

Actualización en neuroimágenes



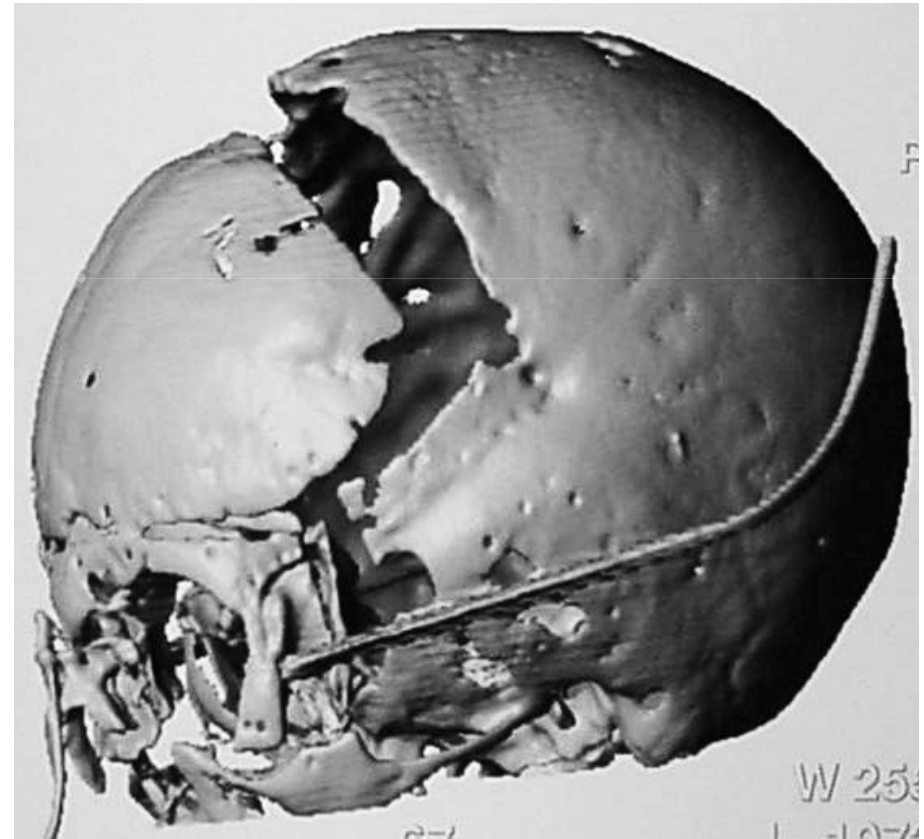
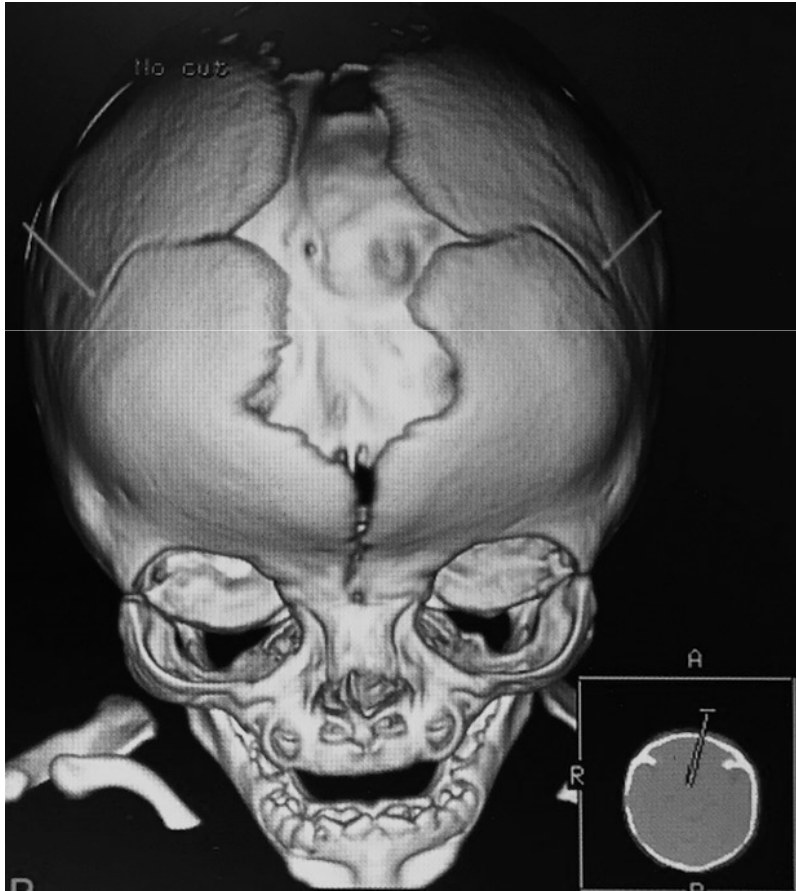
Carlos Rugilo



Cráneo

Reconstrucciones tomográficas 3-D

Niña de 9 meses con braquicefalia



Craneosinostosis

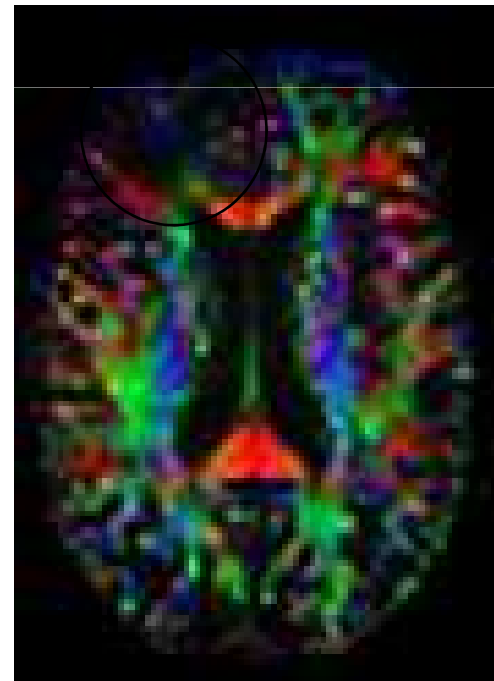
Encéfalo

DTI

- Es la única técnica no invasiva que describe la arquitectura de la sustancia blanca cerebral in vivo.
- Se puede hacer un análisis cuali y cuantitativo de la sustancia blanca y también se puede reconstruir la trayectoria de las fibras nerviosas (tractografía)

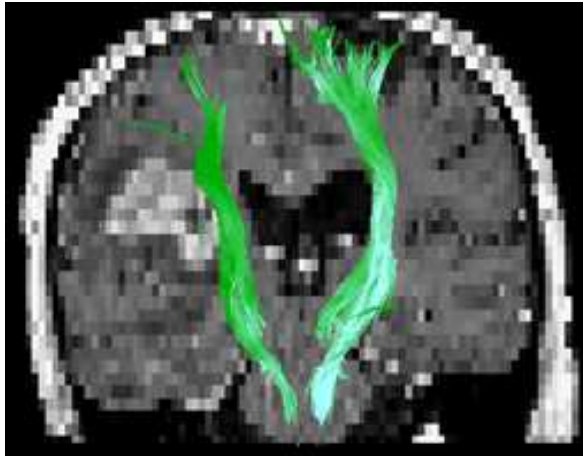


Mapa AF

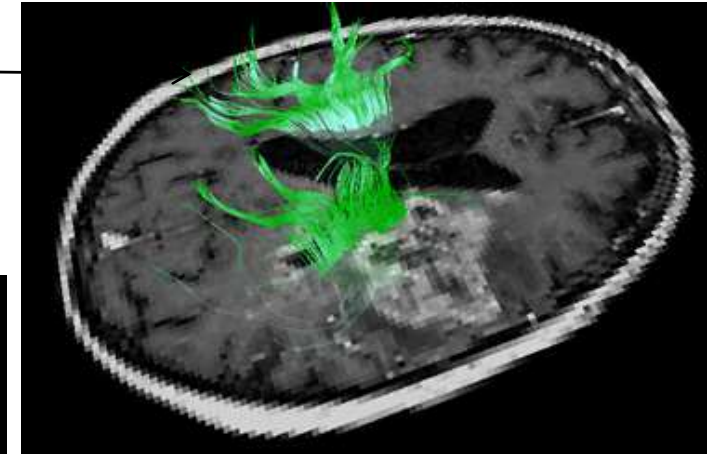
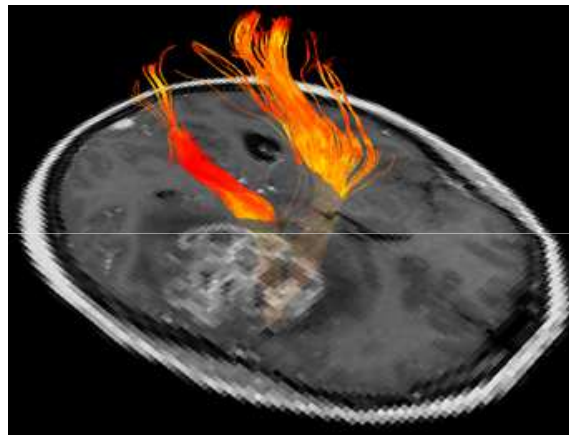


Mapa color

Tractografía

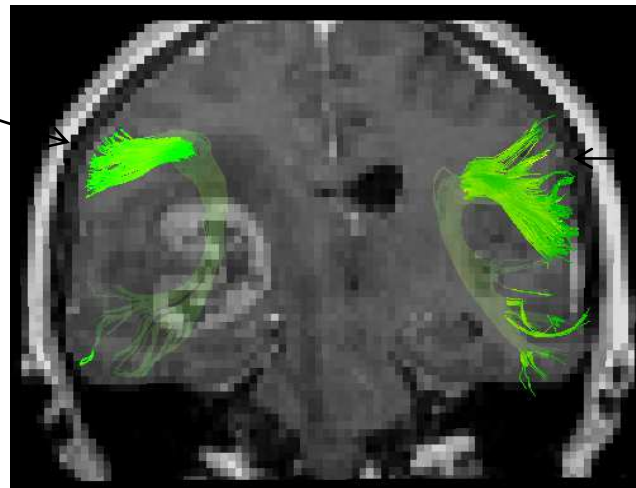


Tracto corticospinal



Fascículo Arcuato der.

Number of tracks:
243
Mean Vector:
(0.33, 0.89, -0.3)
Minimum dti_fa:
0.379096
Maximum dti_fa:
0.544677
Mean dti_fa:
0.482013 +/- 0.119816

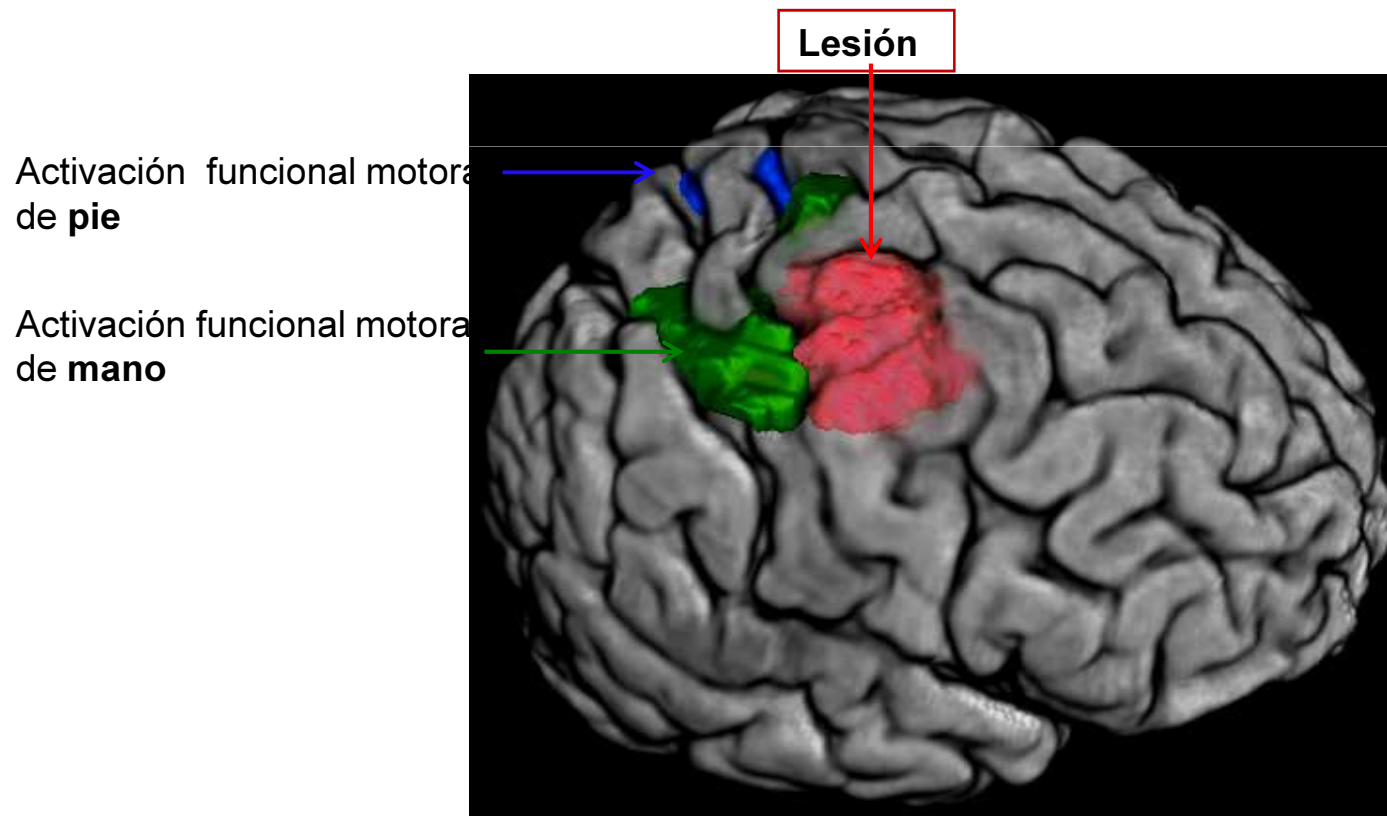


Fascículo Arcuato izq.

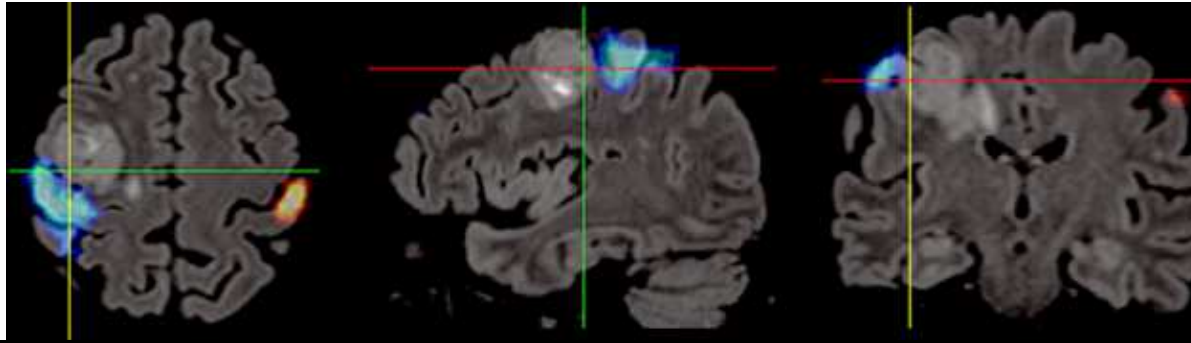
Number of tracks:
527
Mean Vector:
(-0.38, 0.9, 0.21)
Minimum dti_fa:
0.446481
Maximum dti_fa:
0.627828
Mean dti_fa:
0.556968 +/- 0.115376

RM funcional

- Es una técnica no invasiva que mapea la actividad neuronal en el cerebro.
- Durante una tarea, las áreas cerebrales involucradas aumentan el consumo de oxígeno. Los cambios en los niveles de oxígeno en sangre modifican la señal de RM y esto puede cuantificarse.

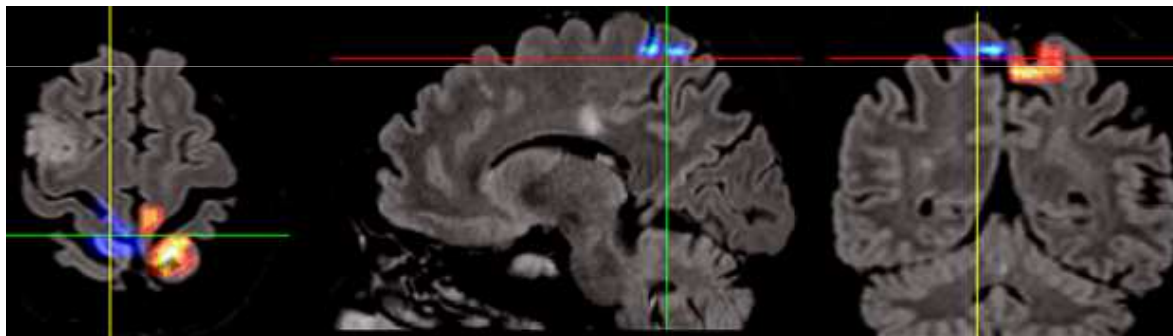


RM funcional



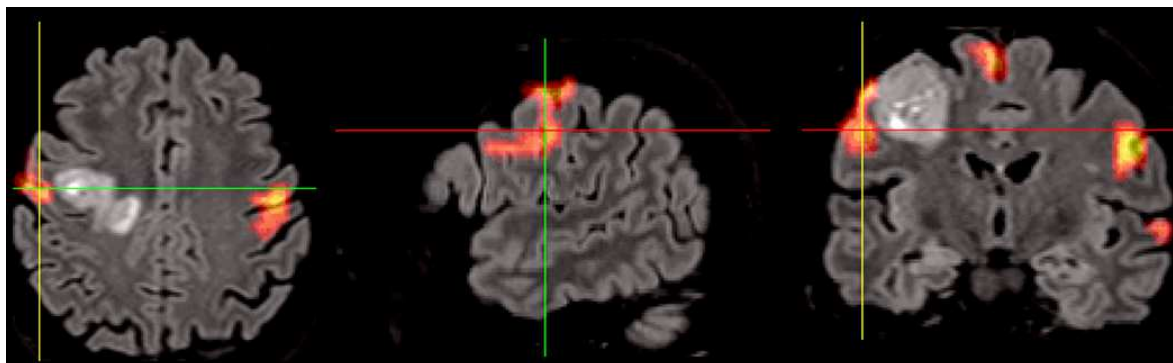
Activación Motora - Mano der.

Activación Motora - Mano izq.



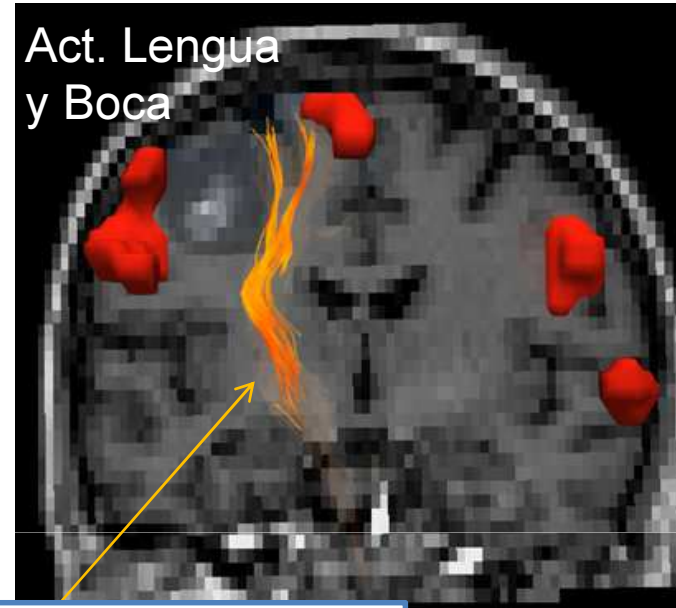
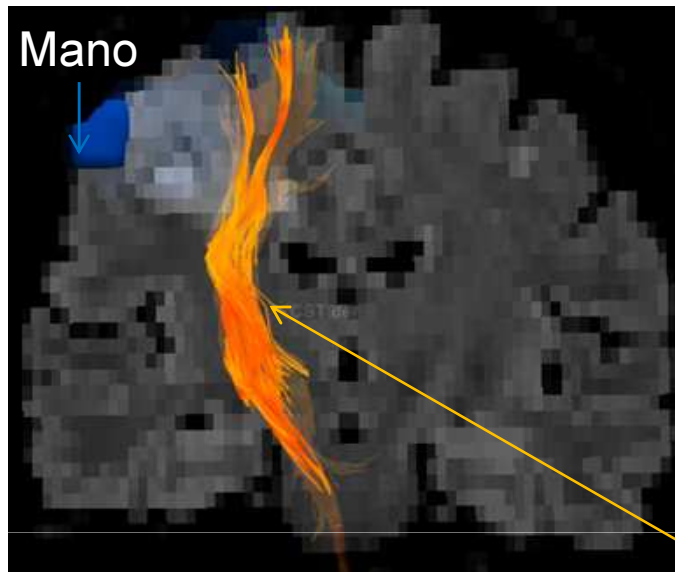
Activación Motora - Pie der.

Activación Motora - Pie izq.

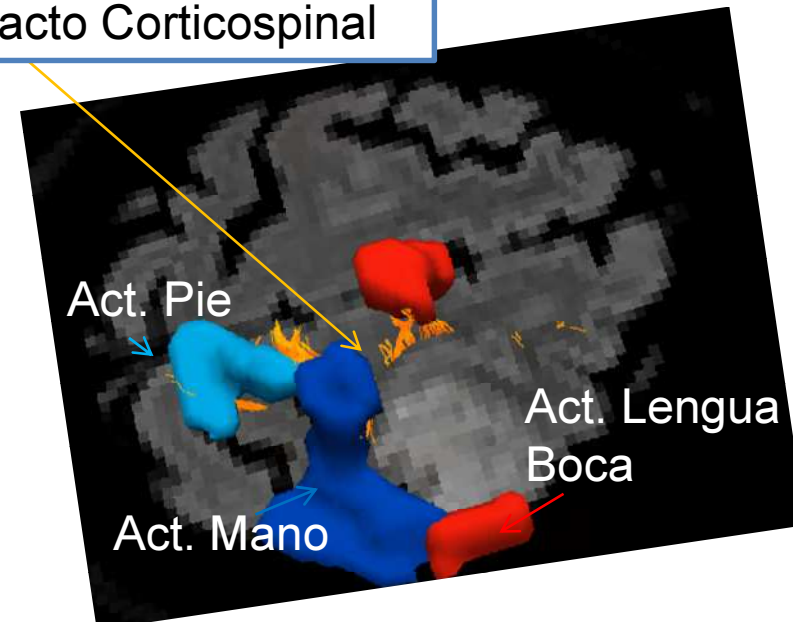
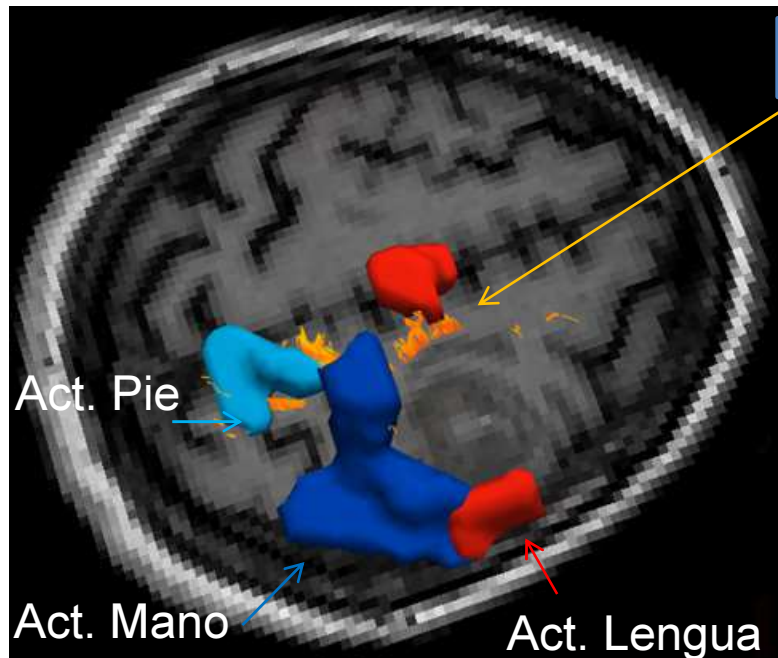


Activación Motora - Lengua y boca

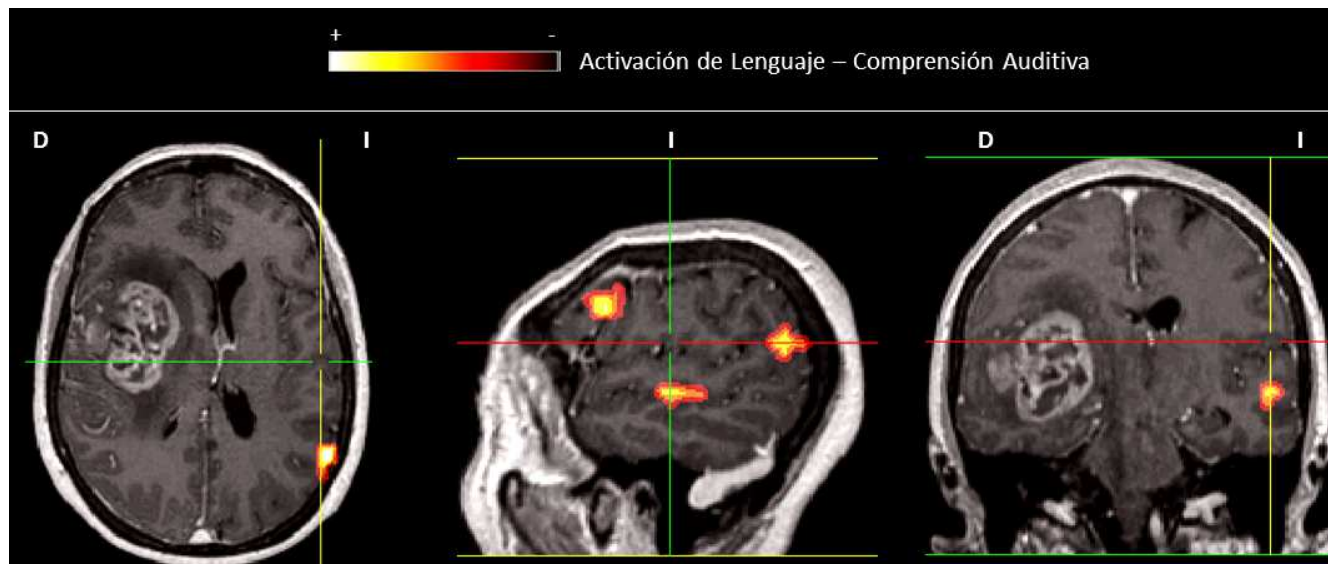
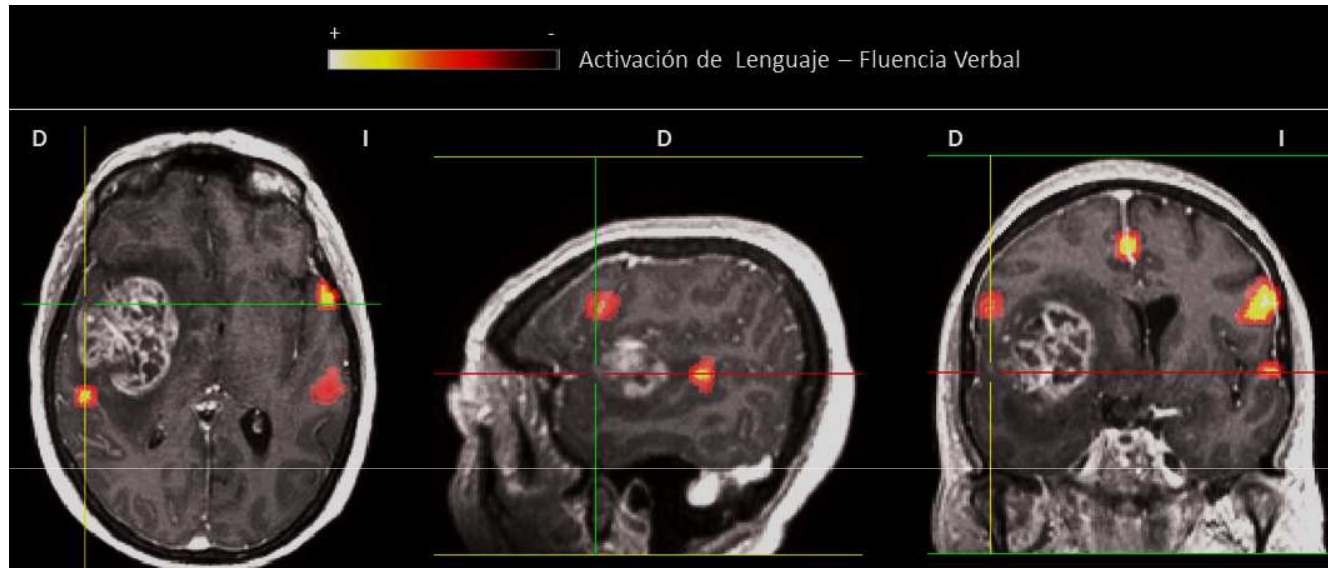
Fusión RM funcional-tractografía



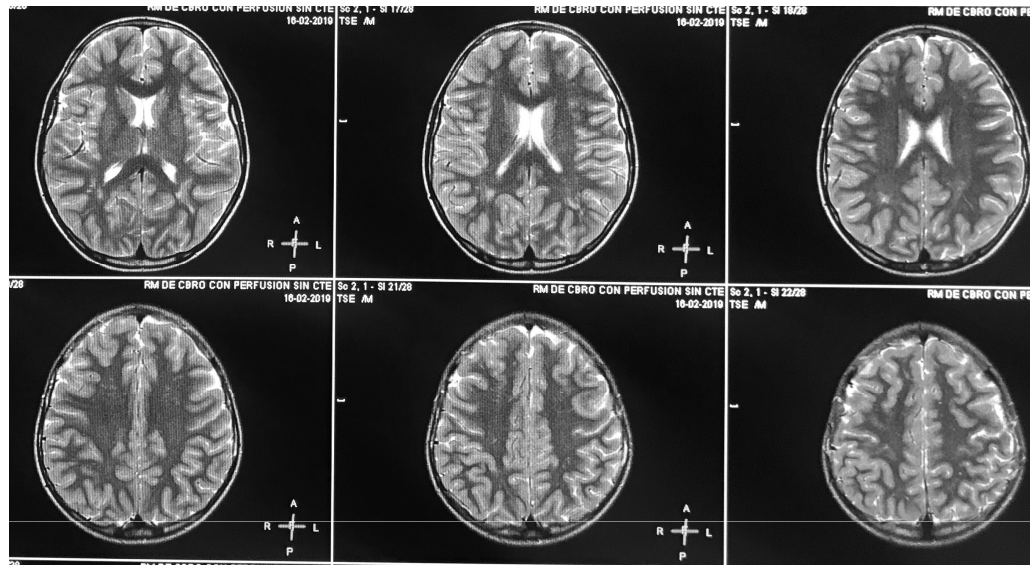
Tracto Corticospinal



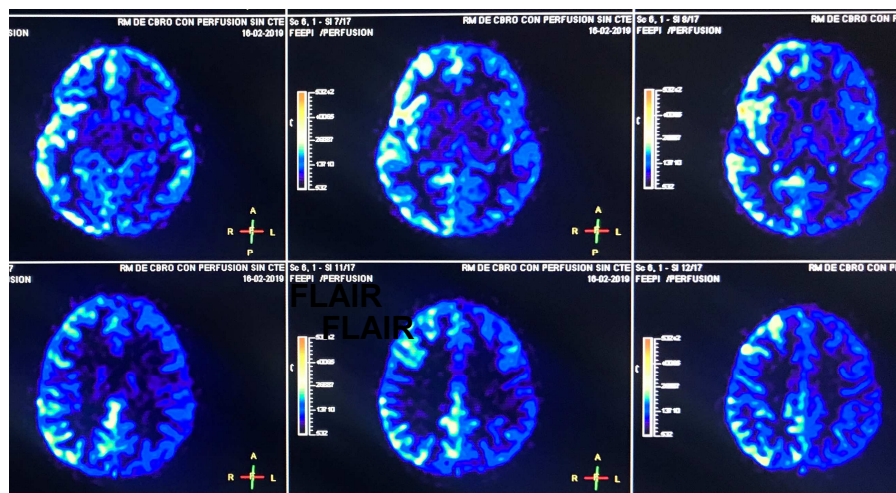
RM funcional – Paradigmas de Lenguaje



Perfusión por RM sin contraste: ASL

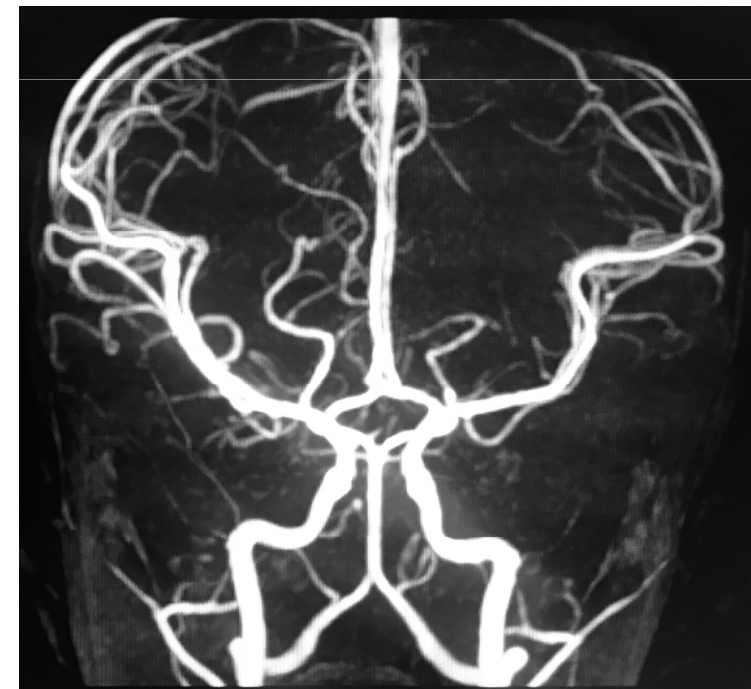


T2



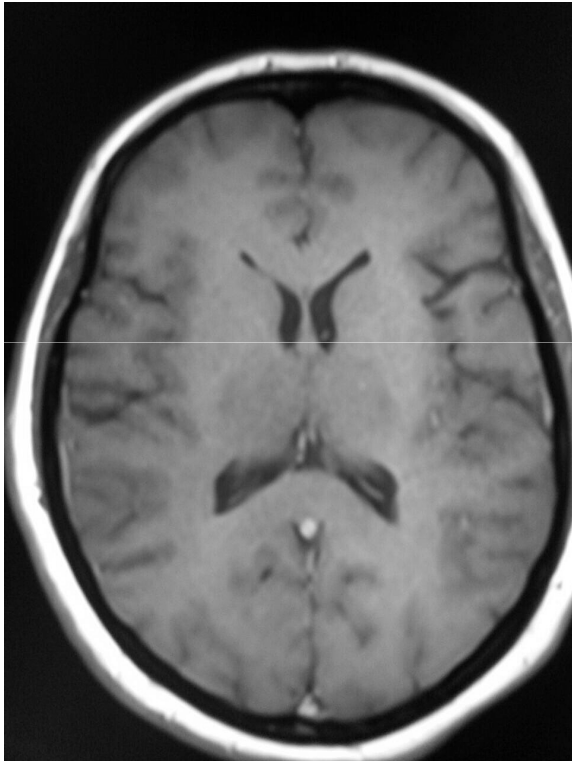
pcASL

Varón de 10 años con ataque de migraña de 24 hs. de evolución asociado a hemiparesia izquierda. Atc. de migraña hemipléjica familiar.

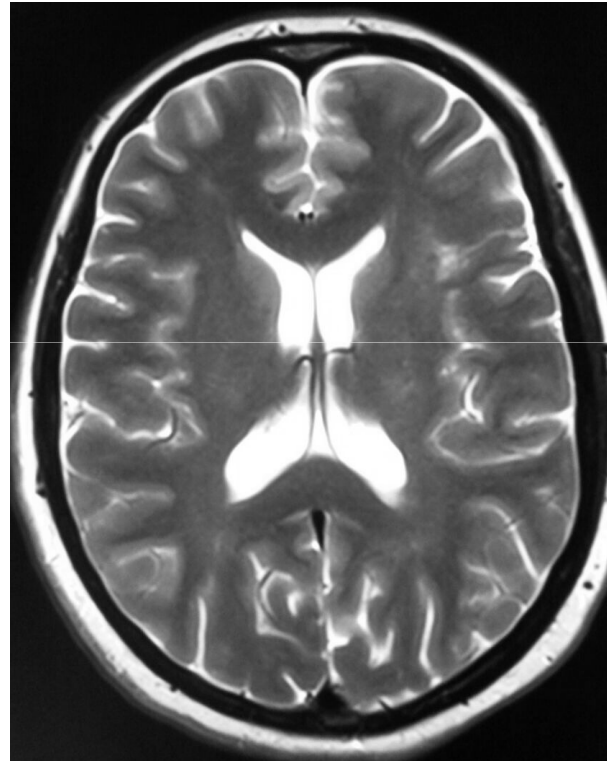


ARM

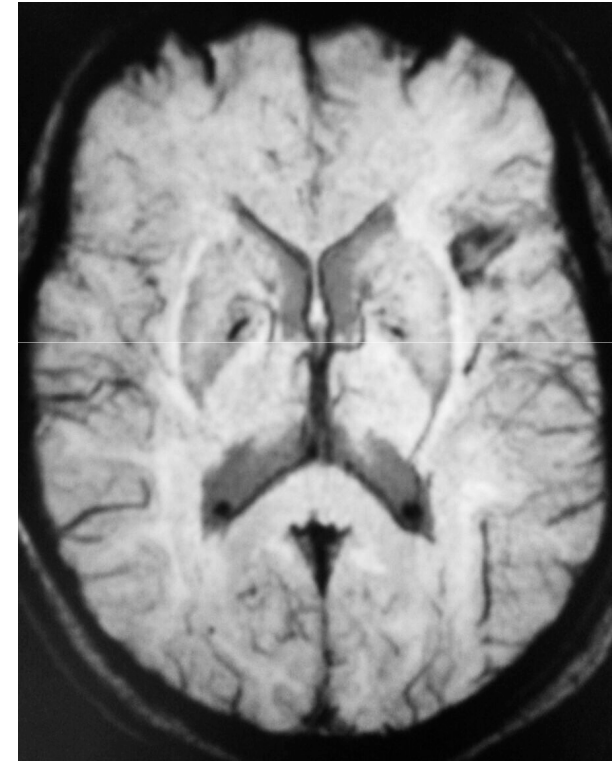
SWI para detectar minerales y restos hemáticos



T1-WI



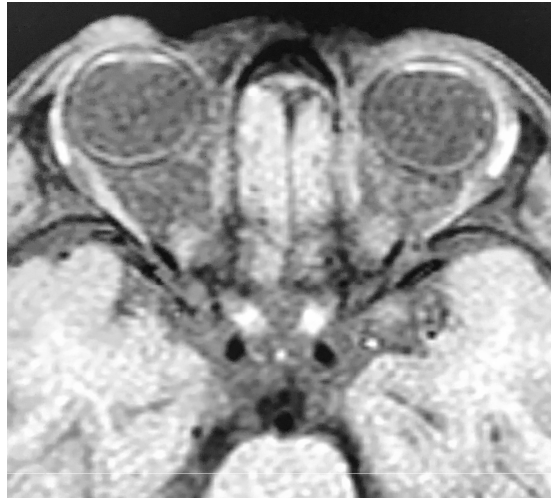
T2 -WI



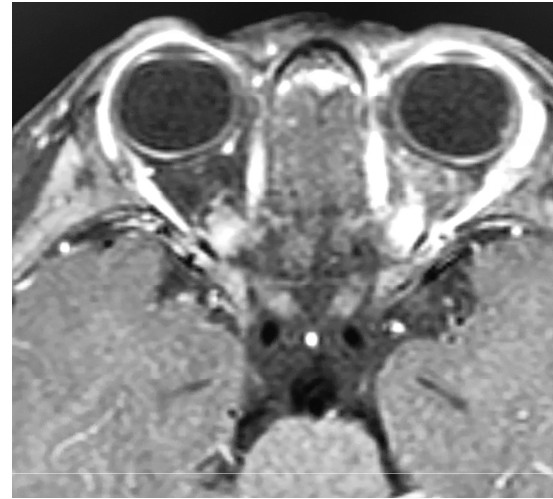
SWI

Imágenes de fase de SWI para detectar calcificaciones

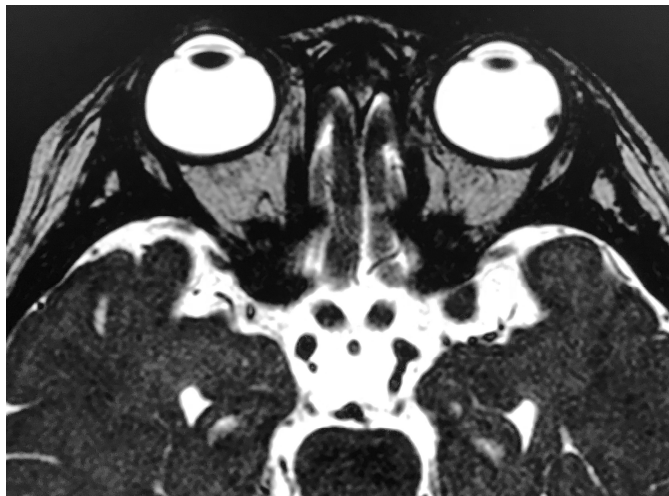
SPIR-T1 s/gado



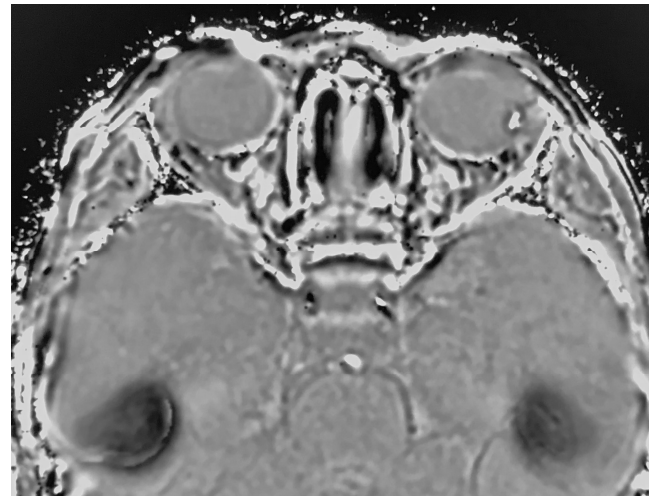
SPIR-T1 c/gado



T2-WI



SWI-P

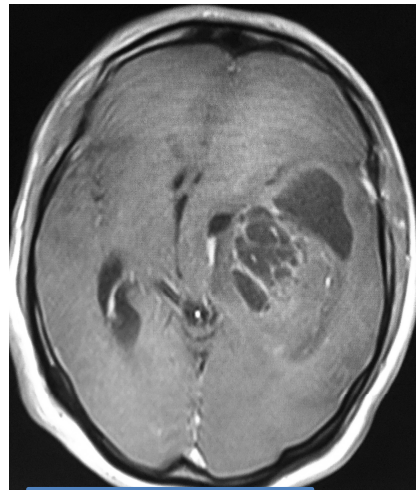


Retinoblastoma

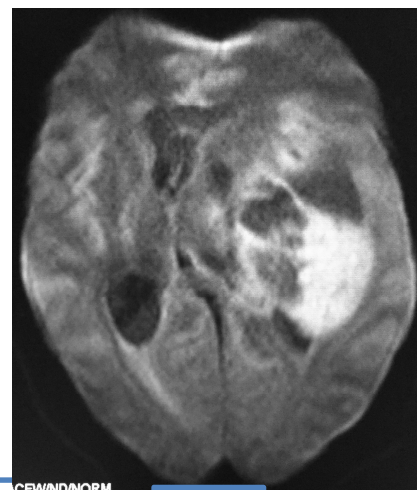
Estudio multimodal de tumor cerebral: perfusión, difusión y espectroscopía



FLAIR

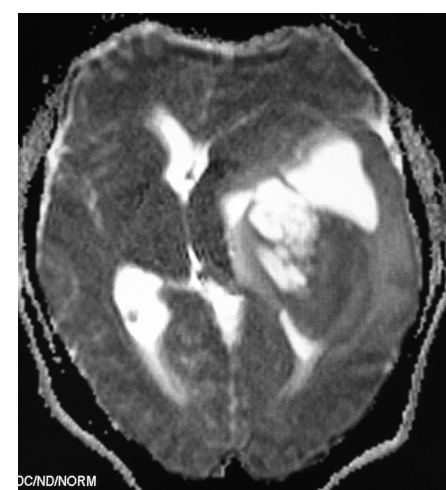


T1 -WI c/gado

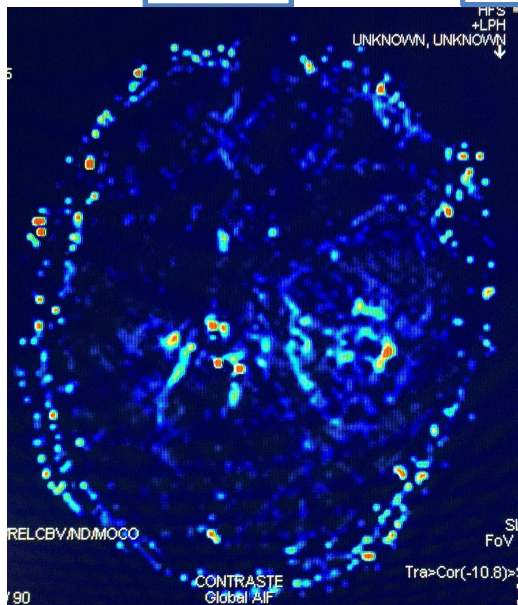


GBM

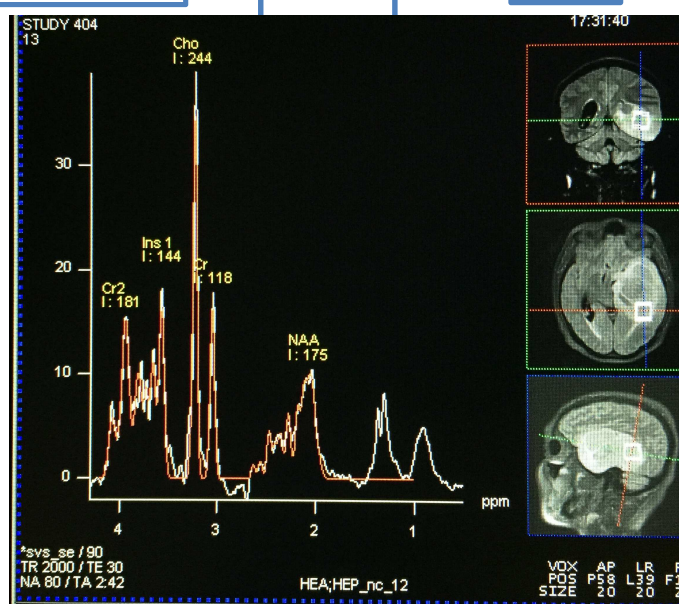
DWI



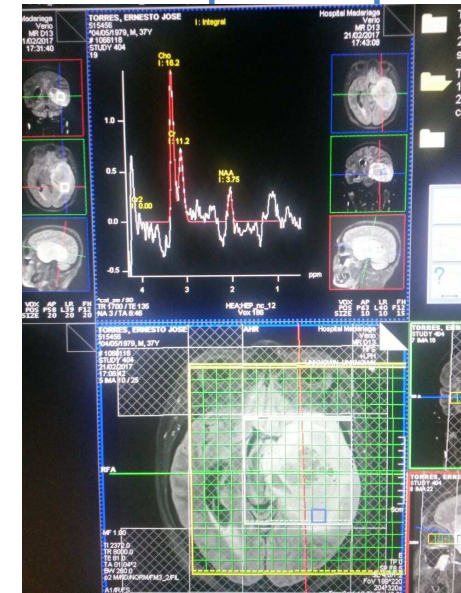
ADC



Perfusión: VSC



Espectroscopía monovoxel



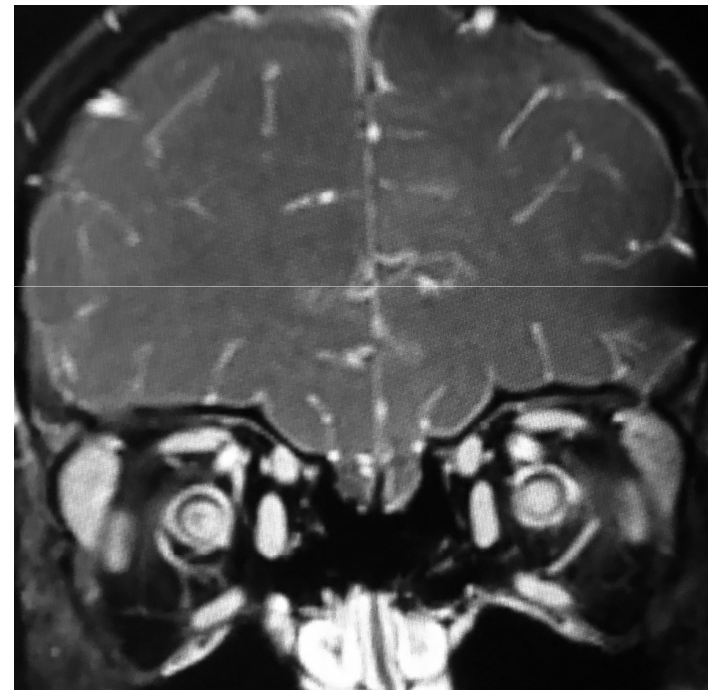
Espectroscopía multivoxel

Sustancia blanca

Varón de 16 años que comienza con cefalea, visión borrosa y confusión



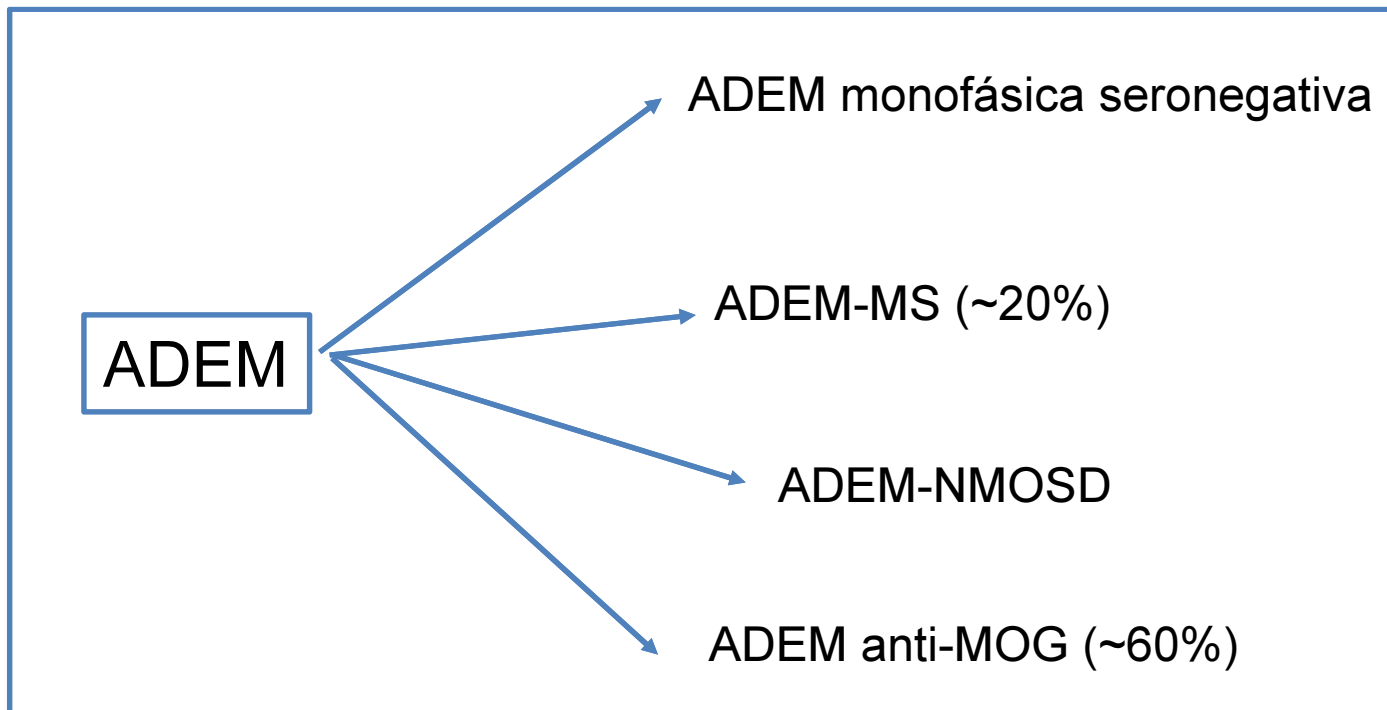
FLAIR



T1-Fat-Sat
c/ga

ADEM

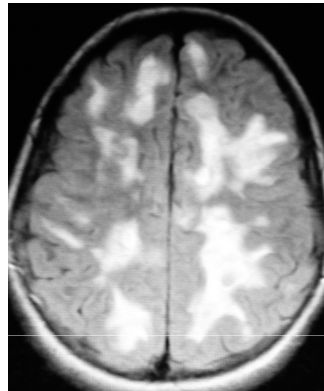
Fenotipo ADEM



ADEM-EM

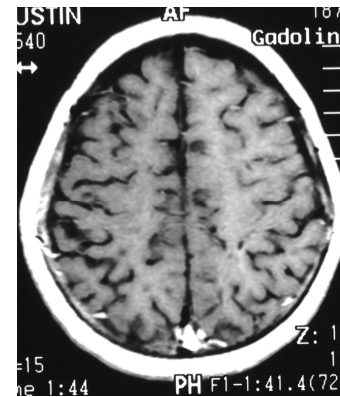
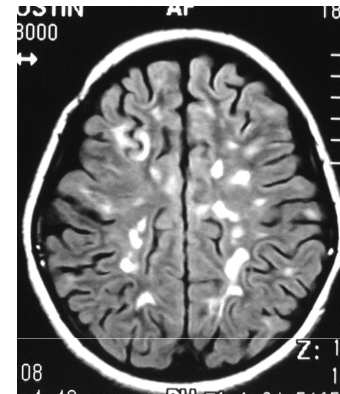
ADEM-like

Niño
2 años



RM inicial

FLAIR



RM control 1 mes post-pulsos

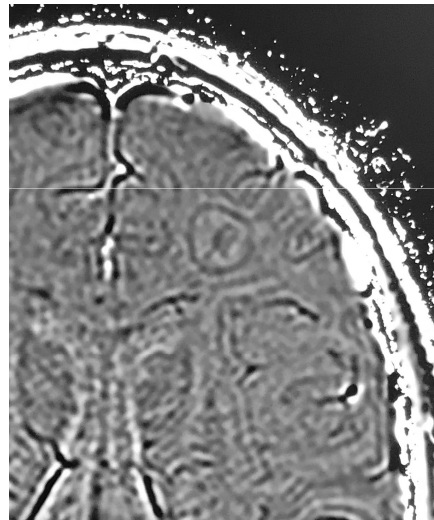
Fase de la susceptibilidad magnética

Anillos paramagnéticos

EM

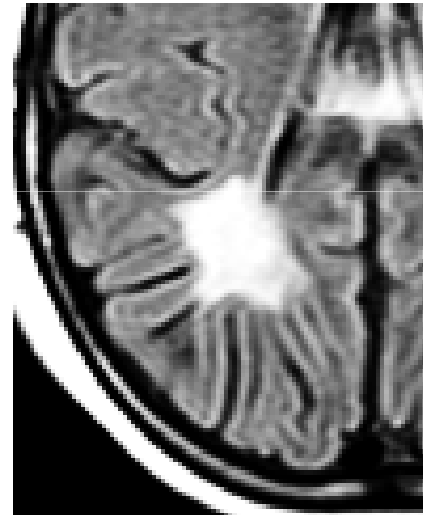


FLAIR

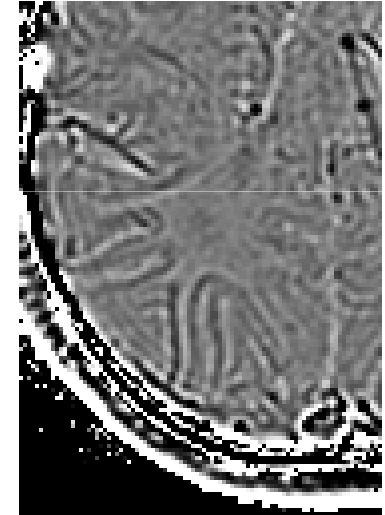


SWI-phase

Anti-MOG



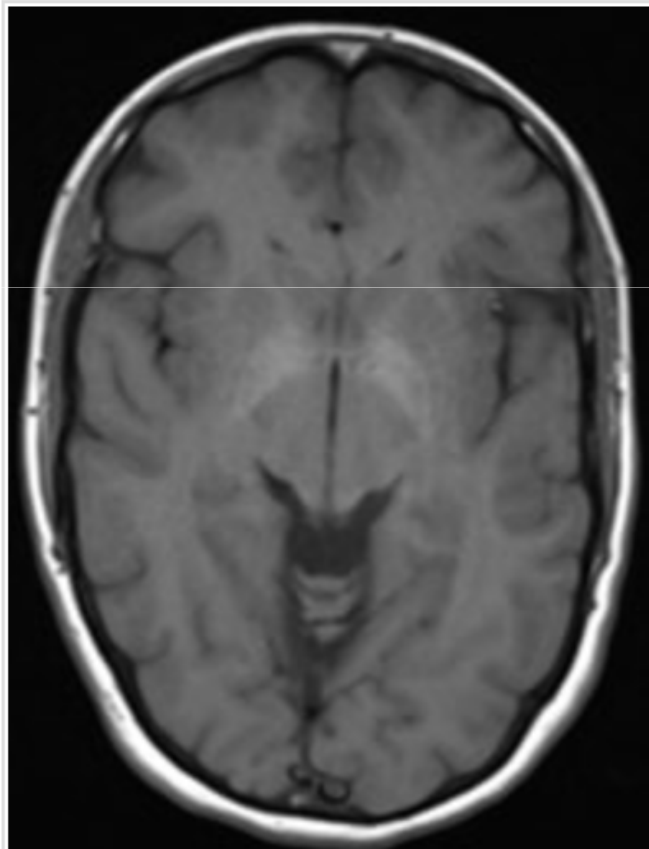
FLAIR



SWI-phase

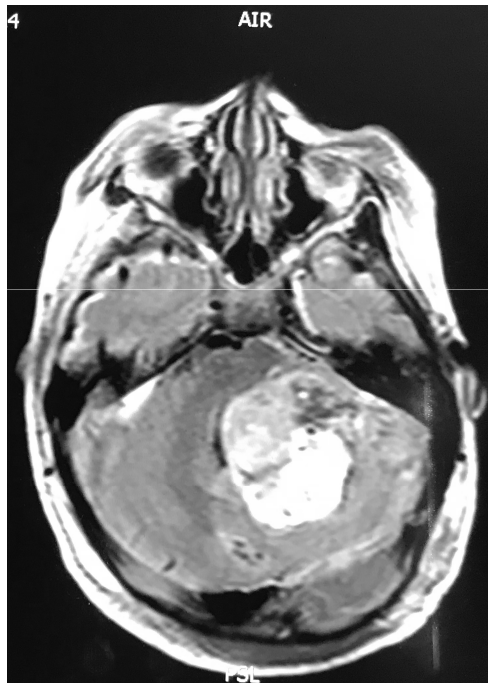
Contraste

**Varón de 14 años
15 estudios de RM con gadolinio**

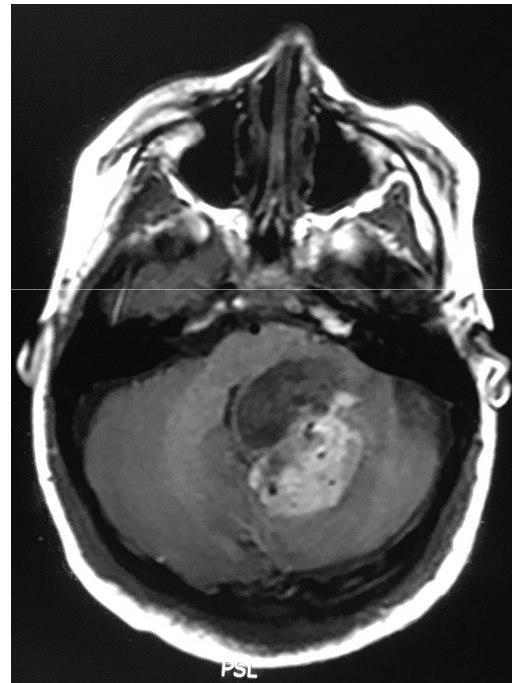


T1 c/g

Contraste



T1 c/g



T1 s/g

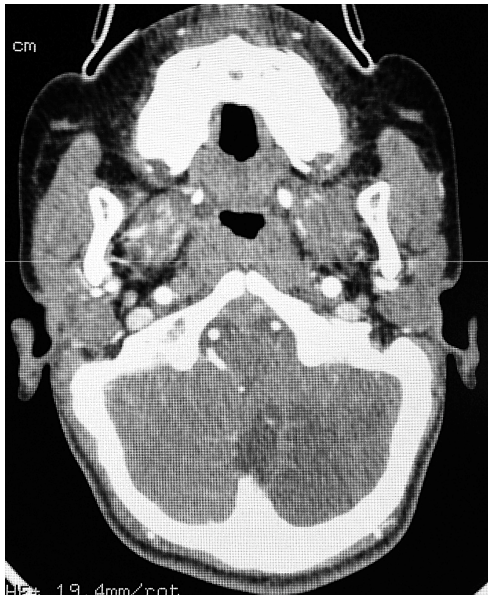


Técnica de substracción

Vasos

Angio-TC

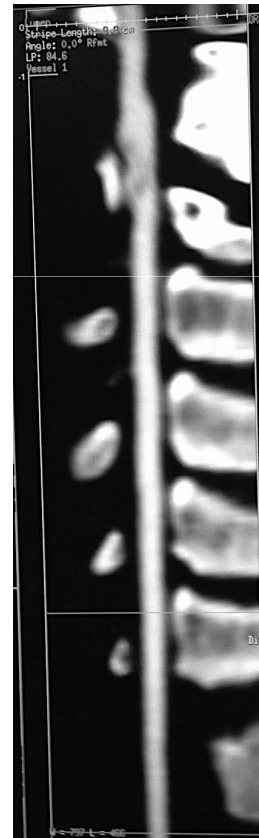
Disección de arteria vertebral izquierda



TC



MIP cor.



Angio-TC
rec. lineal



ICATC

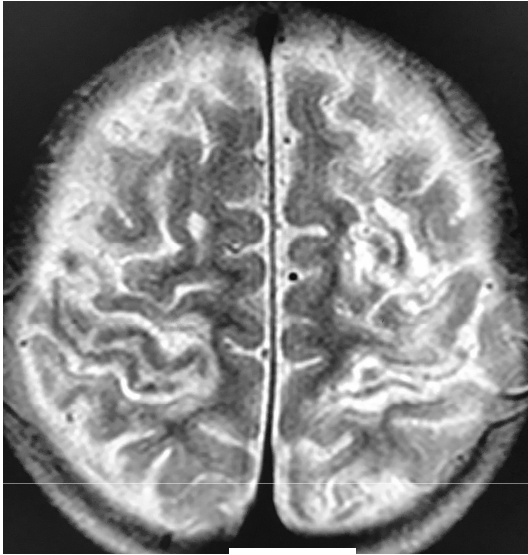
Signo de la
"llave francesa"

50 % de los strokes de
territorio posterior en pediatría

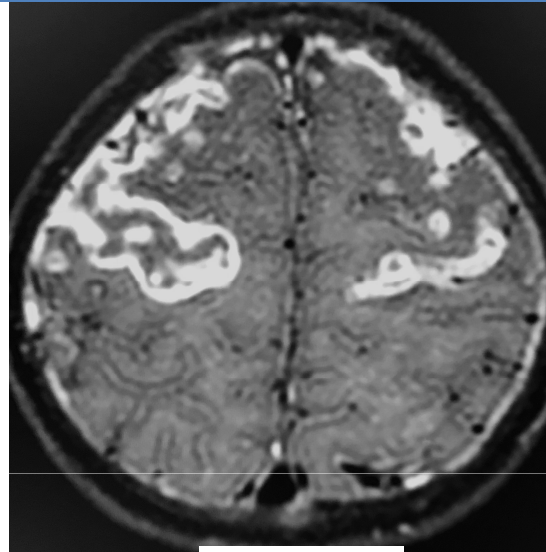
Imágenes de la pared vascular

Técnica de sangre negra

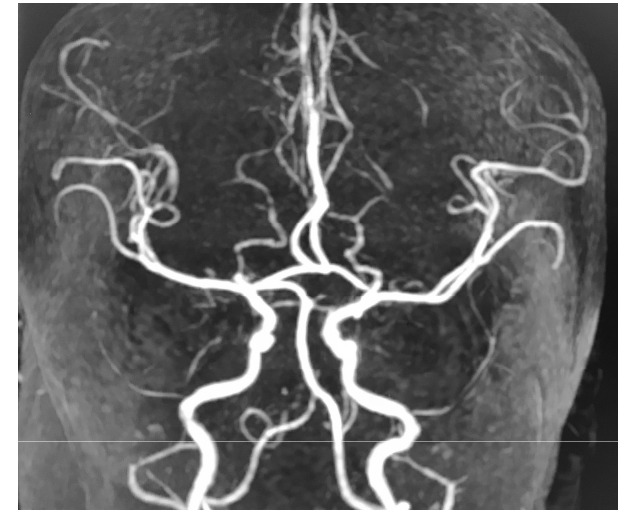
Niña de 6 años con meningitis bacteriana



T2-WI



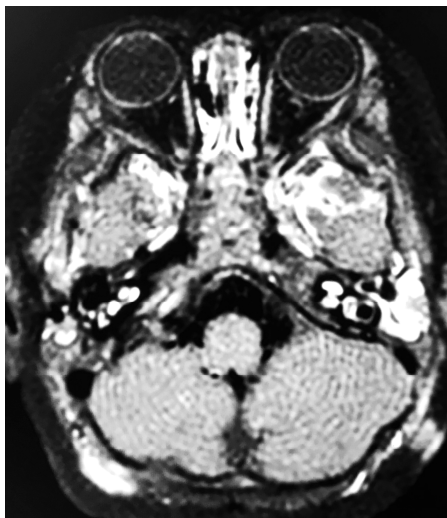
SN con Gd



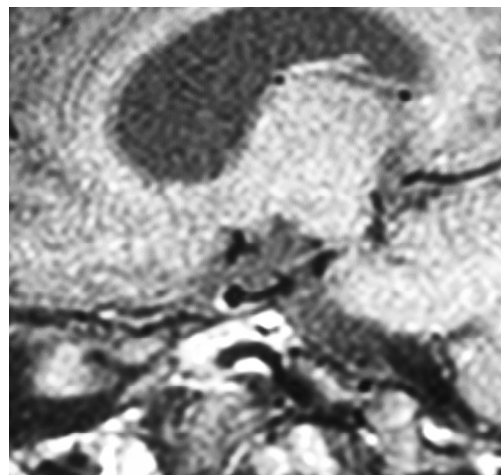
ARM

El valor de VWI

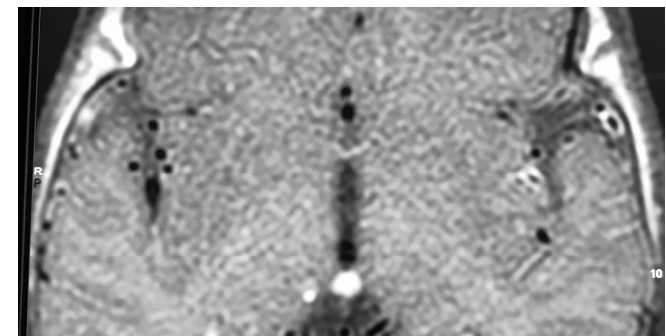
Vasculitis por neumoco



SN con Gd



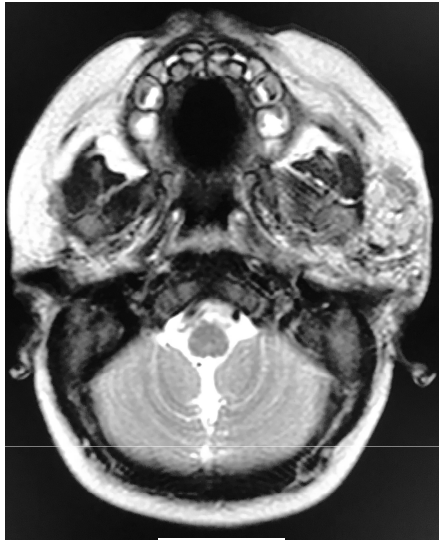
SN con Black Gd



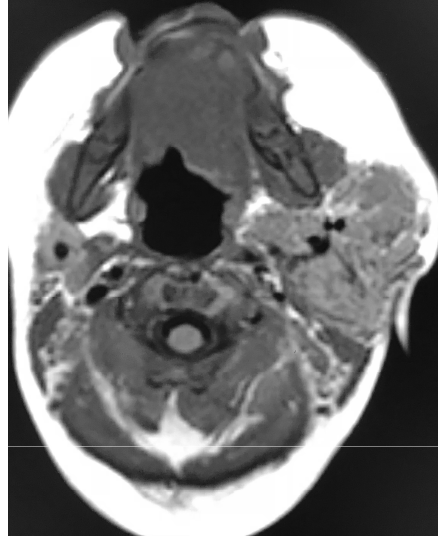
SN con Gd

Angiografía por RM 4-D

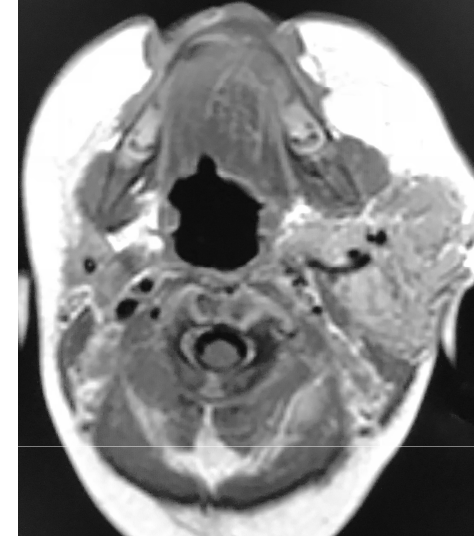
Niña de 3 años con hemangioma de la región parotídea y látero-cervical



T2-WI



T1-WI s/g



T1-WI c/g



Fase arterial



Fase parenquimatosa



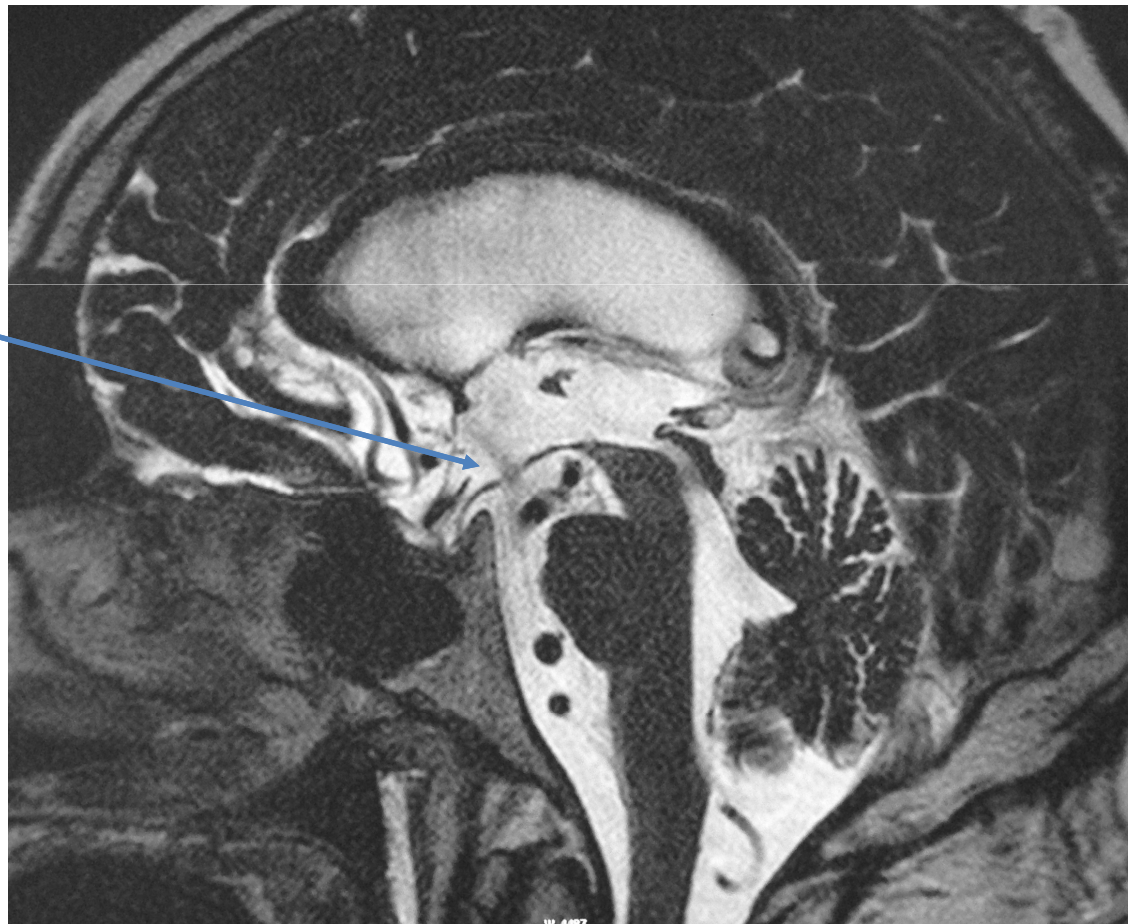
Fase venosa

LCR

T2 volumétrico (DRIVE, CISS, FIESTA)

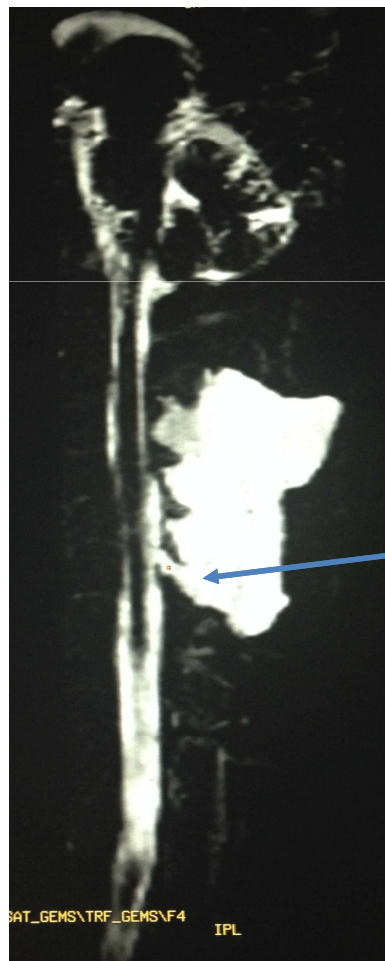
Control tercer-ventriculostomía

Flujo LCR



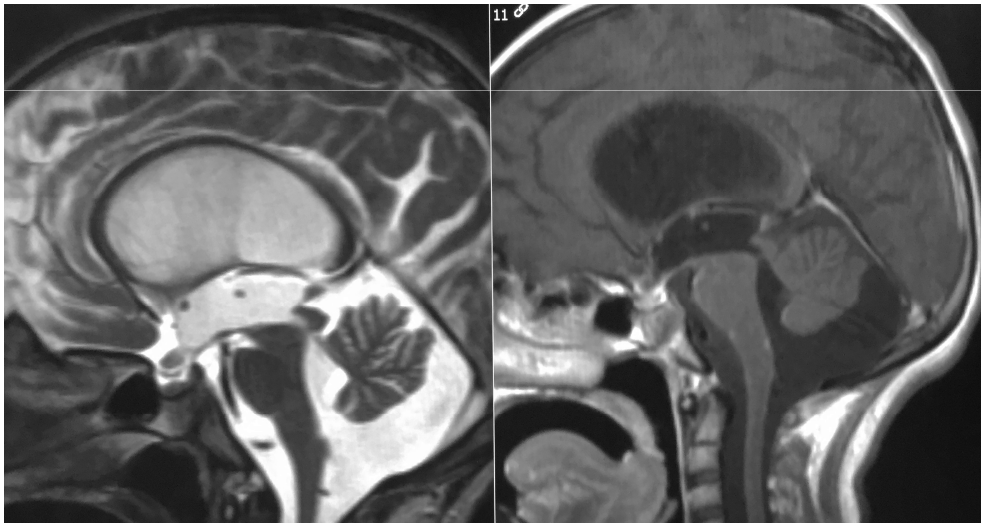
T2 volumétrico (DRIVE, CISS, FIESTA)

Pseudomeningocele post-operatorio



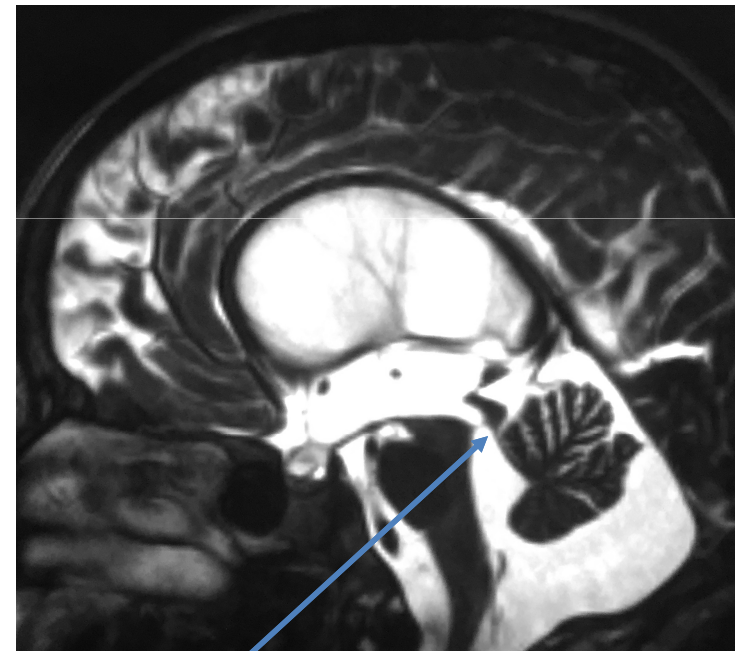
T2 volumétrico (DRIVE, CISS, FIESTA)

Estenosis acueductal



T2-SE

T1 c/g



T2 vol.

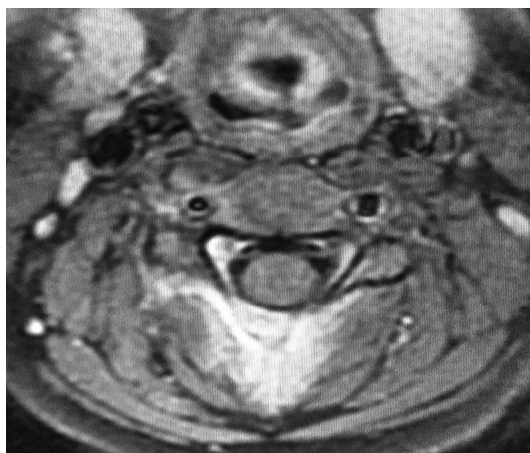
Membrana

Columna

Complemento TC-RM



T1 fat-sat s/g



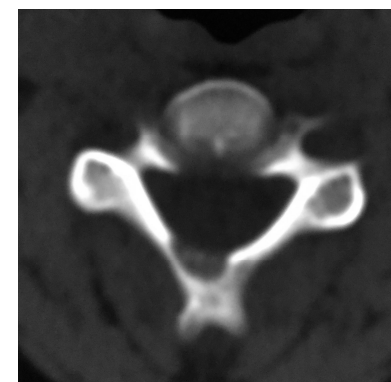
T1 fat-sat s/g

Varón de 8 años con cervicalgia nocturna de meses de evolución



TC

Osteoma osteoide



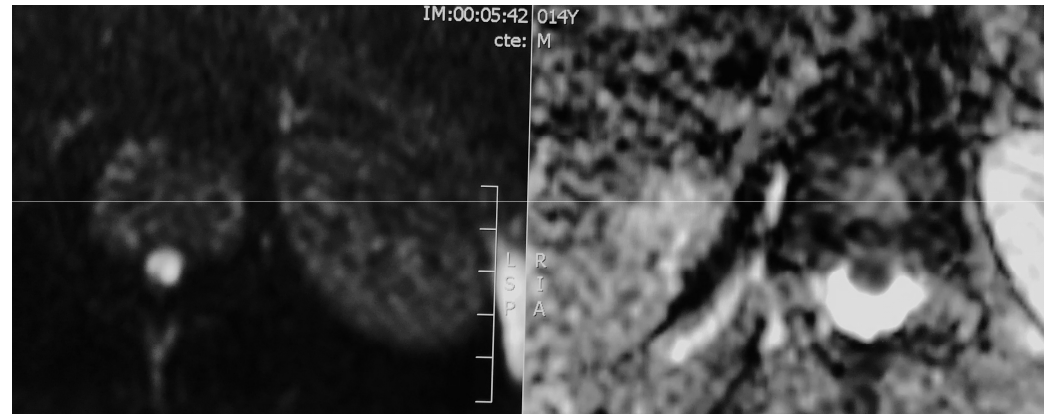
TC

Difusión en médula

Varón de 13 años con paraparesia
aguda luego de levantar peso



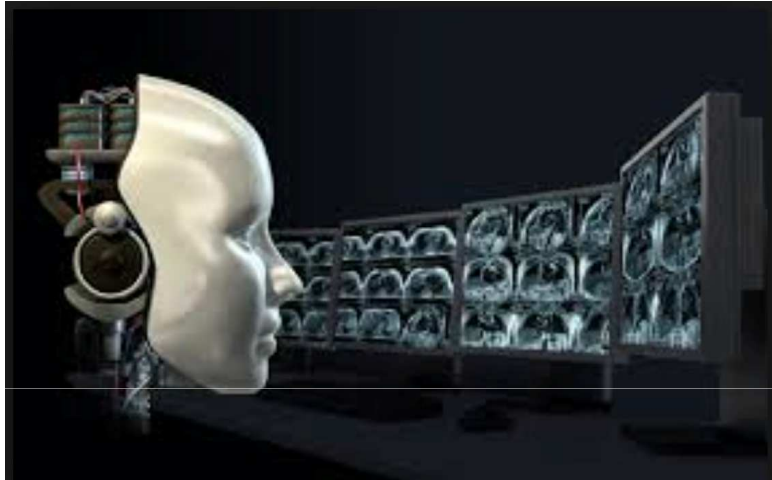
STIR



DWI

ADC

Futuro: Inteligencia artificial



- **Inteligencia artificial**
- **Machine learning**
- **Deep learning**

Future PACS



- The future PACS will be a "portal" to radiological knowledge:
 - incorporation of quantitative imaging methods
 - Integration of patient data
 - automatic retrieval of images similar images to those under review
 - Decision support and artificial intelligence to support radiologist

Source: Laboratory of Imaging Informatics, Stanford University
<http://www.stanford.edu/~rubin/projects.html>



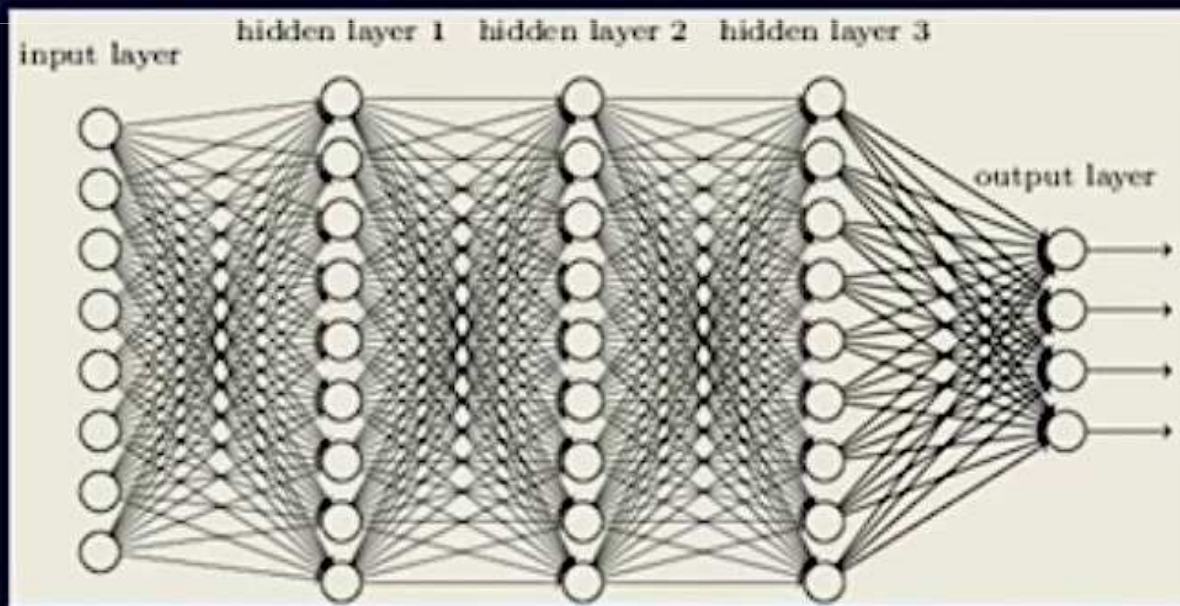
CNN

(convolutional neural network)

The Convolutional **Neural** Network

“What do I think the picture is?”

Mathematics



The Multilayer Perceptron- increased output complexity

Conclusiones

