Does First-Trimester Growth Lag After FET Predict Live Birth? A Large Multi-Center Analysis of ΔEDD and Outcomes

A. Eubanks, MD[1]; K. Hunkler, MD, MSt[1], MSc; D. Boedeker, DO, MHA[1]; B. Neumann, DO[1]; M. Hill, DO[2]; P. Lindner, MD[1]
1. Walter Reed National Military Medical Center, Bethesda MD; 2. US Fertility, Rockville, MD

INTRODUCTION

- Embryo transfer dating provides precise gestational age estimation
- First-trimester crown–rump length (CRL) may reflect early embryonic growth dynamics
- Clinical significance of CRL-based deviation from expected dating after FET remains unclear
- We evaluated whether ultrasound-derived ΔEDD is associated with live birth

OBJECTIVE

To determine whether first-trimester ΔEDD after FET is associated with live birth and identify clinically meaningful thresholds

METHODS

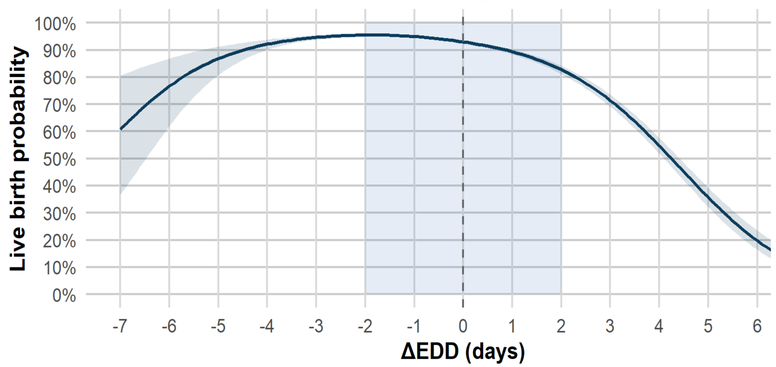
- **Design:**
  - Retrospective cohort study
- **Population:**
  - FET pregnancies with a measurable CRL ultrasound <9 weeks
- **Exposure:**
  - ΔEDD = ultrasound-derived EDD − FET-calculated EDD (days)
  - Restricted to ΔEDD ±7 days
- **Outcome:**
  - Live birth
- **Analysis:**
  - Continuous modeling using restricted cubic splines
  - ΔEDD categorized (≤0, 1–2, 3–5, >5 days)
  - Poisson regression with robust variance estimation
  - Adjusted for age, patient type, and PGT

RESULTS

COHORT

Characteristic	Value
Total N	24,241
Age, mean ± SD (years)	36.00 ± 4.64
ΔEDD, median (IQR), days	−0.22 (2.03)
Live birth rate, %	91.10
PGT cycles, %	67.60
Median gestational age: 8.2 weeks (IQR 7.4-8.6)	

Adjusted Live Birth Probability by ΔEDD

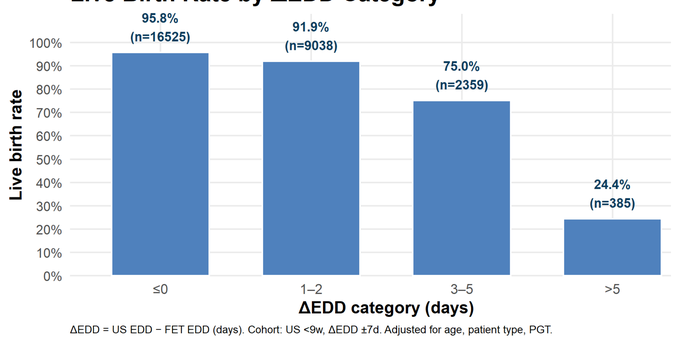


ΔEDD = US EDD − FET EDD (days). Cohort: US <9w, ΔEDD ±7d. Adjusted for age, patient type, PGT.

Continuous Association

- Live birth probability remains high within ±2 days of expected dating
- Probability declines progressively with increasing growth lag
- Steeper decline observed beyond ~3 days

Live Birth Rate by ΔEDD Category

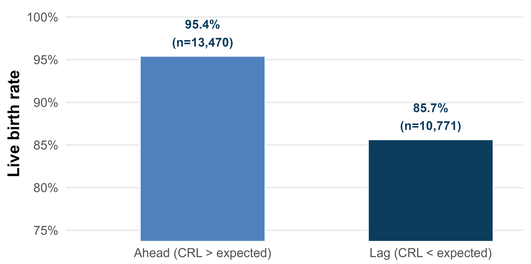


ΔEDD = US EDD − FET EDD (days). Cohort: US <9w, ΔEDD ±7d. Adjusted for age, patient type, PGT.

Threshold Effect

- Compared with ΔEDD ≤0:
- 1–2 days: RR 0.96
- 3–5 days: RR 0.78
- >5 days: RR 0.25
- Risk increases sharply beyond 3 days

Live Birth Rate by ΔEDD Direction



ΔEDD = US EDD − FET EDD (days). Cohort: US <9w, ΔEDD ±7d. Adjusted for age, patient type, PGT.

Directionality

- CRL measuring ahead of expected:
  - 95.4% live birth
- CRL lagging expected:
  - 85.7% live birth
- Growth lag drives risk reduction

CONCLUSIONS

- Early first-trimester growth lag after FET is independently associated with lower live birth
- Risk is minimal within ±2 days of expected dating
- ΔEDD >3 days identifies a clinically meaningful high-risk group
- The association between ΔEDD and live birth did not significantly differ by PGT status (interaction p = 0.06)

CLINICAL IMPLICATIONS

- ΔEDD may provide early prognostic information after FET
- Mild variation (±2 days) is reassuring
- Marked lag (>3 days) warrants closer surveillance and counseling

TAKE-HOME MESSAGE

- Early growth lag after FET is independently associated with lower live birth
- Live birth probability remains high within ±2 days of expected dating
- Risk increases substantially beyond ~3 days of lag
- Marked lag (>5 days) identifies a small but high-risk subgroup

ACKNOWLEDGEMENTS

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