

Poster number : EP06.49

Beyond head circumference: a novel ultrasound method for estimating fetal cranial volume

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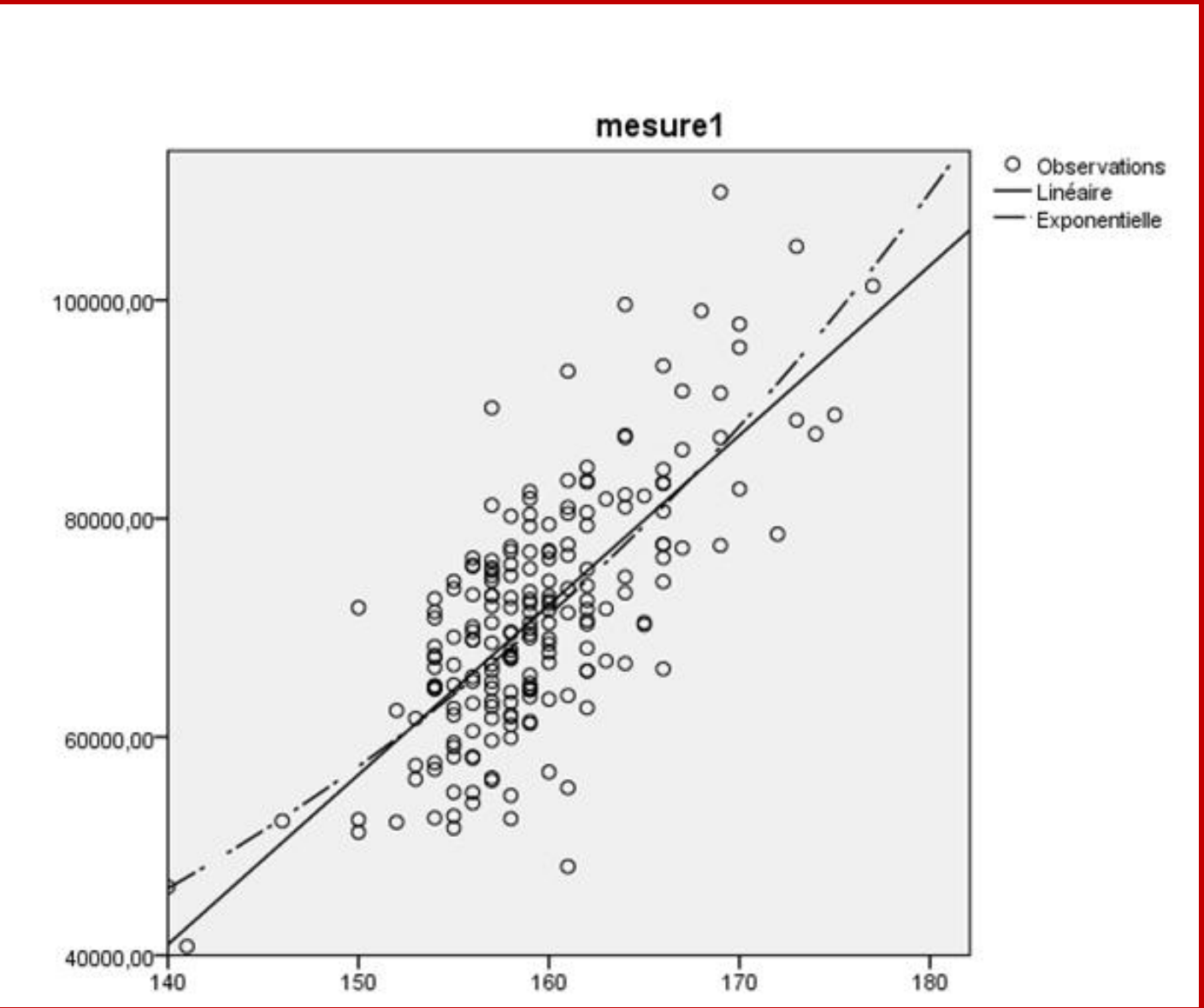
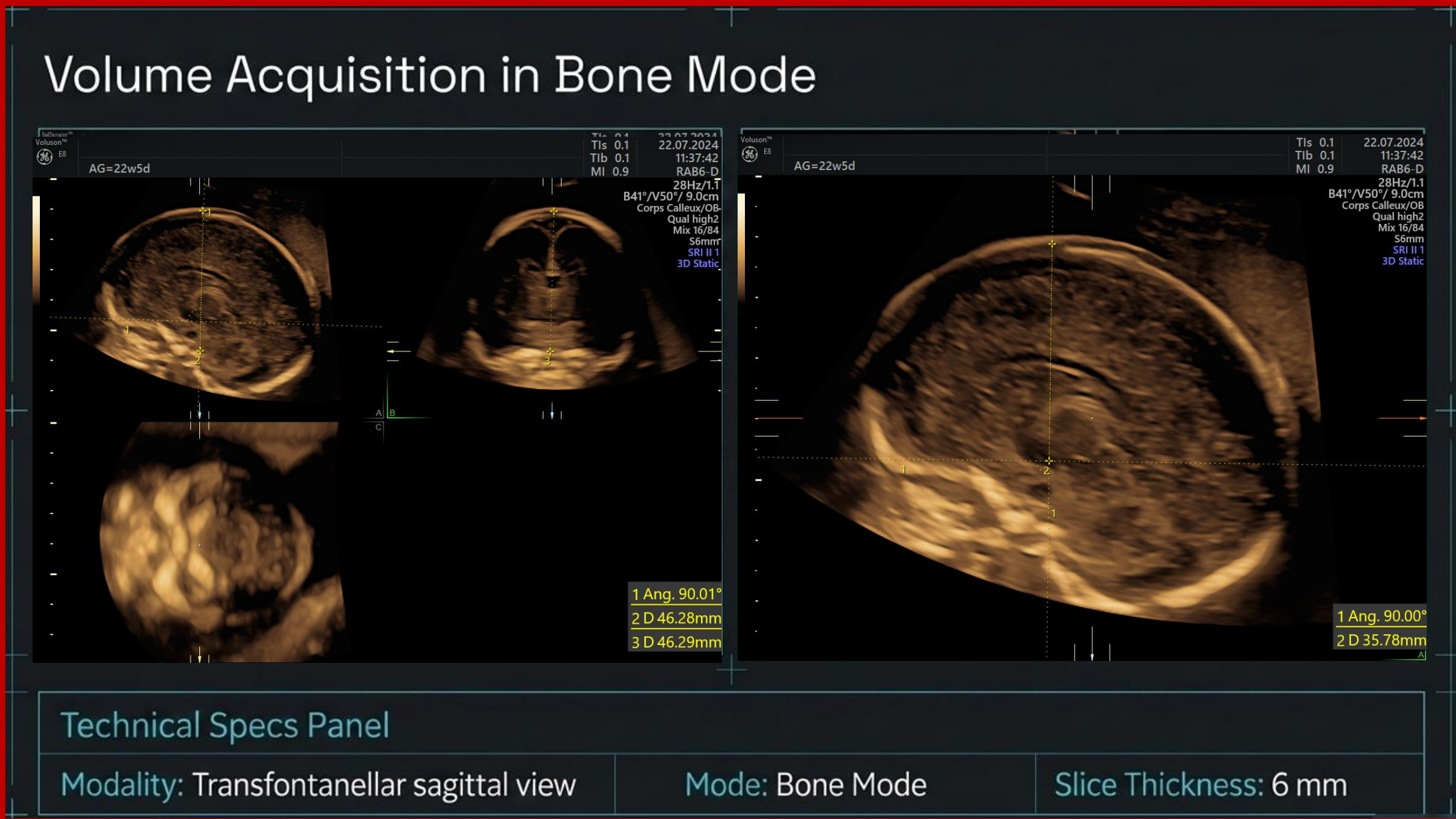
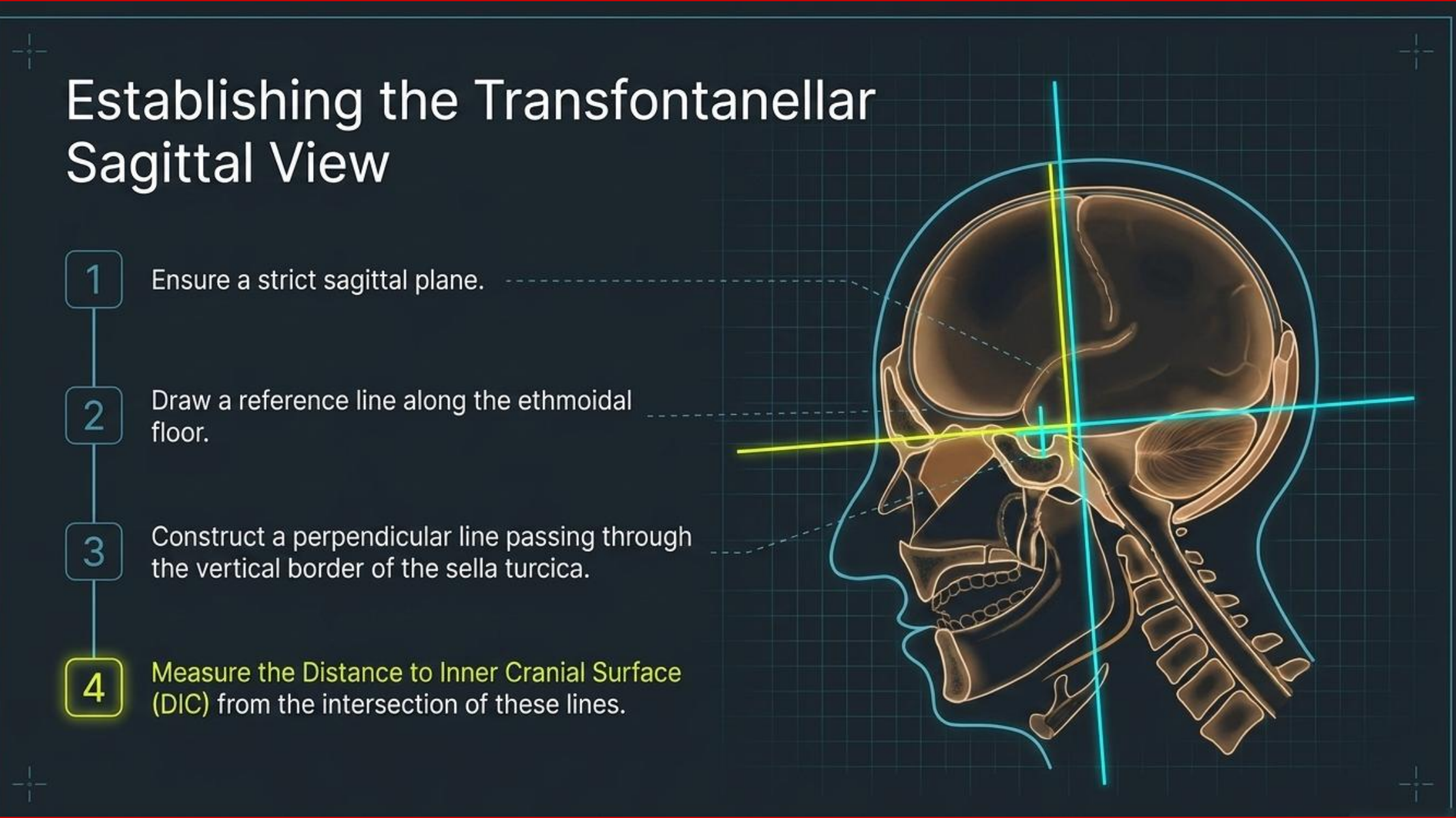
Question : why should we accept to continue evaluating a volume with a surface ??

Objectives: Fetal head assessment is traditionally based on biparietal diameter (BPD) and head circumference (HC) obtained from a single axial plane. However, the fetal skull is a dynamic three-dimensional structure due to unfused sutures. This study aimed to develop and evaluate a novel ultrasound-based method for estimating fetal cranial volume during the second trimester.

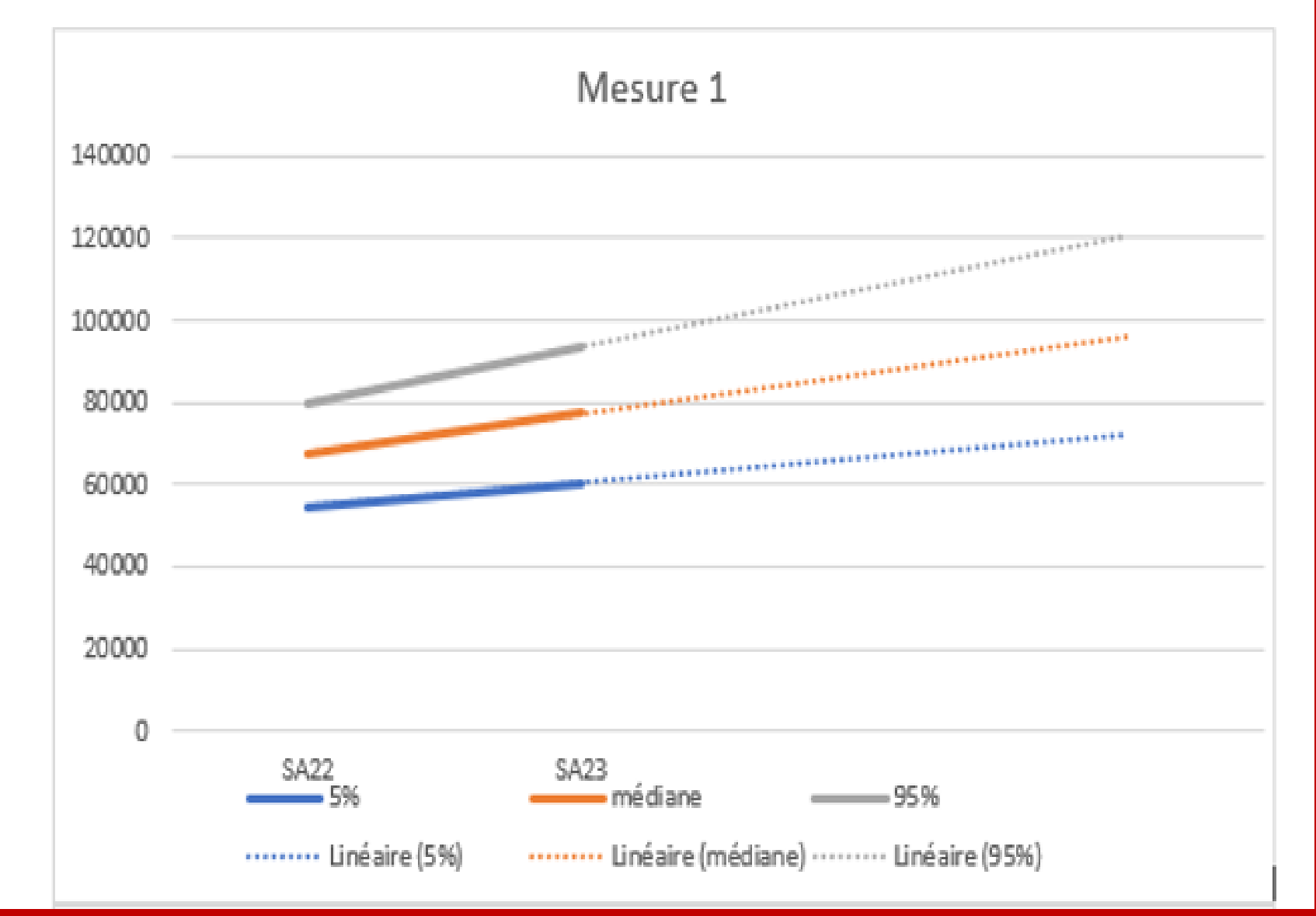
Methods: In this prospective study , 204 pregnant women with accurate first-trimester dating were included. Fetuses with structural anomalies or intrauterine growth restriction were excluded. Measurements were performed at the routine anomaly scan between 20 and 24 weeks of gestation. A transfontanellar sagittal view of the corpus callosum was used. Volume acquisition was performed in bone mode with a slice thickness of 6 mm. On a strict sagittal plane, a reference line was drawn along the ethmoidal floor, and a perpendicular line was constructed through the vertical border of the sella turcica. The distance between their intersection and the inner cranial surface (DIC) was measured. Cranial volume was calculated using a hemi-ellipsoid formula: **$(4/6) \times \pi \times (BPD/2) \times (FOD/2) \times DIC$** . Percentile distributions were generated for each gestational age.

Results: In groups with sufficient sample size,Cranial volume ranged from 54.7 to 79.9 cm3 (5th–95th percentile), with a mean of 67.8 cm3 at 22 weeks, and from 60.4 to 93.6 cm3 (5th–95th percentile), with a mean of 76.6 cm3 at 23 weeks.

Conclusion: Cranial volume increased linearly with gestational age within the studied interval, likely reflecting the narrow gestational range. A non-linear (exponential) growth pattern is expected over a wider range. This method may serve as a complementary tool for refining the assessment of small head circumference, particularly in fetuses between the 3rd and 10th percentiles. No need expert level on US or expensive machine.



Gestationnel Age (Day)



The cranial volume distribution in the 2nd Tr US exam (5th – 95p)