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FLIP Panometry *AFS 2021*

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Disclosures

- Medtronic: Speaking/consulting
- Phathom Pharmaceuticals: consulting
- Medtronic GI Solutions: Northwestern University has a relationship related to a license agreement surrounding FLIP Panometry systems, methods, and apparatus granting rights to U.S. Patent Application Number 15/546,986 and Canadian Patent Application Number 2,975,603

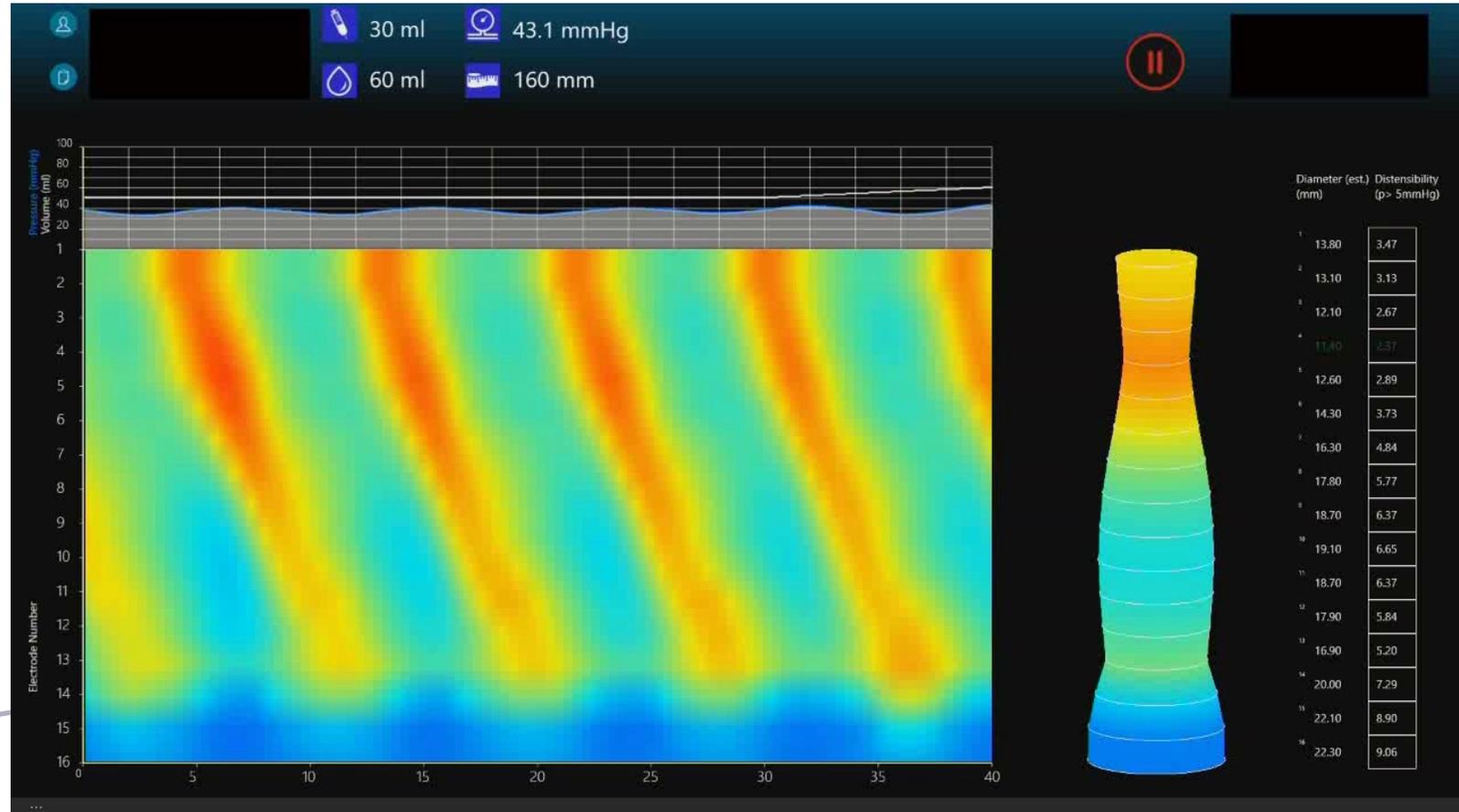
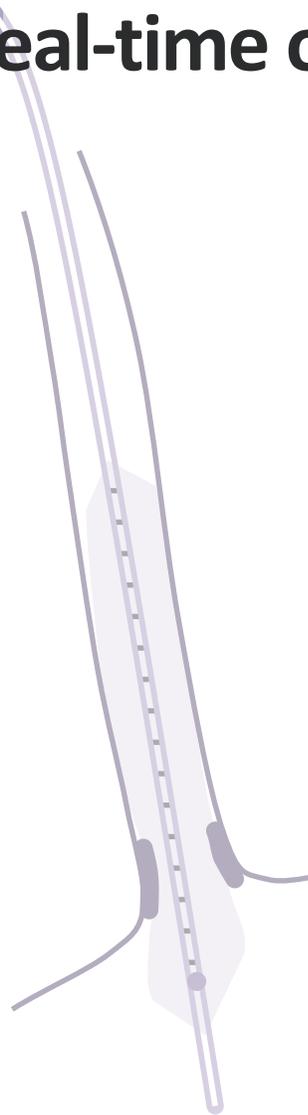
FLIP Panometry

- ❖ Distensibility
- ❖ EGJ opening
- ❖ Contractile response (CR) to distension

❖ Real-time output during endoscopic encounter

- Impedance planimetry
- 16 luminal diameters (mm)

DISTENSIBILITY:
Relationship between luminal geometry (CSA ≈ diameter) and distensive pressure



FLIP Panometry - Outline

Evaluation of esophageal motility with FLIP Panometry

- FLIP Panometry study protocol
- Contractile response to distension (i.e. secondary peristalsis)
- EGJ distensibility/opening
- Clinical application of FLIP Panometry motility assessment

Evaluating esophageal motility with FLIP Panometry

*During endoscopy

Primary evaluation:

- Dysphagia
- Chest pain
- Reflux symptoms

Complementary evaluation:

- *Equivocal/inconclusive diagnosis from initial evaluation*

EGD

Objective diagnosis

- Advanced esophagitis
- Large hiatal hernia
- Peptic stricture
- EoE

Normal / suggestive of motor disorder

❖ **FLIP Panometry**

Evaluate motility
Direct therapy or subsequent evaluation

FLIP Panometry Esophageal Motility test protocol

16cm FLIP

Positioning

Stepwise volumetric filling: 50-60-70ml x60seconds each

FILL VOLUME

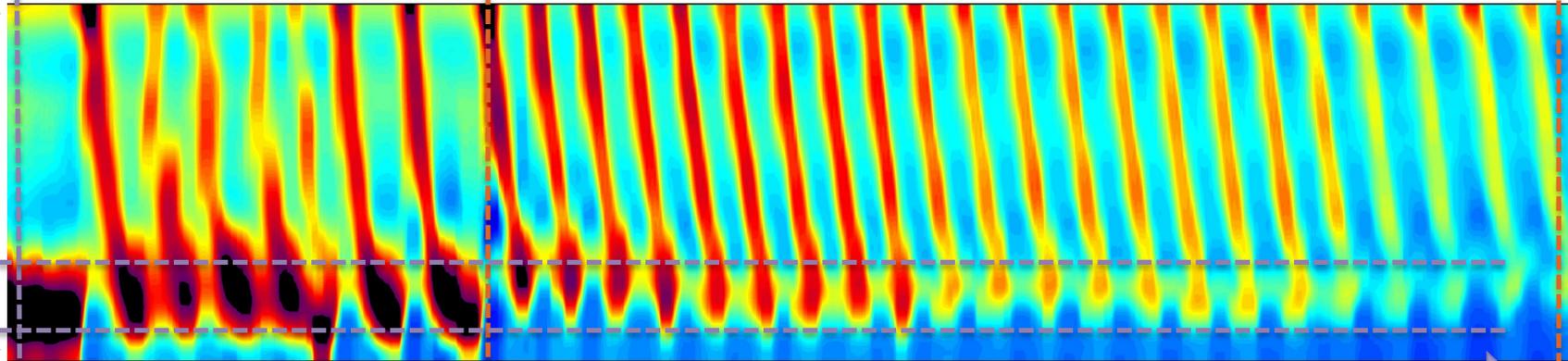
50ml
60seconds

60ml
60seconds

70ml
30-60 sec

Diameter (mm)
30
25
20
15
10
5

Axial length: 16 cm



*Maintain position with 1-2cm in stomach throughout study

Interpretation

Analysis program for "archived" study data available at

<http://www.wklytics.com/nmgi>

Contractile response pattern: 50-70ml fill volume

EGJ-DI: 60ml

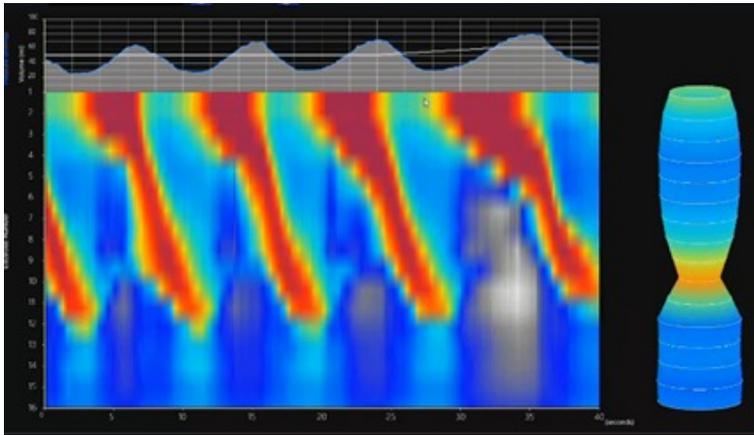
Max EGJ diameter: 60-70ml

Panometry contractile response (CR) patterns

Normal contractile response (NCR)

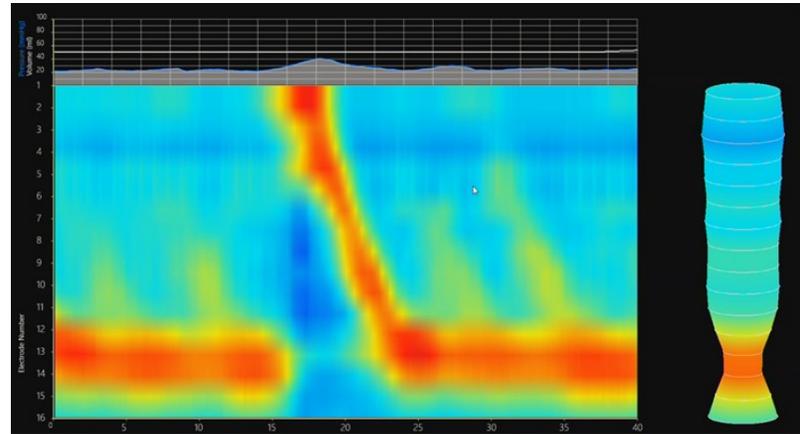
RAC Rule of 6s (Ro6s):

- ≥6 consecutive antegrade contractions (AC) of
- ≥6 cm in axial length occurring at
- 6+/-3 AC per minute regular rate



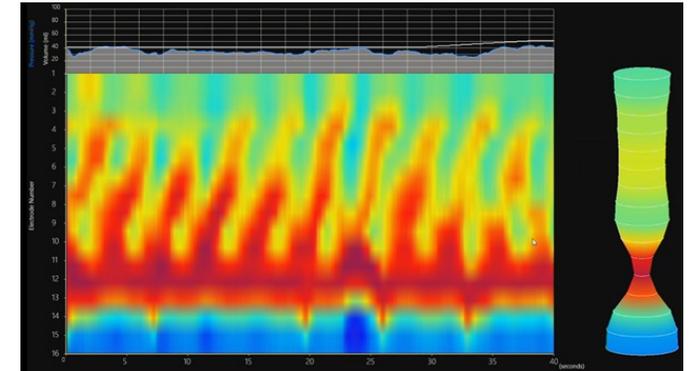
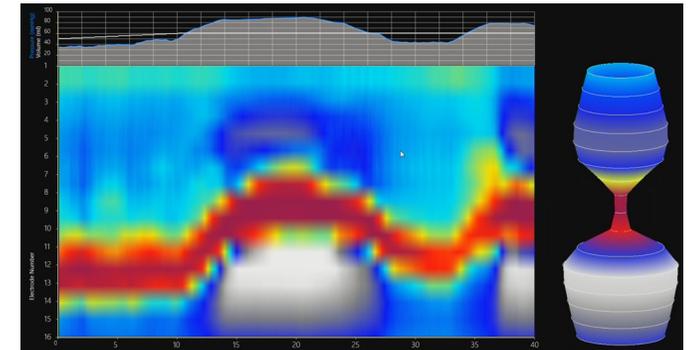
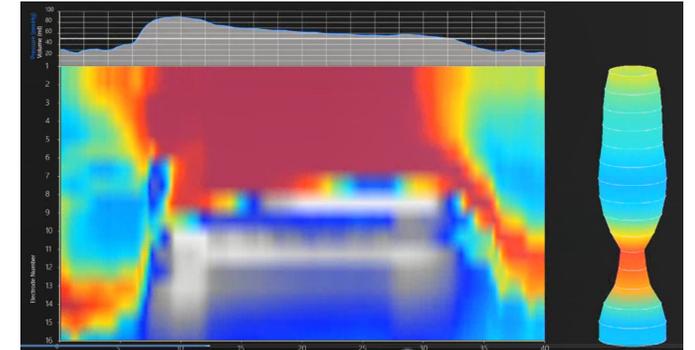
Borderline/diminished (BDCR)

+Antegrade contraction (AC); not RAC Ro6



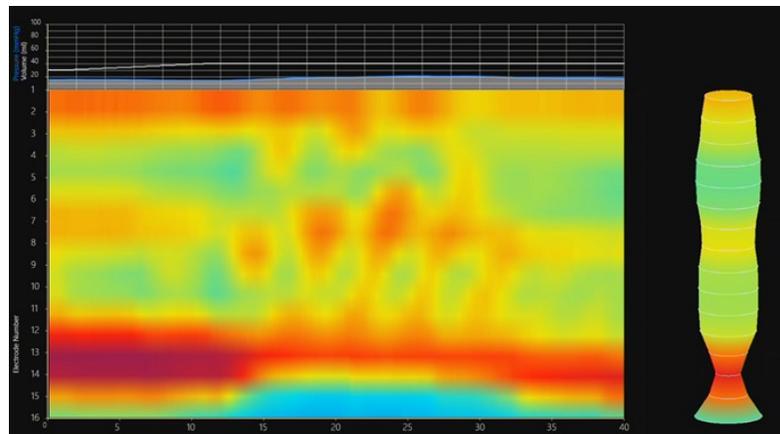
Spastic-Reactive (SRCR)

Sustained occluding contraction (SOC) or sustained LES contractions (sLESC) or RRCs (>6 RCs at >6cm length at >9 RC/min)



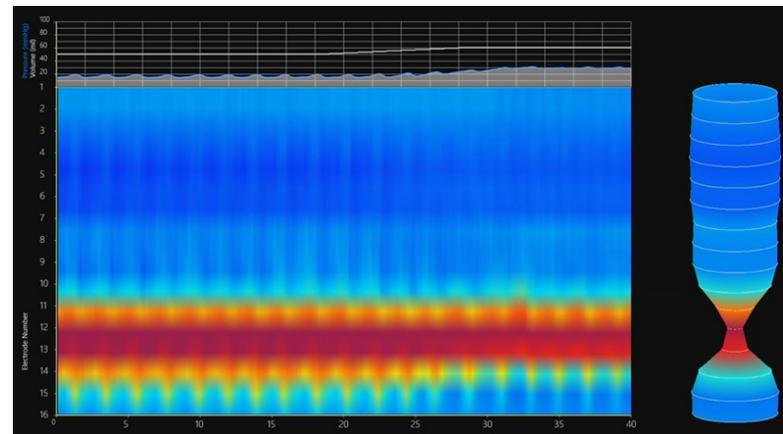
Impaired / disordered (IDCR)

+Contractility, but no distinct AC's or SRCR criteria



Absent (ACR)

No contractility



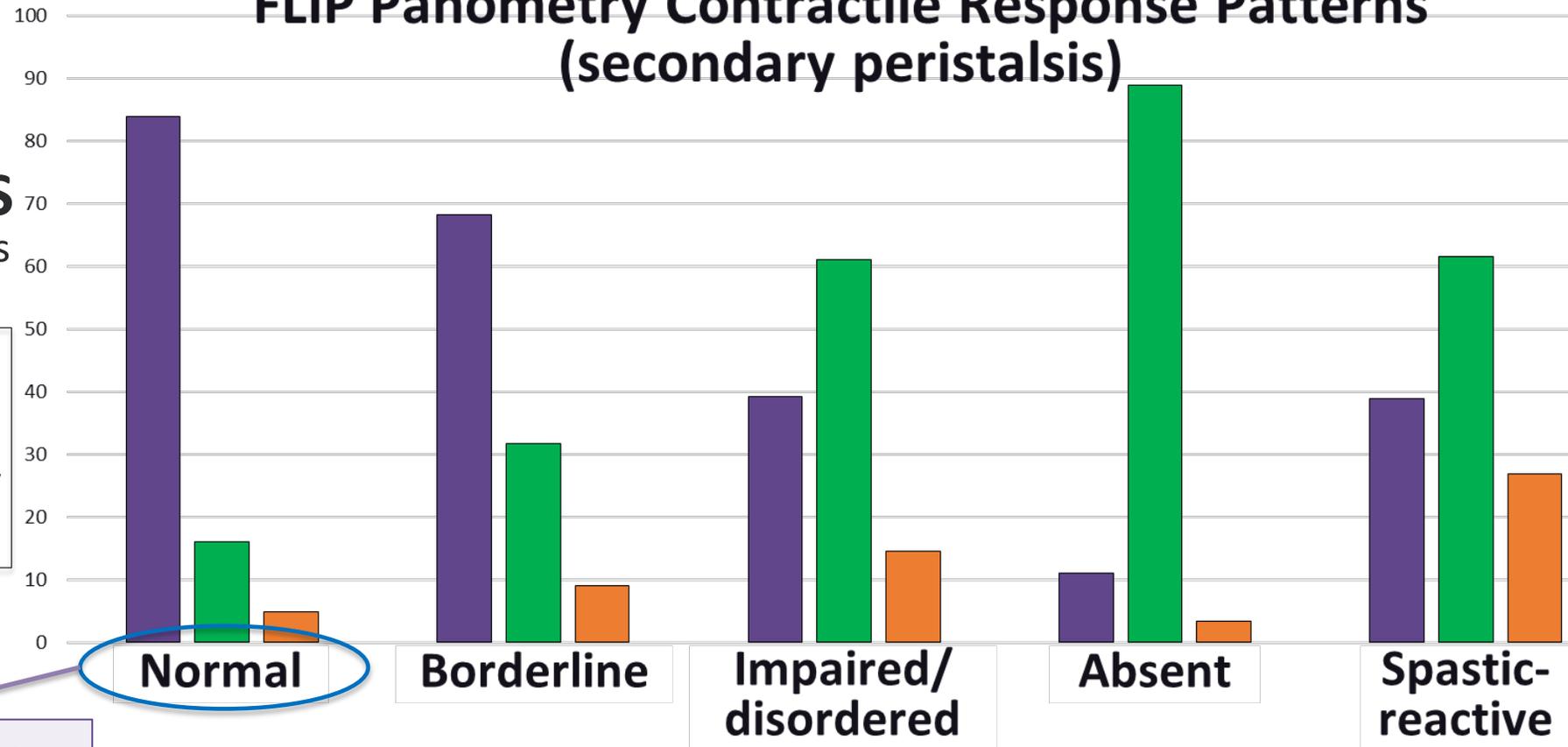
Panometry contractile response (CR) patterns

Parallel function with primary peristalsis (HRM)

N=706 patients

FLIP Panometry Contractile Response Patterns (secondary peristalsis)

PRIMARY PERISTALSIS
(% swallow types on HRM)



0% achalasia

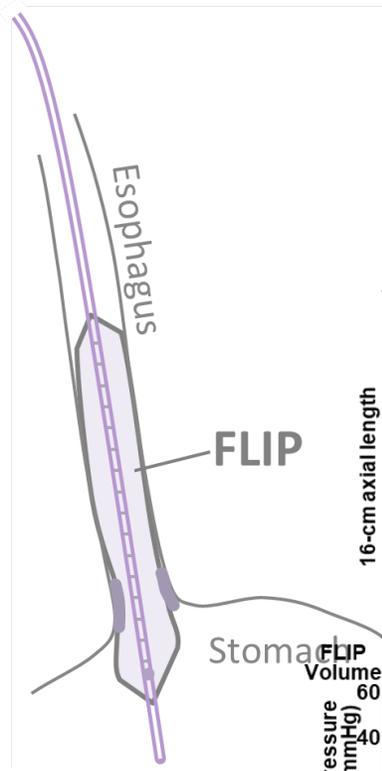
FLIP Panometry: EGJ distensibility and opening

- **EGJ-Distensibility Index (DI):**

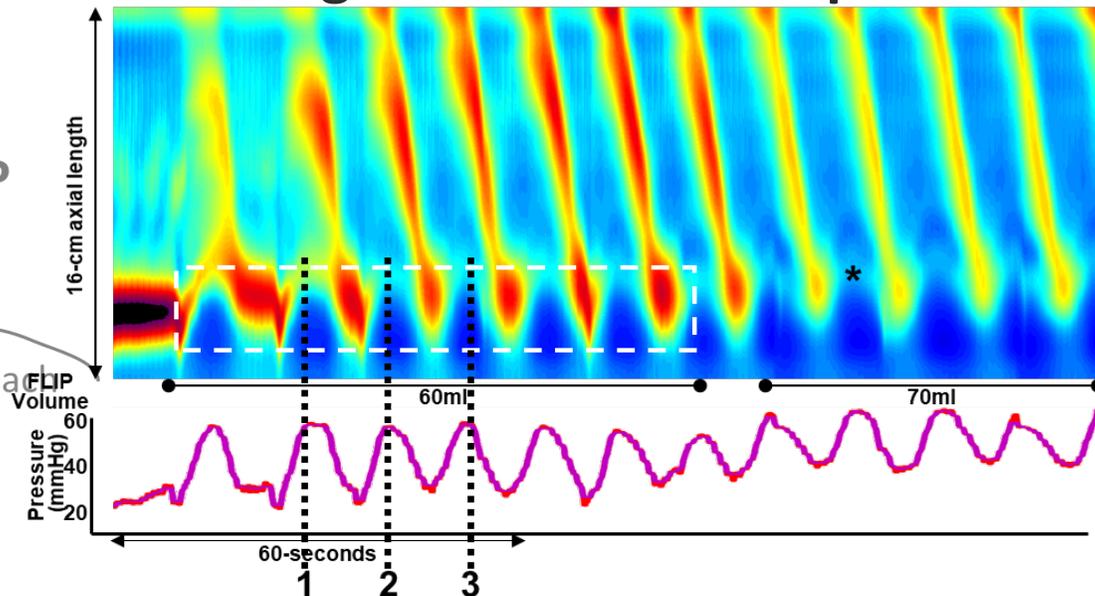
- = $CSA_{EGJ} / \text{intra-balloon pressure}$
- 60ml fill volume

- **Maximum EGJ diameter**

- 60-70 ml fill volume

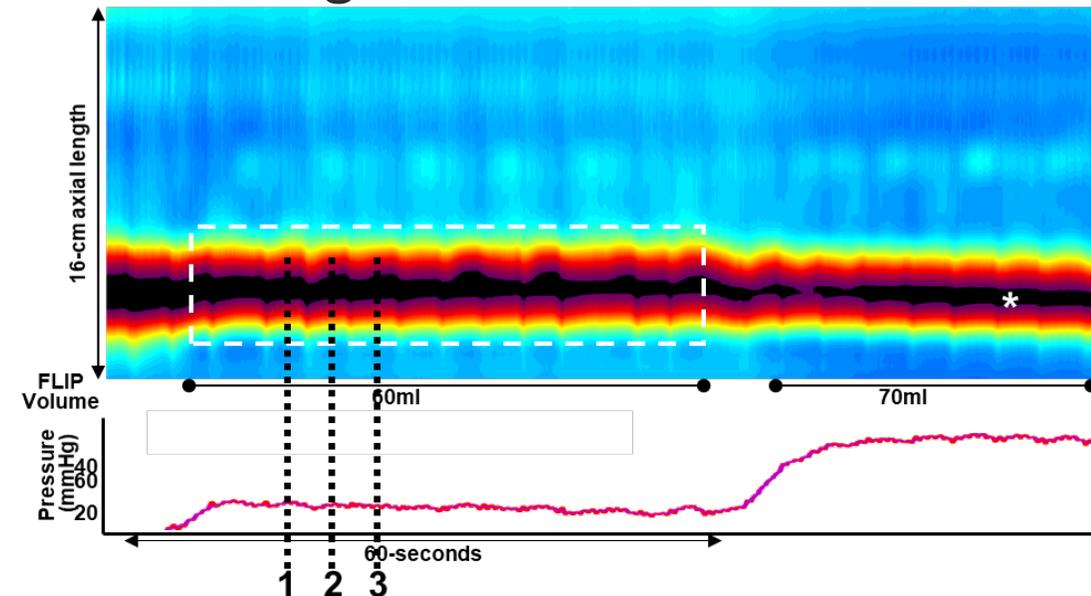


Antegrade contractions present

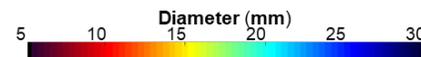


Normal EGJ opening

Antegrade contractions absent

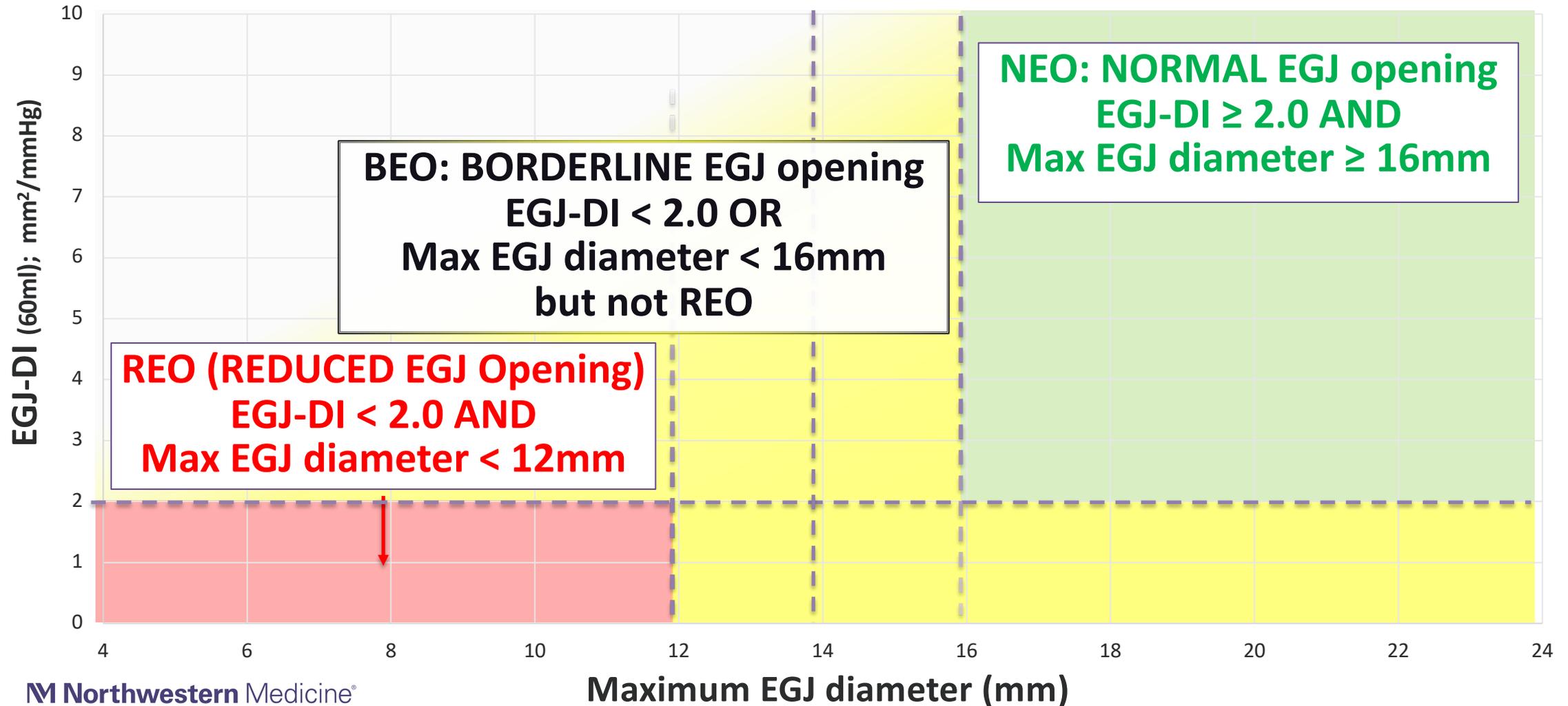


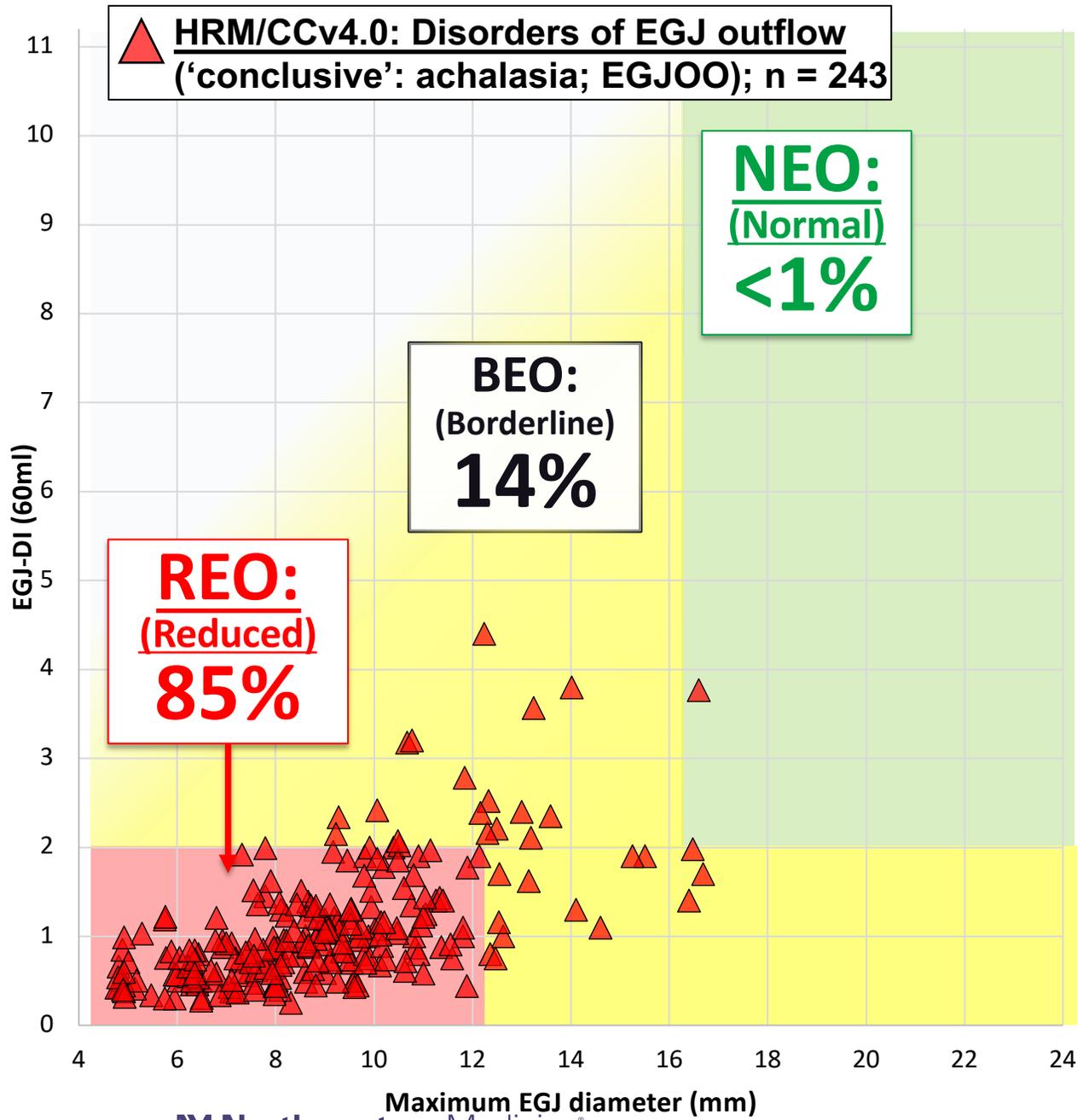
Reduced EGJ opening



Interpretation: EGJ opening

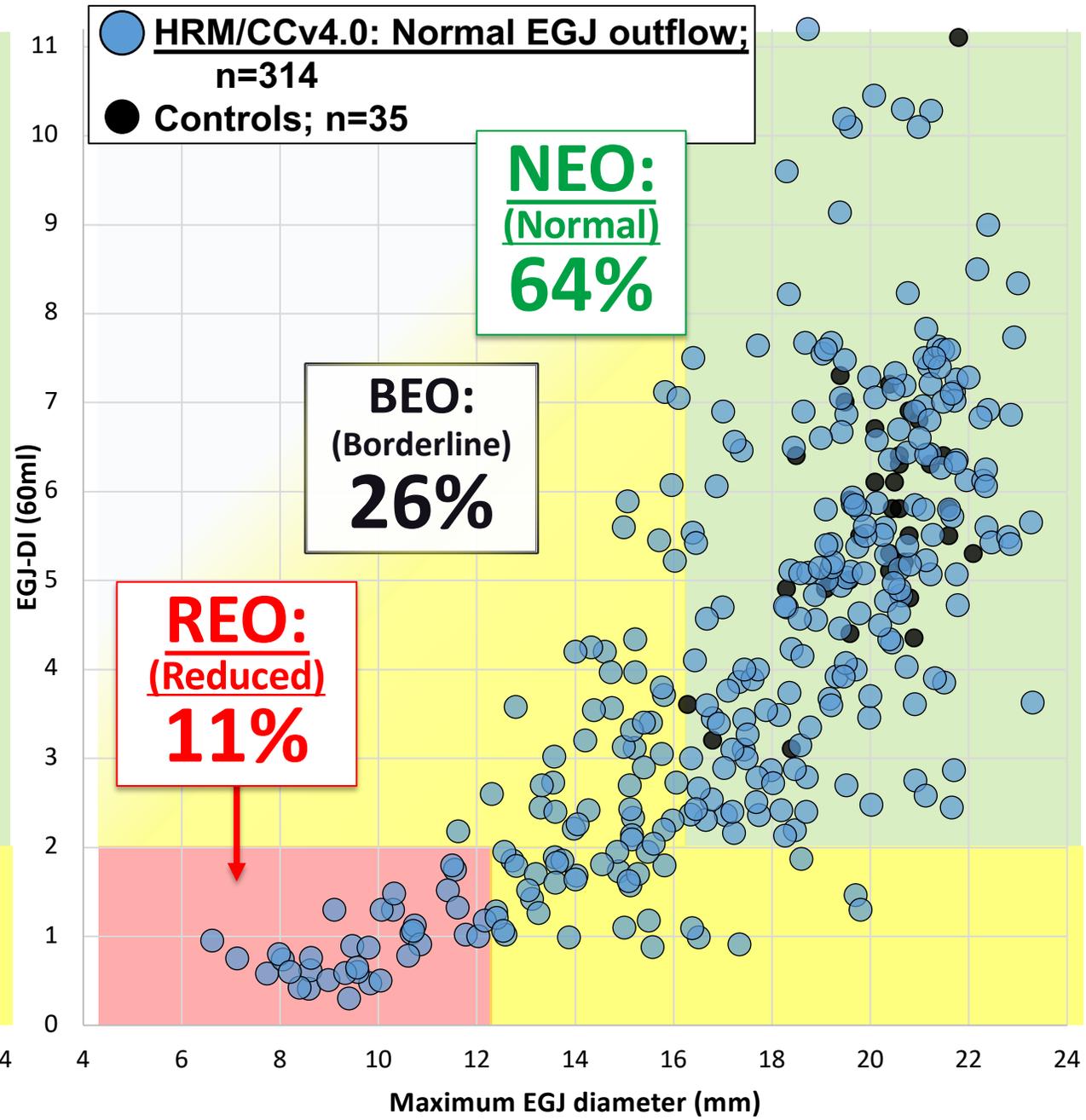
Apply BOTH EGJ-DI and maximum EGJ diameter



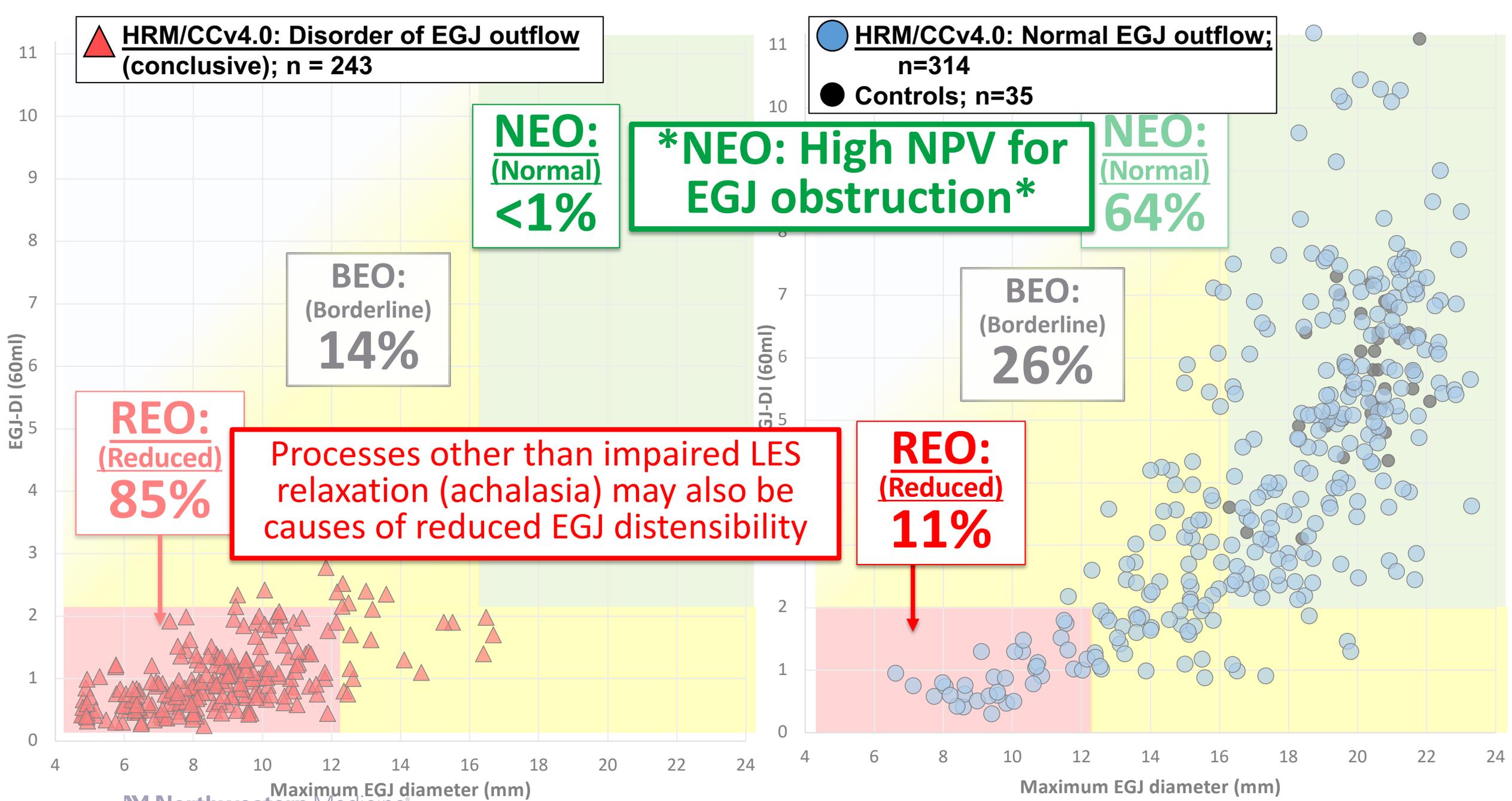


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Adapted from Carlson, DA et al. Clin Gastroenterol Hepatol; 2021



Relationship of FLIP panometry and HRM

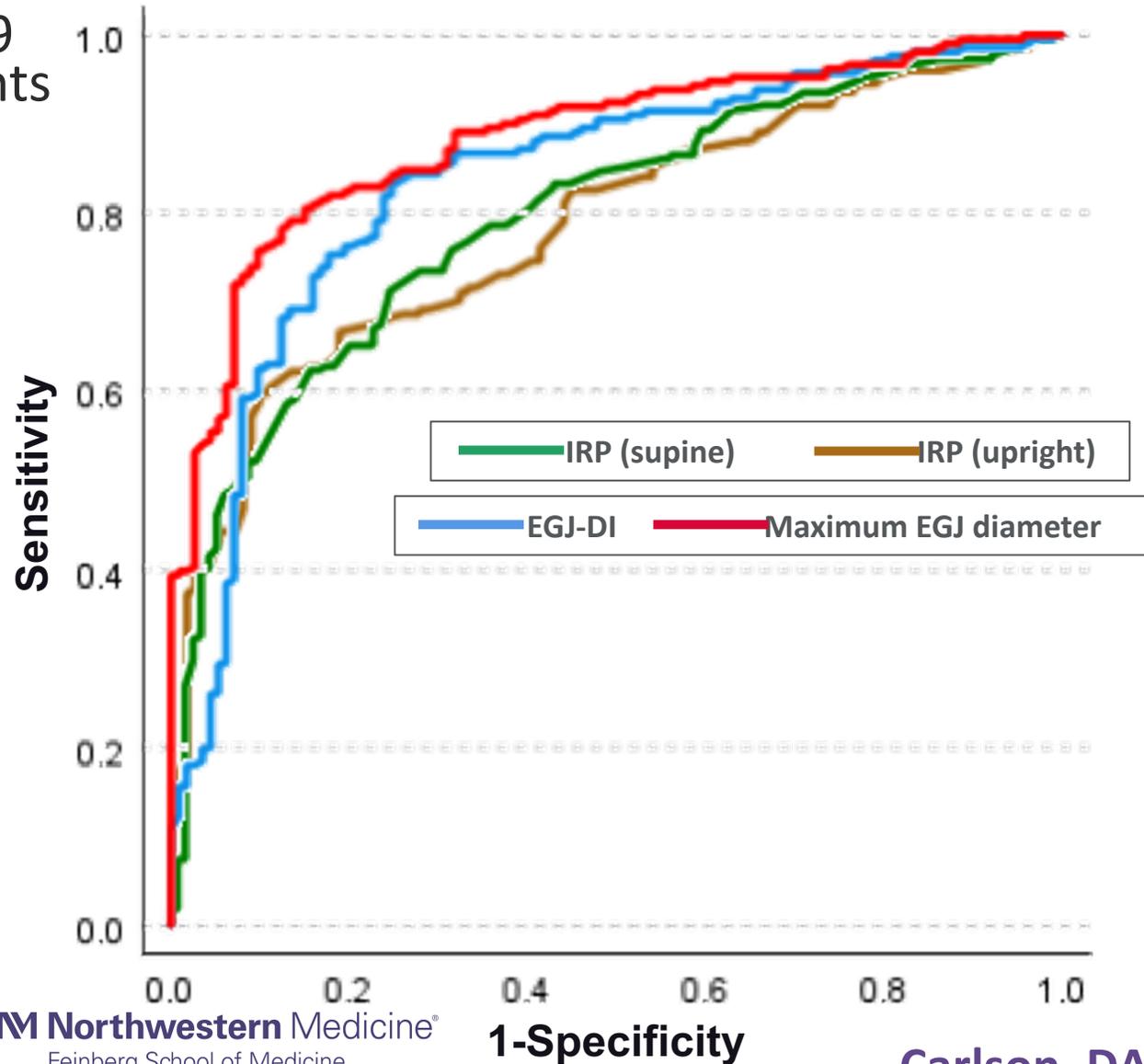
FLIP Panometry ≠ HRM

- **FLIP Panometry** - response to **distension**
 - EGJ opening/distensibility
 - Secondary peristalsis
- **HRM** – response to **swallows**
 - LES relaxation/EGJ pressure
 - Primary peristalsis

FLIP Panometry VS HRM

Prediction of esophageal retention (TBE)

N=329 patients

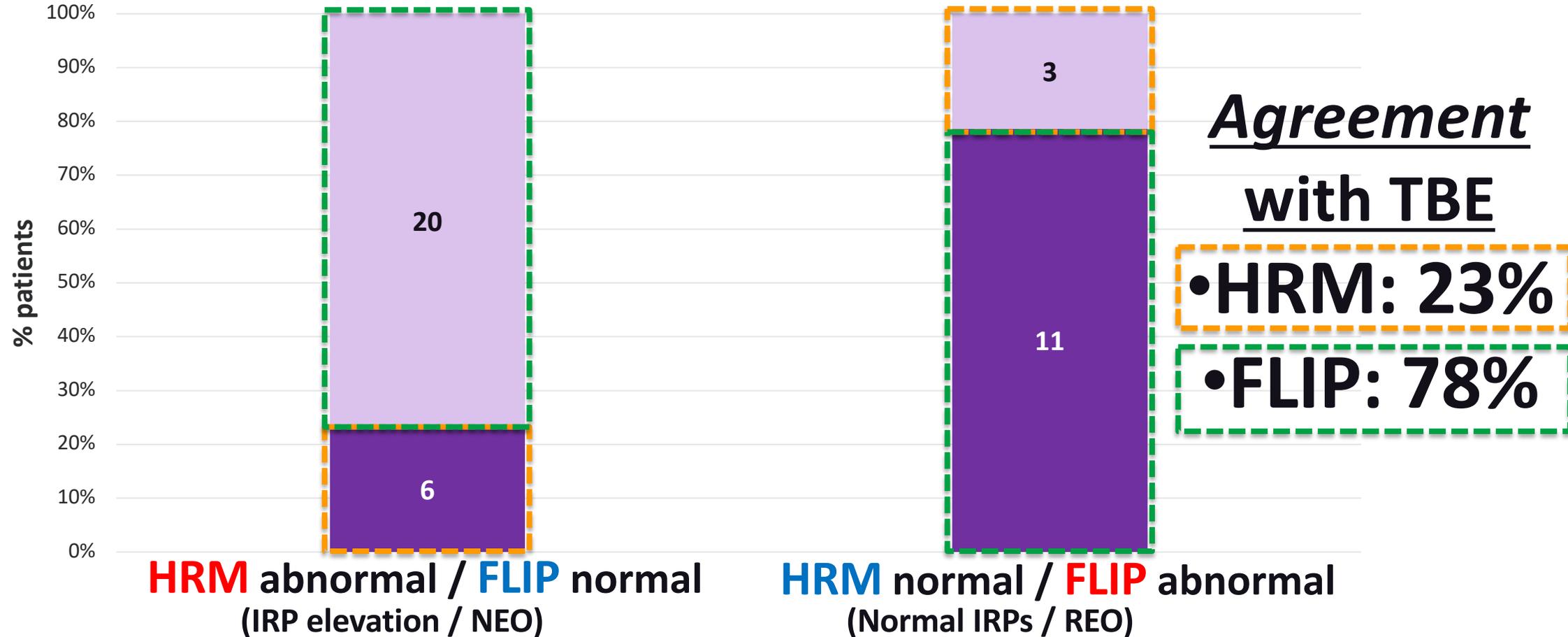


	AUC	95% CI
IRP-supine	0.79	0.75-0.84
IRP-upright	0.79	0.76-0.86
EGJ-DI	0.84	0.79-0.88
Max EGJ diameter	0.88	0.85-0.92

FLIP Panometry VS HRM

Prediction of esophageal retention (TBE)

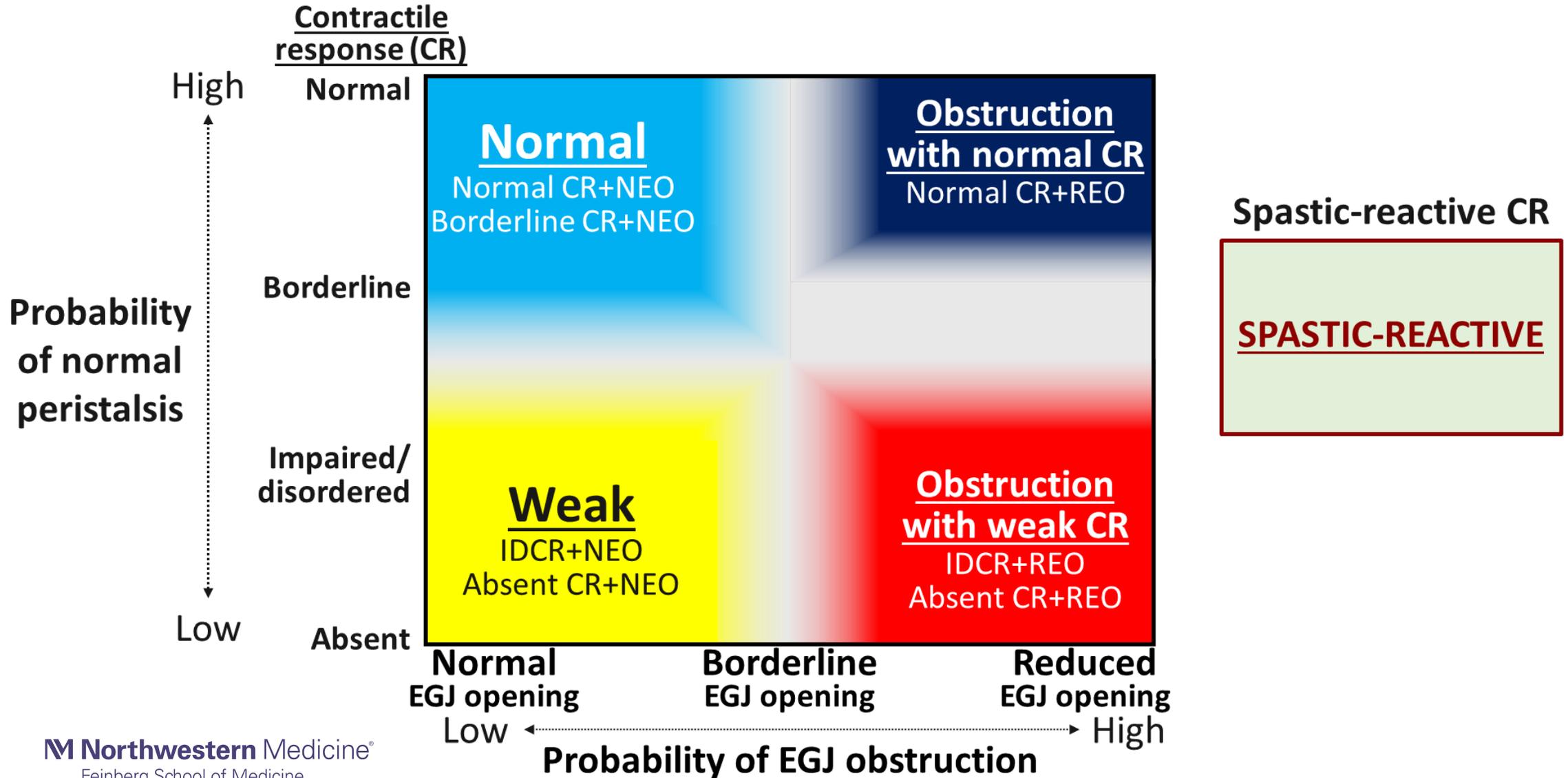
TBE findings in patients with DISCORDANT HRM-FLIP (n=40)



Agreement
with TBE

- HRM: 23%
- FLIP: 78%

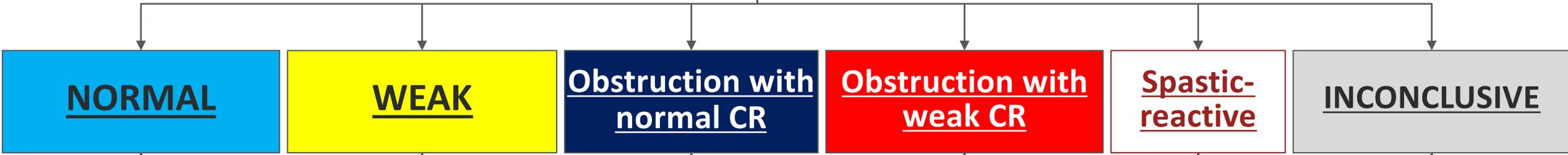
FLIP Panometry: Classifying esophageal motility



FLIP Panometry: Classifying esophageal motility

Clinical application

FLIP Panometry during endoscopy*
Motility Classification



Clinical application

- **GERD or functional**
- Major motility disorder essentially ruled out
- Consider ambulatory reflux monitoring

- **GERD or hypomotility**
- Consider HRM to evaluate primary peristalsis
 - (especially if antireflux surgery is being considered)
- Consider ambulatory reflux monitoring

- Suspect **mechanical obstruction**
- Reassess with endoscopy
- **Consider dilation**
- Consider TBE with tablet and/or HRM with solid bolus challenge

- Suspect **achalasia**
- Obtain/review TBE
- Obtain **HRM** if **hiatal hernia** is present and/or if discordance with endoscopic appearance or TBE

- Suggestive of type III achalasia, hypercontractile esophagus, or DES
- **Obtain HRM** to characterize spasm

- **Obtain HRM**
- Consider TBE if impression remains inconclusive after HRM

*EGD/history without secondary esophageal motor abnormalities, such as large hiatal hernia, stricture, or previous foregut surgery

Conclusions:

Esophageal motility evaluation with **FLIP Panometry**

- Primary and complementary evaluation of esophageal motility
- Normal FLIP Panometry associated with normal esophageal motility
- FLIP Panometry is consistently abnormal in achalasia
- FLIP Panometry can clarify inconclusive HRM (e.g. HRM=EGJOO)
- Inconclusive FLIP Panometry findings direct need for additional testing (HRM; TBE)
- Complements diagnostic impression at time of endoscopy
- Can direct endoscopic therapy or subsequent management plan

Thank You
Questions?

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