

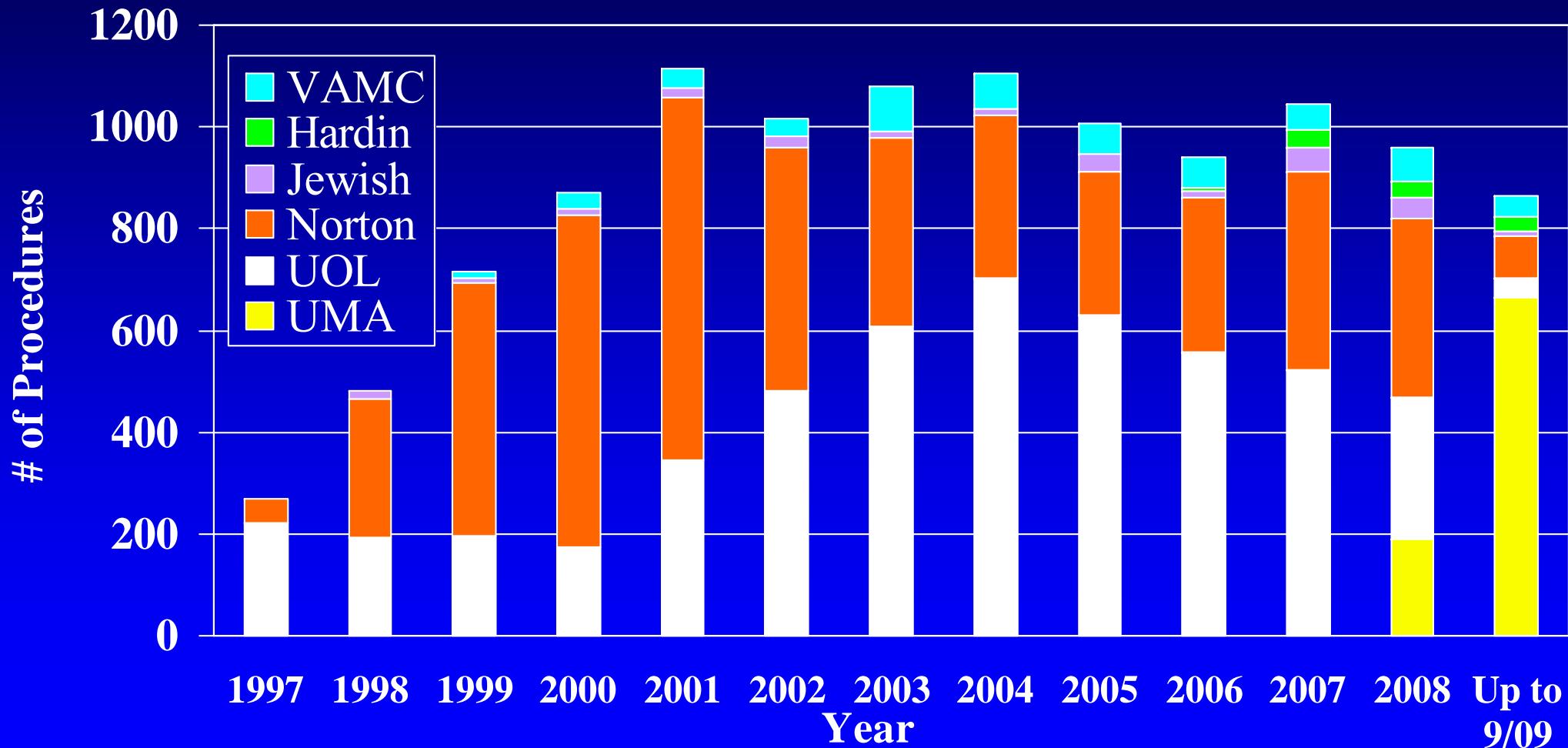
Esophageal Manometry

**John M. Wo, M.D.
October 1, 2009**

Esophageal Manometry

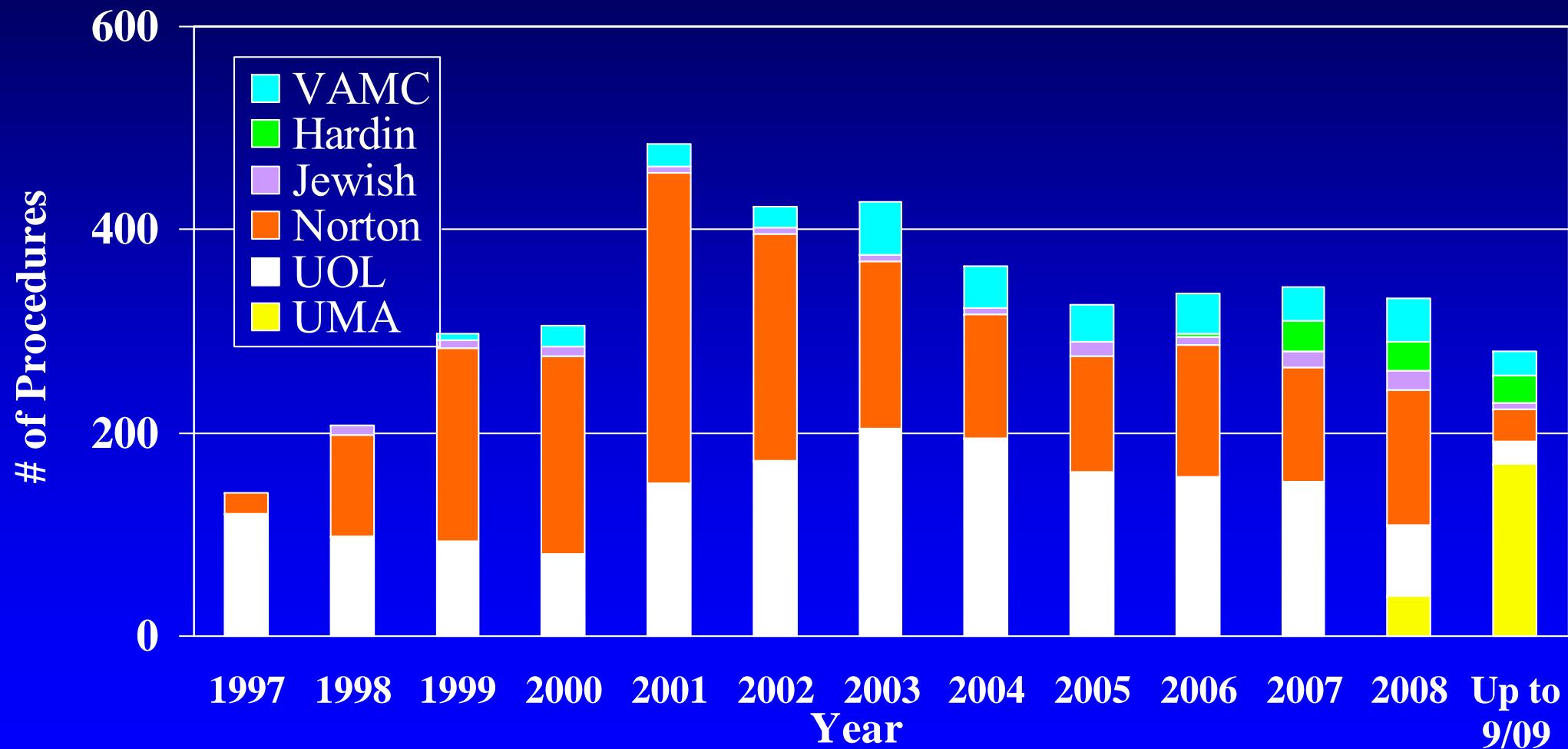
- Anatomy and physiology of the esophagus
- Conventional esophageal manometry
- High resolution esophageal manometry (Pressure Topography)
- Chicago classification of esophageal motility disorders
- Clinical cases

Motility Diagnostic Testing*

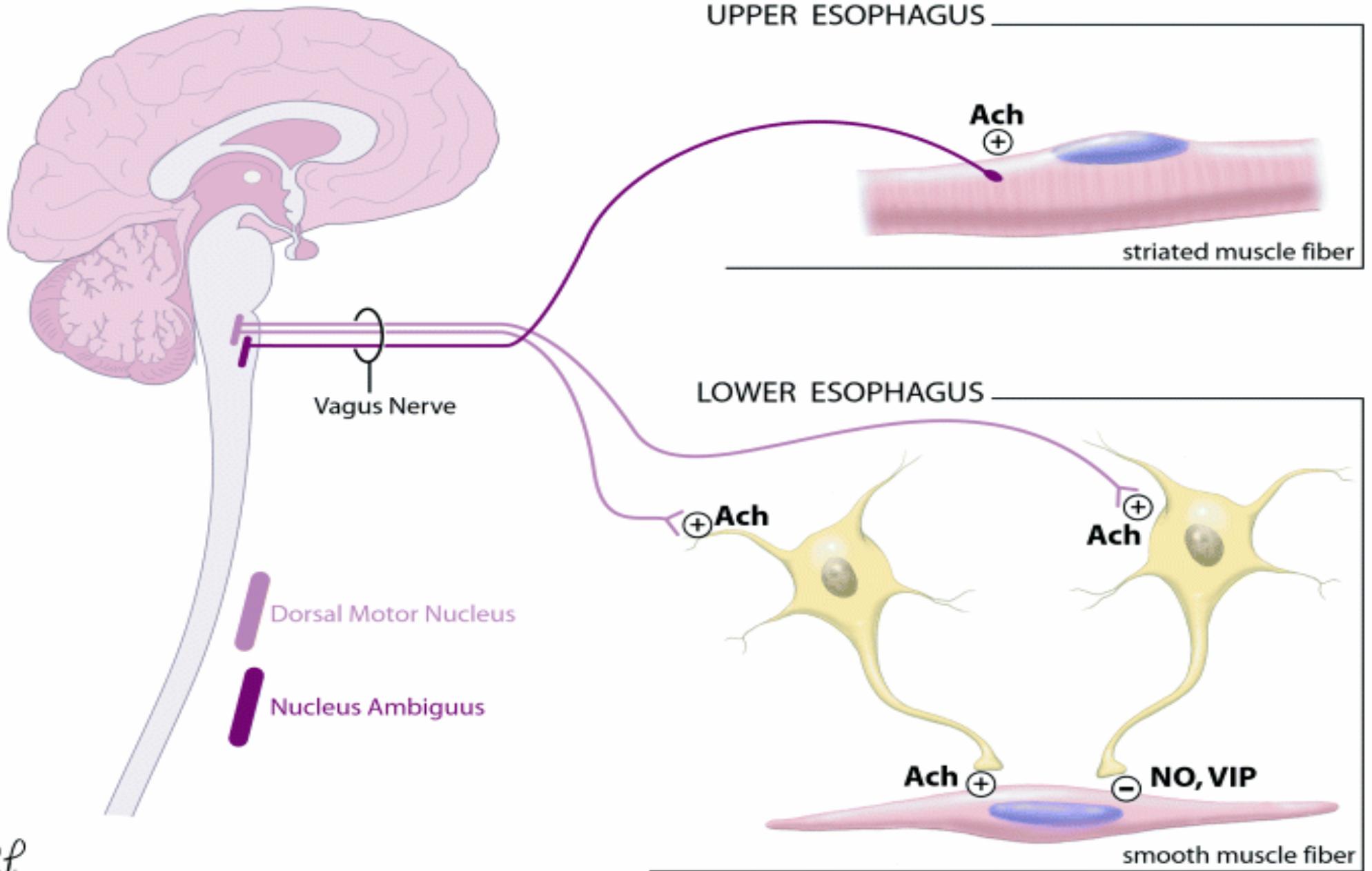


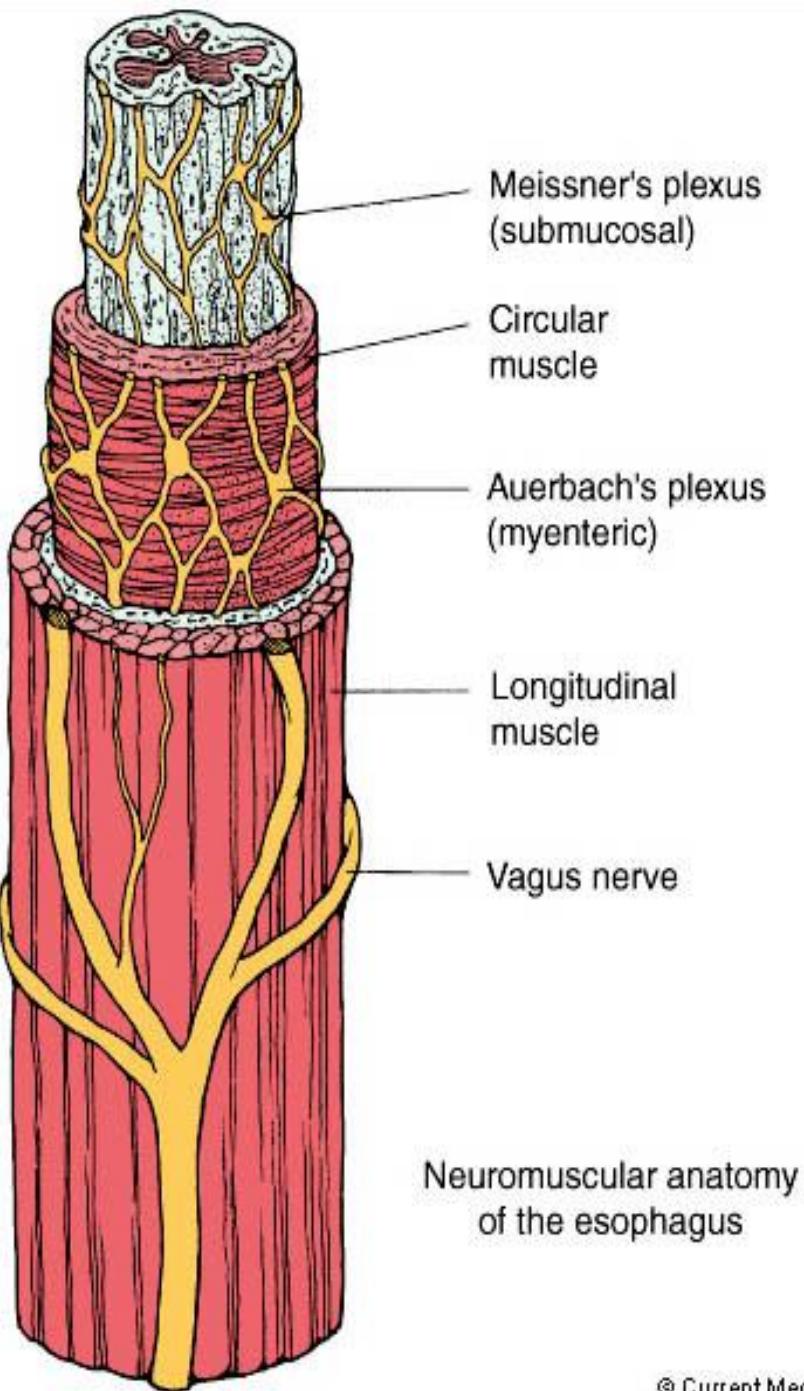
*Studies read by Dr. Wo

Esophageal Manometry*



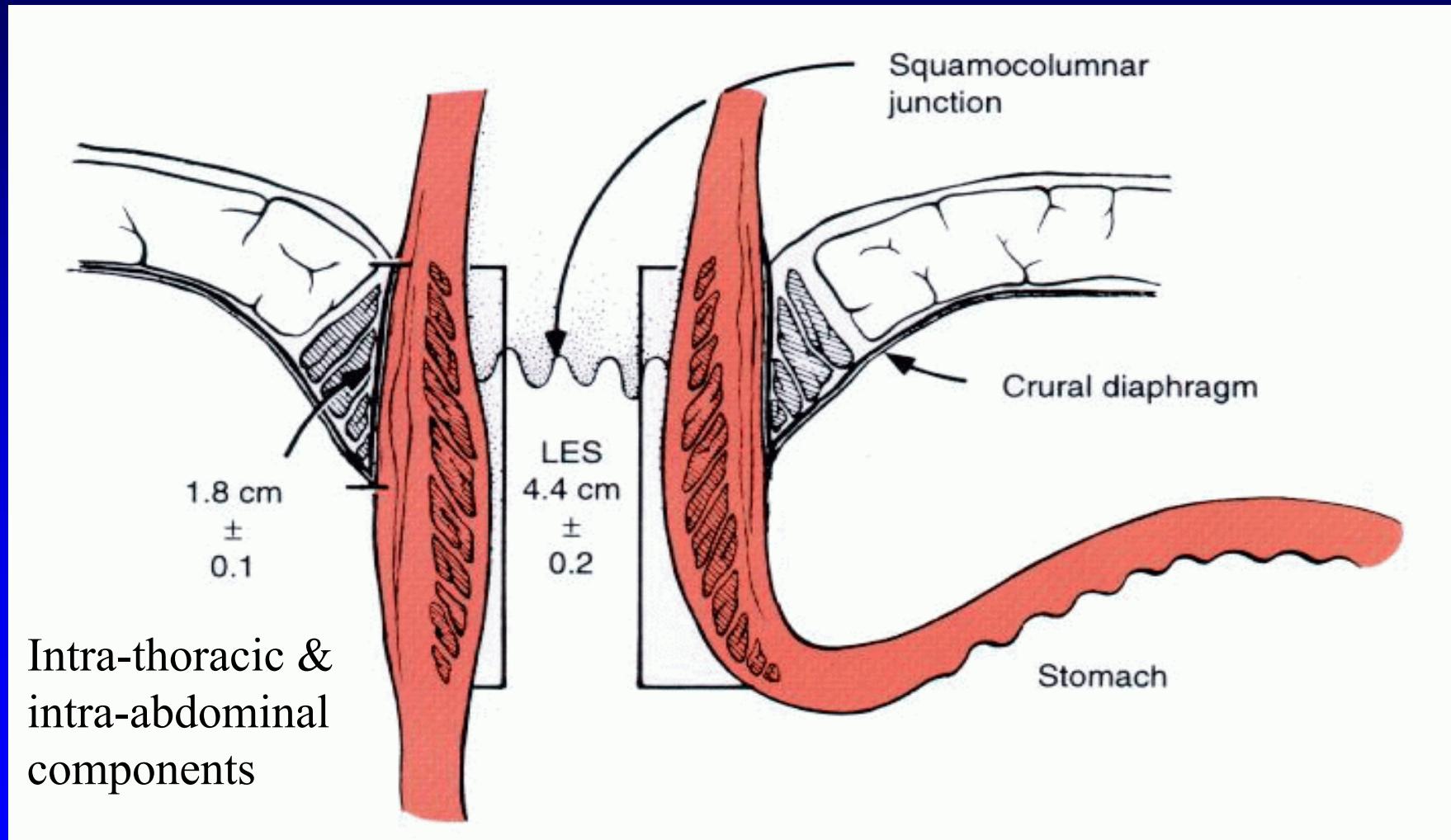
*Studies read by Dr. Wo





- Any vagal or myenteric neuropathy may result in esophageal motility disturbance
 - Hypercontracting or Hypocontracting esophagus

Lower Esophageal Sphincter



Key Concepts of Esophageal Function

- Peristalsis ≠ Bolus Transit
 - (Aperistalsis ≠ Achalasia)
- Esophageal coordination is just as important than pressure
- Manometric findings may be an epiphenomenon

Esophageal Bolus Transit

- Effected by the resistance through the esophagus
 - EGJ
 - Intrabolus pressure
 - Esophageal closure pressure behind the bolus



Clinical Utility of Esophageal Manometry

1. To accurately define esophageal motor function
2. To define abnormal motor function
3. To delineate a treatment plan based on motor abnormalities

Esophageal Manometry Methods

- Water perfusion manometry
- Solid state manometry
 - Standard (4 sensors, every 5 cm)
 - High resolution (36 sensors, every 1 cm)

Indications for Esophageal Manometry

- Diagnose achalasia
- Suspect impaired esophageal motility
- Dysphagia of unclear etiology
- Pre-op evaluation for fundoplication
- Post-fundoplication evaluation
- Suspect diffuse UGI dysmotility

Benefits and Pitfalls of Esophageal Manometry

BENEFITS

- Easy to do
- Most patients tolerate procedure
- Only way to confirm achalasia
- Identify patients with an esophageal dysmotility

PITFALLS

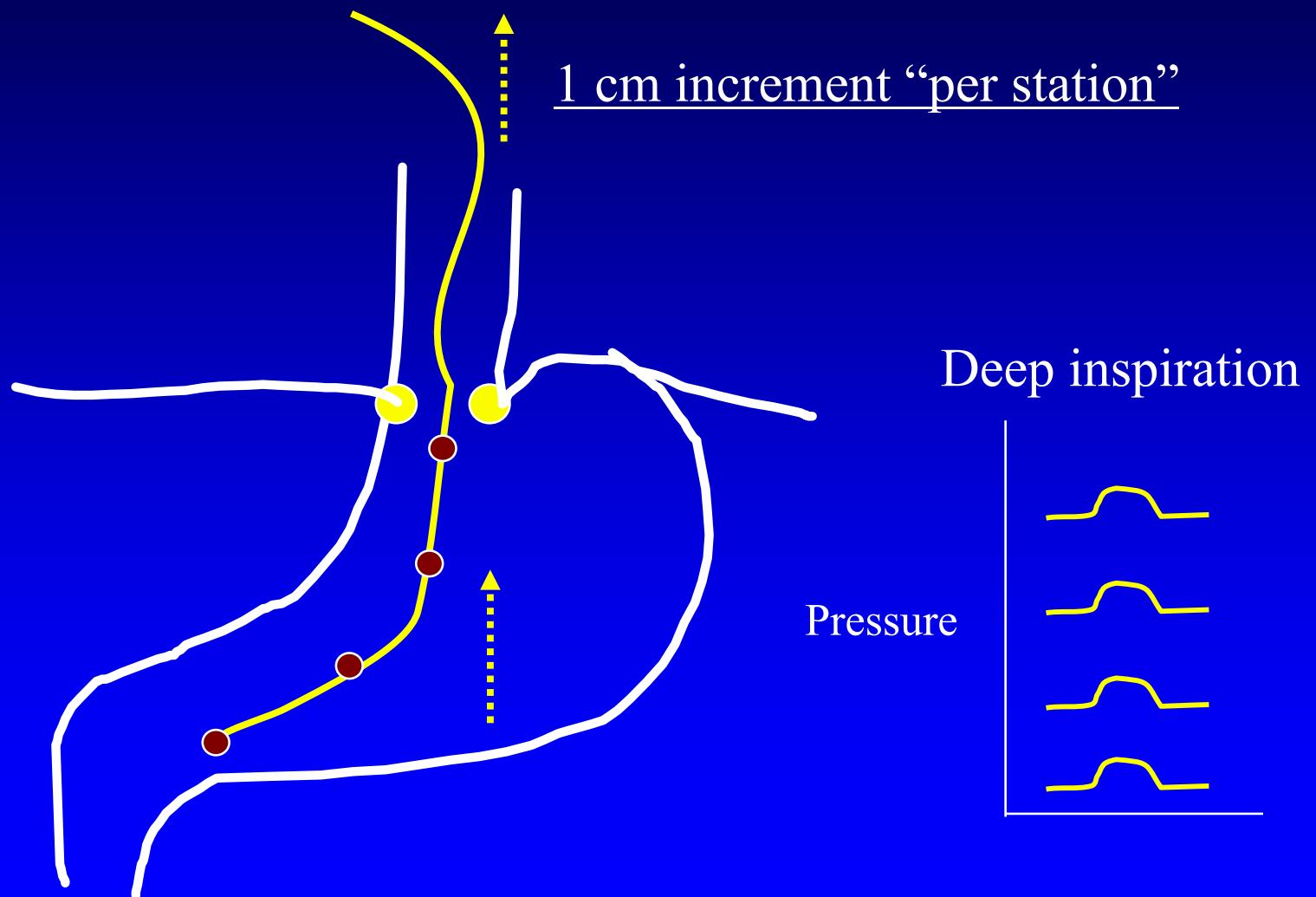
- Does not measure esophageal transit
- May not detect dysmotility, which can be intermittent
- Except for achalasia, most esophageal dysmotility are epiphomenon of a secondary disorder

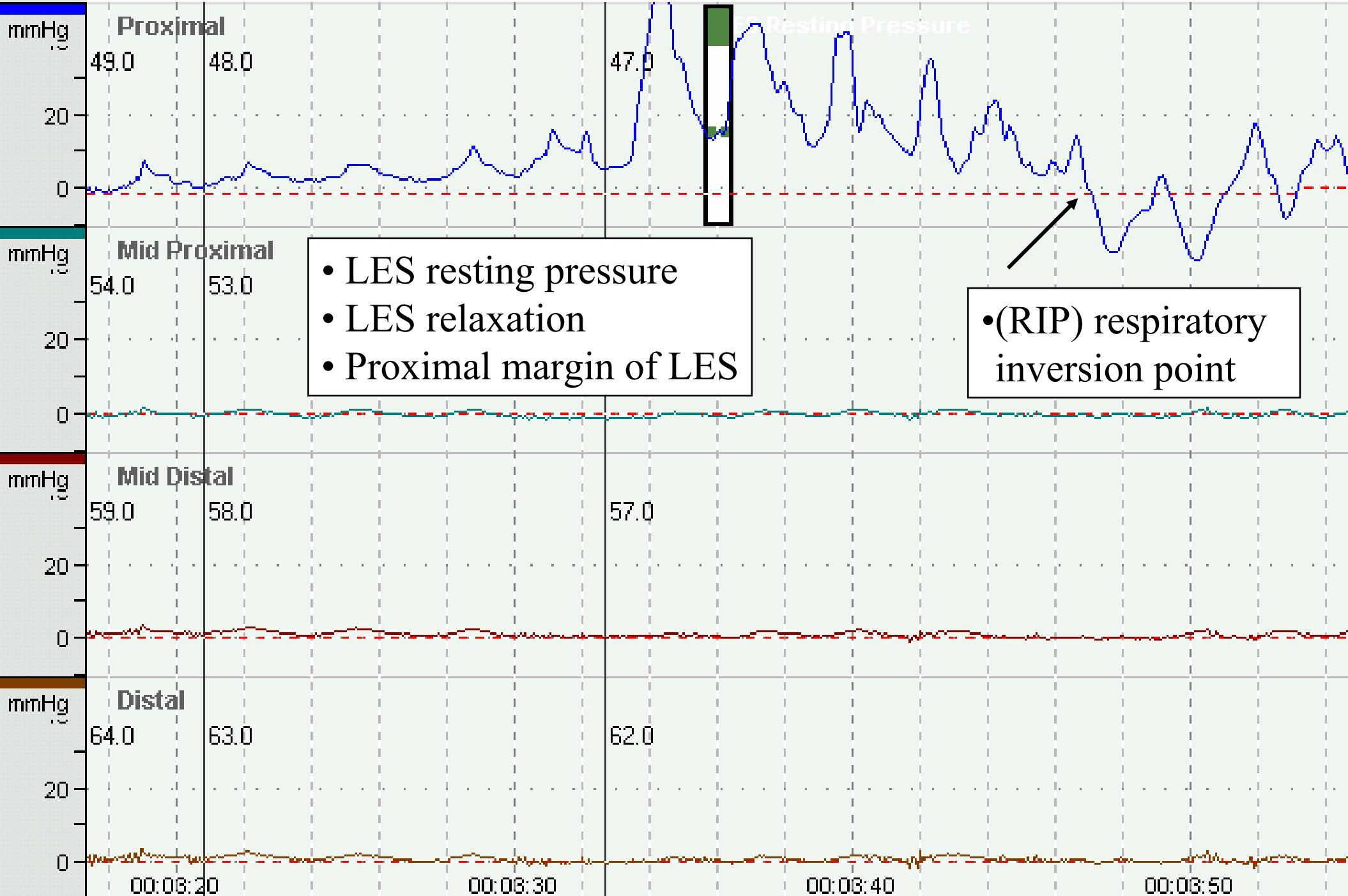
Traditional Esophageal Manometry

Components of Conventional Esophageal Manometry

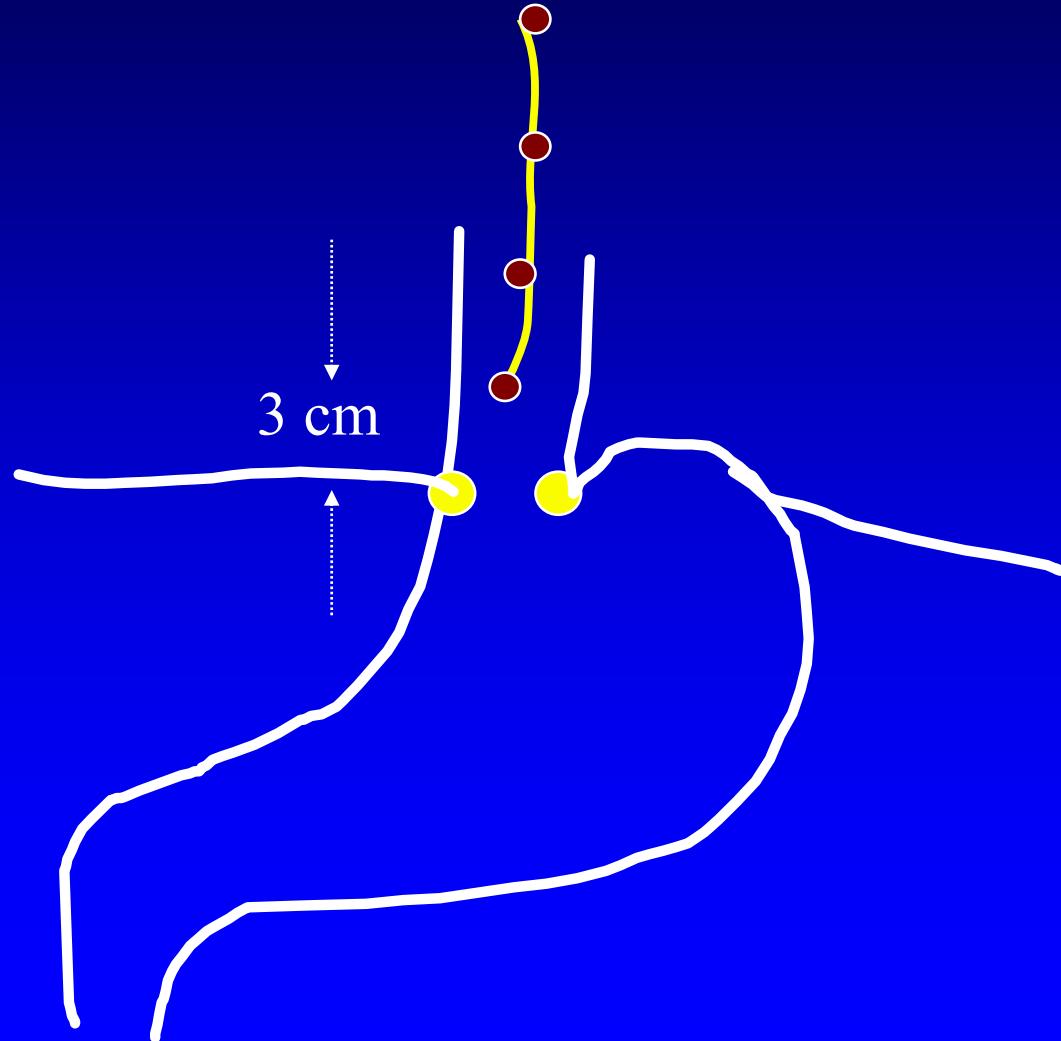
- Lower esophageal sphincter
- Esophageal body
- Upper esophageal sphincter

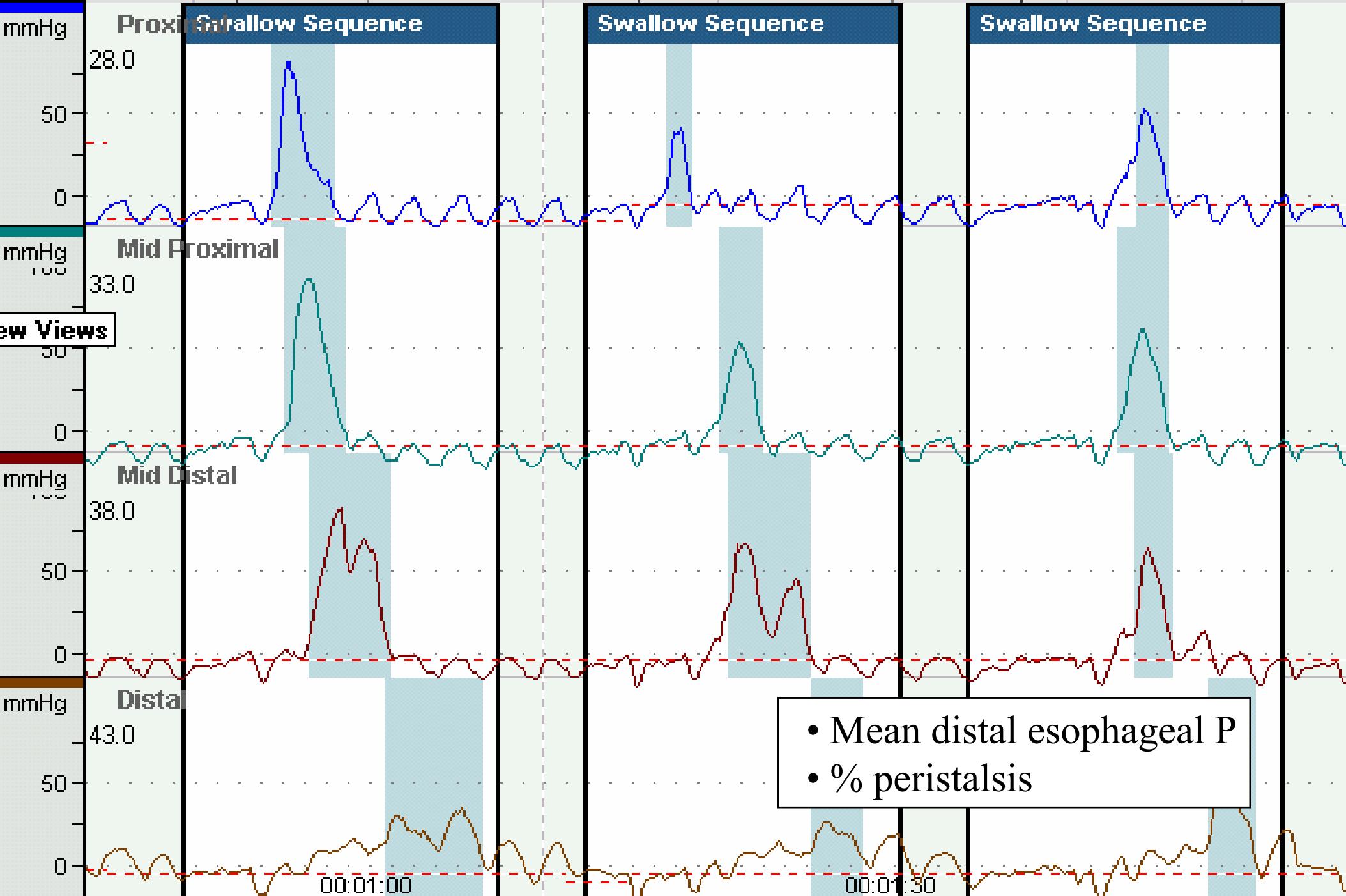
1. LES Station Pull-Through





2. Esophageal Body Measurements





Parameters in Esophageal Manometry

- Upper border of the LES (cm)
- LES Pressure (mmHg)
- LES relaxation
- Distal body pressure (mmHg)
- Distal body contraction duration (sec)
- Esophageal peristalsis (%)

Normal Esophageal Manometry

<u>Pressure</u>	<u>mmHg (SD)</u>	<u>normal</u>
- LES	15.2 (10.1)	10 - 45
- Mean dist P	99 (40)	40 - 180
<u>Motor response</u>	<u>% wet swallows (SD)</u>	
- double peaks	11 (19)	
- simultaneous	4 (8)	
- non-conducted	0.4 (2)	
- retrograde	0	

Normal Esophageal Motility

Normal

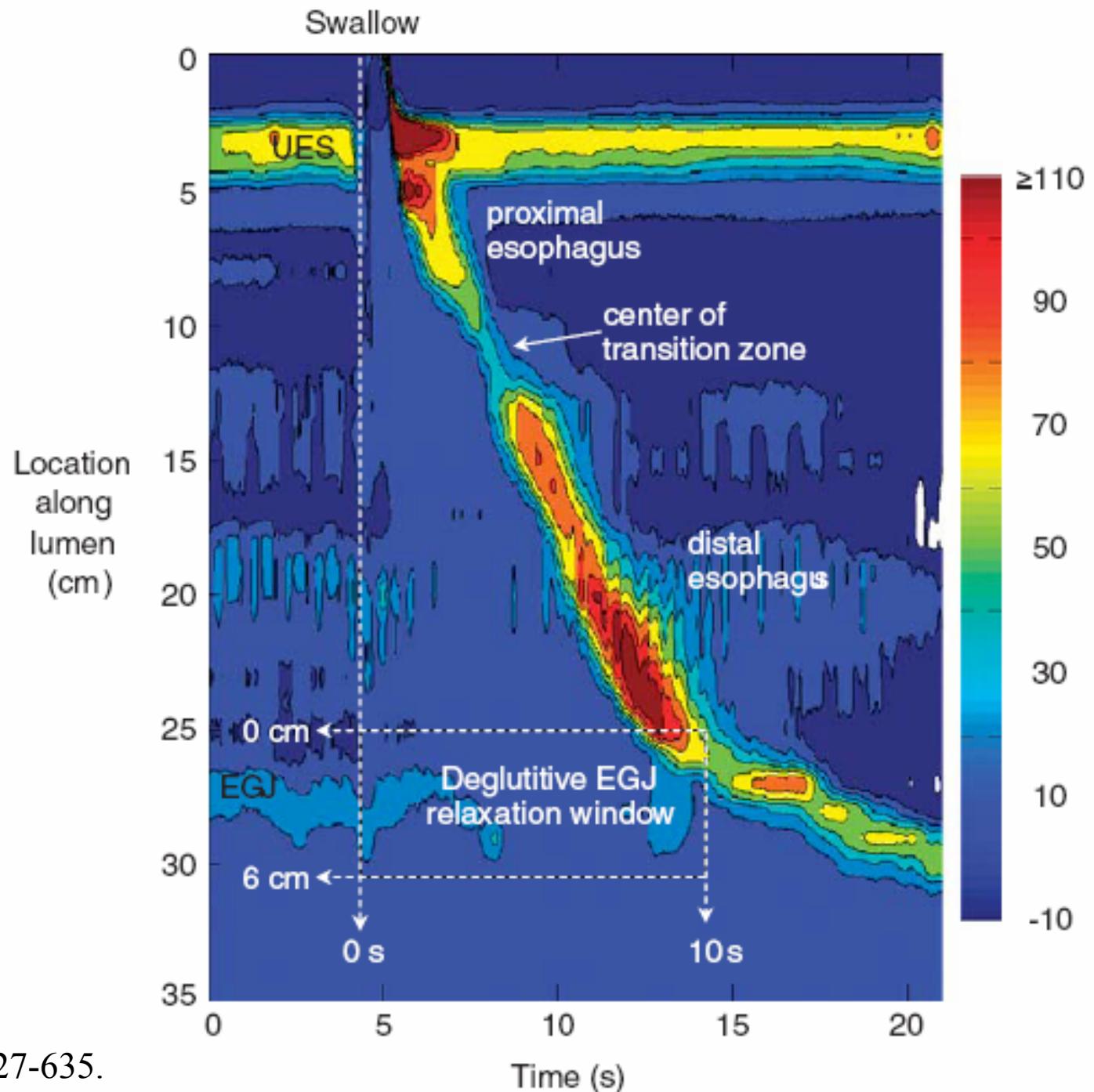
Mean distal peristaltic P

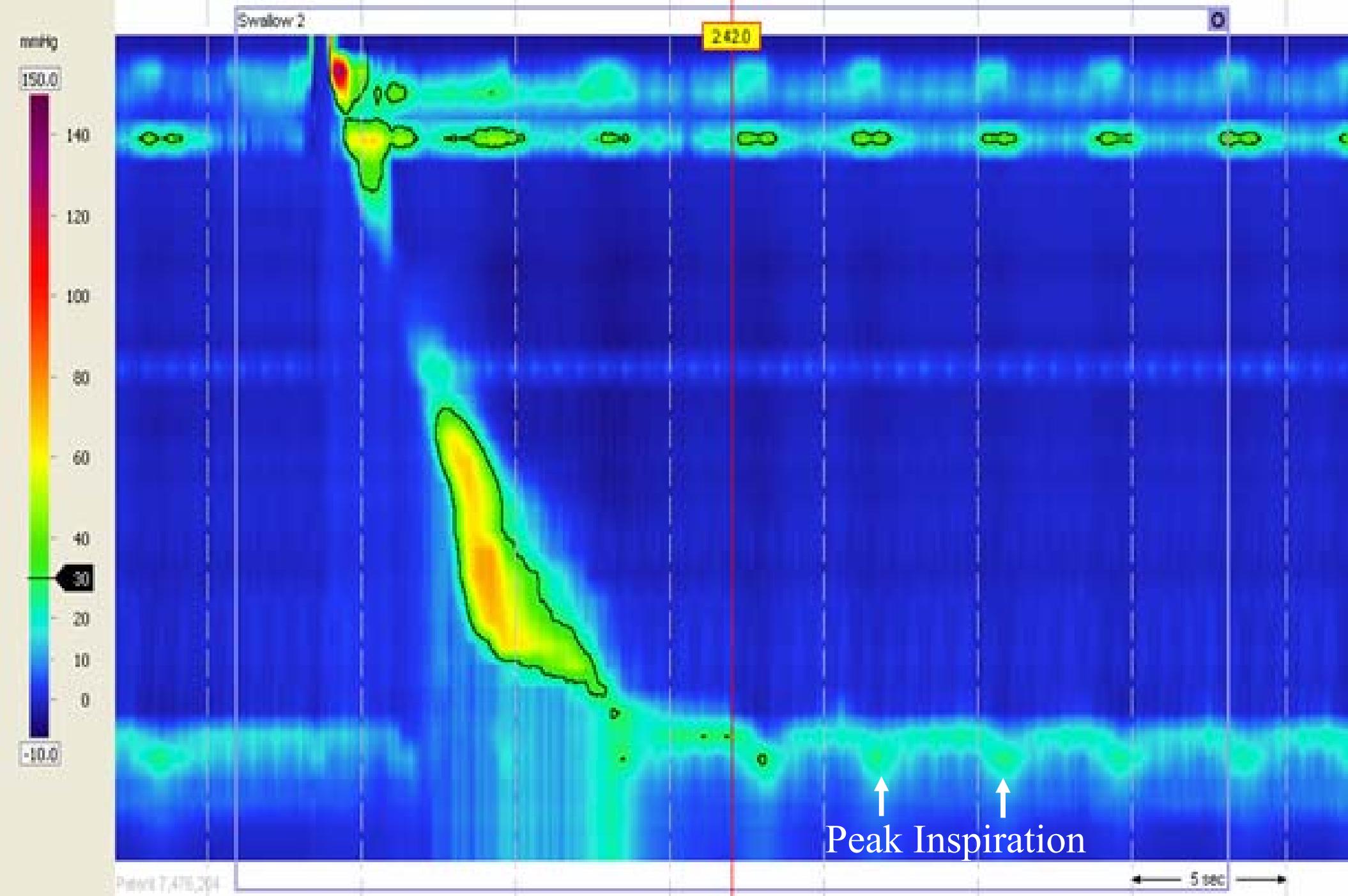
> 30 to 40 mmHg

Peristaltic waves

> 60%

High Resolution Esophageal Manometry (Pressure Topography Plots)





Major Advantages of Pressure Topography over Conventional Manometry

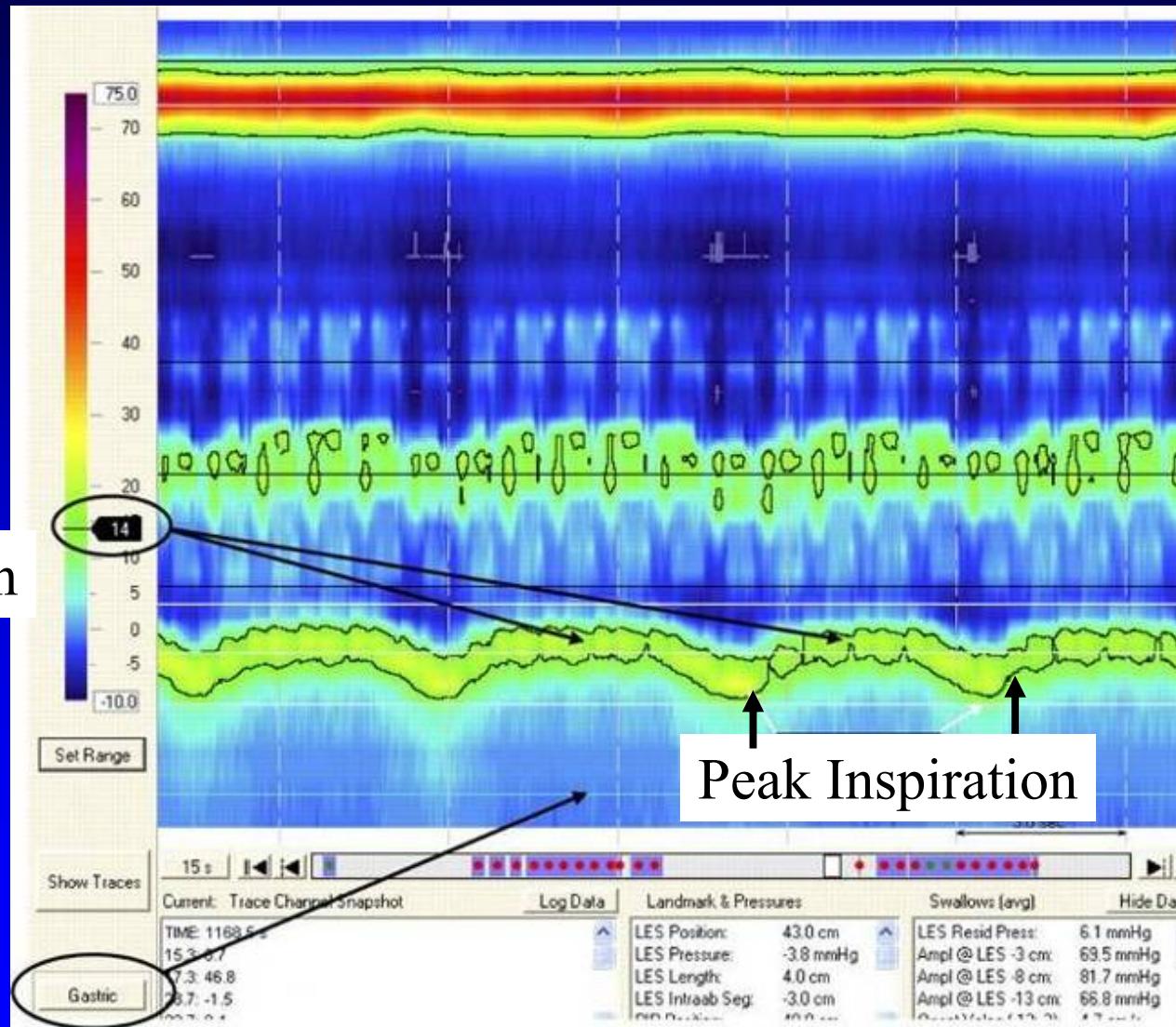
1. Define GEJ relaxation
2. Define spatial limits, strength, and integrity of contractions over the entire esophagus
3. Distinguish between compartmentalized intraesophageal pressurization and rapid contractions
 - Differentiate between esophageal spasm, vigorous achalasia, functional obstruction, and nutcracker

Components of High Resolution Manometry

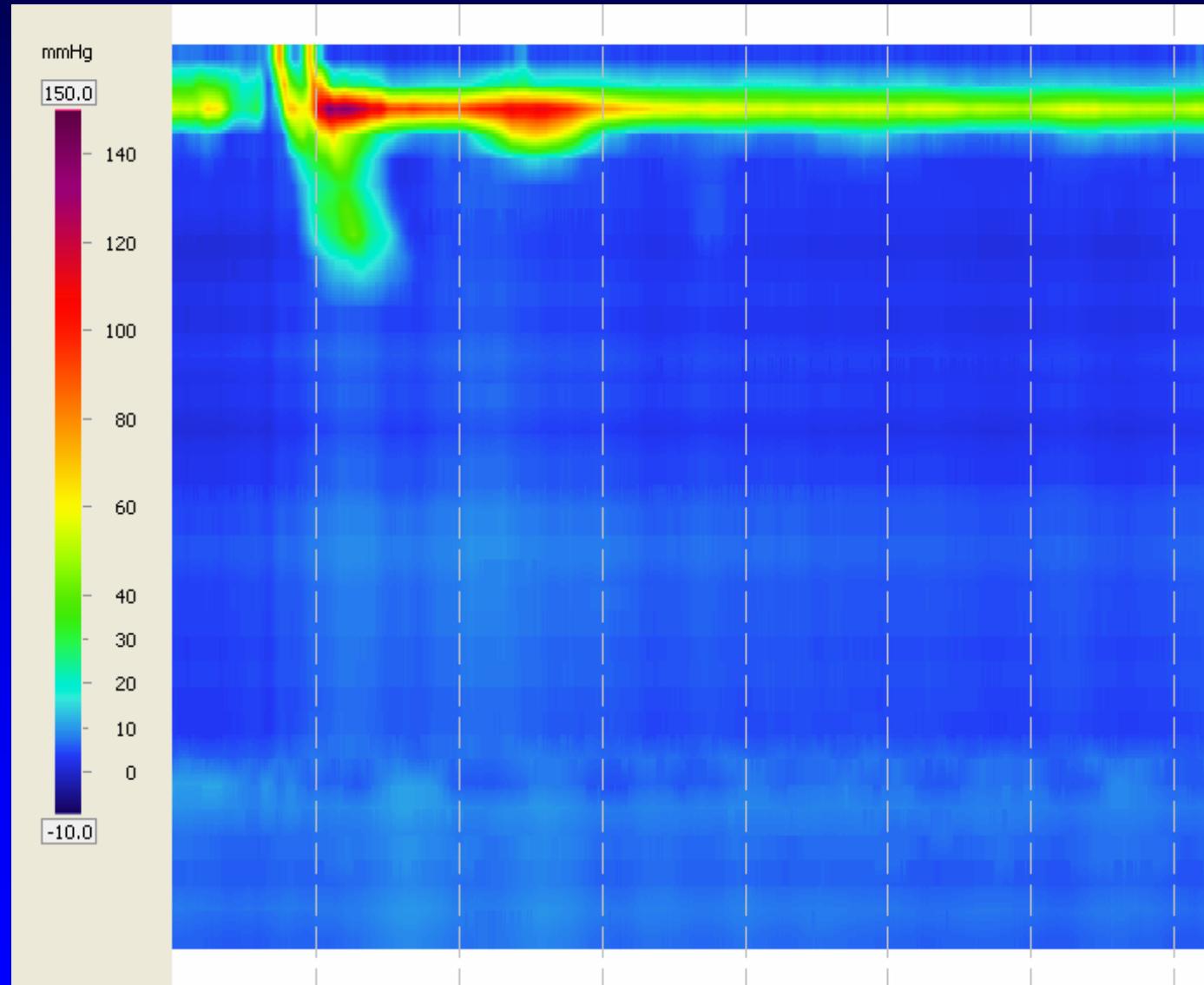
- GEJ (GEJ resistance)
 - End expiratory residual pressure
 - GEJ residual pressure
- Distal esophageal contraction (intrabolus pressure)
- Esophageal closure pressure behind the bolus

GEJ

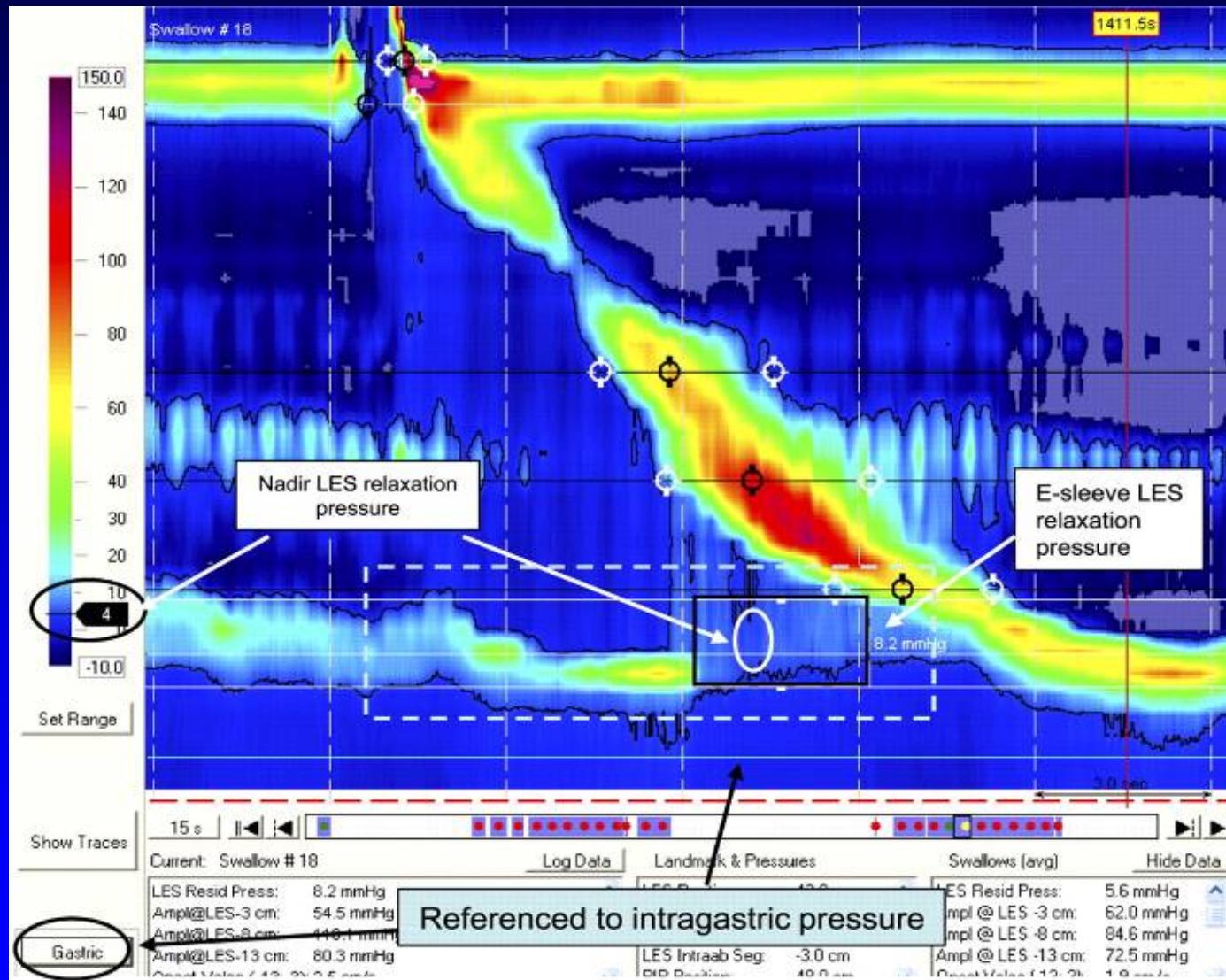
GEJ End Expiration Pressure



Low GEJ Pressure

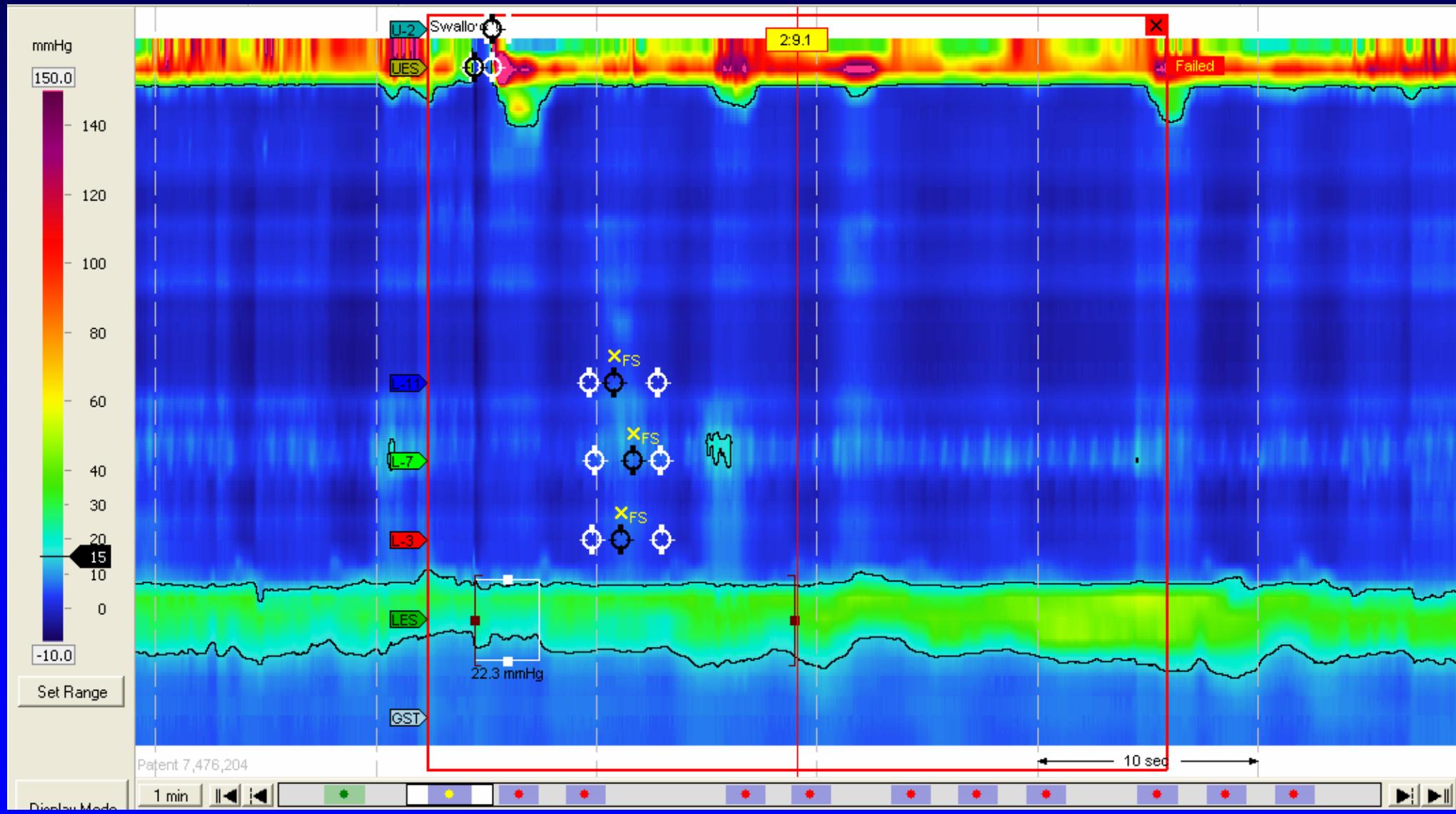


GEJ Relaxation



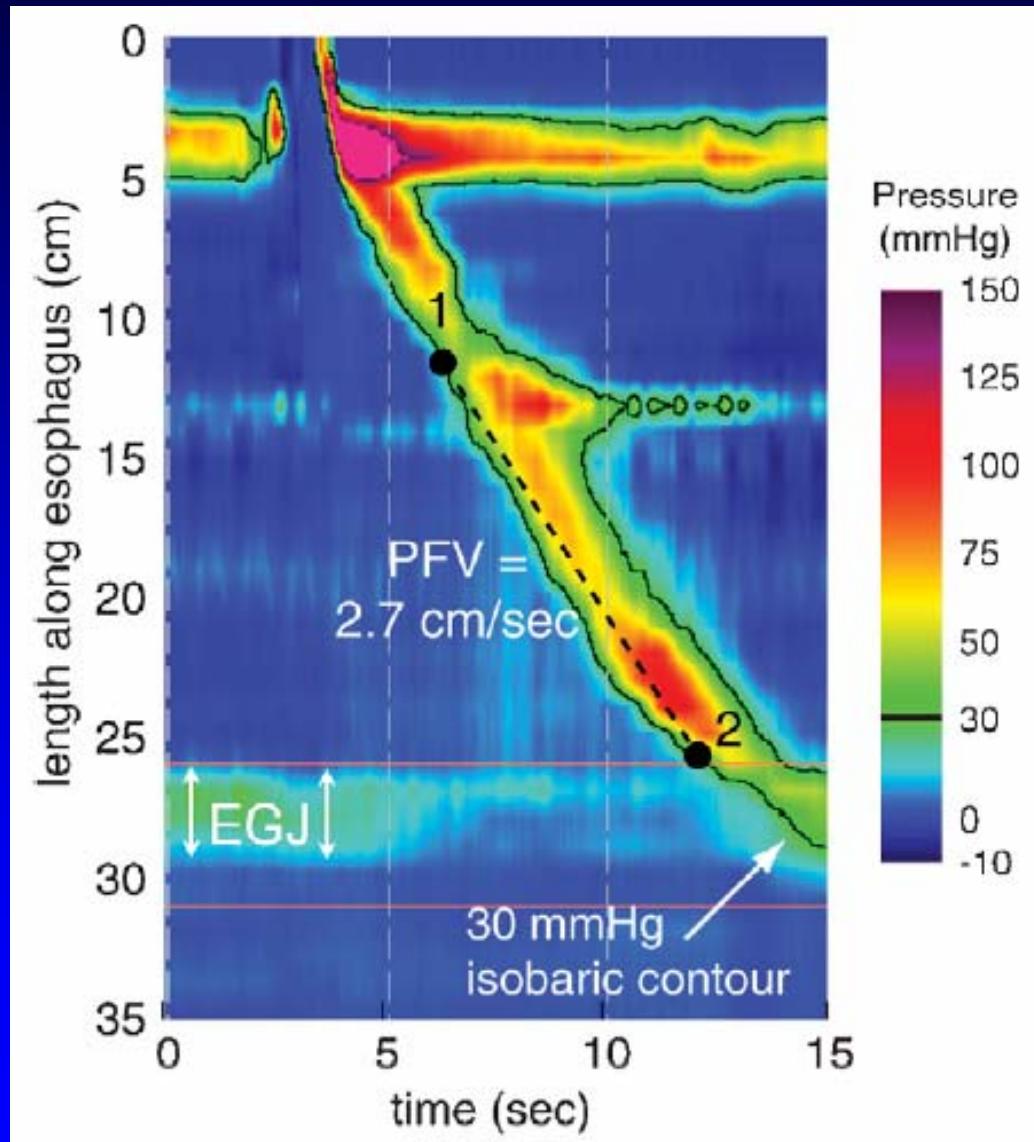
- E-sleeve GEJ residual pressure
 - Normal <15 mm Hg

Incomplete GEJ Relaxation



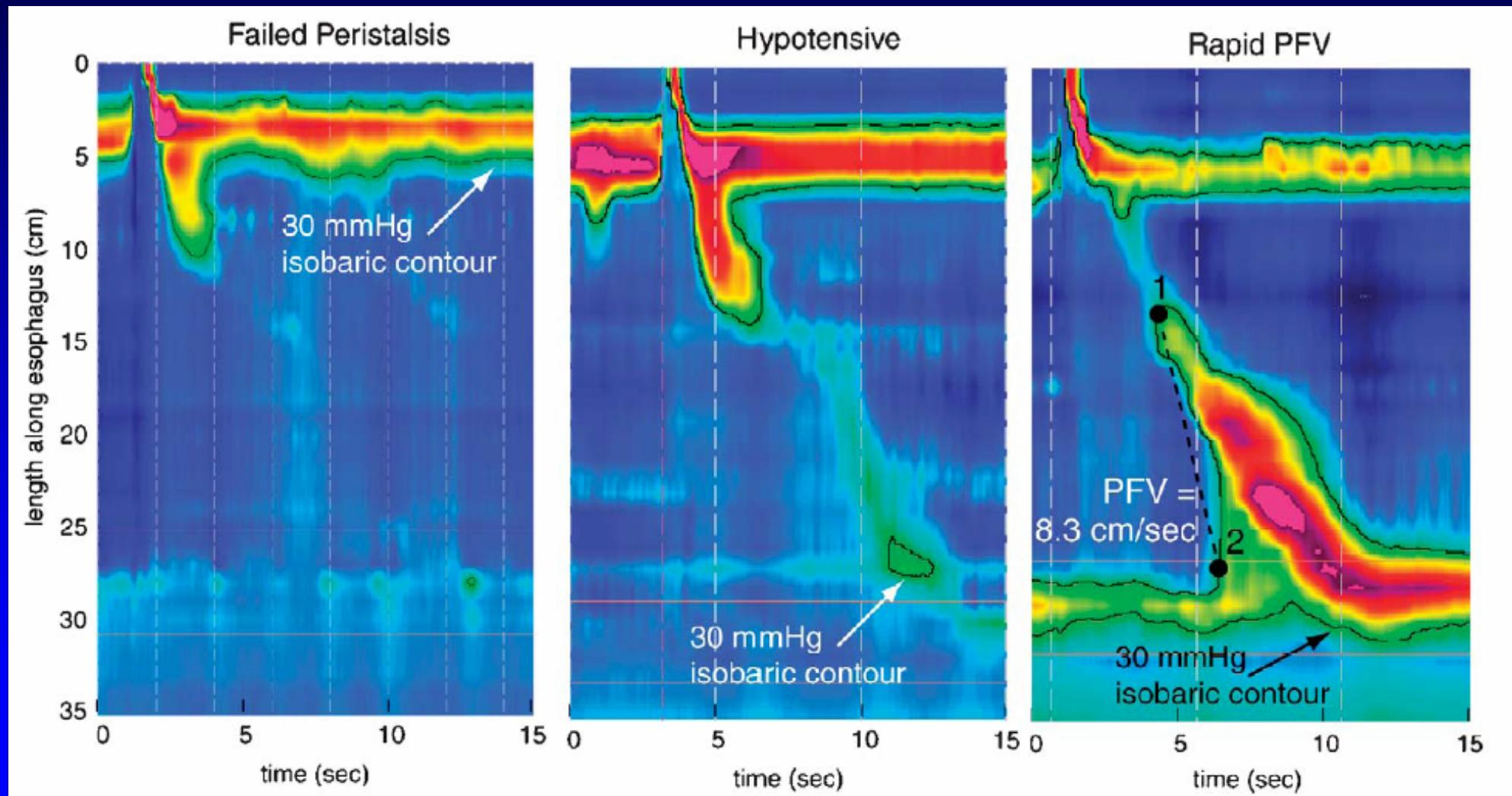
Distal Esophageal Peristalsis

Normal Distal Esophageal Peristalsis

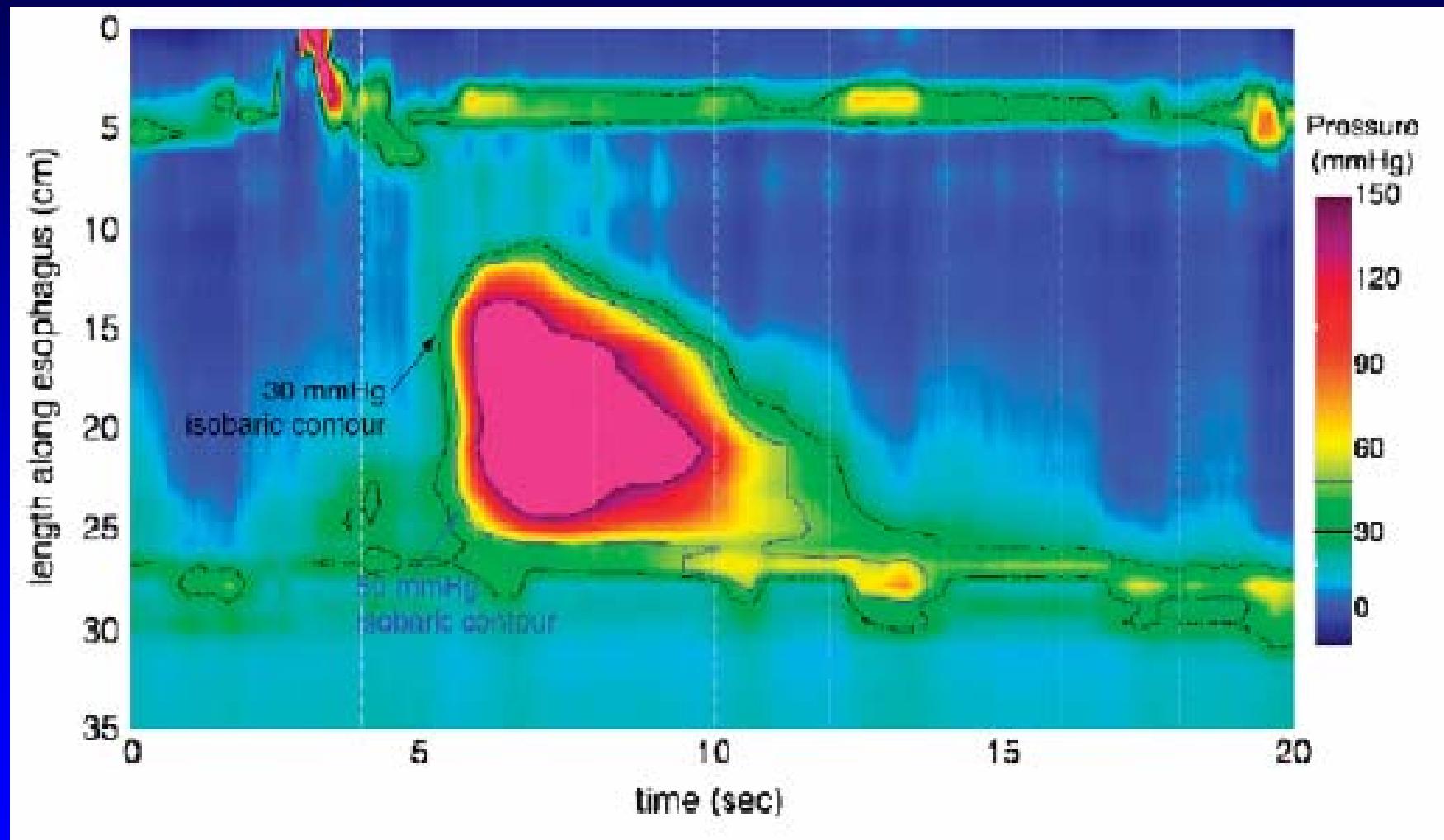


- Pressure Front Velocity (PFV) < 8 cm/sec
- Distal Contraction Integral (DCI) < 5,000 mmHg-s-cm

Abnormal Distal Esophageal Peristalsis



Abnormal Distal Contractile Integral



Conventional Classifications of Esophageal Motility Disorders

Hypercontracting esophagus

- Diffuse esophageal spasm
- “Nutcracker”
- Hypertensive LES

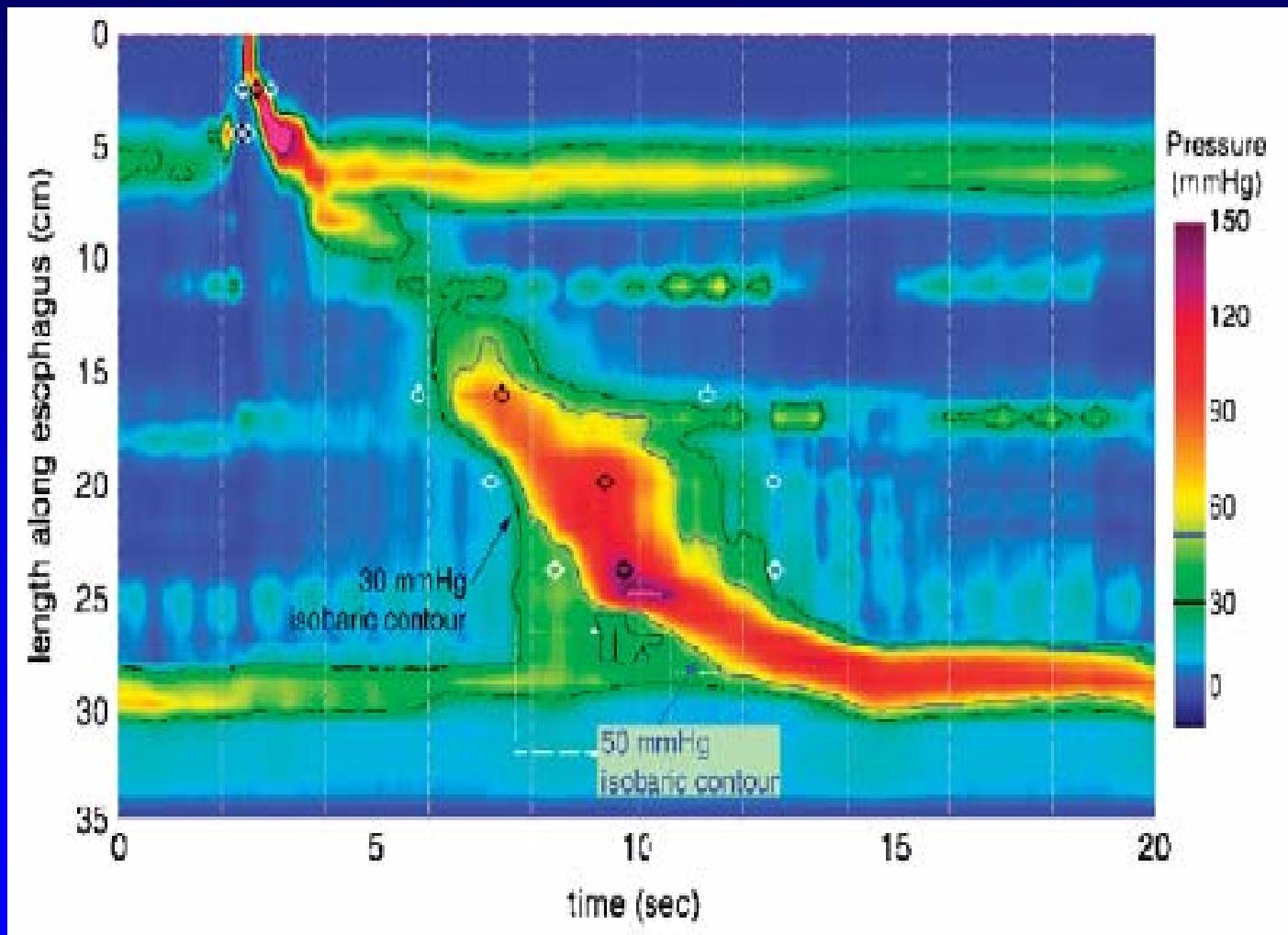
Hypocontracting esophagus

- Primary achalasia
- Secondary achalasia or impaired esophageal motility
 - Connective tissue diseases
 - Systemic sclerosis
 - Mixed connective tissue disease
 - Idiopathic inflammatory myopathy
 - Endocrine diseases
 - Diabetes
 - Neuromuscular diseases
 - Chagas disease
 - Amyloidosis
 - Paraneoplastic syndrome

New Chicago Classifications of Esophageal Motility Disorders

- Normal
- Peristaltic Dysfunction
- Aperistalsis
- Hypertensive peristalsis
- *Rapidly propagated pressurization
- Abnormal LES tone
- Achalasia (types 1, 2, 3)
- *Functional obstruction

Functional Obstruction and Compartmentalized Pressurization



Cases