MRI OF BRAIN METASTASIS

Dr P. AGUETTAZ
Hôpital Privé Clairval
Marseille

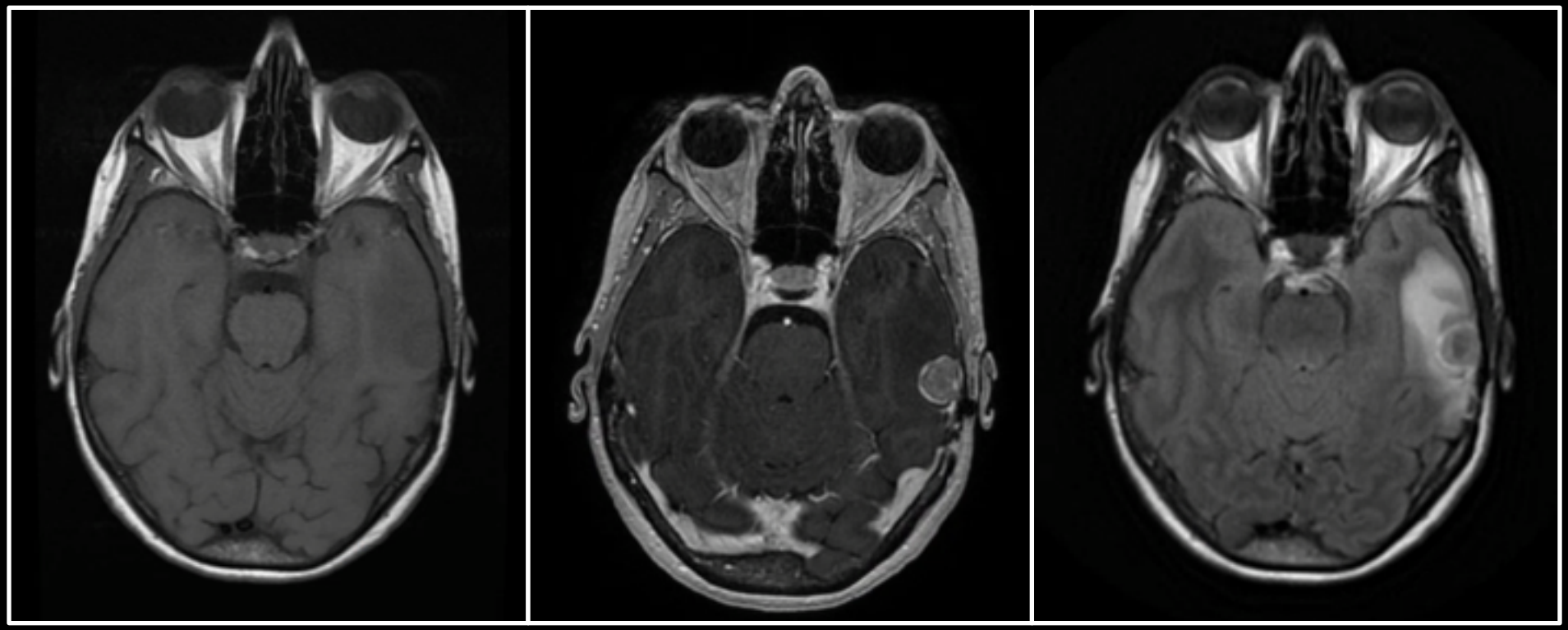
Purpose

- To avoid a few common pitfalls when imaging patient suspected of brain metastasis
  1. Does hyperintensity on post contrast T1 weighted imaging always traduce gadolinium uptake?
  2. Are all enhancement synonymous of brain metastasis?
  3. Does measurement increase always represent tumor progression?

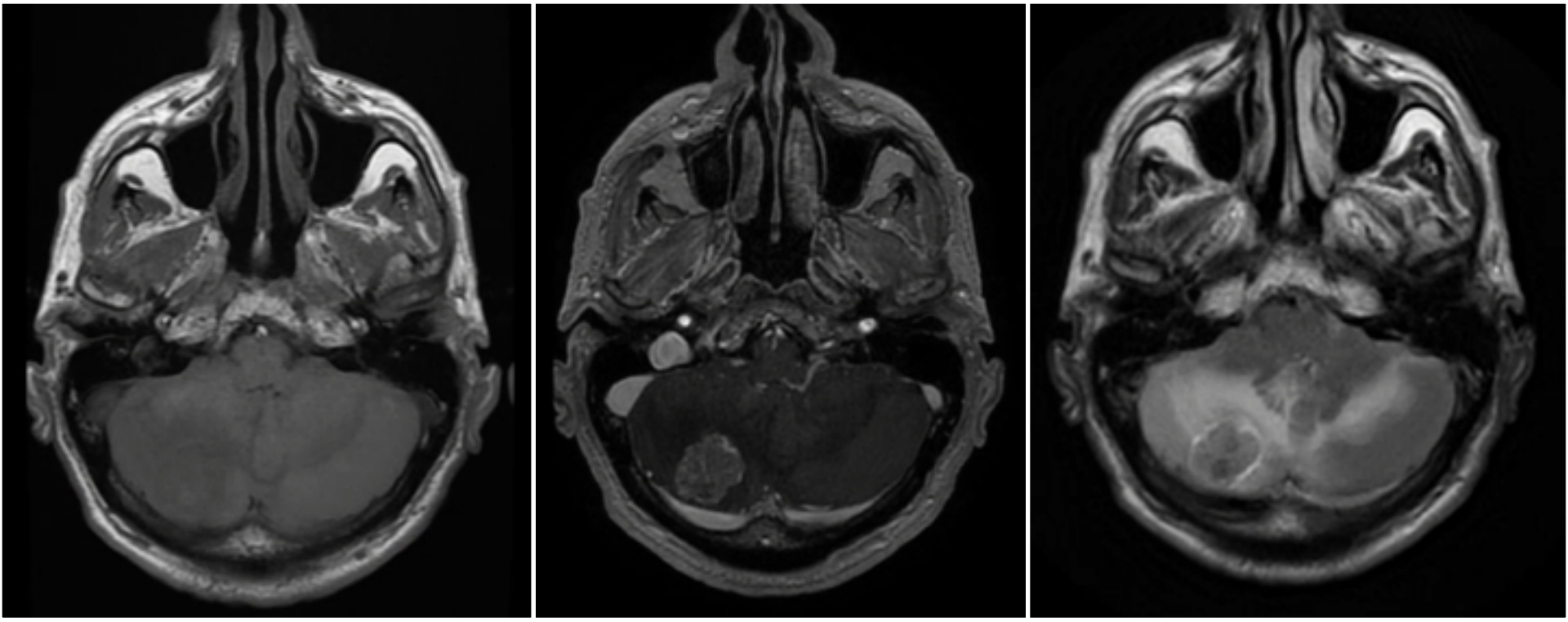
Brain metastasis

- Semeiology is simple and reproductible
- BM Appear usually as :
  - Intra axial mass
  - With sometimes calcifications, or haemorrhage
  - Enhanced after gadolinium injection
  - Surrounded with oedema
  - Typical sub-cortical location

Brain Metastasis



Brain Metastasis

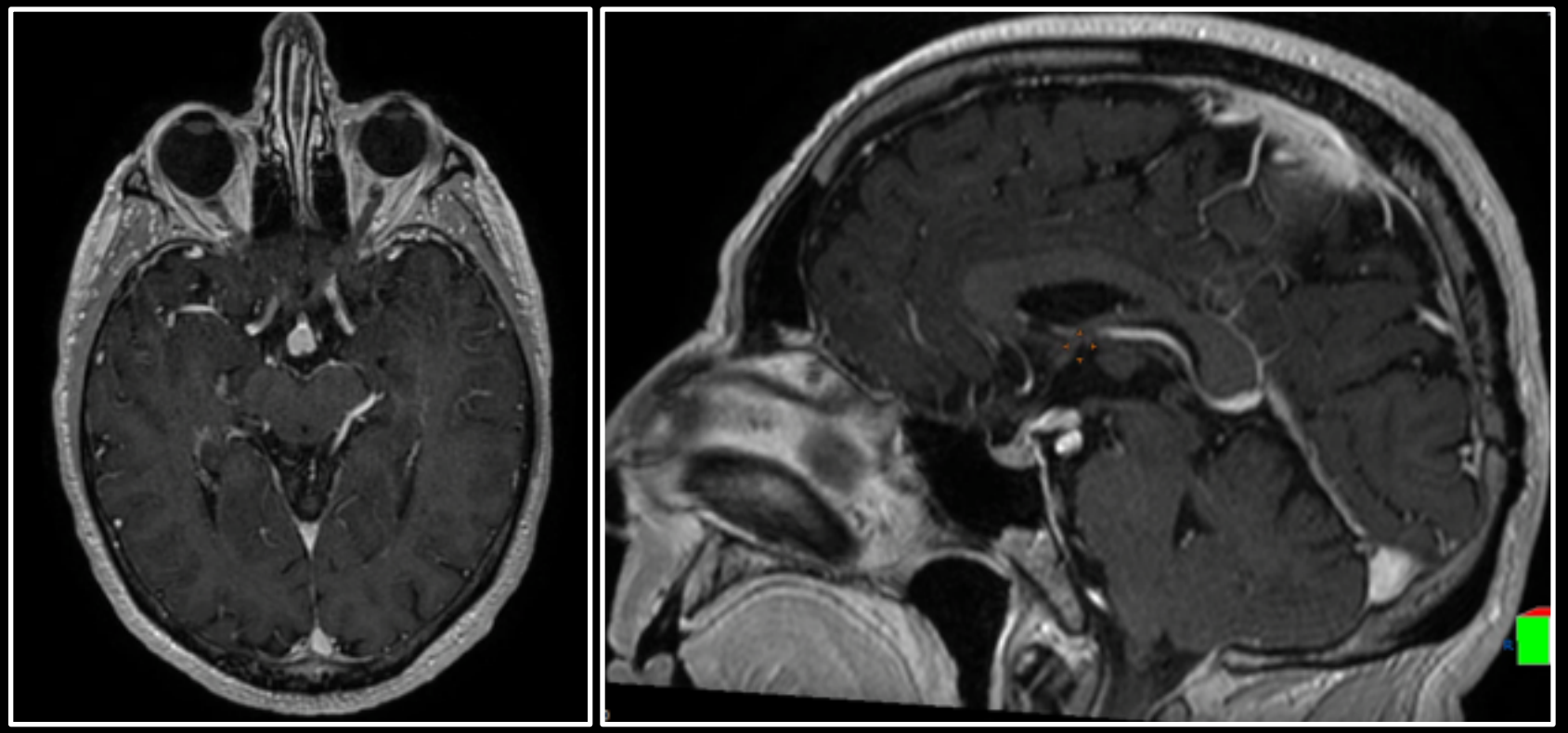


Does hyperintensities on post gadolinium T1 weighted imaging represent always contrast enhancement?

Post Gd hyperintensities = contrast uptake?

- This question could be or should be trivial if all suspected patients were explored in a proper way…

Post Gd hyperintensities = contrast uptake?



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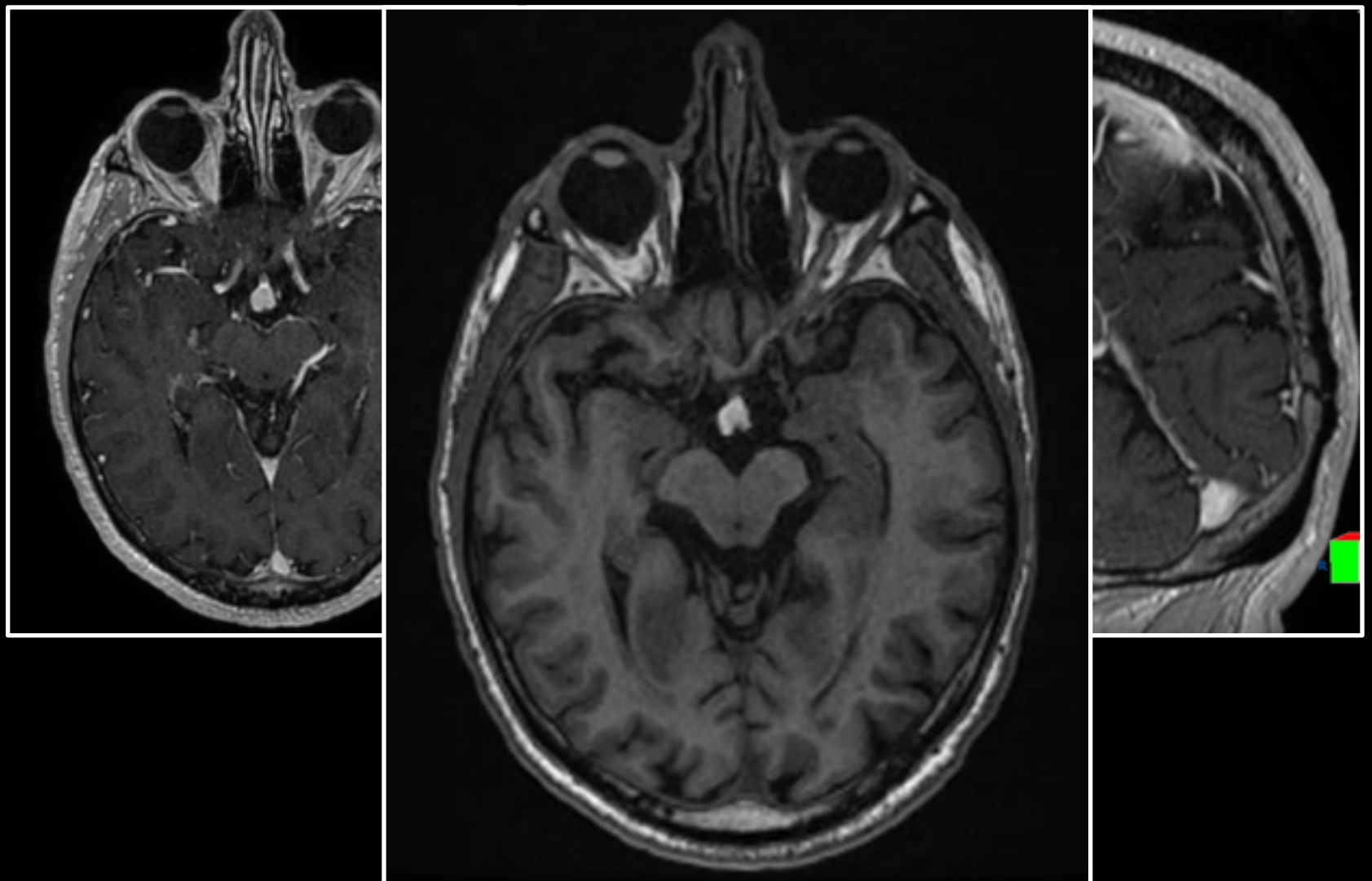

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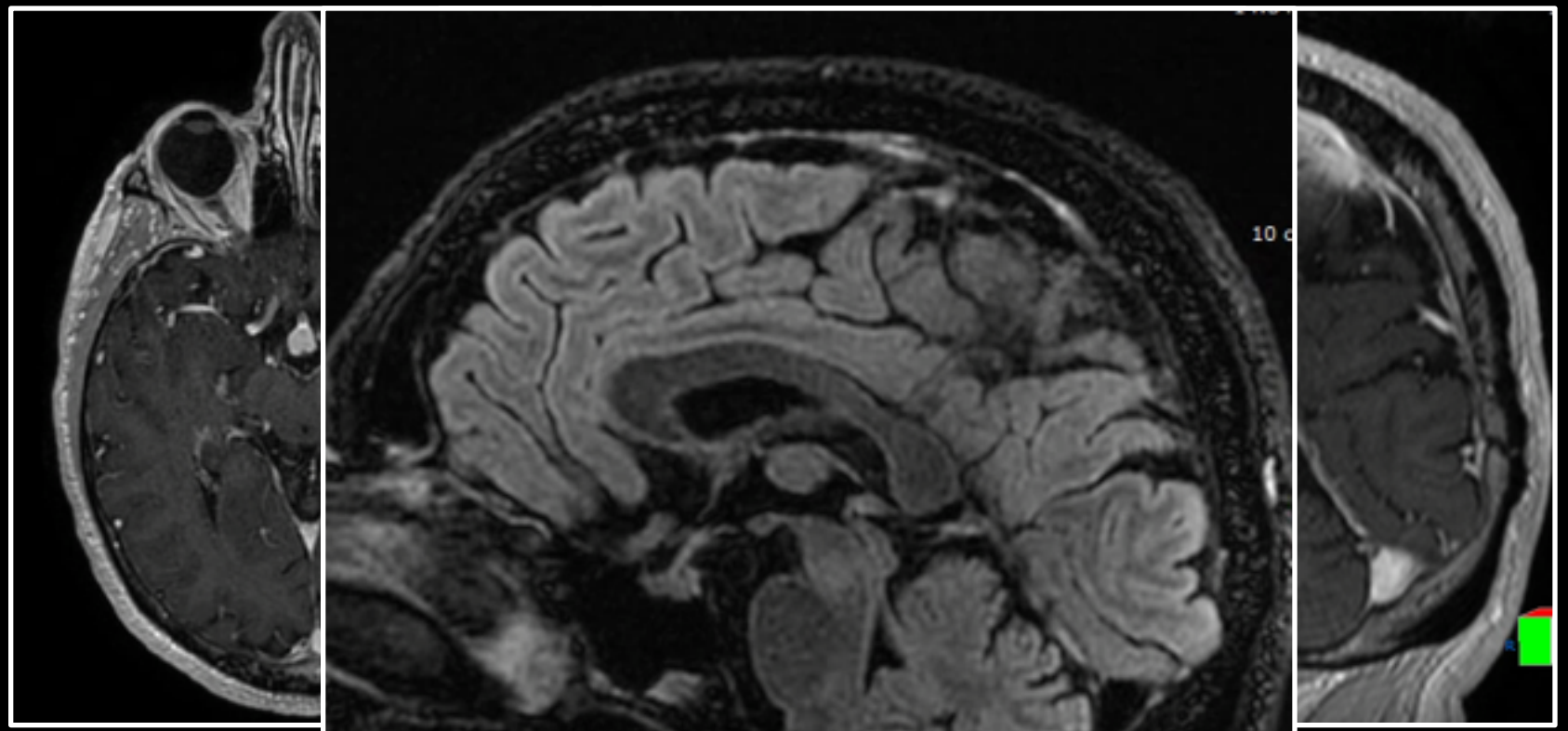
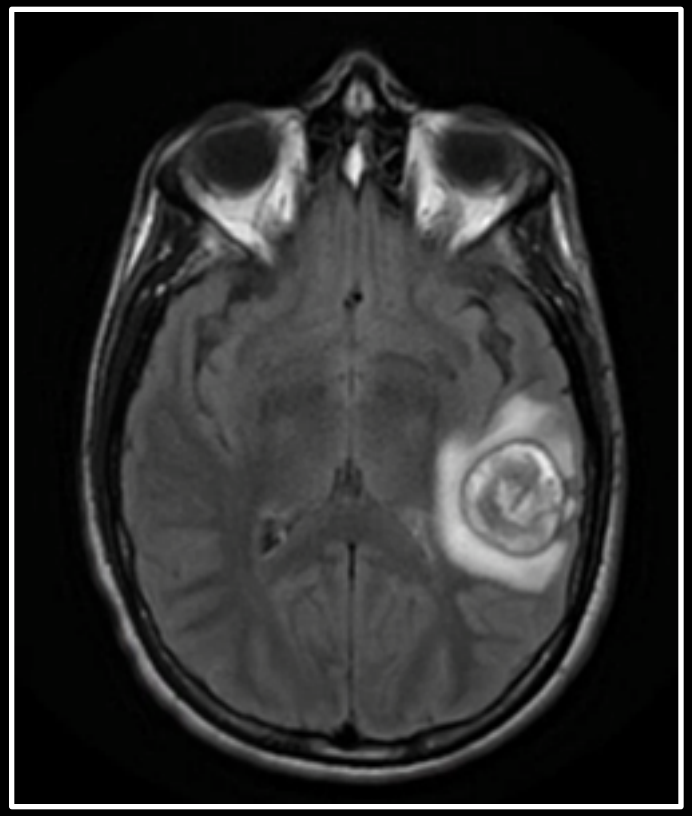
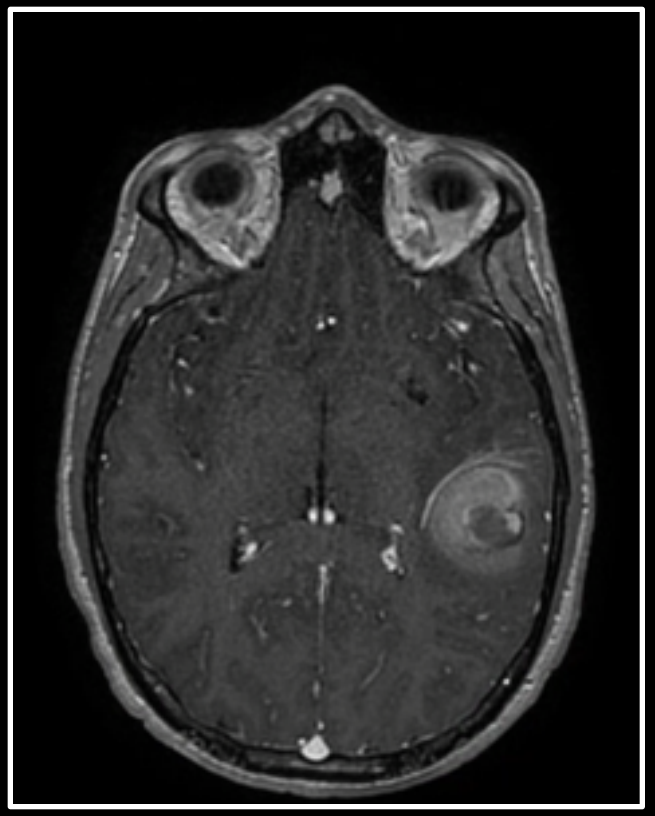


THIRD VENTRICULE FLOOR LIPOMA

Post Gd hyperintensities = contrast uptake?





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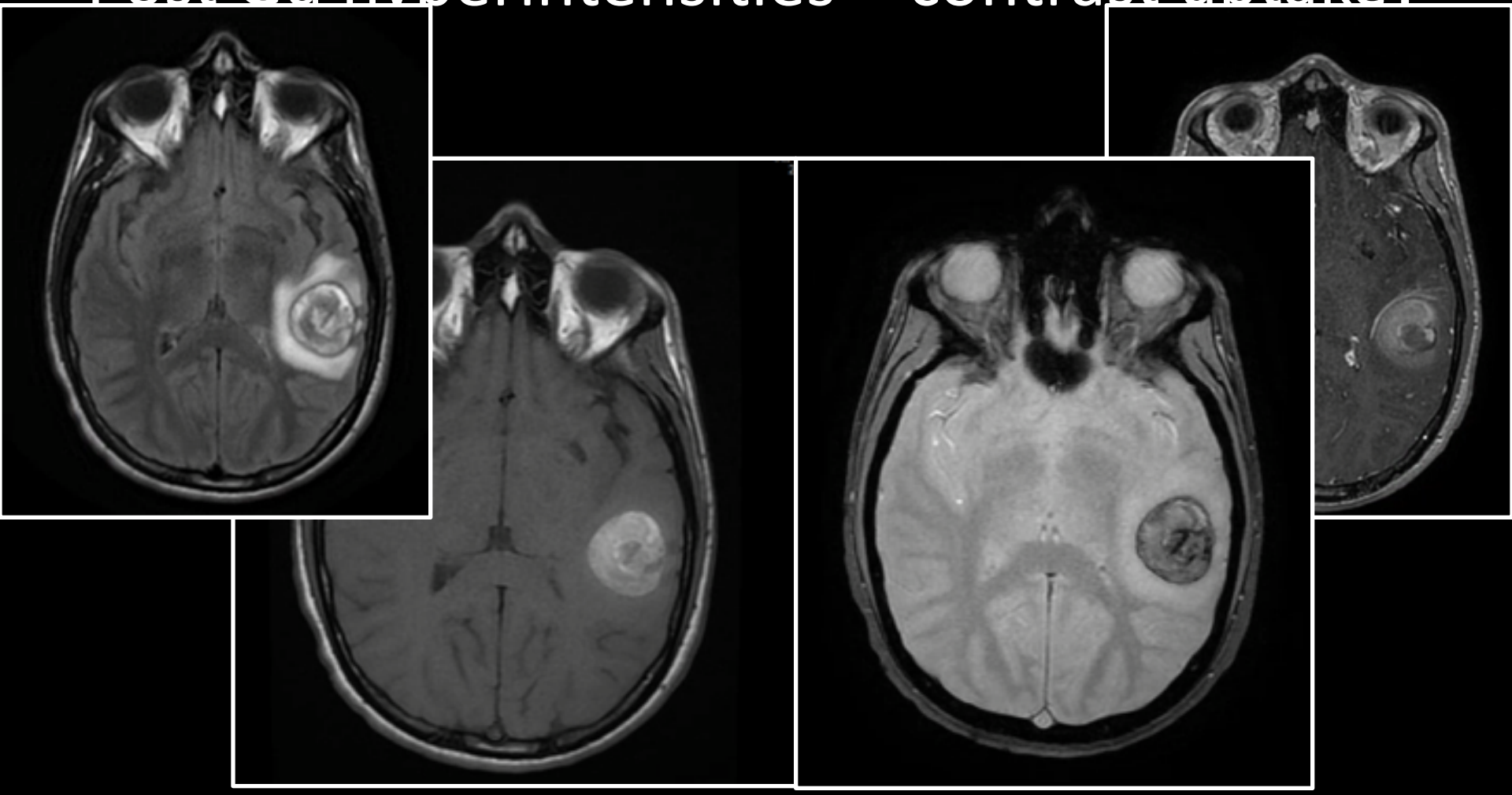

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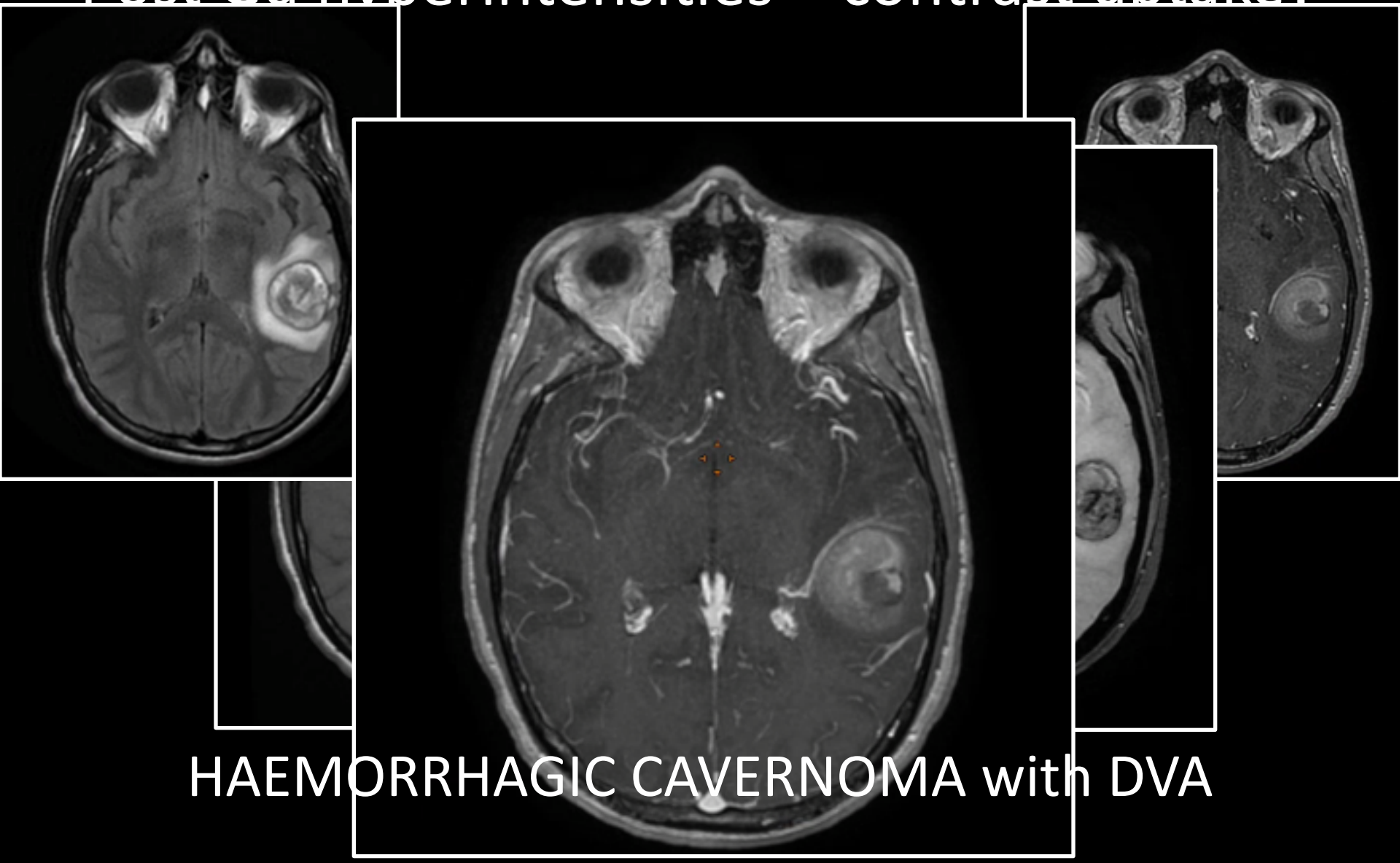


HAEMORRHAGIC CAVERNOMA with DVA

Post Gd enhancement = metastasis?

- Once you're sure that the hyperintensity on post contrast T1 weighted imaging is related to Gd enhancement, you still have a few things to do…
- Avoid the easy association of

Evolutive cancer

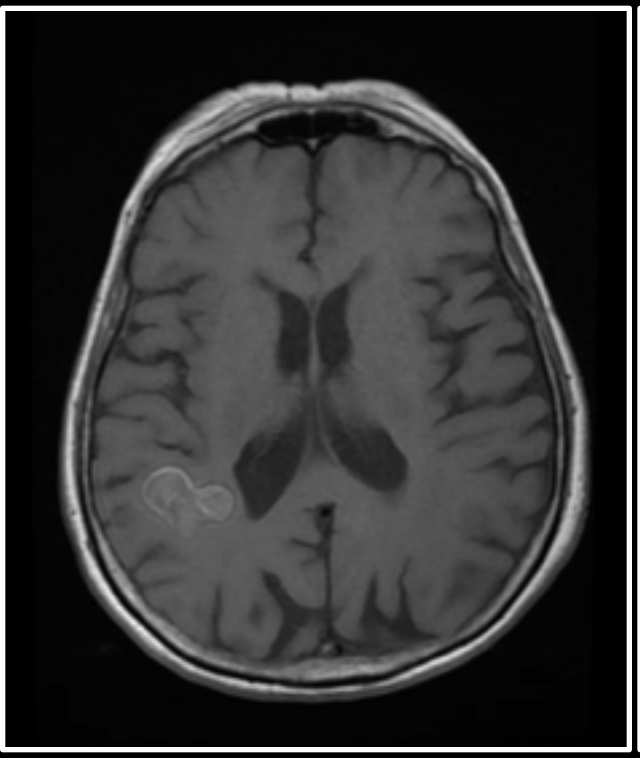
+

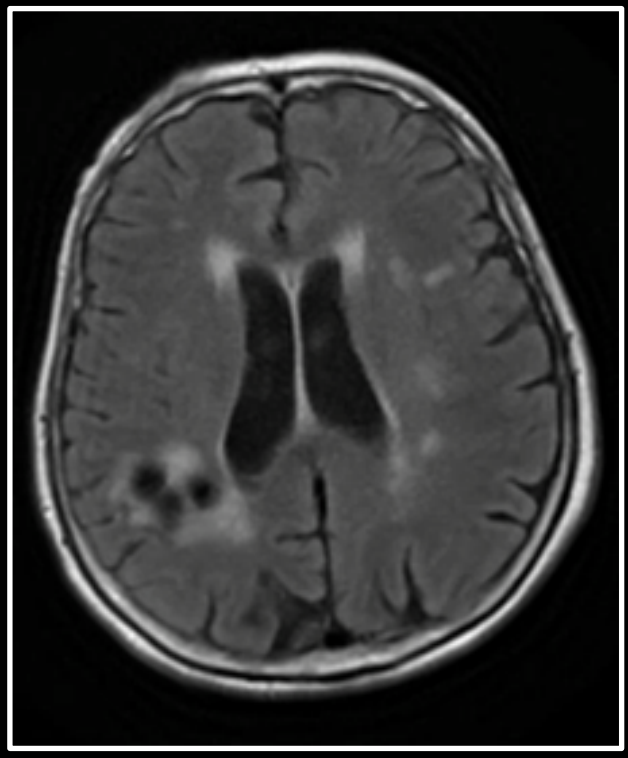
Brain contrast enhancement

=

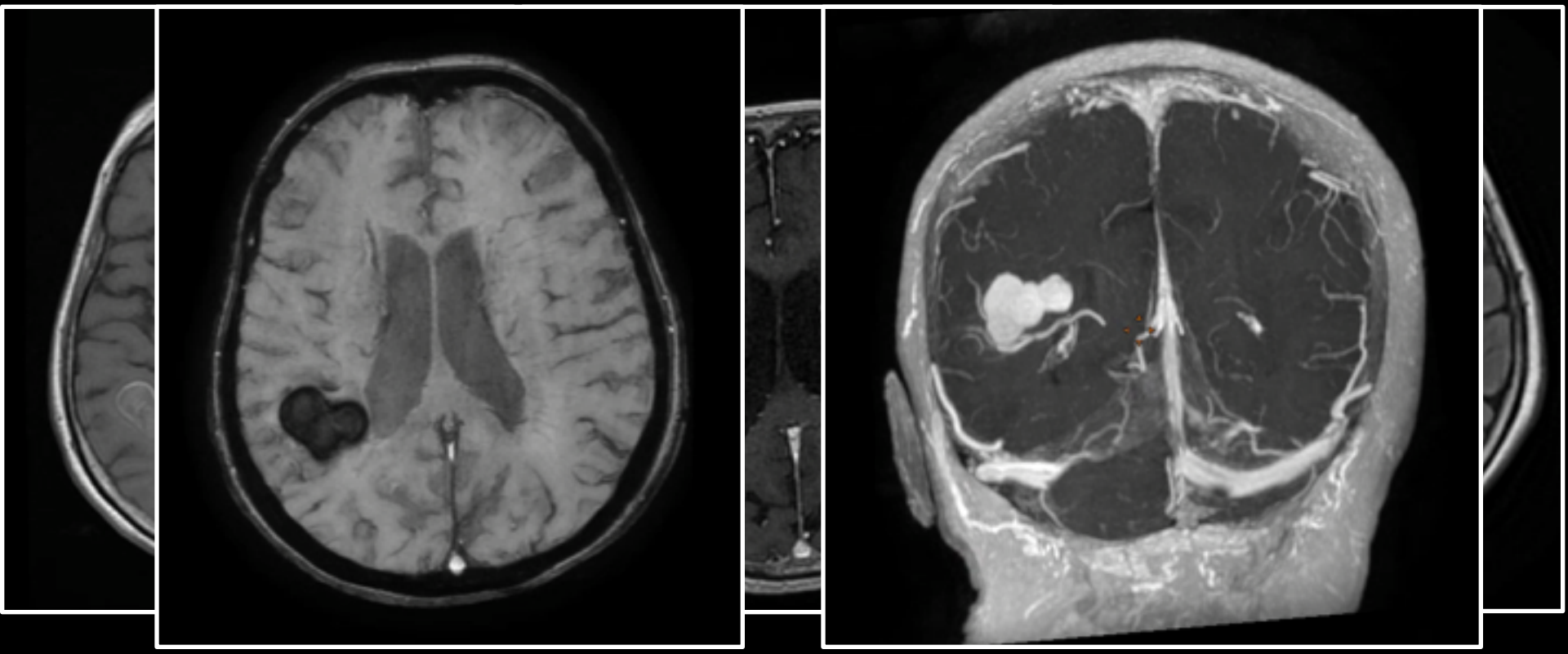
Brain metastasis

Post Gd enhancement = metastasis?





Post Gd enhancement = metastasis?

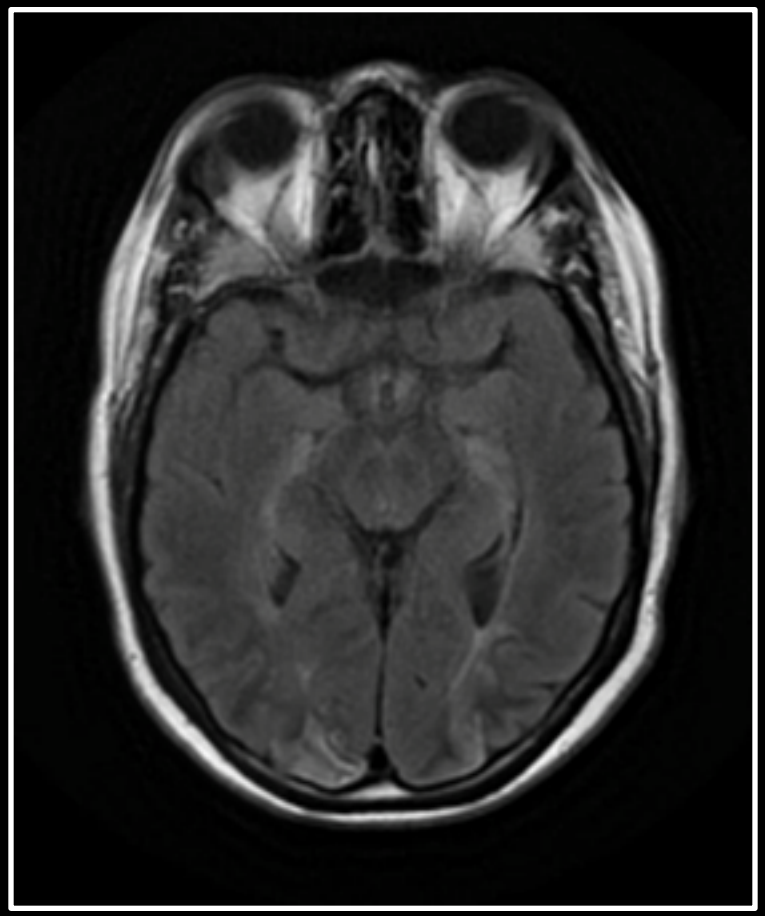


Another Cavernoma!

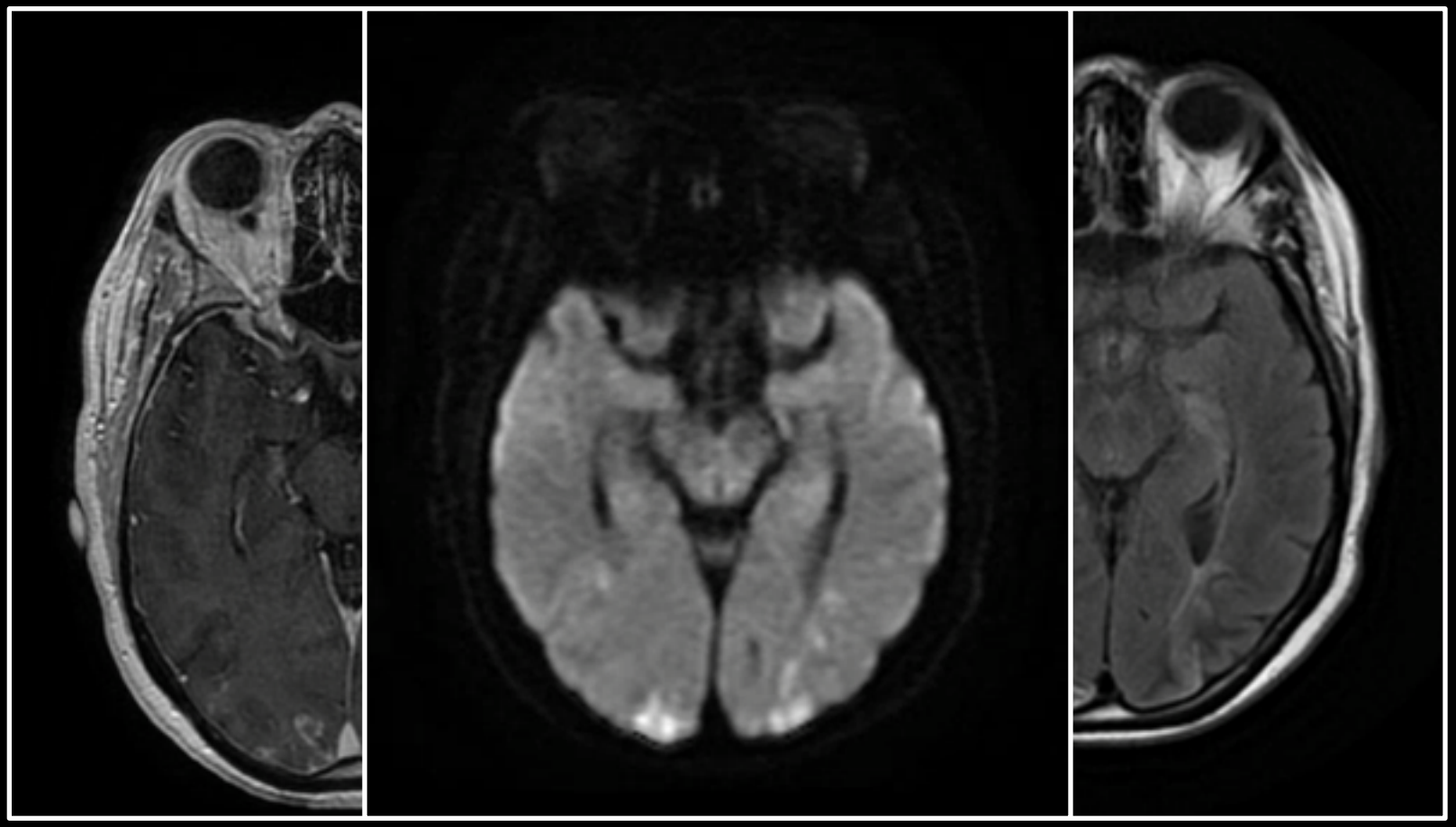
Up to 25% of cavernoma will show enhancement!

Association with an DVA strongly suggest the diagnosis

Post Gd enhancement = metastasis?



Post Gd enhancement = metastasis?

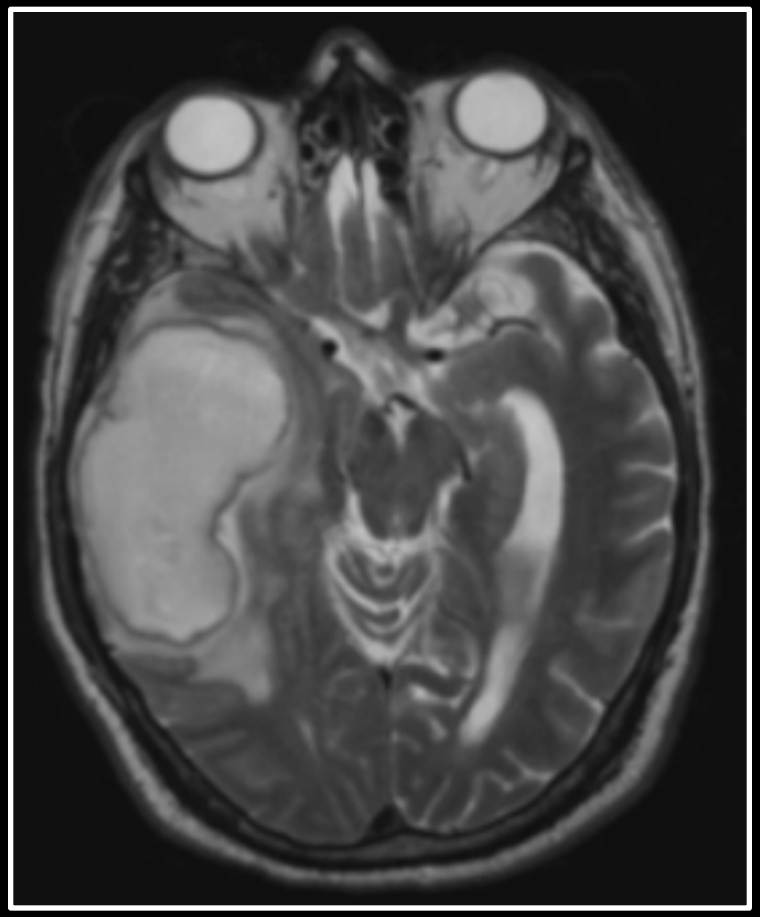


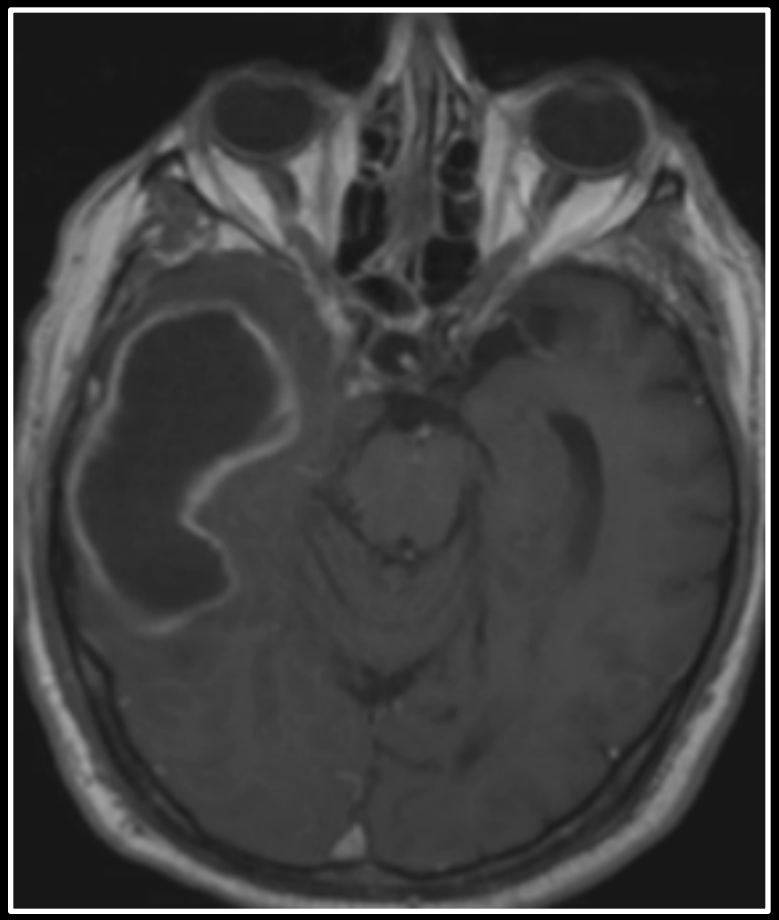
Unusual presentation on both post Gd T1 and FLAIR

Consider DWI!

ACUTE ISCHEMIC LESION

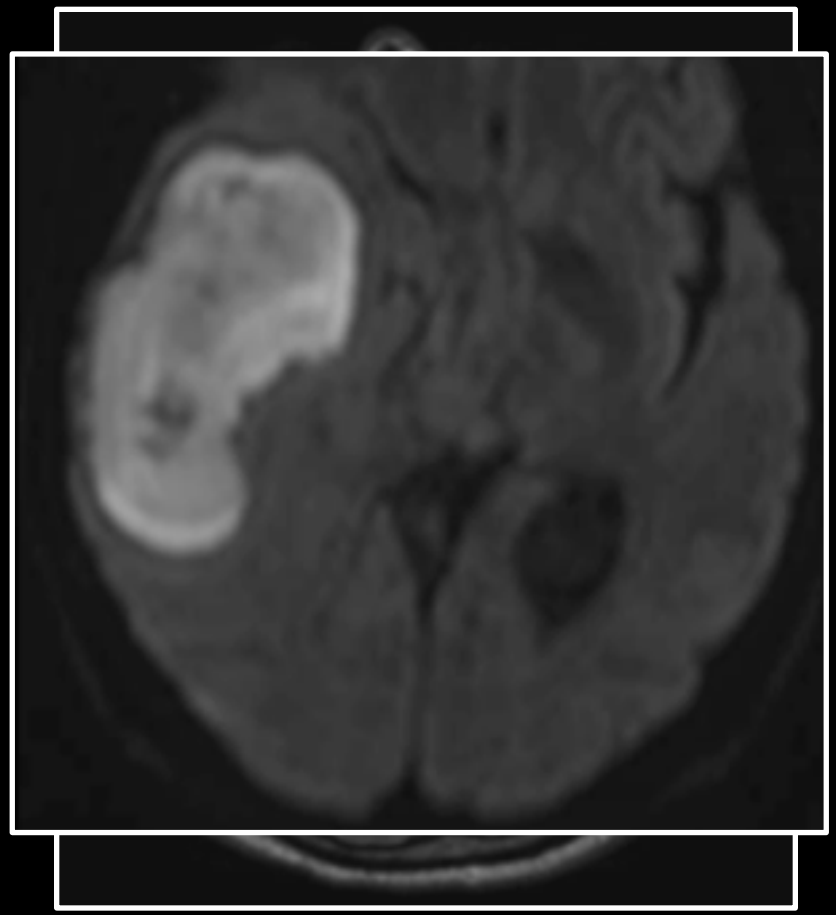
Post Gd enhancement = metastasis?

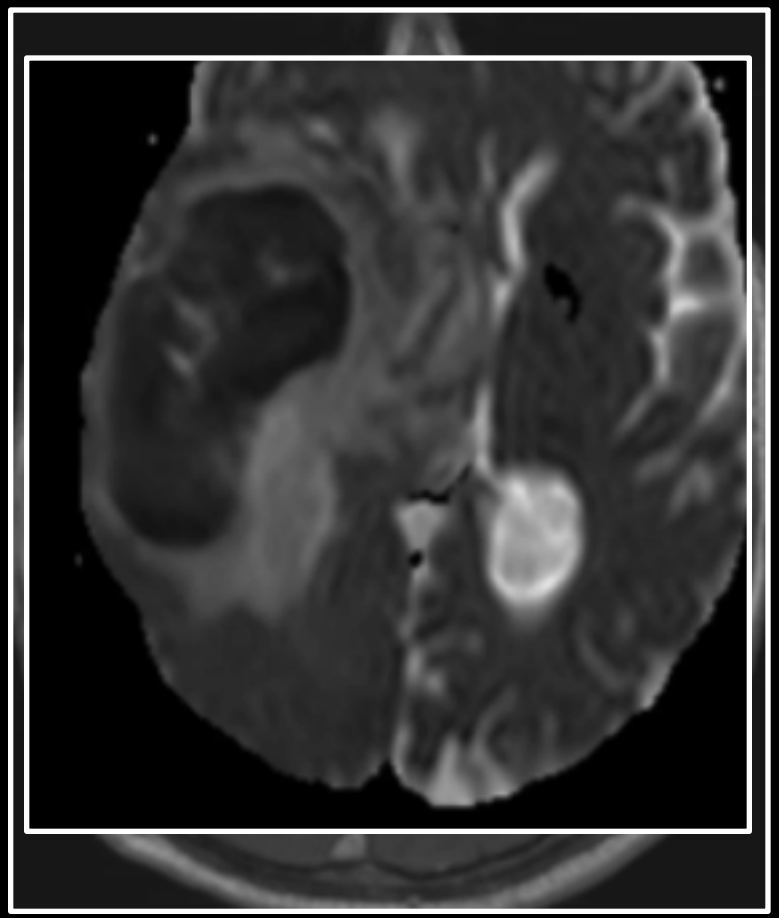




Courtesy Of S. Grand, CHU Grenoble

Post Gd enhancement = metastasis?



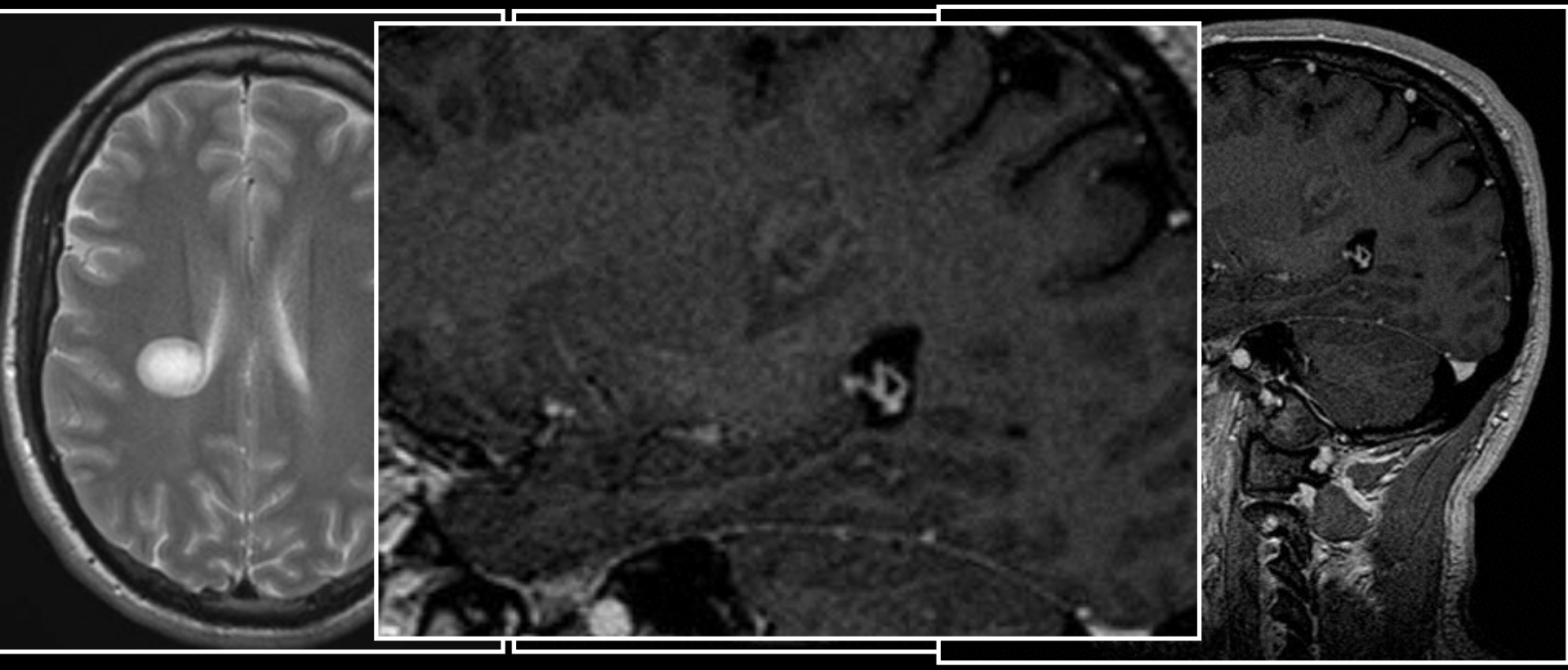


RIGHT TEMPORAL ABSCESS

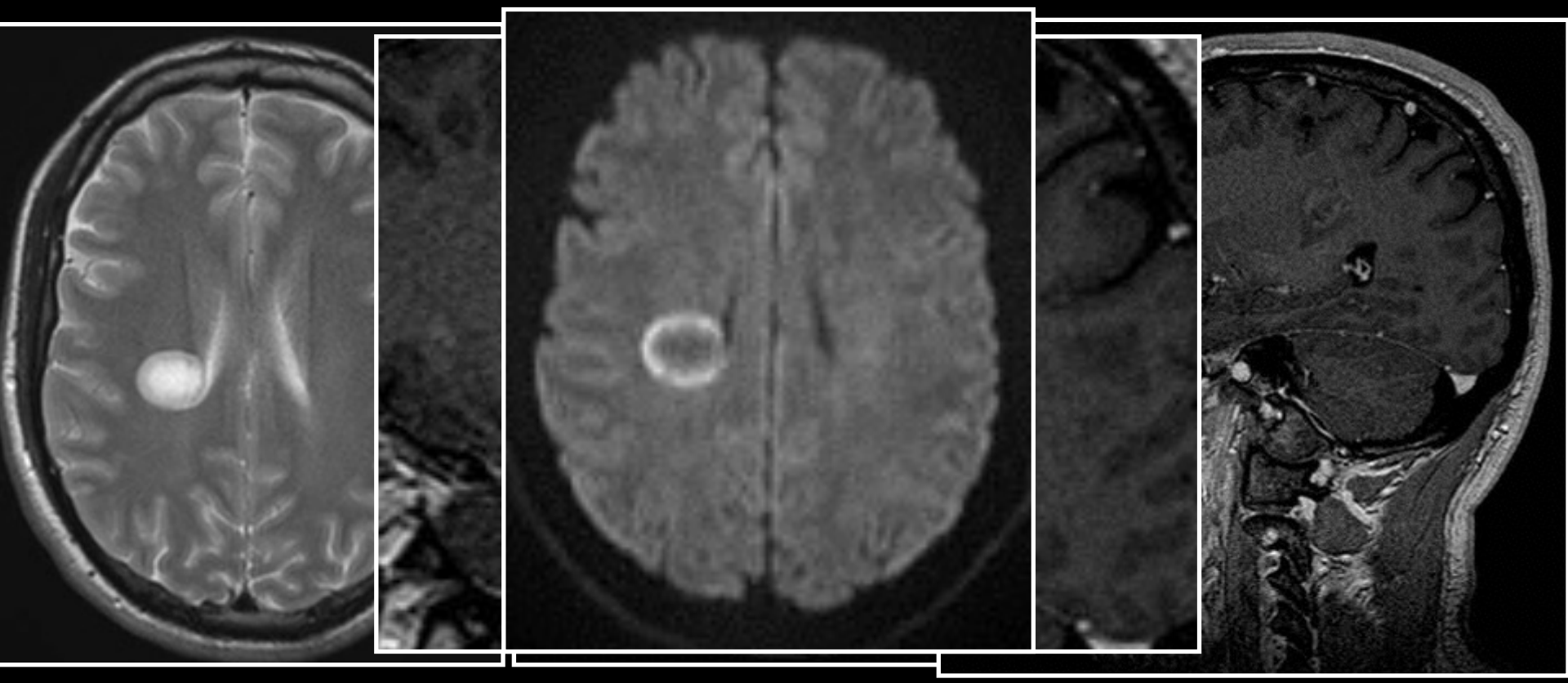
DWI +++

Courtesy Of S. Grand, CHU Grenoble

Post Gd enhancement = metastasis?

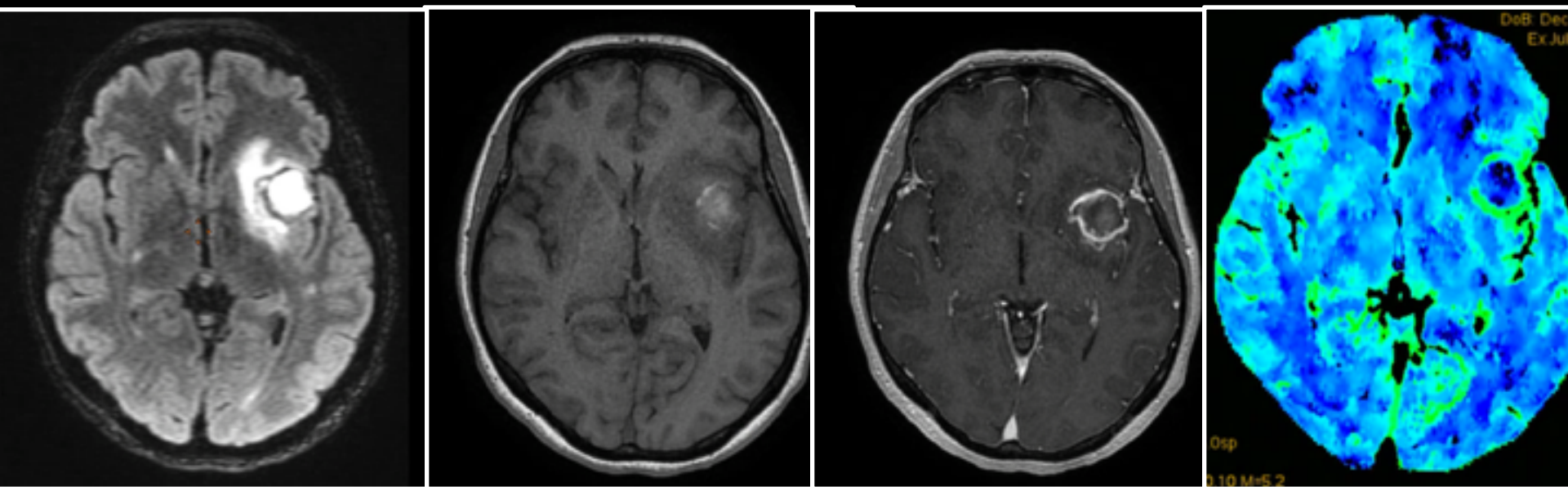


Post Gd enhancement = metastasis?



ISOLATED LESION
JUXTAVENTRICULAR
FAINT CONTRAST ENHANCEMENT
PERIPHERIC DIFFUSION RESTRICTION
MS

Post Gd enhancement = metastasis?



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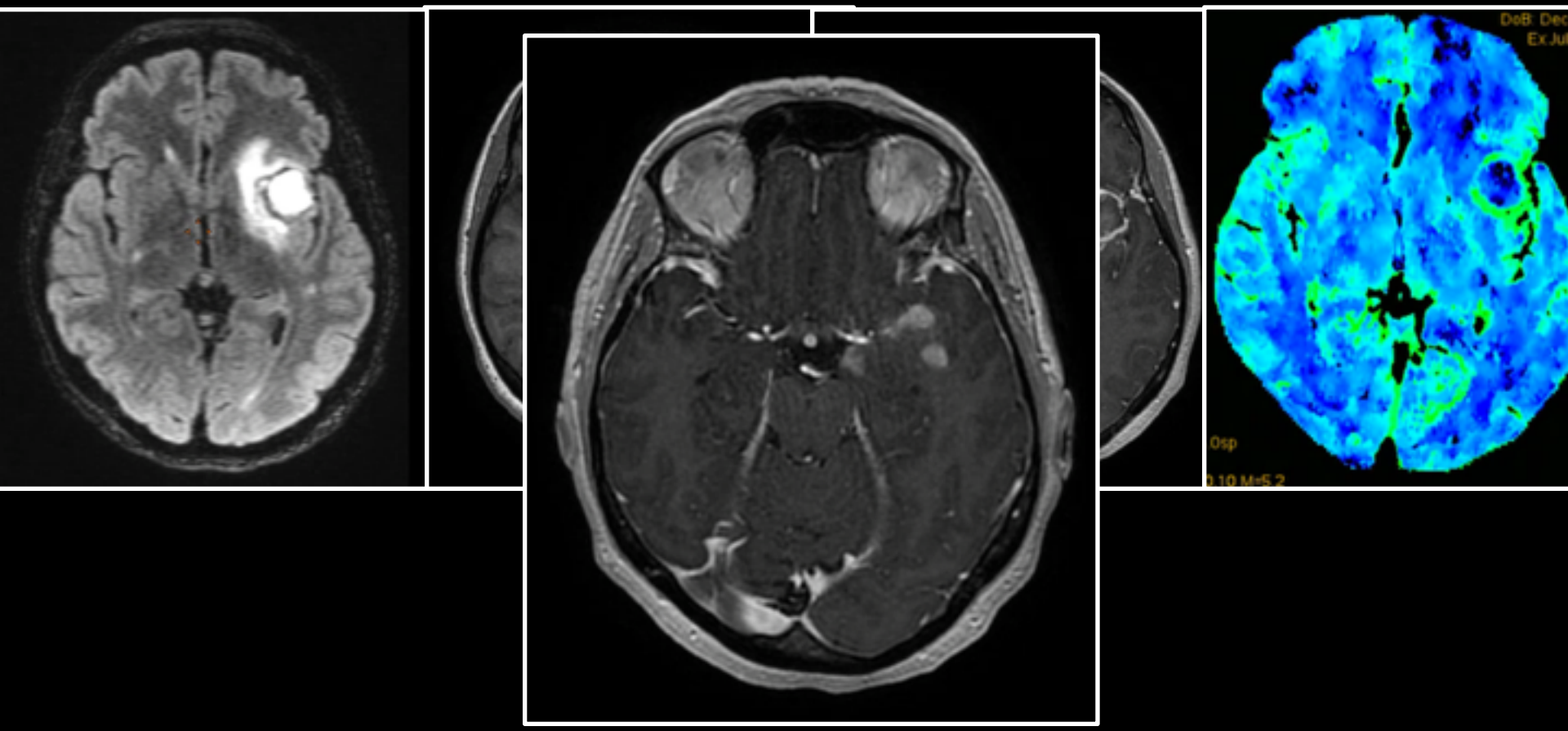
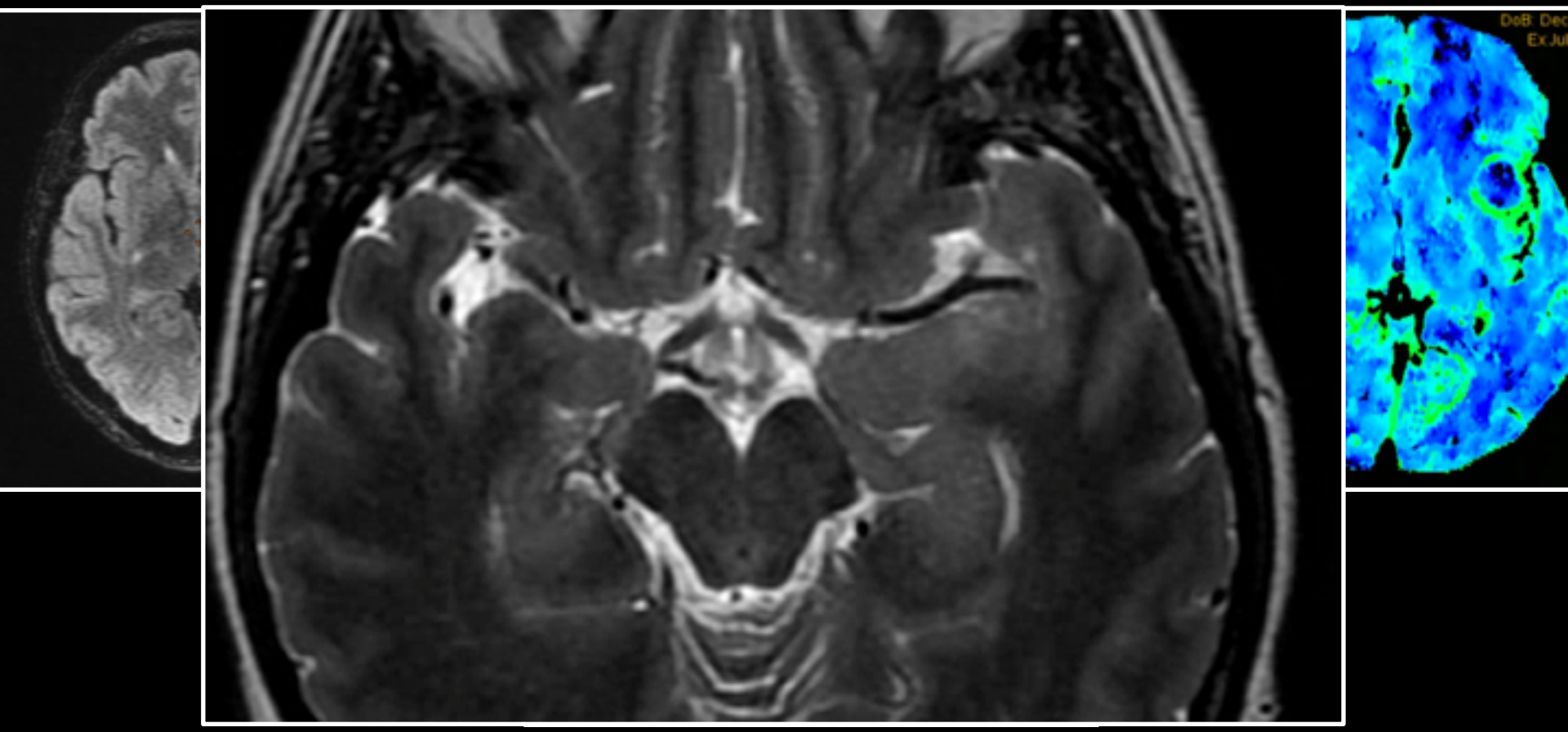


Metastasis?

Post Gd enhancement = metastasis?

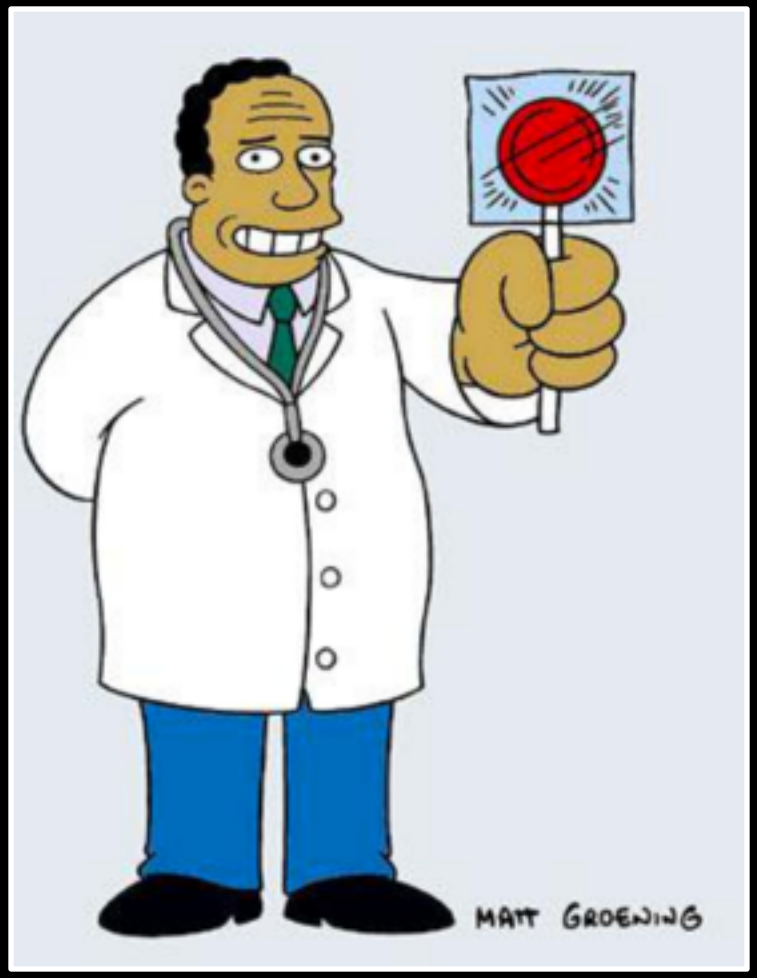


~~Metastasis~~

AMYGDALO-HIPPOCAMPIC CORTICAL THICKENING

GB WITH INTRA TUMORAL HAEMORRHAGE

Post Gd enhancement = metastasis?



Metastasis

Abcess

GB

Ischemia

Contusion (post traumatic)

Demyelination : MS, ADEM

Radionecrosis

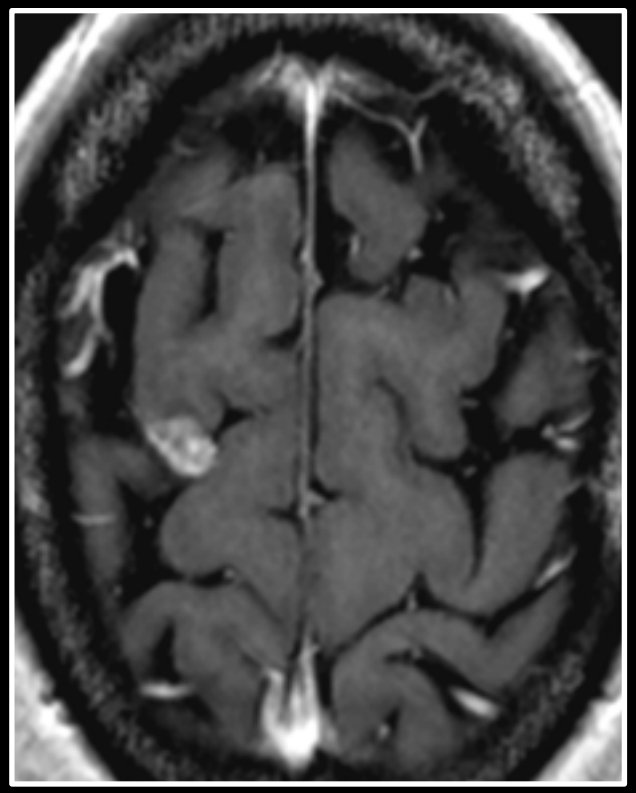
Increase in size = tumor progression?

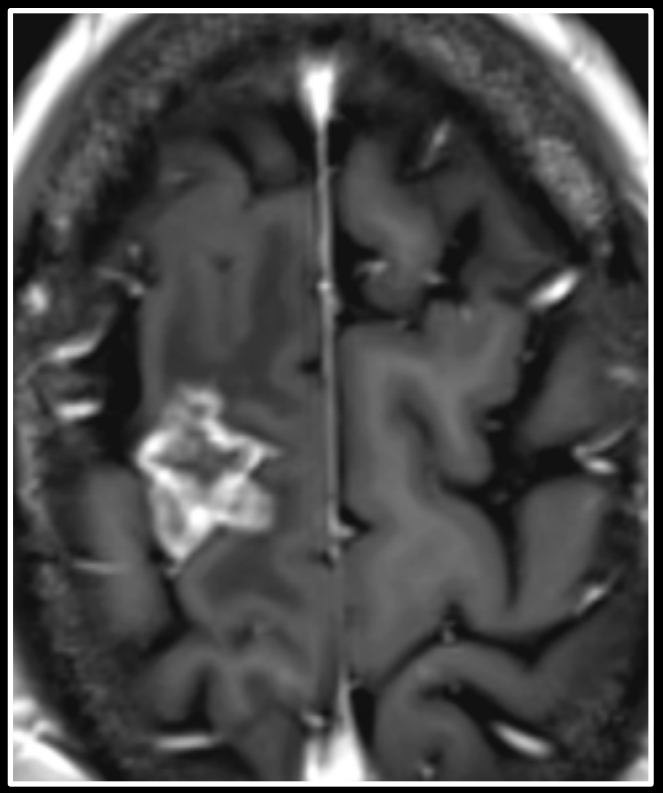
BM Progression

Defined as

An increase in longest diameter of more than 20%

Increase in size = tumor progression?





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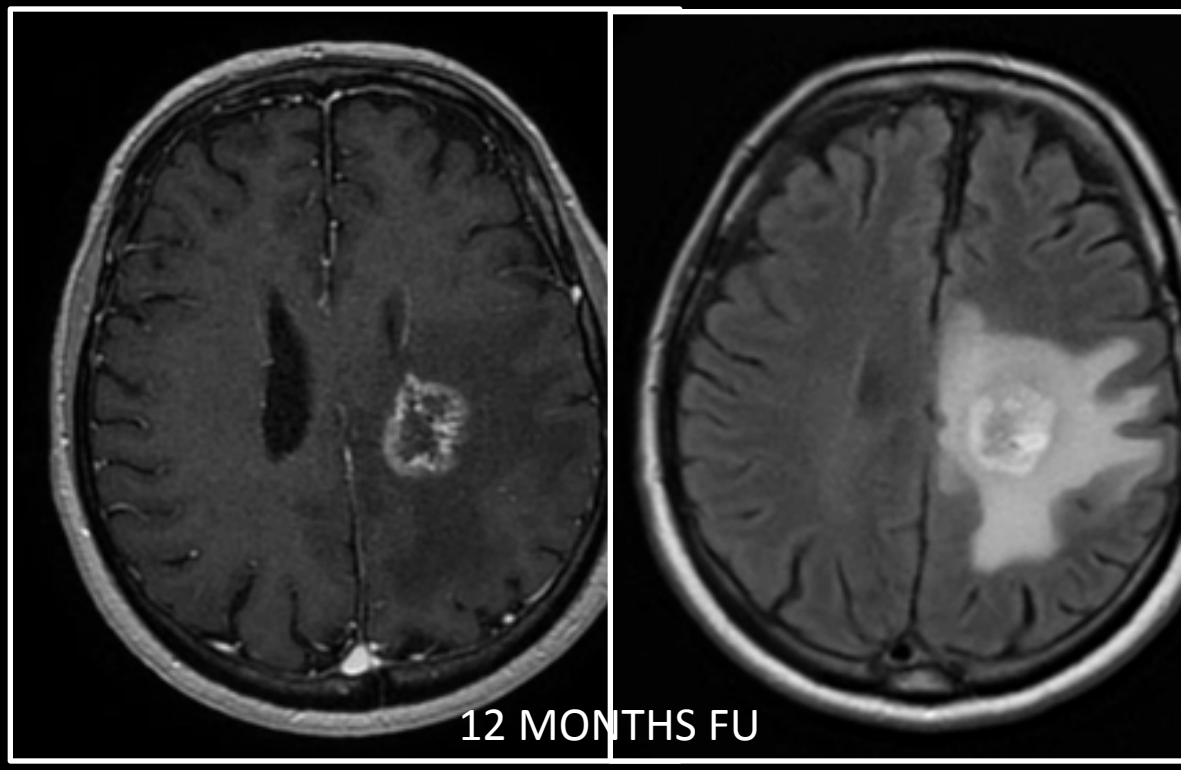
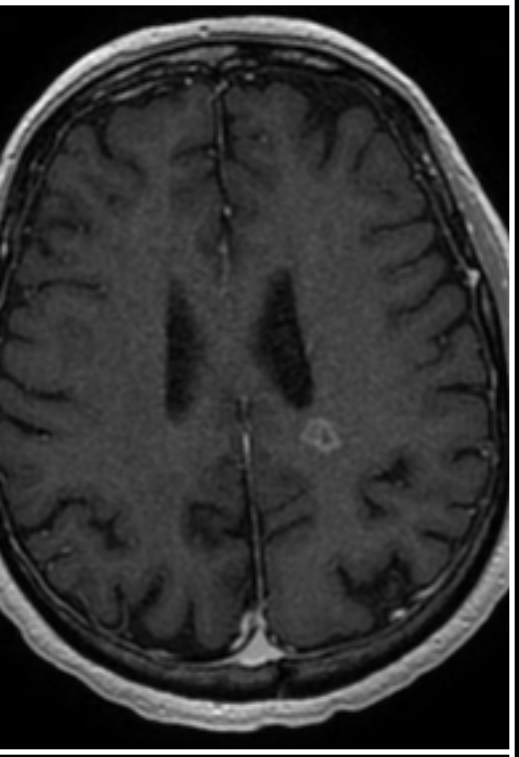
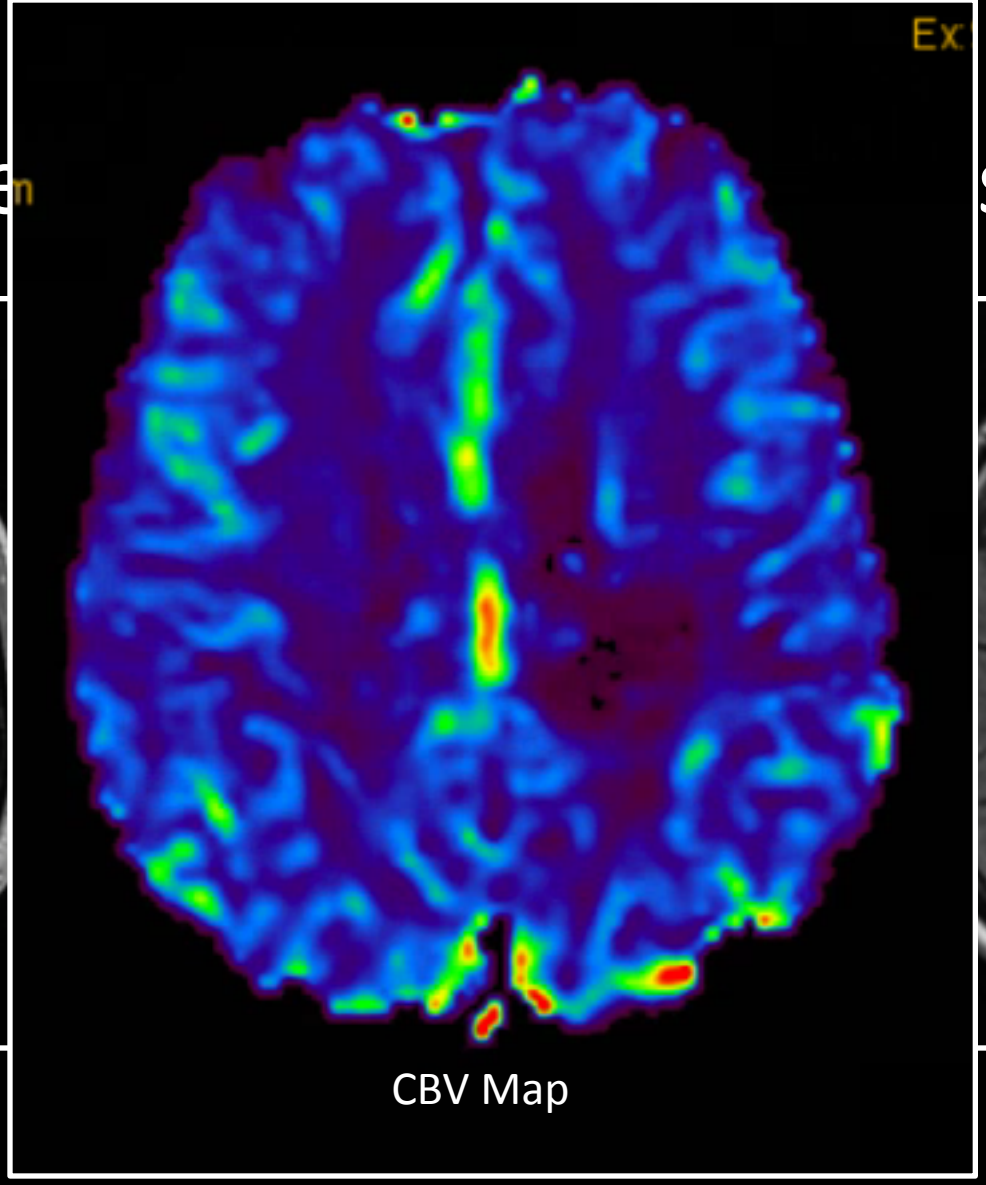


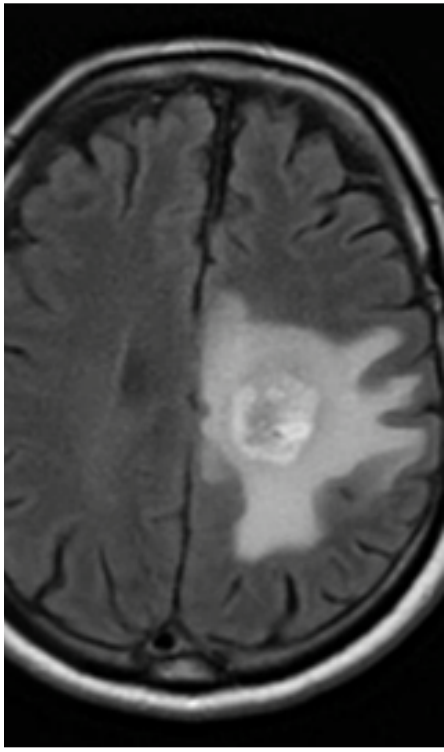
Disease progression or Radionecrosis?

Increase ssion?



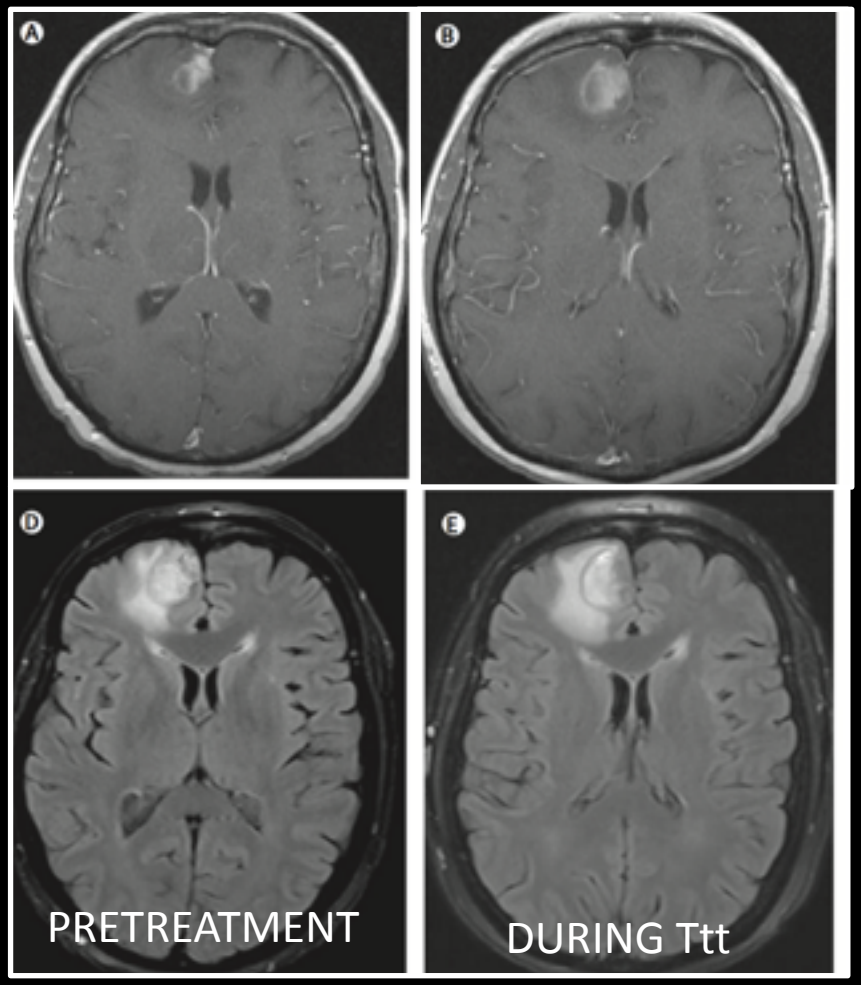


CBV Map



NO RESIDUAL NEOANGIOGENESIS
RADIONECROSIS

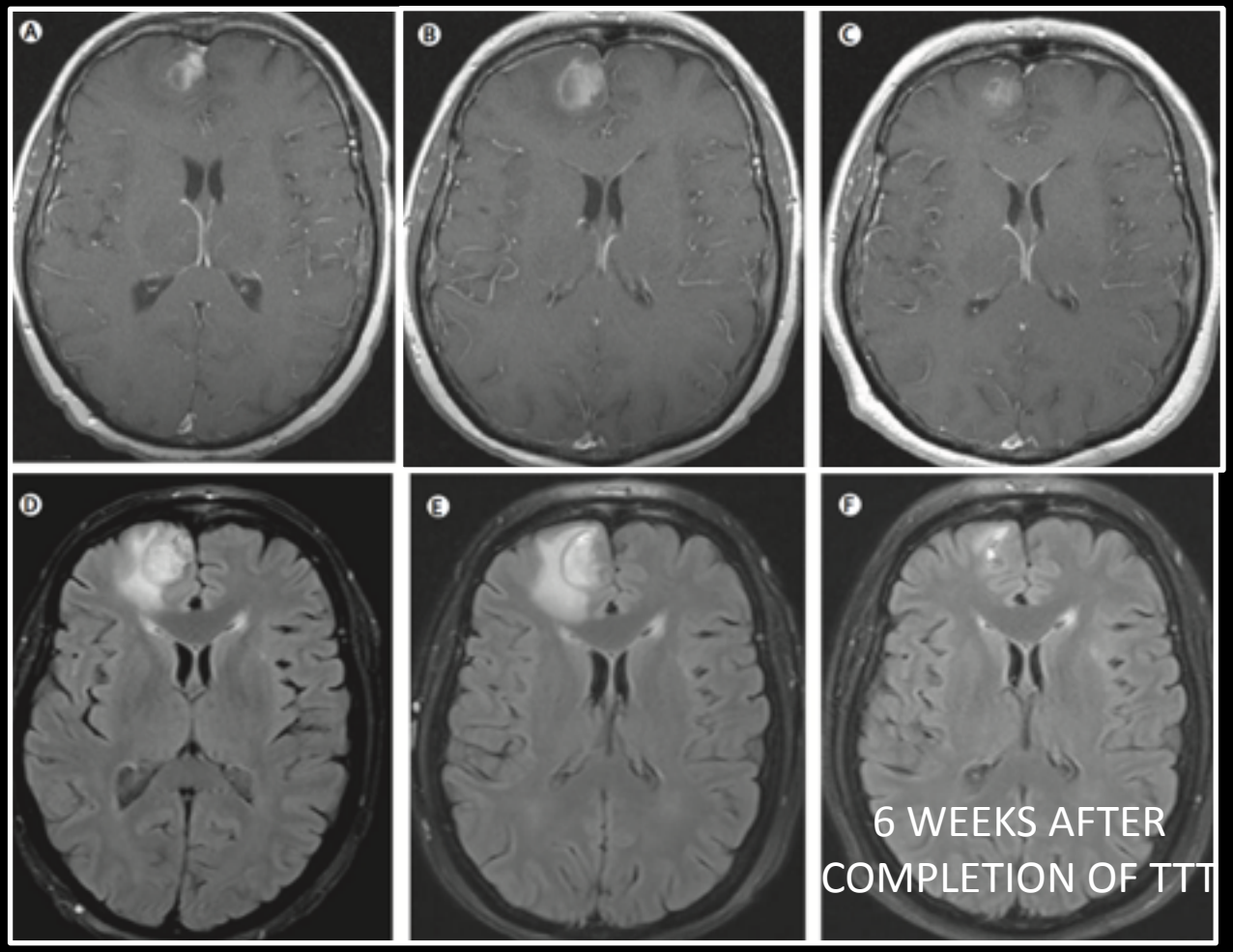
Increase in size = tumor progression?



Metastastic melanoma
Treated by Ipilimumab

In Lin, Lancet Oncol 2015

Increase in size = tumor progression?



Pseudoprogression under immunotherapy

In Lin, Lancet Oncol 2015

Increase in size on FU imaging

- Very common situation (SRS+++)
- Could be very tough, consider :
  1. Increase in volume
     - > 65% associated with recurrence
  2. Assessment of boundaries on T1Gd and T2
     - Mismatch is in favor of RN
  3. Perfusion Imaging (MRI or CT)
     - Residual CBV elevation strongly suggests recurrence
  4. MR Spectroscopy
     - More difficult to use than in glioma FU
     - Elevated Choline compared with contralateral white matter suggests recurrence

Increase in size on FU imaging

DESPITE THOSE TOOLS, DISTINGUISH RECCURENCE FROM RADIONECROSIS REMAINS SOMETIMES A CHALLENGE!

Take Home Messages

1. Hyperintensities on post Gd T1 do not represent always gadolinium uptake

Spontaneously Hypertintense in T1 weighted imaging :

Melanine

Fat

Blood products

Fluid with high protein concentration (colloid or mucinous cyst)

Take Home Messages

1. Hyperintensities on post Gd T1 do not represent always gadolinium uptake

Spontaneously Hypertintense in T1 weighted imaging :

Melanine

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Blood products

Fluid with high protein concentration (colloid or mucinous cyst)

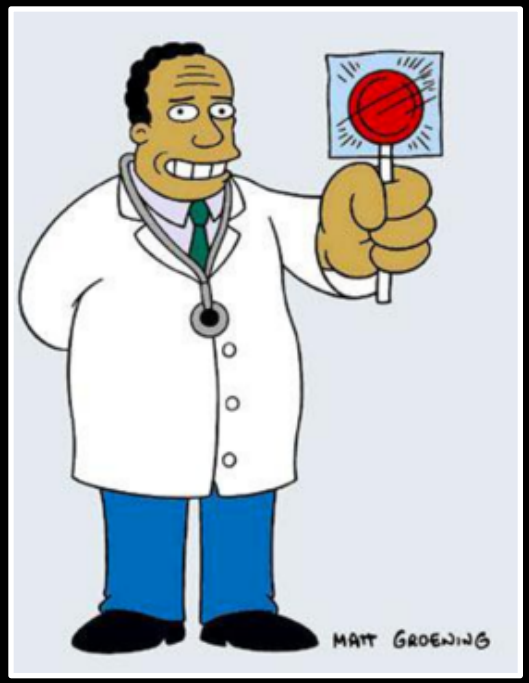
DON’T FORGET TO EXPLORE YOUR PATIENT IN A PROPER AND COMPLETE WAY!

and

TO BROWSE THE DIFFERENTIALS DIAGNOSIS

Take Home Messages

2. Gd enhancement is not always synonymous of metastasis, even in the context of a extra cerebral metastastic neoplasia



Metastasis

Abcess

GB

Ischemia

Contusion

Demyelination

Radionecrosis

Take Home Messages

3. Increase in size doesn't always mean disease progression

Be very cautious after SRS+++

Don't forget the available tools to deal with this tricky situation

(PWI+++)