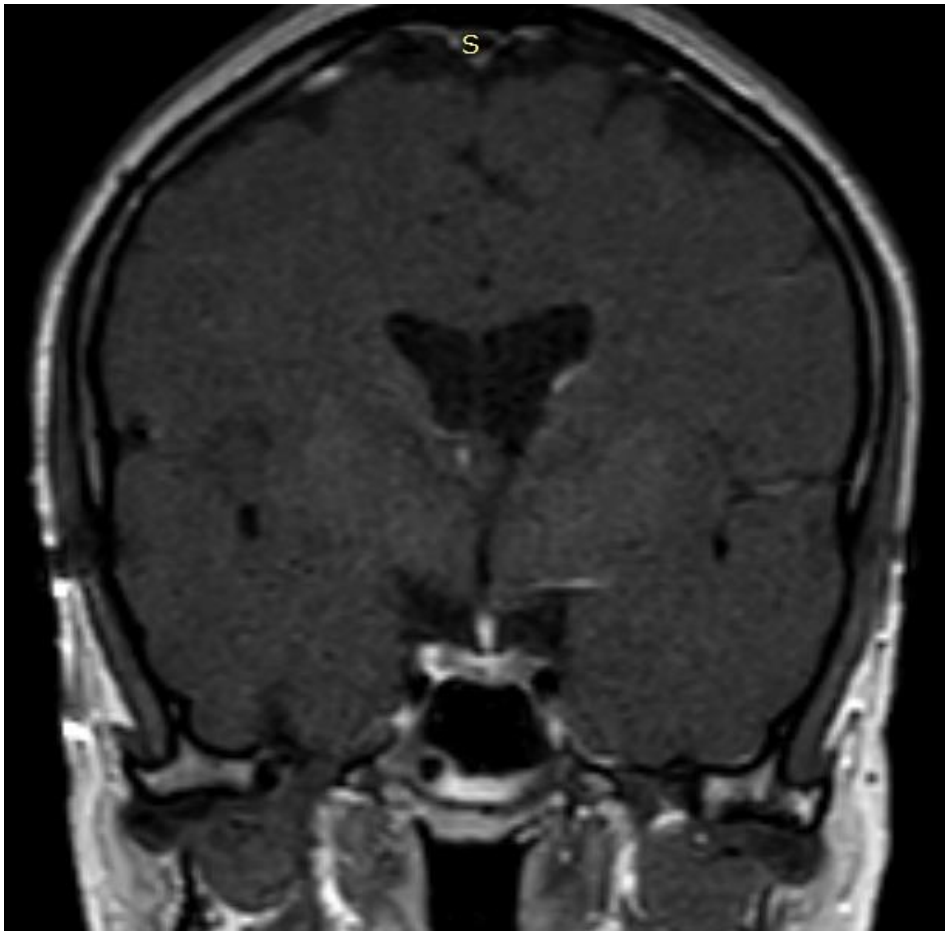


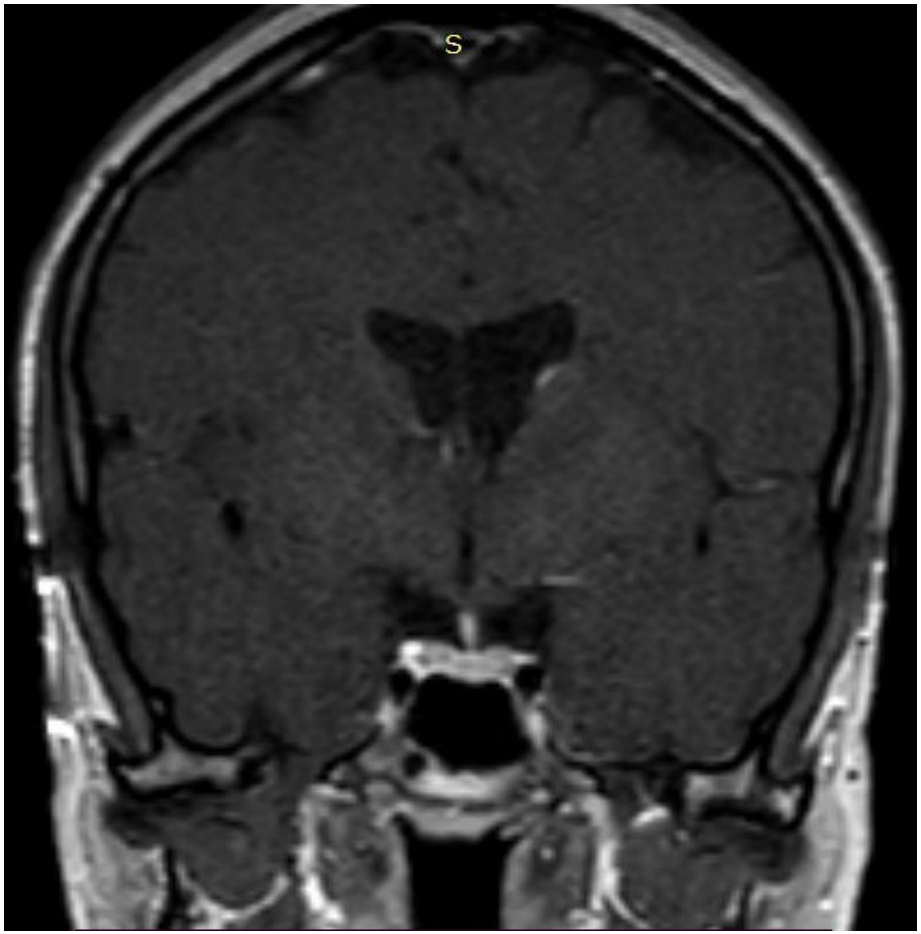
# Pratica: Dinamica dell'Ipofisi



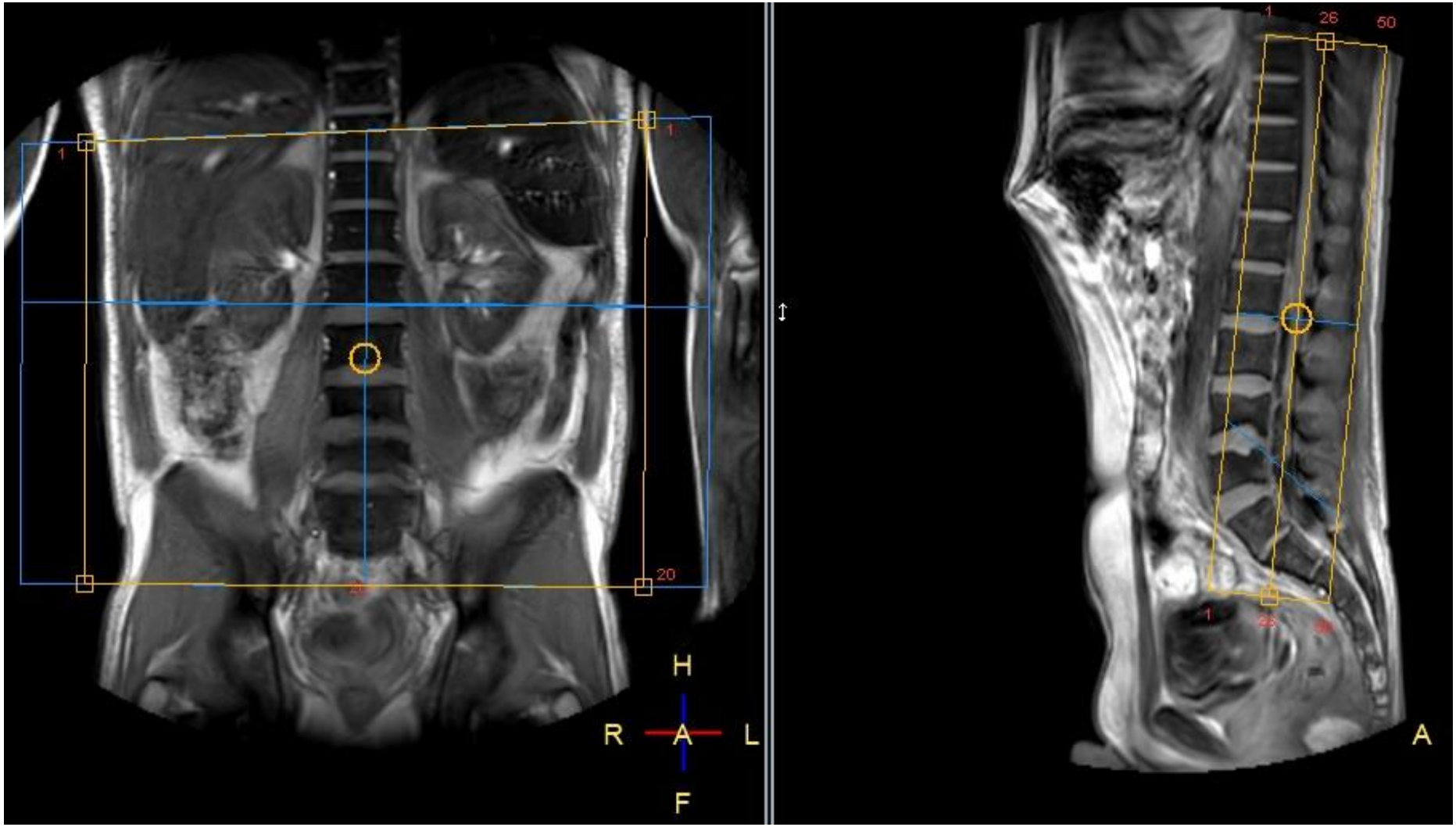



# Pratica: Dinamica dell'Ipofisi

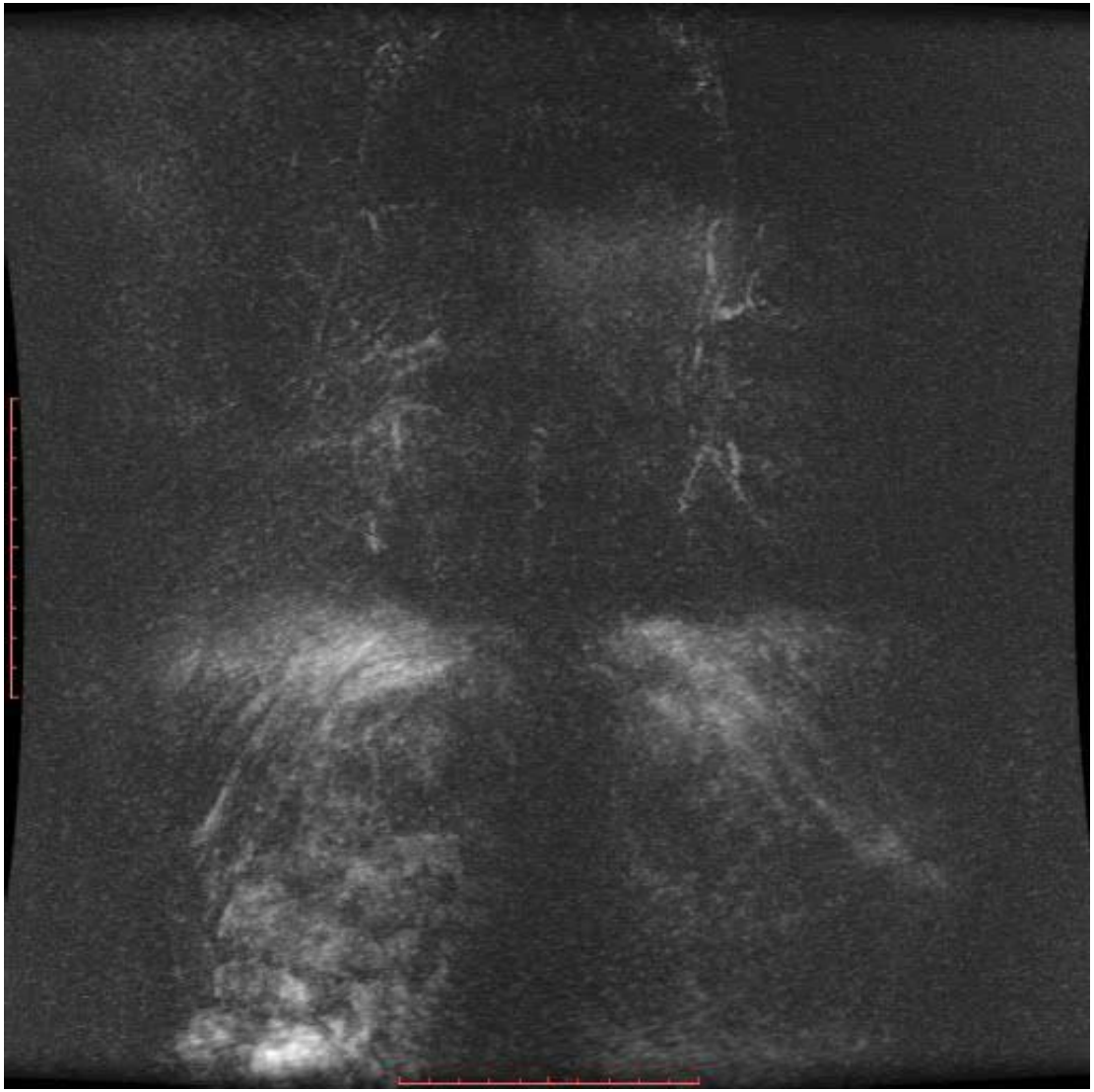


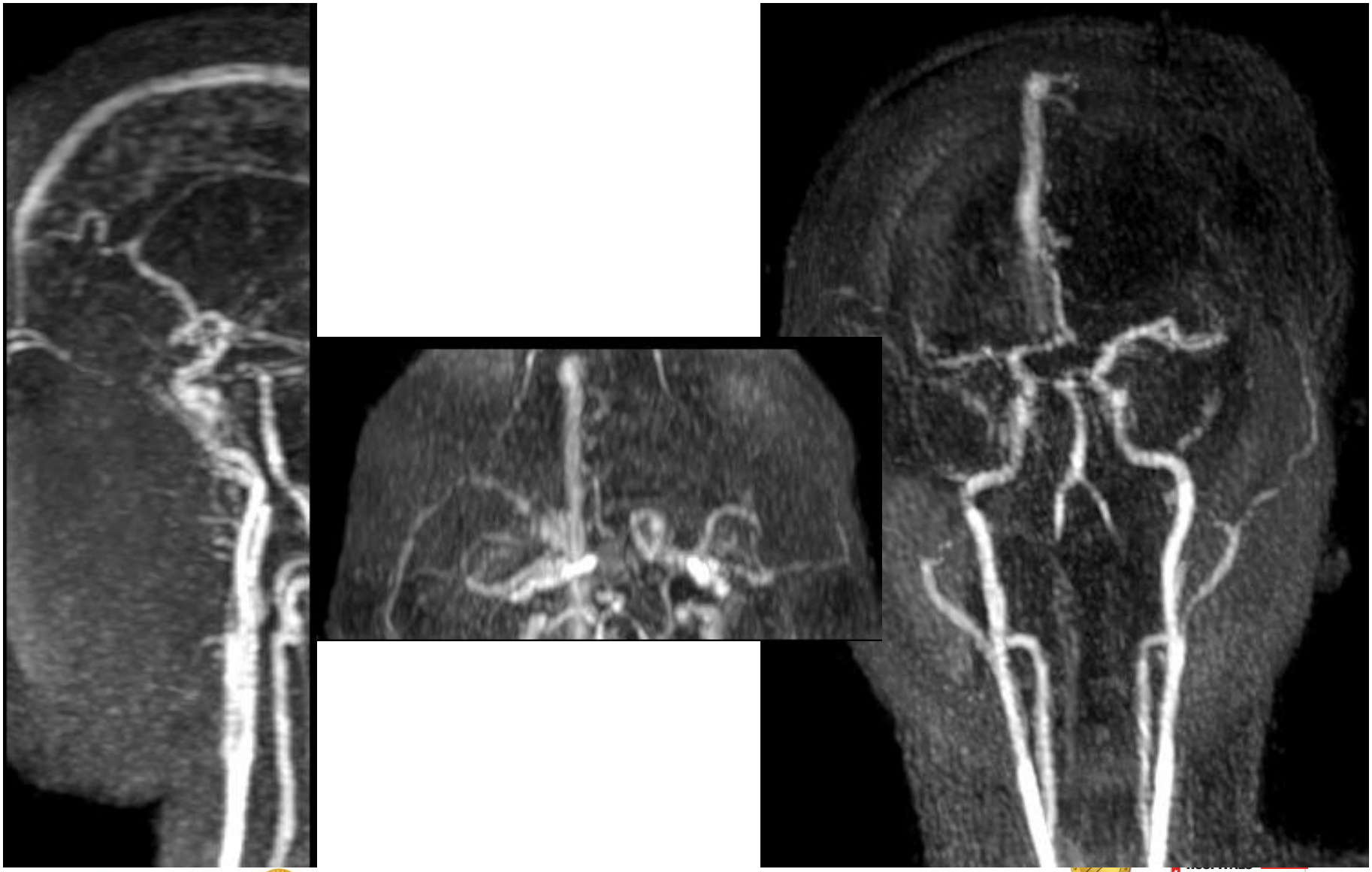
# Angio midollo



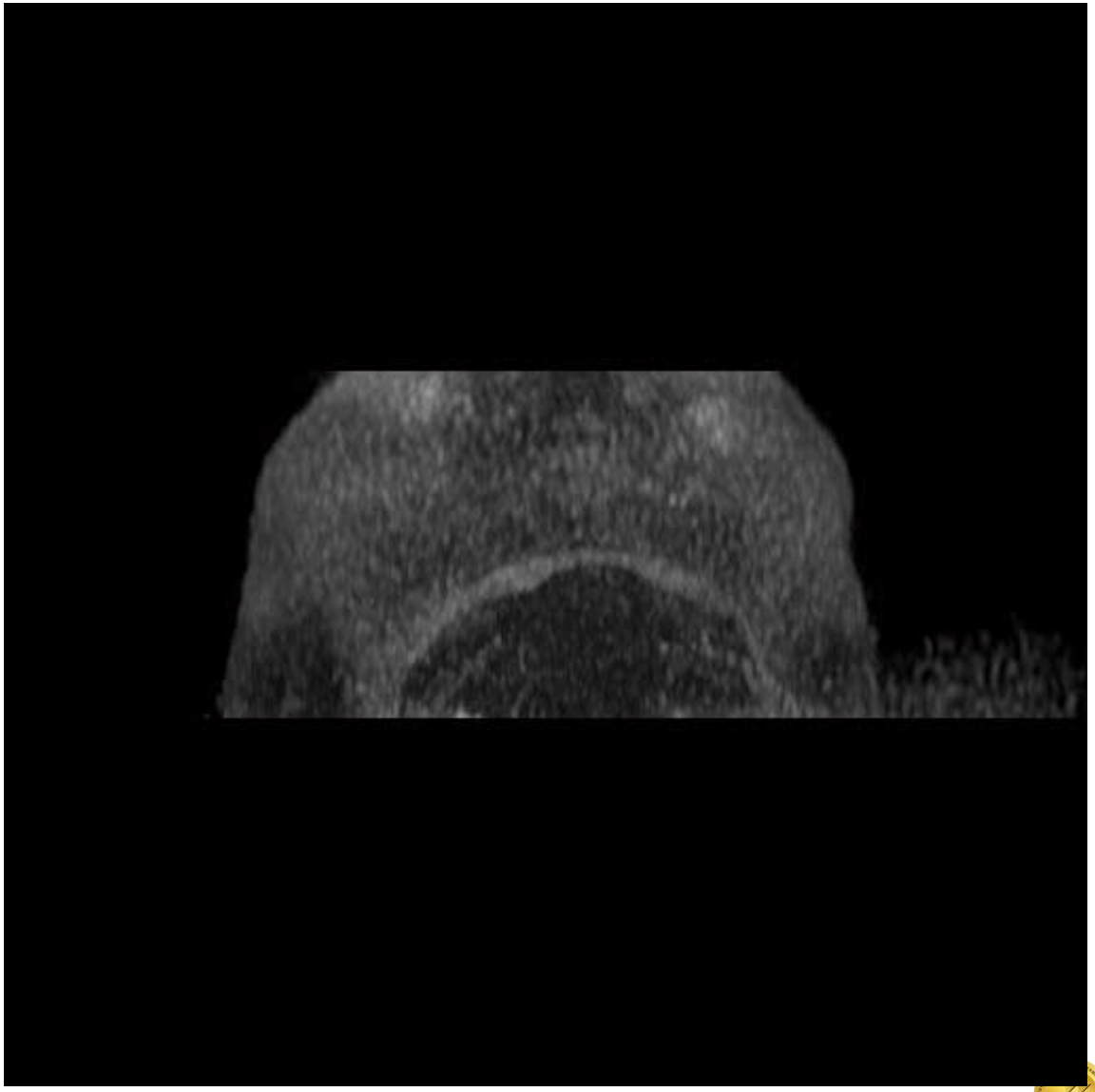
# Tricks midollo



# 4D_EMI_1 sec

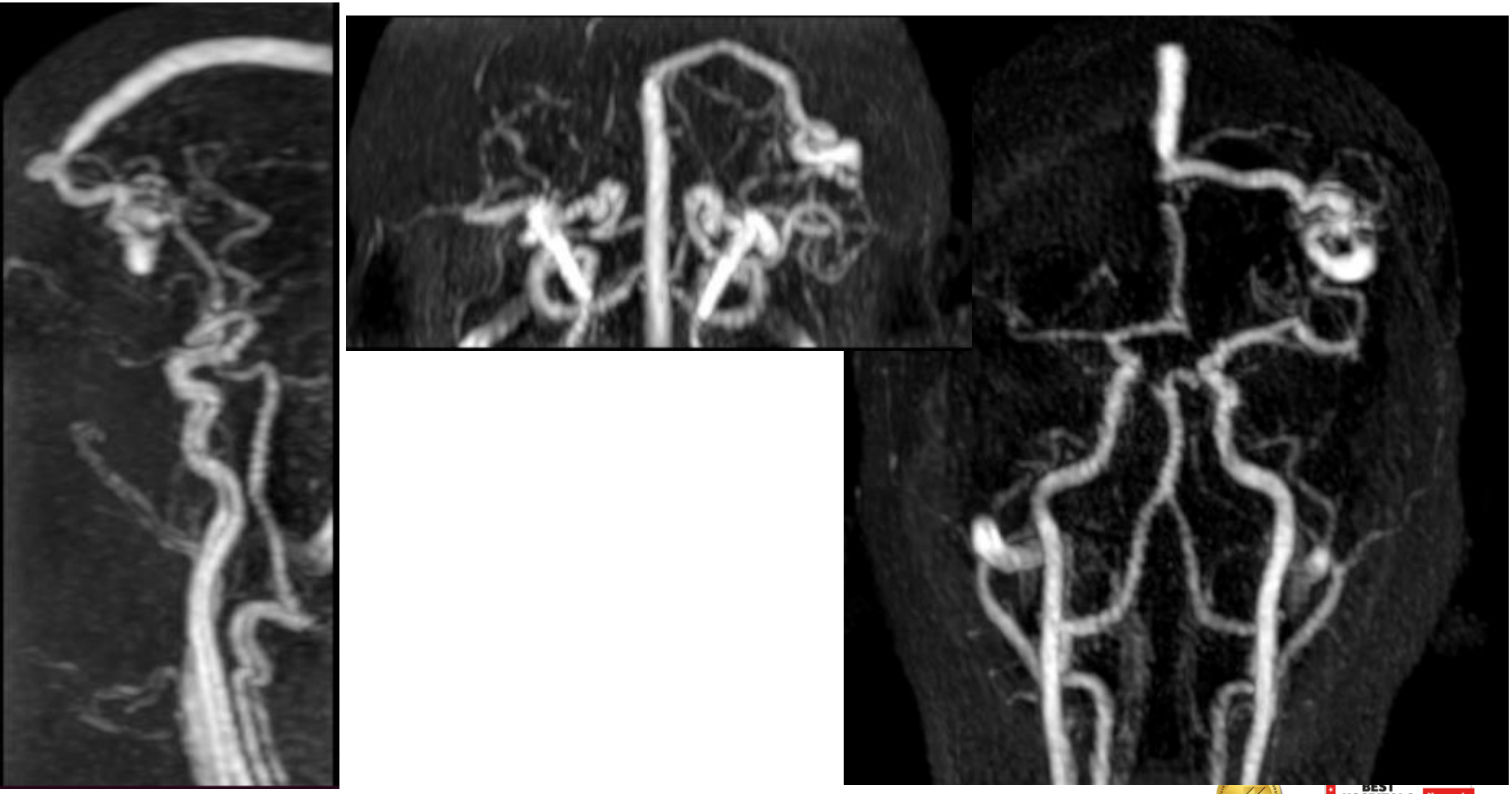


# 4D_EMI_1 sec

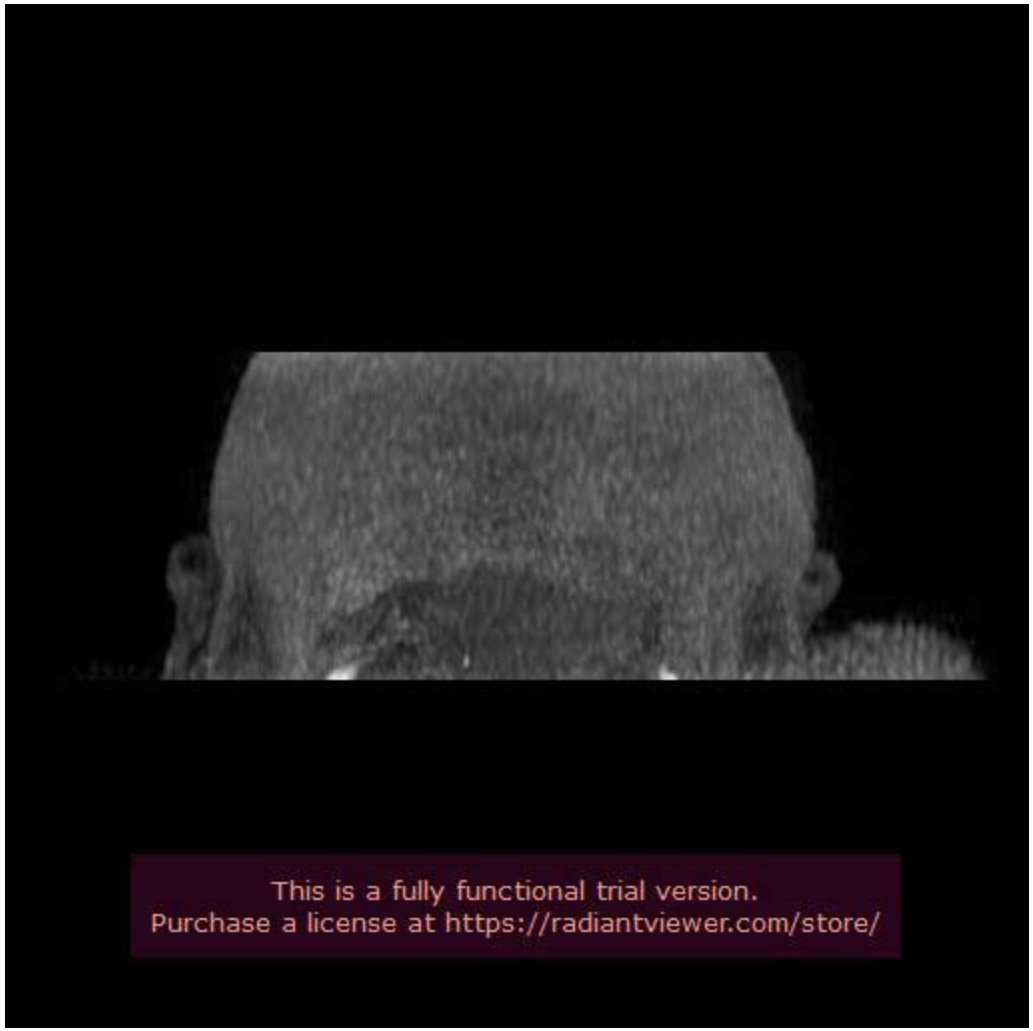


# 4D_EMI_1 sec

Bambino/a del 2010: residuo/recidiva di malformazione artero-venosa in sede frontale sinistra



# 4D_EMI_1 sec


This is a fully functional trial version.
Purchase a license at https://radiantviewer.com/store/

# 4D_TRAK

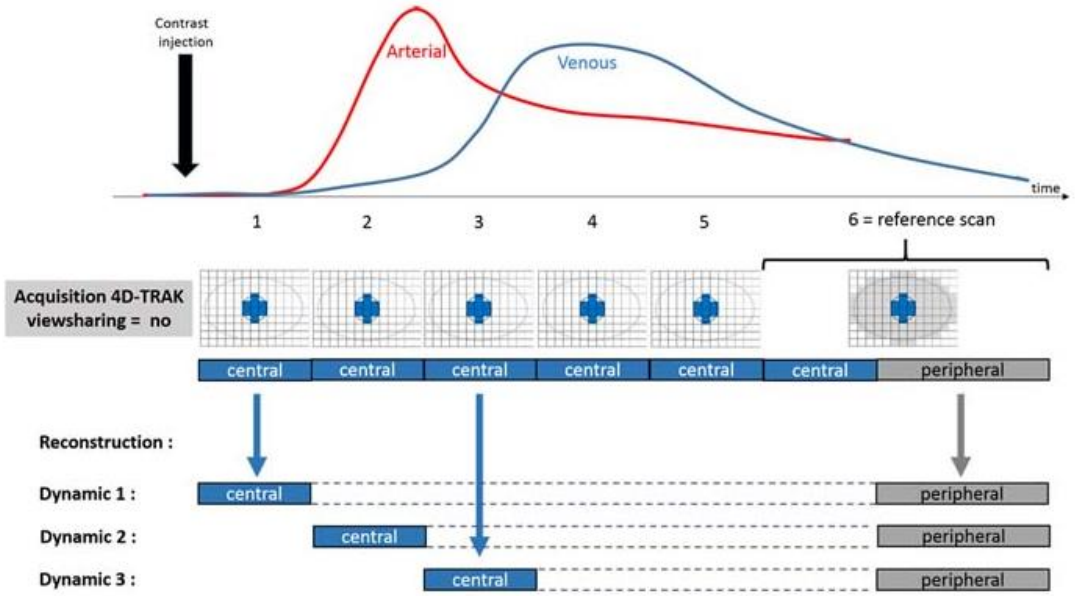
**4D-TRAK (4D Time-Resolved Angiography using Keyhole)** rende possibili nuovi standard nell'MRA con mezzo di contrasto (CE-MRA). Offre velocità di scansione nettamente superiori per le scansioni CE-MRA ad alta risoluzione spaziale e temporale. 4D-TRAK utilizza la tecnica di scansione 3D FFE e combina tutti i vantaggi di dS-SENSE, Keyhole e CENTRA.

# 4D_TRAK

Formazione per l'eccellenza

**Presentazione schematica di 4D-TRAK (viewsharing = no)**

- **Keyhole** = sì
- **Keyhole - dimensioni centrali** = 25%
- **Viewsharing** = no
- **Keyhole - scansione rifer.** = ultima

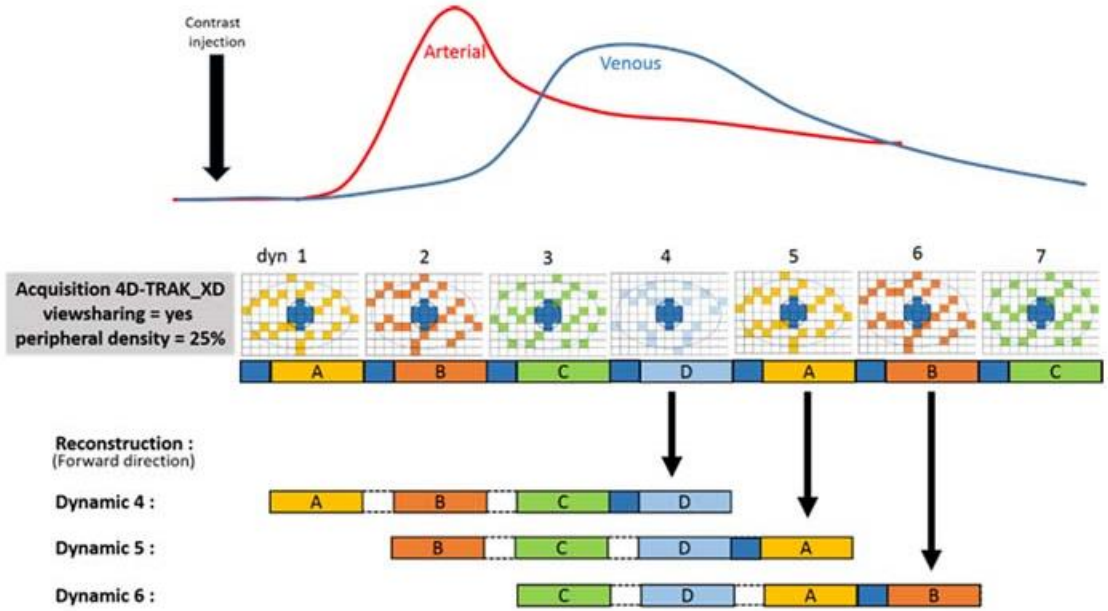


# 4D_TRAK

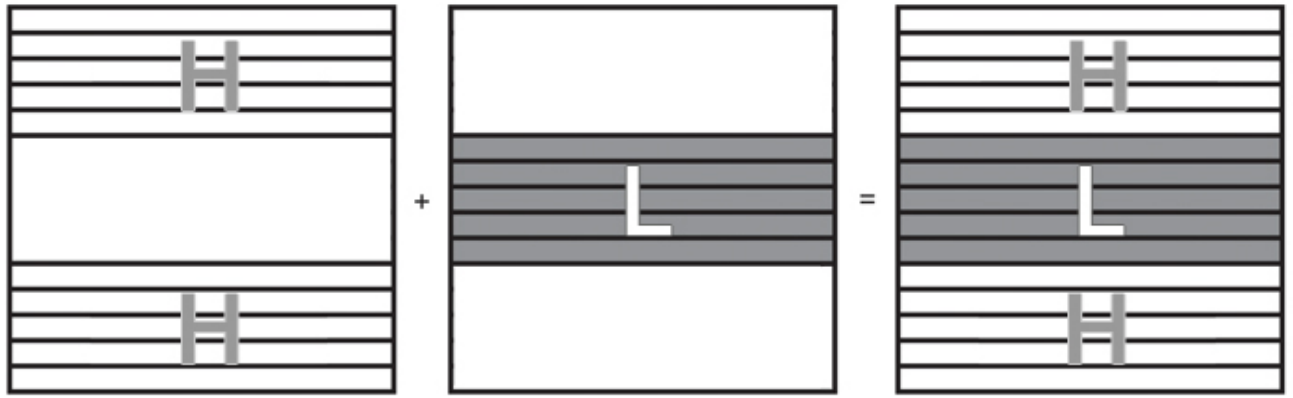
Formazione per l'eccellenza

**Presentazione schematica di 4D-TRAK XD (viewsharing = no)**

- **Keyhole** = sì
- **Keyhole - dimensioni centrali** = 25%
- **Viewsharing** = sì
- **Viewsharing - densità periferica** = 25%
- **Viewsharing - dir. condivisione** = avanti



Keyhole è una tecnica che può essere utilizzata in qualsiasi tipo di scansione dinamica per rendere più rapida la scansione.

| | |
|---|---|
| **Keyhole in modalità di scansione 2D e MS** |  |

Keyhole:

- Assicura una significativa riduzione del tempo di scansione rispetto alle scansioni non keyhole, poiché riduce l'acquisizione dei dati per le scansioni dinamiche keyhole, ad eccezione della scansione dinamica di riferimento (ultima o prima dinamica), in caso di viewsharing = no. La prima o l'ultima scansione dinamica è denominata scansione dinamica di riferimento, mentre le altre scansioni sono definite scansioni dinamiche keyhole.
- Consente di acquisire tutti i profili dello spazio k richiesti per la scansione dinamica di riferimento.
- Consente di acquisire solo i profili per la determinazione del contrasto (profili centrali) per le scansioni dinamiche keyhole. La dimensione della riduzione per le scansioni keyhole può essere definita dai valori assegnati agli specifici parametri keyhole.

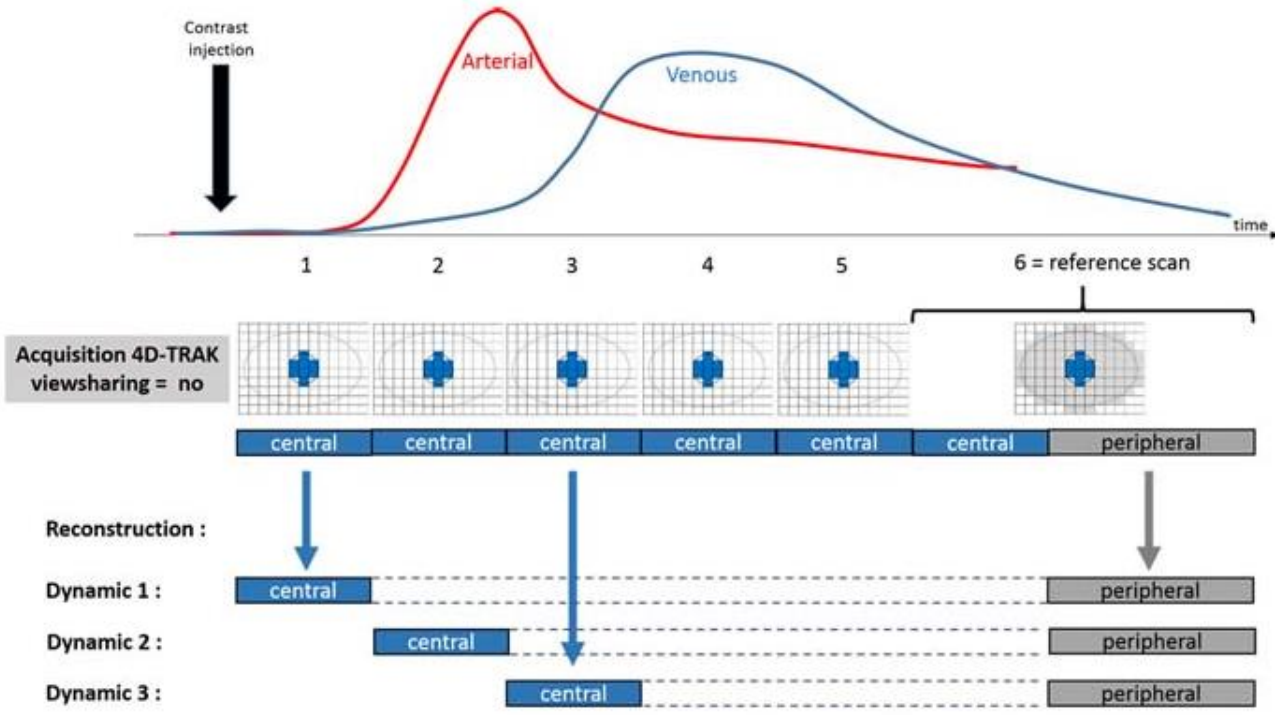
Keyhole:

- Fornisce informazioni di scansione complete copiando la parte mancante dalla scansione di riferimento (in caso di viewsharing = no) o da altre scansioni dinamiche keyhole durante la ricostruzione (in caso di viewsharing = sì). In tal modo combina l'alta risoluzione spaziale della scansione di riferimento con il contrasto che si osserva nelle scansioni dinamiche keyhole a bassa risoluzione spaziale.
- Può essere combinata con viewsharing. Combinate con studi di contrasto, le acquisizioni keyhole possono essere utilizzate per ottenere un'elevata risoluzione temporale.

# 4D_TRAK

Formazione per l'eccellenza

**Keyhole in 3D**



## Dimensioni centrali keyhole (%)

Questo parametro determina la percentuale (%) del numero di stadi di codifica di fase nella scansione dinamica keyhole rispetto alla scansione dinamica di riferimento.

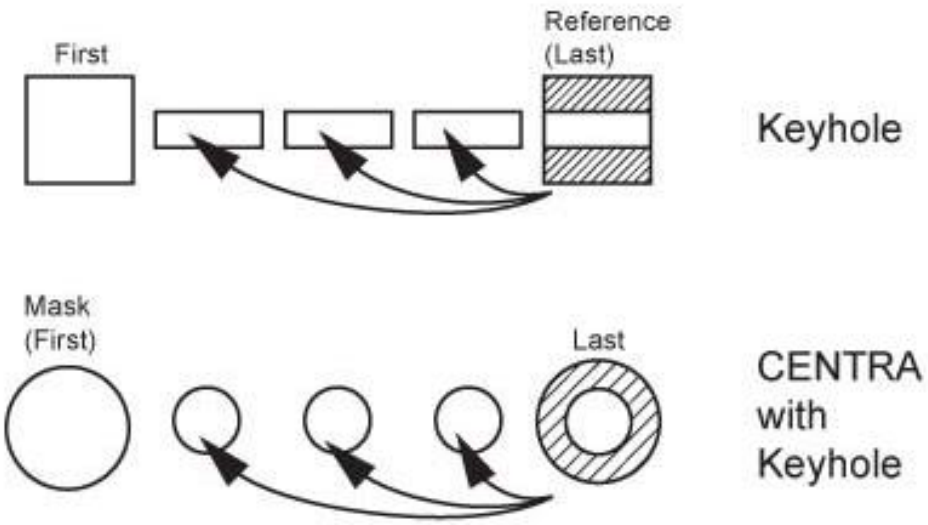
Il parametro dimensioni centrali (%) deve essere impostato su **15 - 25%** per avere una buona copertura dei dati di contrasto.

Limitazioni/svantaggi

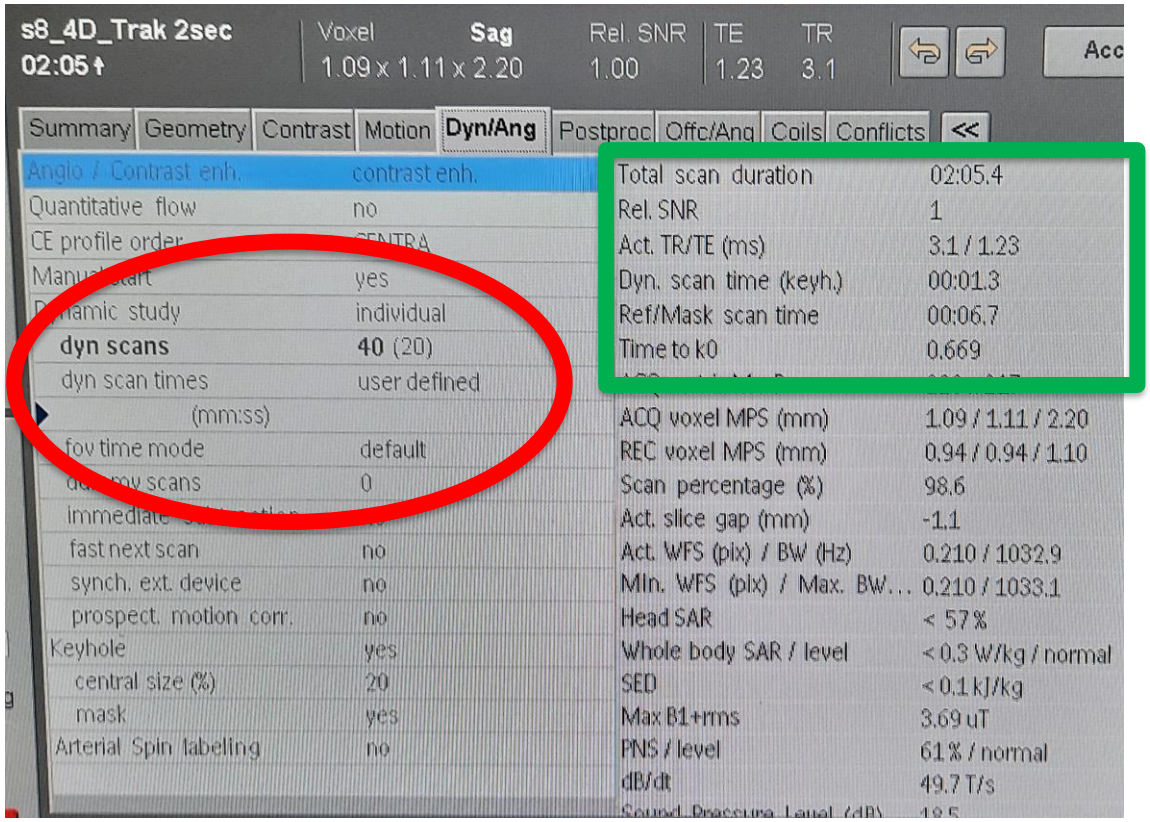
Se la raccolta di profili è minima (15%), è possibile che parte delle informazioni di contrasto venga persa.

DIN/ANG → Keyhole → maschera

Viene acquisita una maschera utilizzabile per la sottrazione (dinamiche post-contrasto meno maschera precontrasto). Se attivata, la maschera è la prima scansione dinamica (precontrasto).

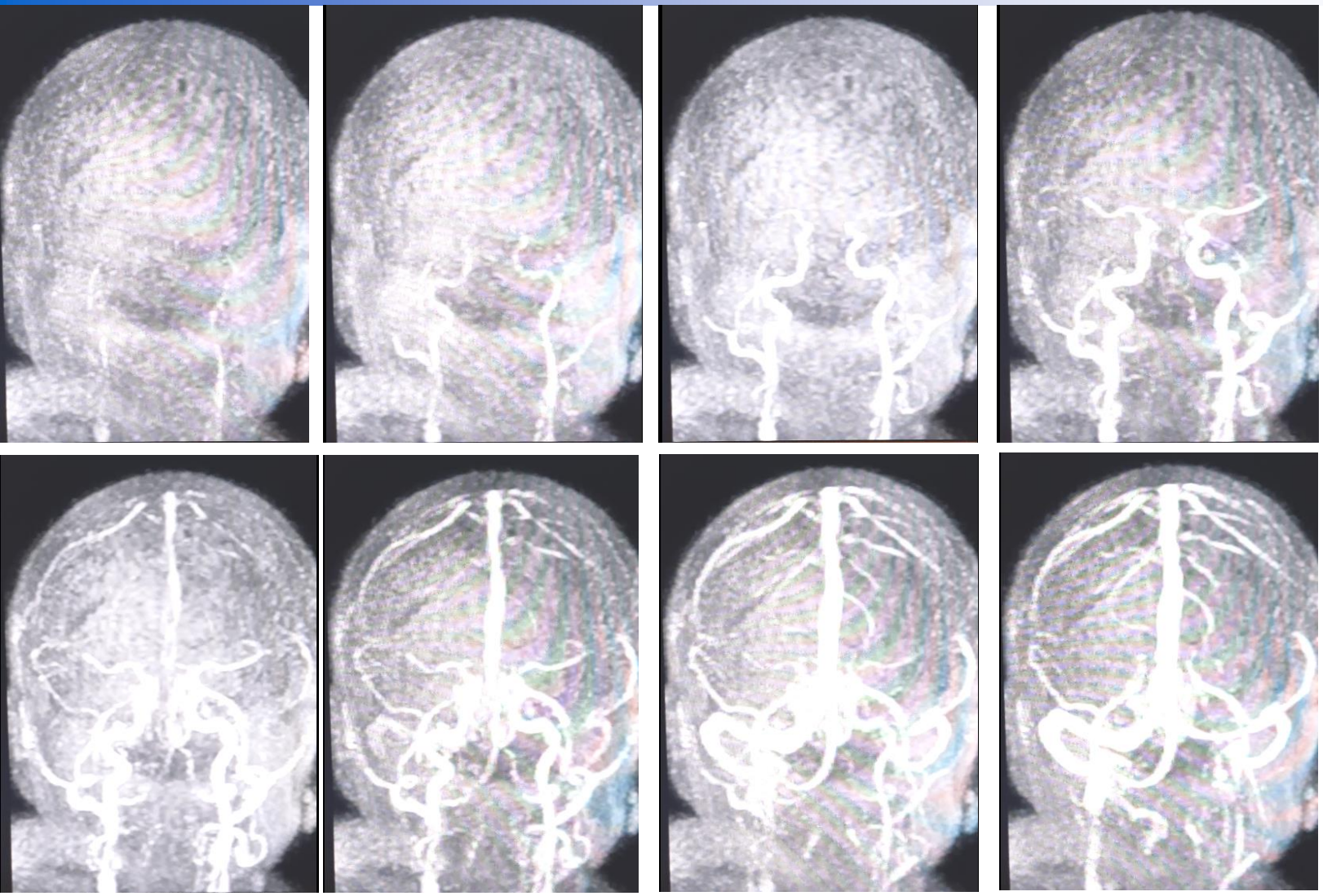


# 4D_TRAK → 0.8 sec



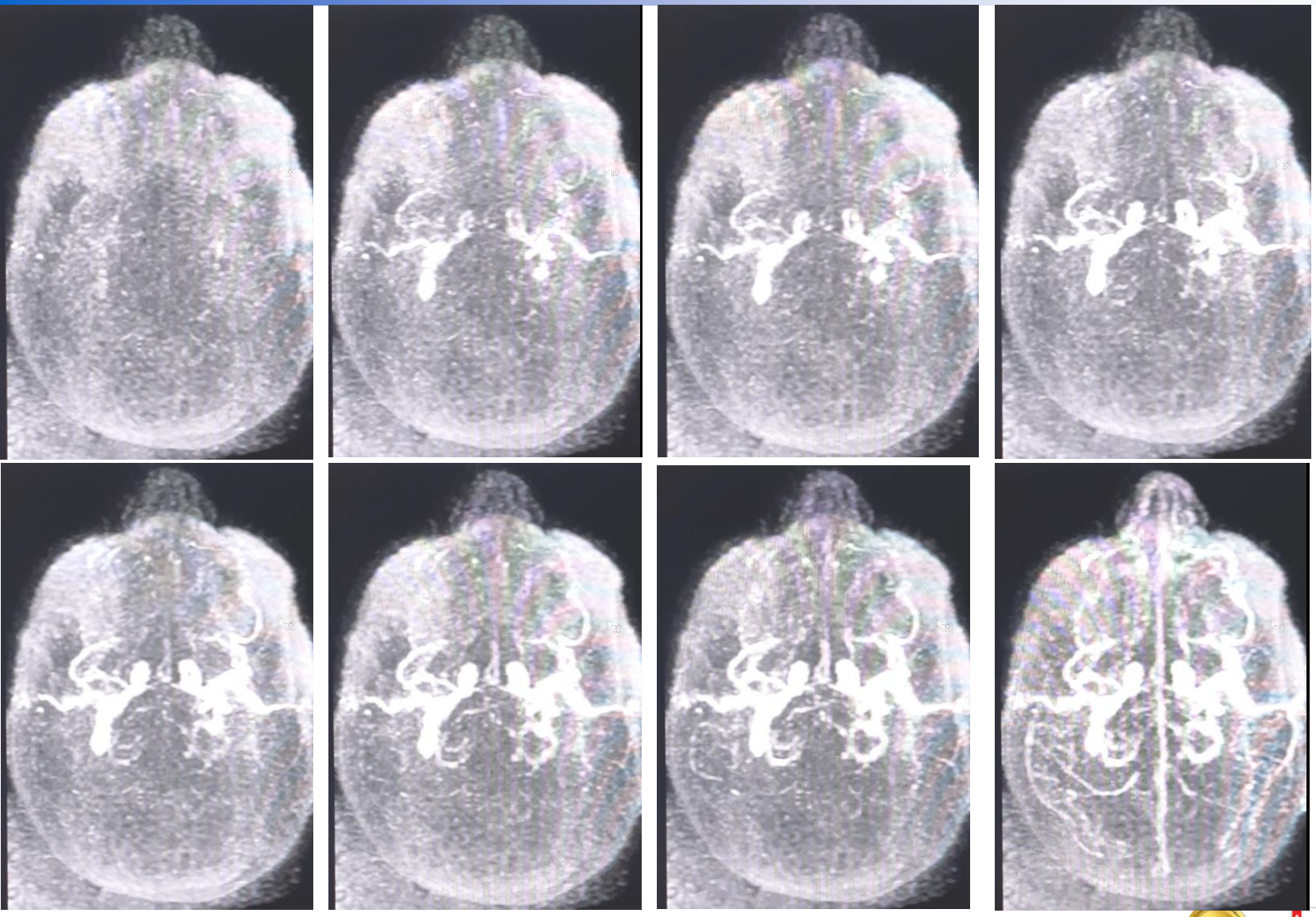

«Dyn scans»: impostare al massimo possibile… (64?)
Su «dyn scan times» togliere le pause e mettere sempre shortest.
P reduction: 3
S reduction: 3
Dyn scan time: ≤ 0.8sec
La sequenza deve durare intorno al minuto.
Controllare i tempi nel riepilogo.

# 4D_TRAK → 0.8 sec



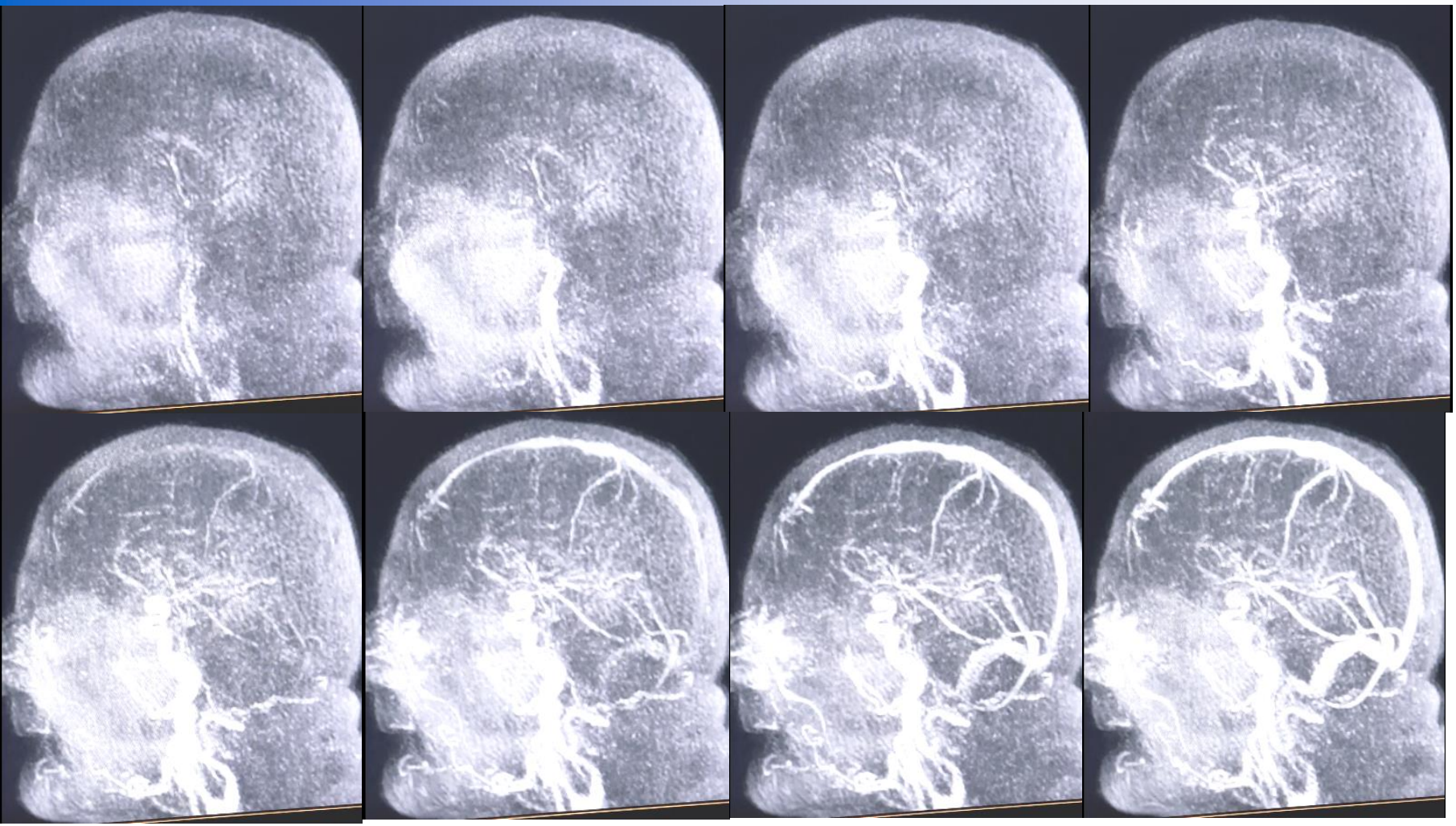
...

# 4D_TRAK → 0.8 sec

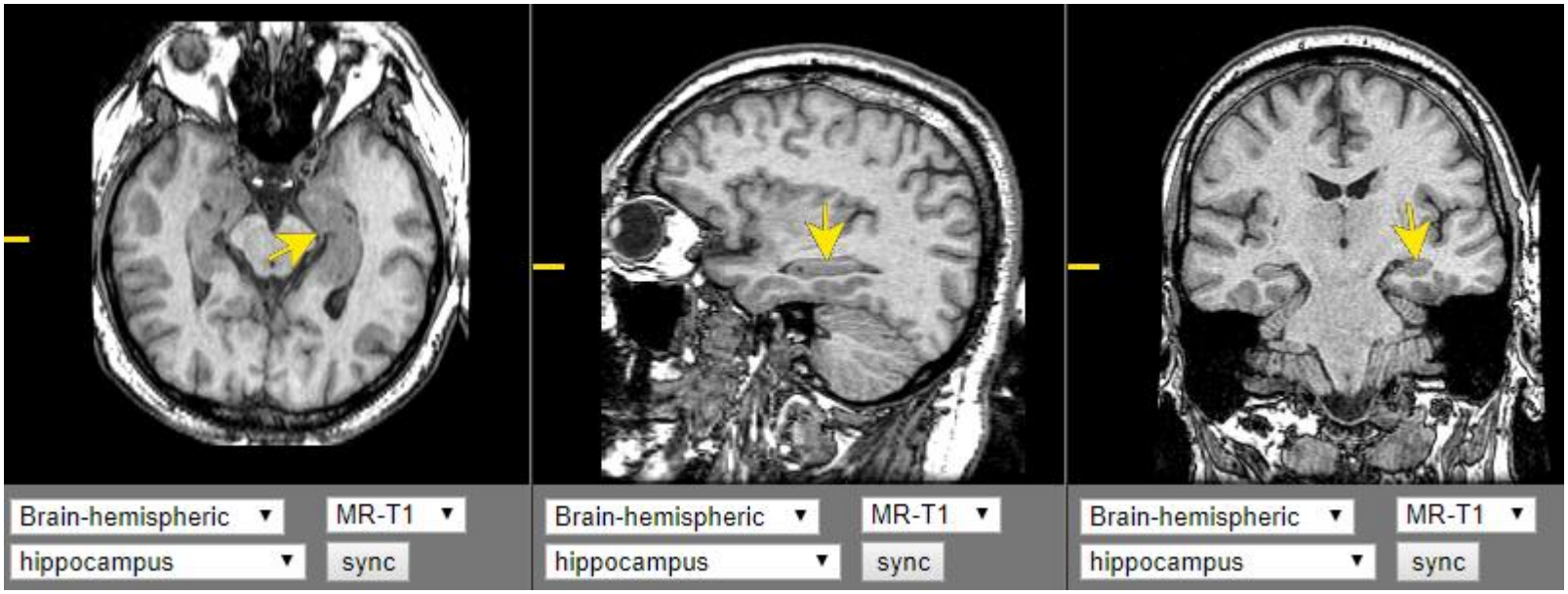


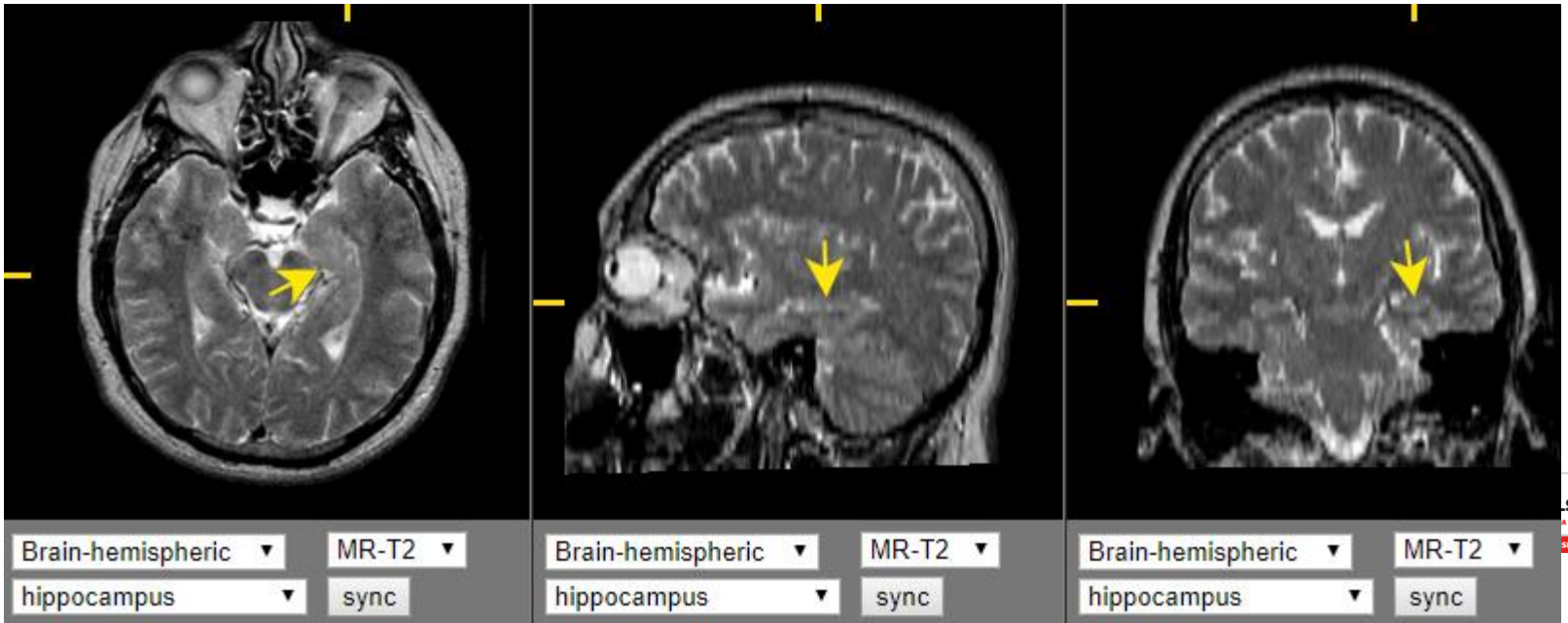
...

# 4D_TRAK → 0.8 sec

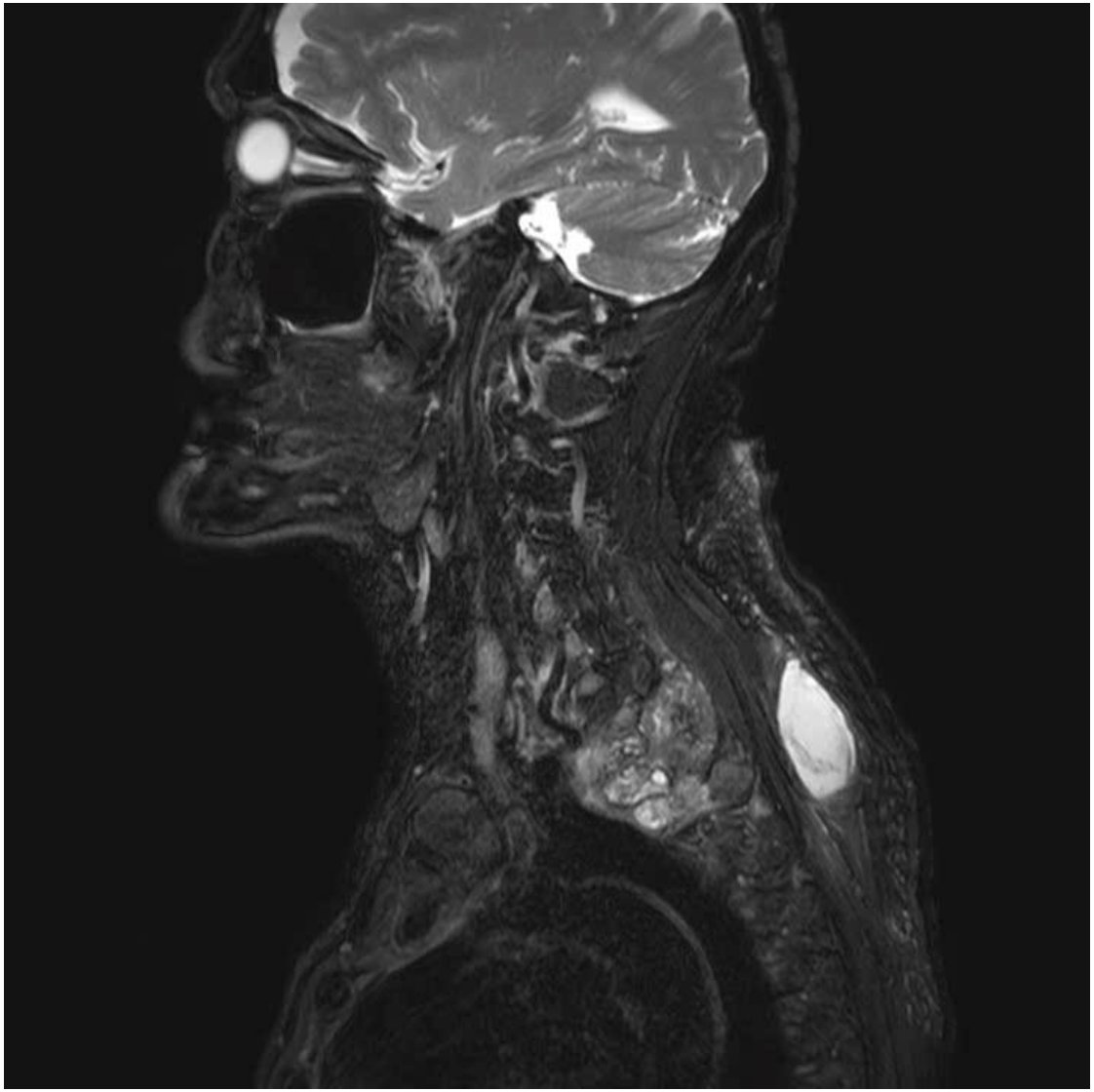


# Pratica: Ippocampo



# Pratica: Colonna con mdc in urgenza



Esame RM colonna in toto in urgenza.
Sag T2 dixon

# Colonna: lesioni vascolari

Formazione per l'eccellenza

**eBook** for Undergraduate **Education in Radiology**

Vascular disorders of the spinal cord can be caused by venous or arterial ischemia and vascular malformations.

**Acute arterial ischemia** is typically seen as a complication of aortic aneurysm surgery or catheterization. Spinal cord infarctions show a swollen cord and hyperintensity on T2-weighted images (**figure 67**).

**Vascular malformations** depict abnormal, dilated, serpiginous vascular structures within the spinal cord or subarachnoid space (**figure 68**).

# Colonna: lesioni vascolari

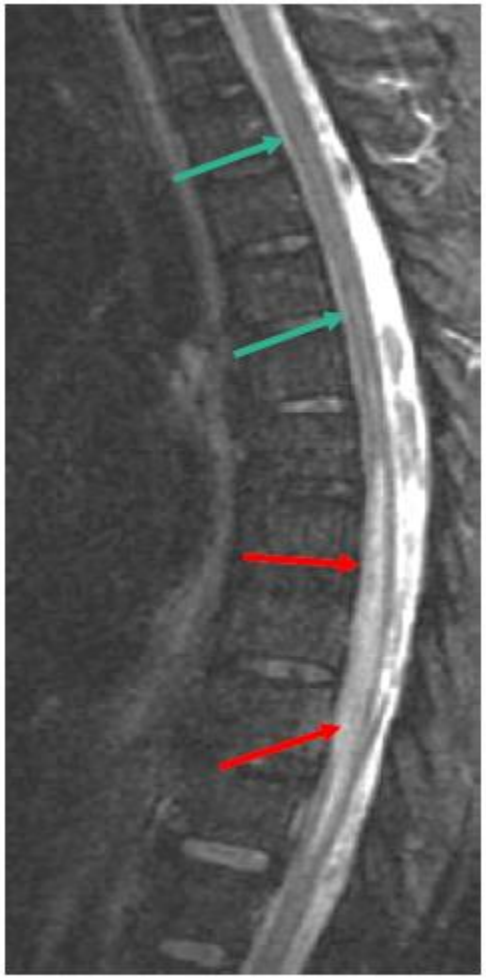


Fig. 67. Spinal cord infarction demonstrating cord swelling and increased signal (red arrows) on a sagittal T2-weighted image. Areas without spinal cord infarction (green arrows)

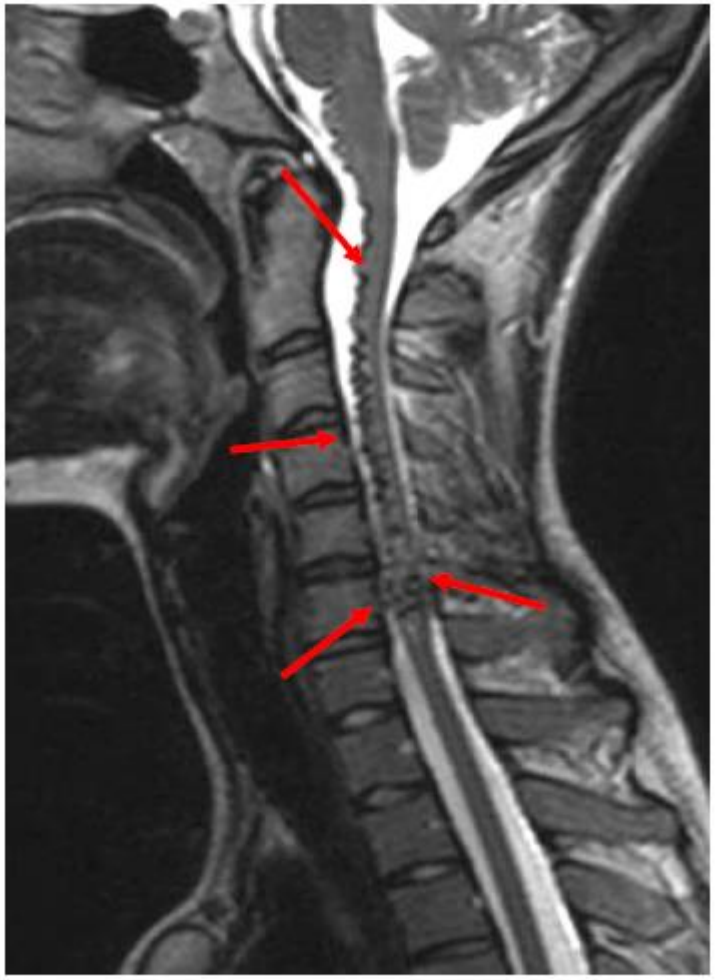
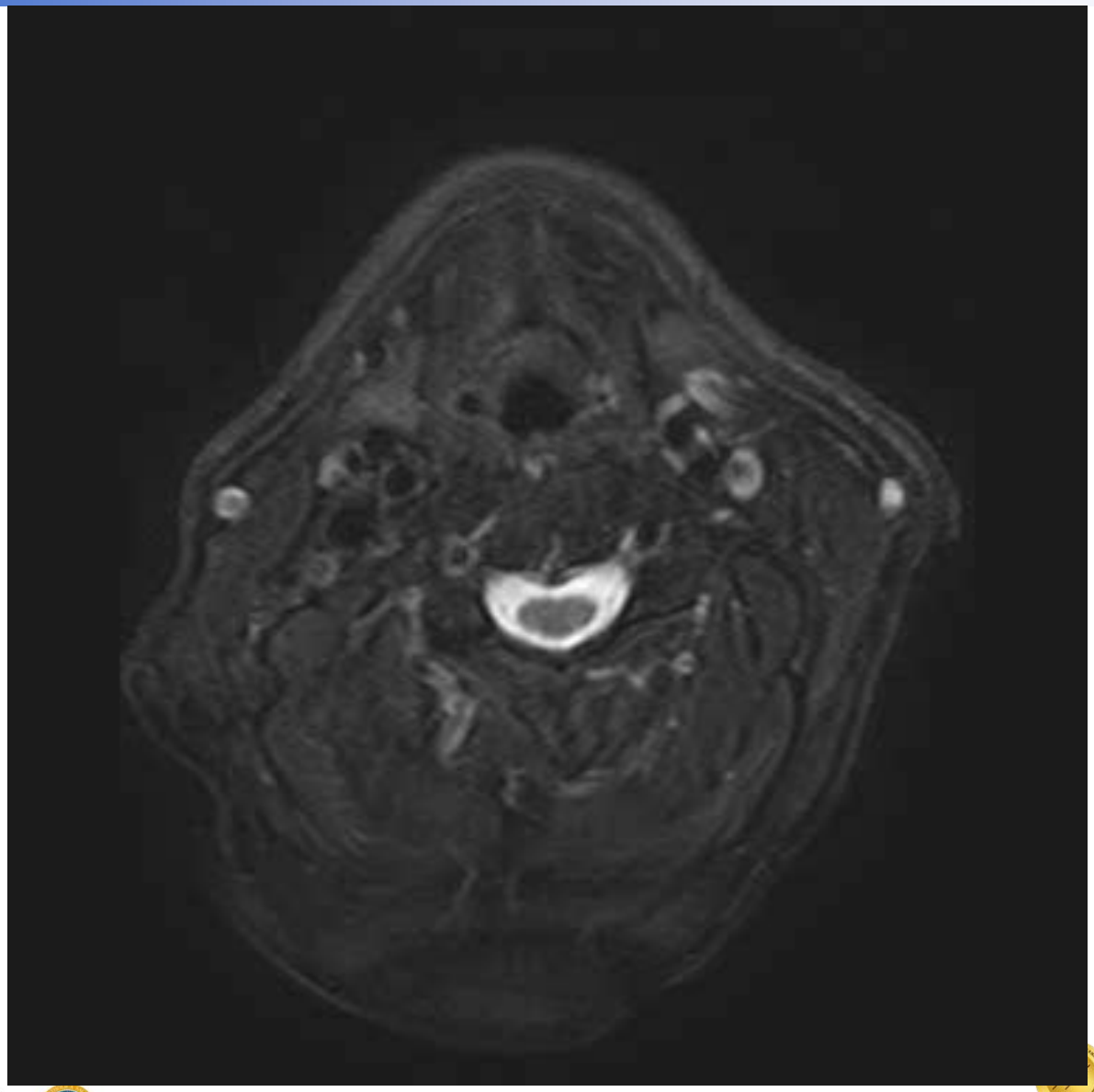


Fig. 68. Vascular malformation. Sagittal T2-weighted image showing dilated serpiginous vessels (arrows).

# Pratica: Colonna con mdc in urgenza

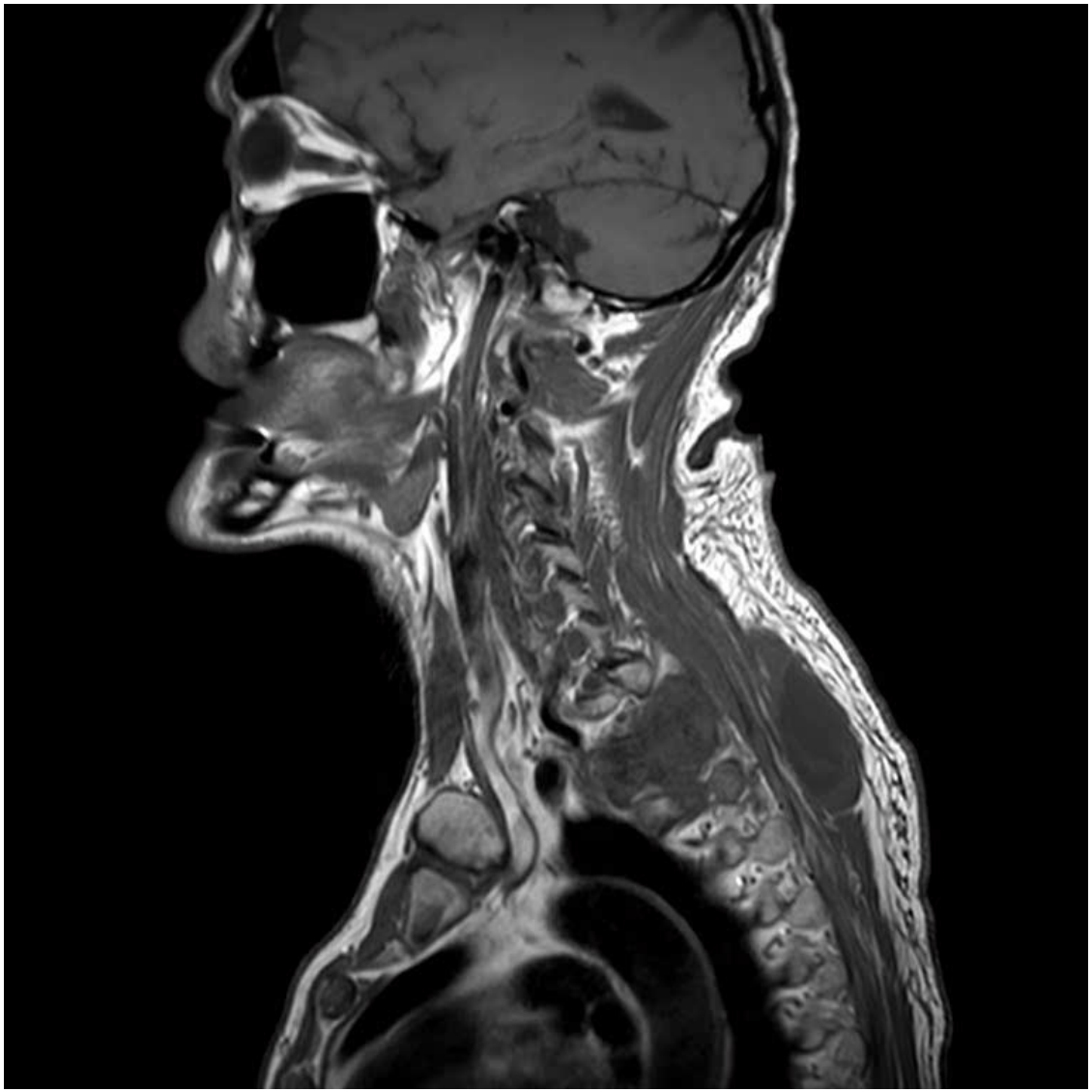
# Pratica: Colonna in urgenza

Ax T2W
Dixon TSE

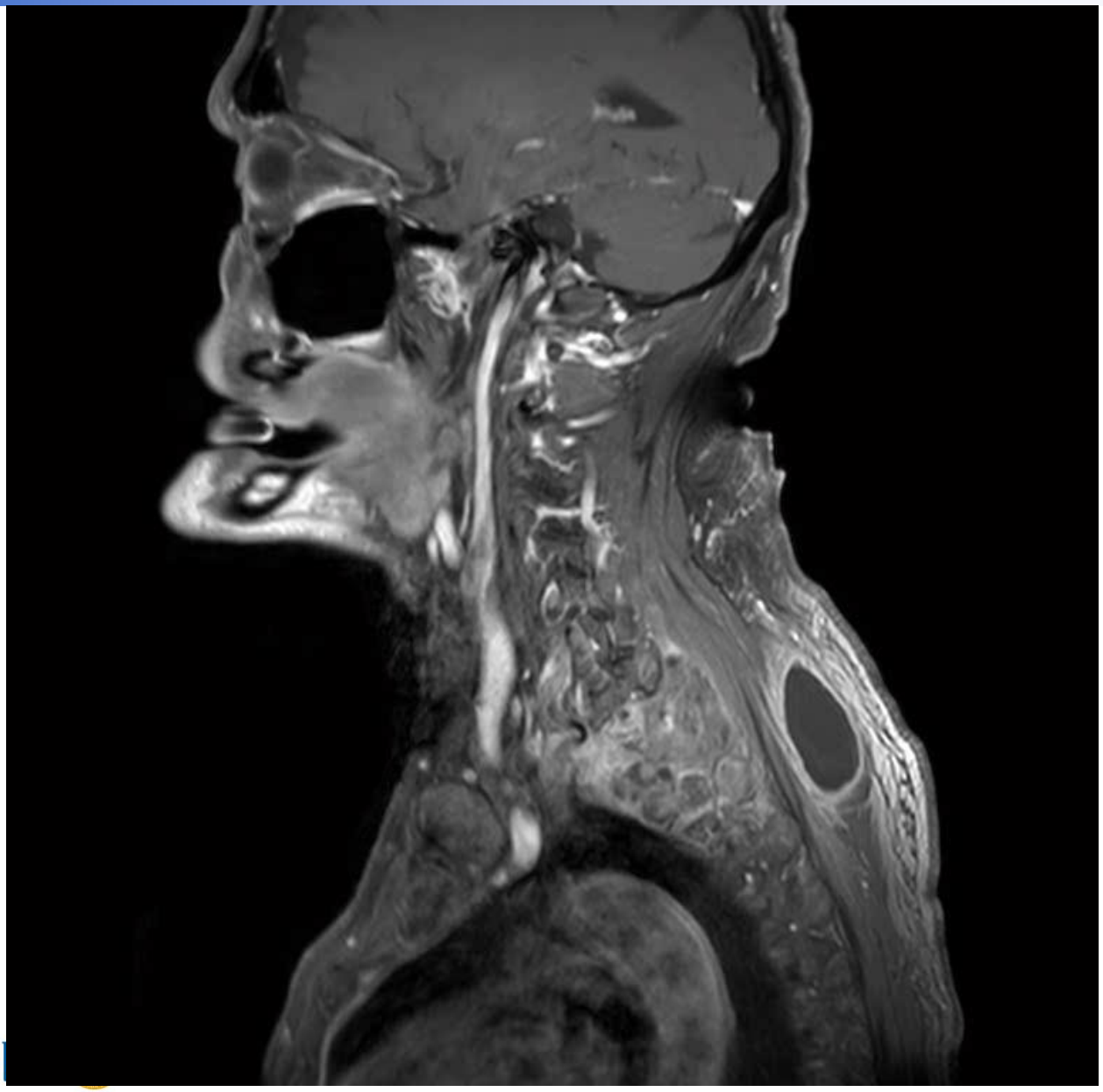


# Pratica: Colonna senza e con mdc in urgenza

# Pratica: Colonna senza mdc in urgenza



# Pratica: Colonna con mdc in urgenza



# Pratica: TOF in urgenza – giugno 2022

Paziente con vertigini, poi progressiva perdita di coscienza fino al coma. ICTUS ISCHEMICO

«…Mancato segnale di flusso in corrispondenza dell'apice di arteria basilare e dei tratti P1 di entrambe le ACP. Non rilevabile segnale di flusso anche nei restanti tratti di entrambe le arterie cerebrali posteriori (ove probabilmente è marcatamente rallentato)…»

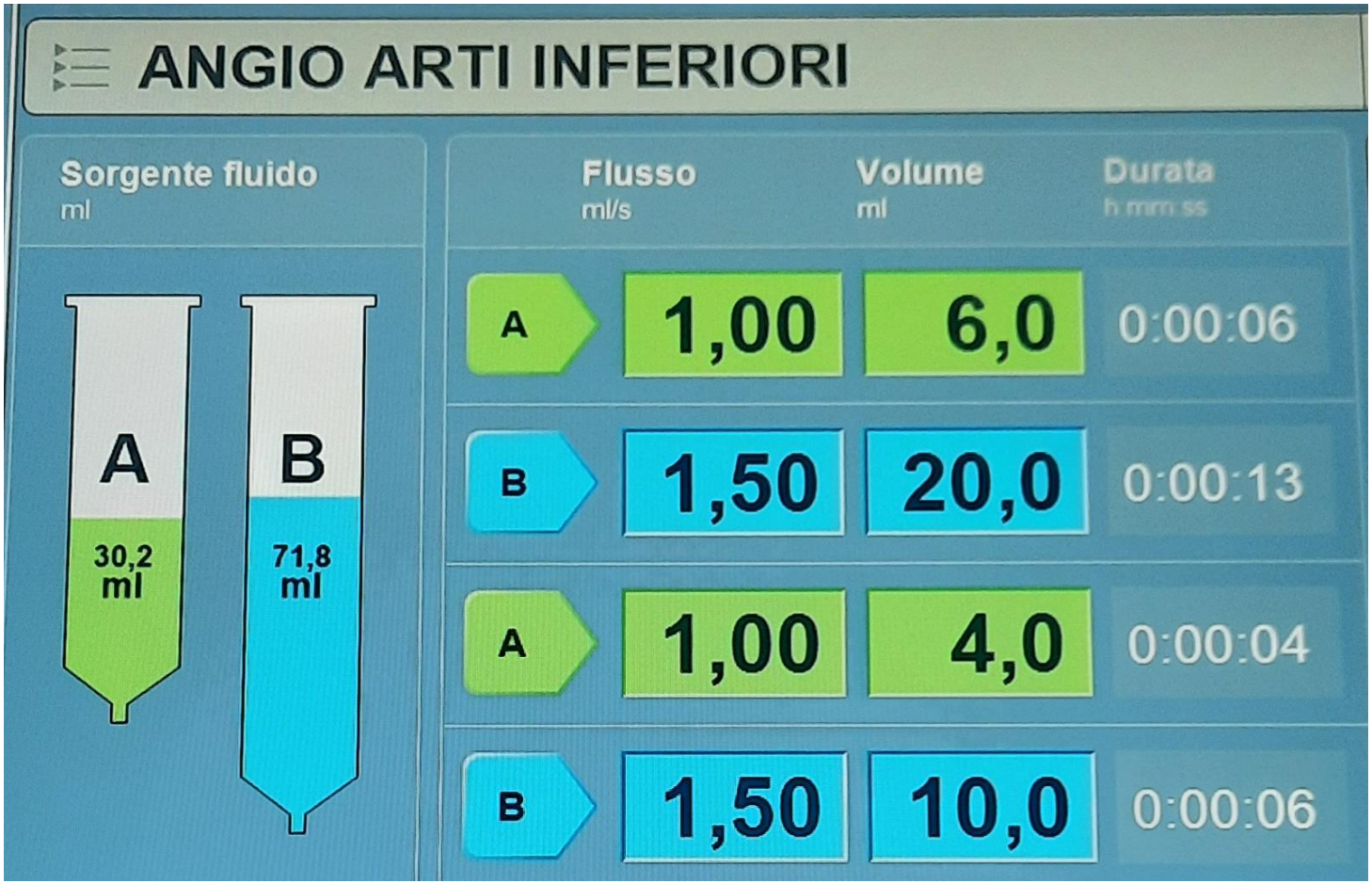
# Pratica: TOF in urgenza – giugno 2022

Formazione per l'eccellenza

## Controllo Rm dopo tromboaspirazione in sala angiografica

«… pervia l'arteria basilare ed entrambe le ACP …»

# Pratica: 3T Angio arti inferiori




N.B. Il quantitativo di MdC dipende sempre dal peso del paziente