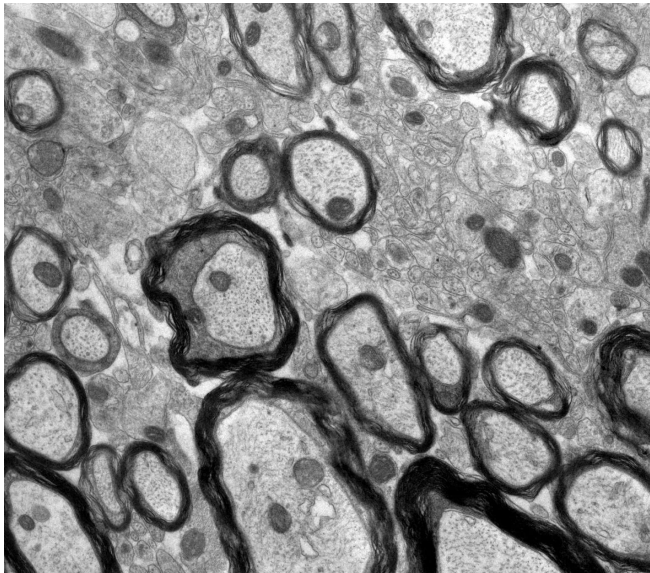


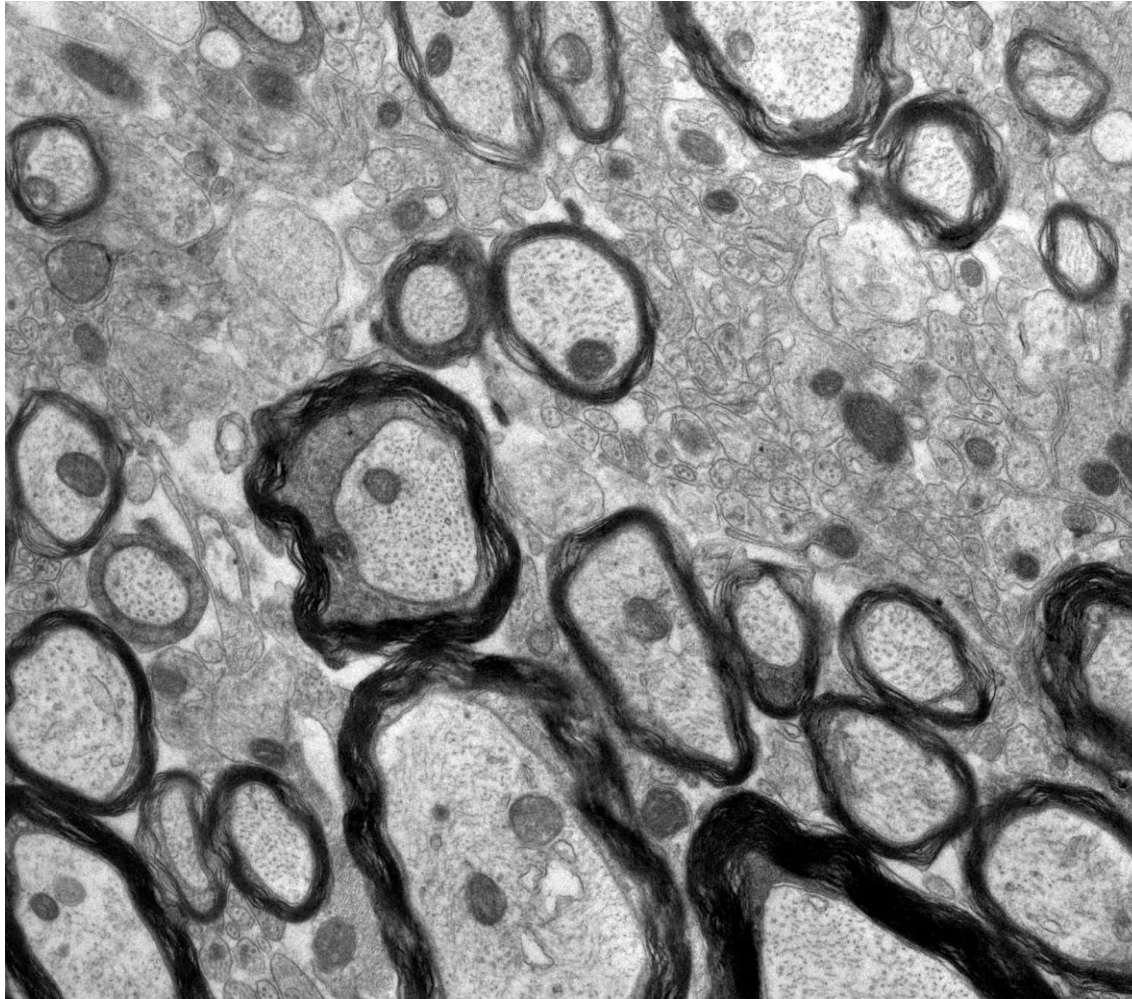
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# *DATABLITZ*: QUAND LA CLINIQUE RENCONTRE LA RECHERCHE FONDAMENTALE CHU DE LIÈGE

SAMEDI 17 DÉCEMBRE 2022 AUDITOIRE LÉON FRÉDÉRICQ



MULTIMODAL  
QUANTIFICATION OF  
BRAIN  
MICROSTRUCTURE  
AND SYNAPTIC  
DENSITY IN MS  
PATIENTS



# MULITMODAL QUANTIFICATION OF BRAIN MICROSTRUCTURE AND SYNAPTIC DENSITY IN MS PATIENTS

Solène DAUBY & Emilie LOMMERS

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## WORK PLAN

- **MULTIPLE SCLEROSIS**
  - NON-CONVENTIONAL IMAGING
    - 3T & 7T Q-MRI
    - PET-SV2A
  - Q-MRI & PET STUDIES @ CRC
-

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# MULTIPLE SCLEROSIS

- In **Belgium**: +/- 14 000 affected people ➔ +/- 1/1000
- 2<sup>nd</sup> cause of young adult **acquired disability**, after traffic accident
- **Young people**: average age at diagnosis 30
- **Treatable** disease
  - « Time is brain (and spinal cord, and optic nerve...) »

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# MULTIPLE SCLEROSIS

- Inflammatory demyelinating & neurodegenerative disease of CNS

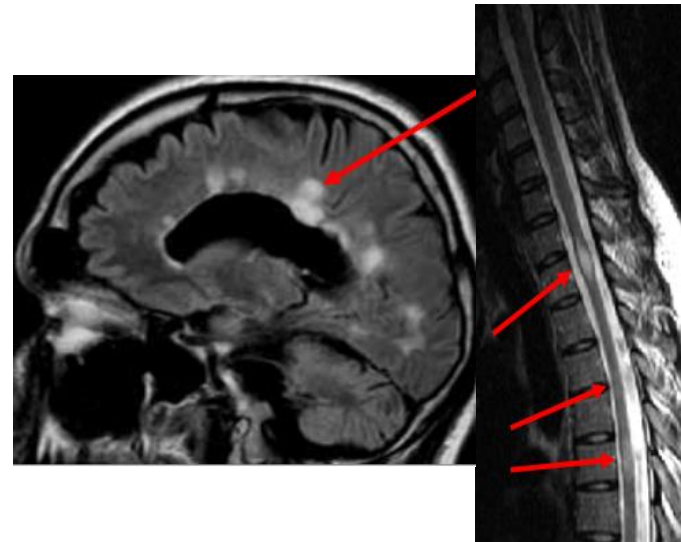
=> INFLAMMATION

=> DEMYELINATION

=> AXONAL LOSS

=> SYNAPTIC LOSS

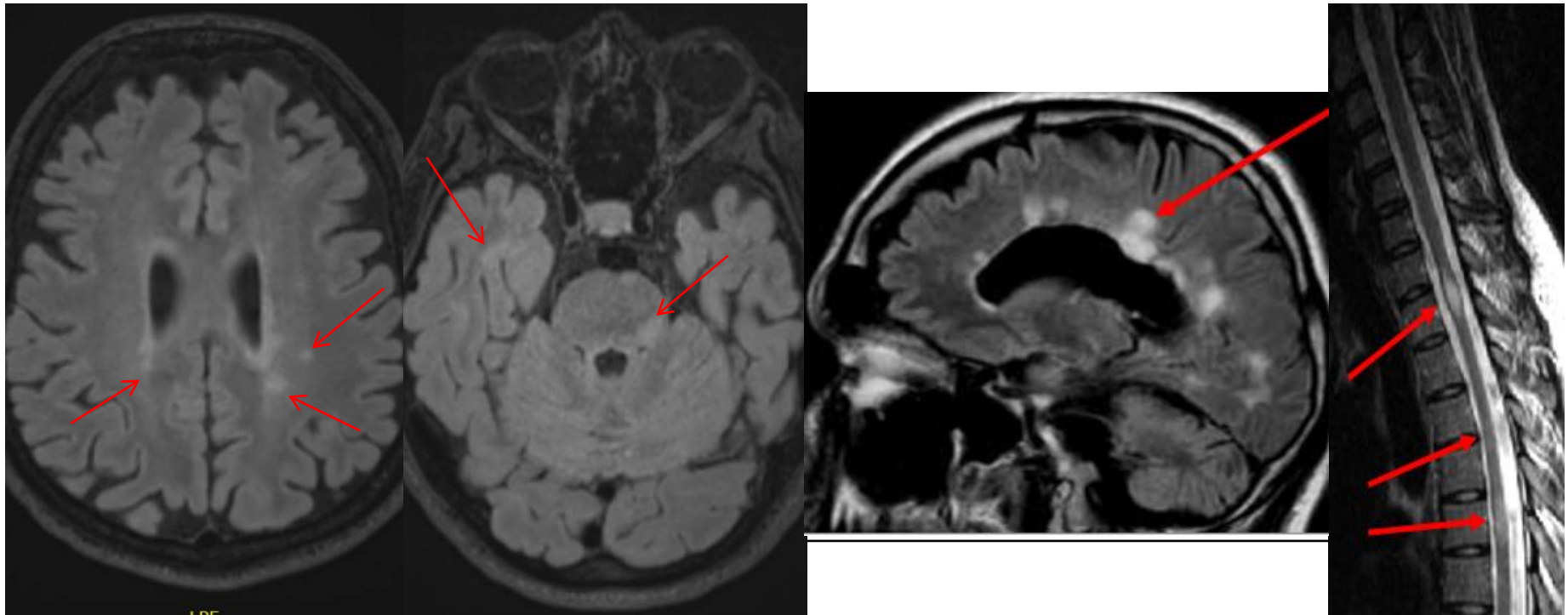
- Follow-up
  - ↗ Clinical examination
  - ↘ Imaging



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# MULTIPLE SCLEROSIS

- Follow-up
- Clinical examination
- Imaging



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# MULTIPLE SCLEROSIS: PHYSIOPATHOLOGY

Pathological phenomenon

INFLAMMATION

DEMYELINATION

AXONAL LOSS

SYNAPTIC LOSS

Measurable parameters of interest

IRON

MYELINE

SYNAPSES

Blood  
BIOMARKERS

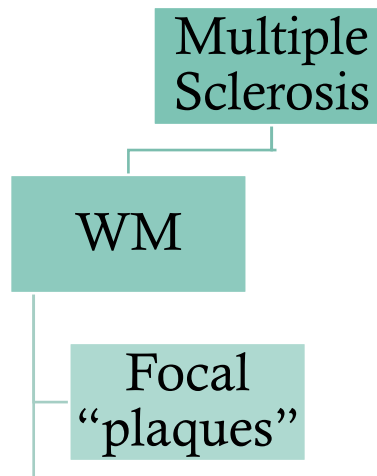
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# MULTIPLE SCLEROSIS: RATIONALE OF OUR STUDIES

1- WEAK correlation:      conventional imaging  clinical status!

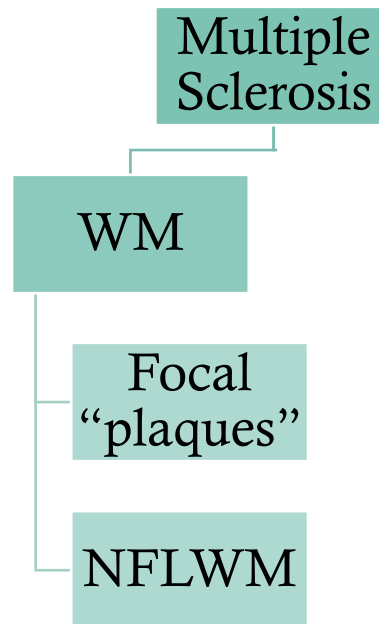




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# MULTIPLE SCLEROSIS: RATIONALE OF OUR STUDIES

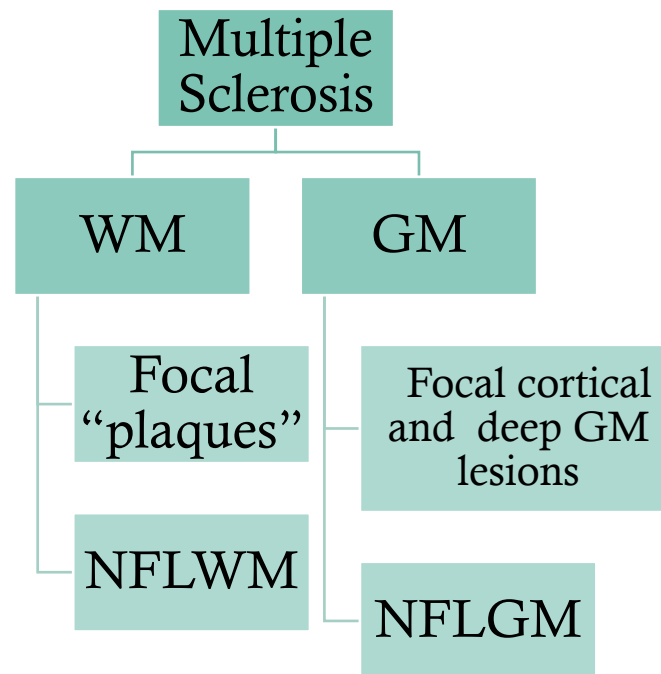
1- WEAK correlation: conventional imaging  clinical status!



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# MULTIPLE SCLEROSIS: RATIONALE OF OUR STUDIES

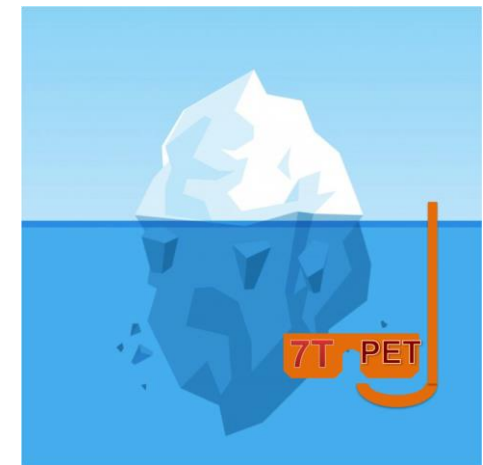
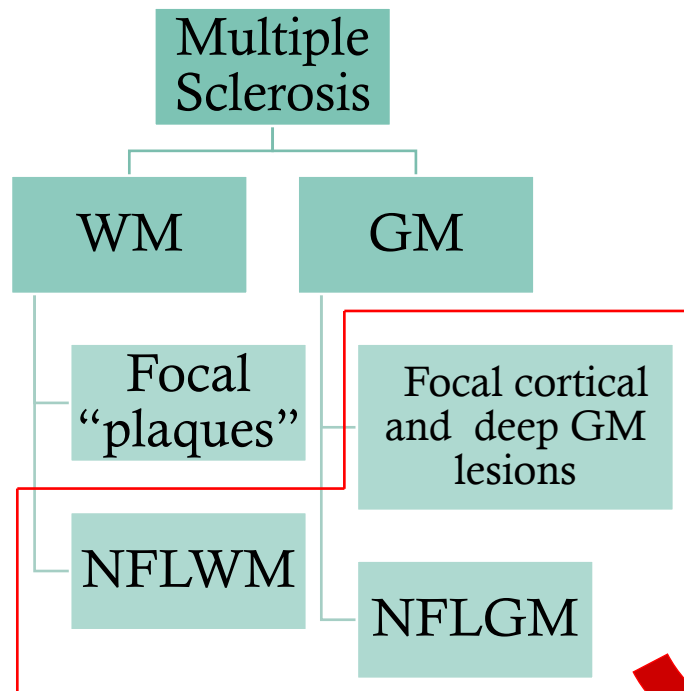
1- WEAK correlation:      conventional imaging  clinical status!



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# MULTIPLE SCLEROSIS: RATIONALE OF OUR STUDIES

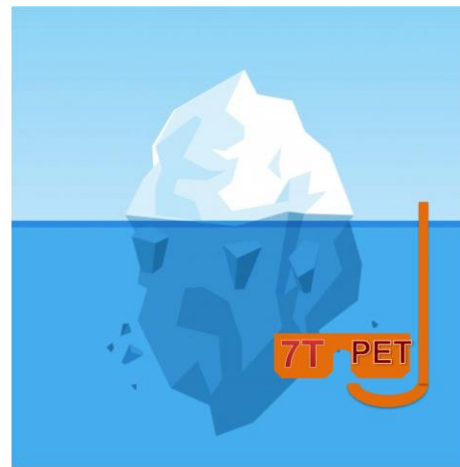
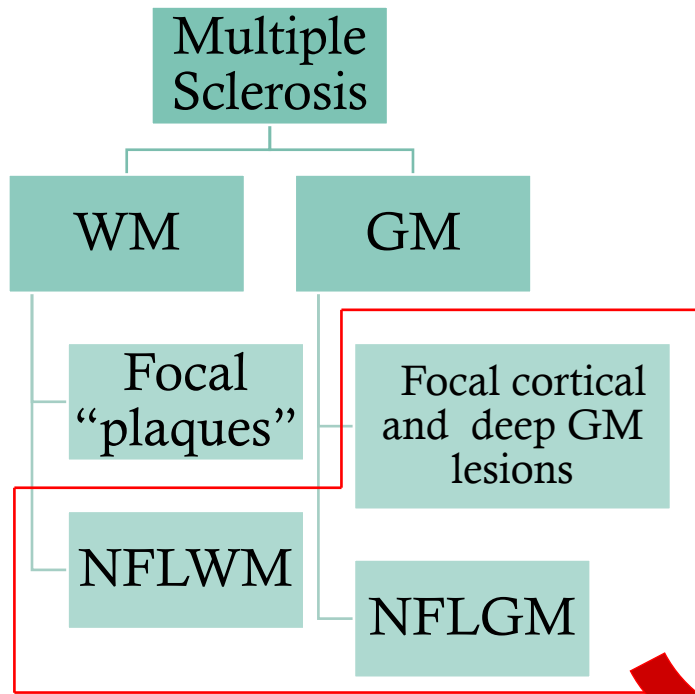
1- WEAK correlation:      conventional imaging ~~↔~~ clinical status!



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# MULTIPLE SCLEROSIS: RATIONALE OF OUR STUDIES

1- WEAK correlation: conventional imaging  clinical status!



2- need for  
QUANTIFICATION

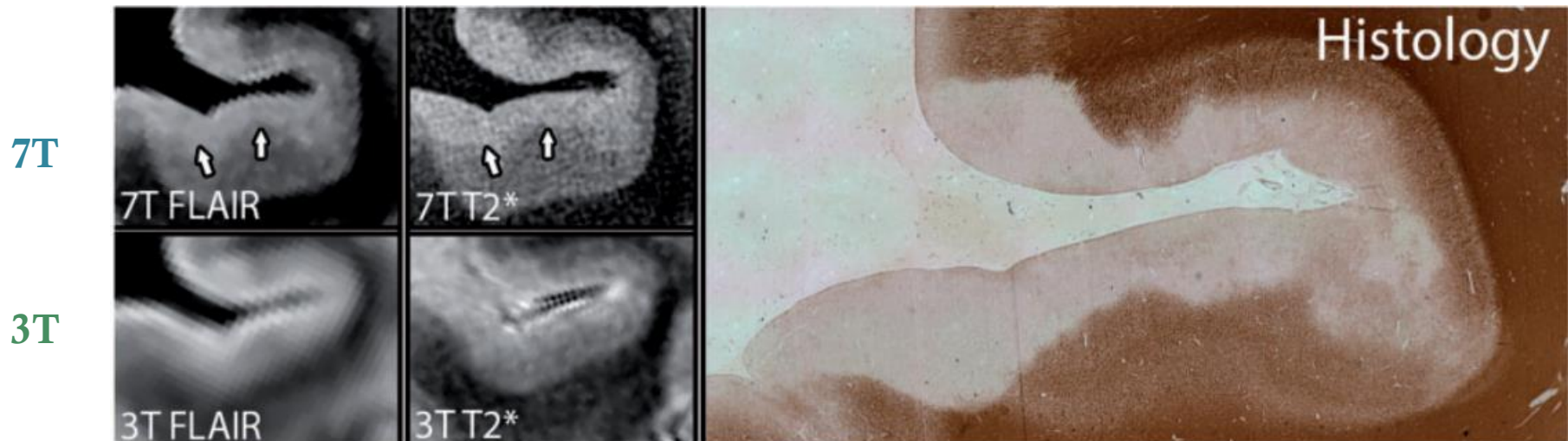
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## WORK PLAN

- MULTIPLE SCLEROSIS
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    - 3T & 7T Q-MRI
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-

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# NON CONVENTIONAL IMAGING: 3T-7T Q-MRI



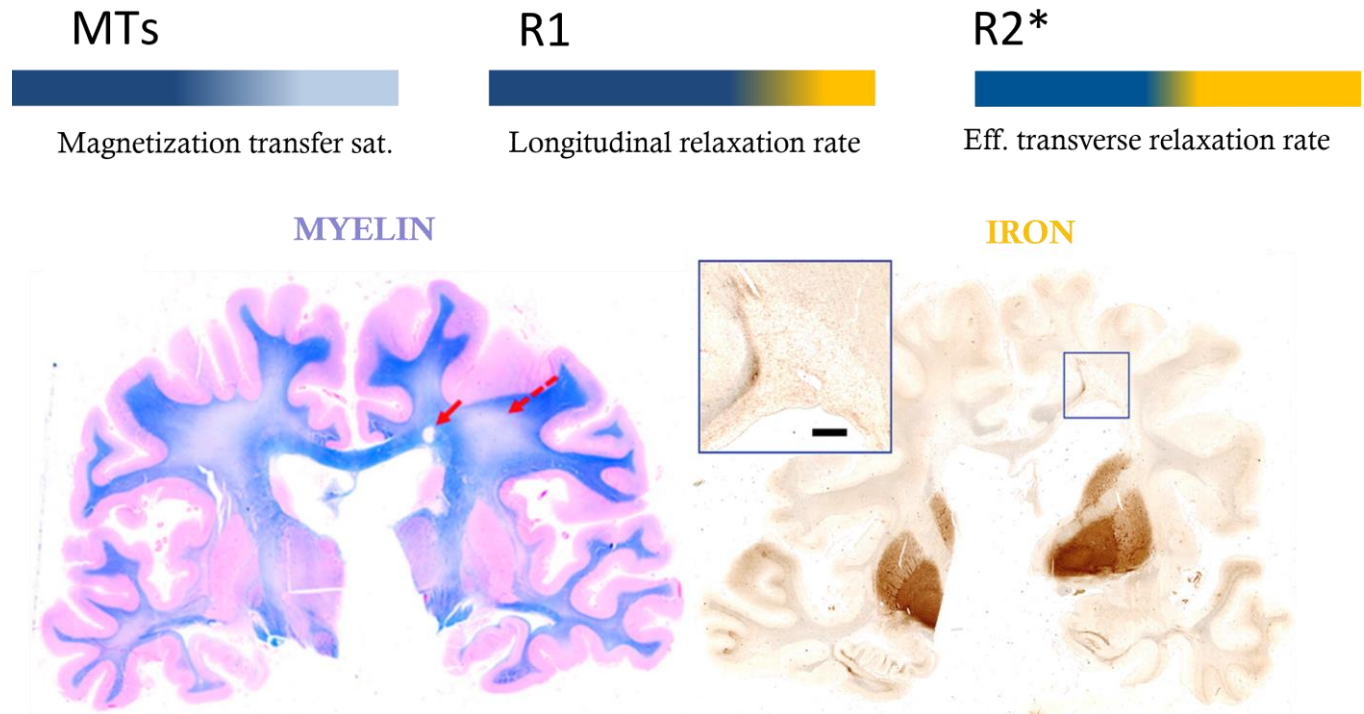
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# NON CONVENTIONAL IMAGING: 3T - 7T Q-MRI

- Parameters:

MT, R1, R2\*

- q-information:*  
myelin, iron





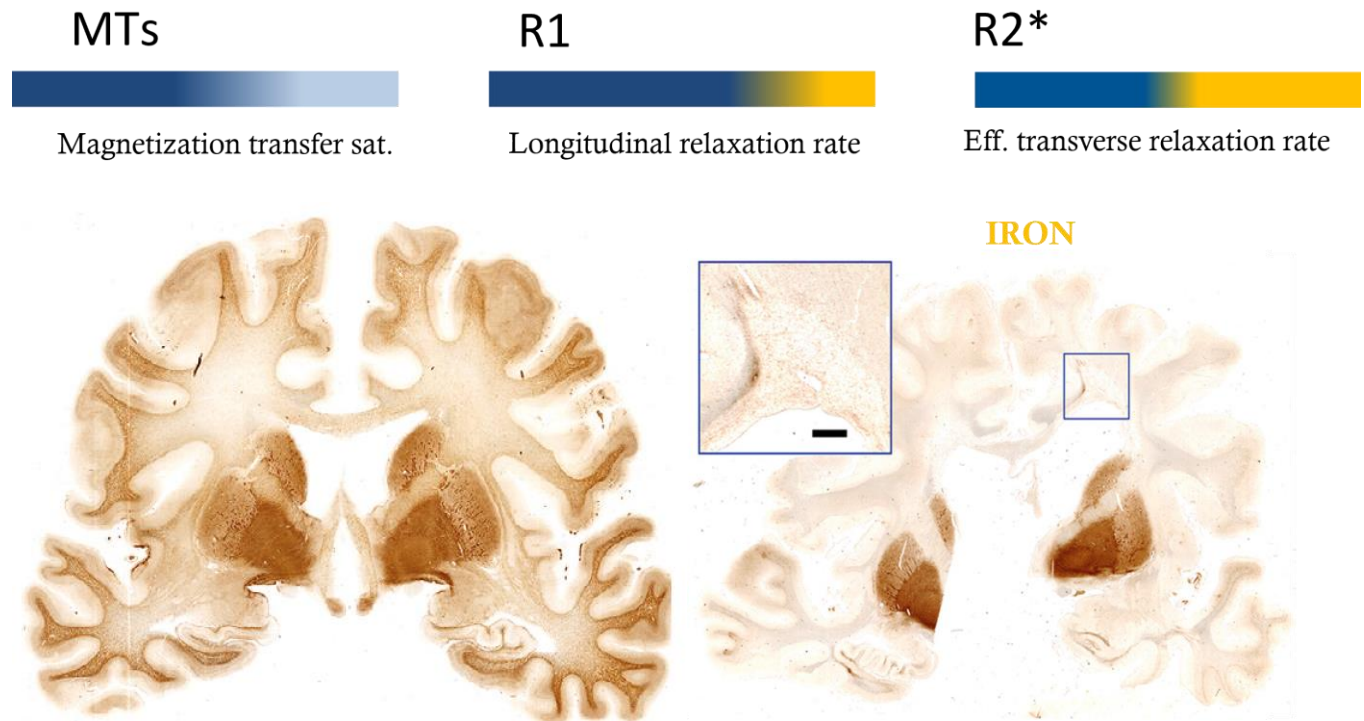
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# NON CONVENTIONAL IMAGING: 3T - 7T Q-MRI

- Parameters:

MT, R1, R2\*

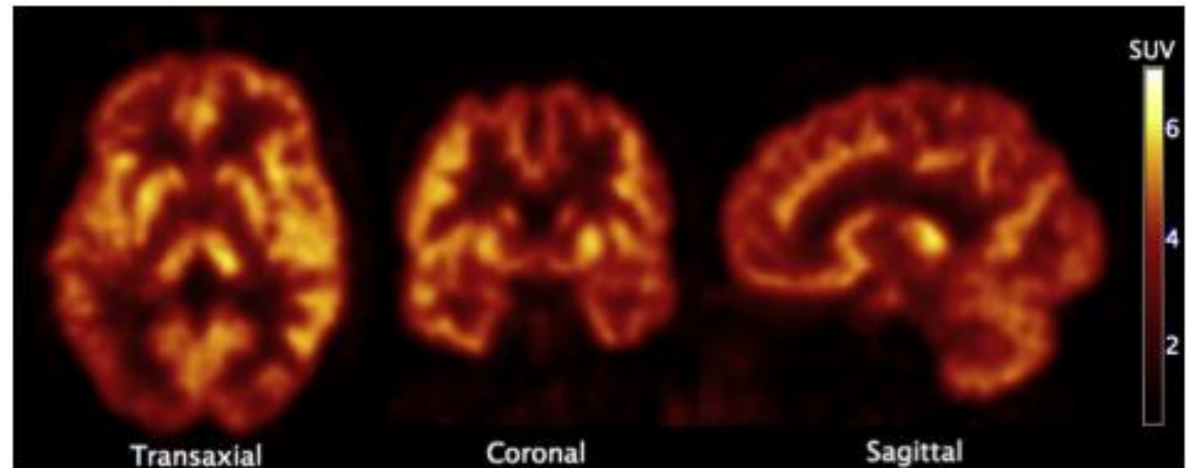
- q-information:*  
myelin, iron



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# NON CONVENTIONAL IMAGING: PET SV2A

- Target: SV2 protein
  - Ubiquitous protein involved in vesicle trafficking
  - Expression in synapses
  - [ $^{18}\text{F}$ ]-UCB-H as imaging agent



Bahri et al. 2017

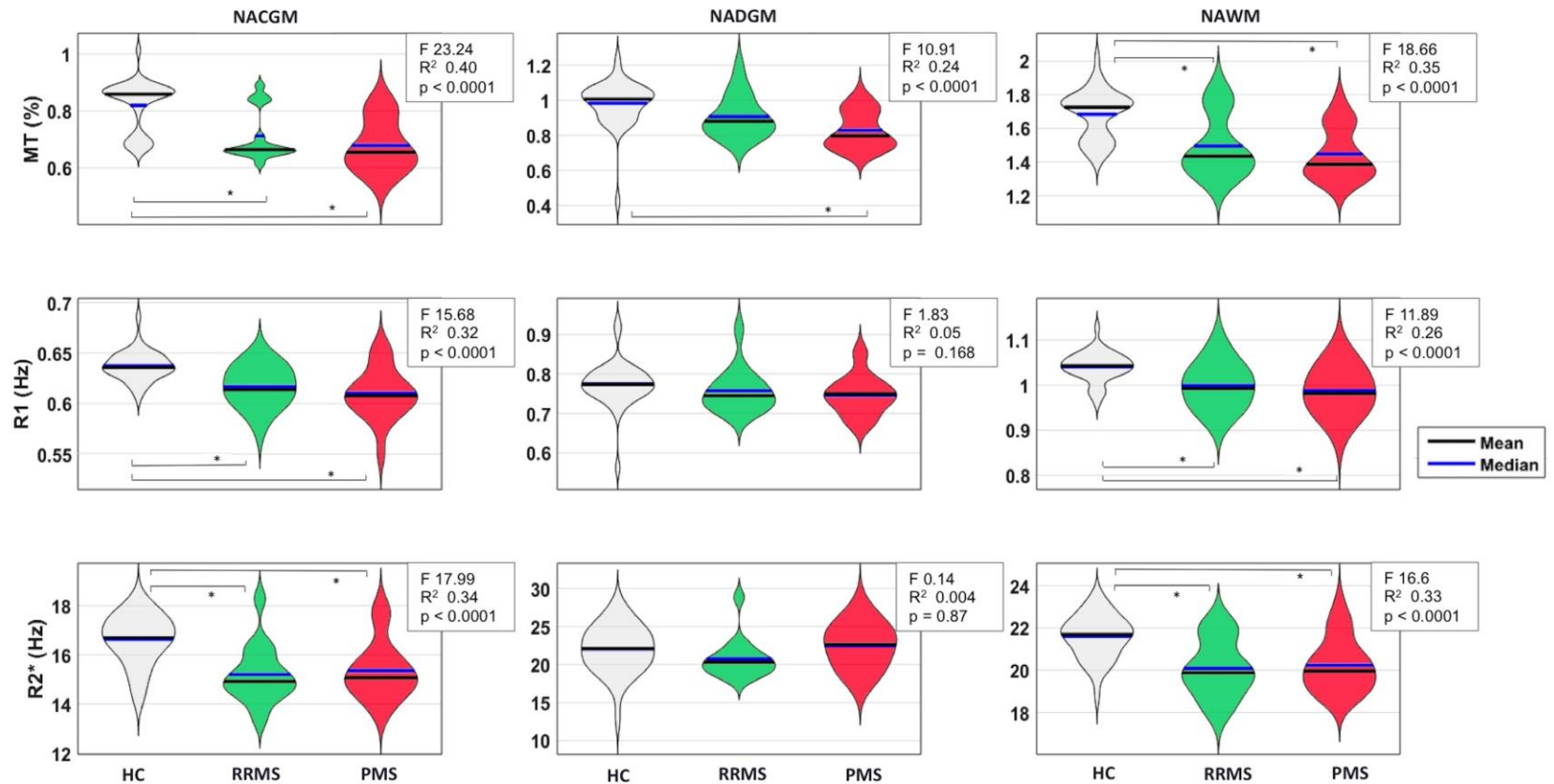
- *q-information*: synaptic density
-

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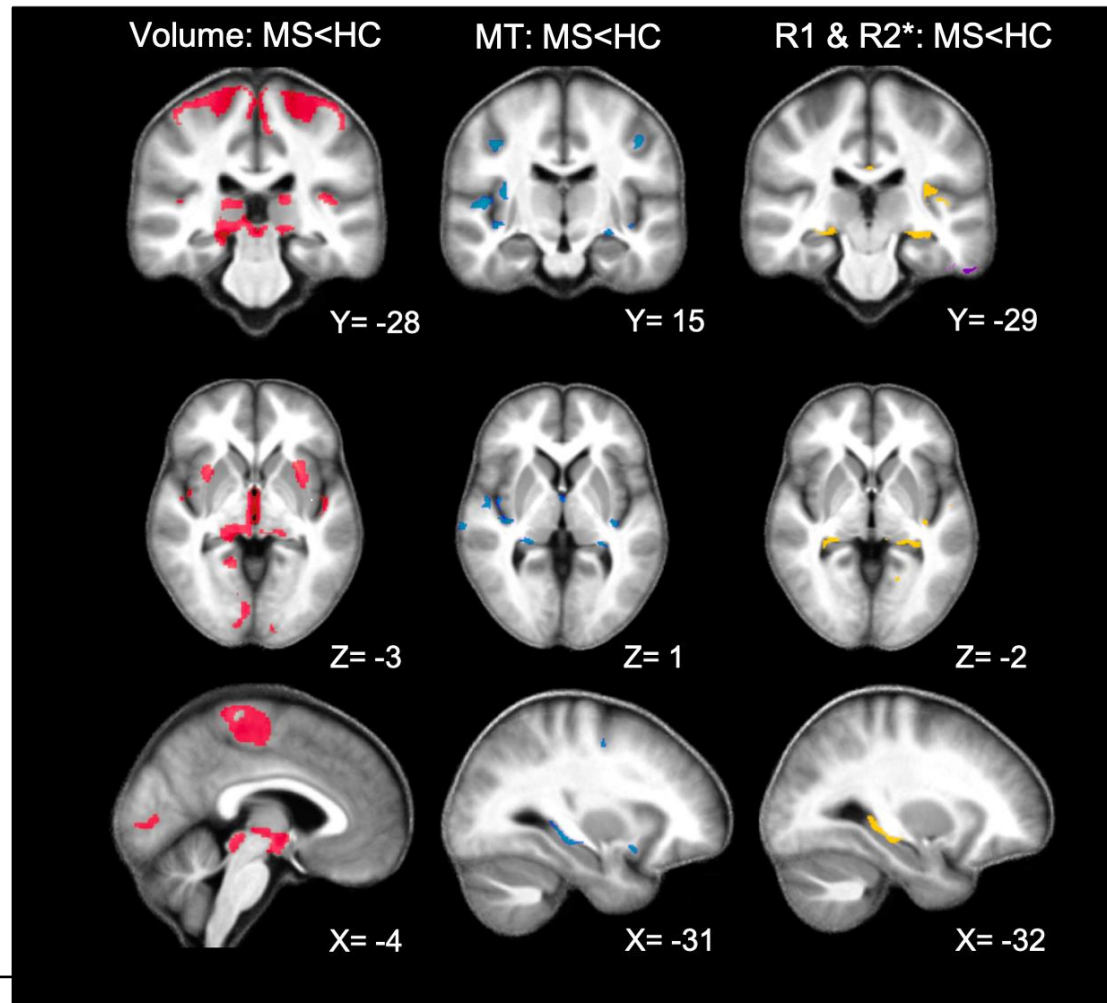
## WORK PLAN

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# Q-IMAGING STUDIES: Q-MRI 3T



# Q-IMAGING STUDIES: Q-MRI 3T

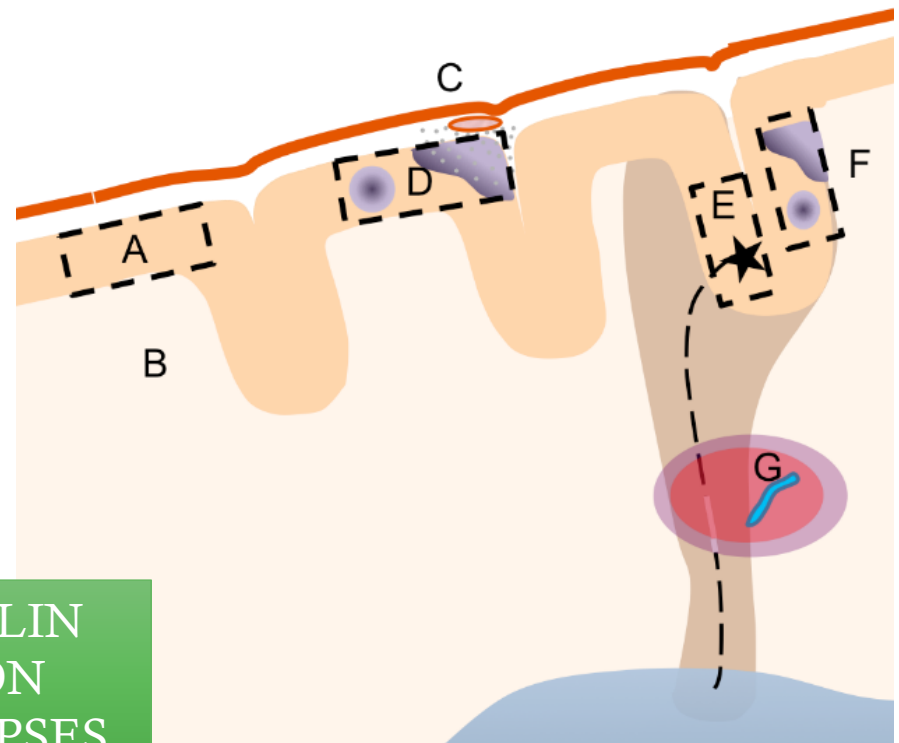


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# Q-IMAGING: MS7TSV2A STUDY

- Focus on *CORTICAL PATHOLOGY*

CGM	Above plaque	NOT above plaque
Focal cortical lesion	FCL/PL+ (F)	FCL/PL- (D)
Cortex without focal lesion	NFCL/PL+ (E)	NFCL/PL- (A)

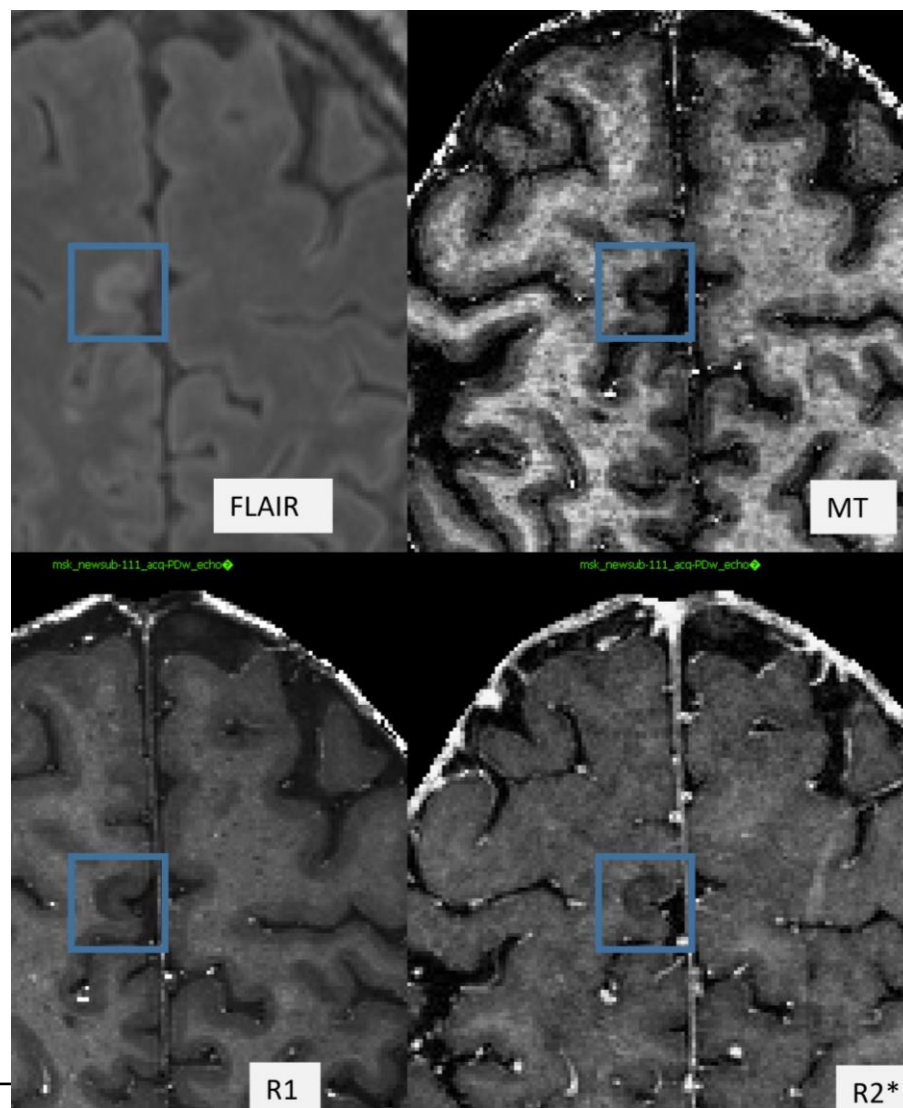


⇒ MYELIN  
⇒ IRON  
⇒ SYNAPSES

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# Q-IMAGING: MS7TSV2A STUDY

- Focus on *CORTICAL*  
*PATHOLOGY*

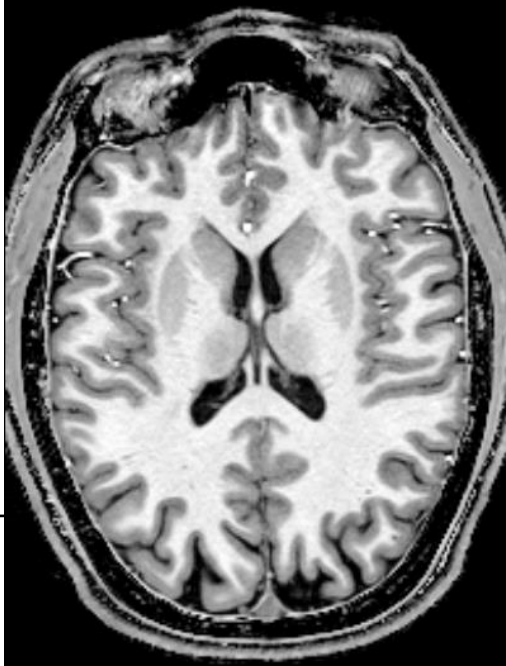
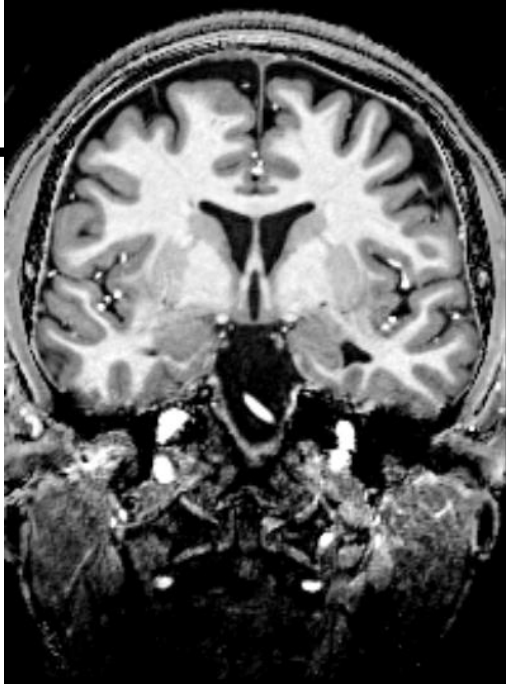




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Merci pour votre attention

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183 343 256

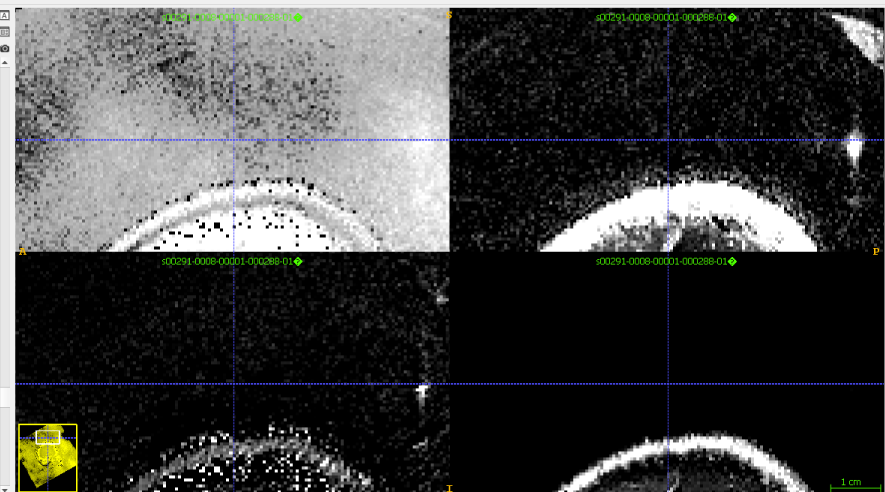
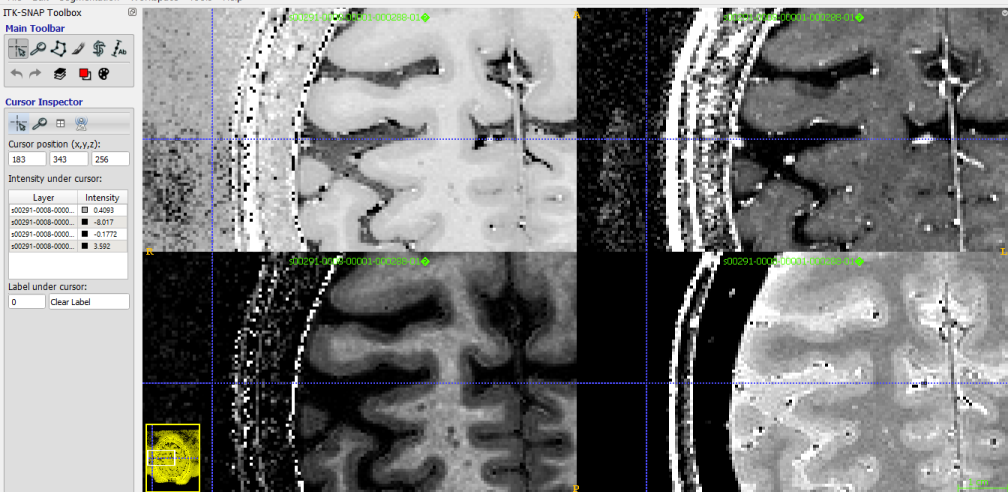
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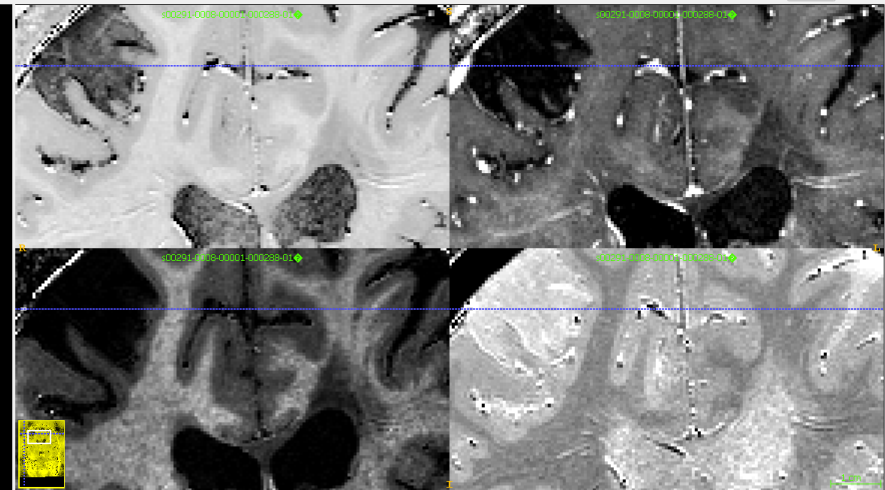
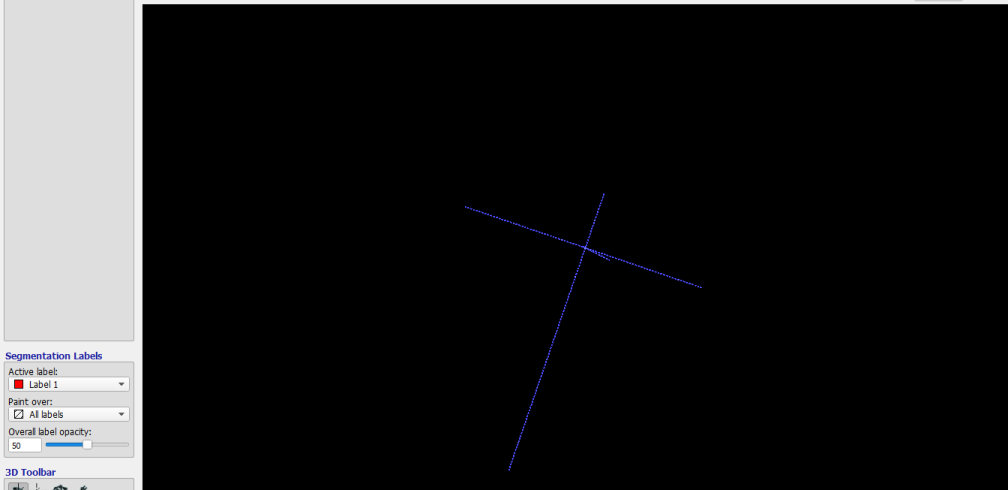
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zoom to fit 343 of 426

zoom to fit 256 of 268



update

zoom to fit 183 of 364