

# MRI gastric motility assessment in patients with upper gastrointestinal symptoms using a spatiotemporal motility mapping tool – a feasibility study

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# Background & study aim

- Gastric motility is complex and remains poorly understood in patients with functional upper GI symptoms, such as functional dyspepsia and gastroparesis
- Dynamic MRI is increasingly used to quantitatively evaluate GI motility, given its non-invasive profile and ability to acquire cross-sectional images
- However, the data processing required is typically laborious and time-consuming
- The aim of this study was to assess the use of a semi-automated MRI spatiotemporal motility mapping (STMM) tool<sup>1</sup> for dynamic quantification of gastric diameter changes

1. Menys A, Hoad C, Spiller R, *et al.* Spatio-temporal motility MRI analysis of the stomach and colon. *Neurogastroenterol Motil* 2019;31(5):e13557

# Methods – spatiotemporal motility mapping (STMM) tool



The user manually defines the stomach wall boundaries on the reference image (single time frame) and a long axis centreline within the gastric lumen is automatically generated.

A series of lines perpendicular to the centreline at 5 mm spacing is generated to measure gastric lumen diameters. The ROI and lines are automatically propagated through the entire time series after manual delineation on the reference image\*. As the stomach wall moves, the change in diameters is recorded at each time point (1 frame/sec; 20 sec sequence). A global STMM 'score' is generated in addition to a corresponding motility heatmap.

The segmented area can be adjusted to specifically generate an antral STMM score (using the incisura angularis as an anatomical marker).

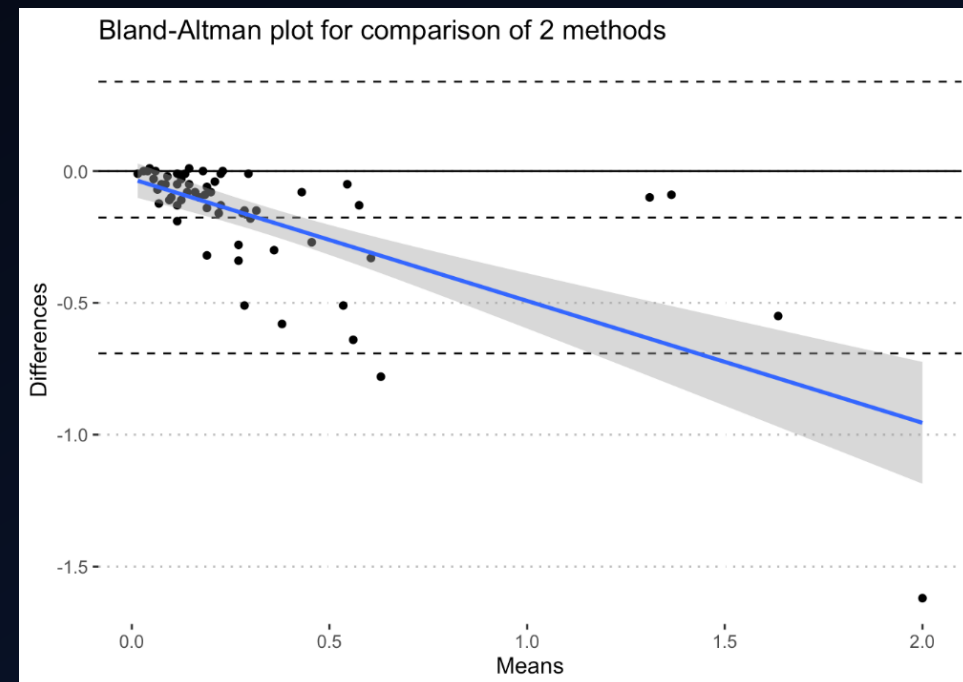
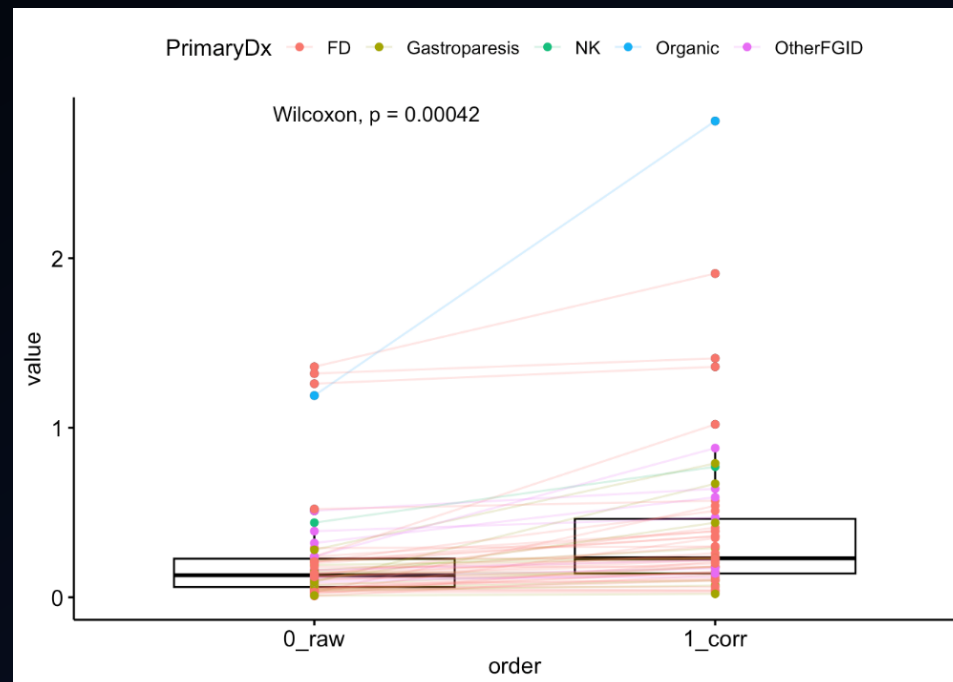
[\*Requires some manual correction to account for image registration errors]

## Results – patient demographics

- 56 patients with UGI symptoms who underwent a clinically requested small bowel MRI study (with a satisfactory coverage of the stomach) were retrospectively identified
- 36 - functional dyspepsia; 12 - gastroparesis; 8 - mixed FGID
- 45 (80%) female; mean age 32.5 years

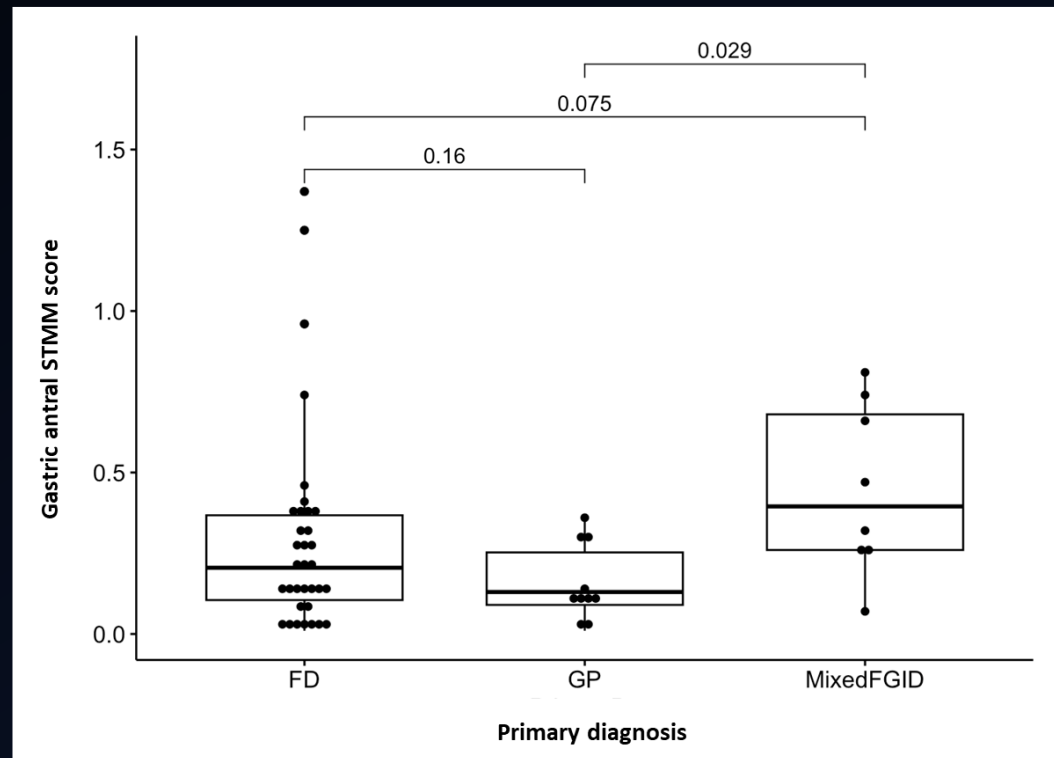
# Results – manual correction of image registration errors

- Took <10 mins in 47/56 (84%) cases
- Increased the median global STMM score by 0.09 a.u. [0.03; 0.16] ( $p < 0.001$ )
- Highly skewed differences between raw and corrected values



# Results – gastric antral motility (STMM score)

- Patients with mixed FGID had the highest antral motility – 0.4 a.u. [0.3; 0.7] followed by those with functional dyspepsia – 0.2 a.u. [0.1; 0.4] and gastroparesis – 0.1 a.u. [0.1; 0.3]
- There was a significant difference between the gastroparesis and mixed FGID groups ( $p = 0.03$ )



# Conclusions

- Semi-automated STMM can be used to assess MRI gastric motility in patients with upper GI symptoms
- This has potential for practical clinical translation, although currently a small degree of manual correction is still required when using the tool
- Further work should aim to ascertain how STMM assessment correlates with other gastric motility parameters, including those captured by gastric emptying studies