



# AUTOMATED UTERINE FIBROID MAPPING ON MRI USING DEEP LEARNING: DEVELOPMENT AND PROOF OF CONCEPT

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## BACKGROUND & RATIONALE

- Uterine fibroids are among the most common gynaecological conditions.
- MRI offers excellent anatomical detail, but manual fibroid delineation is time-intensive and operator-dependent.
- Inter-reader variability can affect lesion localisation, volume assessment, treatment stratification, surgical planning, and reporting consistency.
- Deep learning offers an opportunity to automate and standardise fibroid mapping.



## AIM

To develop and evaluate an AI-powered deep-learning pipeline for automated uterine fibroid segmentation on MRI, as a proof-of-concept foundation for reproducible clinical decision support.



## METHODS



Retrospective single-centre dataset of 98 women with confirmed uterine fibroids.



MRI performed on 1.5T and 3T scanners using a multiparametric pelvic protocol.



Two independent radiologists annotated anonymised datasets primarily on T2-weighted images in axial, sagittal, and coronal planes.



T1-weighted, diffusion-weighted, and post-contrast sequences were used where available for tissue characterisation and exclusion of alternative pathology.



A U-Net encoder-decoder convolutional neural network was trained using a 75% training / 50% validation / 50% testing split.

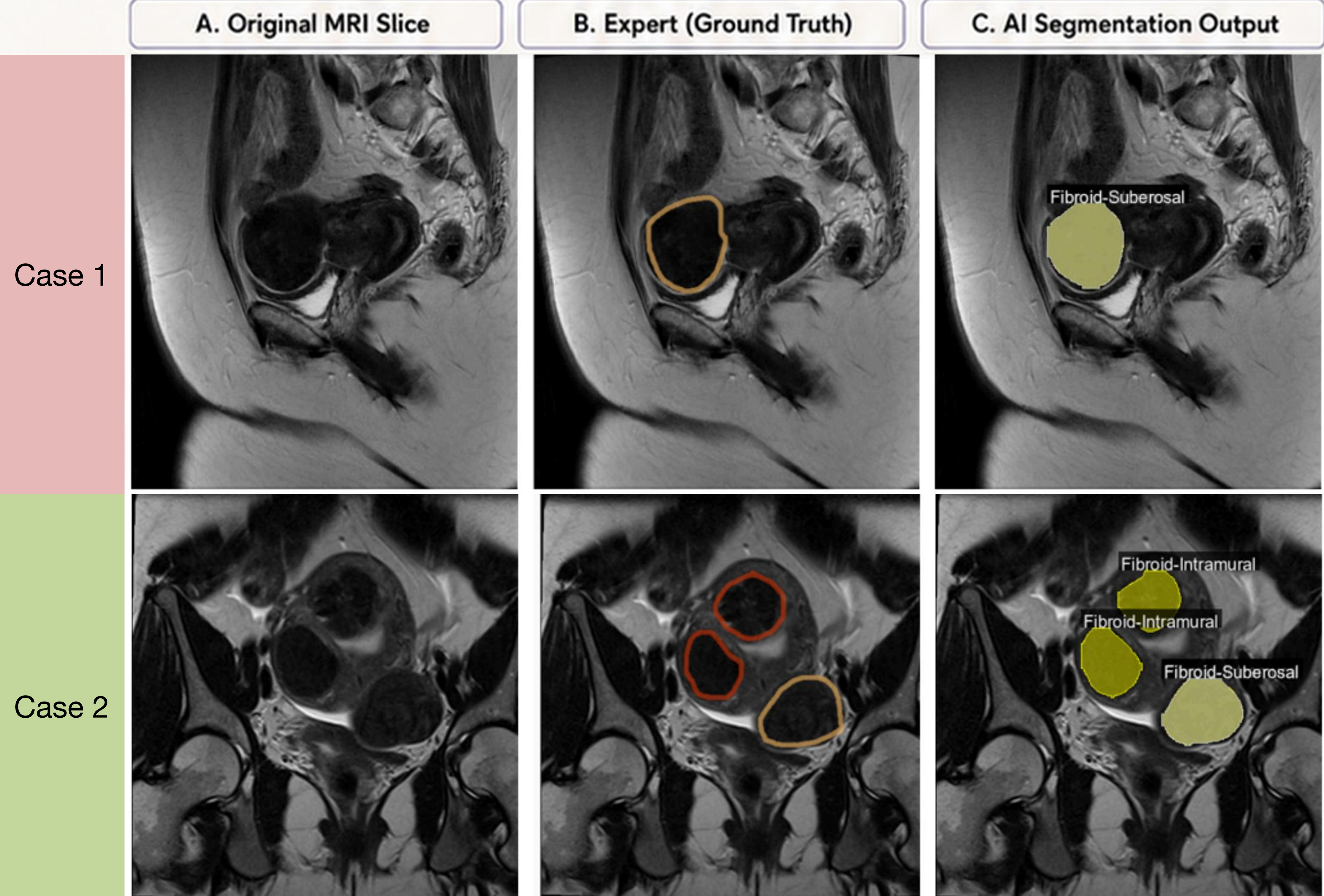


Structured preprocessing and augmentation were used.



Performance metrics: Dice similarity coefficient (DSC), sensitivity, specificity, precision, and F1-score.

## REPRESENTATIVE MRI SEGMENTATION EXAMPLES

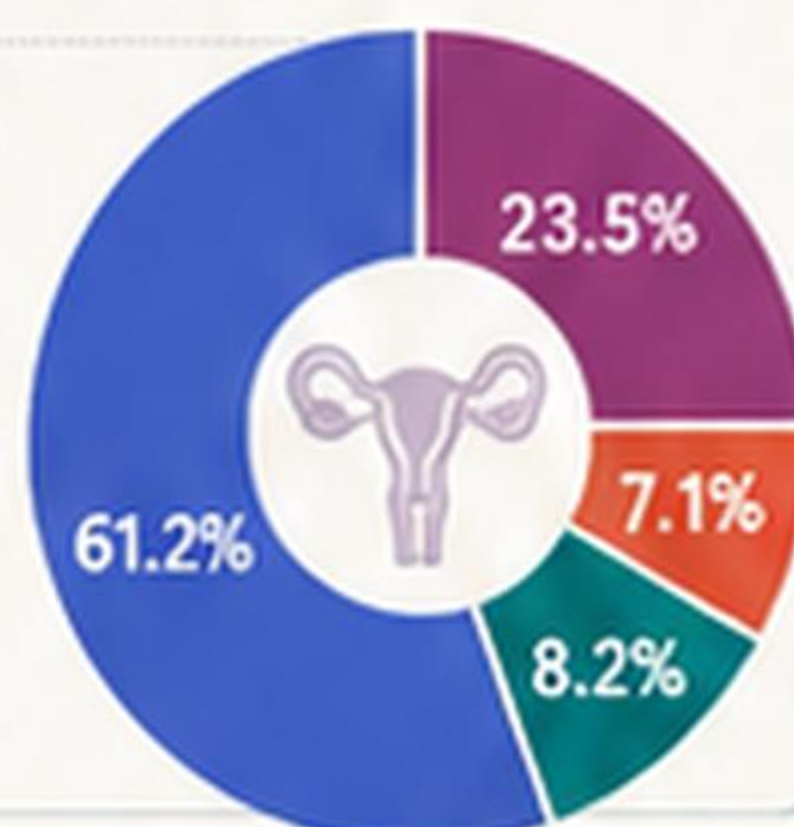


## STUDY COHORT & DATASET OVERVIEW

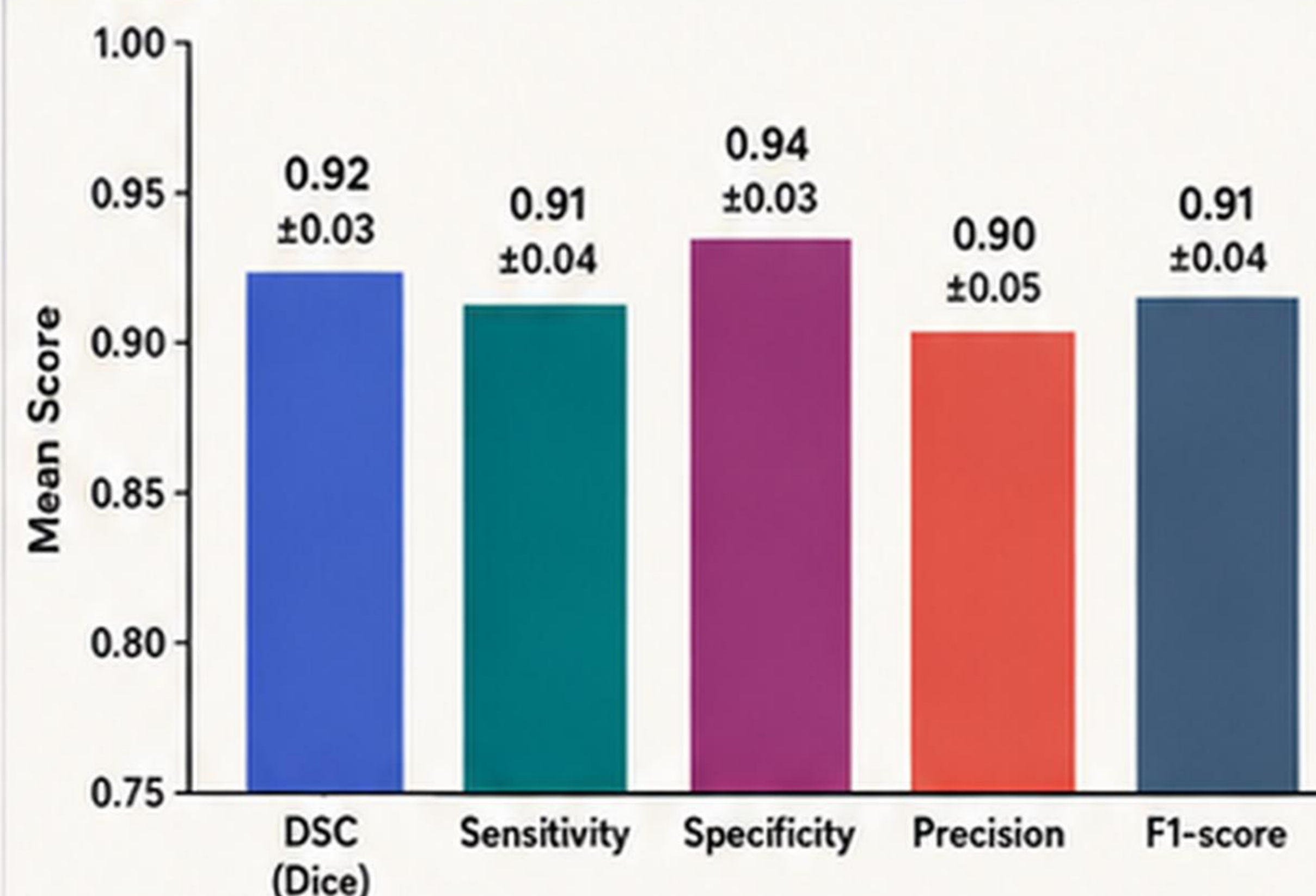
- n = 98 women
- Mean age: 44 ± 10 years
- Median fibroid volume: 113 cm<sup>3</sup> (IQR 33–268)
- Median fibroids per participant: 4.5 (range 1–8)
- 8,820 T2-weighted sequences

Fibroid types (distribution):

- Intramural 61.2%
- Subserosal 8.2%
- Submucous 7.1%
- Mixed 23.5%

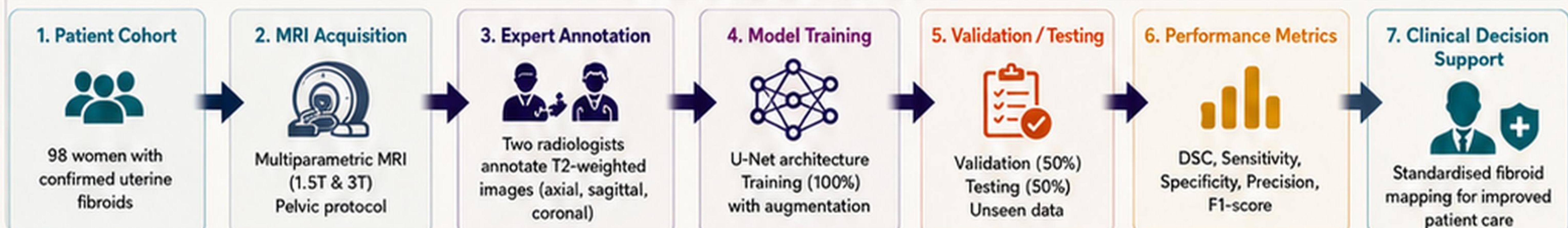


## MODEL PERFORMANCE (MEAN ± SD)



★ High concordance with expert annotations across varying fibroid size and morphology.

## AI PIPELINE WORKFLOW



## KEY RESULTS

| DSC (Dice)  | Sensitivity | Specificity | Precision   | F1-score    |
|-------------|-------------|-------------|-------------|-------------|
| 0.92 ± 0.03 | 0.91 ± 0.04 | 0.94 ± 0.03 | 0.90 ± 0.05 | 0.91 ± 0.04 |



Deep-learning-based MRI segmentation achieved high accuracy and reproducibility for automated uterine fibroid mapping.



## CONCLUSION & CLINICAL IMPACT

- Accurate & reproducible:** Deep-learning segmentation achieved excellent performance with high agreement to expert annotations.
- Clinical impact:** May reduce diagnostic variability, support surgical planning, and improve personalised gynaecological management.
- Future directions:** Larger multicentre validation and seamless integration into clinical workflow are essential next steps.