

Fetal MRI Estimates Fetal Weight Centiles Closer To True Birthweight Than Ultrasound

Waheed H.^{1,2}, Uus A.², Aviles Verdera J.², Neves Silva S.², Bansal S.², Kyriakopoulou V.², Hutter J.², Siassakos D.¹, David AL.¹, Rutherford M.²

¹EGA Institute for Women's Health, University College London ²Early Life Imaging Research Department, Kings College London

1. Background

Correctly estimating fetal size= Clinically important
Antenatal fetal size = Estimated Fetal Weight (EFW)
Current gold standard is Ultrasound Scan (US)
Both Small and Large for Gestational Age (SGA, LGA,) fetus
→ Birth **complications**
As per Big Baby Trial, diagnosis of LGA by US has large variation
& **false positives 60%** (Gardosi et al., 2025)
Scope for improving diagnostic accuracy, particularly in the LGA cohort.

There is emerging evidence that MRI may be more accurate at predicting fetal weight compared to US.

2.1. Methods

As part of the currently recruiting **Mibirth** Research Study (www.mibirthstudy.com) **131** singleton participants, between **35+5 and 40+6** weeks gestation, had the following within 48 hours of each other:

1. Antenatal fetal growth USS
2. Low field MRI (0.55Tesla)

Estimated fetal weight was calculated using both modalities (see 2.2.)

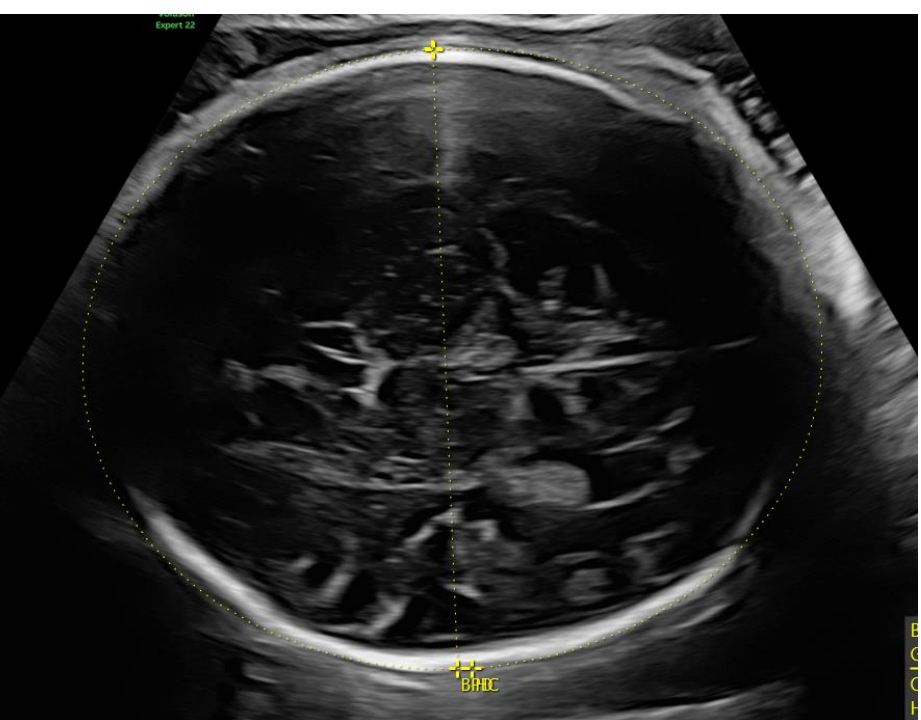
All US, MRI and final birth weights plotted on [Intergrowth 21st](#) charts to obtain centiles and then compared.

2.2. Estimating Fetal Weight

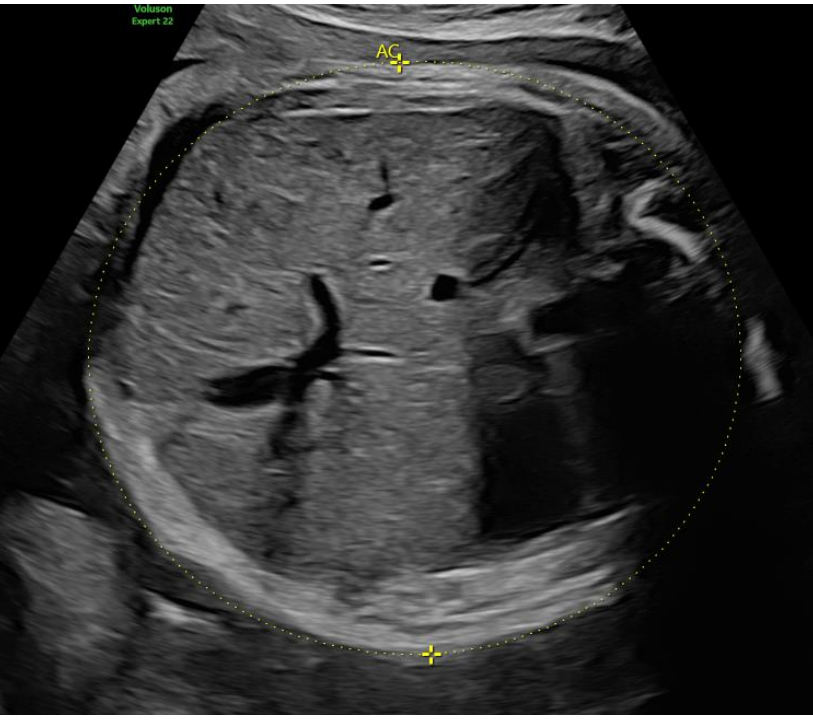
EFW calculated from US and MRI as follows:

US

- 2D fetal biometry; head circumference (HC), abdominal circumference (AC) & femur length (FL)
- **Hadlock-3** formula to calculate EFW



HC



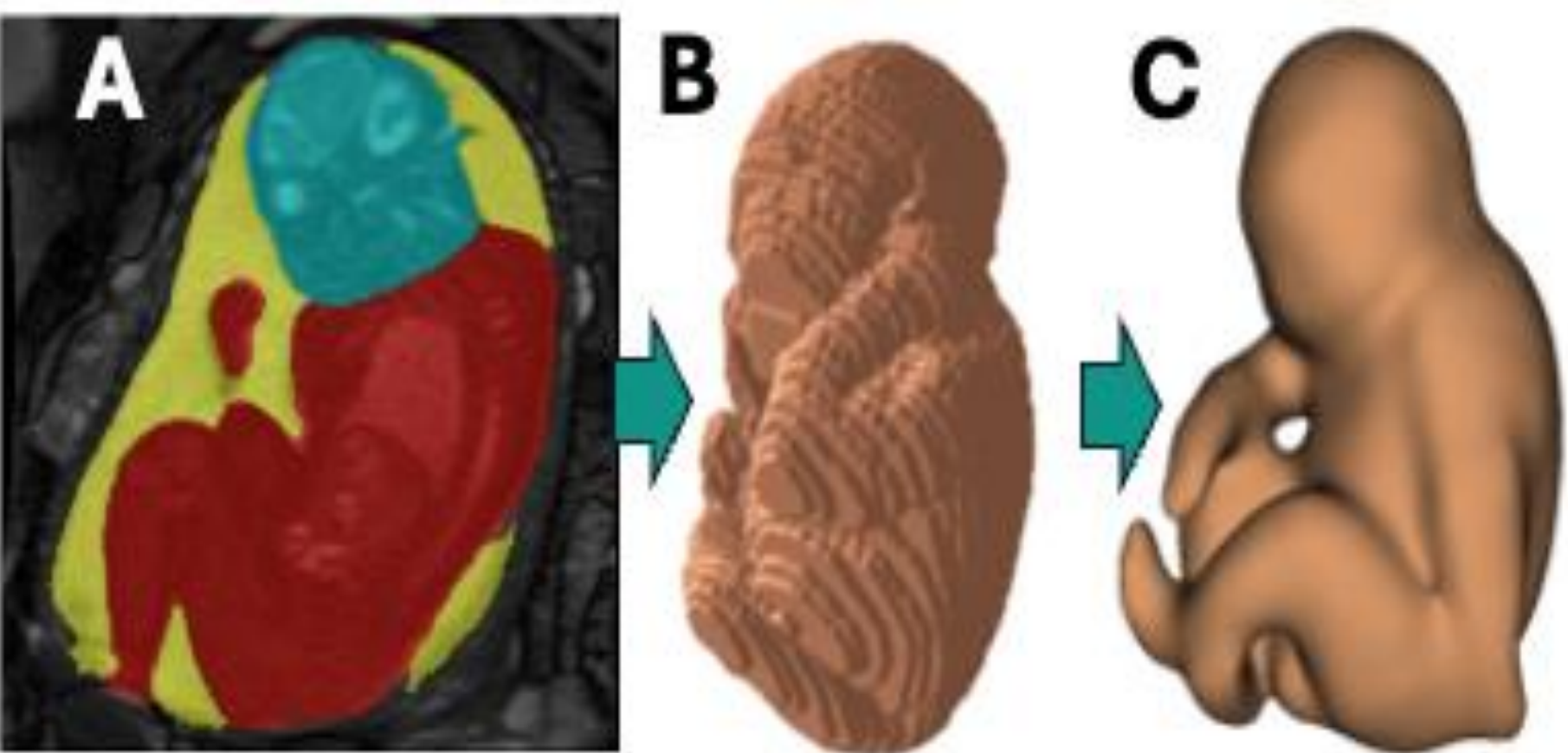
AC



FL

MRI

- **Deep learning model** auto segments boundaries of fetus (A).
- 3D fetal volume calculated by filling 3D reconstructions of the fetus with 3D equivalent of pixels = **voxels** (B).
- Following refinement -> **fetal volume obtained**
- Fetal volume multiplied by **density coefficient** to give EFW
- Various coefficients in literature; we used Kacem et al.
- In the Mibirth Study, all this can done real time in **<5 mins**

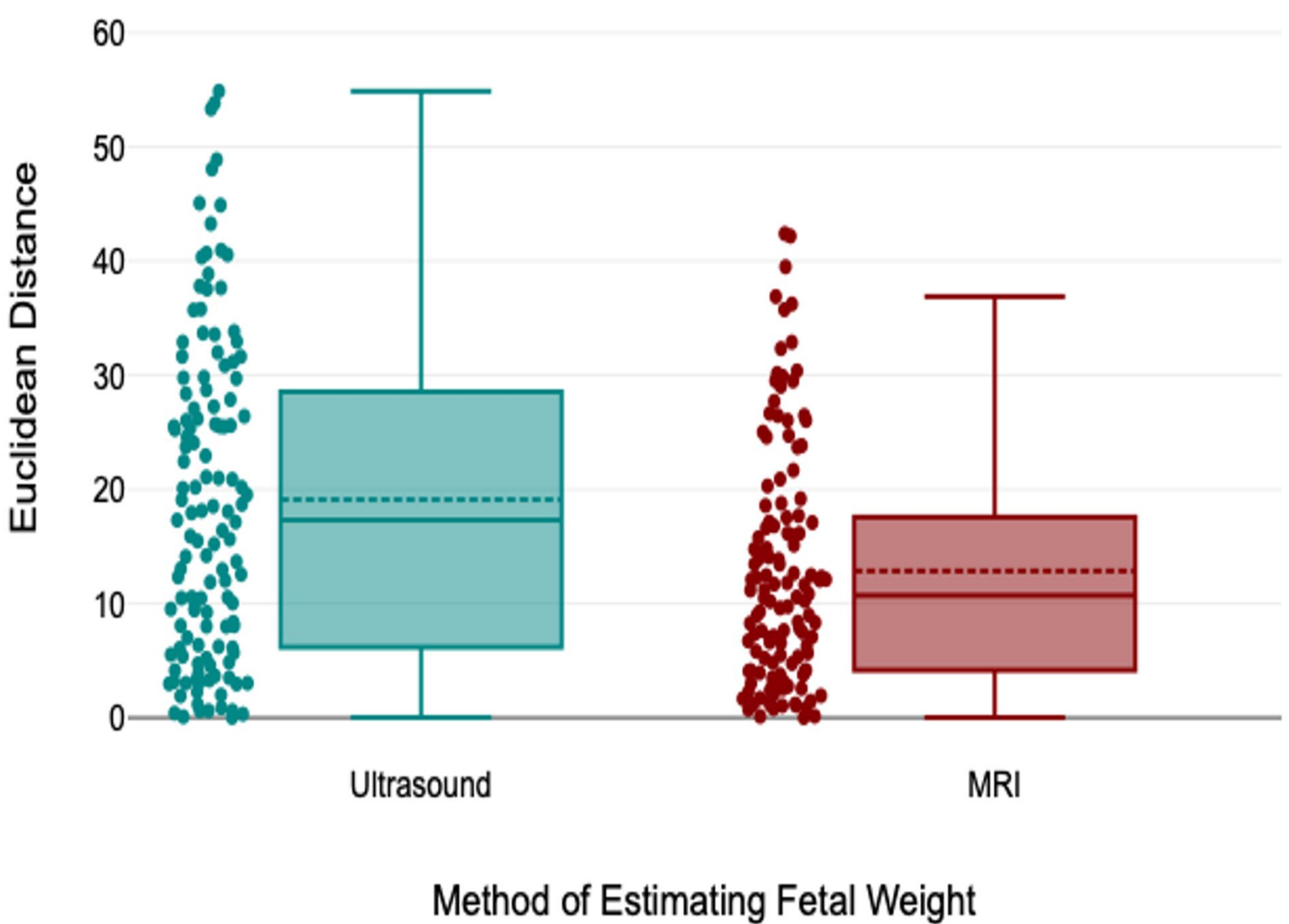


3. Results

83% of the MRIs and US were performed on the same day, 10% within 1 day and 7% within 2 days.

75% of women gave birth within 26 days of the MRI (median 19 days, range 38 days).

For whole cohort (131 cases) MRI estimates EFW centile closer to Birthweight centile than USS



	US (Hadlock et al.)	MRI (Kacem et al.)
Mean Euclidean Distance	20.7 (CI 16.89 -22.14)	13.87 (CI 11.69-15.94)
Statistically Significant Difference p = <0.001, 95% CI [2.99, 8.33]		

5. Summary

Both US and MRI tended to provide estimates of fetal weight centile at late gestation higher than the actual birthweight centile. This may represent overestimation, MRI less so than US.

At gestational ages over and including 35+5, MRI was more likely to provide an EFW centile closer to the birth centile than US.

Further data (n=500) will be collected in **Mibirth Research Study**.

