

**Serial Ultrasound Measurements of Fetal Head Circumference and Abdominal Circumference to Predict Fetal Growth Restriction in a Sri Lankan Study Population**

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# Fetal Growth Restriction (FGR)

## Definition

“Failure to achieve growth according to the growth potential”

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# FGR

- Mostly “Under-diagnosed”
- One of the major causes of Still Births at term
- Placental Insufficiency – “The commonest”

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- “Fetal Origins hypothesis” suggests increased lifetime risk of coronary artery disease, diabetes mellitus and metabolic syndrome in FGR babies
- If FGR is accurately detected, early lifestyle modifications & close follow up can be applied to this group.

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# Small for gestational age (SGA)

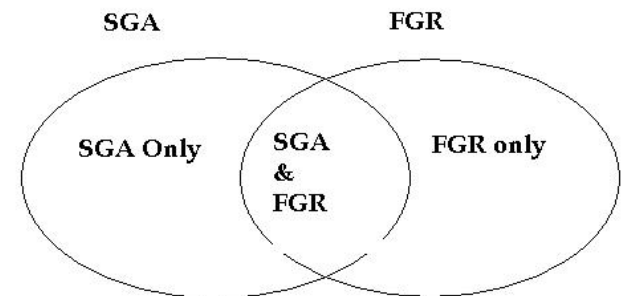
Definition

“ Expected weight according to POA is below 10<sup>th</sup> Centile”

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# FGR vs SGA

- May coincide
- But are not synonymous
- FGR without SGA & SGA without FGR
- *Birth weight alone is a poor indicator of FGR*



# Diagnosis of FGR

- **Clinical - SFH**
  - Static Fundus
  - Customized SFH charts
- **Ultrasound**
  - Abdominal circumference- Centile charts
  - Estimated fetal weight- Centile charts
- **Doppler**
  - Umbilical Artery
  - Middle cerebral Artery

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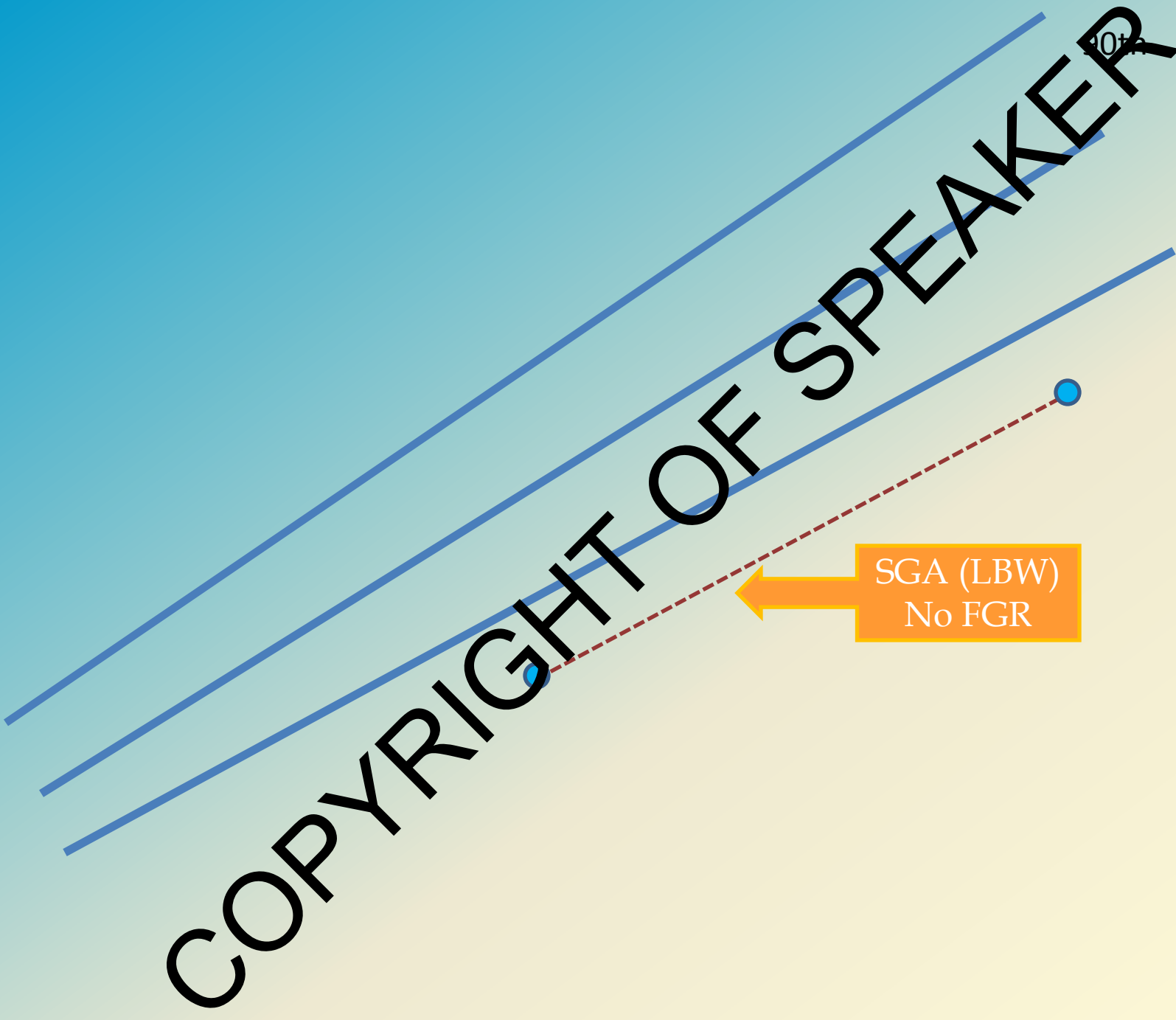
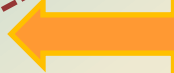
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90th

50th

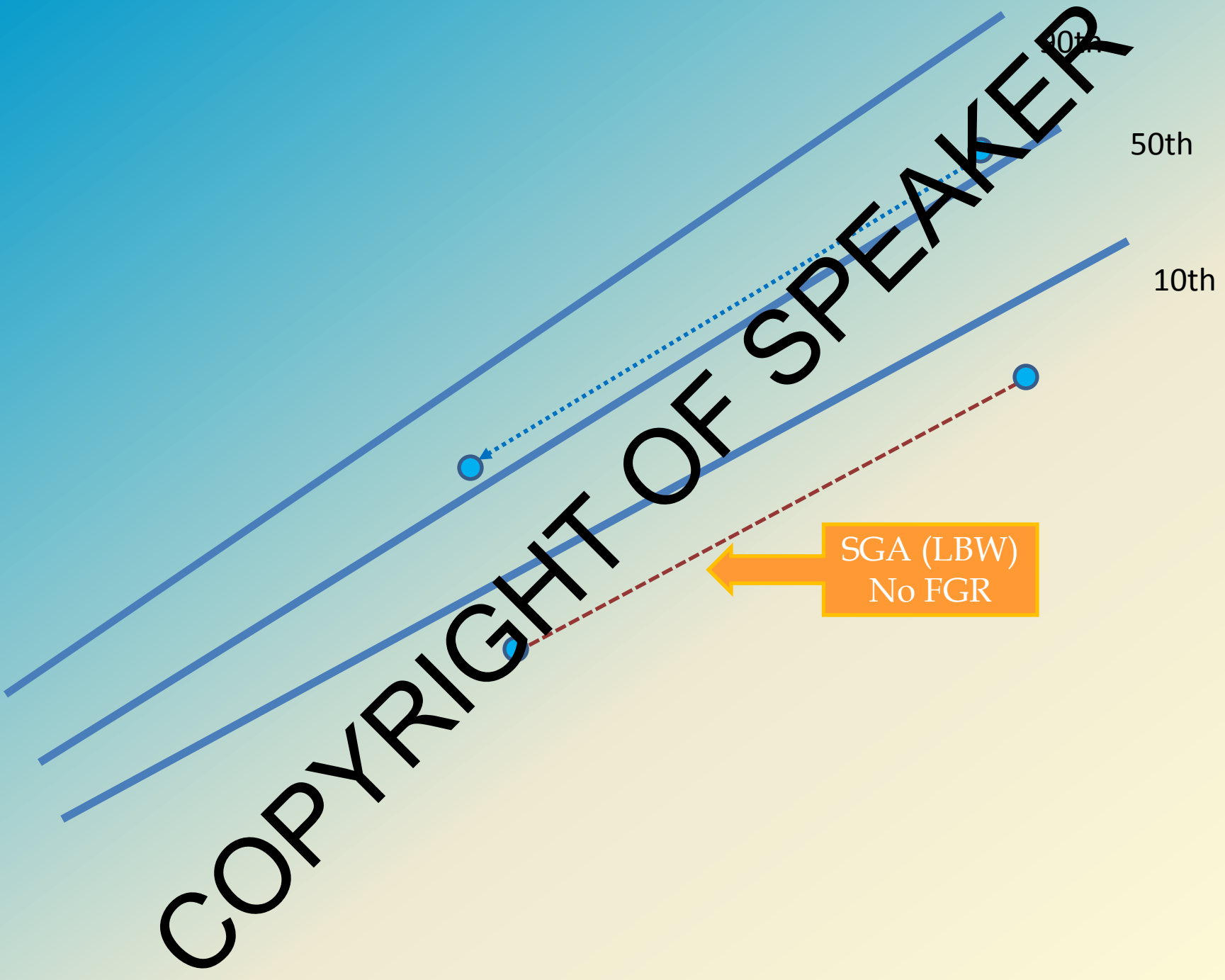
10th

SGA (LBW)  
No FGR





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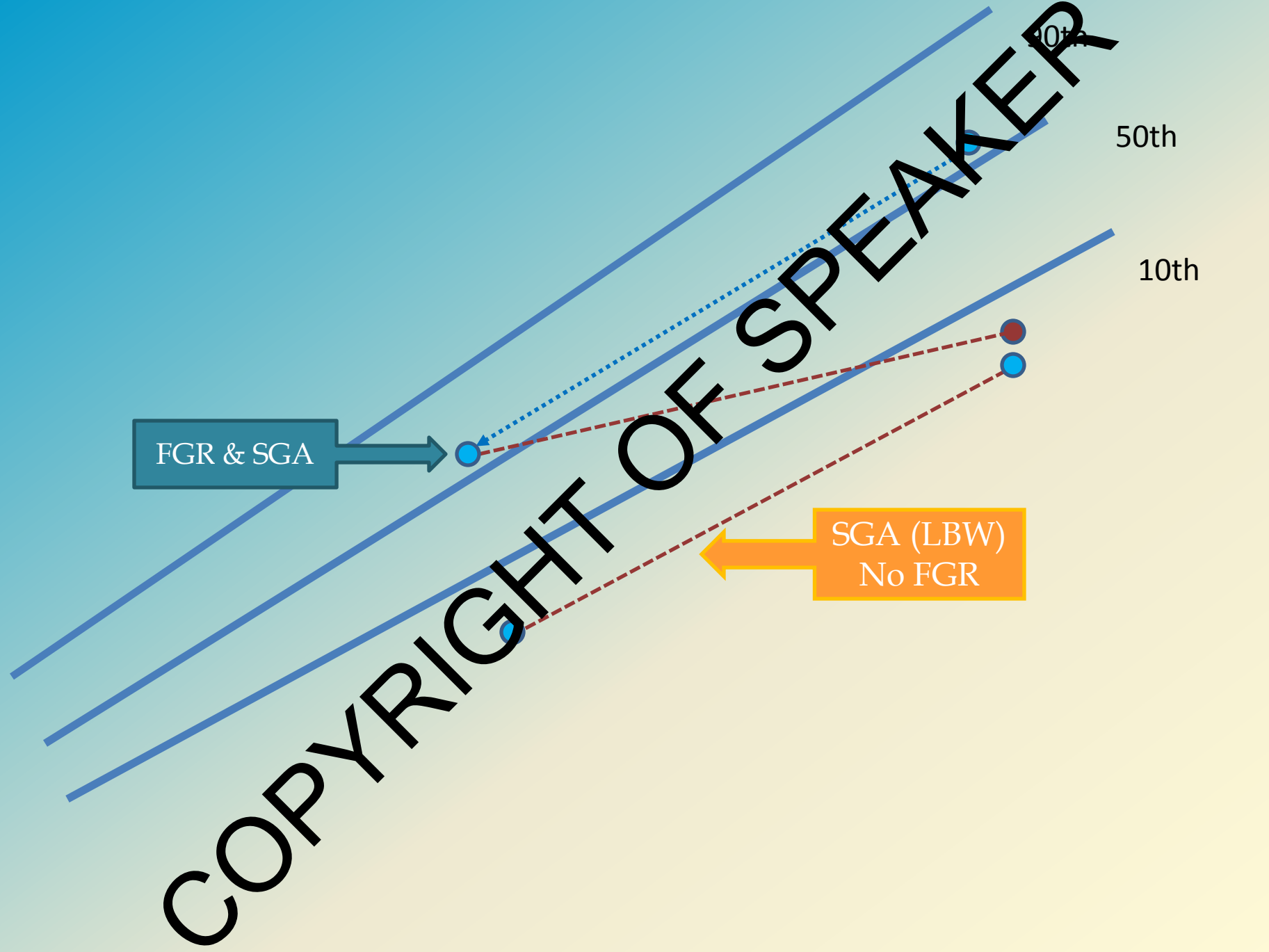
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FGR & SGA

SGA (LBW)  
No FGR

50th

10th



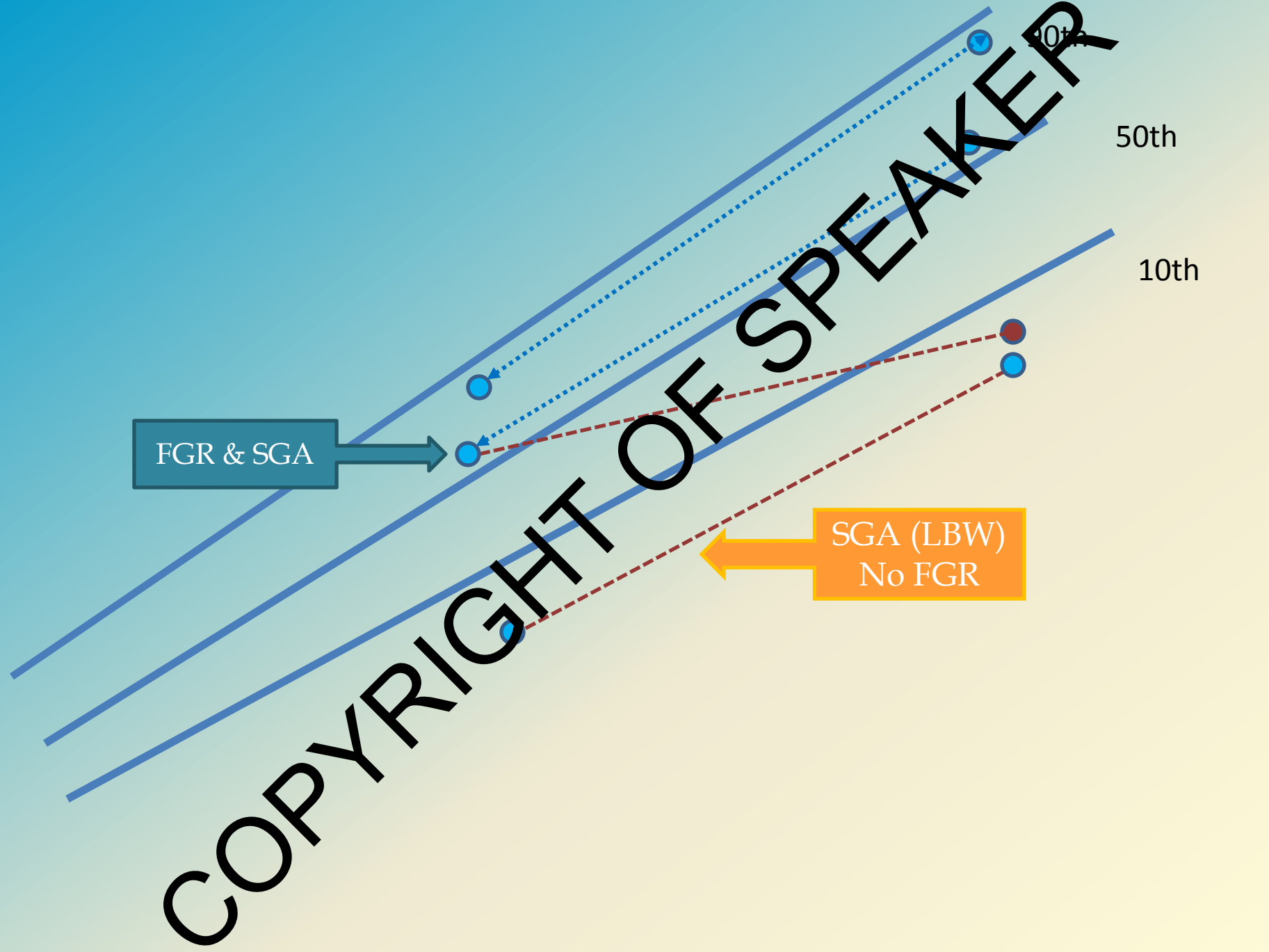
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FGR & SGA

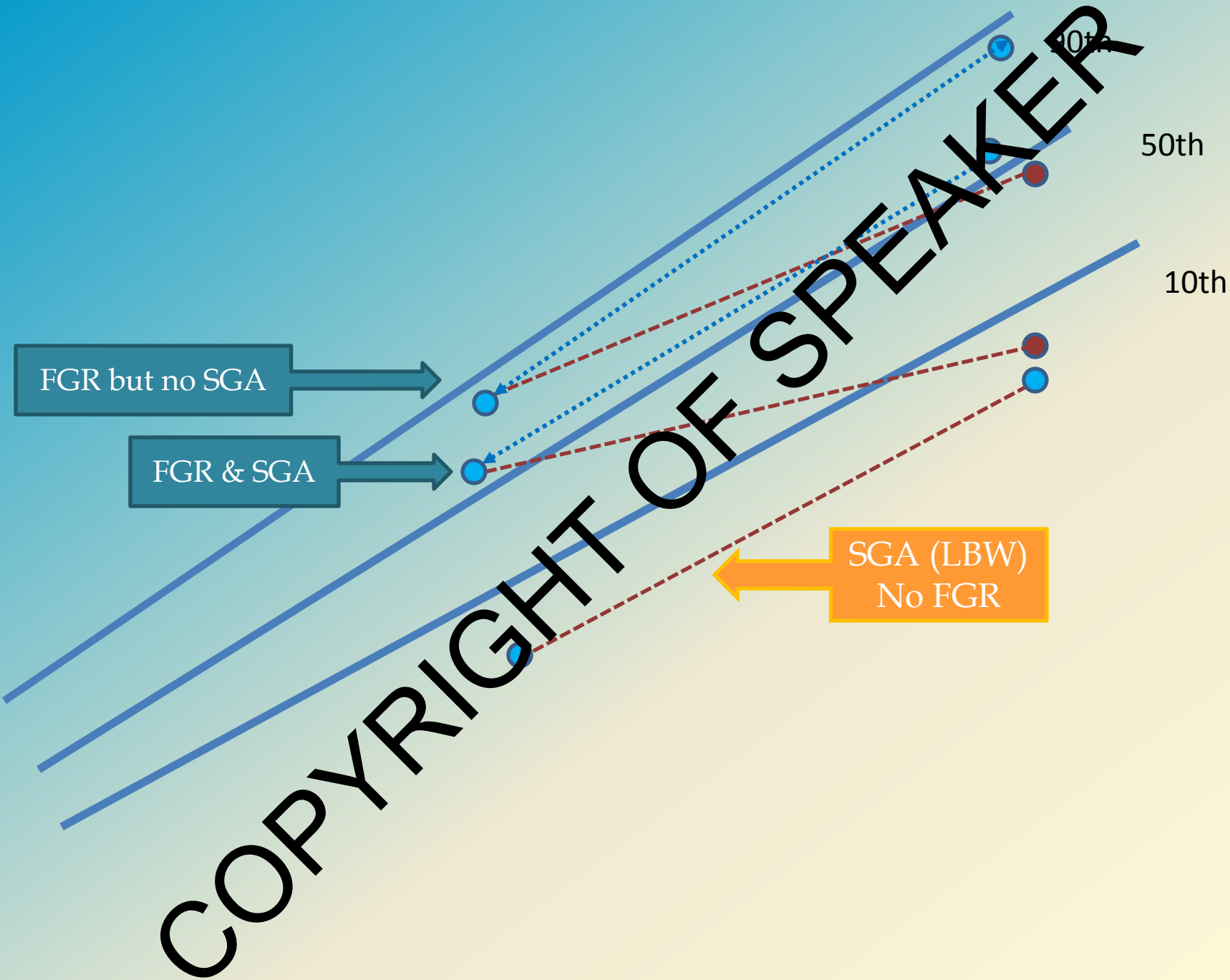
SGA (LBW)  
No FGR

50th

10th



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# Confirmation of FGR after birth

- Criteria not well established
- **Birth Weight alone is not useful**

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# Confirmation of FGR after birth

- **Ponderal Index**
- Skin fold thickness
- Mid arm to occipito frontal ratio

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# Ponderal Index

- Weight (kg) / Length(m)<sup>3</sup>

|                |   |
|----------------|---|
| SI units       | $PI = \frac{\text{mass (kg)}}{(\text{height (m)})^3}$     |
| Imperial units | $PI = \frac{\text{height(in)}}{\sqrt[3]{\text{mass(lb)}}$ |

# Objective

Ascertain the ability of serial ultrasound measurements of fetal head circumference (HC) and abdominal circumference (AC) to predict FGR

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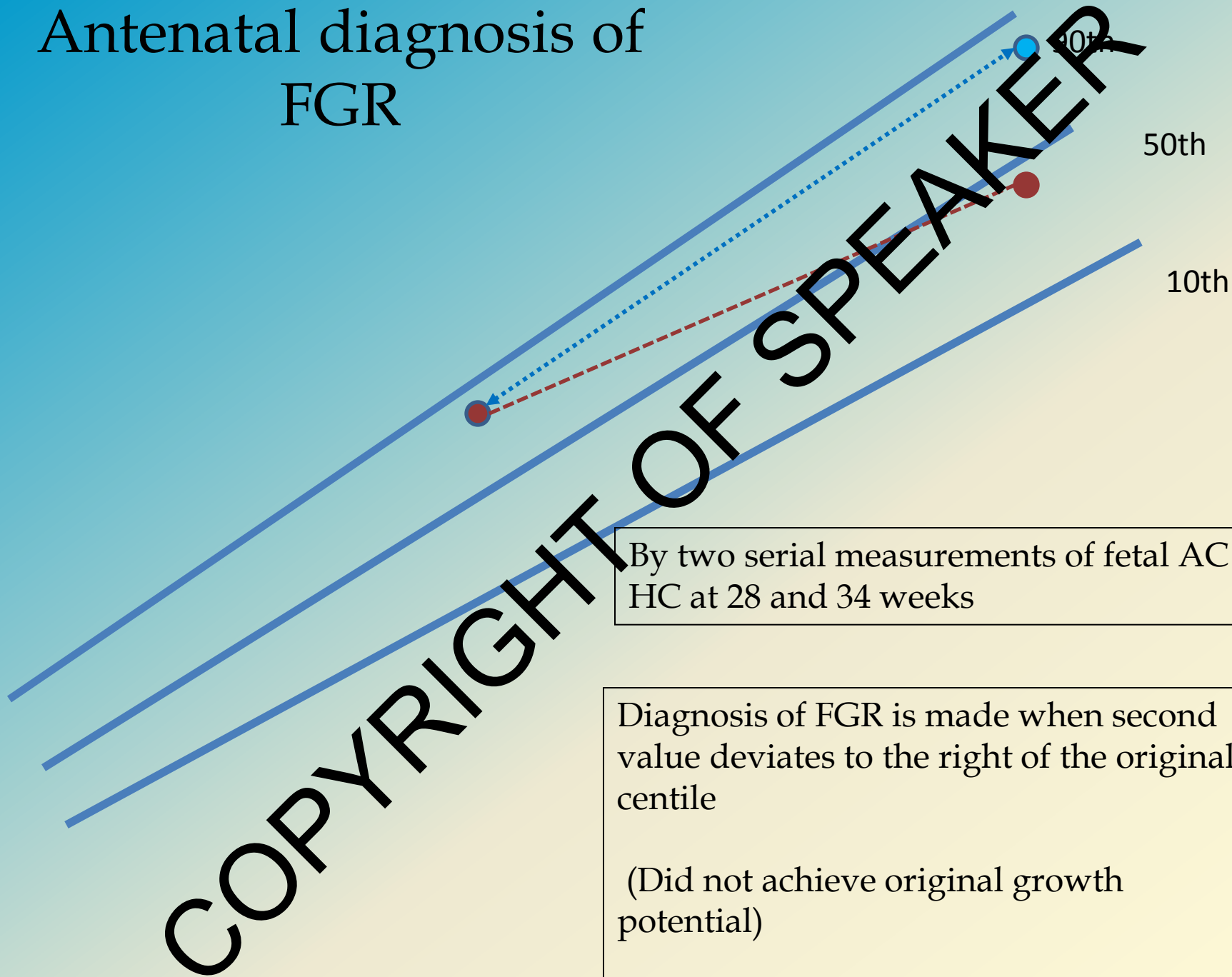


# Study design

- A prospective cohort study
- Excluded - uncertain dates, Late booking, multiple pregnancy, IUD
- 508 pregnant women

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# Antenatal diagnosis of FGR



By two serial measurements of fetal AC & HC at 28 and 34 weeks

Diagnosis of FGR is made when second value deviates to the right of the original centile

(Did not achieve original growth potential)

# FGR and non FGR (Antenatal)

| FGR          | Non FGR      |
|--------------|--------------|
| 223 (43.89%) | 285 (56.11%) |
| Total        | 508          |

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# After Delivery.....

- Ponderal index (PI) was used to identify FGR
- PI below 10<sup>th</sup> centile according to POA confirmed FGR

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# Detection of FGR - Postnatal

| FGR         | Non FGR     |
|-------------|-------------|
| 224 (44.1%) | 284 (59.9%) |
| Total 508   |             |

# Comparison

|                                 | Post natal growth restricted | Postnatal non growth restricted |            |
|---------------------------------|------------------------------|---------------------------------|------------|
| Antenatal growth restricted     | 185                          | 38                              | 223        |
| Antenatal non growth restricted | 39                           | 246                             | 285        |
|                                 | 224                          | 284                             | <b>508</b> |

# Results

- Sensitivity - 82.59%,
- Specificity - 86.62%,
- Positive Predictive Value - 82.59%,
- Likelihood ratio - 6.2

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# Conclusions

- Antenatal diagnosis of FGR by using serial ultrasound measurements of fetal abdominal circumference is accurate.
- FGR accounts for a significant percentage of pregnancies in Sri Lankan population.
- Therefore screening for FGR by two USS at 28 and 32 weeks is justified.



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Thank you