

Sonographic Fetal Weight Estimation Percentiles Should Be Interpreted With Caution in the 2nd Trimester

Ben Melamed¹, Elad Mei-Dan, MD², Amir Aviram, MD¹

¹ Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, Sunnybrook Health Sciences Centre, Temerty Faculty of Medicine, University of Toronto, Ontario, Canada

² Division of Maternal-Fetal Medicine, Department of Obstetrics and Gynecology, North York General Hospital, Temerty Faculty of Medicine, University of Toronto, Ontario, Canada



Background

- One common characteristic of fetal growth charts is the **small absolute difference in estimated fetal weight (EFW) between the various percentiles** in the second trimester (**Figure 1**).
- Consequently, **EFW percentiles during the second trimester may be more sensitive to minor dating or sonographic measurement errors** than later in pregnancy, thereby increasing the risk of a **false diagnosis of fetal growth restriction (FGR)**.

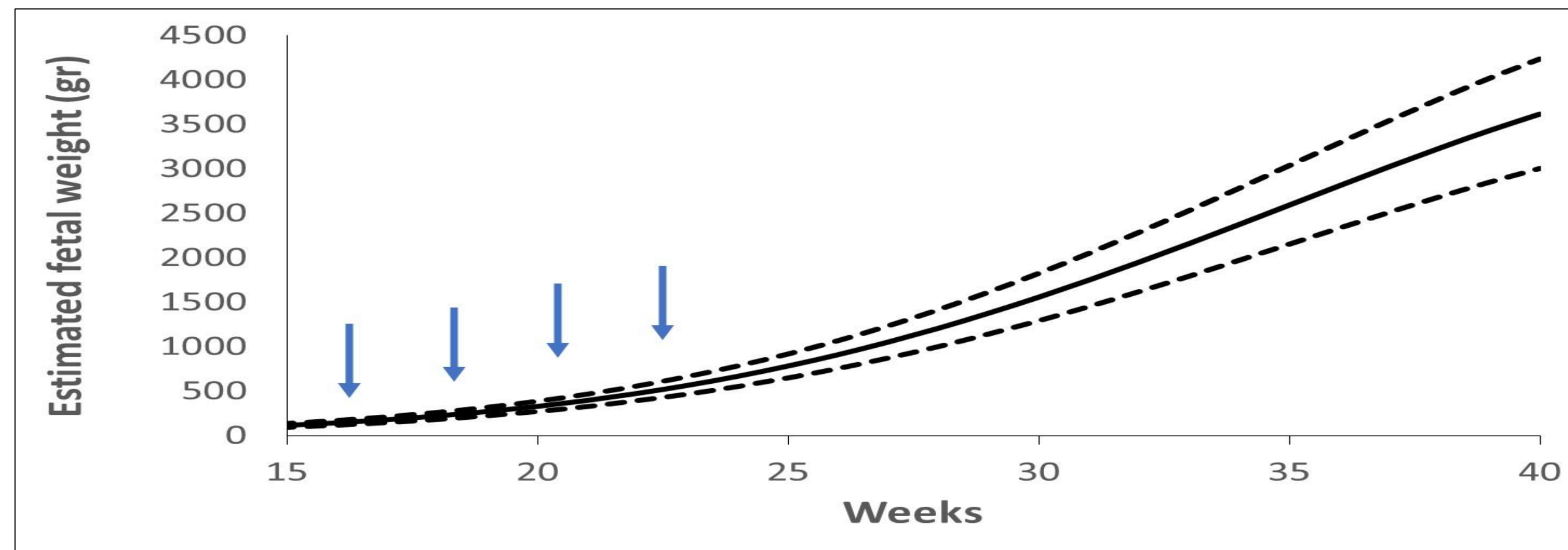


Figure 1. Hadlock estimated fetal weight percentiles

Objective

- Describe the **limitations of sonographic EFW percentiles and their diagnostic accuracy for FGR during the second trimester**.
- Compare the **diagnostic accuracy of second-trimester EFW percentiles** to that of **single fetal biometric indices**.
- Identify the **gestational age threshold** beyond which the sonographic diagnosis of FGR becomes more reliable.

Methods

- First, we illustrated the **theoretical limitations of EFW% in early pregnancy** by simulating the effect of minor dating or sonographic measurement errors using the Hadlock chart.
- Secondly, we **illustrated the same limitations empirically using a cohort of singleton pregnancies** who had sonographic assessment of fetal biometry at a single center (2014-2023) (**Figure 2**).
- The **primary predictor was EFW%**, and the **primary outcome was birthweight <10th%**.

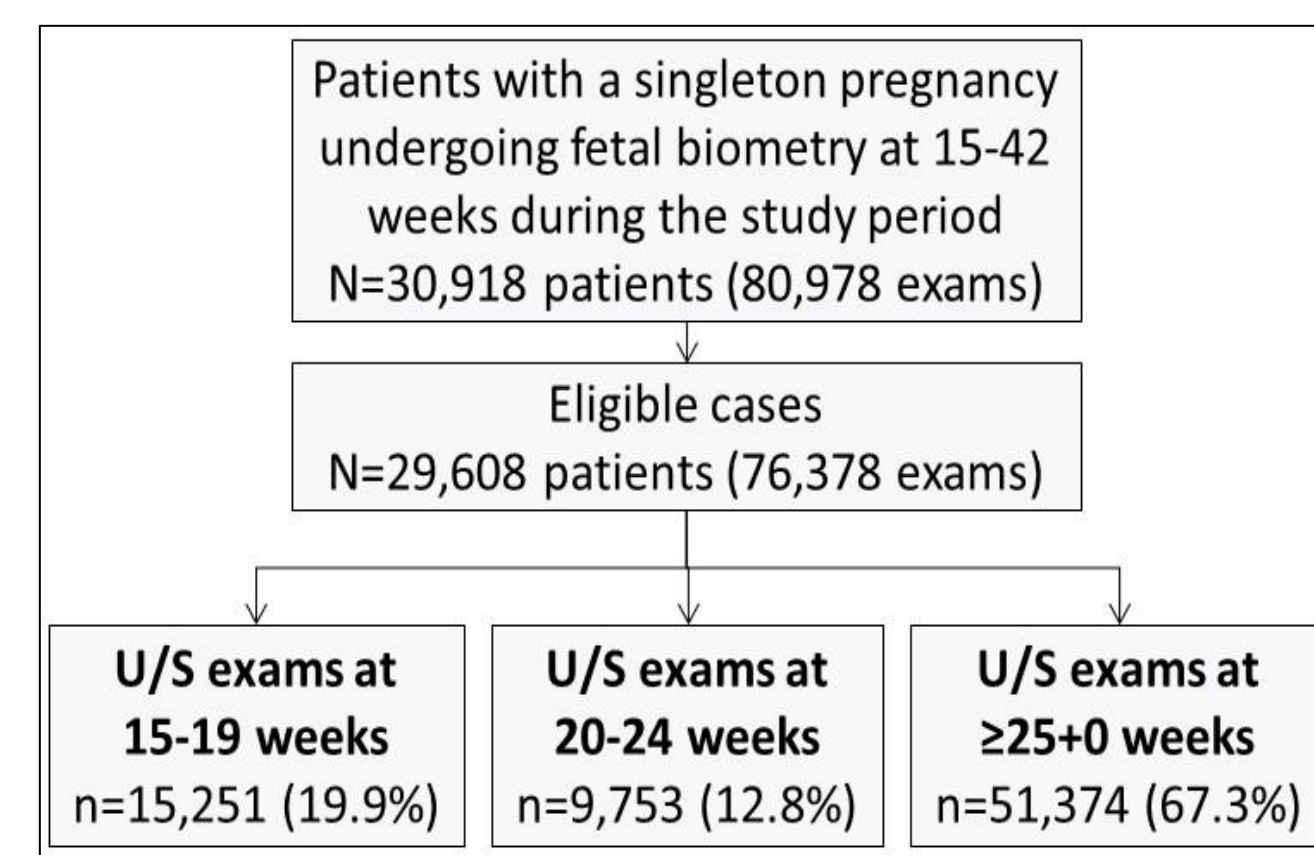


Figure 2. Selection of the study cohort

Results

- In the first part of the analysis, we found that **before 25 weeks, EFW% are anticipated to be highly sensitive to even minor dating (Figure 3) or sonographic measurement errors (Figure 4)**, which might increase the risk of false diagnosis of FGR.
- For example, before 25 weeks of gestation, **dating errors of 5 days or 3 days are expected to result in the false diagnosis of FGR among fetuses that grow normally between the 30th -45th percentiles and 20th - 28th percentiles, respectively**.

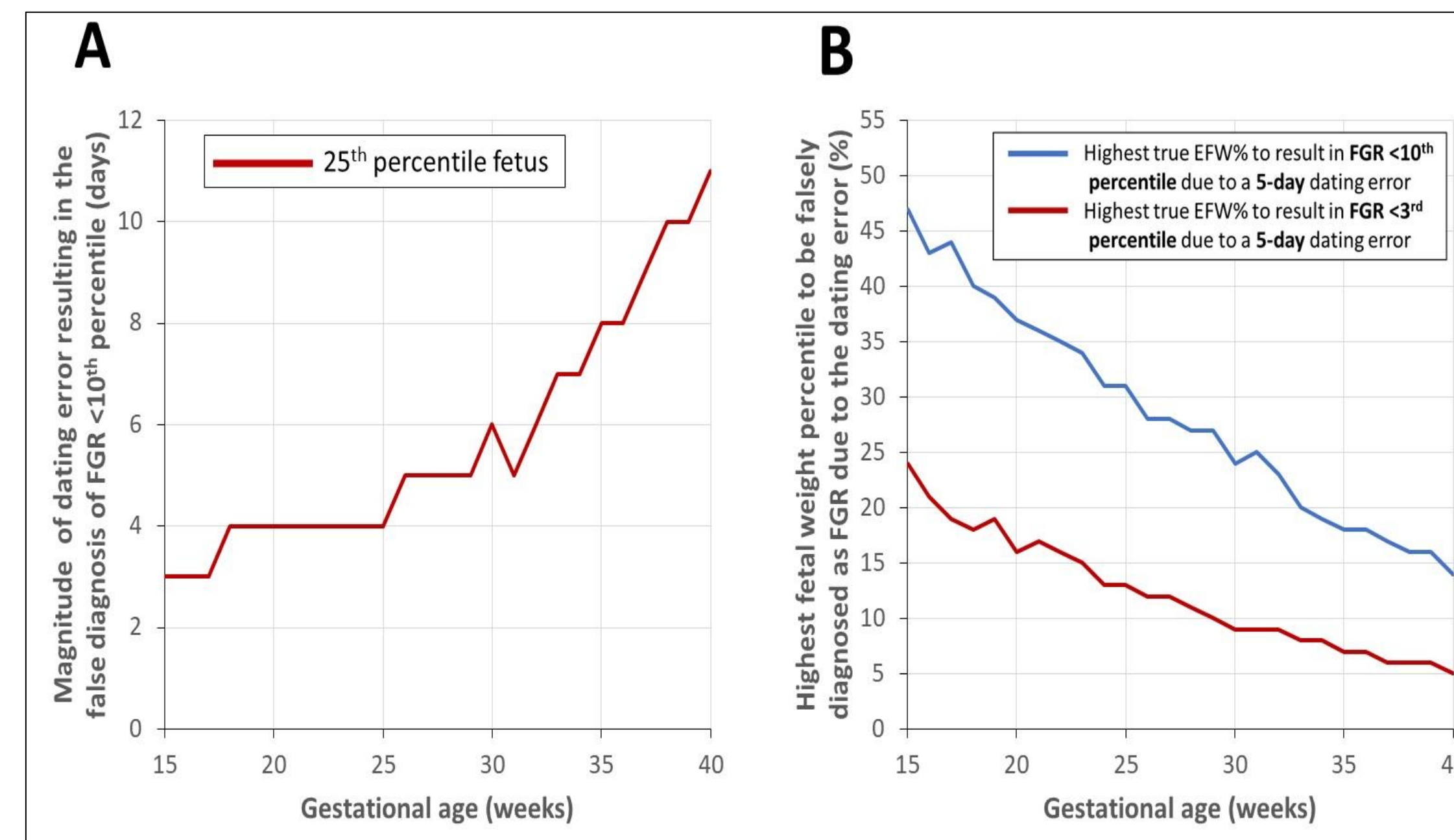


Figure 3. Impact of dating error on the false diagnosis of FGR by gestational age at the ultrasound exam

- In the second part of the analysis, using a cohort of 29,608 patients (76,378 ultrasound exams), we **empirically confirmed the findings**.
- The **positive predictive value (PPV) of EFW% for FGR declined sharply before 25 weeks**, indicating that the **gestational age threshold at which the sonographic diagnosis of FGR becomes more reliable is ≥25 weeks (Figure 5)**.

Figure 5. The predictive accuracy of estimated fetal weight and abdominal circumference for birthweight <10th percentile by gestational age at the ultrasound exam

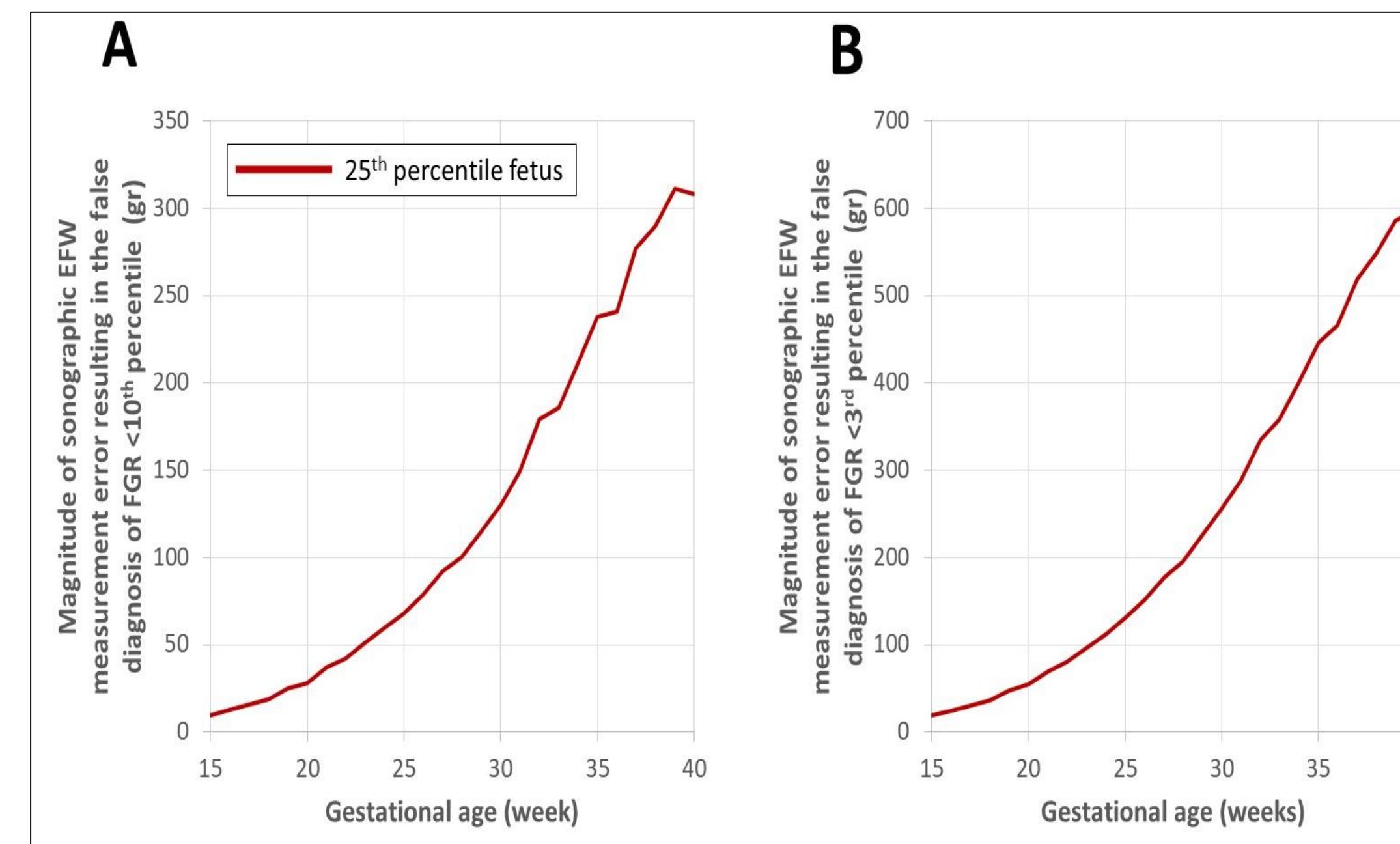
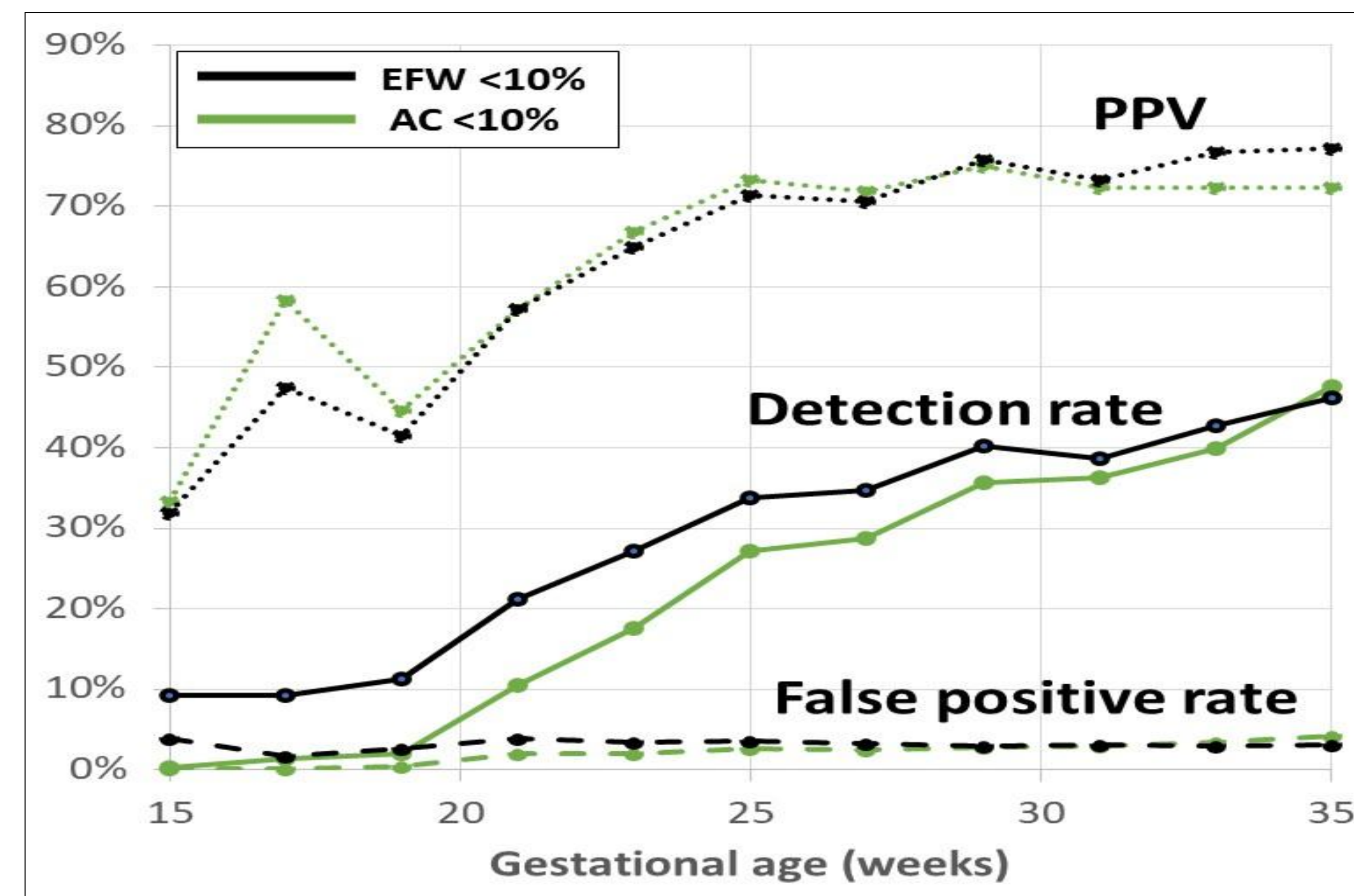


Figure 4. Impact of dating error on the false diagnosis of FGR by gestational age at the ultrasound exam



Results (Continued)

- In addition, we **confirmed that before 25 weeks of gestation, AC percentile <10th percentile has a higher PPV for FGR than EFW <10th percentile**, although the **absolute differences were small** (45% vs. 41% at 15+0 to 19+6 weeks, and 61% vs. 56% at 20+0 to 24+6 weeks) (**Figure 6**).

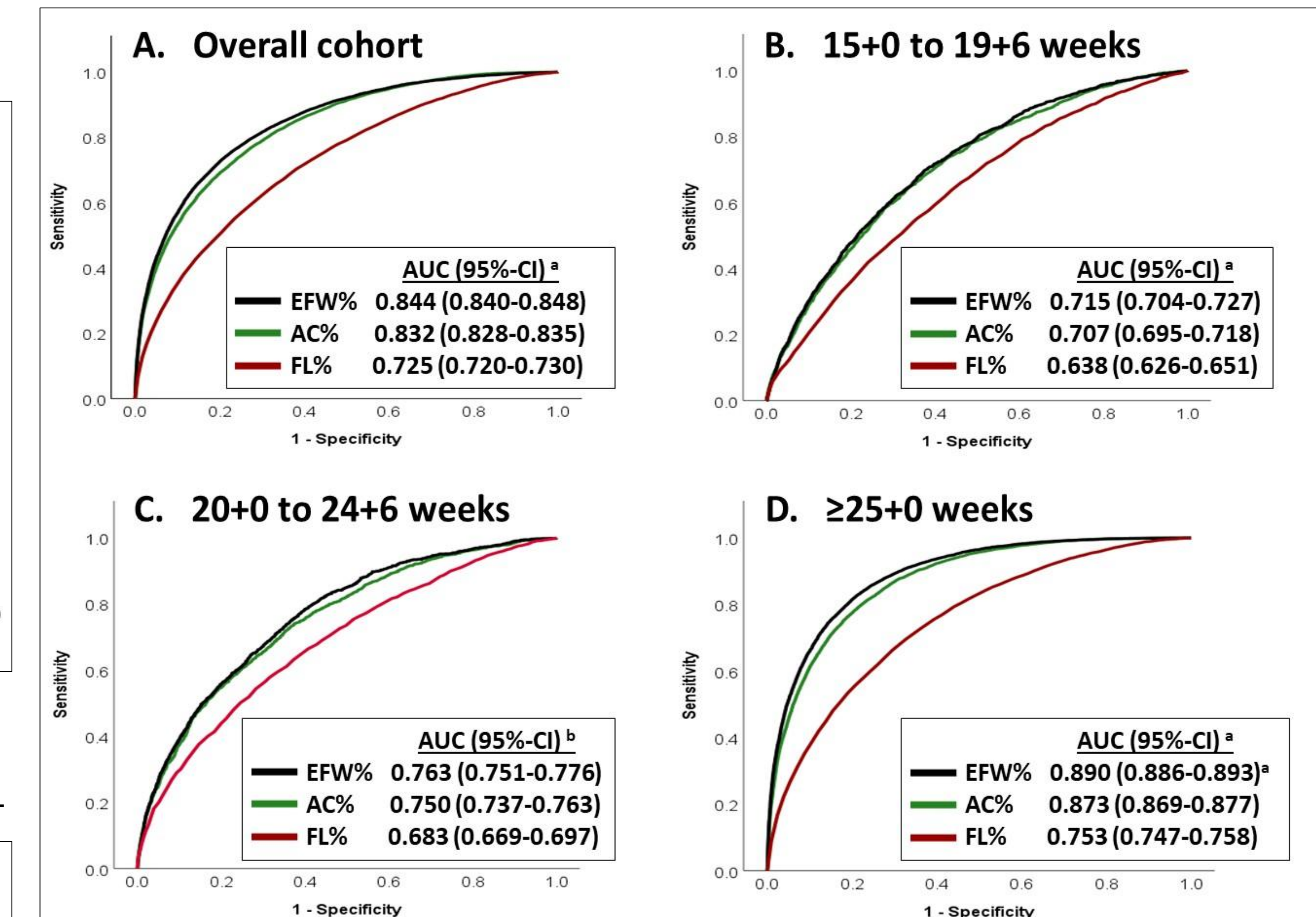


Figure 6. Discriminative accuracy of fetal size centile for birthweight below the 10th centile

Conclusion

- Sonographic EFW percentiles are less reliable before 25 weeks than later in pregnancy**, and should be interpreted with caution during this gestational age period due to the **greater risk of a false diagnosis of FGR**.
- These findings are highly relevant for obstetrical care providers when interpreting the results of sonographic fetal biometry **during the second trimester**.