

Quantitative MRI Measurement of Lung Development in Early Onset Fetal Growth Restriction



Janina Schellenberg³, Paponrad Tontivuthikul¹, Joanna Chappell³, **Nada Mufti**^{1,2}, Dimitra Flouri^{2,3}, Sebastien Ourselin^{2,3}, Rosalind Aughwane^{1,2}, Anna L. David^{1,6,7}, Andrew Melbourne^{3,2,1}

¹Elizabeth Garrett Anderson Institute for Women's Health, University College London, London, United Kingdom.

²Department of Medical Physics and Biomedical Engineering, University College London, London, United Kingdom.

³School of Biomedical Engineering and Imaging, Kings College London, London, United Kingdom.

⁴Medical Physics, University College Hospital, London, United Kingdom.

⁵Centre for Medical Imaging, University College London, London, United Kingdom.

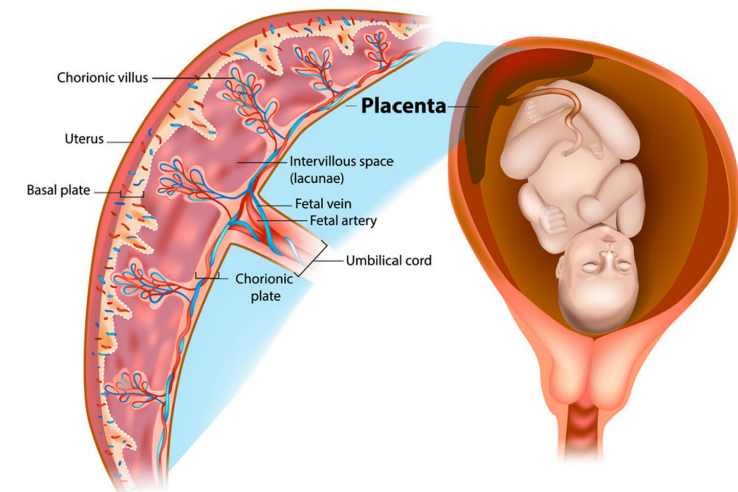
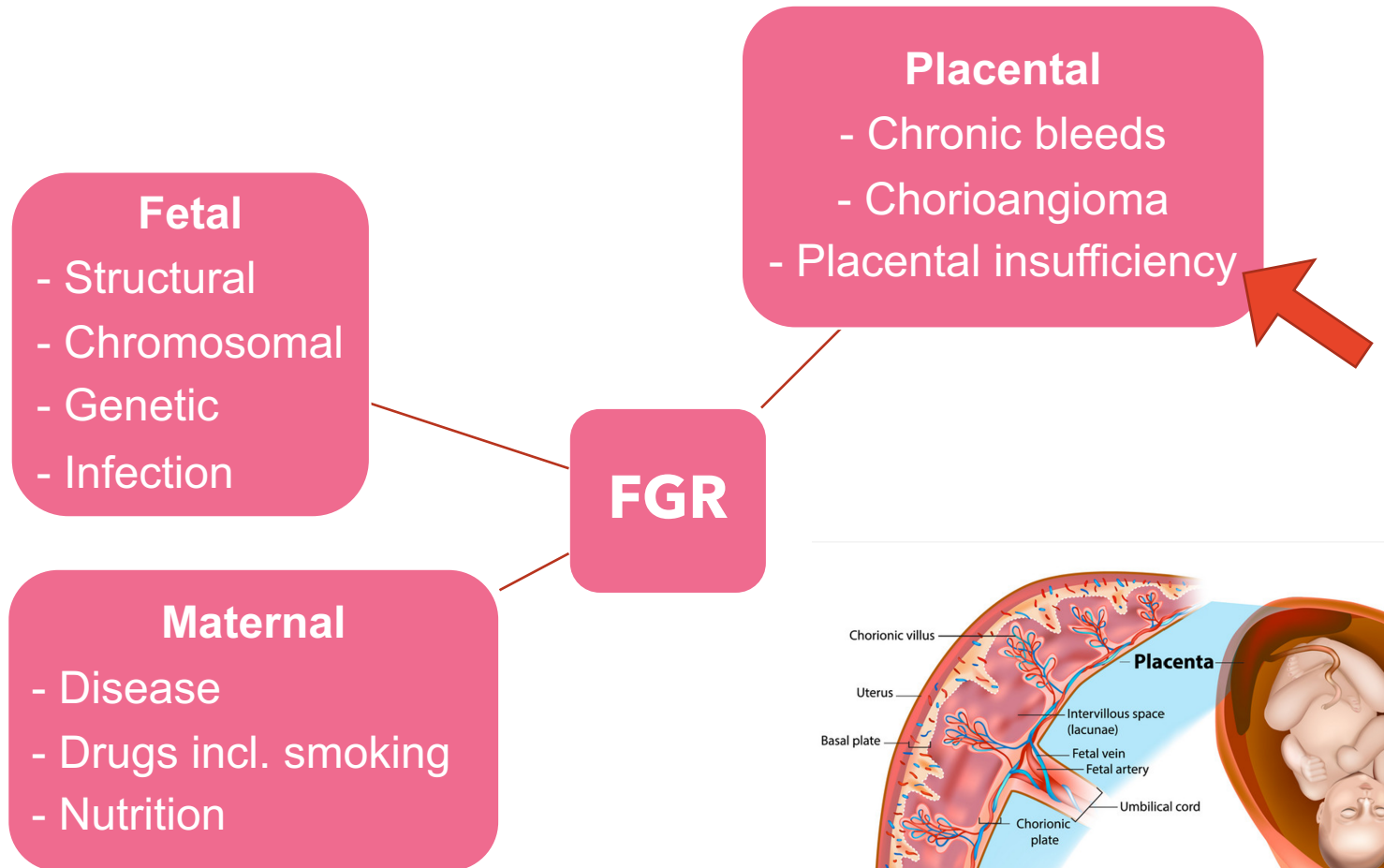
⁶University Hospital KU Leuven, Leuven, Belgium.

⁷NIHR University College London Hospitals Biomedical Research Centre, London, United Kingdom.

⁸Centre for Medical Imaging, University College London, London, United Kingdom

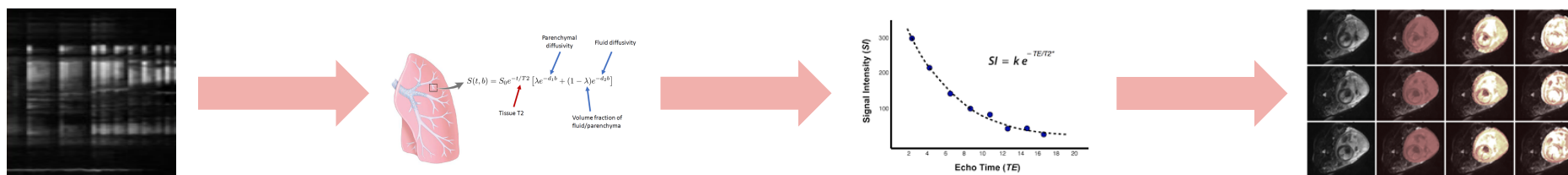
Background

- **Fetal Growth Restriction** affects 3% - 7% of all pregnancies
- Contributes to 1/3 of stillbirths
- Fetus fails to achieve growth potential
- Placental Insufficiency → Hypoxia → **altered structure in developing organs**

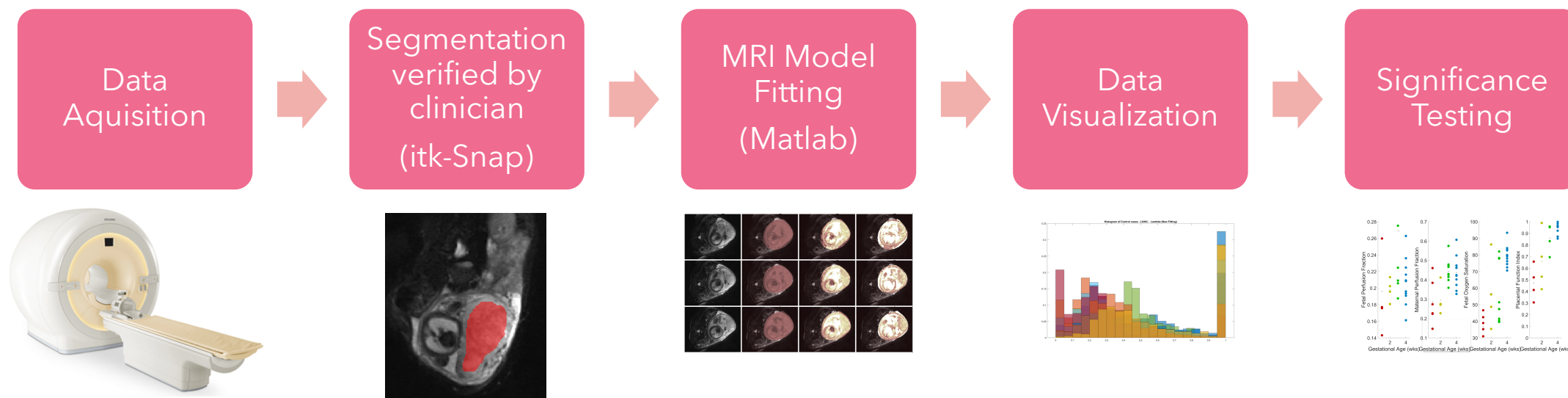


Background – Quantitative MRI

- Why use MRI? non-invasive & non-ionizing radiation
- Quantitative MRI: multiple measurements to infer metric with mathematical tissue models

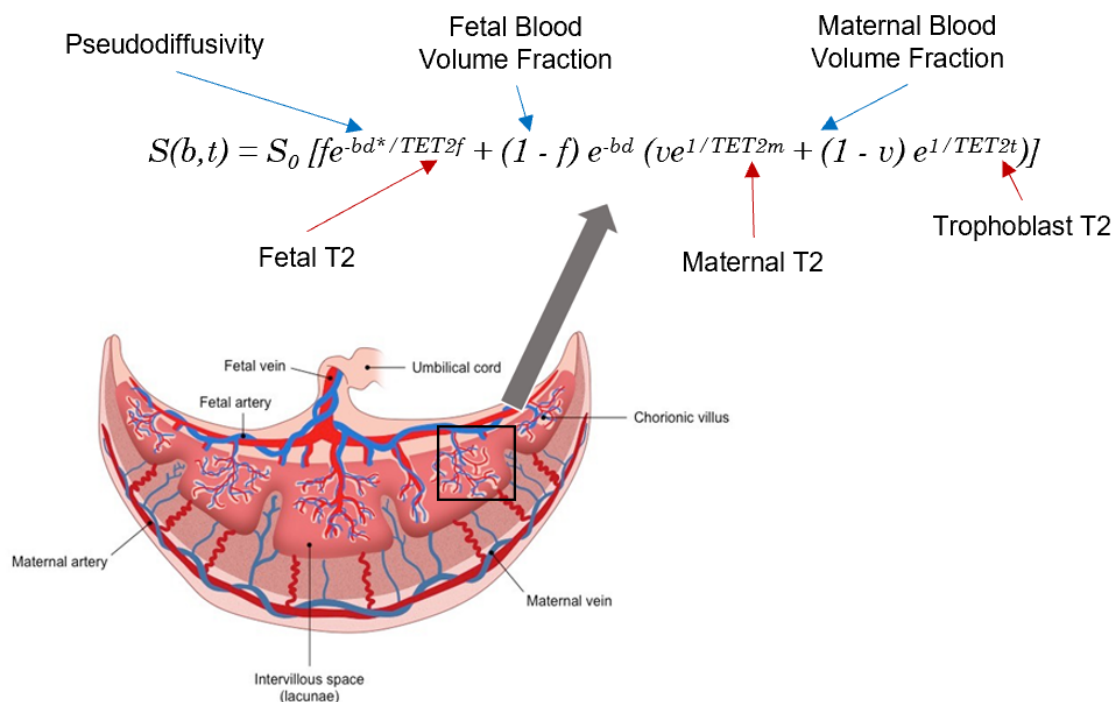


Methods

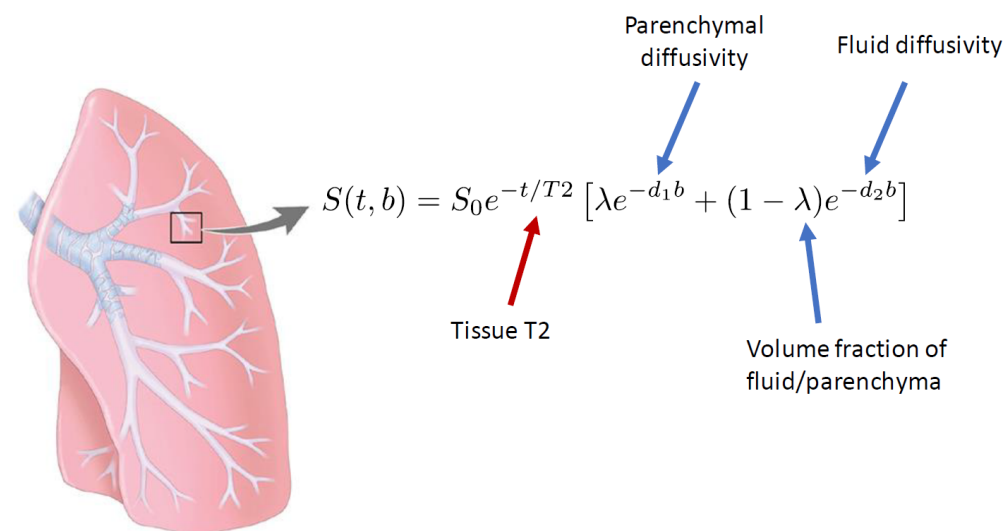


Background – Model Fitting

DECIDE: (Placenta)



LUNG:

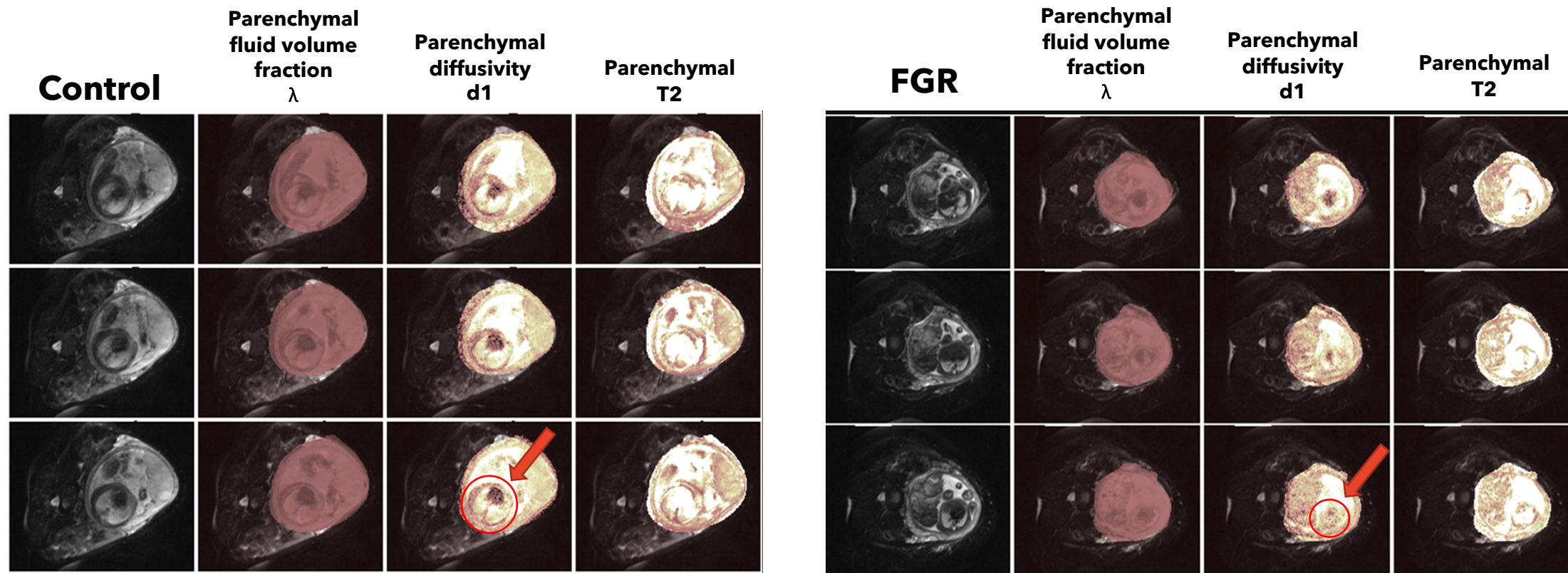


Separating fetal and maternal placental circulations using multiparametric MRI Melbourne et al MRM 2019

Magnetic resonance imaging measurement of placental perfusion and oxygen saturation in early-onset fetal growth restriction. Aughwane et al BJOG 2021

Placental MRI Predicts Fetal Oxygenation and Growth Rates in Sheep and Human Pregnancy. Flouri et al Advanced Science 2022

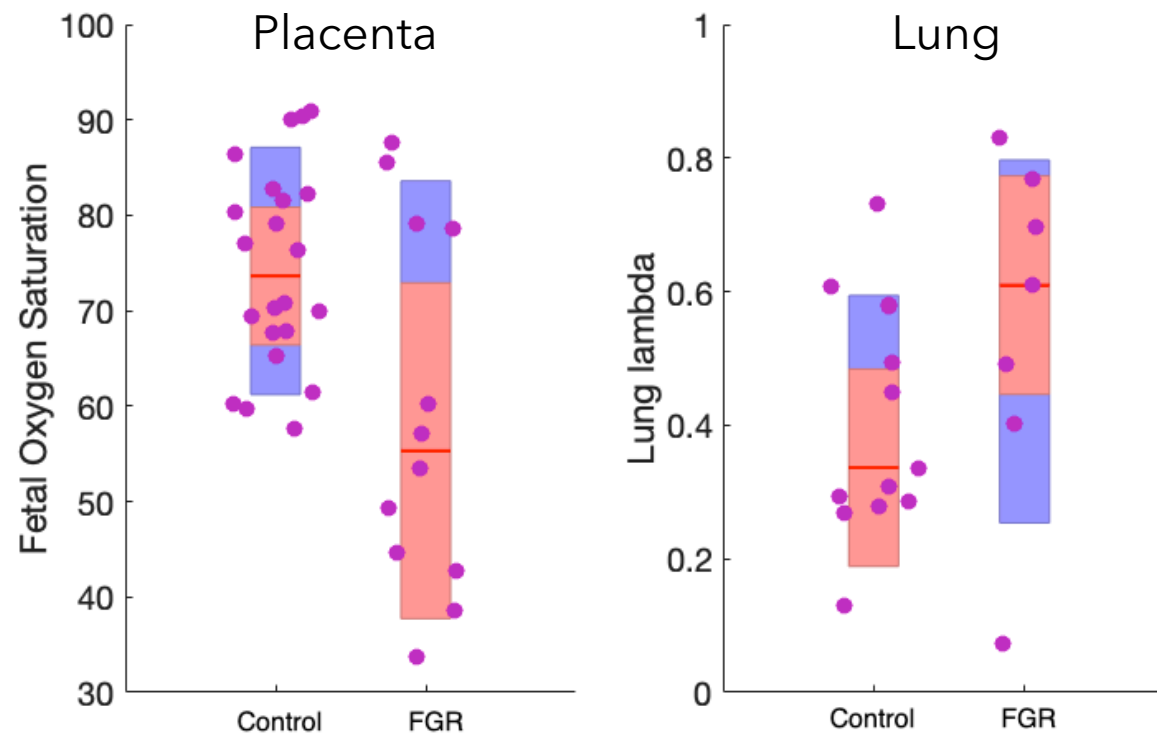
Results - Lungs



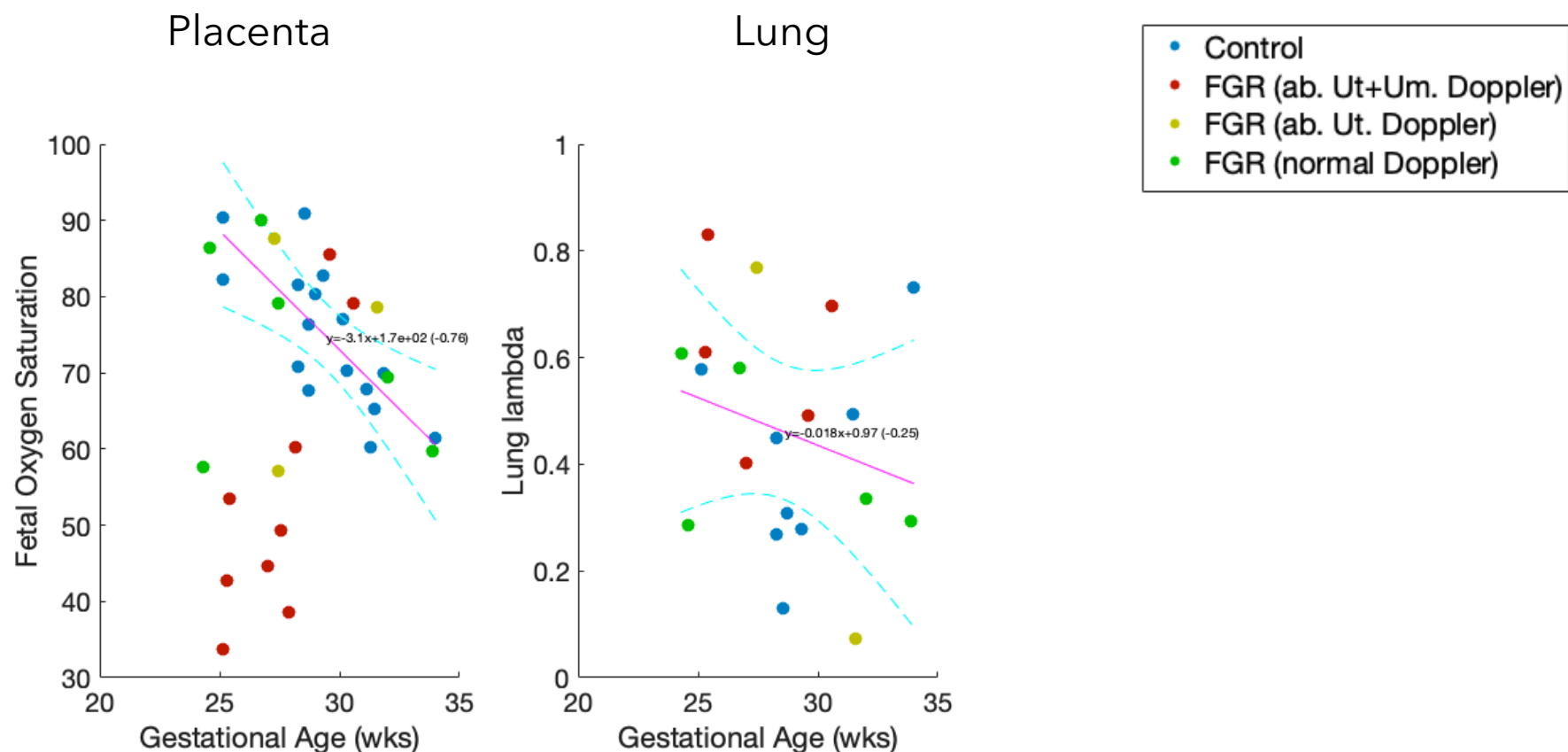
→ some trends visible, but not as clear (i.e. more fluid movement for FGR?)

Results

- Applied to a cohort of 16 controls (GA at scan 28 ± 3 wks, EFW 1424 ± 425 g) and 20 FGR (<3rd centile w/wo Doppler US abnormality) (GA at scan 29 ± 2 wks, EFW 717 ± 313 g)



Results



Magnetic resonance imaging measurement of placental perfusion and oxygen saturation in early-onset fetal growth restriction.

Aughwane et al BJOG 2021

Placental MRI Predicts Fetal Oxygenation and Growth Rates in Sheep and Human Pregnancy. Flouri et al Advanced Science 2022

Conclusion

- Placenta → feto-placental SO₂ is low in FGR and correlates strongly with GA
- Lungs → Lung parenchymal volume fraction is higher in FGR and higher at earlier GA
- Lungs → Lung parenchymal volume fraction correlates with SO₂ independent of GA

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