REGIONE DEL VENETO

ULSS3 SERENISSIMA

NEUROIMAGING

STRUTTURALE E FUNZIONALE

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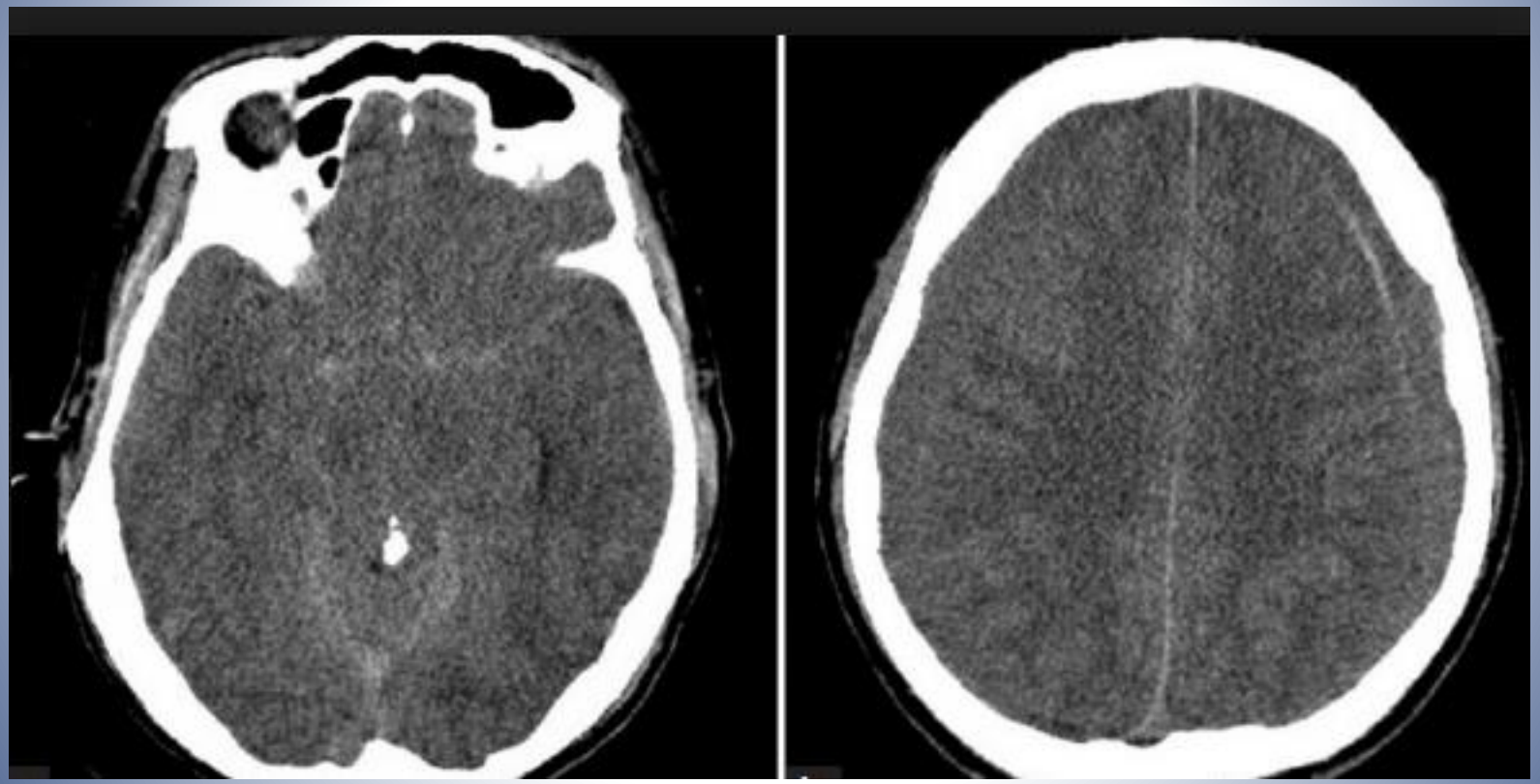
DEMENZA: cause

- Organiche: ascessi, tumori, ematoma subdurale….
- Metaboliche (squilibrio elettrolitico, carenze nutrizionali, ecc)
- Psichiatriche
- Degenerative: Malattia di Alzheimer, morbo di Parkinson, demenza fronto temporale, demenza a corpi di Lewy, vascolare, idrocefalo normoteso
- Infettive/infiammatorie (vasculite, malattia da prioni)
- Demielinizzanti (SM)
- Fenomeni paraneoplastici

DEMENZA: cause organiche



DEMENZE DEGENERATIVE

Alzheimer's disease

vascular dementia

Lewy body disease

frontotemporal lobar degeneration

Creutzfeldt-Jakob disease

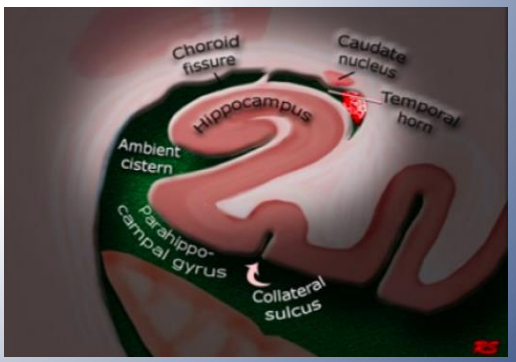
progressive supranuclear palsy (PSP)

multiple system atrophy (MSA)

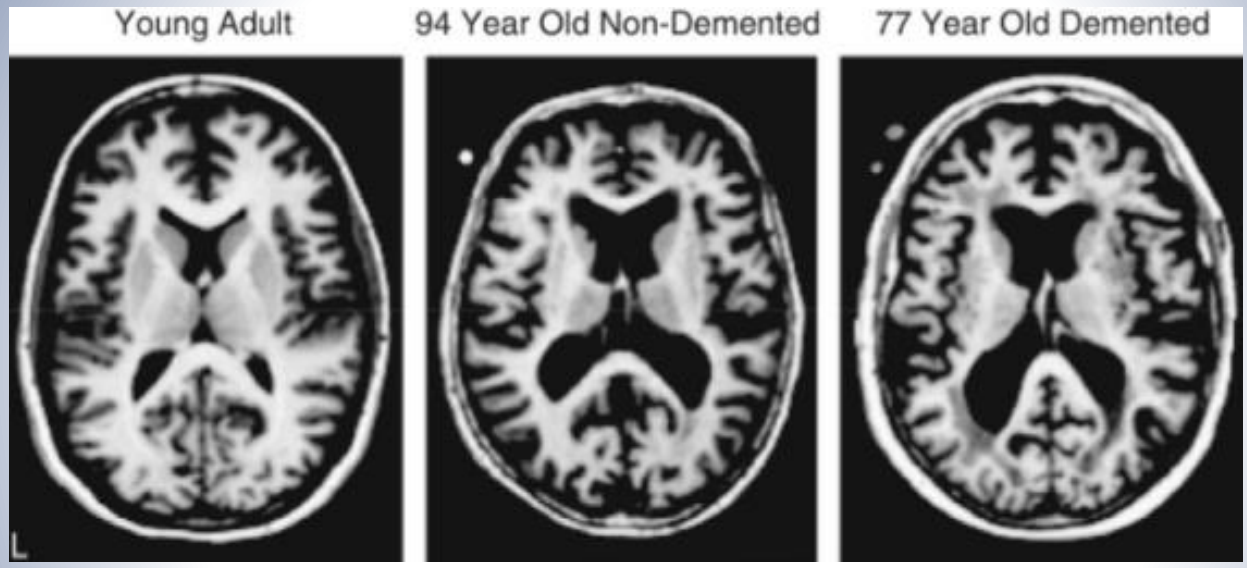
Huntington disease

corticobasal degeneration

CADASIL

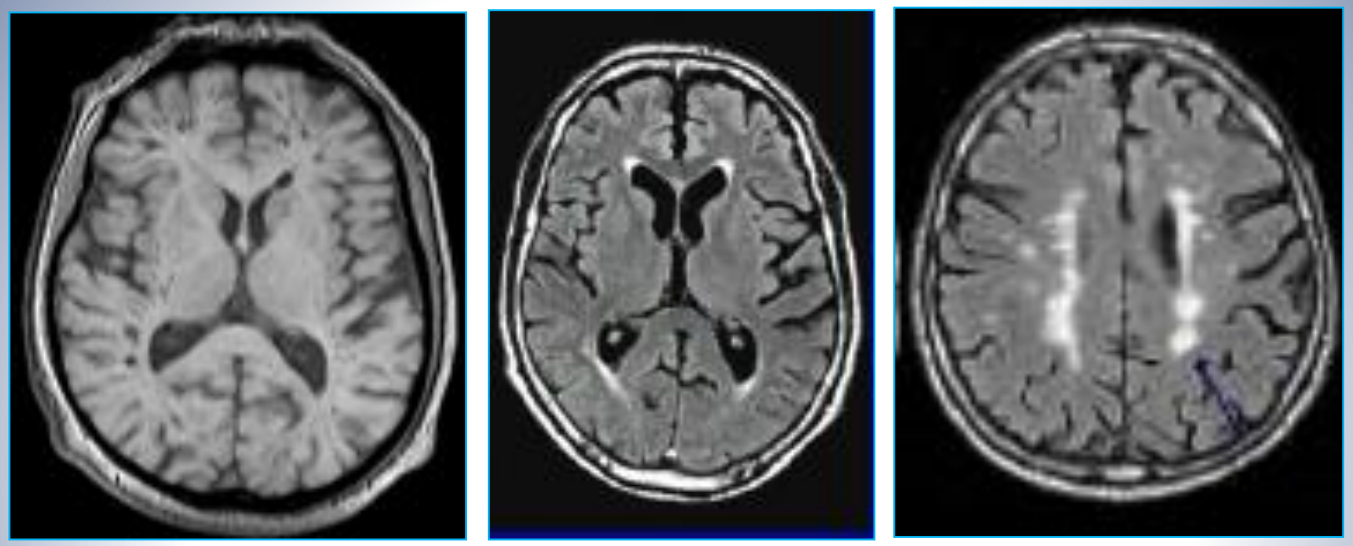


NORMAL AGING



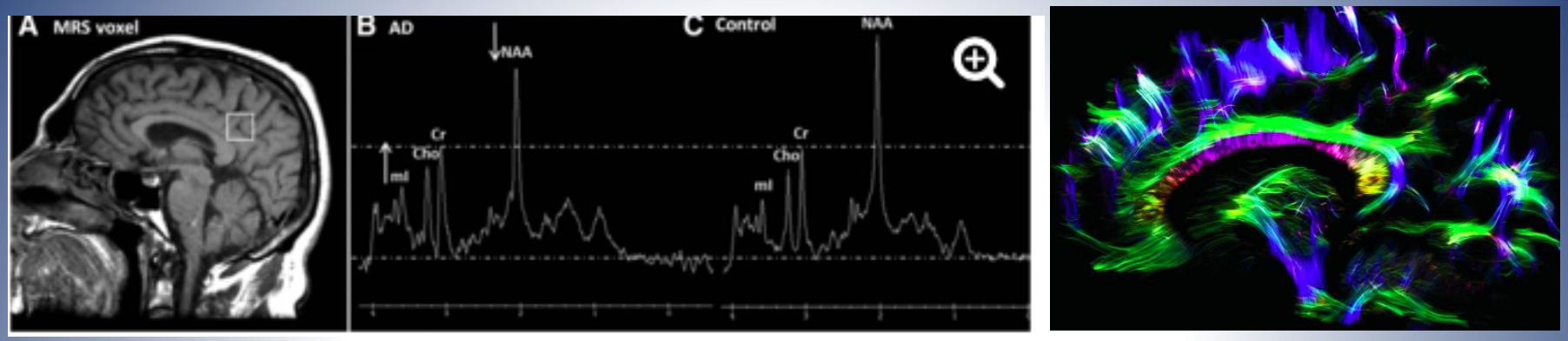
- ⇑⇑⇑ simmetrico e proporzionato di cavità ventricolari e spazi subaracnoidei
- Lieve assottigliamento del corpo calloso

NORMAL AGING



- Nell'anziano sono comuni lacune e iperintensità in T2/FLAIR di tipo vascolare
- Iperintensità in T2/FLAIR periventricolari frontali
- Comuni i microsanguinamenti (da encefalopatia ipertensiva o patologia amiloide)

NORMAL AGING



- Accumulo fisiologico di placche senili, gomitoli neurofibrillari e Corpi di Lewy
- MRS: ⇓⇓NAA nella corteccia, SB
  ⇑⇑⇑Cho e Cr
- DTI: ⇑⇑diffusività correlato alla riduzione delle fibre mielinizzate, ⇑⇑spazio extracellulare e gliosi

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RUOLO DELL'IMAGING NEURORADIOLOGICO:

Patologie neurodegenerative

- Escludere la presenza di lesioni occupanti spazio come tumori, ascessi, ematomi, ecc
- Aiutare la diagnosi clinica (dd)-valutazione atrofia regionale nei diversi tipi di demenza
- Valutare la presenza di esiti vascolari in sedi strategiche
- Valutare la progressione di malattia e la risposta ai trattamenti
- Imaging funzionale (ricerca clinica)

IMAGING NEURORADIOLOGICO

- Imaging strutturale

1. TC
2. RM

- Imaging funzionale

1. PET
2. SPECT
3. RM (f-MRI, spettroscopia, DTI)

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EFNS GUIDELINES/CME ARTICLE

EFNS task force: the use of neuroimaging in the diagnosis of dementia

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Keywords:
Alzheimer's disease, amyloid imaging, dementia, diagnosis, guidelines, magnetic resonance imaging, positron emission tomography, single photon emission computed tomography

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Background and purpose: The European Federation of the Neurological Societies (EFNS) guidelines on the use of neuroimaging in the diagnosis and management of dementia are designed to revise and expand previous EFNS recommendations for the diagnosis and management of patients with Alzheimer's disease (AD) and to provide an overview of the evidence for the use of neuroimaging techniques in non-AD dementias, as well as general recommendations that apply to all types of dementia in clinical practice.

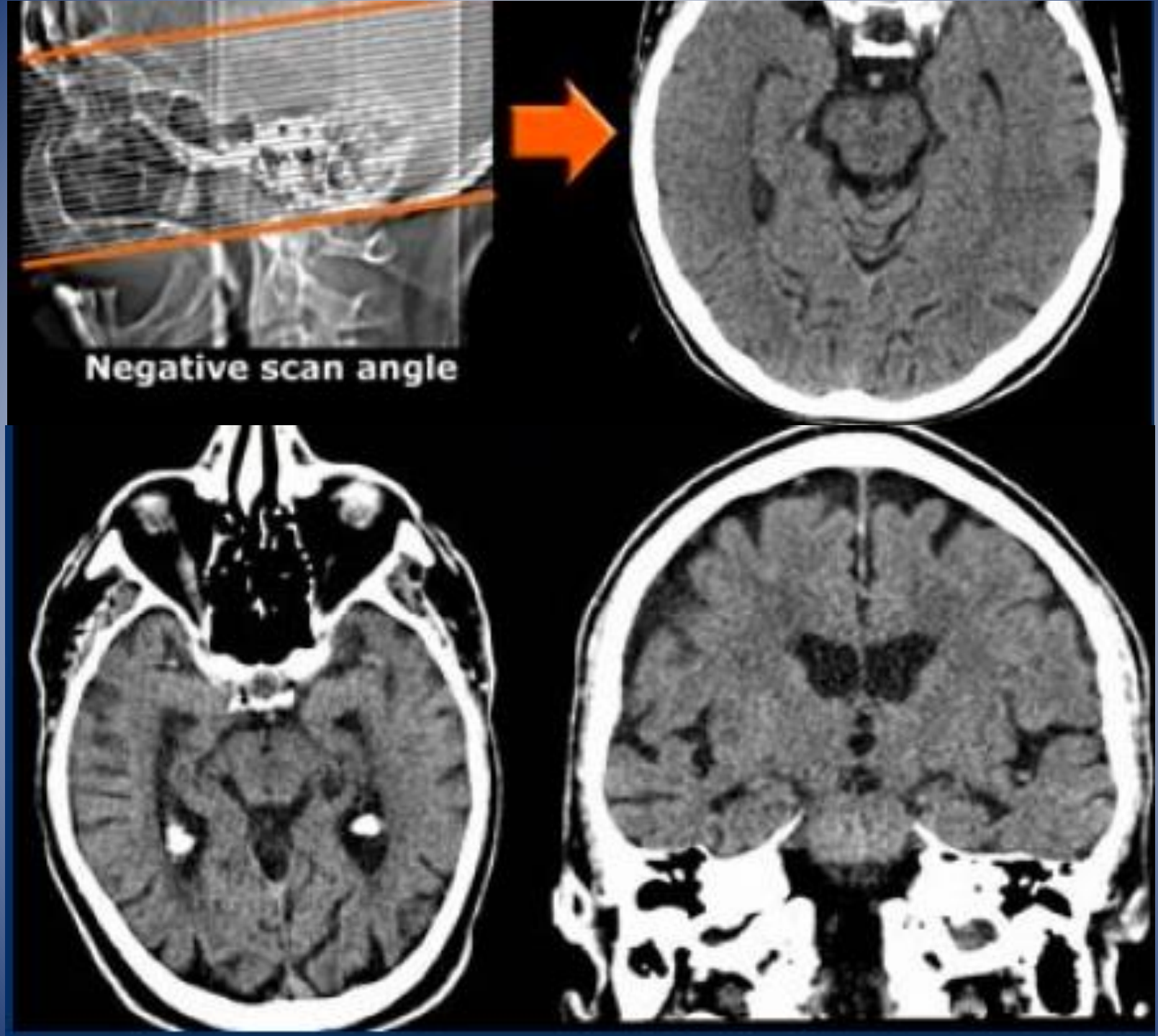
Methods: The task force working group reviewed evidence from original research articles, meta-analyses and systematic reviews, published before April 2012. The evidence was classified, and consensus recommendations were given and graded according to the EFNS guidance regulations.

Results: Structural imaging, which should be performed at least once in the diagnostic work-up of patients with cognitive impairment, serves to exclude other potentially treatable diseases, to recognize vascular lesions and to identify specific findings to help distinguish different forms of neurodegenerative types of dementia. Although typical cases of dementia may not benefit from routine functional imaging, these tools are recommended in those cases where diagnosis remains in doubt after clinical and structural imaging work-up and in particular clinical settings. Amyloid imaging is likely to find clinical utility in several fields, including the stratification of patients with mild cognitive impairment into those with and without underlying AD and the evaluation of atypical AD presentations.

Conclusions: A number of recommendations and good practice points are made to improve the diagnosis of AD and other dementias.

IMAGING NEURORADIOLOGICO: TC

- Limiti intrinseci alla metodica nella valutazione dei lobi temporali e della fossa cranica posteriore per artefatti da indurimento del fascio
- Utile nella valutazione iniziale specie per escludere emorragie
- In pazienti con controindicazioni assolute alla RM
- Con le moderne TC multidetettore è possibile ottenere immagini sul piano coronale con buona visualizzazione dell'ippocampo->multiplanarietà

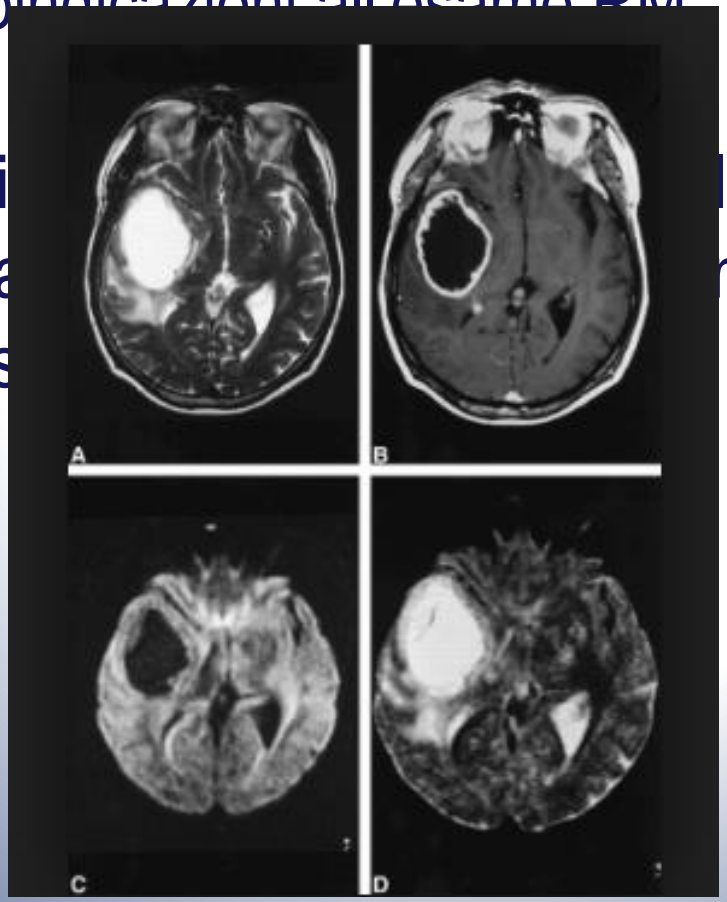

Negative scan angle

IMAGING NEURORADIOLOGICO: RM

- Modalità di scelta per lo studio delle demenze
- Imaging multiparametrico-multiplanare
- Superiore nella valutazione dei tessuti molli
- Non utilizza radiazioni ionizzanti

Quando è indicata la TC cerebrale?

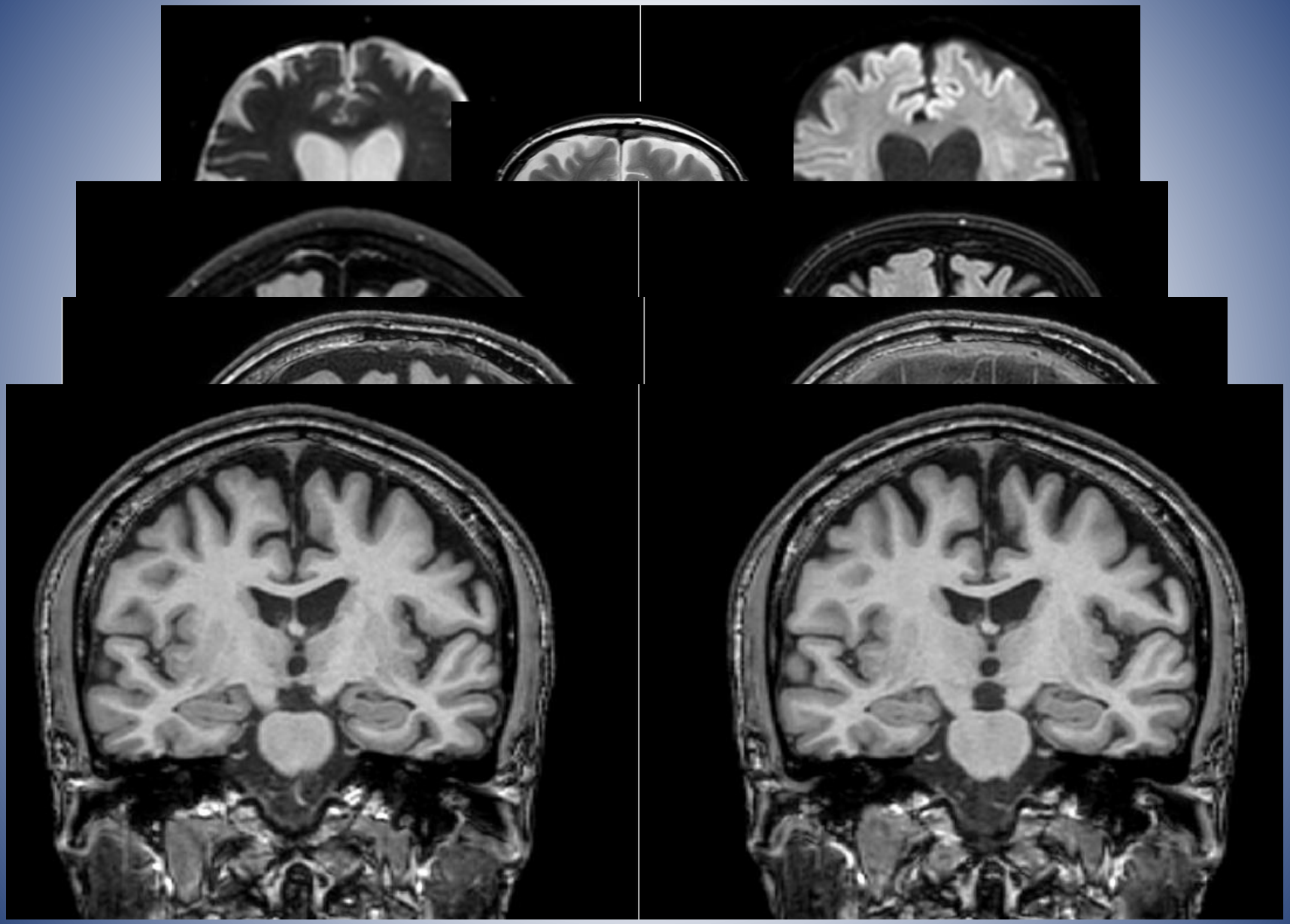
- Controindicazioni all'esame RM
- Identifi lmente reversibili di deca mi, tumori, ascess



RMN cerebrale

- Tre piani di acquisizione (le coronali inclinate sull'ippocampo) con sequenze T1, T2, FLAIR, DWI e T2 GE
- T1 preferibilmente volumetriche GE, miglior definizione anatomica, sequenze migliore per la quantificazione dell'atrofia
- T2 a strato sottile, valuta il segnale dei nuclei della base e delle strutture della fossa cranica posteriore
- FLAIR preferibilmente volumetrica, valuta le alterazioni della sostanza bianca
- DWI/ADC si ha restrizione della diffusione in caso di lesioni ischemiche recenti e nella malattia di Creuzfeldt Jacob
- T2 GE individua microemorragie (es angiopatia amiloide)
- Sequenze opzionali DTI, Perfusion, Spettroscopia

LA RISONANZA MAGNETICA: COME ?



Imaging neuroradiologico: TC-RM

- Escluse lesioni espansive, ematomi subdurali, ecc
- Vanno ricercati segni caratteristici:
- 1. Alzheimer (AD): atrofia temporale mesiale e parietale
- 2. Demenza fronto-temporale (FTLD): asimmetrica atrofia lobare frontale e temporo-polare
- 3. Demenza Vascolare (VD): atrofia globale e esiti ischemici della bianca e lesioni lacunari, lesioni “strategiche” (aree funz. Cognitive)
- 4. Demenza con corpi di Lewy (DLB): nessuna lesione specifica

MR findings in Dementia

	AD	VaD	FTLD	Lewi*
Hippocampal atrophy	+++	++	++	-
Temporal atrophy	++	+	+++	-
Frontal atrophy	-	+	+++	-
Parietal atrophy	++	+	-	-
Lacunes	-	+++	-	-
WML’s	-	+++	-	-
Strategic infarcts	-	+++	-	-

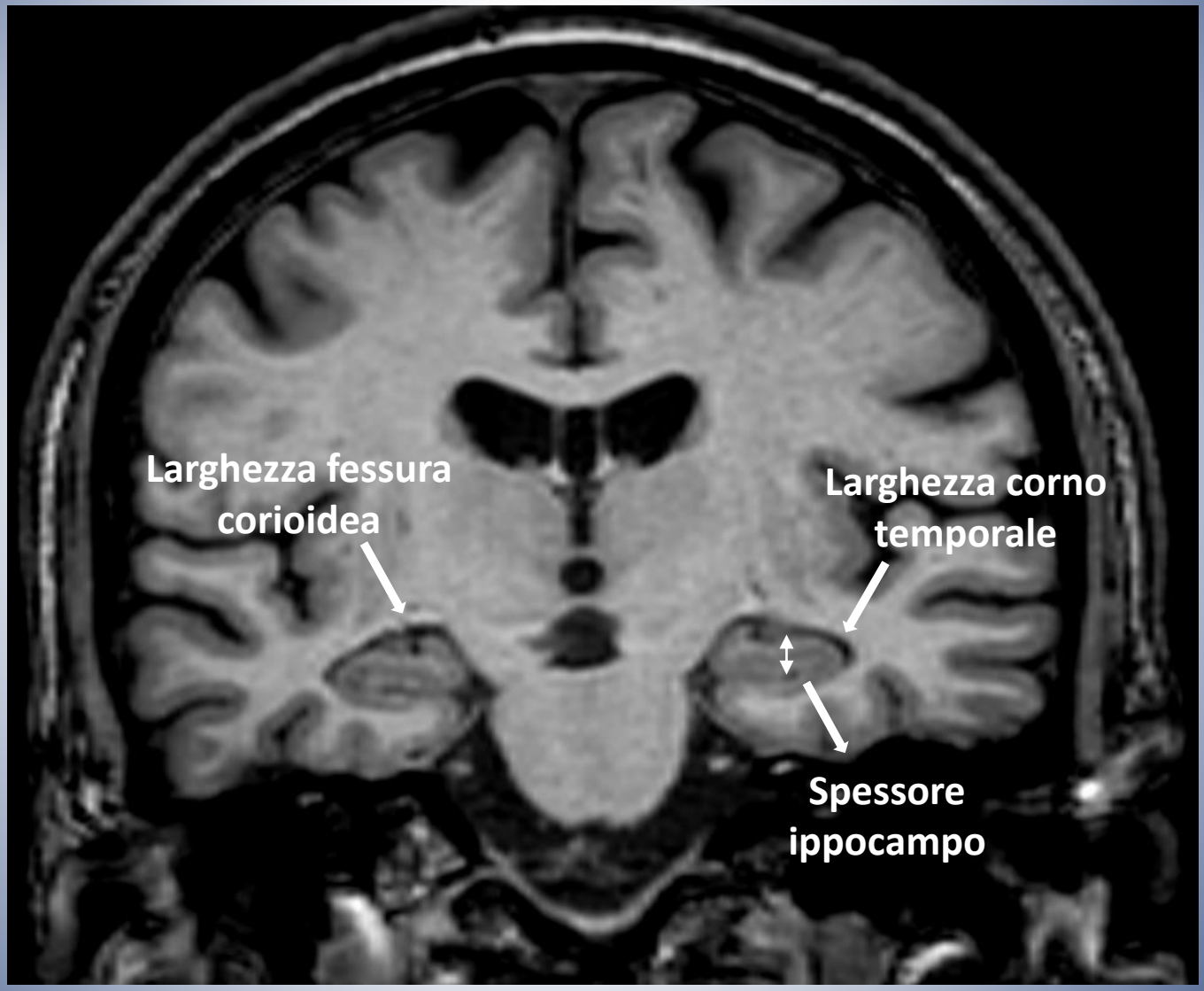
Imaging neuroradiologico:

- GCA-score per l'atrofia globale cerebrale
- MTA-score per l'atrofia temporale mesiale
- Fazekas scale per le lesioni della sostanza bianca
- Koedam score per l'atrofia parietale
- Aree strategiche per danni cognitivi

DEMENZA DI ALZHEIMER: IMAGING RM

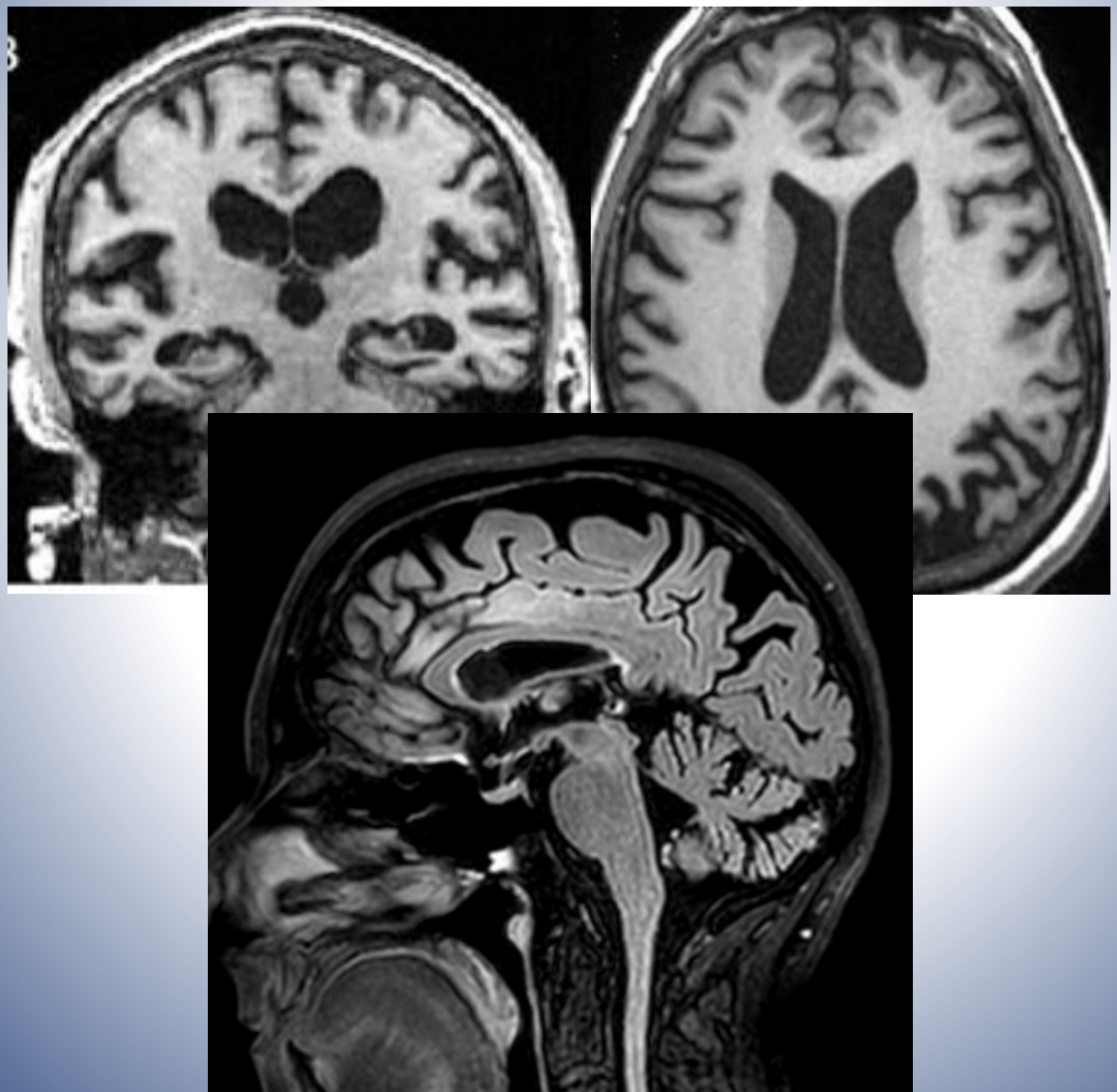
- Atrofia parietale, temporale specie ippocampale (GCA e MTA score)
- T2 GE angiopatia amiloidea associata
- MRS: ↓NAA, ↑mI nel cingolo posteriore anche in fasi precoci di malattia
- DTI: ↓FA nel fascicolo longitudinale superiore, splenio CC
- fMRI: ↓attivazioni corticali per task semantici e fonetici

IMAGING RM-MTA score

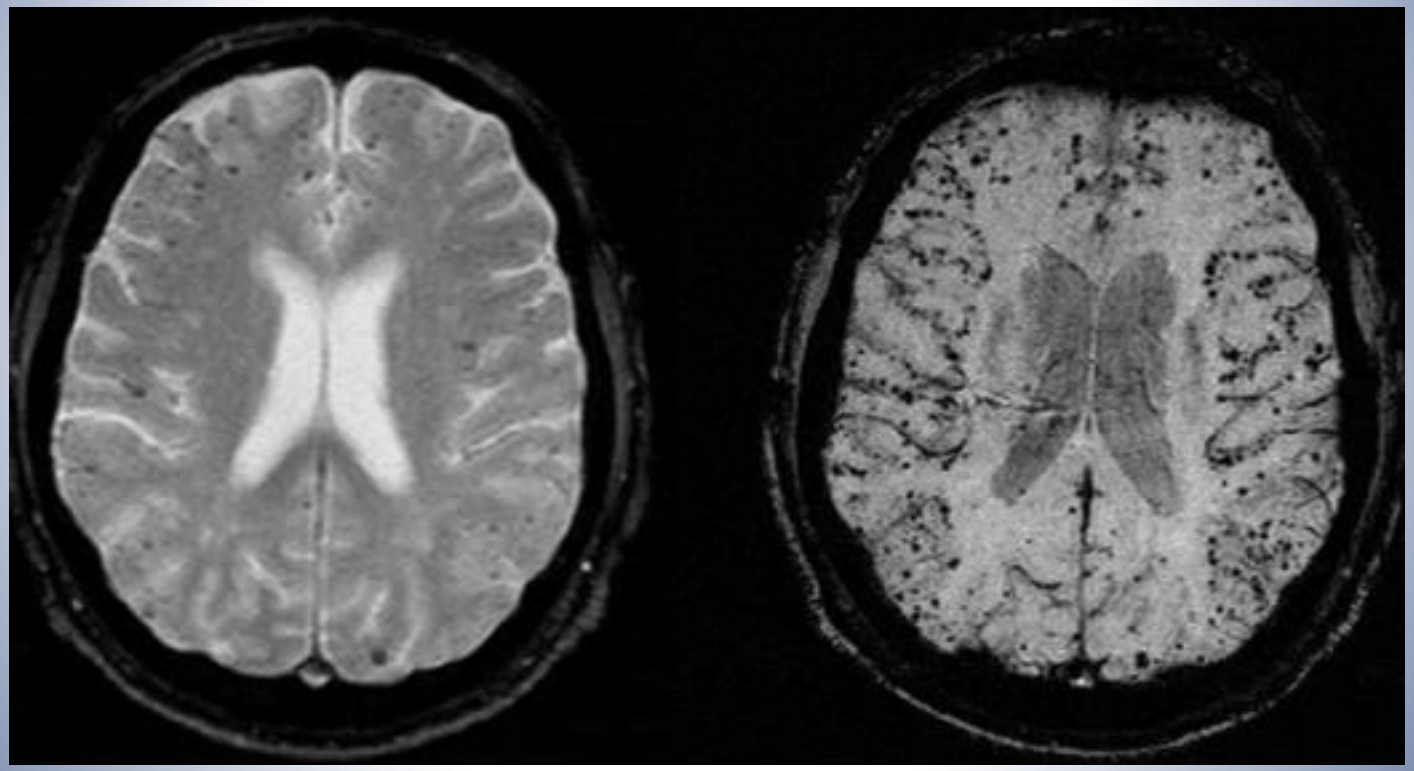


Valutazione visiva su sequenze coronali T1 pesate

DEMENZA DI ALZHEIMER: IMAGING RM



DEMENZA DI ALZHEIMER: IMAGING RM



DEMENZA VASCOLARE

- Seconda causa più comune di demenza
- Spesso associata a AD
- Utile la scala di Fazekas
- TC
- RM

- Ricerca lesioni in aree strategiche per danni cognitivi

Art. C. Media	Aree associative P-T e T-O Giro angolare
Art. C. Poster.	Talamo mediale Lobo temporale inferiore mediale
Watershed inf.	Aree frontali e parietali superiori
Inf. lacunari	Talamici bilaterali

Si valuta meglio in T2 e FLAIR assiale.

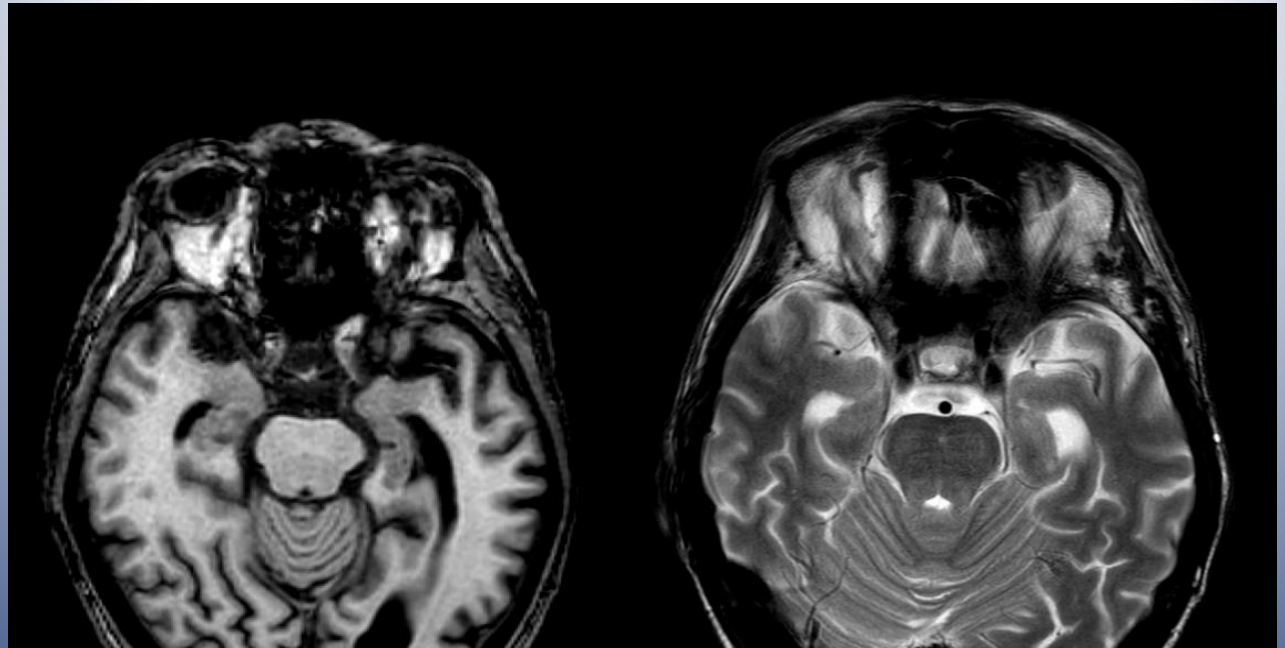
DEMENZA FRONTO TEMPORALE

- Malattia di Pick, 5% delle demenze
- Pazienti giovani, disturbi del linguaggio e del comportamento
- Imaging :

perdita di volume (più frontale che temporale)
Asimmetrica/simmetrica, atrofia del nucleo caudato

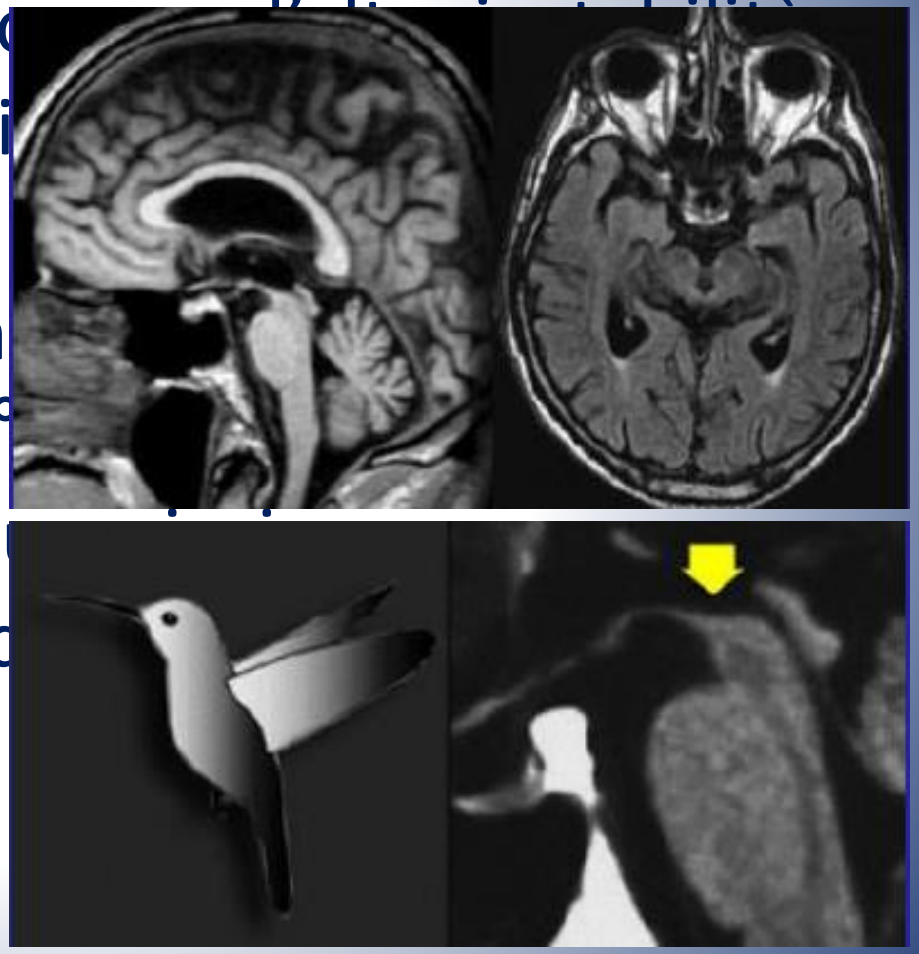
AFASIA PRIMARIA PROGRESSIVA

- Atrofia temporale perisilviana dell'emisfero dominante
- Ippocampo e polo temporale
- Asimmetrica
- "Knife blade atrophy"



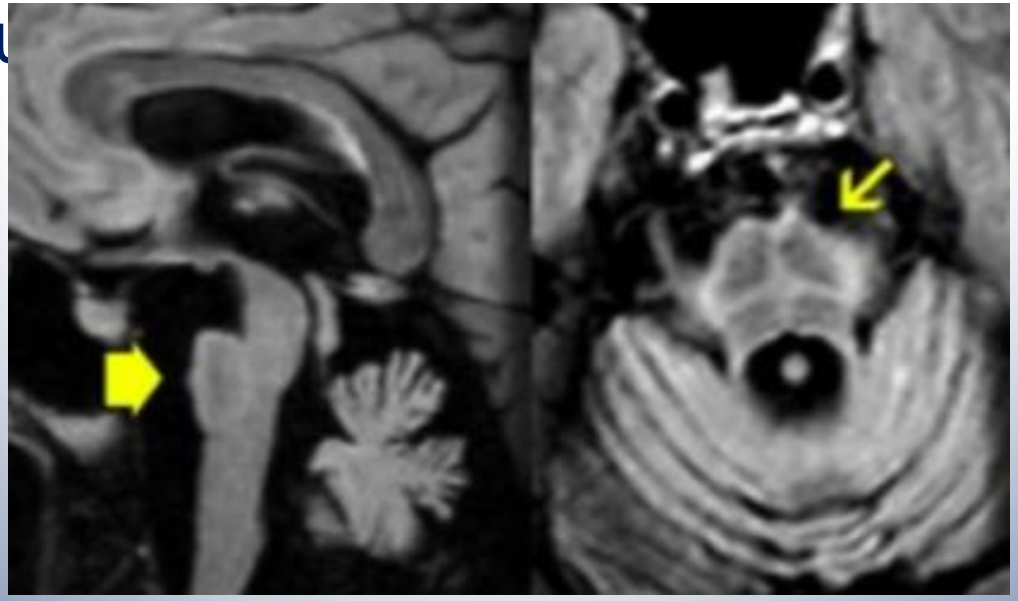
PARALISI SOPRANUCLEARE PROGRESSIVA

- Paralisi dello sguardo
- posturale parkinsoni
- frontali, disturbi del
- Grave atrofia mesen
- Ampliamento del III°
- Atrofia dei collicoli s
- Concavità anomala d
- mesencefalico



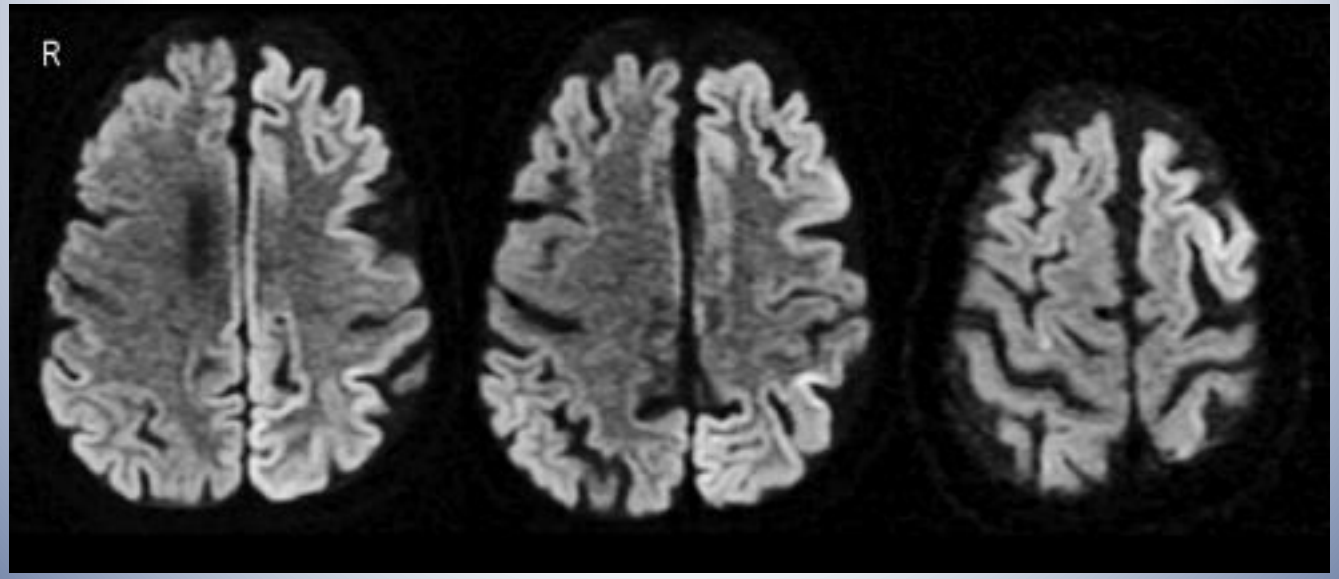
ATROFIA MULTISISTEMICA

- Atassia cerebellare, disfunzioni .., parkinsonismo , disfunzioni cortico spinali
- Ipointensità in T2 putaminale
- Atrofia cerebellare, atrofia pontina, atrofia dei pedu



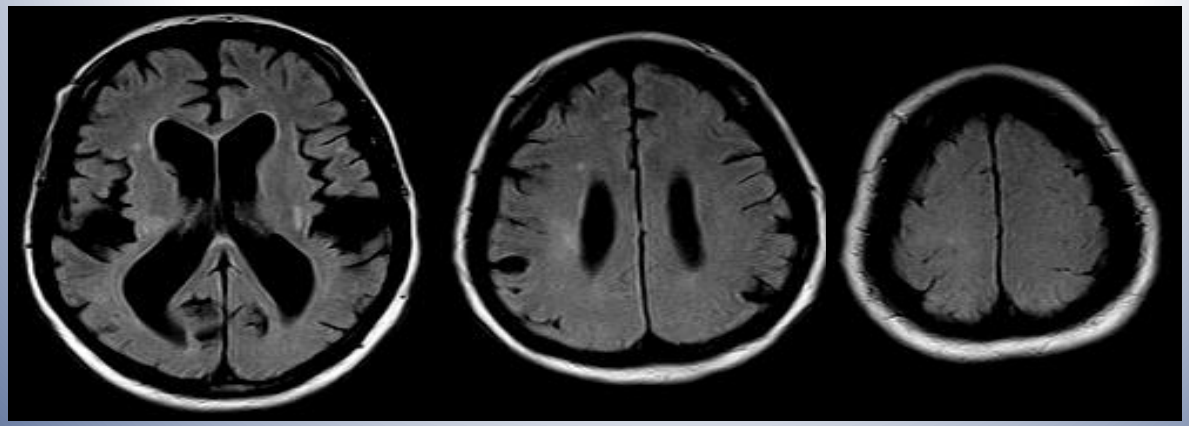
DEGENERAZIONE CORTICO BASALE

- Asimmetria delle regioni fronto-temporali, asimmetrica
- Aree motorie e sensitive
- Relativo risparmio di corteccia temporale e occipitale



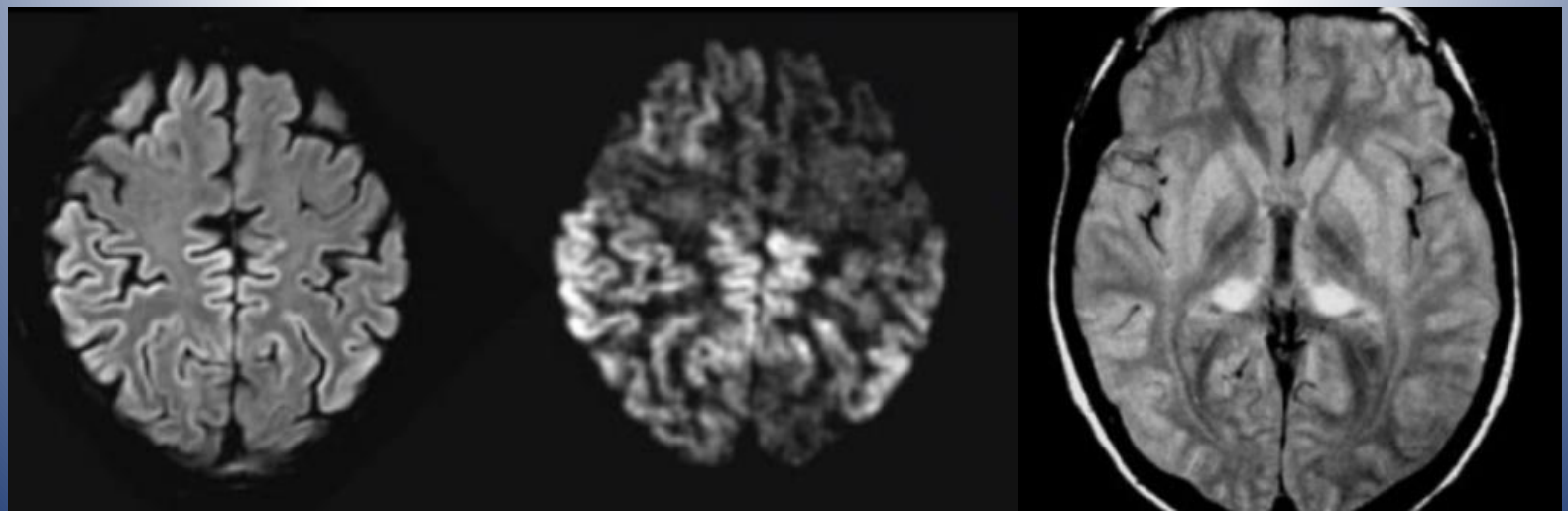
IDROCEFALO NORMOTESO

- ✓ 5-6% delle demenze
- ✓ Indice di Evan > 0.3
- ✓ Trasudazione periventricolare transependimale
- ✓ Scomparsa dei solchi parietali e persistenza di quelli frontali
- ✓ Upward bowing del corpo calloso
- ✓ Sella vuota
- ✓ Scomparsa in assiale dei solchi al vertice
- ✓ Ingrandimento spazi liquorali e della scissura silviana
- ✓ Assottigliamento posteriore del solco del cingolo
- ✓ Artefatto da flusso liquorale in acquedotto mesencefalico
- ✓ Alterazione dinamica liquorale (phase contrast)



MALATTIA DI CREUTZFELDT JACOB

- Malattia da prioni
- Demenza rapidamente progressiva
- Imaging: iperintensita T2/FLAIR: gangli della base, corteccia
- DWI: restrizione della diffusione



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Background

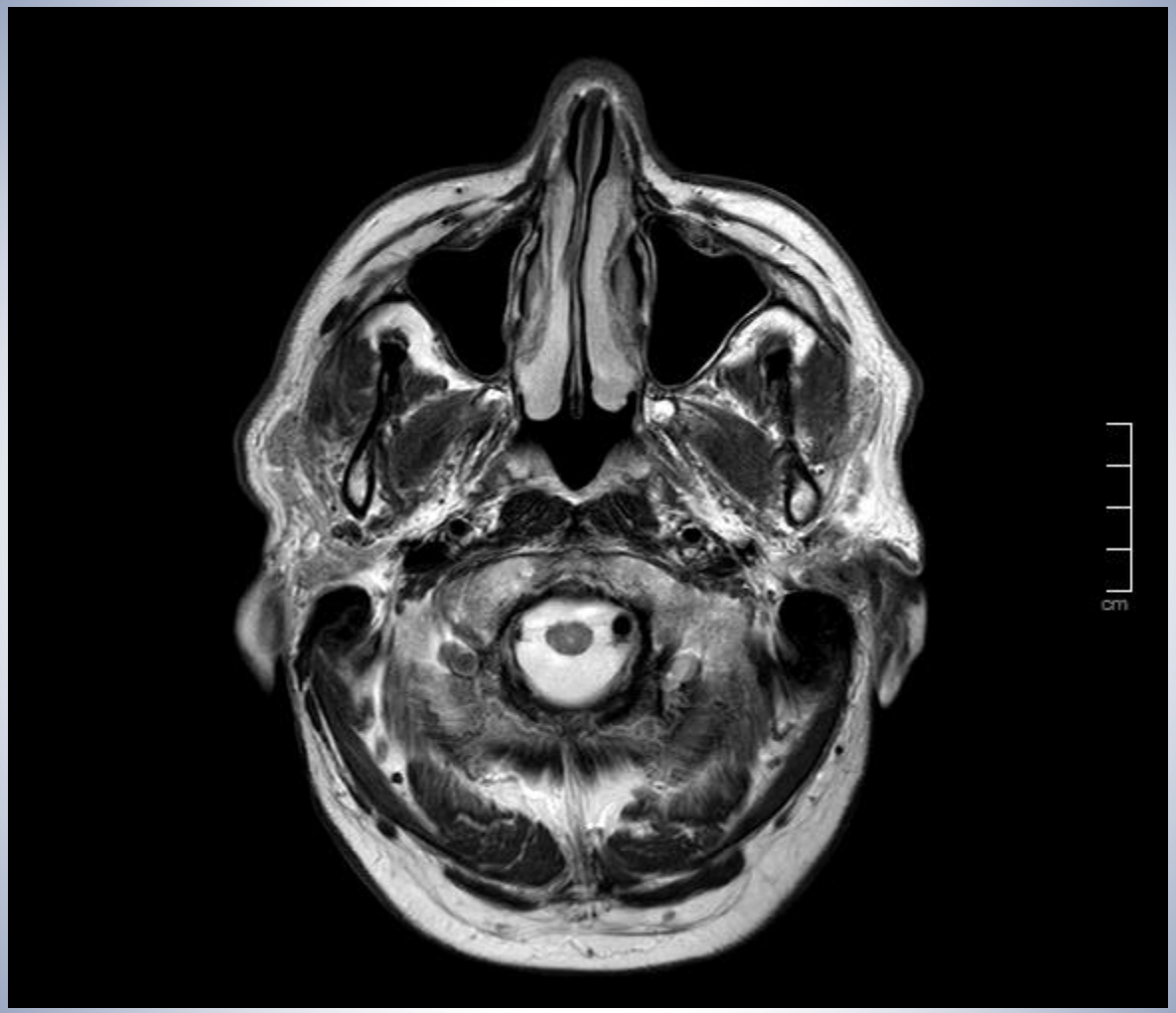
Although a detailed clinical assessment remains the basis of the evaluation of a patient with suspected dementia, current European [1,2], UK [3] and US [4] guidelines recommend that 'structural imaging should be used in the assessment of people with suspected dementia to exclude other cerebral pathologies and to help establish subtype diagnosis'. If the diagnosis is in doubt, functional imaging techniques should also be used to help distinguish different forms of neurodegenerative dementia [2,3]. In general, the tendency is to move away from simply excluding other (brain) diseases, towards finding specific pointers to a diagnosis [5]. This approach is exemplified by the formal incorporation of biomarkers, including those from neuroimaging, in the most recent revisions of the diagnostic criteria for Alzheimer's disease (AD) [6–8]. Two major classes of

IMAGING NEURORADIOLOGICO

- RM metodica di scelta
- Esclude la presenza di lesioni occupanti
- Supporta la diagnosi clinica (dd)
- TC utile se controindicazioni alla RM
- Imaging funzionale (ricerca clinica)

CASO CLINICO

- Uomo, 68aa.
- Vigile, eloquio disartrico.
- Marcia a base allargata, paraparetо-atassica.
- Ipertensione e DM ben compensati.
- In terapia con Novorapid, Novomix, metformina, Cosyrel, Norvasc, Totalip.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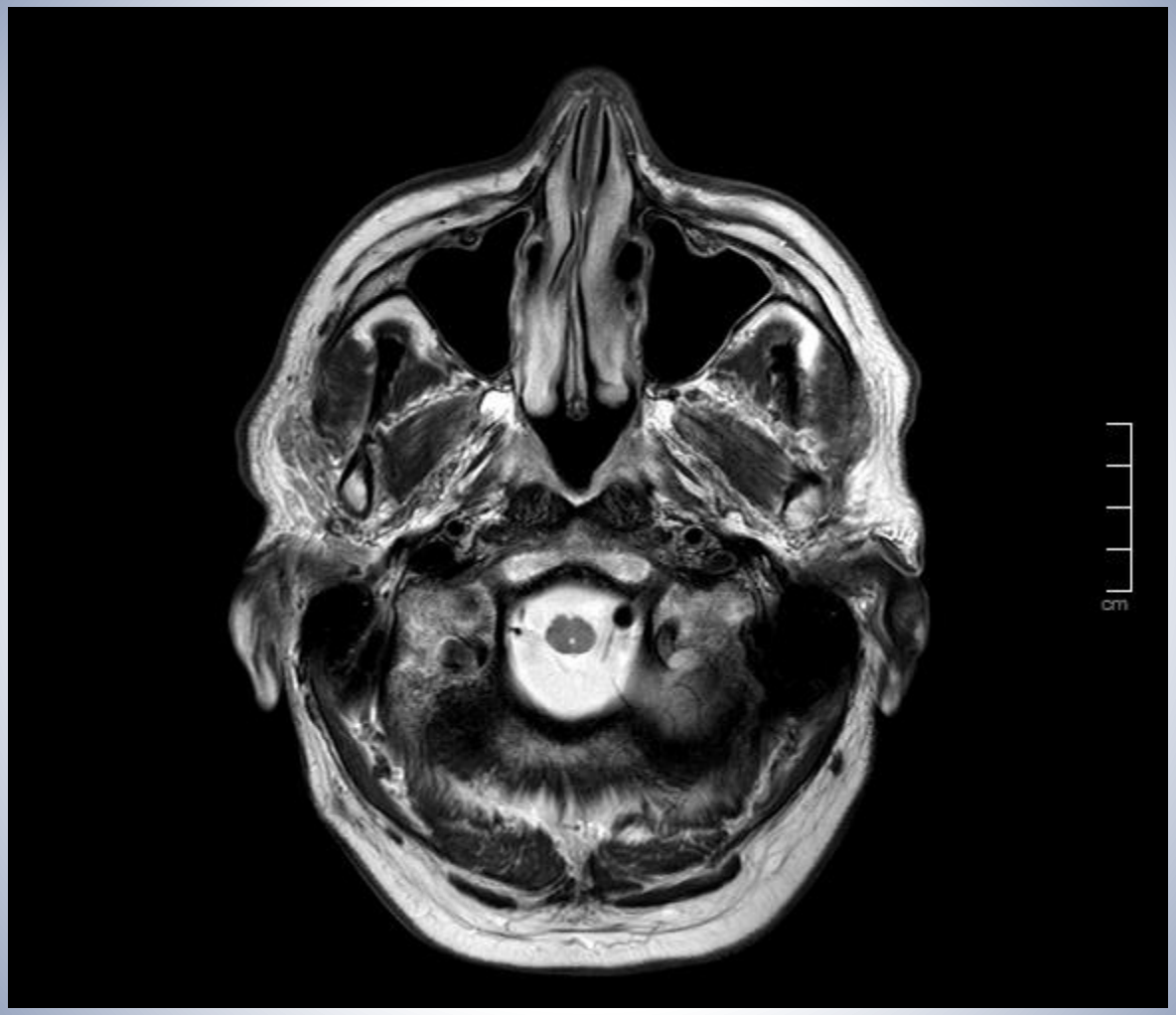
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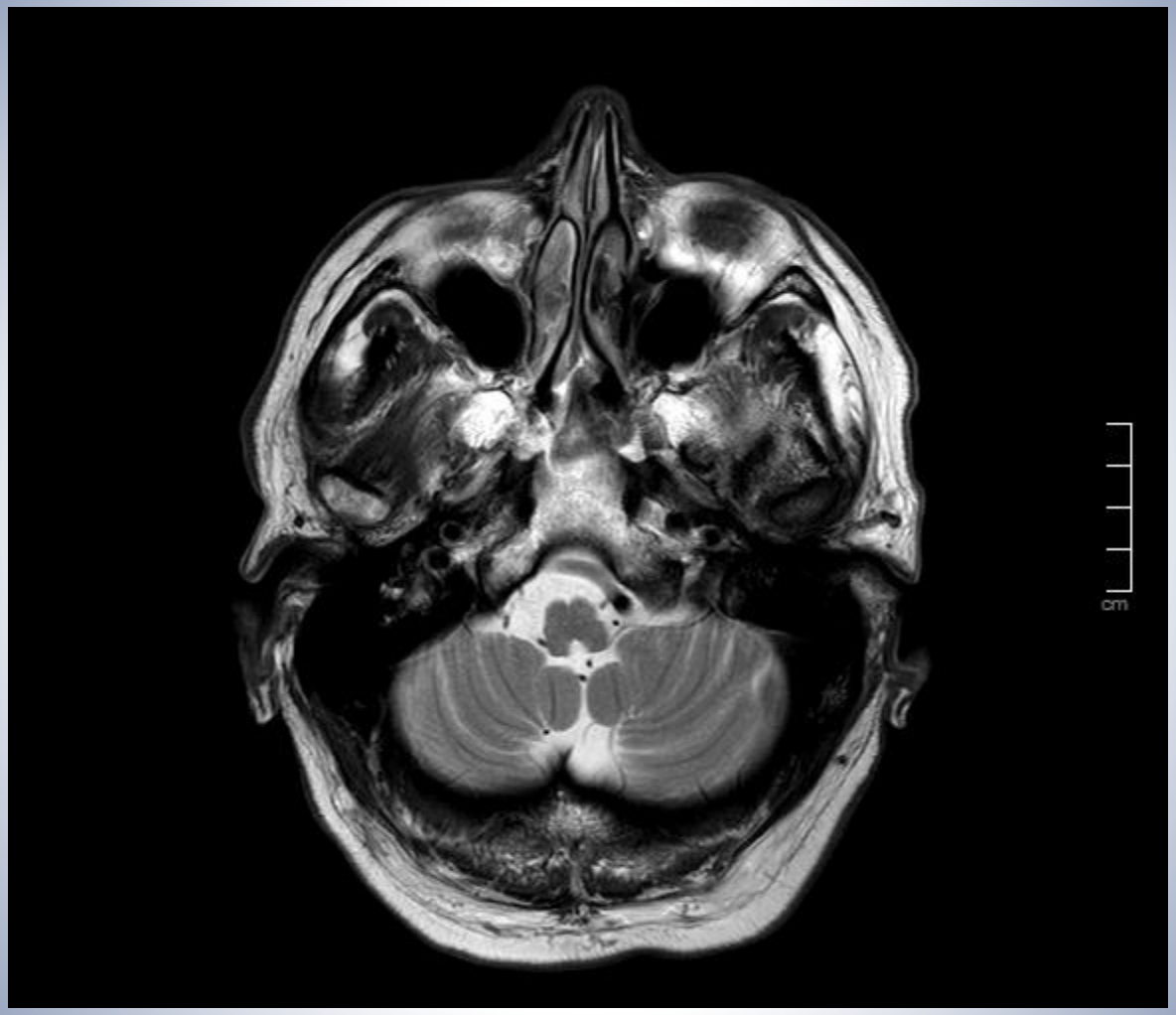
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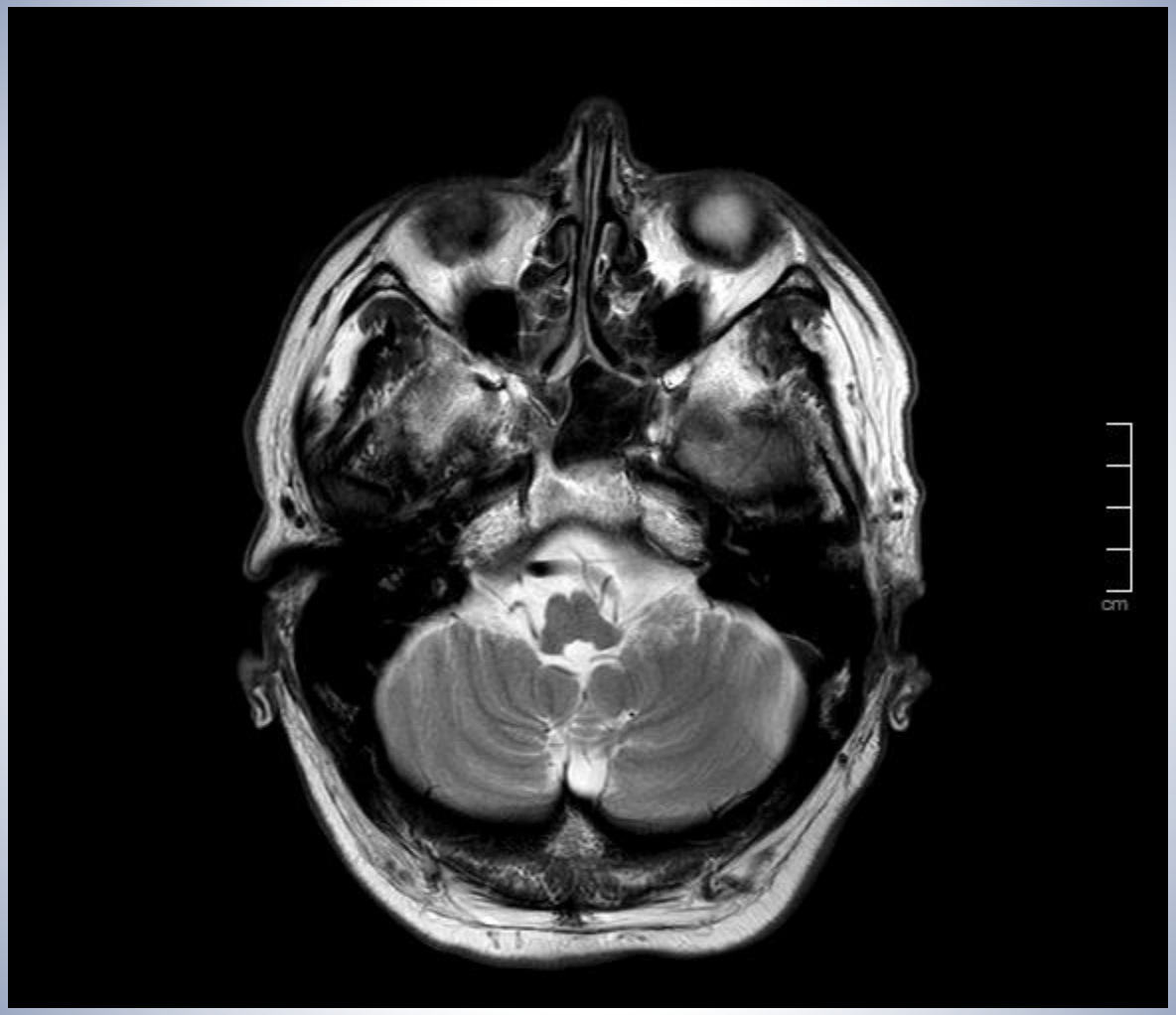
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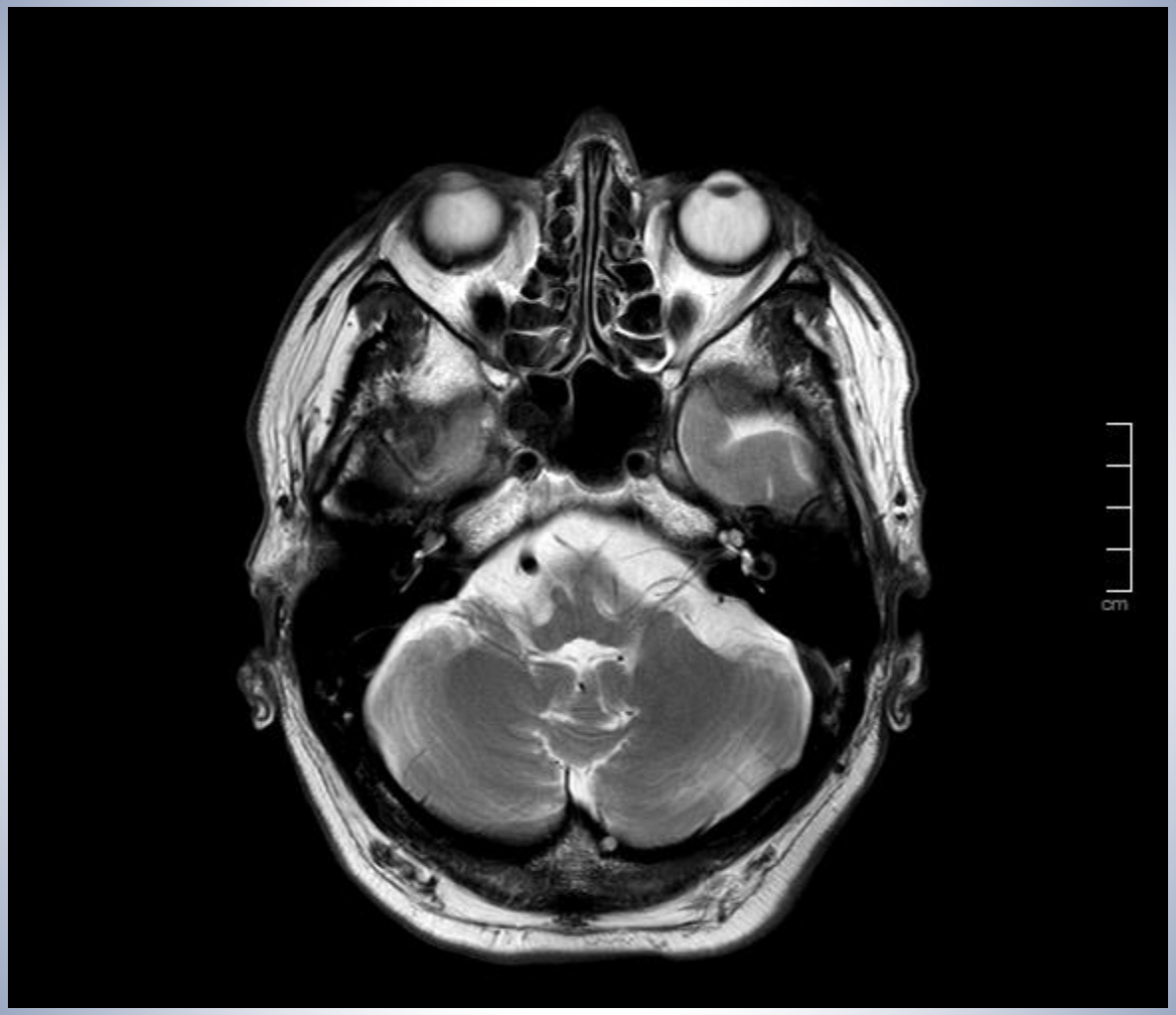
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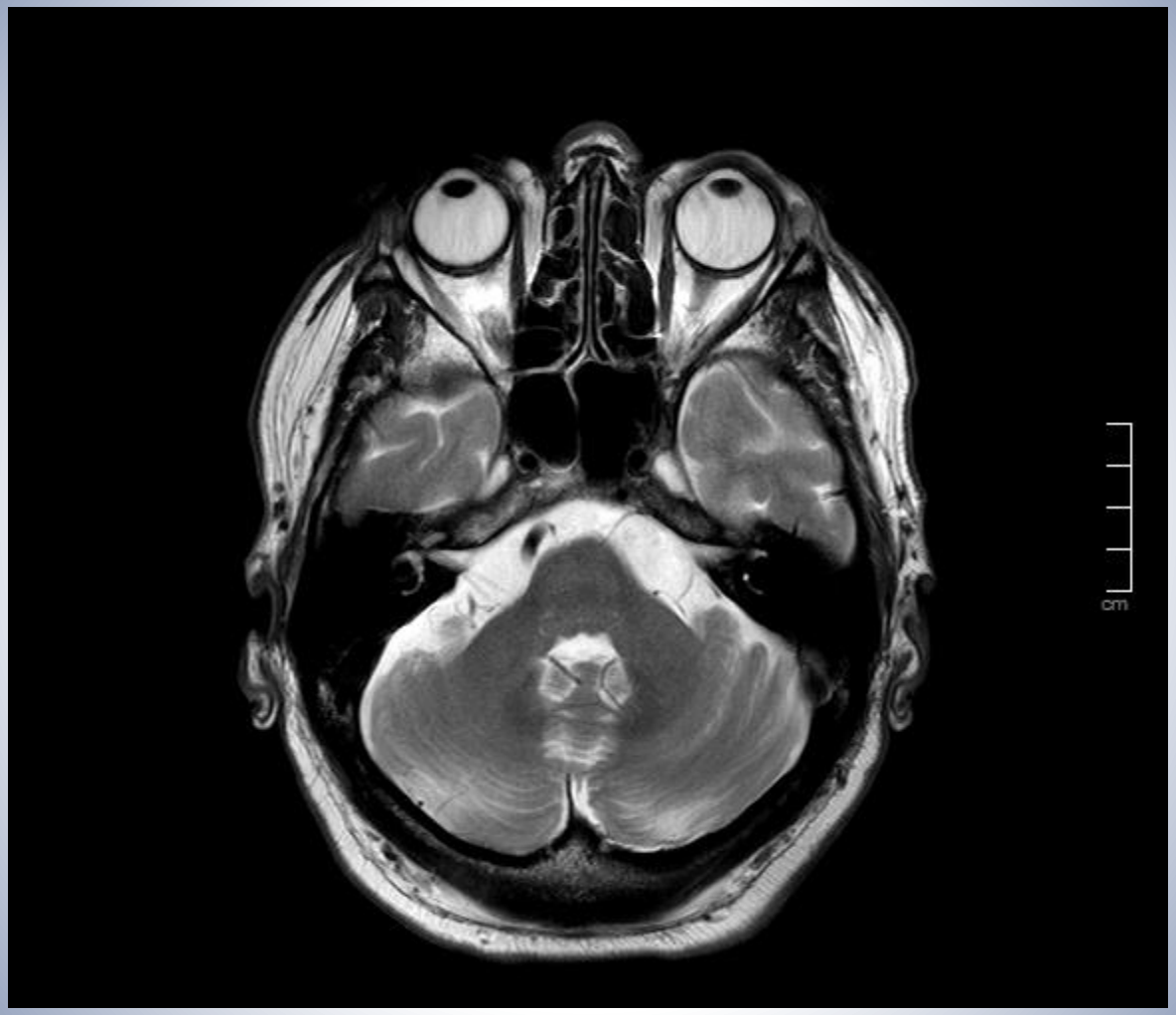
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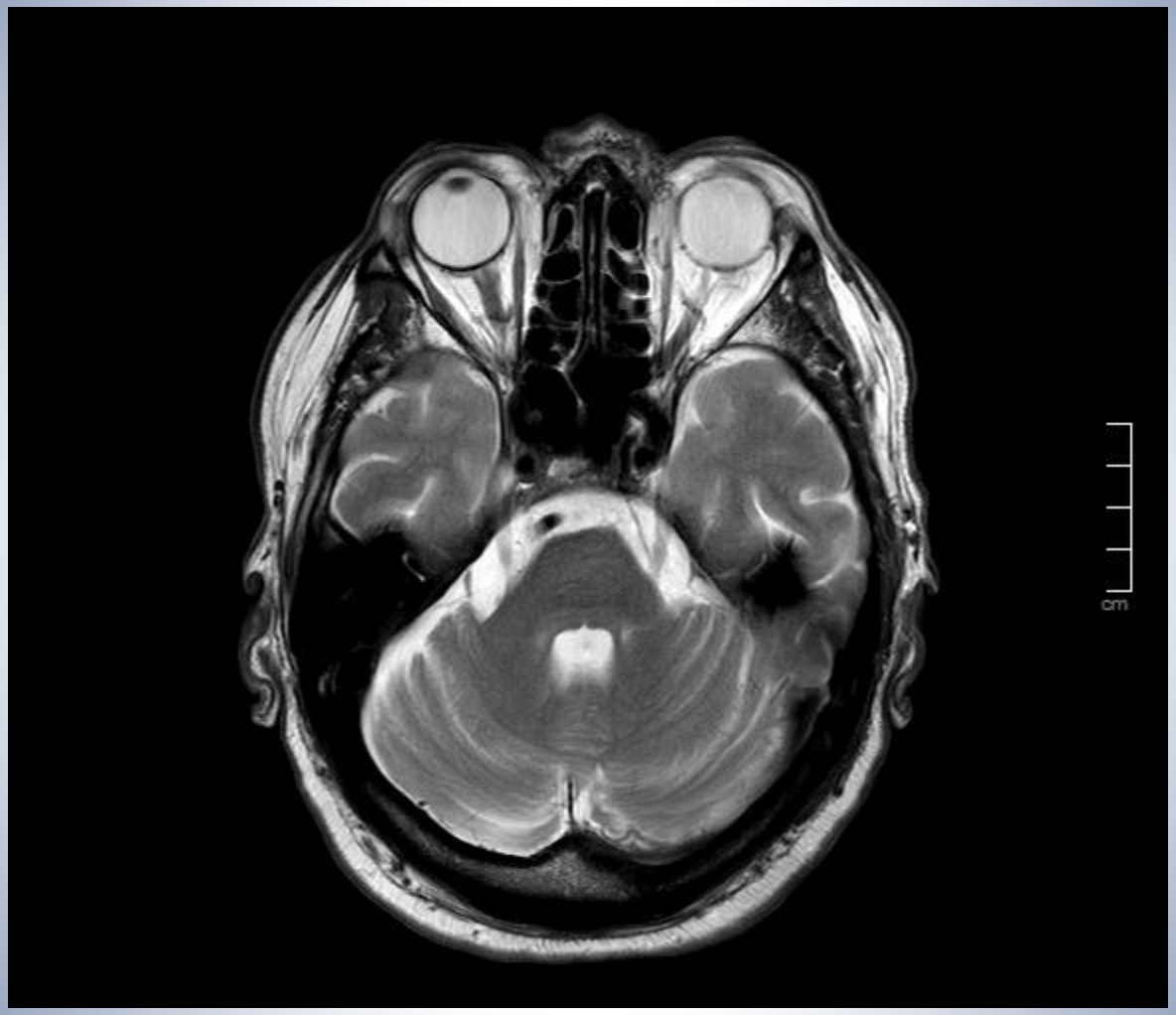
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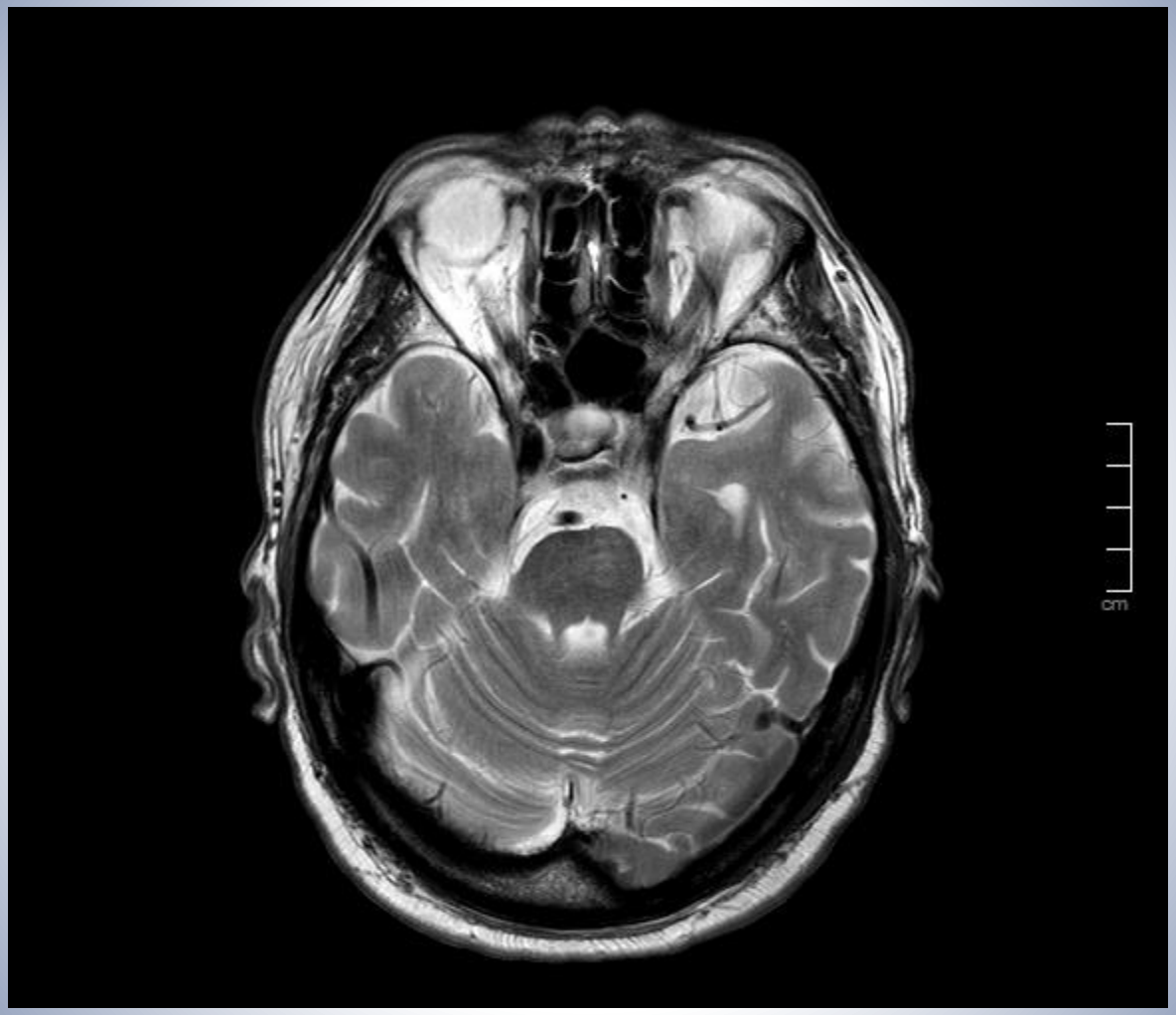
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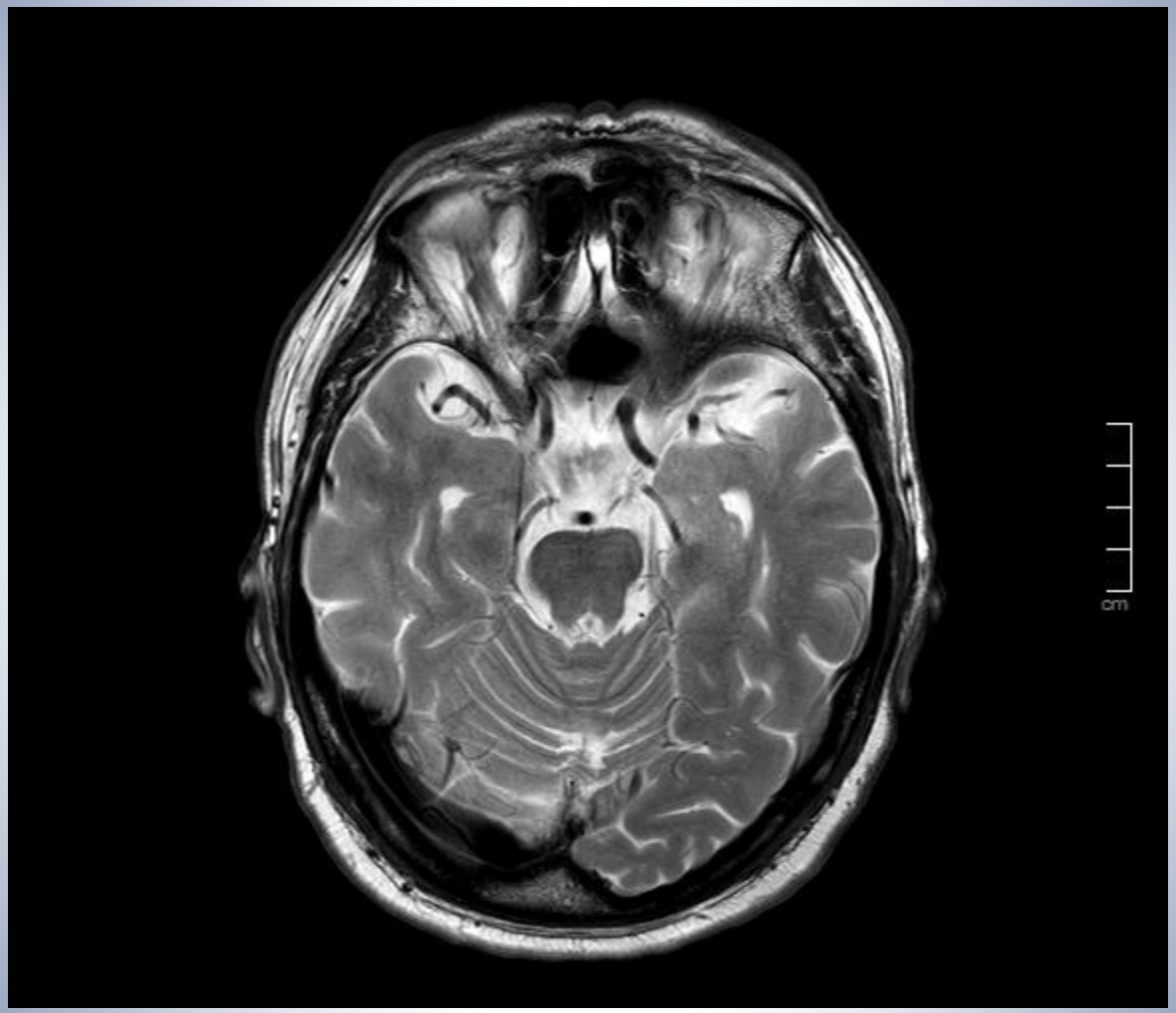
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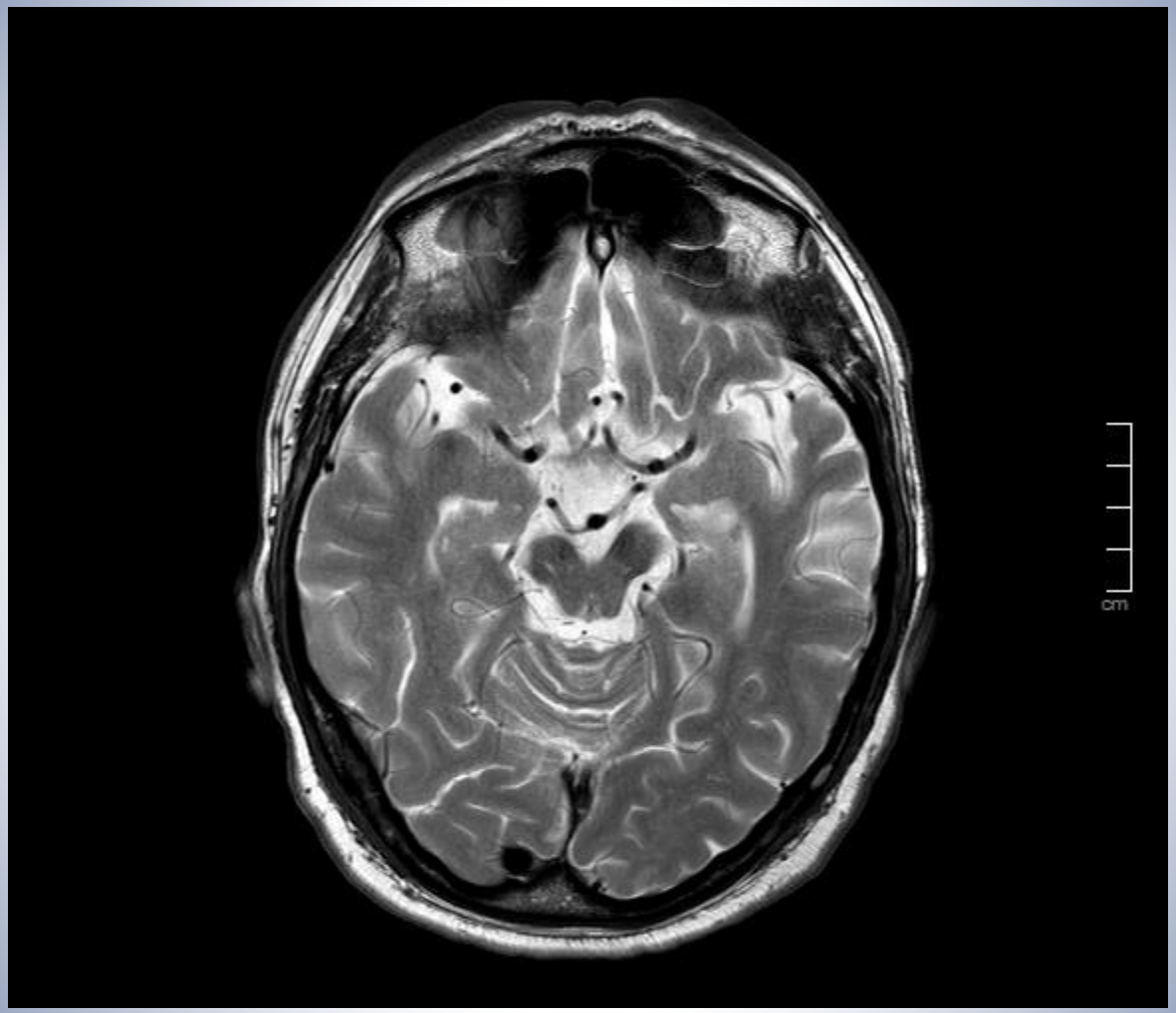
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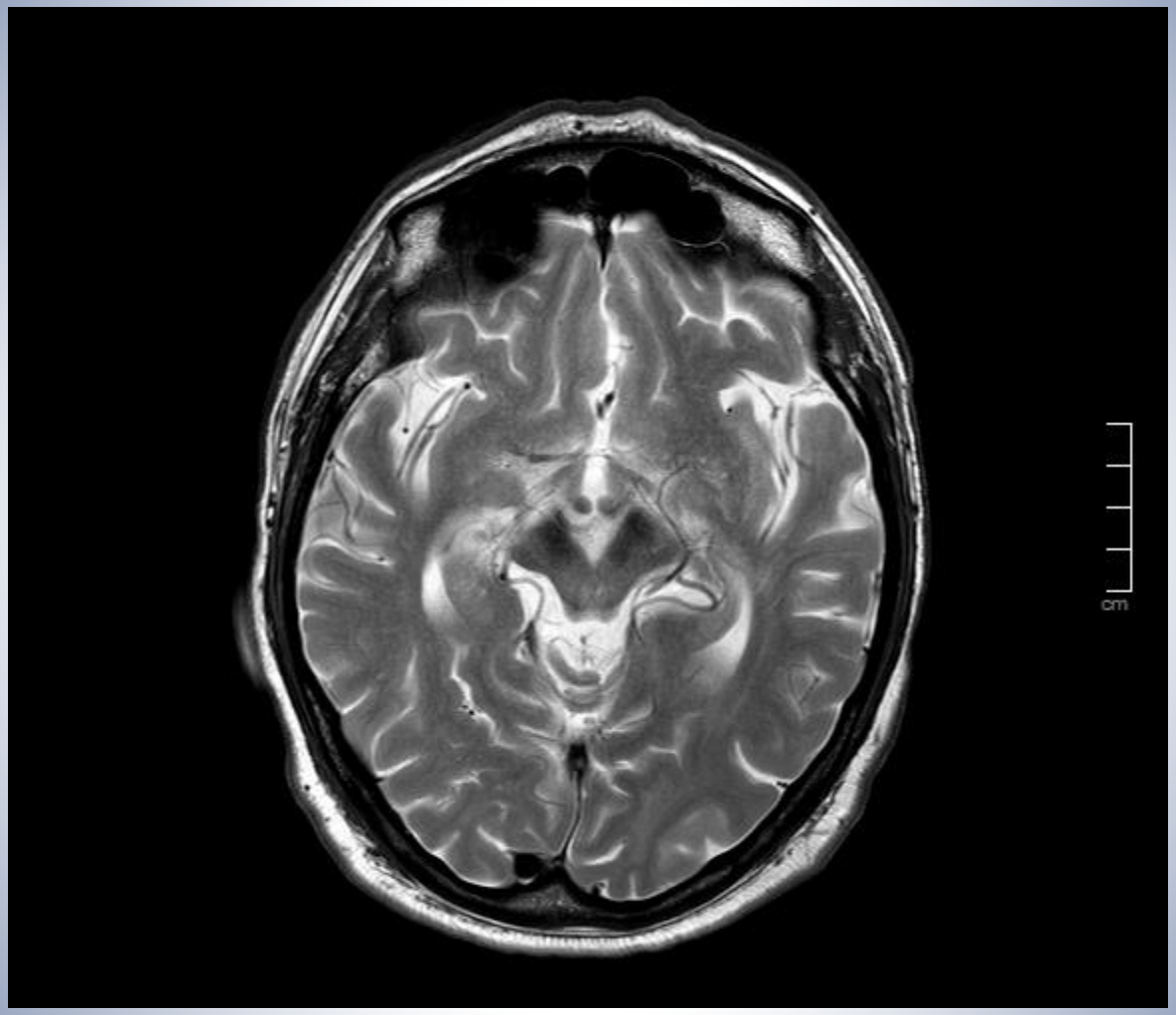
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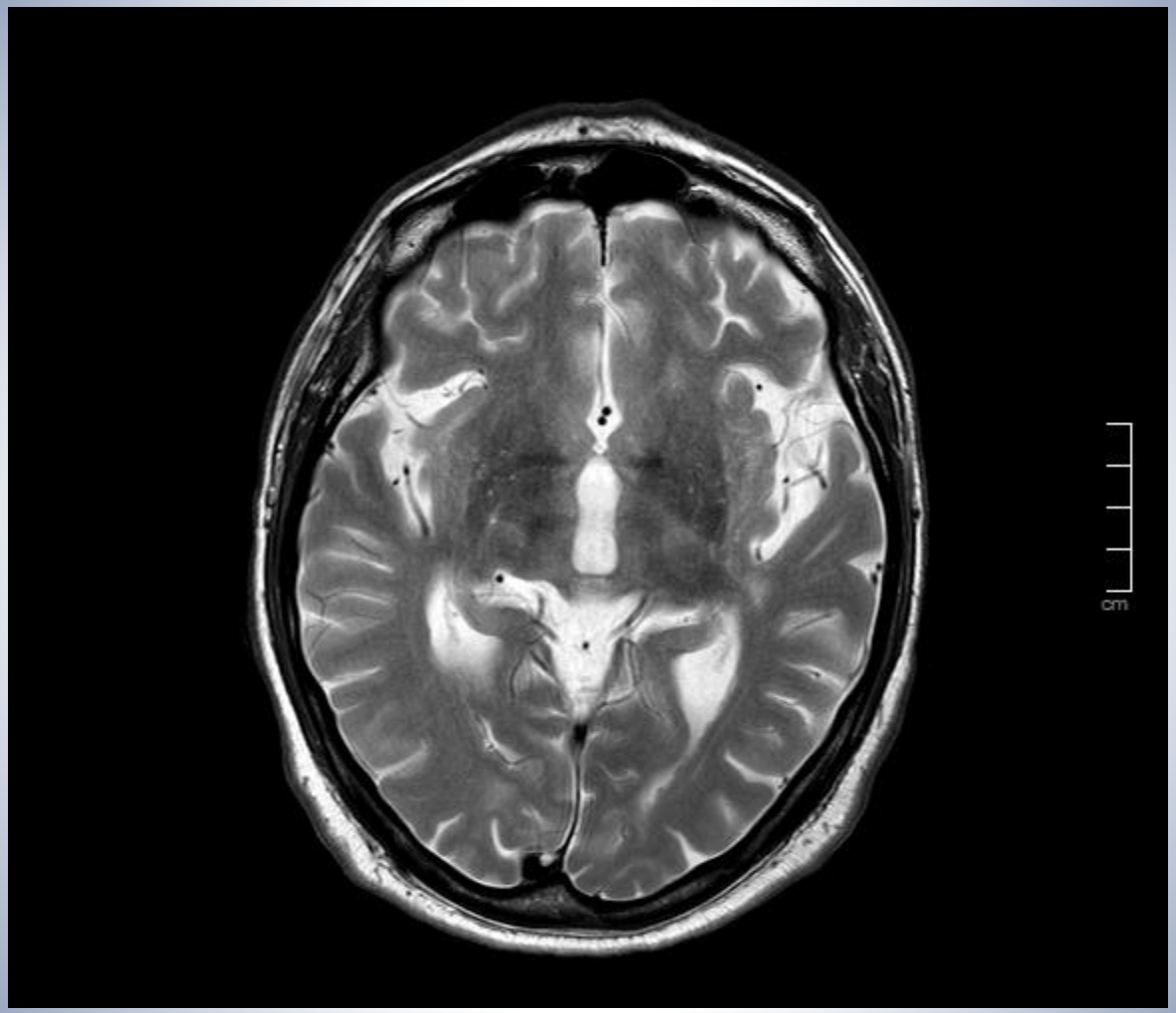
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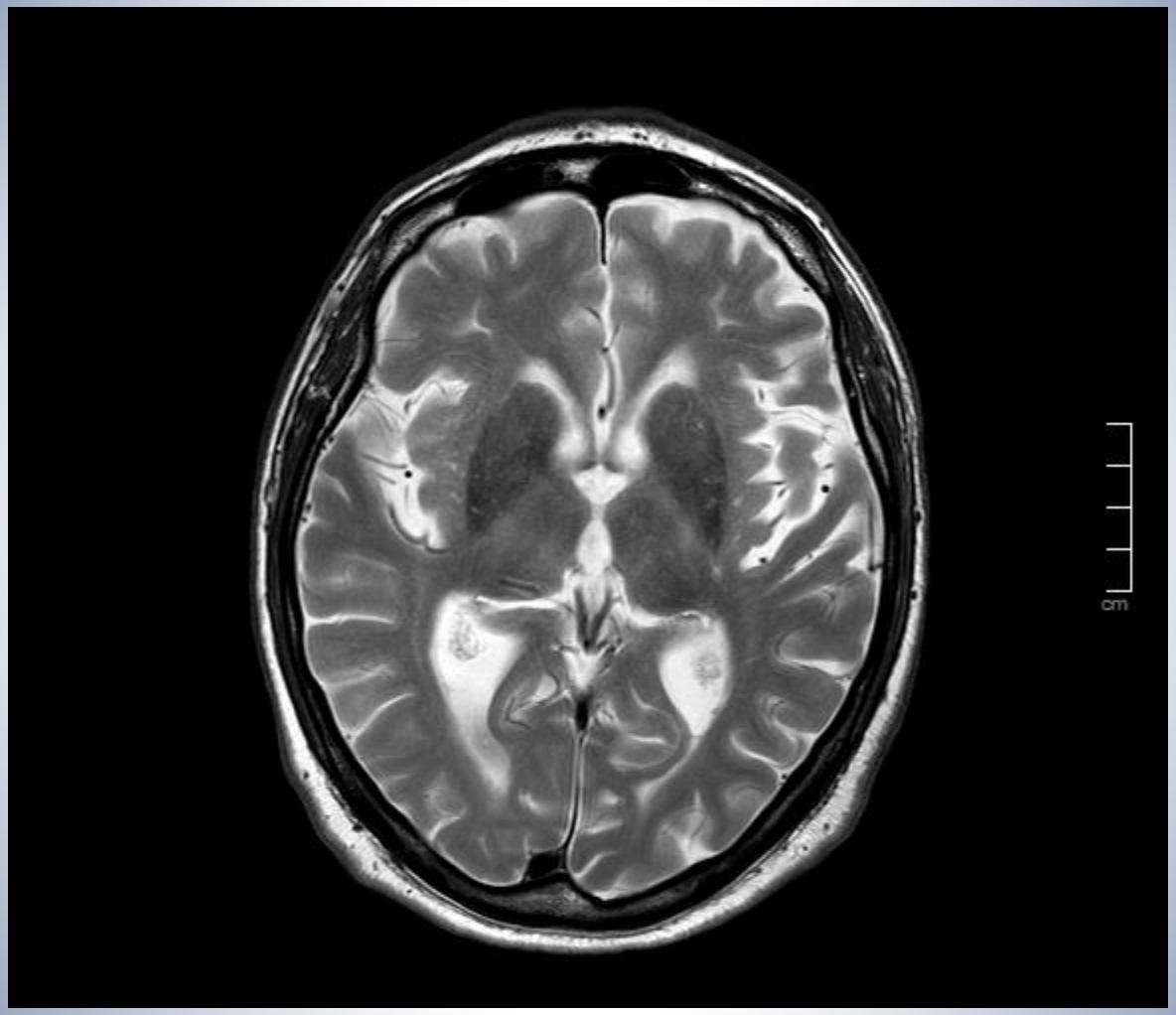
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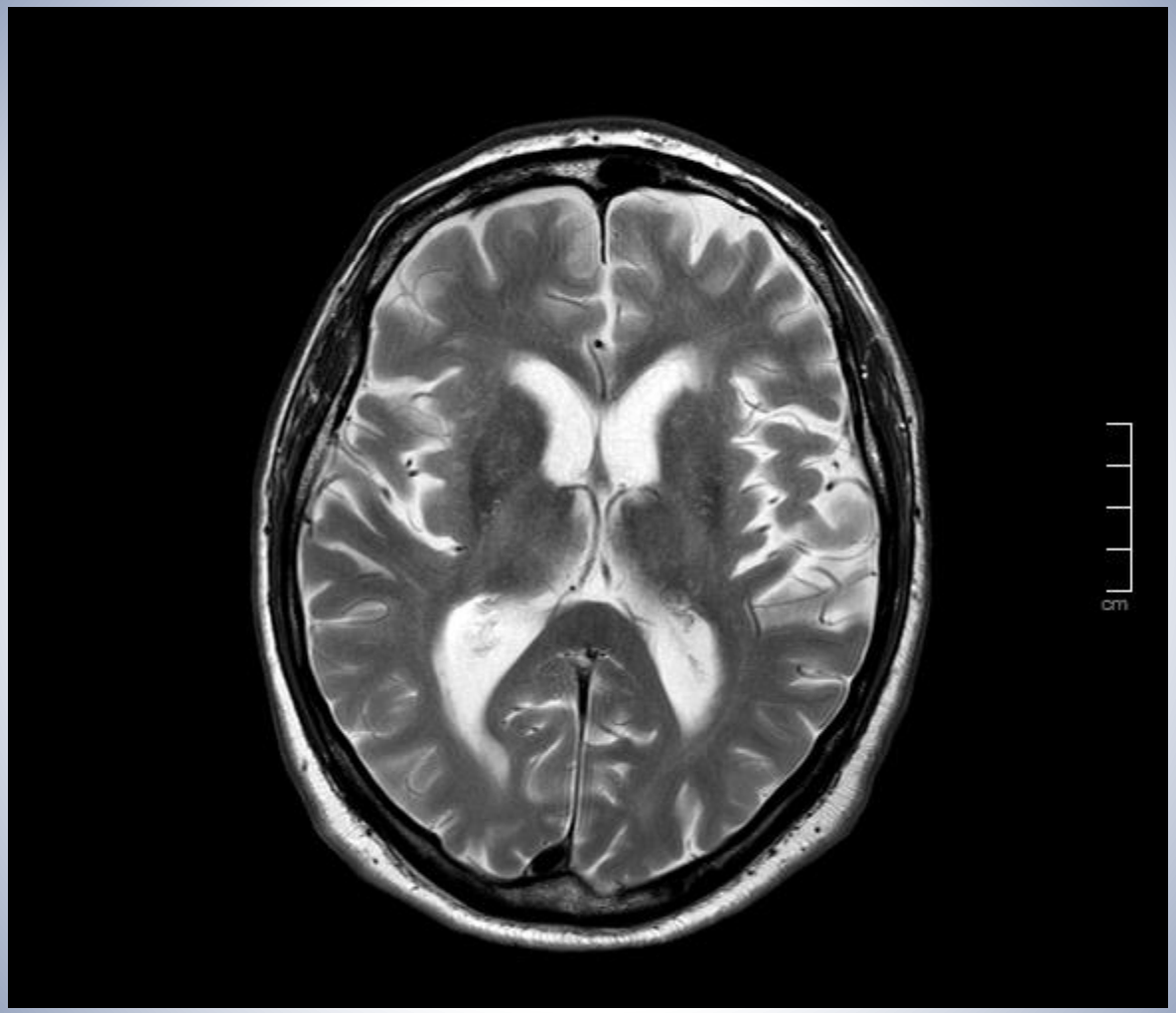
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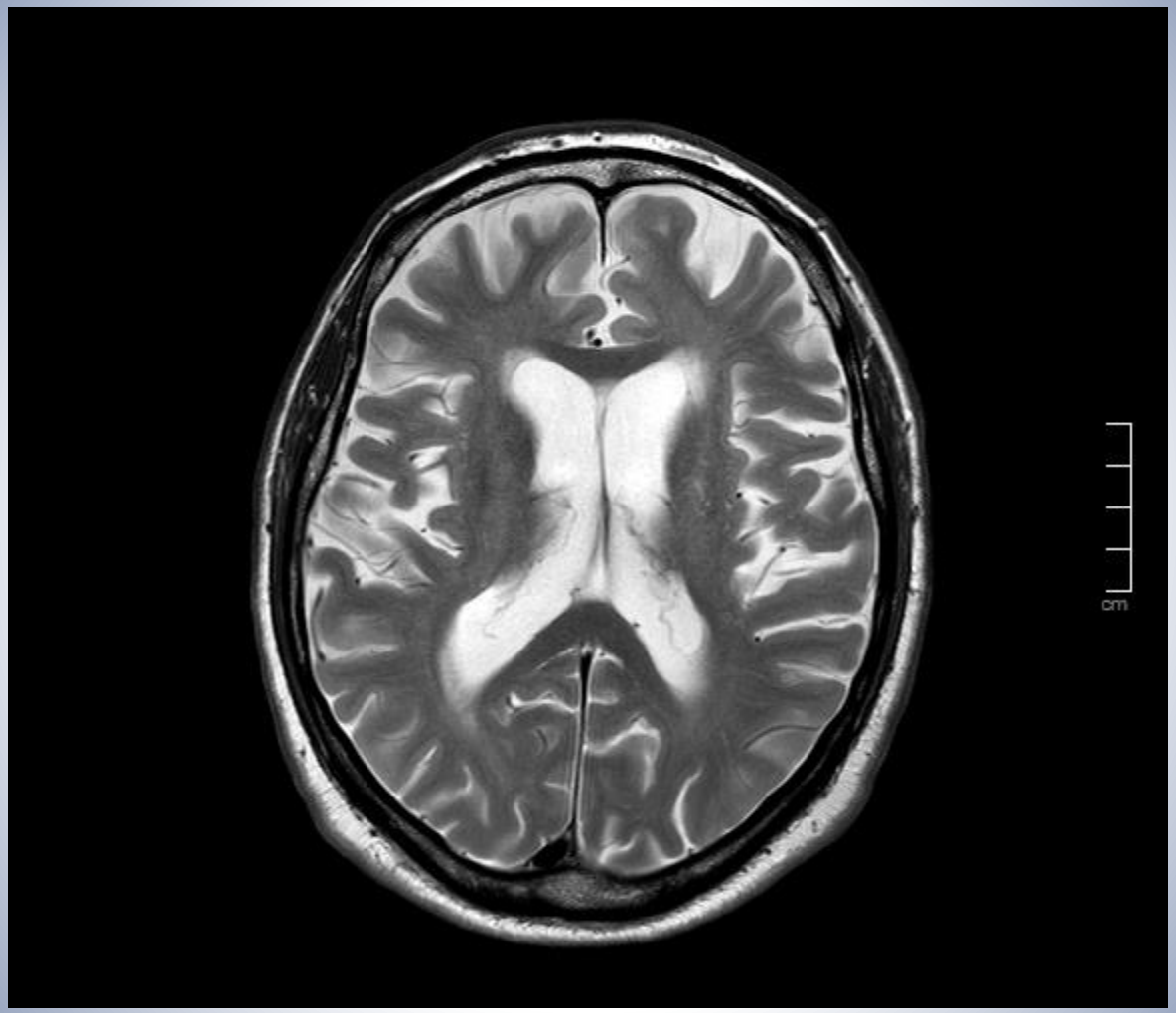
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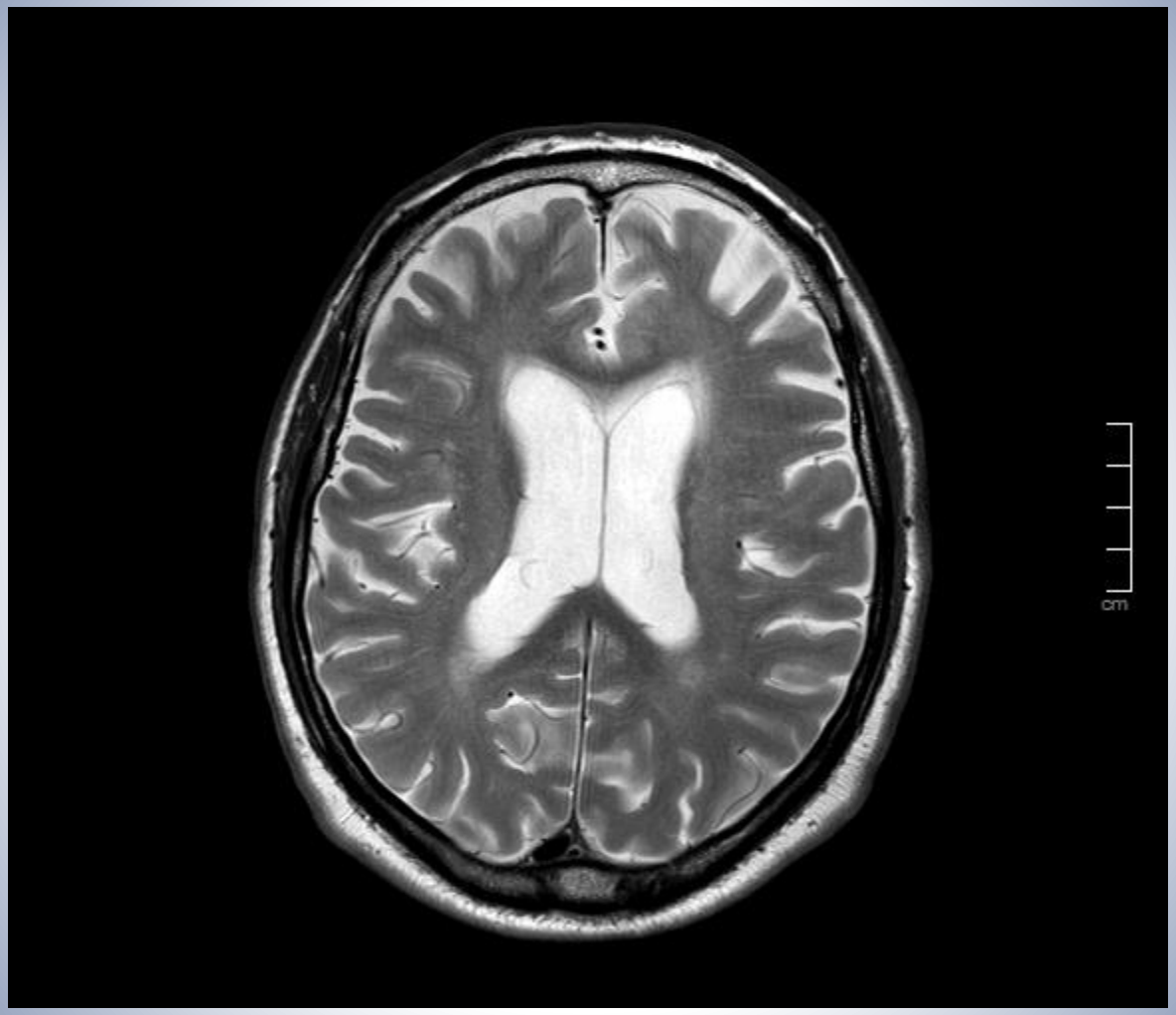
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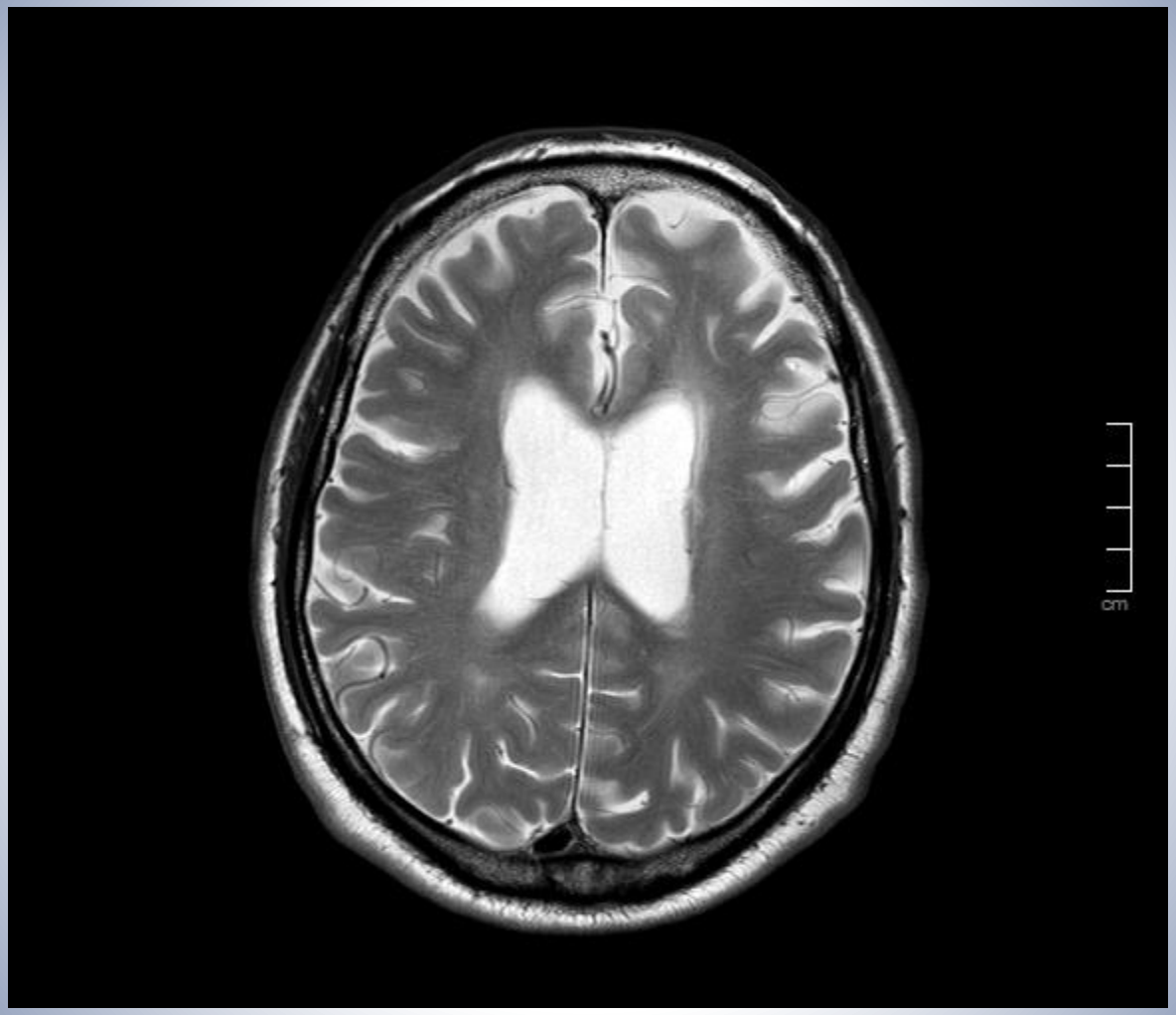
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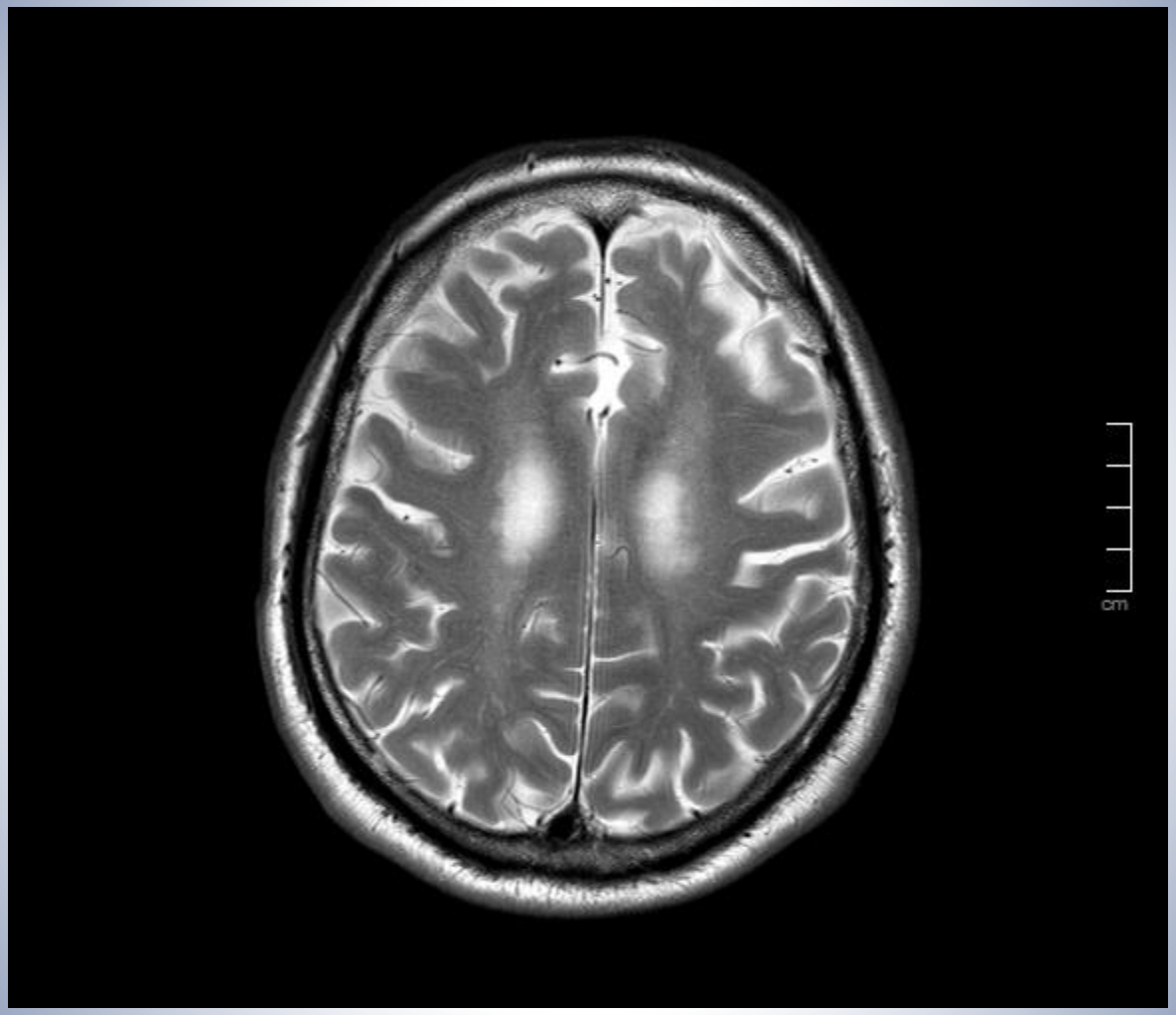
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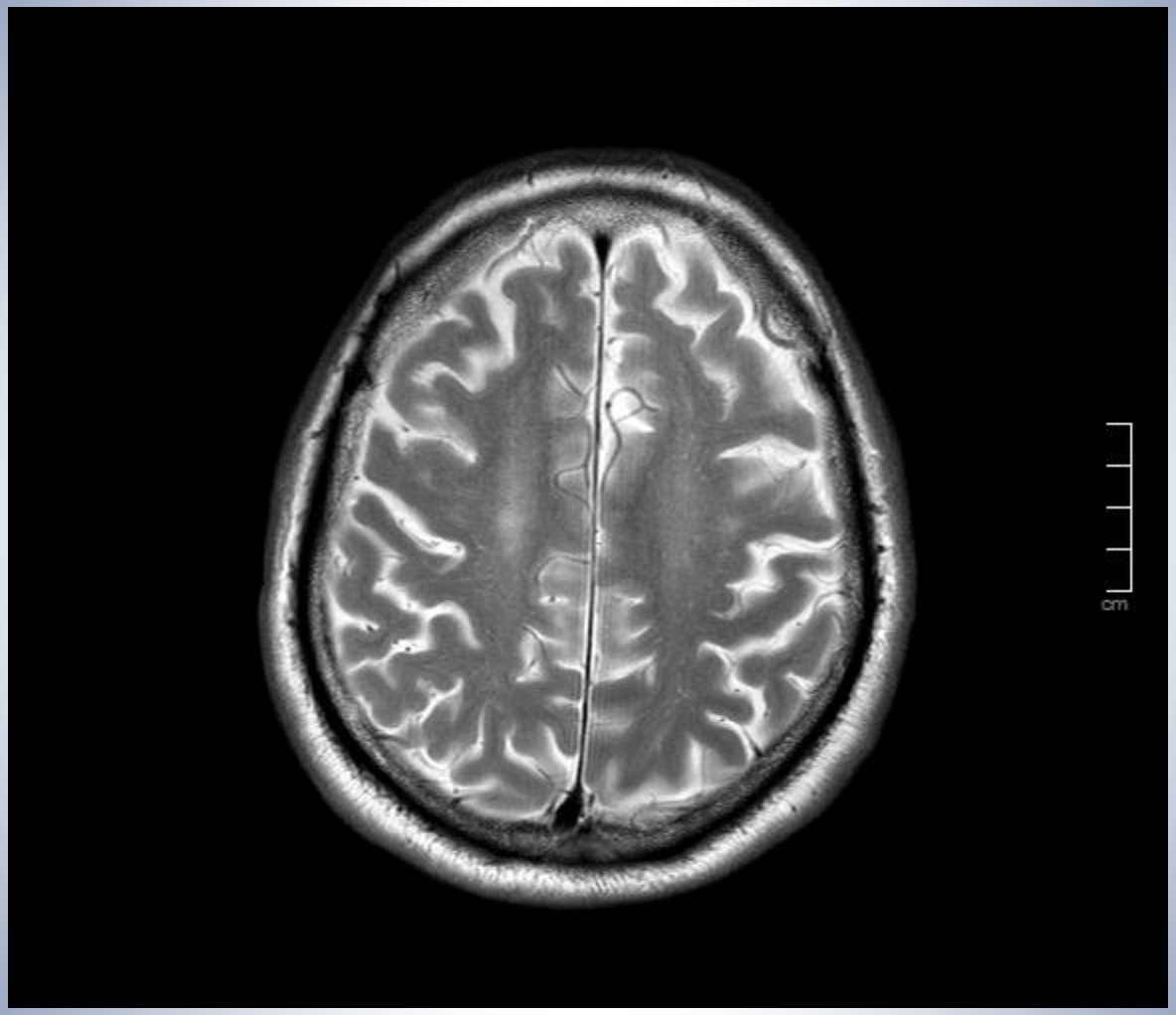
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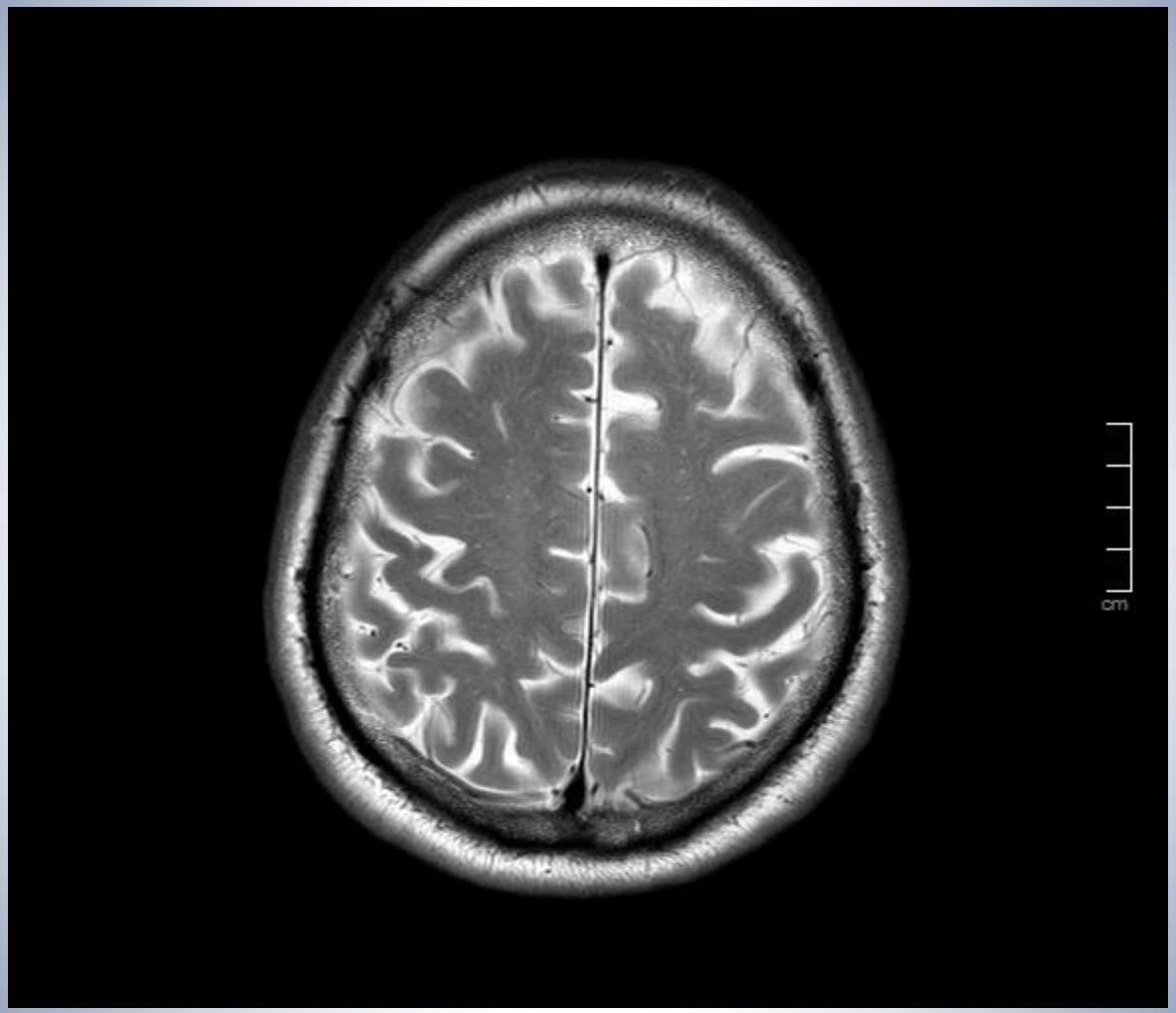
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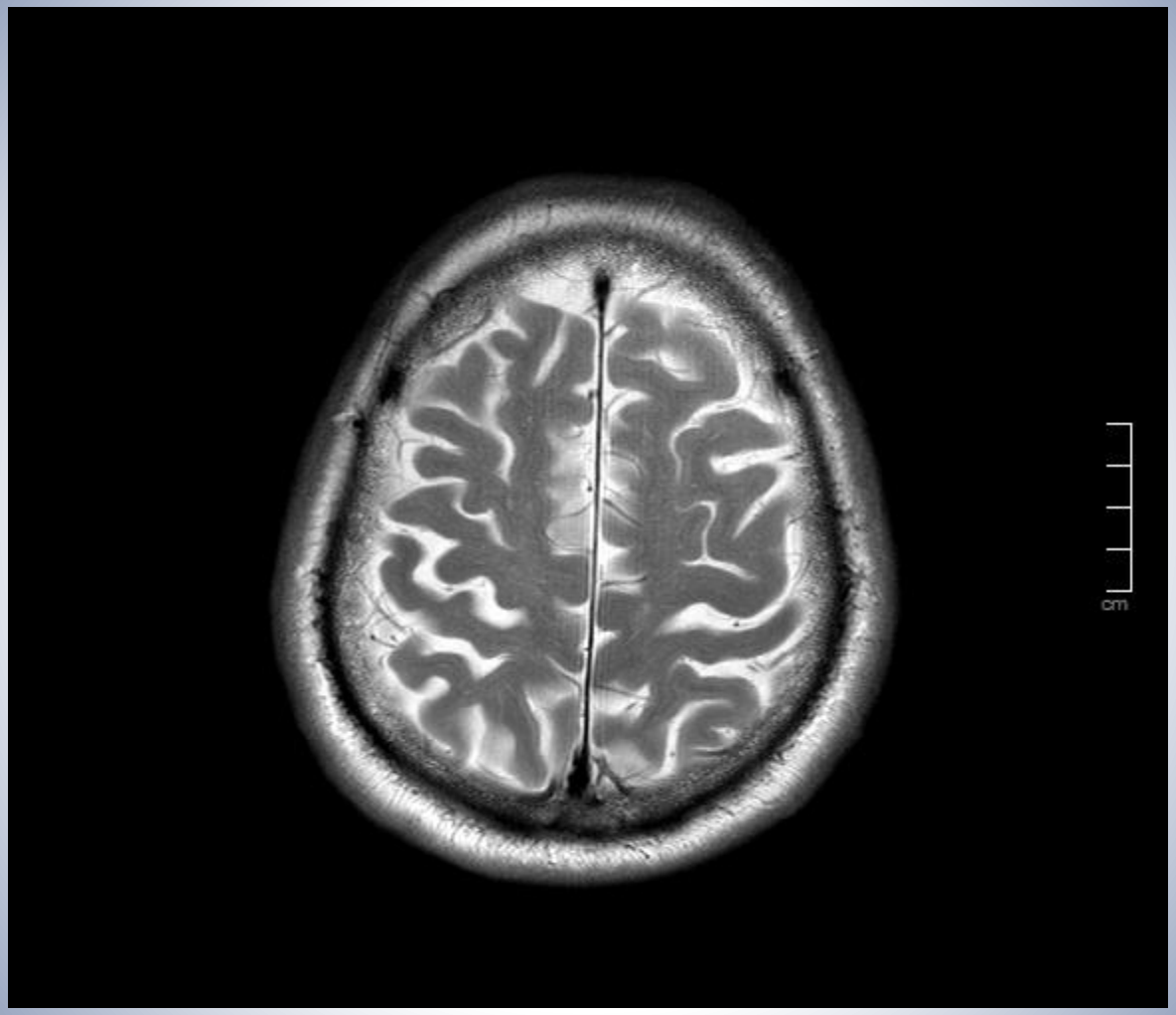
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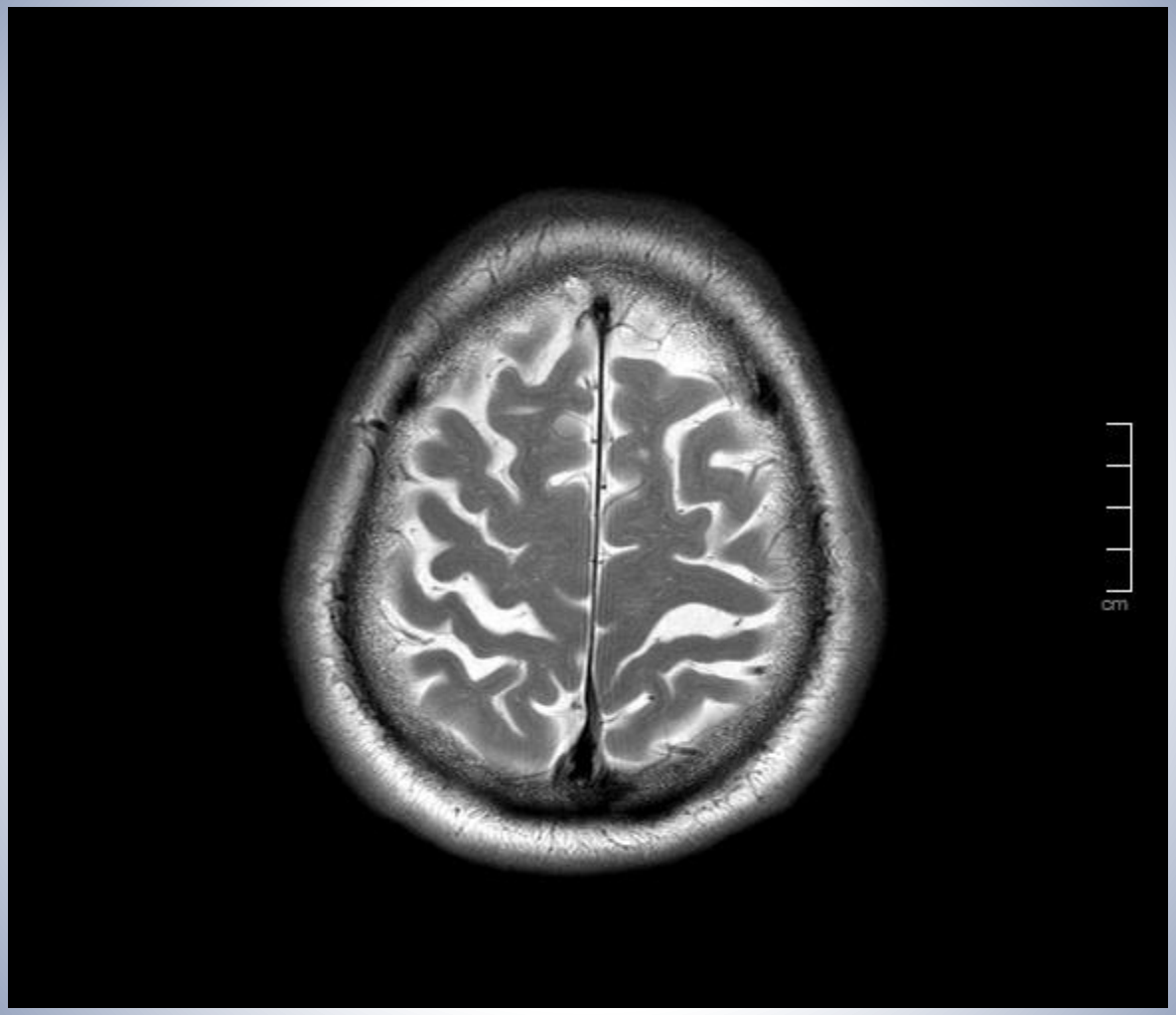
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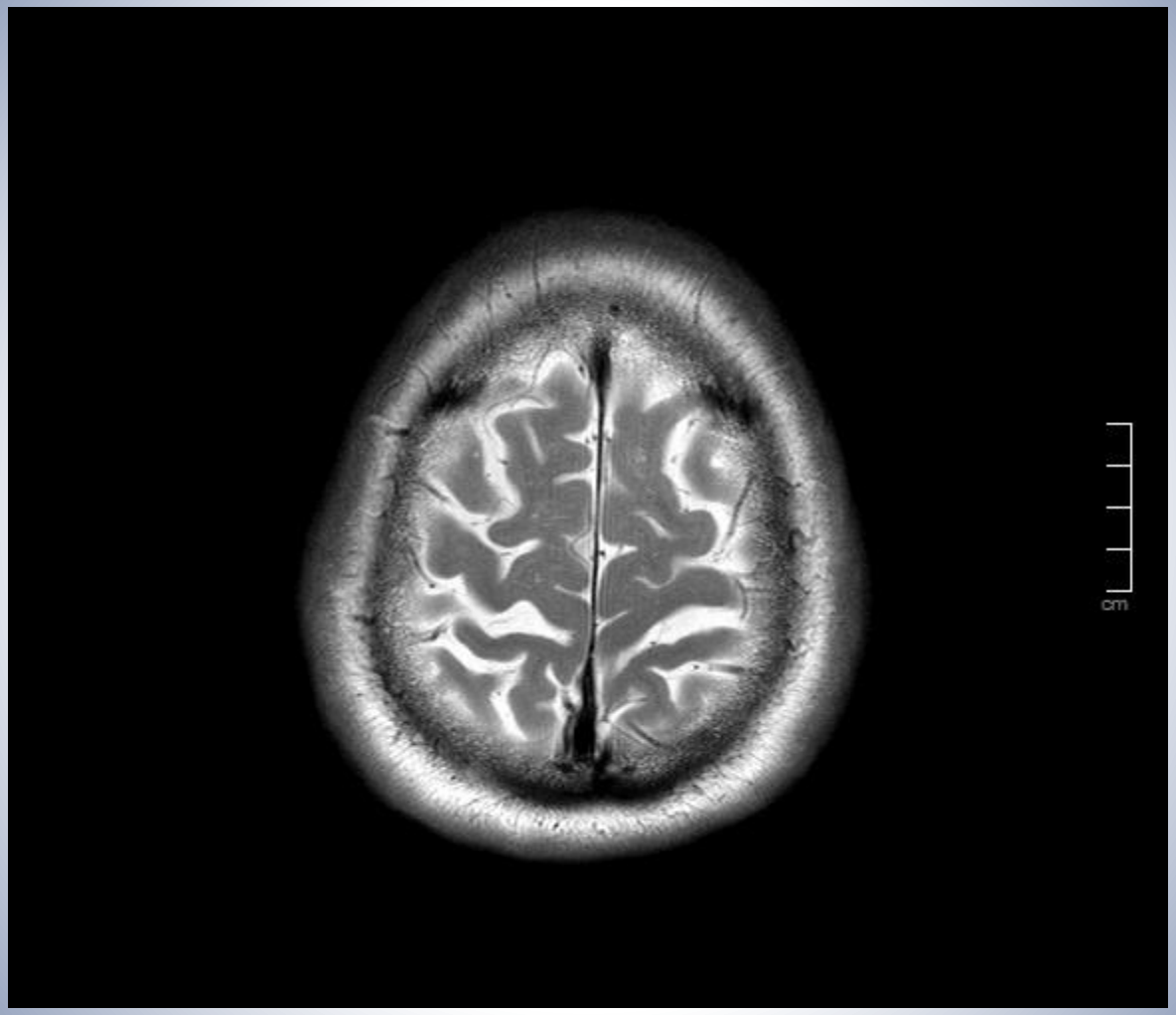
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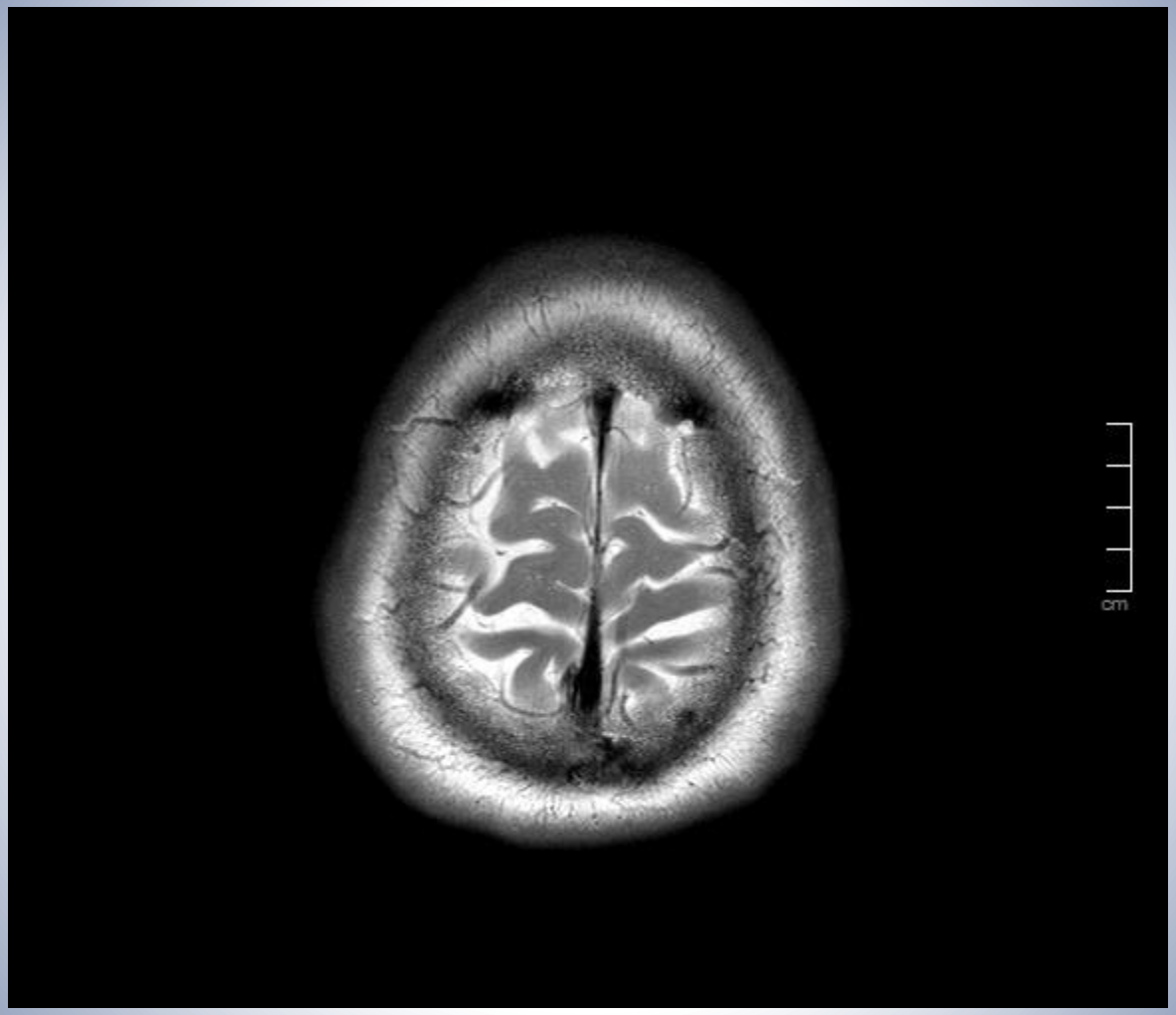
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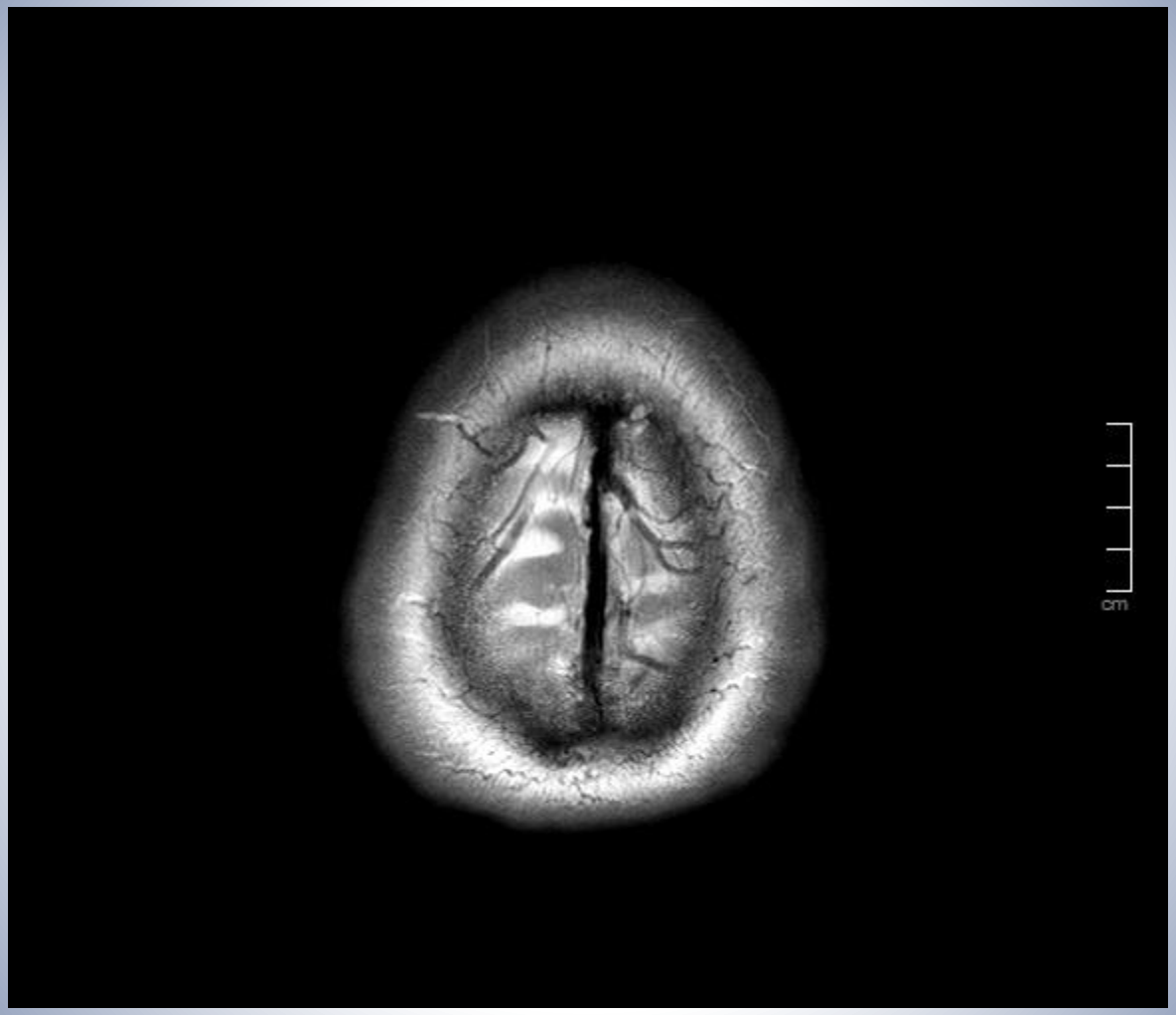
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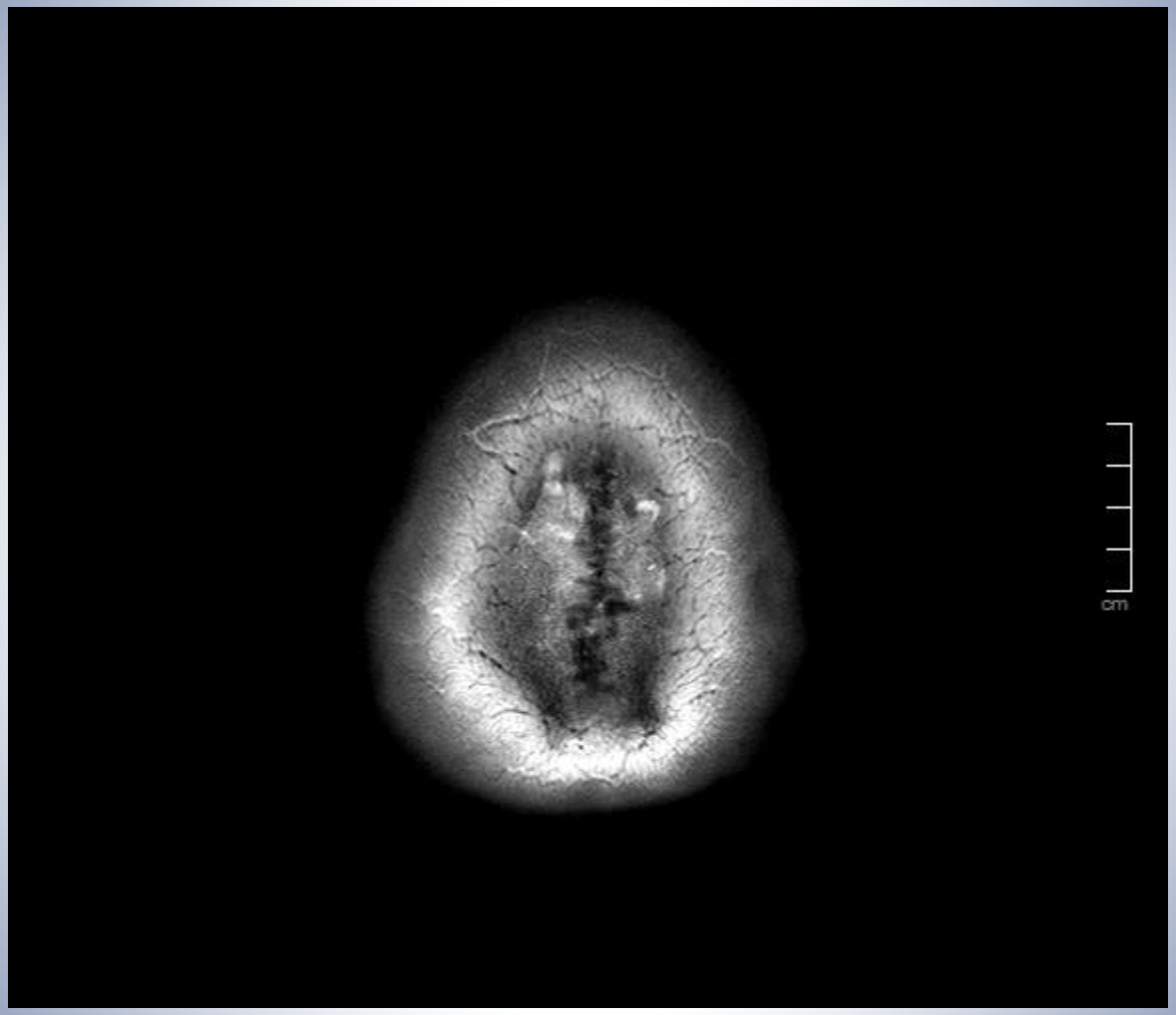
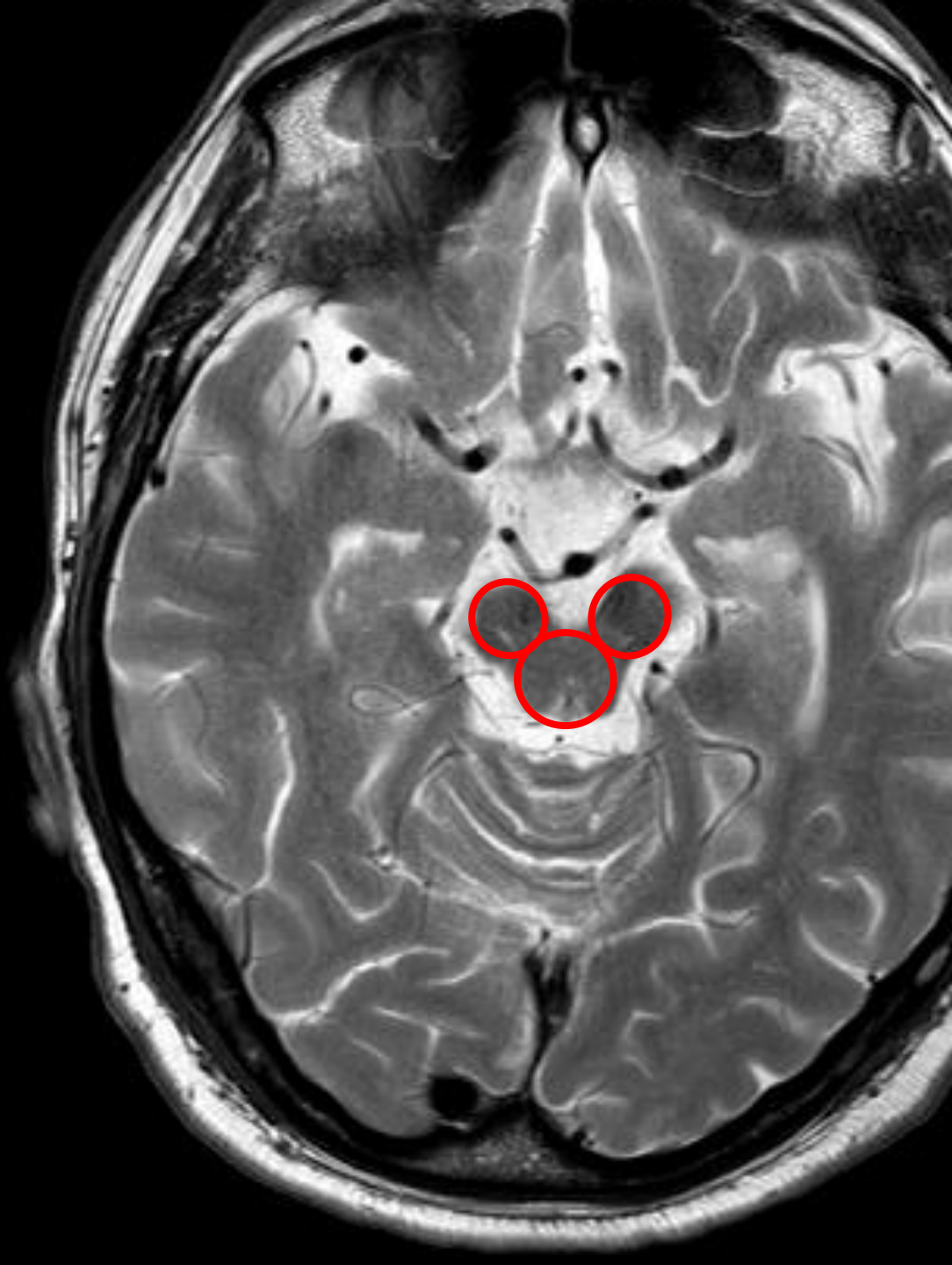

cm

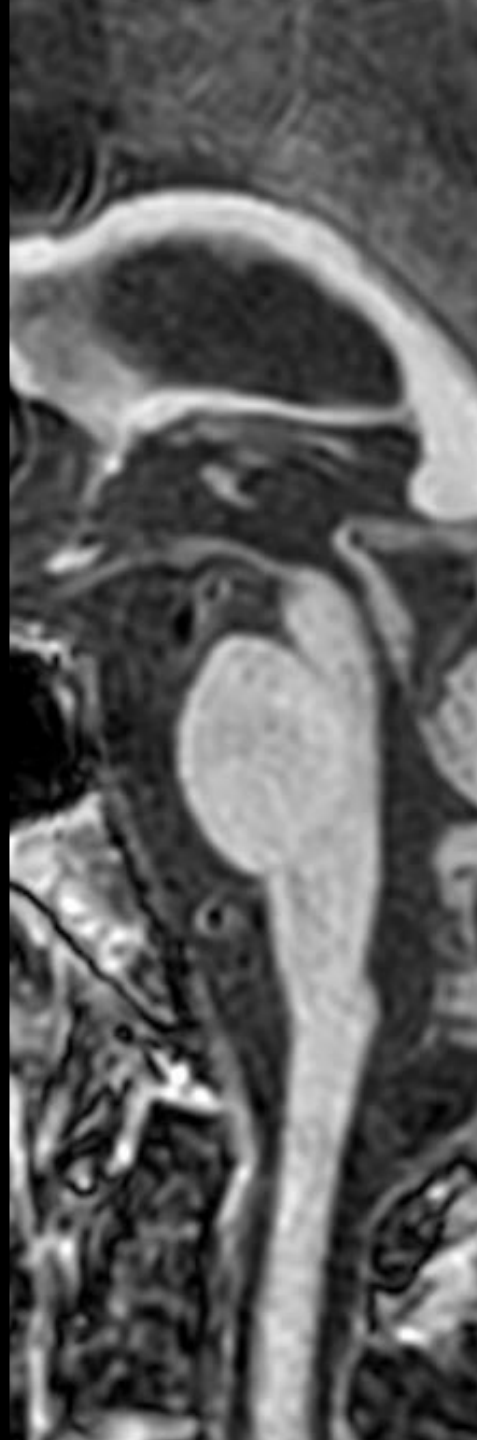
“Mickey Mouse” sign

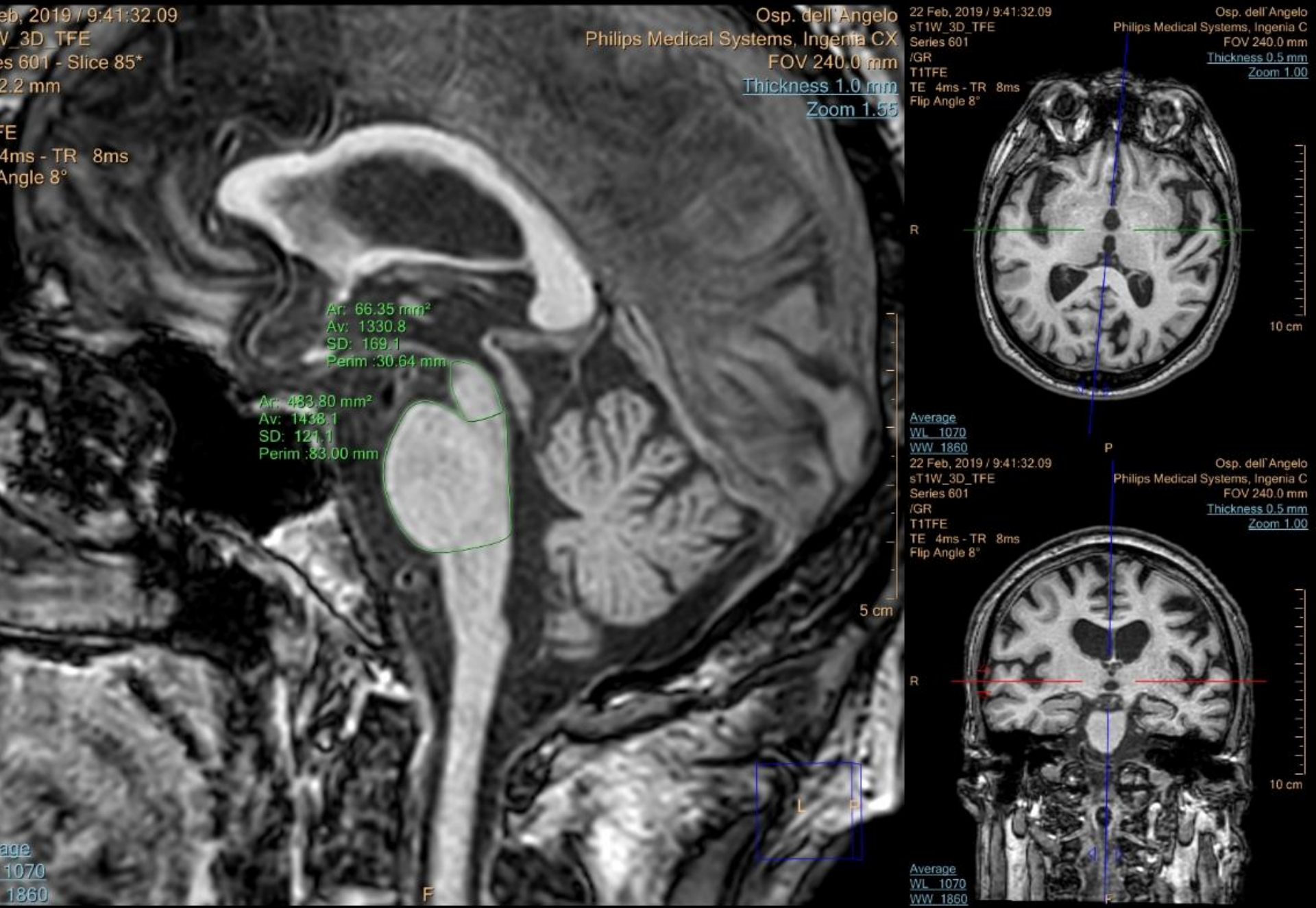
Riduzione del diametro anteroposteriore del mesencefalo sulle immagini assiali.



“Hummingbird sign”

L’atrofia del mesencefalo (testa del colibrì) è particolarmente evidente se confrontata con il normale trofismo del ponte (corpo del colibrì).

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V_3D_TFE
es 601 - Slice 85*
2.2 mm
FE
4ms - TR 8ms
Angle 8°
Osp. dell'Angelo
Philips Medical Systems, Ingenia CX
FOV 240.0 mm
Thickness 1.0 mm
Zoom 1.55
Ar: 66.35 mm²
Av: 1330.8
SD: 169.1
Perim :30.64 mm
Ar: 483.80 mm²
Av: 1438.1
SD: 121.1
Perim :83.00 mm
5 cm
L
F
F
age
1070
1860
22 Feb, 2019 / 9:41:32.09
sT1W_3D_TFE
Series 601
/GR
T1TFE
TE 4ms - TR 8ms
Flip Angle 8°
Osp. dell'Angelo
Philips Medical Systems, Ingenia C
FOV 240.0 mm
Thickness 0.5 mm
Zoom 1.00
R
10 cm
Average
WL 1070
WW 1860
P
22 Feb, 2019 / 9:41:32.09
sT1W_3D_TFE
Series 601
/GR
T1TFE
TE 4ms - TR 8ms
Flip Angle 8°
Osp. dell'Angelo
Philips Medical Systems, Ingenia C
FOV 240.0 mm
Thickness 0.5 mm
Zoom 1.00
R
10 cm
Average
WL 1070
WW 1860
F

PSP?

Grazie per l’attenzione