

Defining limits of AI- Impact of Maternal BMI, gestational age, fetal position and image quality on the reliability of AI-Driven fetal neurosonography

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OBJECTIVE

To compare the accuracy of AI-automated fetal brain biometry (SonoCNS) to MFM experts and trainees, and to identify the thresholds in terms of maternal BMI, image quality, fetal position and gestational age where manual intervention is required to adjust for computational errors.

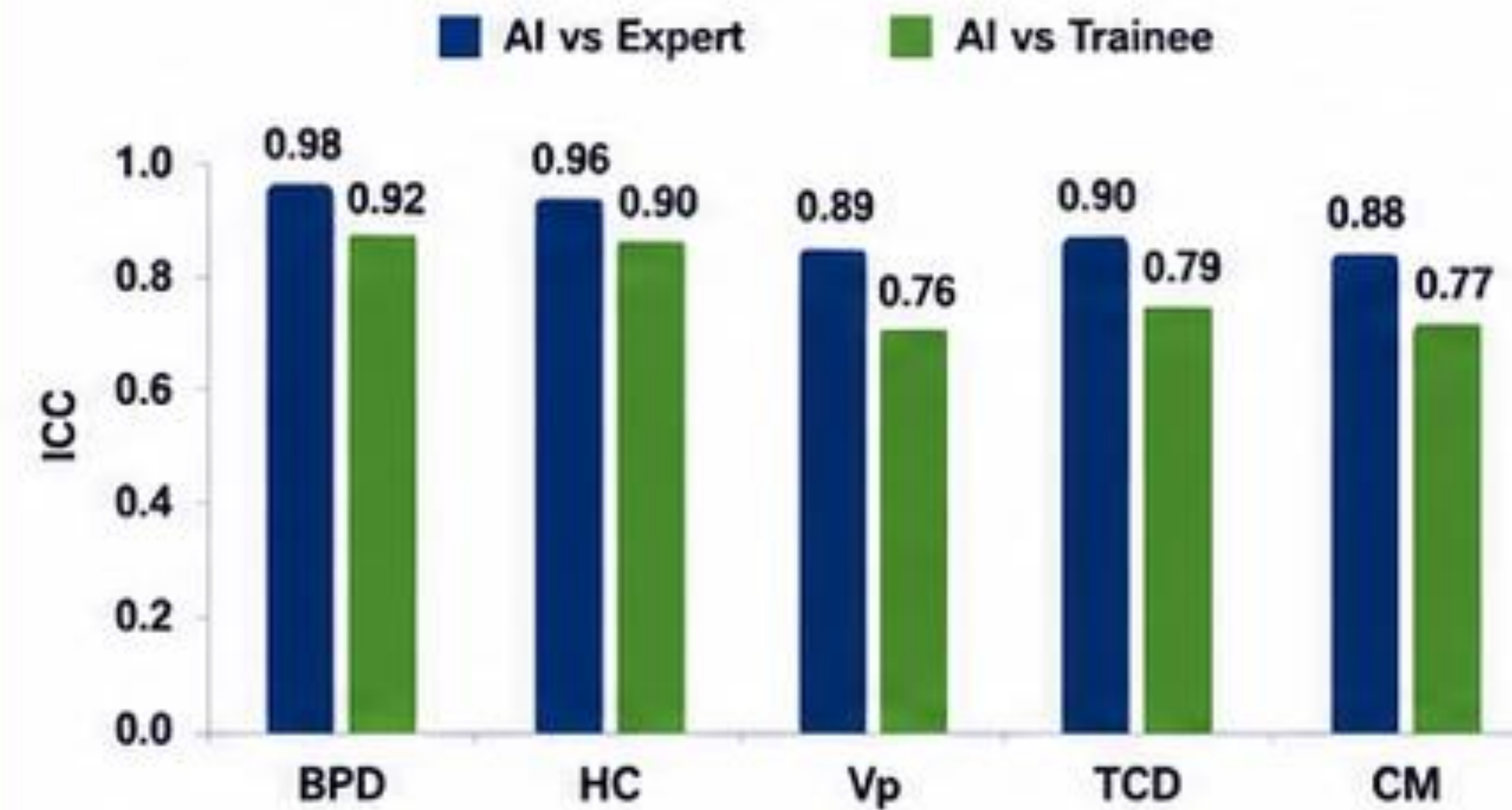


METHODS

- Prospective pilot study of 50 singleton pregnancies at 18–36 weeks GA.
- Three sets of measurements (BPD, HC, Vp, TCD, CM) for each fetus by: AI (SonoCNS), MFM Expert and Trainee.
- Image quality (IQ) graded 1–5 based on acoustic shadowing.
- Accuracy evaluated using Mean Absolute Error (MAE) and Intraclass Correlation Coefficients (ICC).
- Frequency of manual adjustment of AI output correlated with BMI, GA and fetal position.

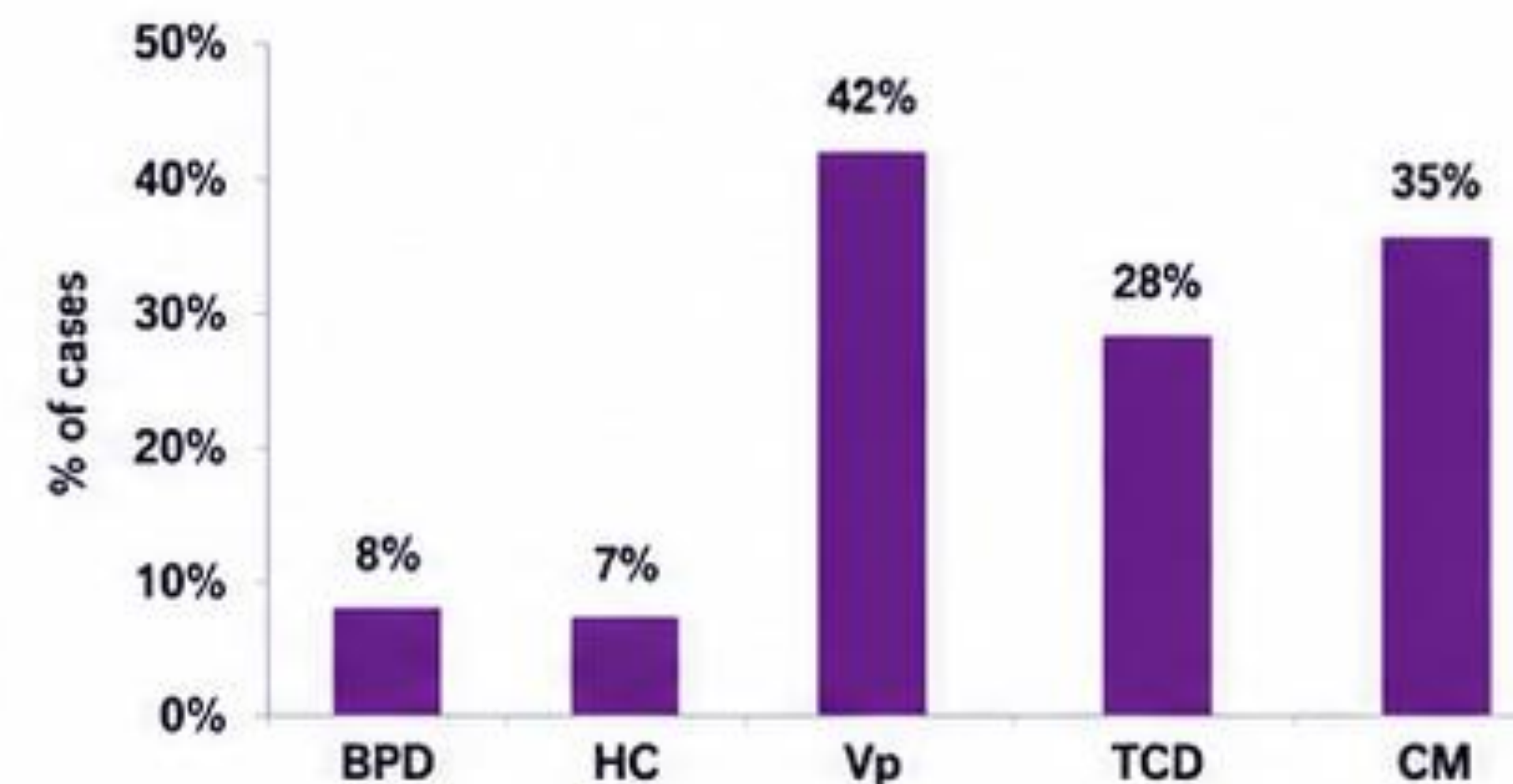
RESULTS

AGREEMENT (ICC) WITH EXPERT AND TRAINEE



SonoCNS showed superior agreement with the Expert (ICC: 0.88–0.98) compared to the Trainee (ICC: 0.76–0.92) for all parameters.

FREQUENCY OF MANUAL ADJUSTMENT REQUIRED FOR AI OUTPUT

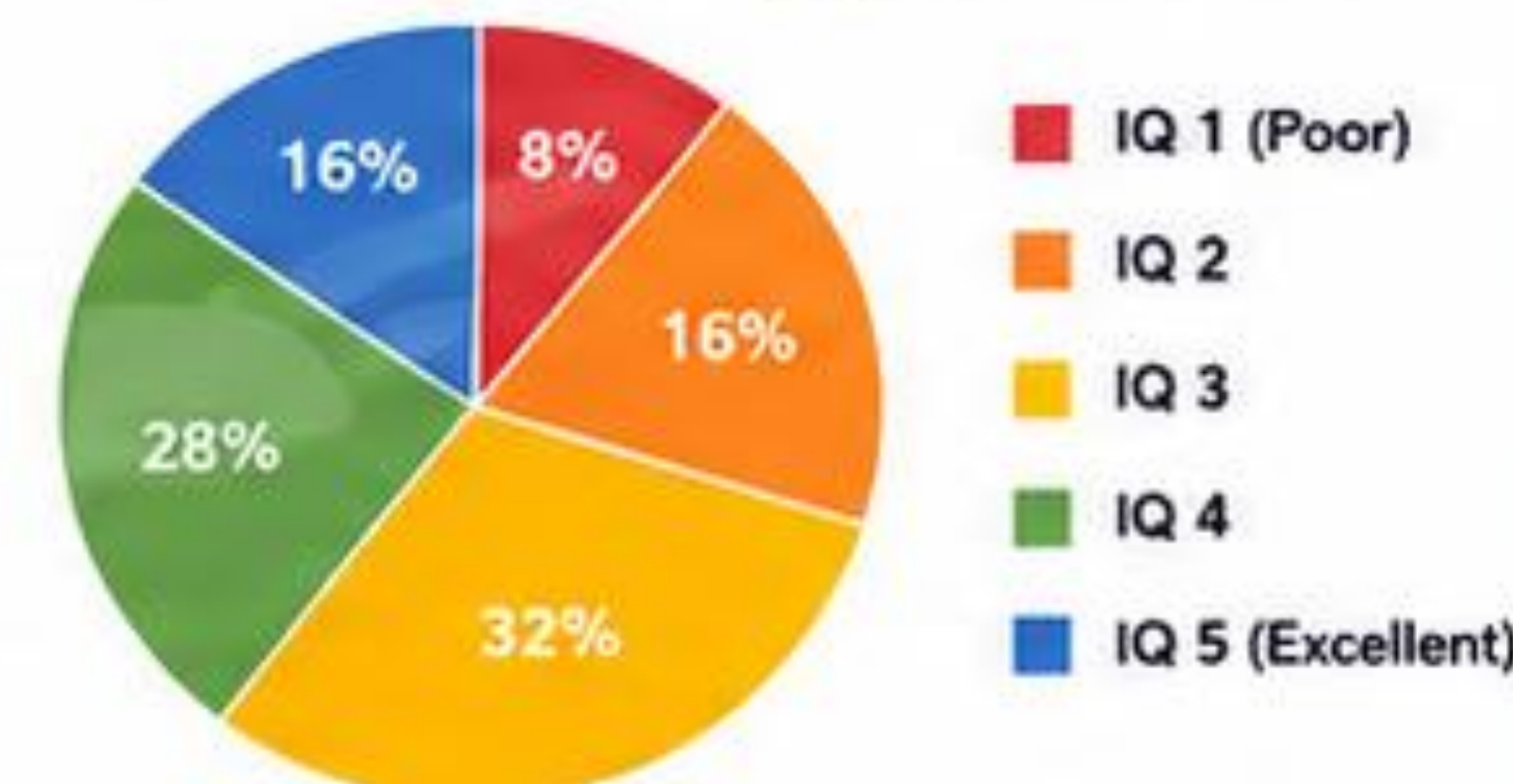


Manual adjustment was most frequently required for smaller measurements – Vp (42%) and CM (35%), while BPD/HC required correction in <10% of cases.

STUDY POPULATION (N = 50)

Maternal age (years), mean ± SD	29.6 ± 4.5
BMI (kg/m ²), mean ± SD	27.4 ± 5.1
Gestational age (weeks), mean ± SD	27.1 ± 4.6
BMI > 30 kg/m ²	10 (20%)
IQ score (mean ± SD)	3.2 ± 0.9

IMAGE QUALITY (IQ) DISTRIBUTION



Lower IQ associated with higher need for manual adjustment.

FACTORS INFLUENCING NEED FOR MANUAL ADJUSTMENT OF AI OUTPUT

 Maternal BMI	BMI > 30 kg/m ² increased the rate of manual override by 3.1 times.
 Gestational Age	Accuracy significantly declined beyond 32 weeks GA.
 Fetal Position	Dorsoposterior position significantly increased the need for manual adjustment of posterior fossa parameters (TCD/CM).



KEY TAKEAWAYS

- SonoCNS bridges the expertise gap between trainees and experts.
- Smaller structures (Vp, CM) are more prone to AI measurement errors.
- High BMI, advanced GA (>32 weeks), poor IQ and dorsoposterior position increase the likelihood of AI inaccuracy.
- Human oversight remains essential in challenging clinical scenarios.



CONCLUSIONS

SonoCNS is a reliable tool for fetal brain biometry and helps narrow the gap between trainees and experts. However, its accuracy is influenced by maternal BMI, gestational age, fetal position and image quality. While it is a valuable aid—especially during second-trimester anatomy scans in busy clinics—human verification remains crucial, particularly in the third trimester and in high-BMI populations.



AI is a powerful assistant, but clinical judgement defines the limits.

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