Placental Volume

A Potential Tool for Identifying those at risk for Stillbirth

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- OPTIONAL Survey Code
- Providing us feedback on the topic

5

Objectives

- Identify potential causes of stillbirth
- Describe how to evaluate and measure placental volume using ultrasound
- Understand how placental volume may serve as an indicator of high-risk pregnancies

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Stillbirth Statistics

- Birth of a fetus > 20 weeks GA without signs of life
- 1.9 million per year globally (WHO)
- 1 in 175 per year (appx 21,000) in the US (CDC)

6, 7, 10, 11, 14, 23

7

Risk Factors for Stillbirth

- Maternal
- Socioeconomic
- Fetal
- Placental

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Maternal Risk Factors

- Maternal Disease
  - Diabetes
  - Hypertensive Disorders
  - Antiphospholipid Syndrome
  - Intrahepatic Cholestasis of Pregnancy
- Nicotine/Drug use
- Maternal Obesity
- Uterine Abnormalities

10, 14

9

Socioeconomic Factors

- Maternal Race
- Maternal Age
- History of Stillbirth

10, 11

10

Fetal Factors

- Aneuploidy
- Congenital Anomalies
- Multiple Gestations
- Post-term Pregnancy
- Fetal Gender
- Poor Fetal Growth

6, 9, 10

11

Placental Factors

- Placental size
- Placental anomaly
- Placental dysfunction

12

Placental Size

Thickness

Weight

13

Placental Size

Thickness

- Not routine
- Limited by location
- Varies with GA
- Mainly focuses on thick placentas

1, 3, 5, 24

14

Placental Size

Thickness

- Not routine
- Limited by location
- Varies with GA
- Mainly focuses on thick placentas

Weight

- Only obtained postnatal

1, 3, 5, 24

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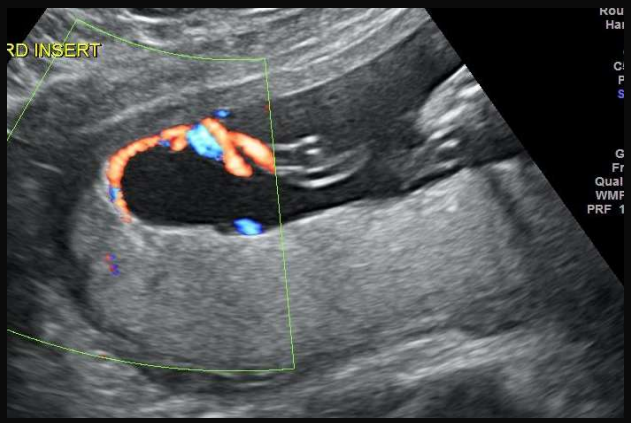
Placenta Anomalies

Physical characteristics easily visible on Ultrasound

- Cord Issues
- Implantation
- Shape
- Other



6, 10, 15, 16, 19, 20

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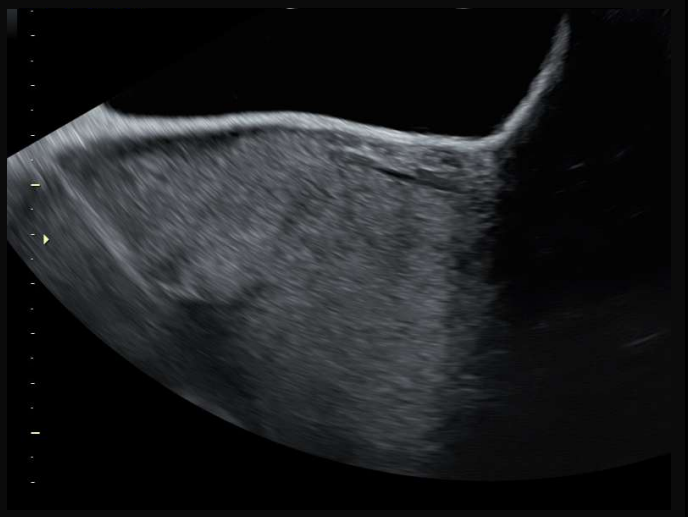

6, 10, 15, 16, 19, 20

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Placenta Anomalies

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6, 10, 15, 16, 19, 20

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Placenta Anomalies

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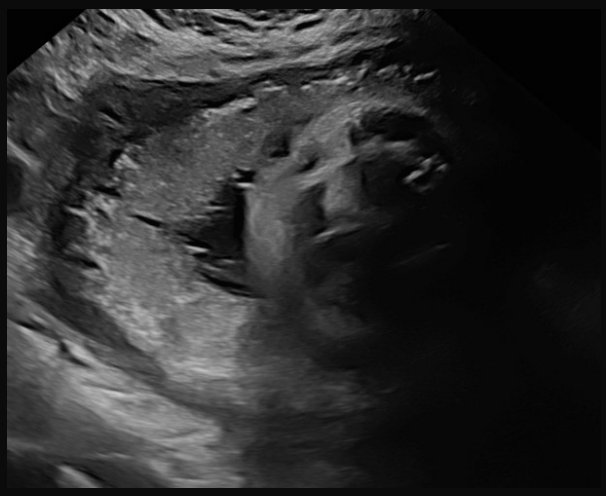

6, 10, 15, 16, 19, 20

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Placental Dysfunction

- Placental Infarcts/Intervillous Thrombosis
- Maternal Vascular Malperfusion
- Infection
  - Chorioamnionitis, etc
- Intramural fibrin deposition
- Chronic histiocytic intervillositis

1, 2, 12, 15, 17, 19, 20, 21

20

What do all of these factors have in common?

21

Placental Evaluation

22

Placental Function

- Nutrition
  - Provides oxygen
  - Removes waste products
- Protection
  - Immune support
- Endocrine
  - Hormone regulation

2, 16, 19, 24, 25

23

Normal Placental Appearance

- Visible as early as 10 weeks
- First trimester:
  - Hyperechoic rim around gestational sac

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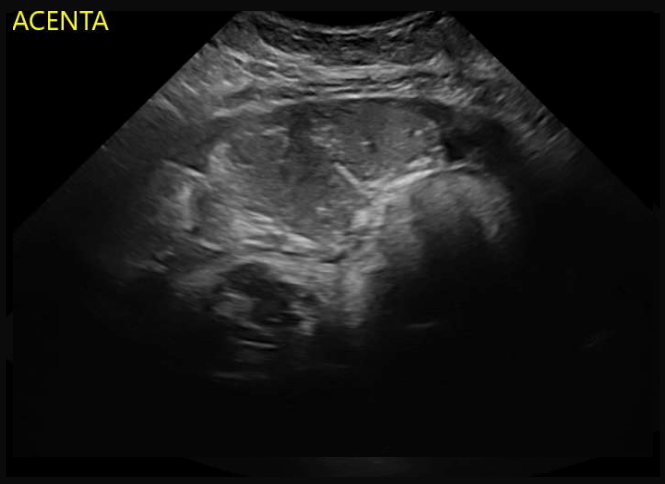
Normal Placental Appearance

- Second Trimester:
  - Homogeneous
  - Hyperechoic
  - Even Texture
- Third Trimester:
  - Increases in size/thickness with advancing GA
  - May demonstrate calcifications



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Appearance Evaluation

- Location
- Thickness
- Shape
- Presence of masses
- Presence of abnormal adherence
- Anechoic, hypoechoic, hyperechoic areas

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Appearance Evaluation

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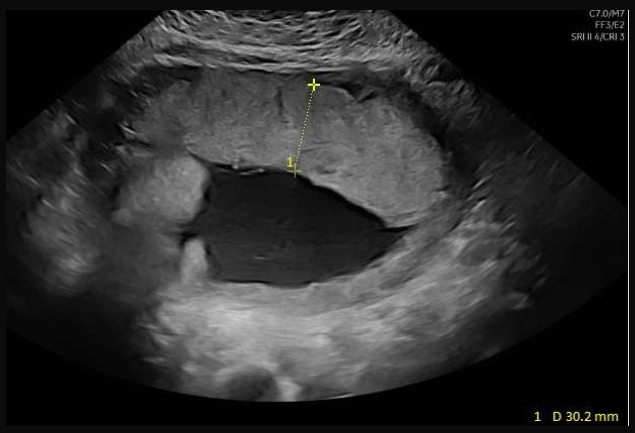

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Appearance Evaluation

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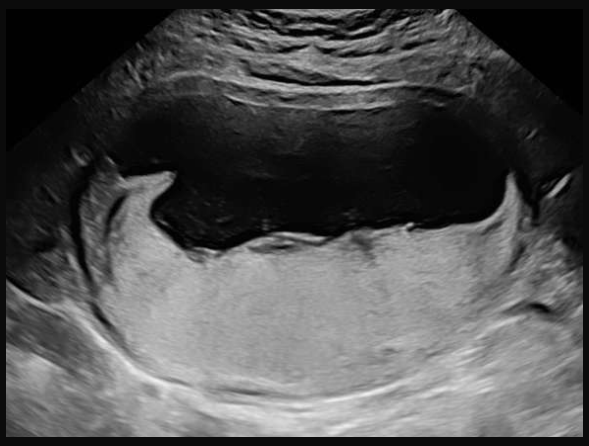

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Appearance Evaluation

- Location
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Appearance Evaluation

- Location
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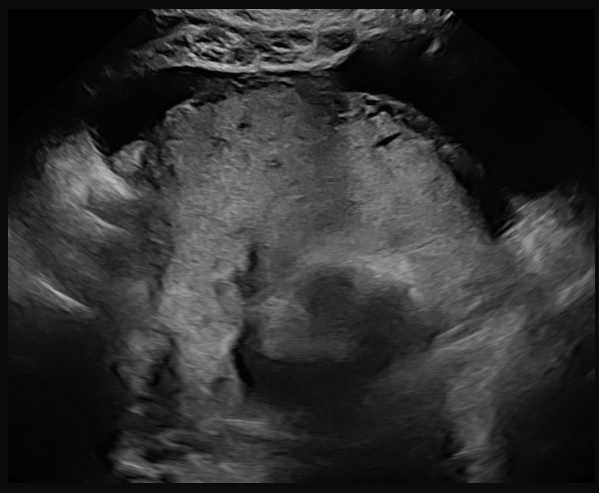

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Other Methods

- Biochemical Markers
- Fundal height/fetal biometry
- Fetal Dopplers
- Placental Pathology

4, 9, 17

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Our Strategy

- Emphasis on stillbirth prevention
- Placental pathology from previous pregnancies
- Maternal history and lab panels
  - APLS, clotting disorders
- Preventative meds
  - Lovenox, tacrolimus
- Weekly surveillance
  - Growth every 4 weeks
  - Dopplers: Umbilical artery, MCA, and Ductus Venosus
  - Placental volume

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Placental Volume

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Previous Methods

- 3D Volume
- MRI

- Limitations:
  - Specialized/expensive
  - Time-consuming
  - Patience
  - Not commonly performed in low-risk scenarios

3, 4, 13, 18

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Steps for Performance

- Find maximum placental cross section
- Transducer perpendicular to placenta
- Both ends visualized

3, 4, 8, 13, 18

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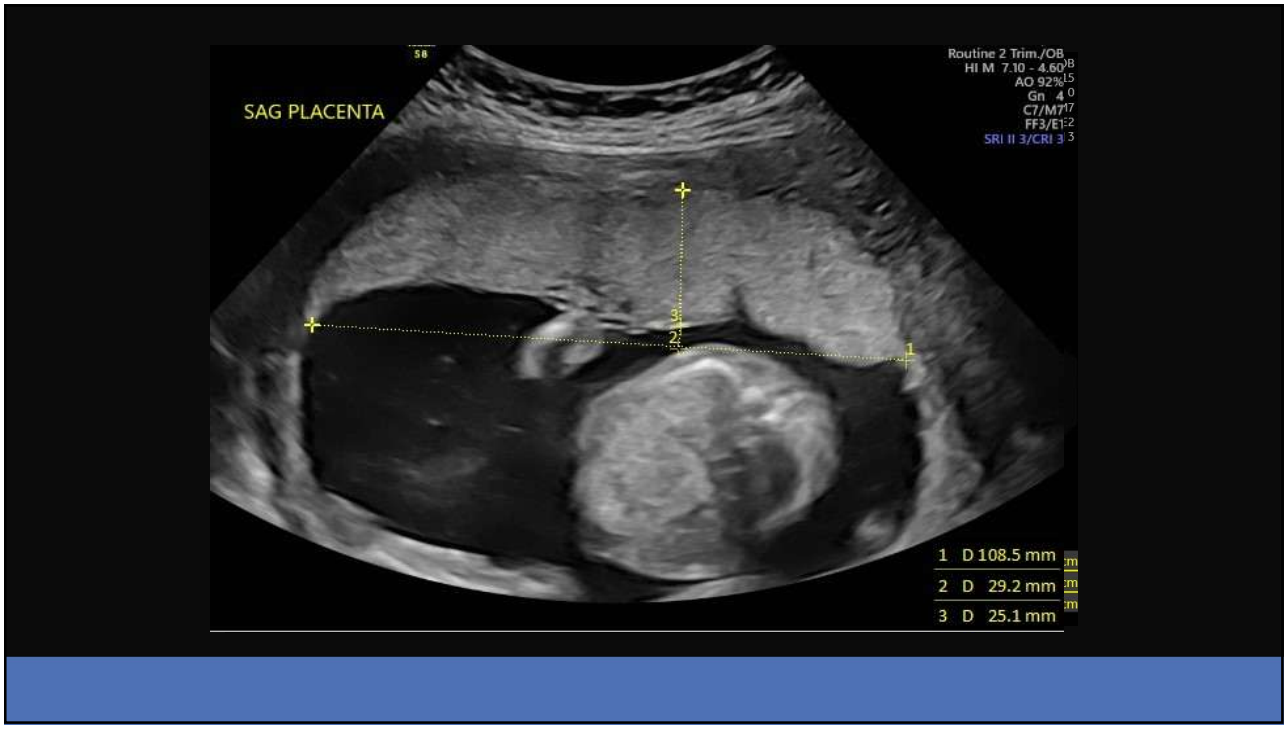

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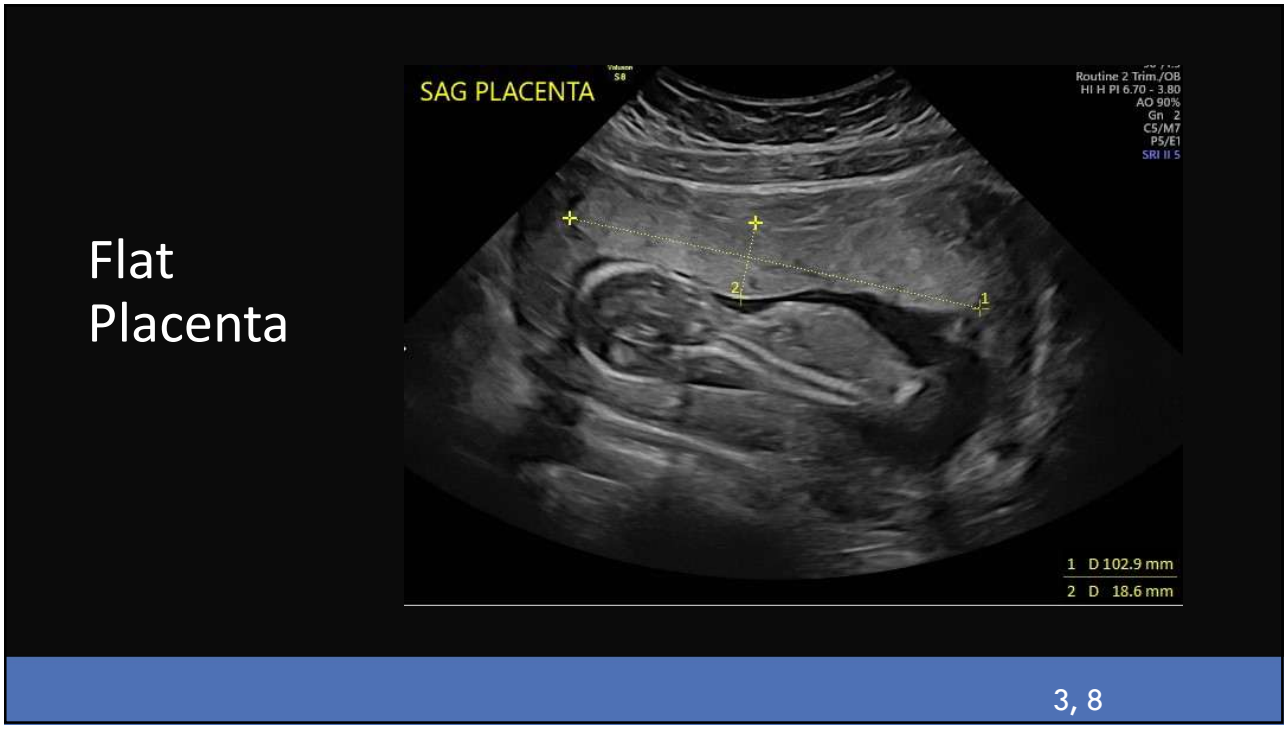

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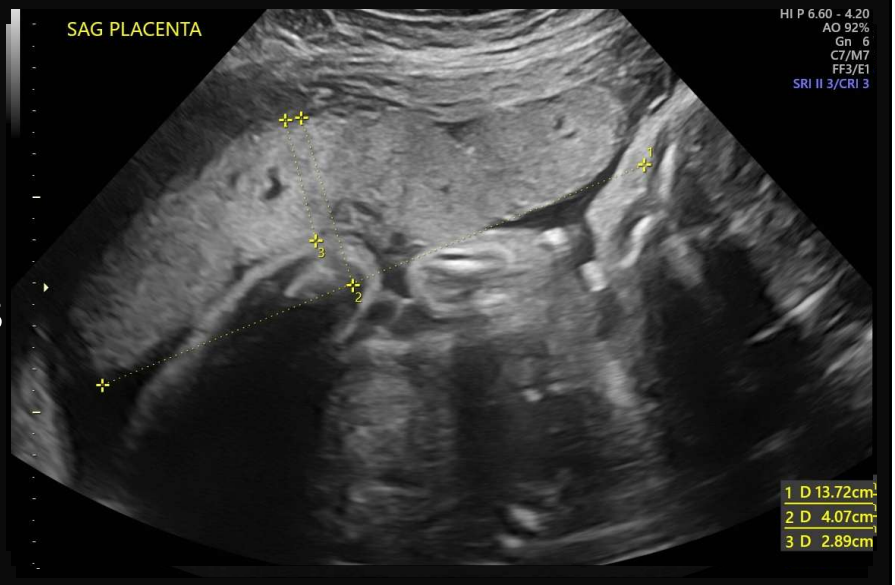
Incorrect Measurements



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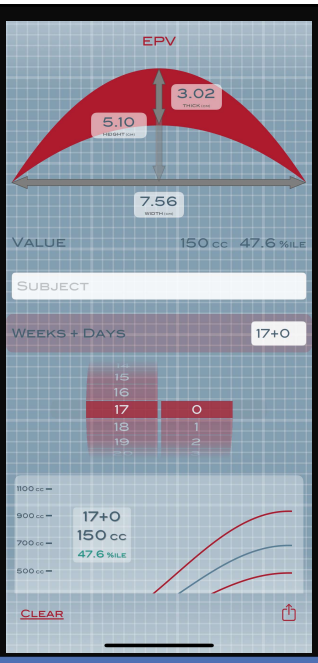

Merwins EPV Calculator (Version 17) [iOS 18]

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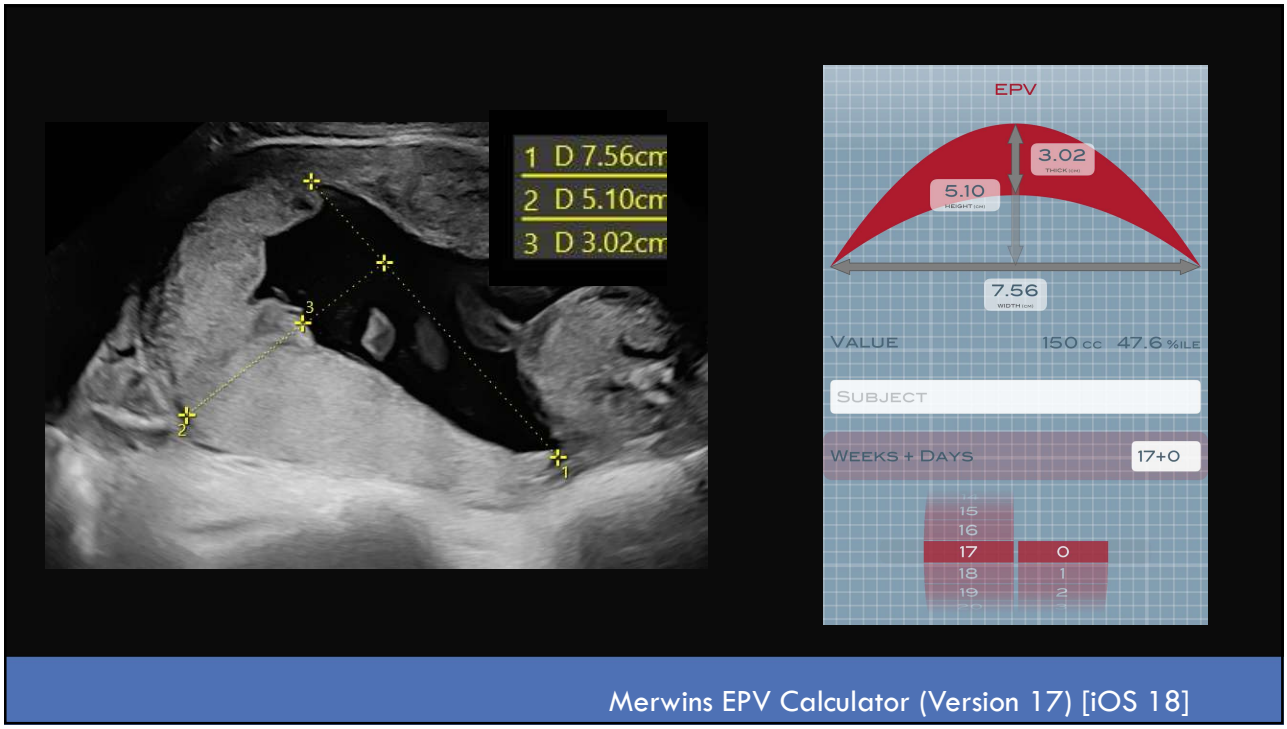

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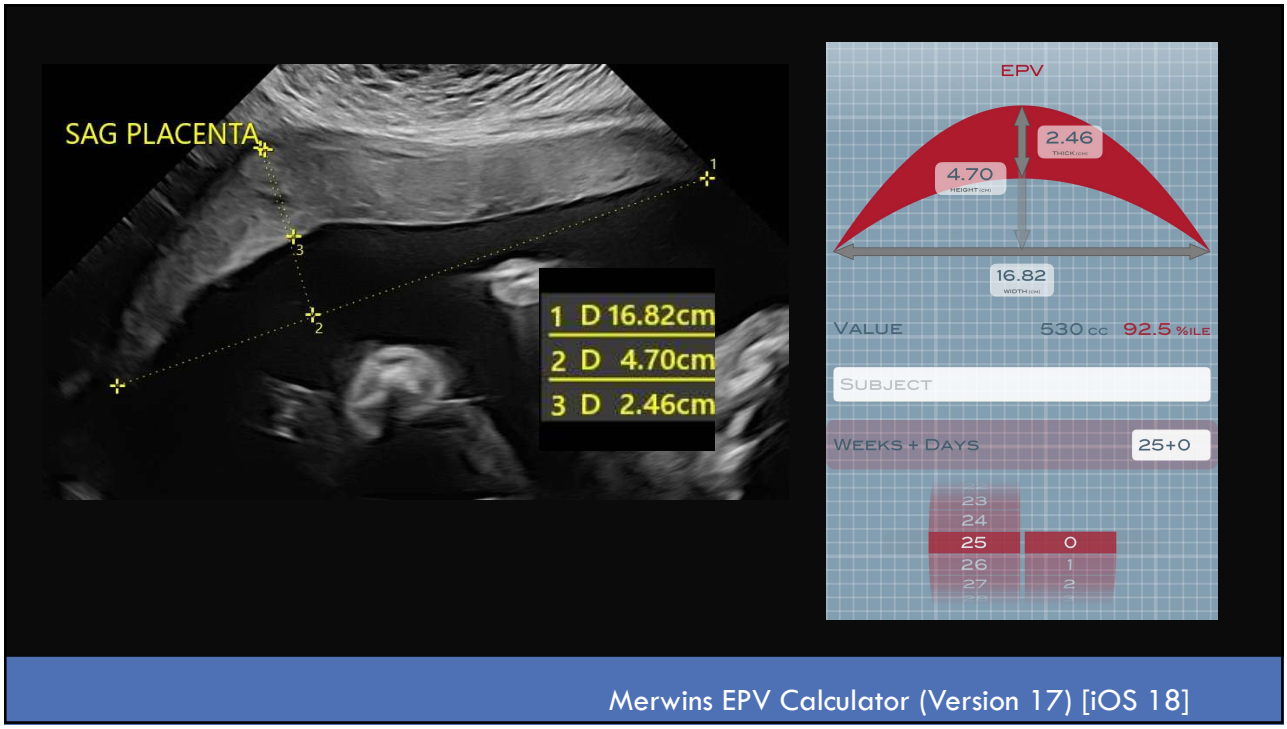

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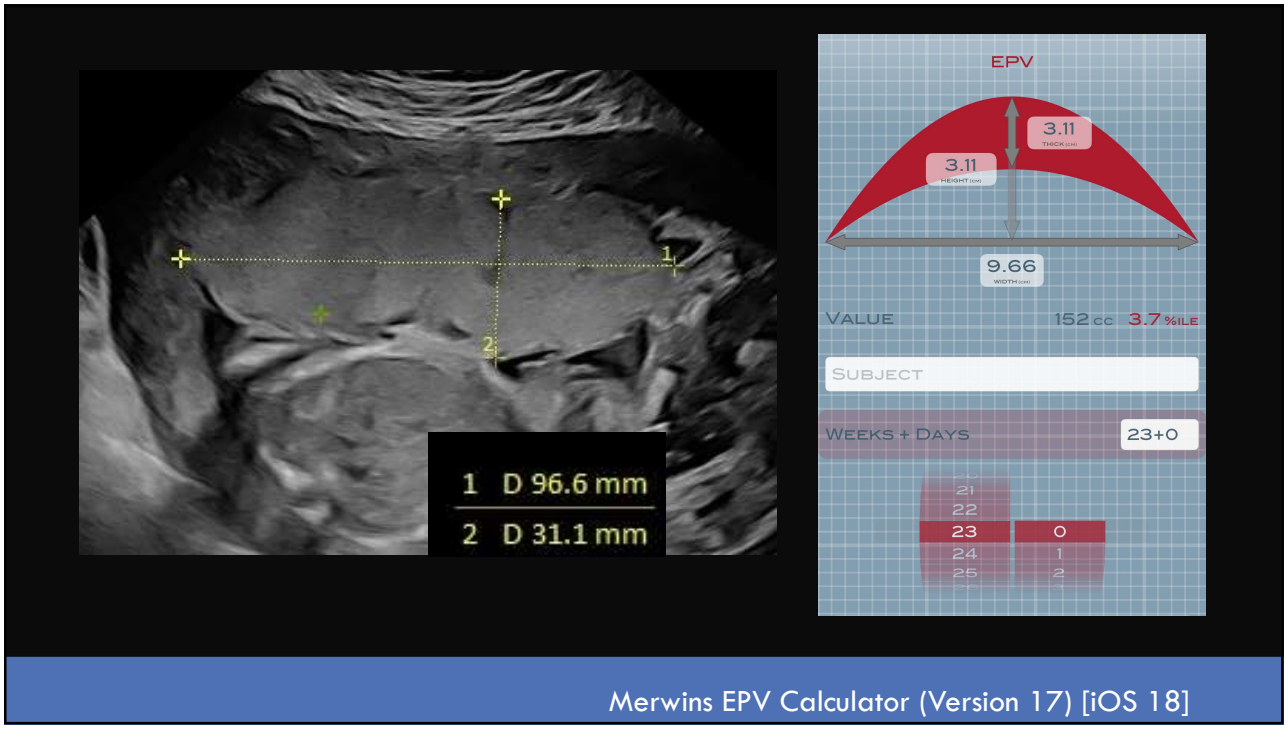

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Normal EPV

- EPV measures between 10% and 90% for gestational age
- EFW %tile: EPV%tile ratio 1.0 or less

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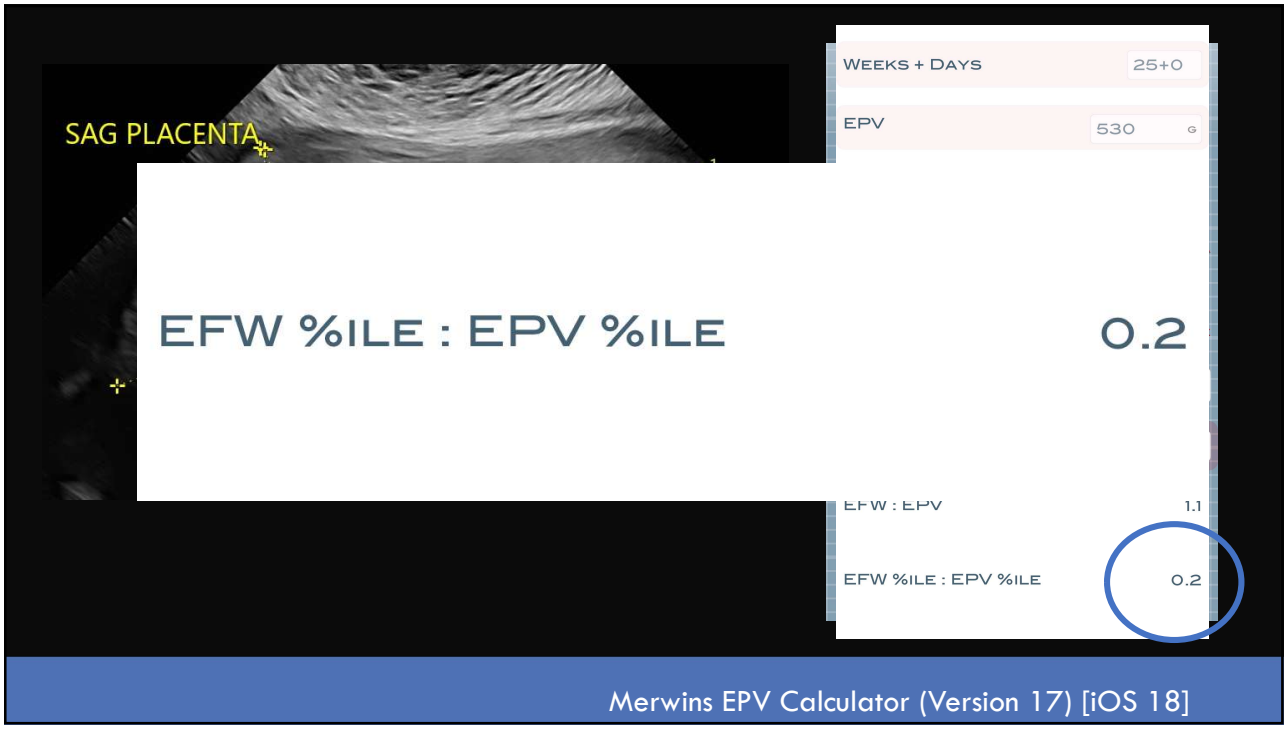

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Abnormal EPV

- EPV measurement below 10% for gestational age

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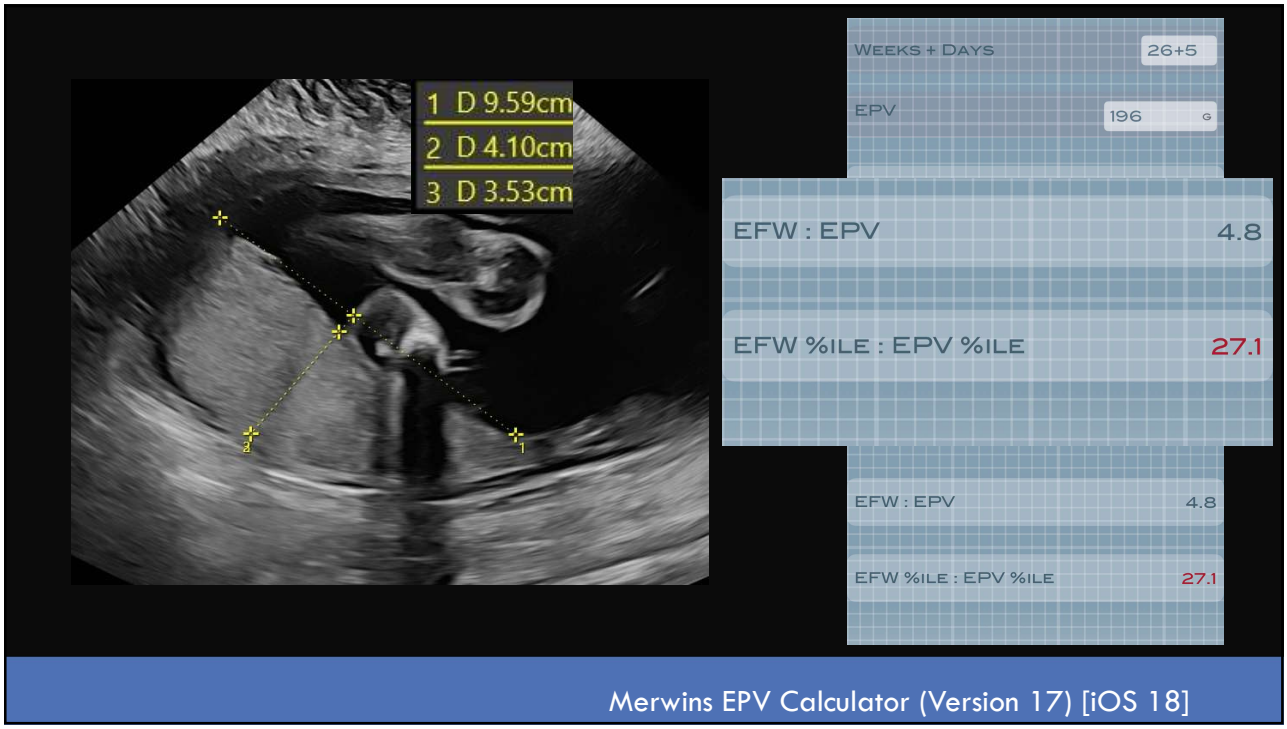

Merwins EPV Calculator (Version 17) [iOS 18]

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Tips and Tricks

- Widest angle possible for measurement
- Height ≥ Thickness
- Utilize cord insertion as a guide

4, 8

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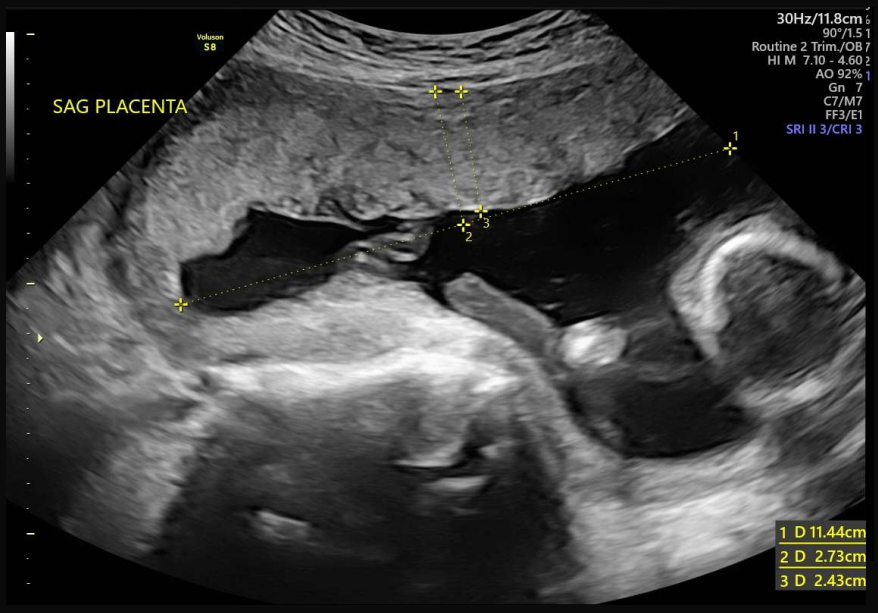
Widest Angle



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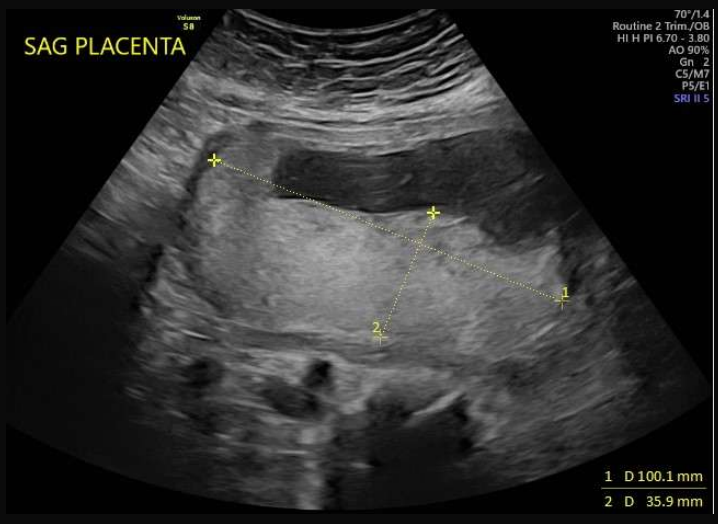
Height > Thickness



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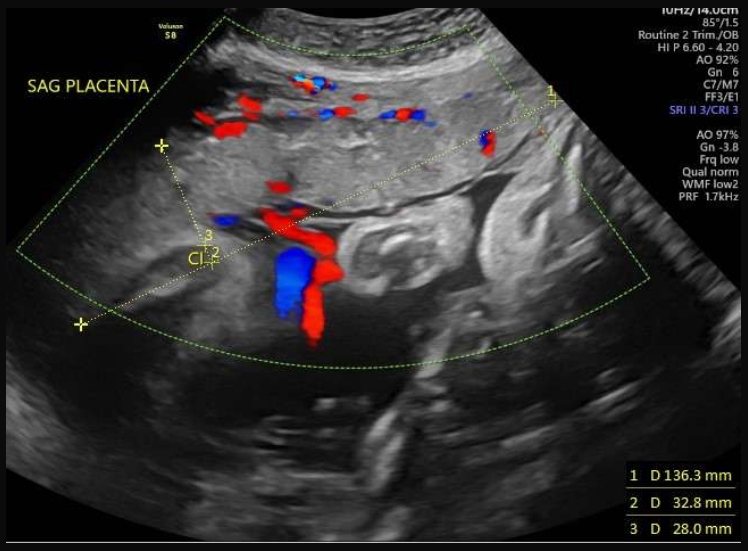
Cord Insertion Guide



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Look out for...

- Transducer pressure
- Bilobed placentas, accessory lobes
- Placental position
- Late gestational age

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Transducer Pressure

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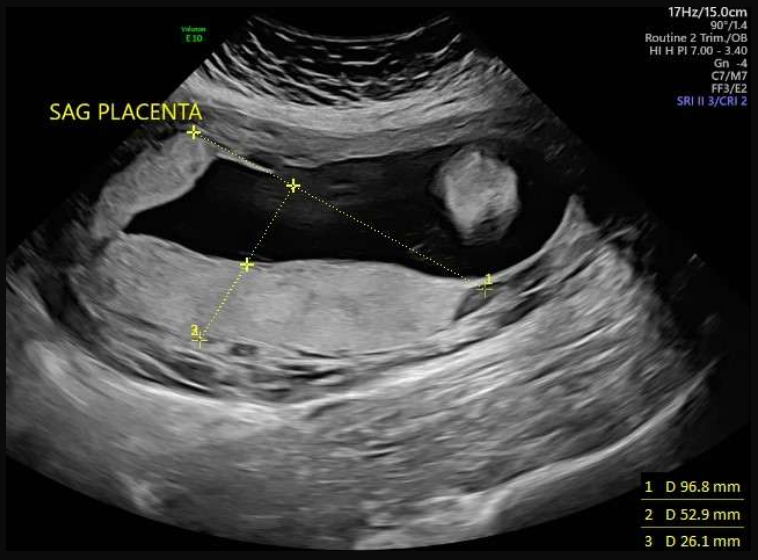
Bilobed Accessory Lobes



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Placental Position

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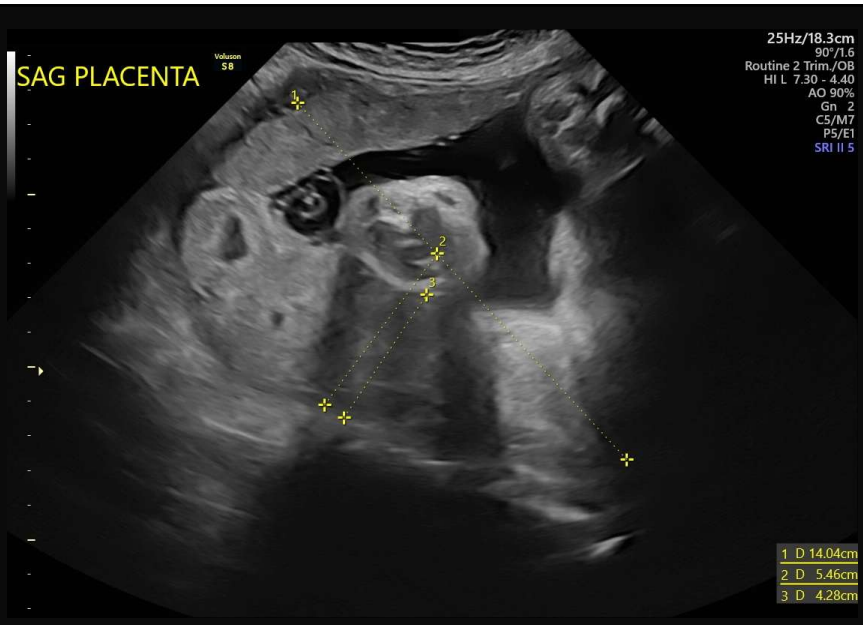
Late Gestational Age



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What's Next?

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What's Next?

- Implementation on all populations
- Identifying placentas in 2nd trimester at risk
- Goal to identify before onset of IUGR

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In Conclusion

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Thank you!

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- OPTIONAL Survey Code
- Providing us feedback on the topic

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