

# Fetal brain maceration score on post-mortem MRI vs. conventional autopsy

N. Hustings, Y. Thonissen, L. Cockmartin, K. Vanderseypen, M. Baldewijns,  
L. De Catte, D. Thal, **M. Aertsen**

Nico Hustings  
Resident Radiology  
University Hospital of Leuven, Belgium

*No conflict of interests to declare*



**KU LEUVEN**

# Introduction

- Fetal maceration
- Body maceration signs on autopsy ~ post-mortem MRI\*
- HOWEVER brain is highly sensitive to maceration
- Need of new MRI-based, brain-specific maceration score
- Clinical application: predictive value of MRI prior to autopsy

\* *Montaldo, P. (2016, BMC Med Imaging)*

# Study Hypothesis/Aim

To create a reproducible brain-specific maceration score on MRI that correlates well with fetal brain autopsy

# Materials and Methods

- Data collected between February 2016 and December 2020
- 79 Cases with APO and MRI
- Brain Maceration Grading:
  - Whole-body MRI maceration score following Montaldo et al (6 organs)
  - New empirical brain-specific MRI maceration score (8 brain structures)
  - Histopathological brain maceration grading

# Materials and Methods

## Brain-specific MRI maceration score (1/2)

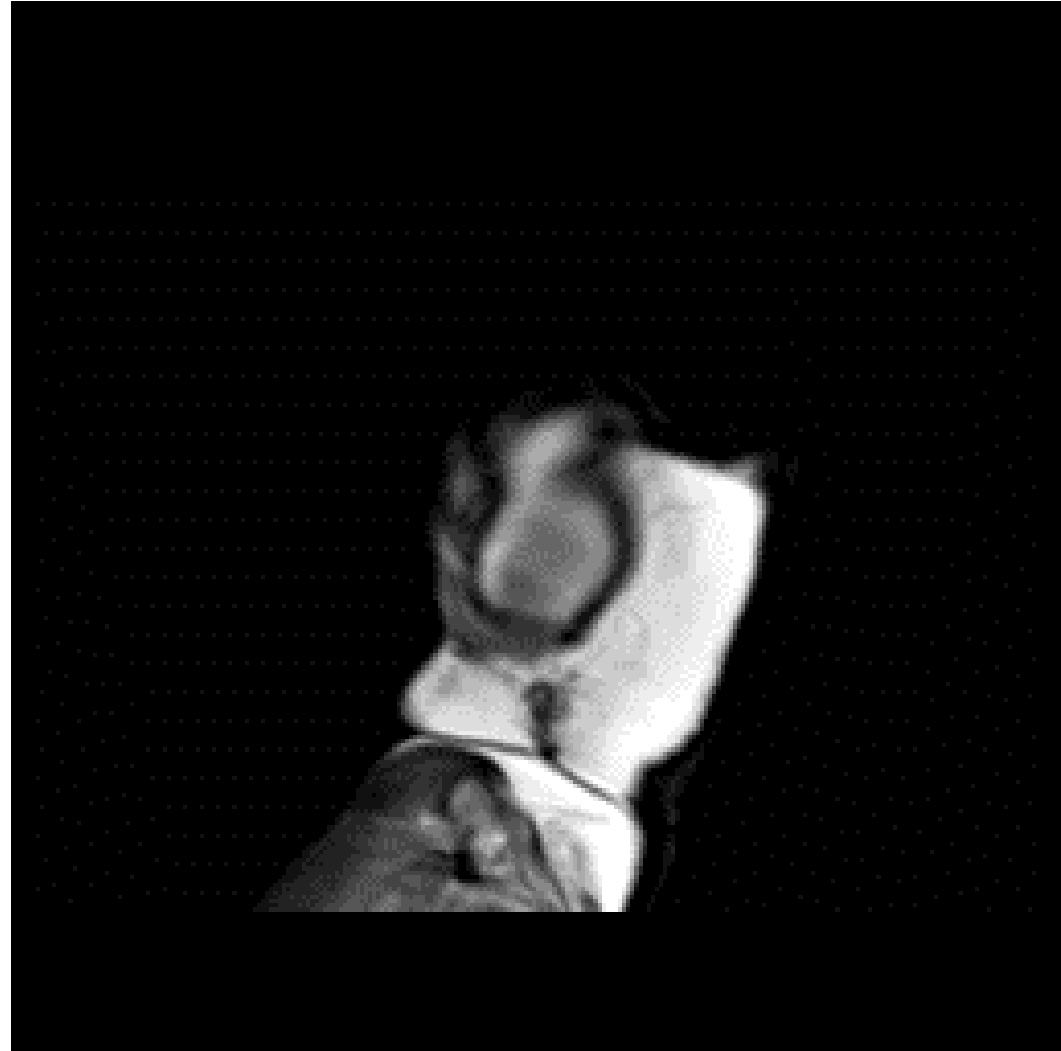
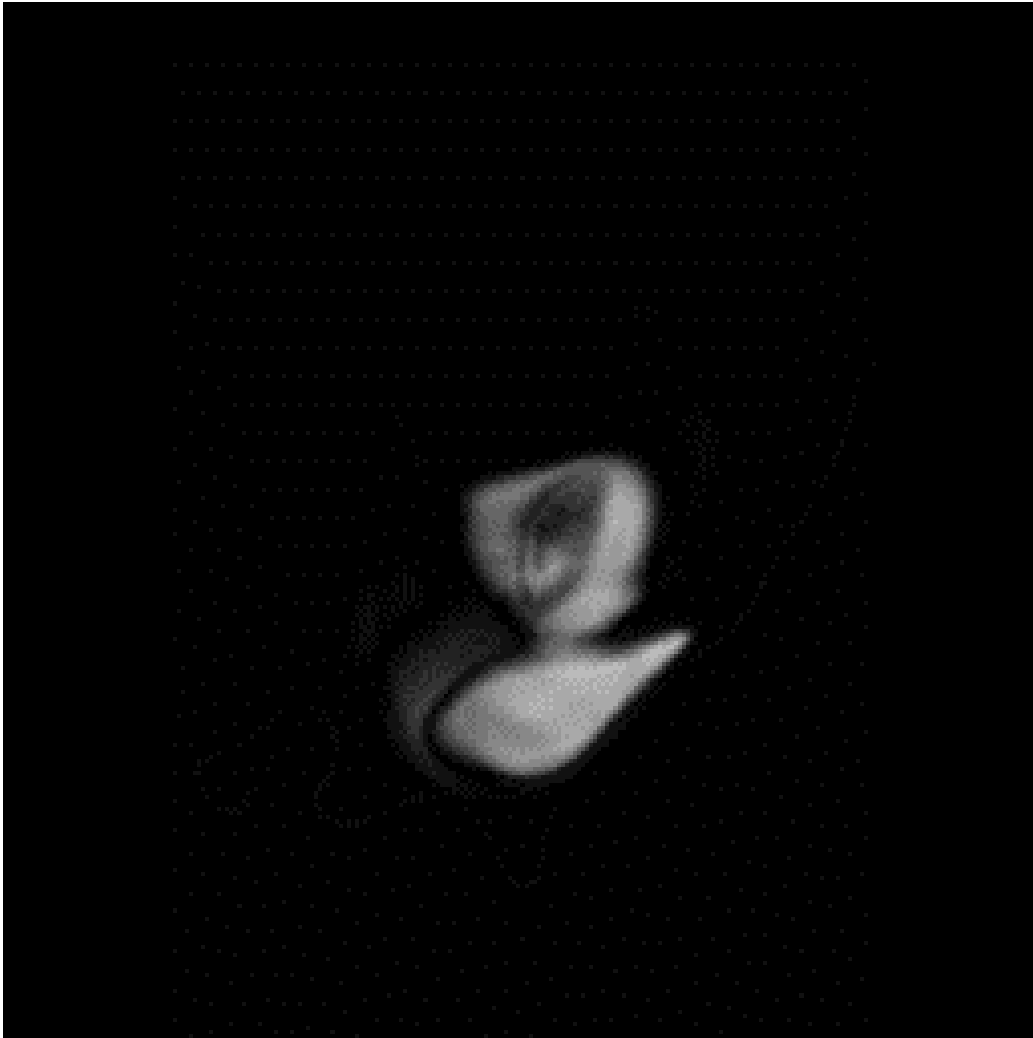
<b>1 Fluid distribution</b>	<p>0 = Preserved fluid within the ventricular system, almost no subcutaneous fluid</p> <p>1 = Decreased or increased fluid in the lateral ventricles with or without fluid-fluid level (due to blood), some subcutaneous fluid, preserved skull lining</p> <p>2 = Decreased fluid in the ventricular system with major subcutaneous fluid presence</p> <p>3 = Major subcutaneous fluid with skull deformation</p>
<b>2 Ventricular lining</b>	<p>0 = Intact</p> <p>1 = Irregular without interruptions</p> <p>2 = Interruptions in the lining of the posterior horn</p> <p>3 = Widespread interruptions in the ventricular lining with cleavage of the surrounding brain parenchyma</p>
<b>3 Congestion</b>	<p>0 = No</p> <p>1 = Mild to moderate congestion of the dural sinuses in the dependent areas</p> <p>2 = Severe congestion of the dural sinuses in the dependent areas</p>
<b>4 Corpus callosum</b>	<p>0 = Intact</p> <p>1 = Partially present</p> <p>2 = Disruption / not seen without signs of corpus callosum agenesis</p> <p>X= Corpus callosum agenesis (not-evaluable)</p>

# Materials and Methods

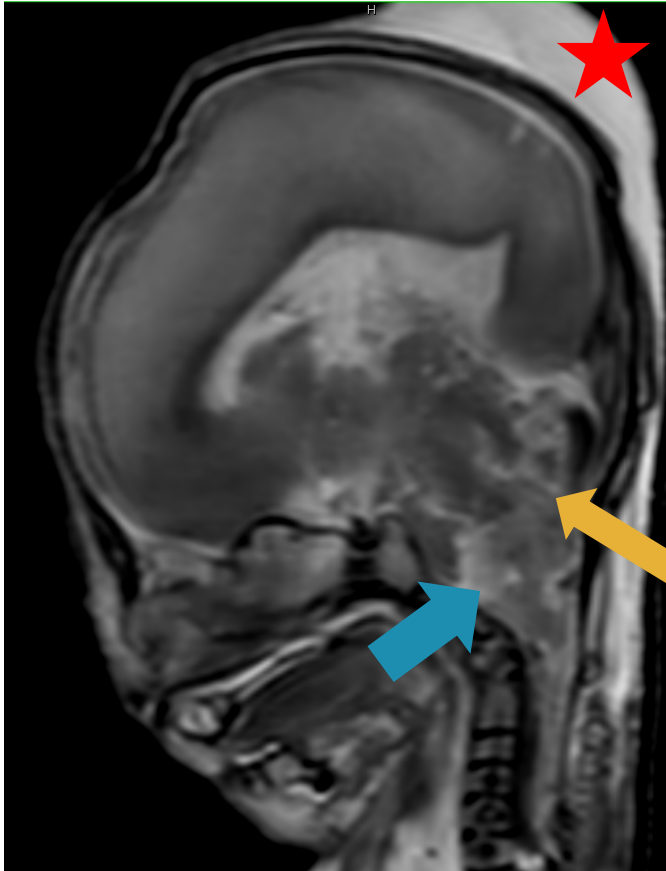
## Brain-specific MRI maceration score (2/2)

<b>5 Deep grey matter integrity</b>	0 = Intact  1 = Some fluid interfering in between deep gray matter areas (basal ganglia)  2 = Severe disruption of the deep gray matter with multiple fluid clefts
<b>6 Brain stem</b>	0 = Intact  1 = Deformed  2 = Complete destruction
<b>7 Cerebellum</b>	0 = Intact  1 = Deformed  2 = Complete destruction
<b>8 Eyes</b>	0 = Homogenous with preserved spherical shape  1 = Internal heterogeneity  2 = Mild loss of spherical shape  3 = Severe deformity with or without internal bleeding

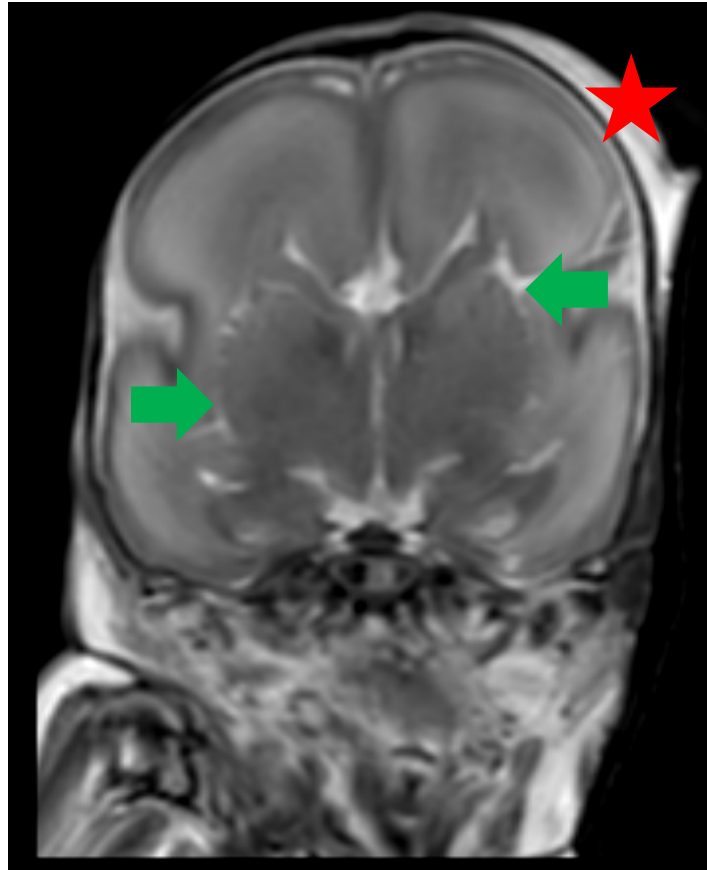
# Example fetal brain maceration



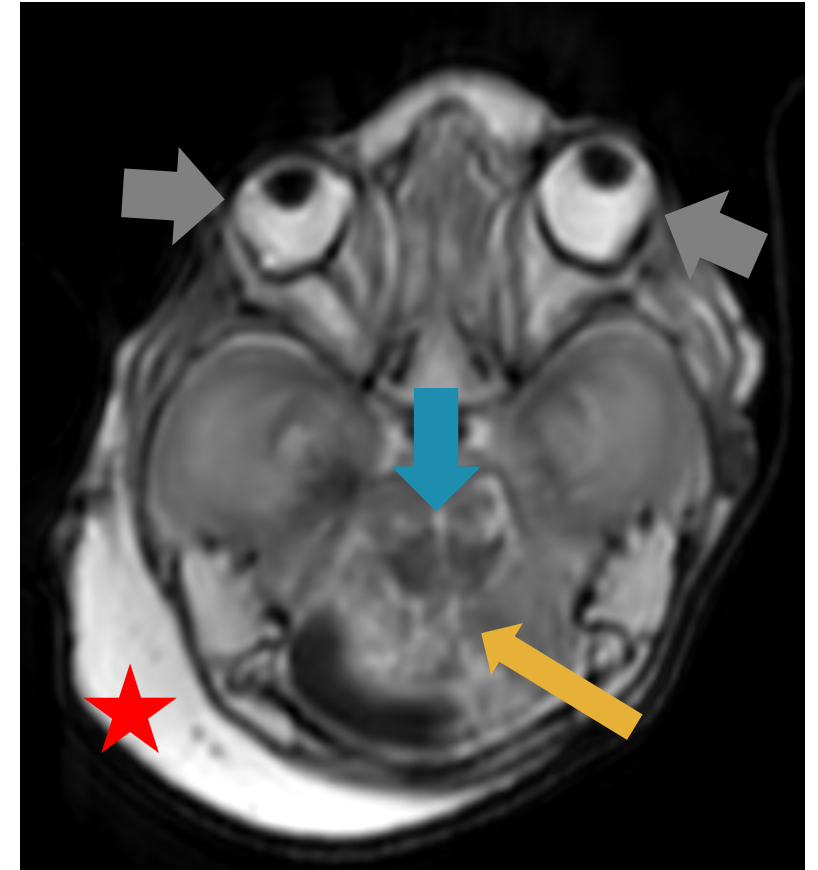
# Example fetal brain maceration



Brainstem Cerebellum  
Fluid distribution



Deep gray matter integrity



Eyes



# Results

## 1) Correlation MRI – Autopsy:

- **Brain-specific MRI maceration score** :  $\tau = 0.69$
- Whole-body MRI maceration score :  $\tau = 0.45$

## 2) Intraclass correlation coefficient (ICC)

- Intra-observer agreement = 0.94
- Inter-observer agreement = 0.86

# Conclusion

We found a substantial correlation between our brain-specific MRI maceration score and autopsy, with almost perfect intra- and inter- observer agreement.

This score on MRI can guide/optimize the histopathological approach/resources.

Thank You

