Klinikum rechts der Isar

Technische Universität München

The Bavarian Longitudinal Study (BLS):

Cerebral perfusion Magnetic Resonance Imaging reveals significantly lower cerebral blood flow in very preterm compared to term-born adults

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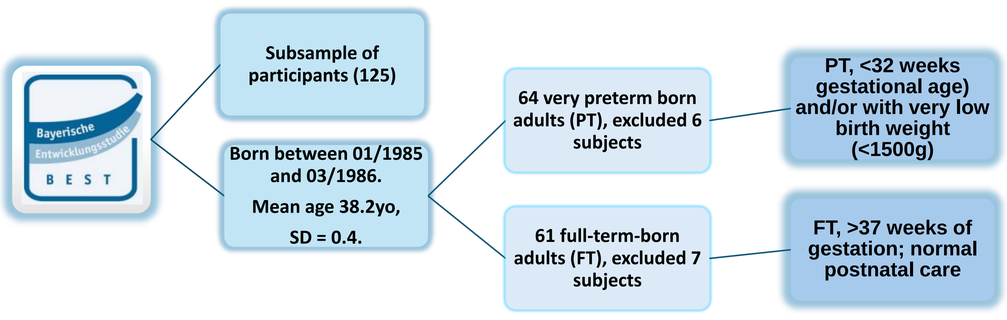
Introduction

- Preterm birth (birth before 37 weeks of gestation) represents 11% of births worldwide.[1]
- Despite advancements in neonatal care, these infants often face long-term neurodevelopmental challenges, e.g., motor and cognitive deficits.[2]
- Cerebral Blood Flow (CBF) supports brain metabolism.
- Impaired CBF in preterm infants may disrupt metabolism, thus affecting brain development.[3,4]
- However, whether perfusion alterations persist into adulthood remains unclear.

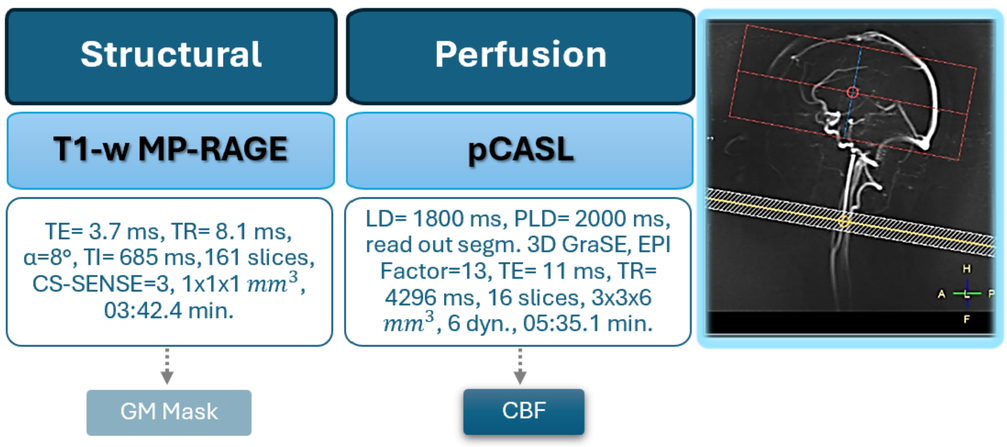
→ **Aim:** Evaluate CBF differences between term and preterm-born adults in adulthood, using Arterial Spin Labelling (ASL) MRI.

Methods

- Participants[5]:



- Multiparametric MRI: 3T Phillips MRI scanner.



- Evaluation and statistical analysis:
  - CBF maps were calculated using a custom pipeline in MATLAB, including normalization to MNI space.
  - Voxel-wise group comparisons of CBF values were conducted using FSL randomise (unpaired t-test) with 5000 permutations, applying a GM mask and assuming significance at p<.05 after Threshold-free cluster enhancement (TFCE) and family-wise error correction.
  - Association with birth-related variables via partial correlations analyses.
  - Visualization: FSL, MRIcron and Nilearn10 with 5mm FWHM Gaussian filter in Python.

Results

Figure 1. Group average term and preterm CBF parameter maps and T1-weighted MP-RAGE MRI in MNI space.

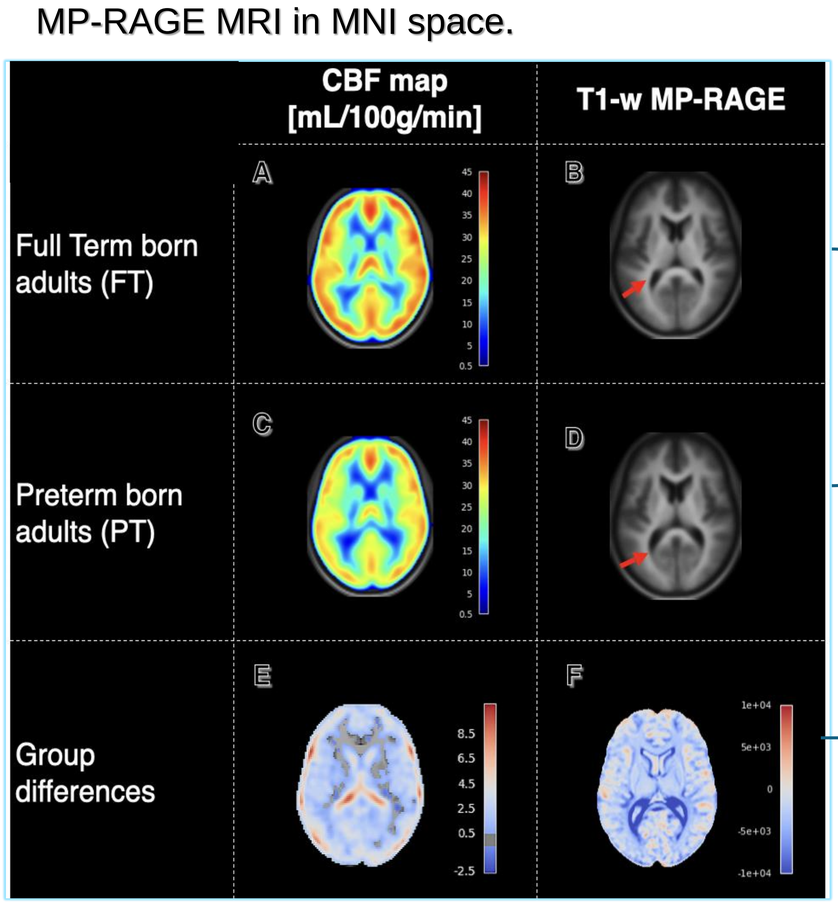


Figure 2. Significantly lower CBF in preterm (PT) compared to term-born (FT) adults.

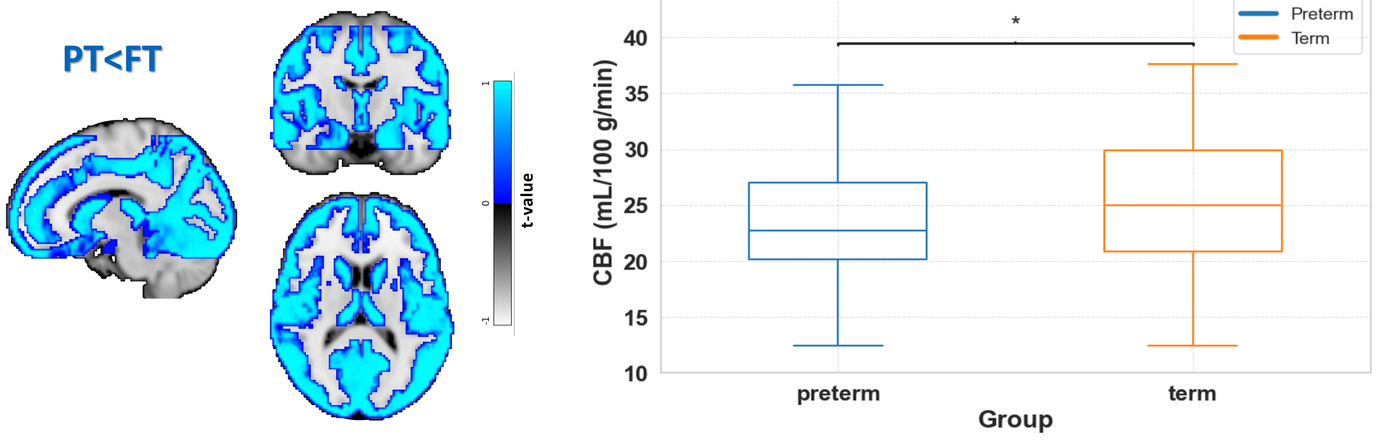
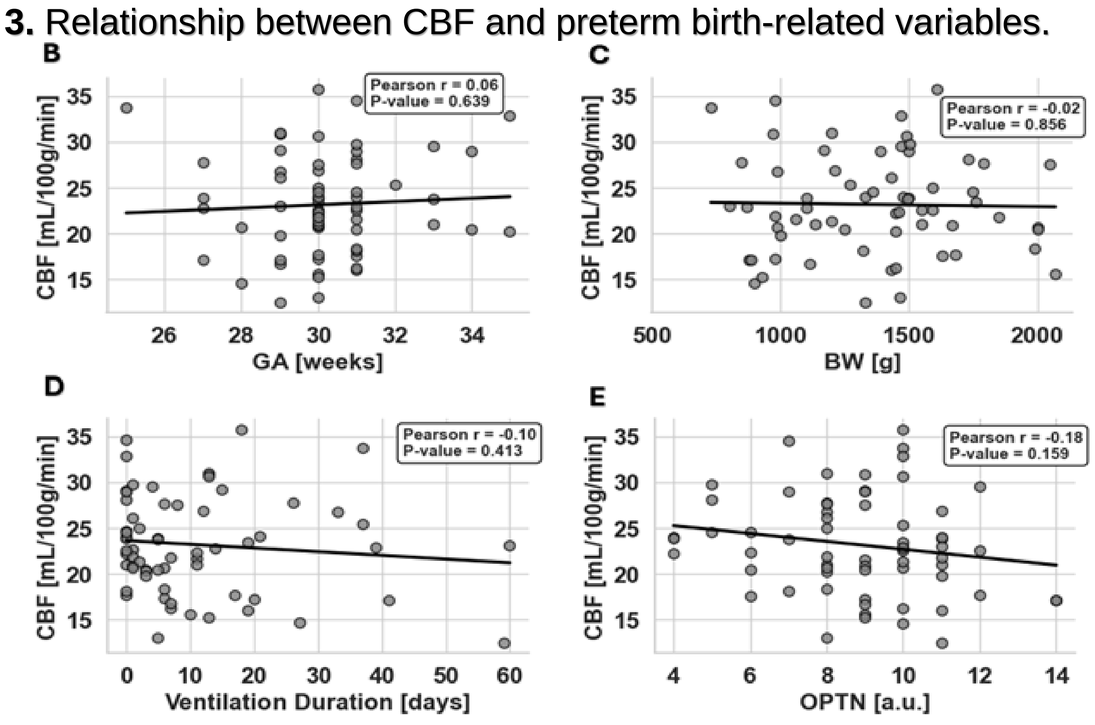


Figure 3. Relationship between CBF and preterm birth-related variables.



Discussion & Conclusion

- CBF in the PT group is significantly lower compared to FT subjects across widespread cortical and subcortical areas, including the thalamus and temporal lobes. This hypoperfusion likely reflects the long-term effects of early brain injuries or developmental issues that originate in infancy.
- Further region-specific ROI analysis is needed to reveal more specific relations and to better elucidate the enduring effects of preterm birth on adult cerebral perfusion.

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Funded by

European Research Council
Established by the European Commission
UK Research and Innovation
DFG Deutsche Forschungsgemeinschaft

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