

Introduction

- Ventriculomegaly is the most common reason for referral for suspected fetal central nervous system (CNS) abnormalities [1]
- Prenatal ultrasound screening of CNS defects remains challenging, as the measurement of lateral ventricle width requires a standardized technique and appropriate reference ranges, and is subject to intra- and inter-observer variability [2]
- Artificial intelligence (AI)-based automated measurement offers a promising tool to reduce this variability and support more consistent CNS screening [3]

How well does AI-based automated measurement of the fetal lateral ventricle width perform for detecting ventriculomegaly?

Methods

- Data Collection:**
 - Retrospective enriched dataset combining normal examinations and selected pathological cases
 - Second and third trimester ultrasound examinations (singleton)
 - Still images and cine loops with an interpretable transventricular view
- Ground Truth:**
 - Three US-based sonographers (>7 years of experience) measured the lateral ventricle width manually
 - Discrepancies of >10% between pairs of measurements were reviewed by three MFM physicians
 - The reference standard corresponds to the average of the three measurements
- AI Software:**
 - The B-Right Views software (BrightHeart, Paris, France) analyzes fetal ultrasound images and video clips using machine learning techniques
 - It automatically detects standard views, detects quality criteria and performs measurements
- Statistical Analysis:**
 - Correlation between manual and AI-based measurements
 - Bland-Altman analyses based on absolute paired differences
 - Sensitivity analysis for the detection of lateral ventricles ≥ 10 mm (i.e., ventriculomegaly) [4]

[1] Pisapia et al. *Childs Nerv. Syst.* 2017.
 [2] Salomon et al. *UOG* 2007.
 [3] Venturini et al. *NPJ Digit. Med.* 2025.
 [4] Malinger et al. *UOG* 2020.

Results

Case characteristics	Value
Ultrasound examinations (n)	378
Gestational age	
Mean $\pm$ SD (weeks)	26.9 $\pm$ 5.3
Range (weeks)	18.0 – 37.4
Normal / abnormal cases (n)	311 (82%) / 67 (18%)
Isolated ventriculomegaly (n/abnormal)	31 (46%)
Spina bifida (n)	13 (19%)
Dysgenesis of the corpus callosum (n)	18 (27%)
Cytomegalovirus infections (n)	3 (5%)
Rhombencephalosynapsis (n)	2 (3%)

Table 1. Characteristics of included cases

AI performance for detecting ventricles ≥ 10 mm (46 with ventricles ≥ 10 mm; 332 without)

Sensitivity (n=46) 97.7% (95% CI: 88.2, 99.6)
Specificity (n=332) 98.1% (95% CI: 95.9, 99.1)

Concordance correlation (Figure 1)

CC coefficient 0.88 (95% CI: 0.84, 0.92)

Bland-Altman results (Figure 2)

Bias 0.19 mm (95% CI: 0.06, 0.32)
Limits of agreement [-2.26 mm , 2.64 mm]

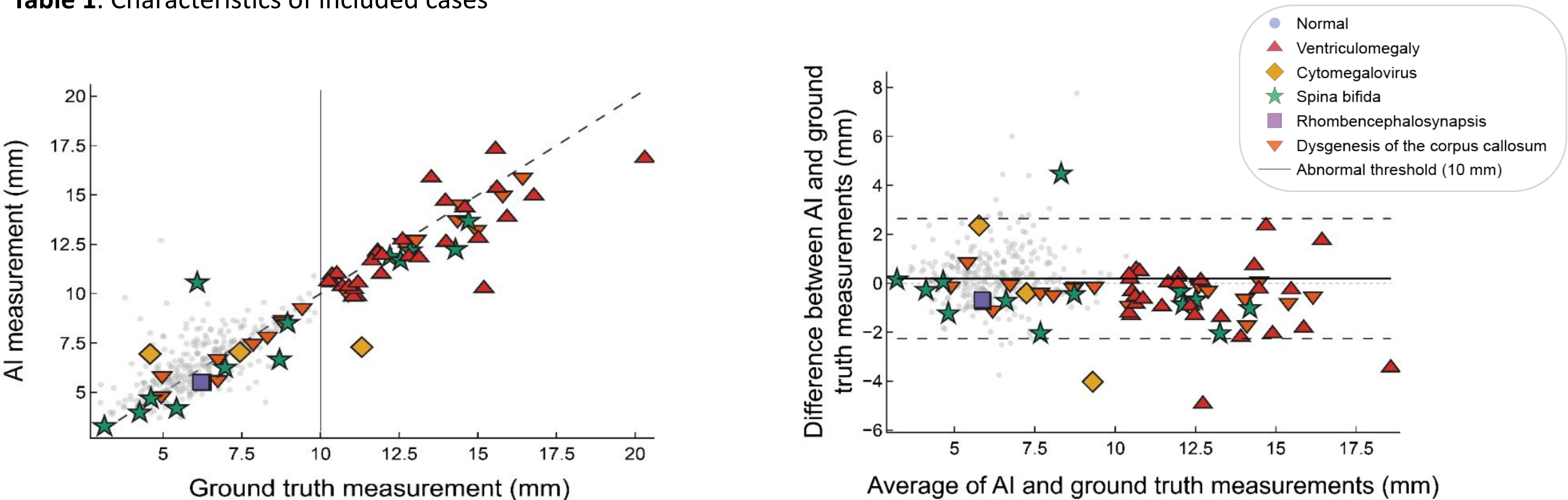


Figure 1. Correlation between AI and ground truth measurements Figure 2. Bland-Altman agreement plot

Conclusions

- The AI reliably classified ventricles against the 10 mm threshold with high sensitivity and specificity, in agreement with expert measurements
- The largest discrepancies occurred in severe ventriculomegaly cases, well above the 10 mm threshold, with only one discrepancy affecting classification.
- AI could serve as an effective screening tool for ventriculomegaly
- Note that the enriched dataset does not reflect screening prevalence