University College London Hospitals
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Introducing a time-efficient cine MRI protocol for assessing gastric motility

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Introduction

- Gastric motility disorders
  - Very common
  - Difficult to diagnose
  - Current Ix have significant limitations

- Gastric MRI
  - ✓ Non-invasive
  - ✓ Objective real-time measurements
  - ✓ Can fully phenotype gastric motor function in a single study

Motor function	Current gold standard test	MRI equivalent measure
Gastric accommodation	Barostat balloon	Gastric volumes (pre- vs post- prandial)
Gastric emptying	Scintigraphy	Time course of gastric volumes (GE T ½)
Gastric secretion volume	Aspiration test	T1 mapping, dilution of a meal labelled with gadolinium contrast
Gastric motility	Antroduodenal manometry	Cine MRI

Aims

Our group has developed a sub-1 hr cine gastric MRI protocol

1. To assess baseline reproducibility of motility measurements in healthy volunteers
2. To determine motility responses to drugs with known effect on gastric motility (erythromycin ➡ increase; glucagon ➡ decrease)

Methods: study design

- Female
- BMI 19-25 kg/m^2
- No GI/psychiatric PMHx

- 7 participants (aged 18-55)
- Randomised 1:1

≥7 days apart

MRI Scan 1

Nutrient drink + IV erythromycin

MRI Scan 2

Nutrient drink + IV glucagon

MRI Scan 1

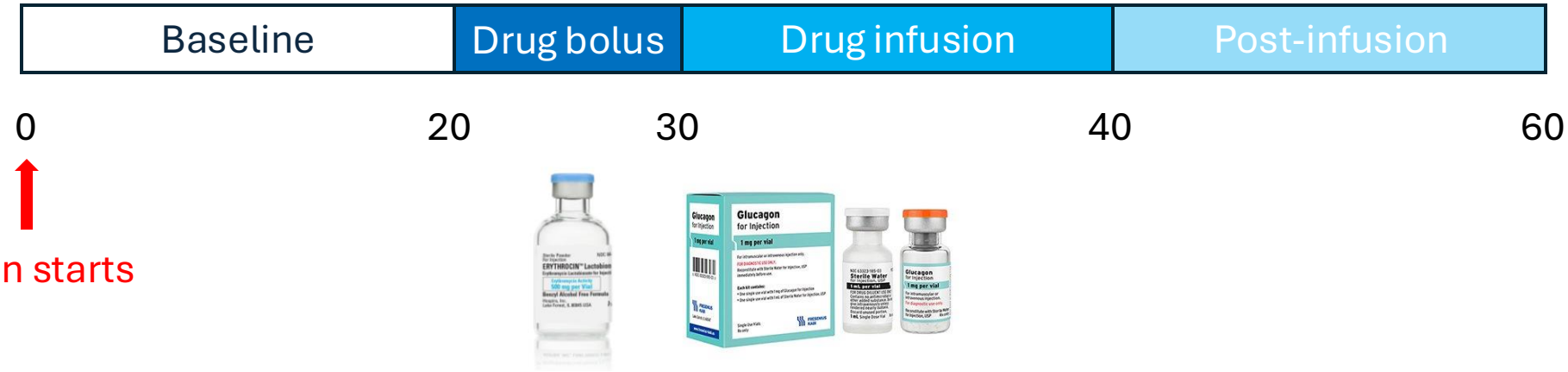
Nutrient drink + IV glucagon

MRI Scan 2

Nutrient drink + IV erythromycin

Methods: MRI protocol

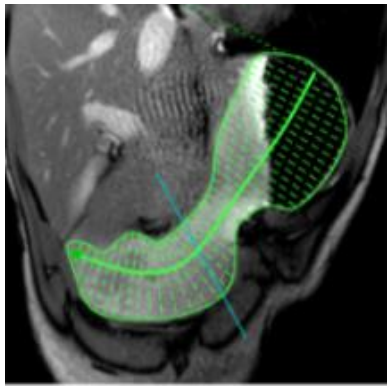
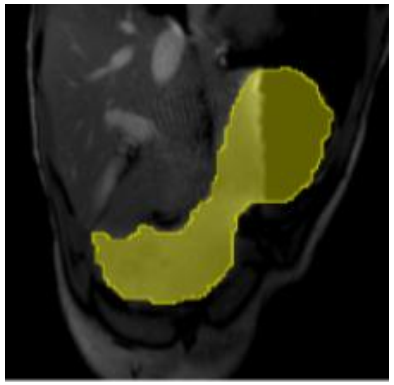
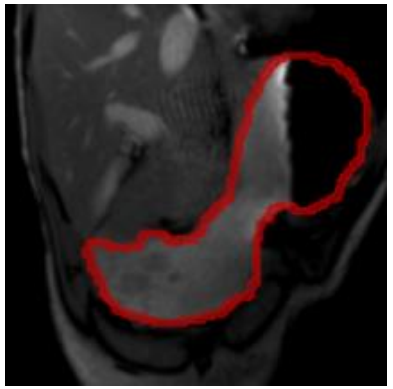
300 ml
(450 kcal)

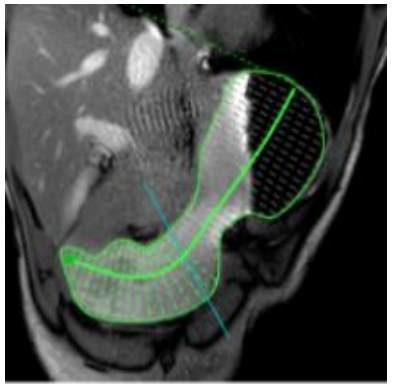
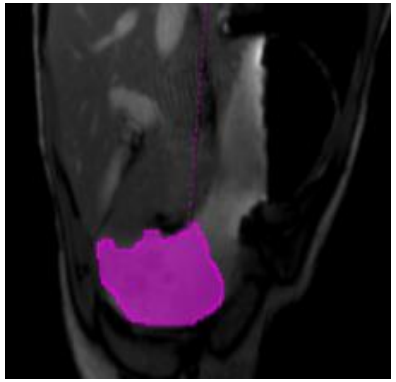
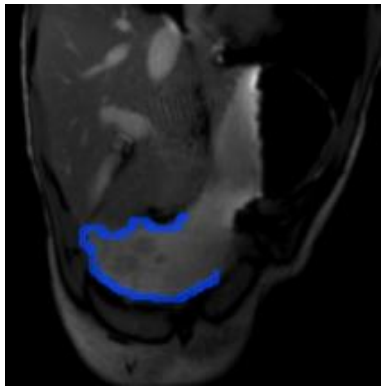


Key MRI sequences

Motility	20-slice BFFE	Average frame rate 0.5 frames/sec
	6-slice BFFE antrum	
Anatomical	Volumetric BTFE	

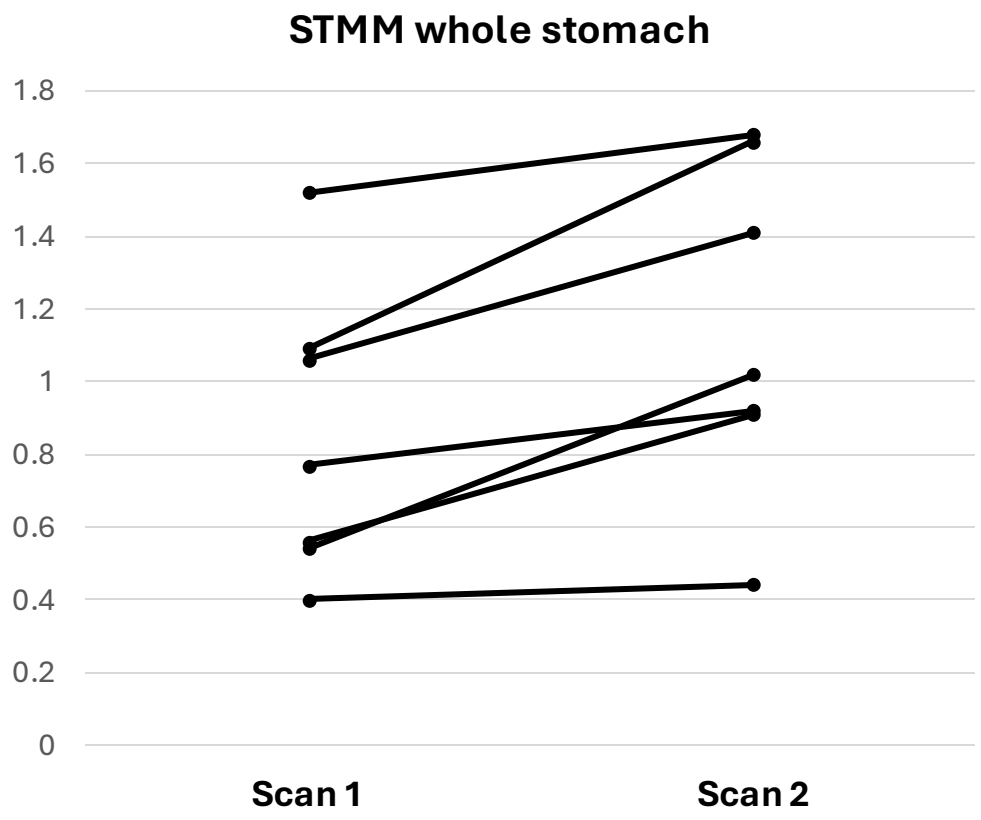
Methods: data analysis

STMM whole stomach	GIQuant whole stomach	GIQuant whole stomach wall
		

STMM antrum	GIQuant antrum	GIQuant antral wall
		

Motilent

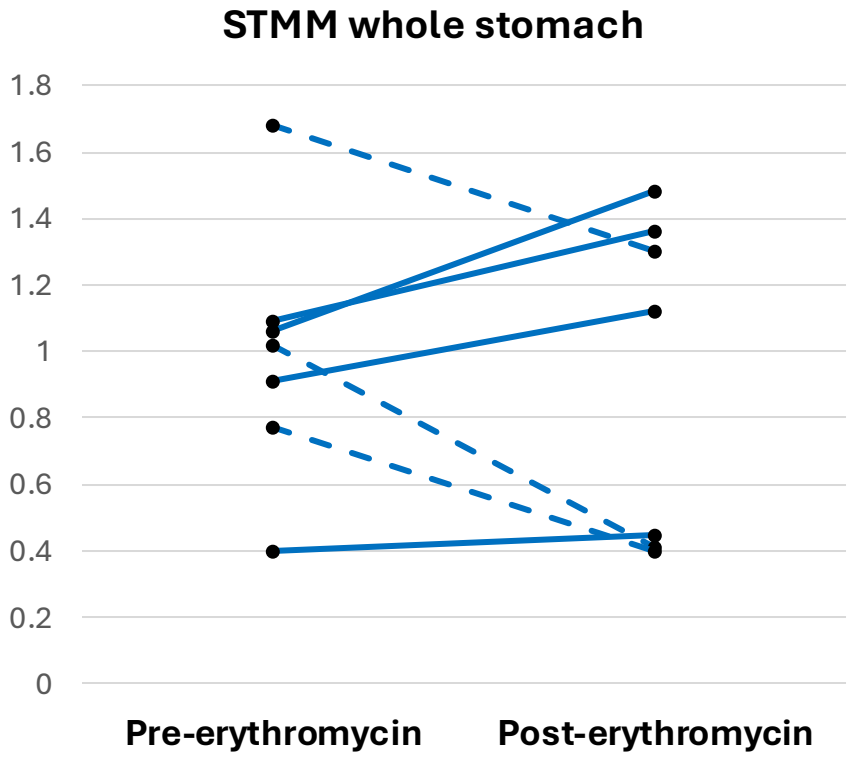
Results: pre-drug baseline reproducibility

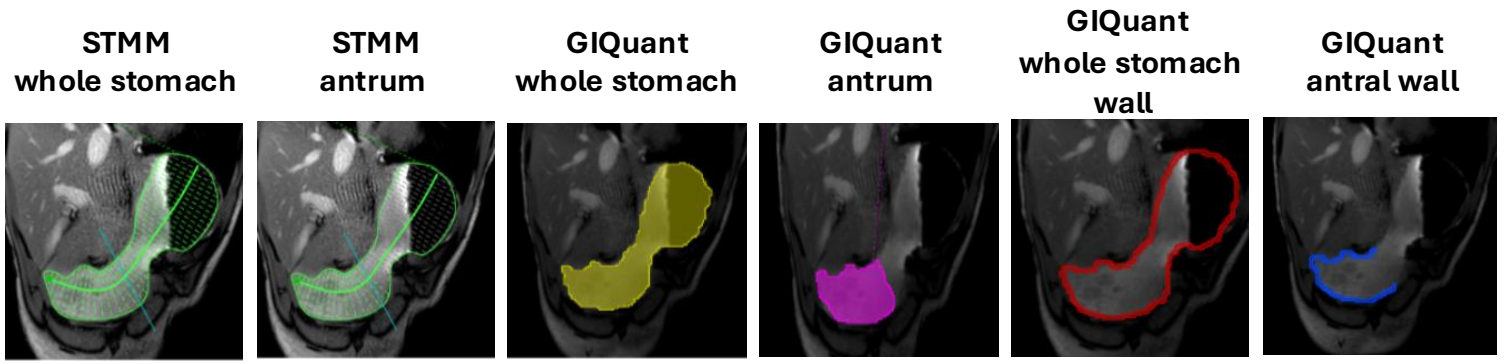


- Scans performed ≥7 days apart
- Total 42 measurements (7 subjects x 6 motility metrics)
- ≥10% change considered suboptimal reproducibility

Increase	29/42 (69%)
No change	5/42 (12%)
Decrease	8/42 (19%)

Results: response to erythromycin



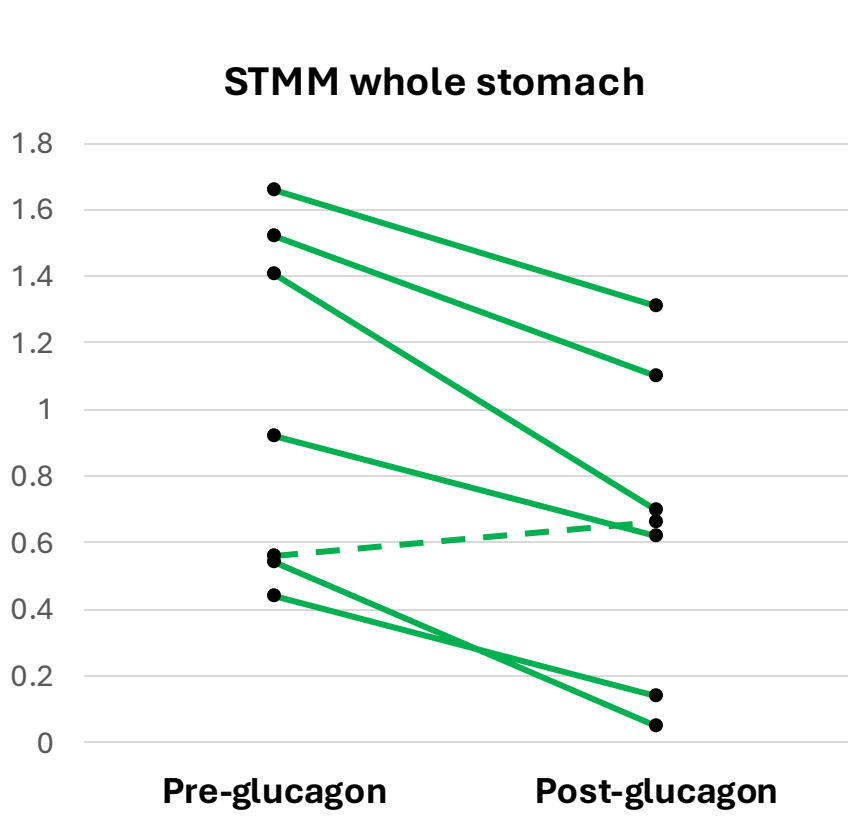


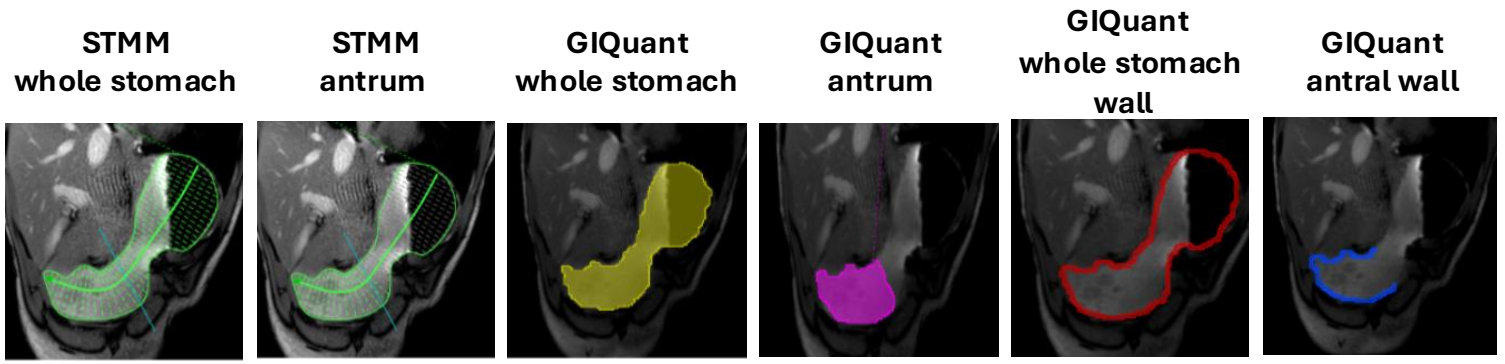
STMM whole stomach	STMM antrum	GIQuant whole stomach	GIQuant antrum	GIQuant whole stomach wall	GIQuant antral wall
4/7	5/7	5/7	4/7	4/7	5/7

No. of subjects with expected response

Expected response for all 6 motility metrics

Results: response to glucagon





STMM whole stomach	STMM antrum	GIQuant whole stomach	GIQuant antrum	GIQuant whole stomach wall	GIQuant antral wall
6/7	5/7	5/7	6/7	5/7	5/7

No. of subjects with expected response

Expected response for all 6 motility metrics

Conclusions

- Our MRI protocol can be used to assess gastric motility post-nutrient challenge in healthy volunteers
- Some variability in baseline motility between scans noted – important to account for this in future studies
- Expected pharmacological response detected in most cases; non-respondents likely due to patient factors and variation between motility metrics
- Next step is to validate MRI protocol in patients with known gastric dysfunction

Thank you

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