



Comparison of Fetal Brain Apparent Diffusion Coefficients According to Abnormal Doppler Grade in Early Onset Intrauterine Growth Restriction

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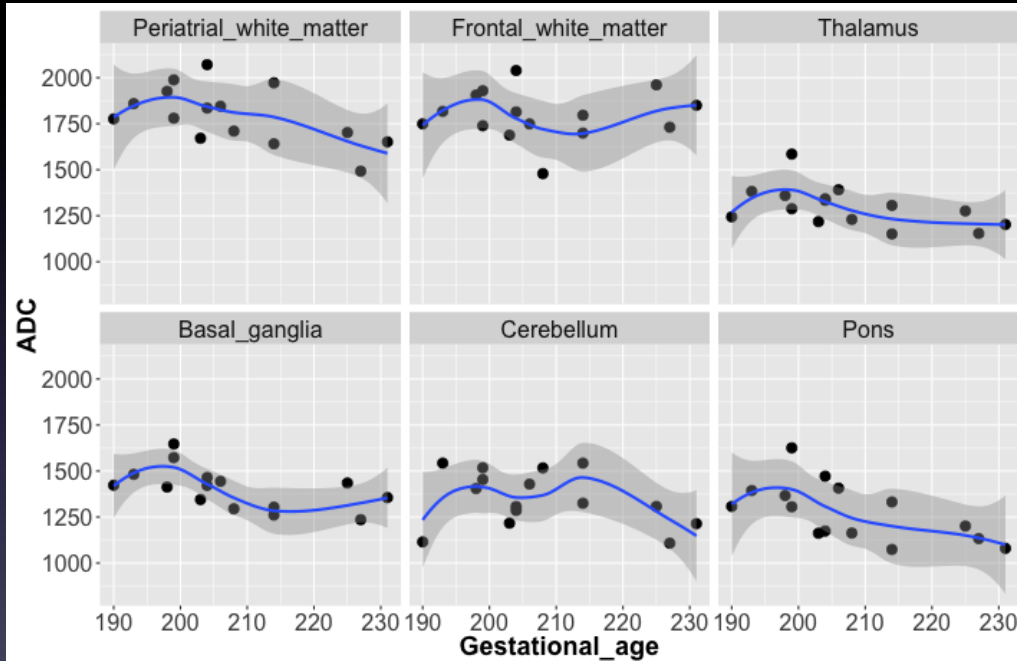
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Aim, Methods, and Patients

- **Aim**
 - To ascertain critical Doppler findings predicting fetal cerebral diffusion restriction in early onset iugr
- **Diagnostic evaluation**
 - Doppler Evaluations: ISUOG Guidline (2013)
 - Diffusion MRI: 1.5-T MR unit with a whole body surface coil.
- **Patients**
 - Singleton
 - 27 < < 34 gestational weeks
 - EFW <10 pc
 - Abnormal Doppler, normal fetal anatomy
- **Study Groups**
 - Control, normal growth (n=15)
 - Group 1, UA -PI>95p (n=12)
 - Group 2, UA PI>95 p and MCA PI<5p (n=11)
 - Group 3, absent EDF in UA (n=21)
 - Group 4, reverse EDF in UA (n=10)

| Demographics | (n) %/ mean \pm SD |
|--------------------------|----------------------|
| Age | 29.2 \pm 6.2 |
| Preeclampsia | 32(66.6) |
| Oligohydramnios | 14(29.1) |
| Smoking | 2(3.7) |
| Gest. age at MRI | 30 w, 1d \pm 10.1d |
| BMI (kg/m ²) | 25.3 \pm 1.4 |

Correlation between ADC values and gestational age in normal fetuses

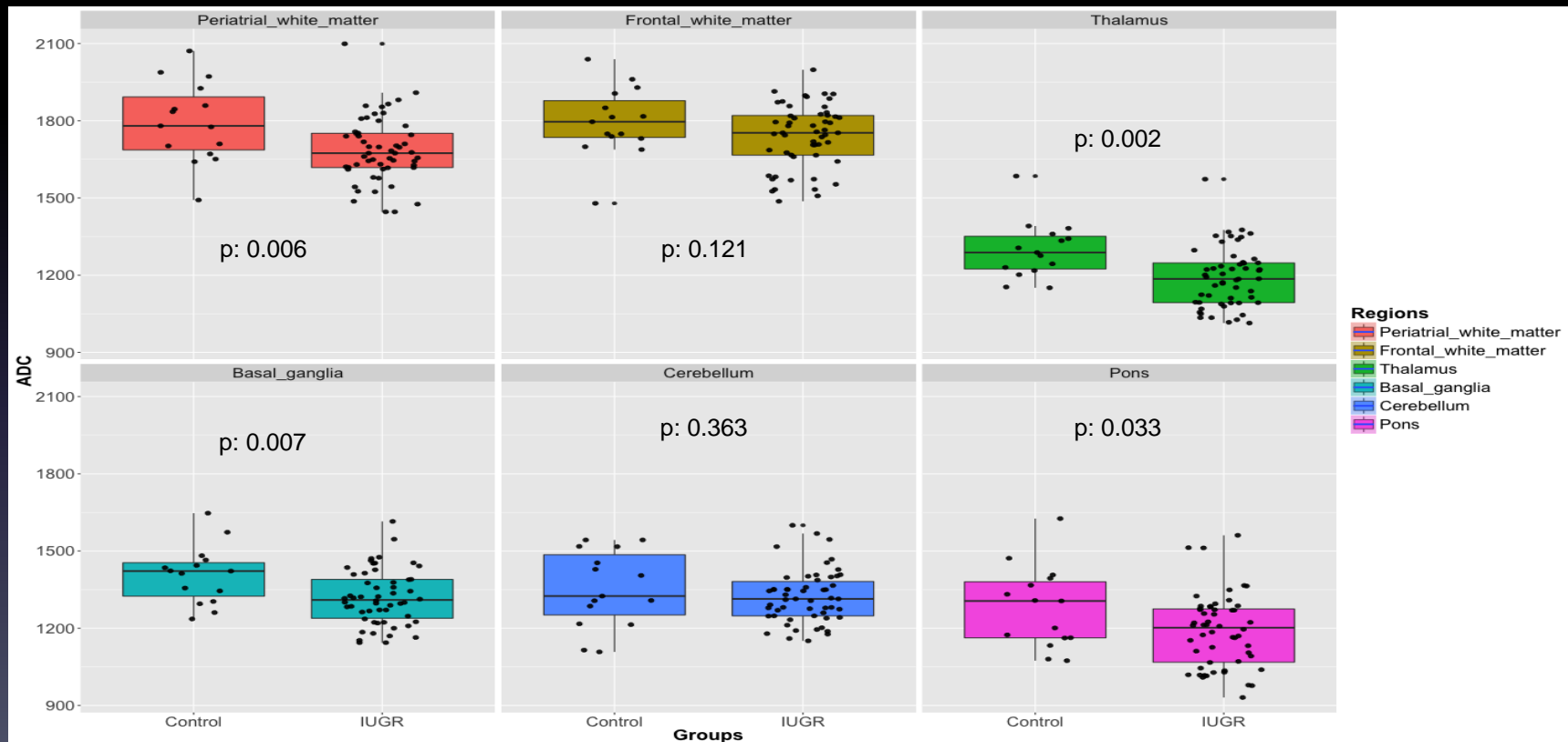


Comparison of ADC values between brain regions in normal fetuses

| Regions | ADC values |
|-----------|-----------------------------|
| PAWM | ^a 1794.6 ± 155.4 |
| FWM | ^a 1796.4 ± 134.4 |
| Thalamus | ^b 1297.5 ± 110.6 |
| Basal Gg. | ^b 1406.7 ± 112.4 |
| Cereb. | ^b 1352.6 ± 148.5 |
| Pons | ^b 1279.9 ± 157.3 |

p < 0.001

Comparison of ADC values between control and IUGR fetuses



Comparison of Doppler Stage

| Variables | Groups | | | | | p | p* |
|-----------------|-----------------------------|-----------------------------|------------------------------|-----------------------------------|-----------------------------|-------|-------|
| | Control | UA-PI> 95pc | UA-PI> 95pc, BSE (+) | A-EDF in UA | R-EDF in UA | | |
| PAWM | ^a 1794.6 ± 155.4 | ^a 1747.1 ± 85.6 | ^{ab} 1677.6 ± 100.5 | ^{ab} 1694.5 ± 156.1 8 | ^b 1602.3 ± 68.8 | 0.007 | 0.004 |
| FWM | ^a 1796.4 ± 134.4 | ^{ab} 1772.6 ± 99.9 | ^{ab} 1790.5 ± 110.7 | ^{ab} 1748.2 ± 116.3 | ^b 1622.6 ± 114.0 | 0.006 | 0.020 |
| Thalamus | ^a 1297.5 ± 110.6 | ^{ab} 1234.3 ± 82.1 | ^{ab} 1168.5 ± 90.4 | ^{ab} 1182.5 ± 144.7 | ^b 1168.8 ± 107.4 | 0.017 | 0.020 |
| Basal G. | 1406.7 ± 112.4 | 1353.1 ± 86.5 | 1311.1 ± 100.9 | 1313.8 ± 122.6 | 1300.9 ± 105.5 | 0.072 | 0.075 |
| Cereb. | 1352.6 ± 148.5 | 1361.9 ± 102.2 | 1307.7 ± 76.8 | 1293.2 ± 103.3 | 1351.1 ± 118.2 | 0.350 | 0.355 |
| Pons | ^a 1279.9 ± 157.3 | ^{ab} 1236.1 ± 55.2 | ^{ab} 1147.8 ± 113.7 | ^{ab} 1212.3 ± 182.5 | ^b 1125.4 ± 118.2 | 0.059 | 0.037 |

•^{a,b} Groups with different superscript letters were found to have statistically significant differences.

Conclusions

- **Brain ADC values decline in IUGR**
- **Reverse End- Diastolic flow at Umbilical arteries** is the stage at which diffusion in fetal brain is started to be restricted.
- Effects of Venous changes?
- Effects of preeclampsia and oligohydramnios?
- Longitudinal change in time?
- Correlation with clinical outcome?

Should be addressed with further studies