

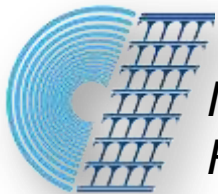


Department of Gastroenterology  
Esophageal Surgery Unit  
*University of Pisa*



# Radiofrequency ablation of Barrett's Esophagus and Dysplasia

*Dr Biagio Solito*



*Italian National School of Esophageal Surgery  
Referral Center*

# Pathogenesis of Barrett's Esophagus



Squamous esophagus

Chronic inflammation

Barrett's metaplasia

Low-grade dysplasia

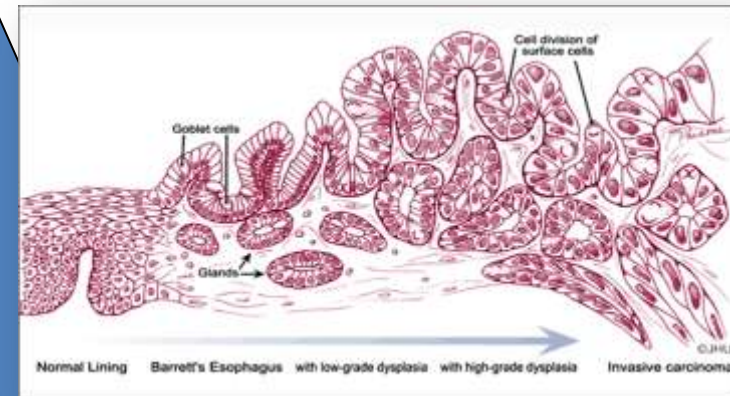
High-grade dysplasia

Invasive Adenocarcinoma

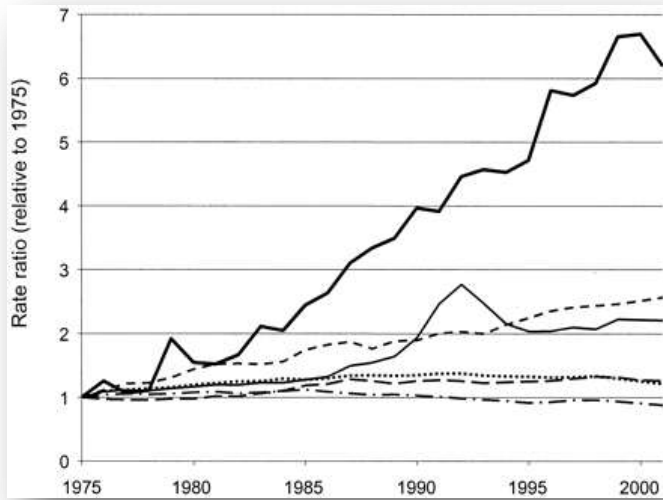
Injury Acid & bile reflux nitrous oxide

Genetics, Gender, race, ? other factors (cox-2)

Accumulate Genetic Changes



# Esophageal Cancer Prevalence and 5-years Survival

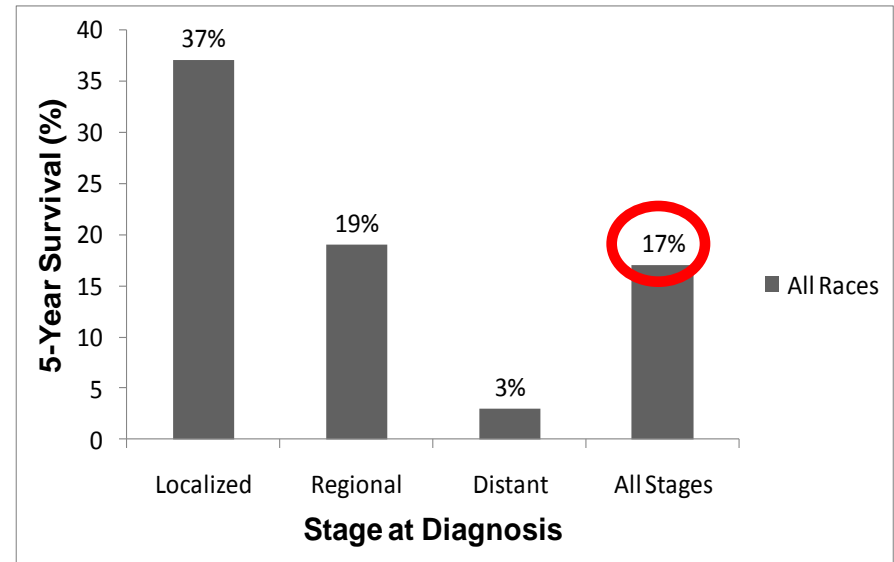


Esophagus

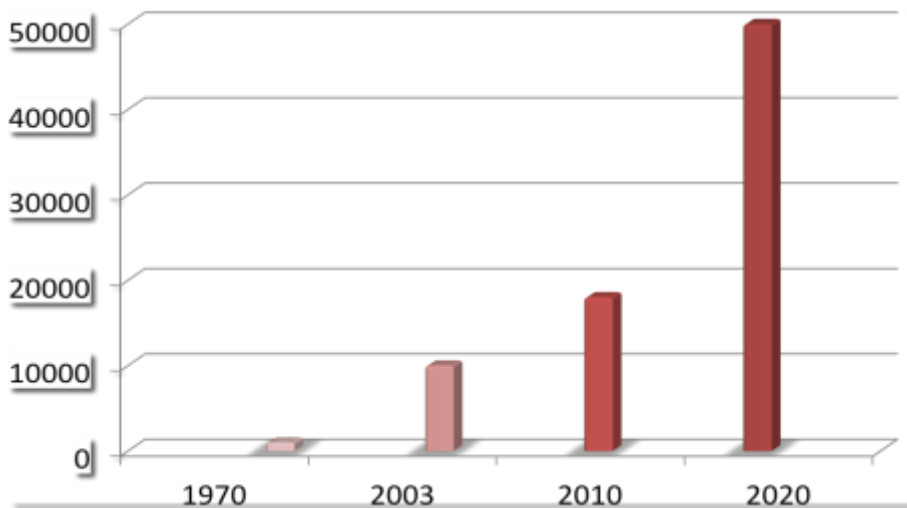
Melanoma  
Prostate

Lung/Breast  
Colorectal

*Pohl, J Natl Cancer Inst, 2005*



*Siegel R, et al. CA Cancer J Clin. 2011*



# (Early) Esophageal Cancer: Therapy



Esophagectomy has been the traditional therapy for High-Grade Dysplasia and Intramucosal Adenocarcinoma



Operative Morbidity and Mortality rates :

- 2 – 7 % (High volume centers)
- >20% (Low volume Hospitals)
- Older age, co-morbidities

The NEW ENGLAND  
JOURNAL of MEDICINE

Birkmeyer JD, et al. N Engl J Med, 2002

# (Early) Esophageal Cancer: Therapy

Surgery

Radiotherapy

Chemiotherapy

Alternative endoscopic therapies:

**(EMR) Endoscopic Mucosal Resection**

(ESD) Endoscopic Submucosal Dissection

**(RFA) Radiofrequency Ablation**

(APC) Argon Plasma Coagulation

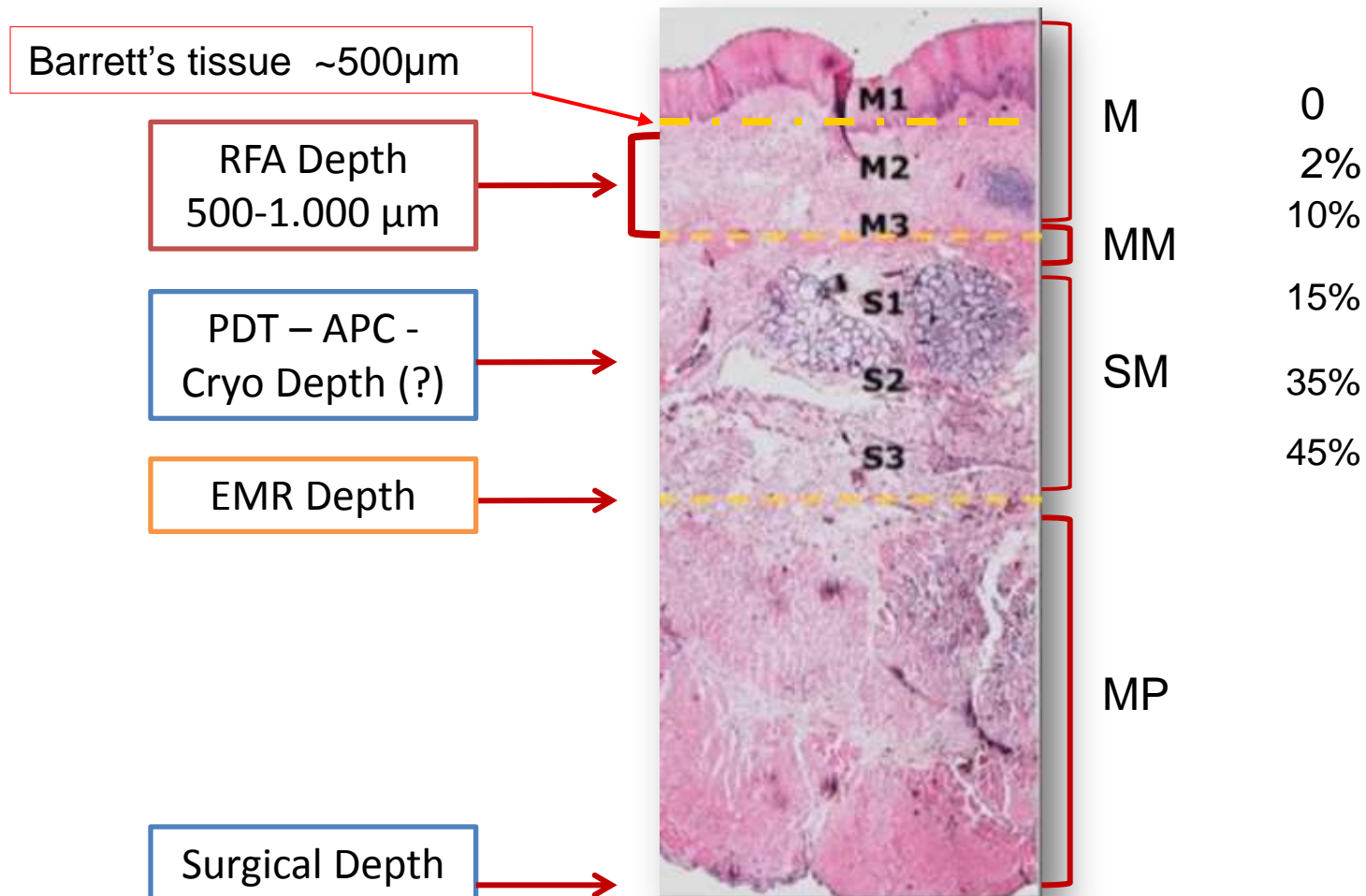
(PDT) Photodynamic Therapy (light-sensitizing drug and laser)

(CT) Cryotherapy (liquid nitrogen)

New endoscopic approaches allow treatment of early lesions with esophageal preservation

# Risk of nodal involvement in early esophageal cancer

## LN Metastases



# Barrx™ Radiofrequency Ablation System

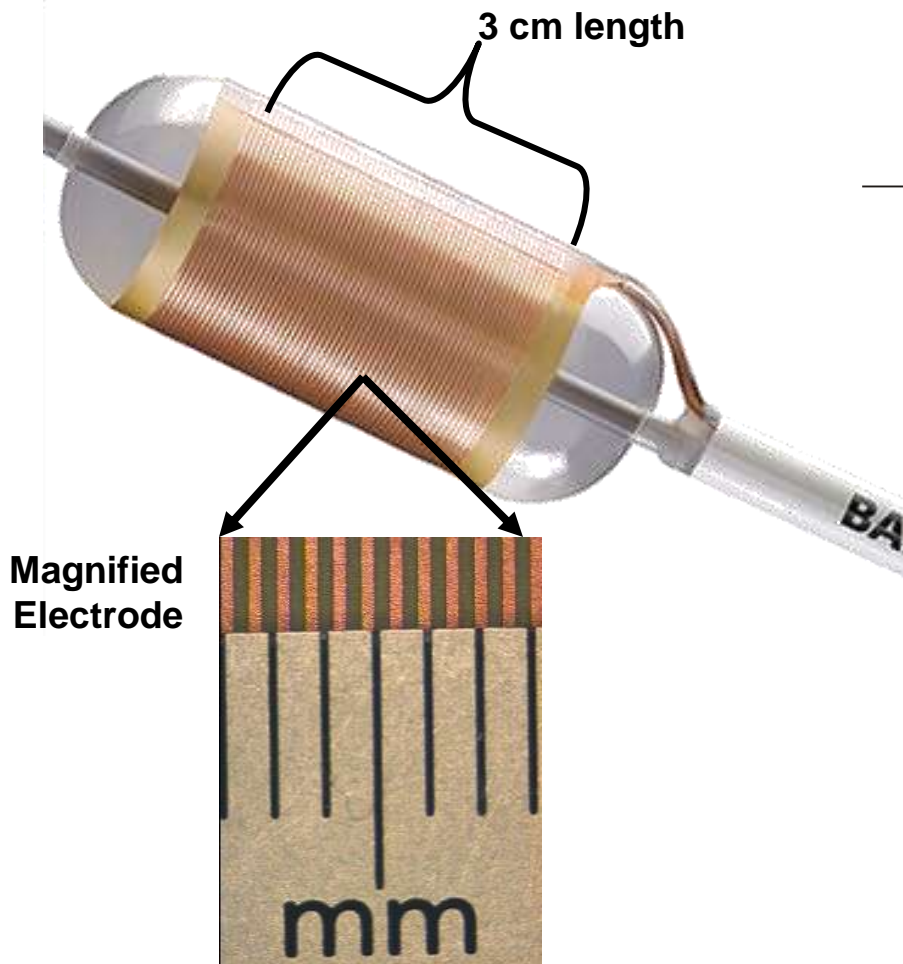
Advanced Rf Ablation Technology for Treating Barrett's Esophagus



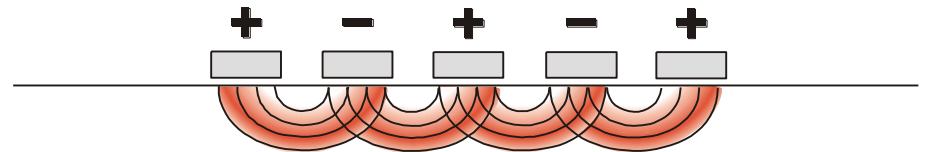
Barrx™ Flex Generator



# HALO<sup>360</sup> Catheter



## Electrodes Closely Spaced



- Controls depth of energy delivery, reducing risk of stricture formation.
- Maximizes effectiveness without significant injury to the underlying tissue and allows for the re-growth of healthy tissue.
- Controlled application of energy uniformly removes the epithelium, reducing potential for buried glands and improving patient tolerability.



## Radiofrequency ablation of Barrett's Esophagus: preliminary outcomes of 80 patients from a multicenter registry in Italy



Battaglia G<sup>1</sup>, Cestari L<sup>2</sup>, Sassatelli R<sup>3</sup>, Santi S<sup>4</sup>, Cengia GP<sup>2</sup>, Decembrino F<sup>3</sup>, Diamantis G<sup>1</sup>, Realdon S<sup>1</sup>, Solito B<sup>4</sup>, Cesarotto M<sup>1</sup>

<sup>1</sup> Unità di Endoscopia Diagnostica e Operativa, Istituto Oncologico Veneto, Padova;  
<sup>2</sup> Ospedale di Brescia; <sup>3</sup> Arcispedale S. Maria Nuova Reggio Emilia;  
<sup>4</sup> Azienda Ospedaliera Universitaria Pisana, Pisa.



*Before the procedure*



*Immediately after the procedure*

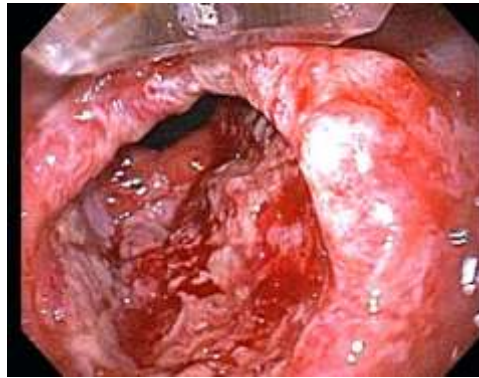
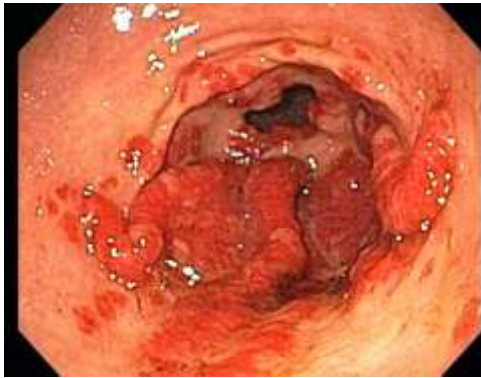


*3 months after the procedure*

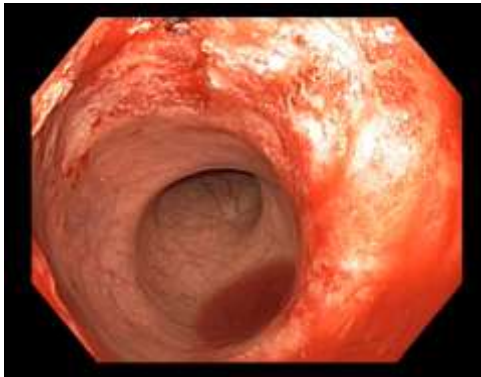
CR-IM and CR-D  
were achieved  
in 92% and 93% of patients,  
respectively

# New RFA applications

*(GAVE) Gastric Antral Vascular Ectasia*



*Radiation Proctitis*



Images Courtesy of Jose Nieto, DO, Borland-Groover Clinic, Jacksonville, FL

# Conclusions

The use of radiofrequency ablation (RFA) for eradication of Barrett's esophagus (BE) has shown promising results in trials conducted at either academic centers or community hospitals.

It has been proved how RFA reduces the risk of neoplastic progression in dysplastic BE and achieves a durable response.

In a multicenter registry conducted at four Italian centers, the observed safety and efficacy outcomes associated with RFA for Barrett's esophagus are comparable to those previously reported in multicenter trials.

Patients with ADK seem to respond better to the RFA treatment.

More data need to be collected prospectively from more sites to confirm the preliminary outcomes and assess durability and disease progression.

## OUR COLLABORATIONS





Department of Translational Research and New Technologies in Medicine and Surgery  
Gastroenterology Unit  
*University of Pisa*

# **New Technologies Improve Diagnosis in Diseases of Esophagus**

*Prof. Santino Marchi*

*Dott. Nicola de Bortoli*

# BACKGROUND

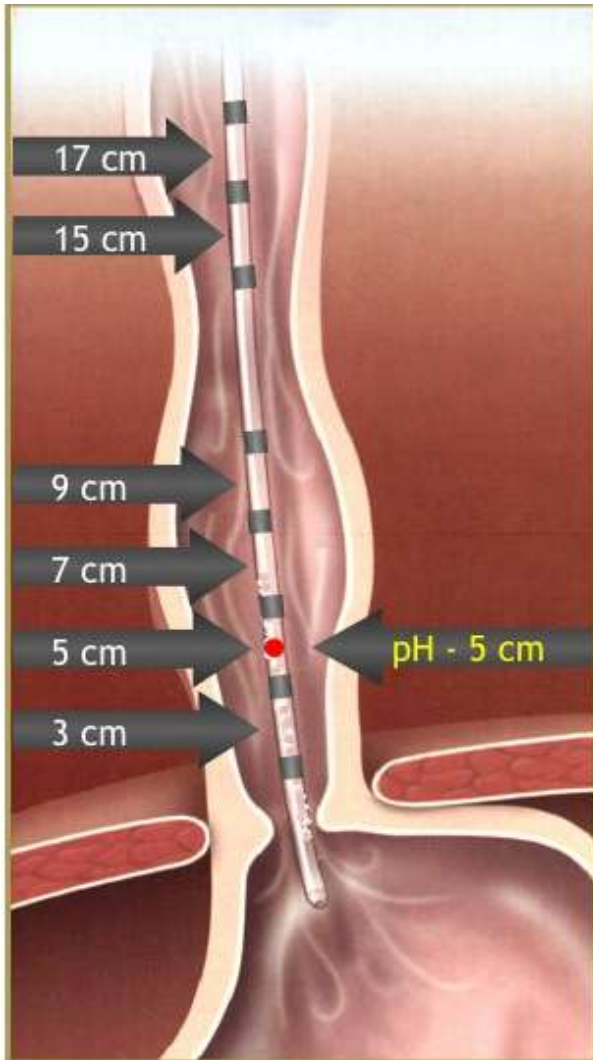
## **DISEASES OF THE ESOPHAGUS:**

- Heartburn is one of the most frequent symptom (65%) in patients referring for gastrointestinal consultations
- It is an easy clinical diagnosis but...
  - 90% of patients with heartburn are treated
  - 55% of patients with heartburn improve their symptoms
  - 21% of patients had a diagnosis

## **•UP & COMING ESOPHAGEAL DISEASES:**

- Eosinophilic Esophagitis
- Achalasia
- Primary Motor Disorder of the Esophagus

# GASTROESOPHAGEAL REFLUX DISEASE

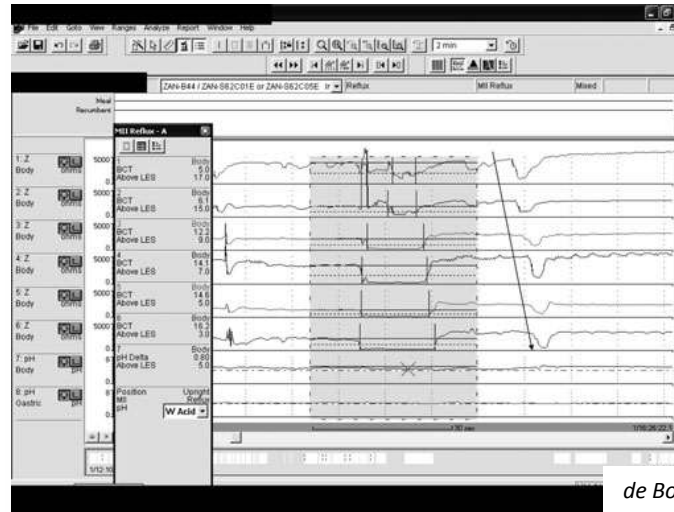


- pH-parameters
  - % time  $\text{pH} < 4$  (total, upright, recumbent)
- Impedance-parameters
  - Number of reflux episodes (acid, weakly acidic, weakly alkaline)
- Symptom association
  - SI and/or SAP
- **Baseline Impedance**
- **PSPW**

# Post-reflux swallow-induced peristaltic waves (PSPW) are frequent in functional heartburn

**Table 1** Pathophysiological findings (off PPI therapy) in PPI-dependent ERD and NERD and in controls

	ERD (n = 31) [21 males, median age 54 years]	NERD (n = 44) [22 males, median age 48 years]	Controls (n = 30) [13 males, median age 48 years]
LES tone (mm Hg)	12.4 (9.3–22.2) ERD vs NERD <i>P</i> < 0.05	20.6 (15.6–31.5) NERD vs controls <i>P</i> < 0.05	20 (14.6–25.1) ERD vs controls <i>P</i> < 0.05
DEA (mm Hg)	66.2 (45.2–83.9) ERD vs NERD <i>P</i> < 0.05	87.6 (61.8–107.6) NERD vs controls <i>P</i> < 0.05	70.7 (56.9–91.7) ERD vs controls <i>P</i> > 0.05
EAET (%)	9.5 (5.7–12.4) ERD vs NERD <i>P</i> < 0.05	4.8 (3.6–7.2) NERD vs controls <i>P</i> < 0.05	0.7 (0.2–1.5) ERD vs controls <i>P</i> < 0.05
Total refluxes (n)	56 (50–76) ERD vs NERD <i>P</i> > 0.05	50 (41–70) NERD vs controls <i>P</i> < 0.05	17 (10–23) ERD vs controls <i>P</i> < 0.05
Acid refluxes (n)	49 (39–70) ERD vs NERD <i>P</i> > 0.05	39 (32–55) NERD vs controls <i>P</i> < 0.05	13 (5–18) ERD vs controls <i>P</i> < 0.05
Weakly acidic refluxes (n)	9 (7–21) ERD vs NERD <i>P</i> > 0.05	11 (7–18) NERD vs controls <i>P</i> < 0.05	5 (2–9) ERD vs controls <i>P</i> < 0.05
Weakly alkaline refluxes (n)	0 (0–0) ERD vs NERD <i>P</i> > 0.05	0 (0–0) NERD vs controls <i>P</i> > 0.05	0 (0–0) ERD vs controls <i>P</i> > 0.05
BCT (s)	15 (11–19) ERD vs NERD <i>P</i> > 0.05	15 (11–20) NERD vs controls <i>P</i> > 0.05	12 (8–17) ERD vs controls <i>P</i> > 0.05
PSPW index (%)	15 (10–24) ERD vs NERD <i>P</i> < 0.05	33 (24–41) NERD vs controls <i>P</i> < 0.05	75 (66–86) ERD vs controls <i>P</i> < 0.05

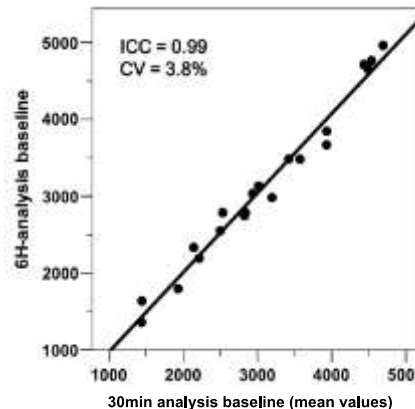
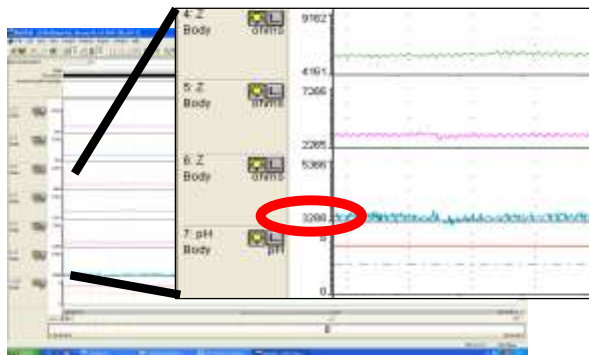


The PSPW index is defined as the number of refluxes followed within 30 s by a swallow-induced peristaltic wave divided by the number of total refluxes to obtain a parameter representing the efficacy of chemical clearance.

de Bortoli N. – Digestive Disease Week 2014

## NOCTURNAL BASELINE IMPEDANCE LEVELS

- Channel: 3cm
- During overnight rest at 1 am, 2 am and 3 am
- 30-min time window (excluding swallowing, reflux and pH drops)



de Bortoli N. – Neurogastroenterology 2014



May 3-6, 2014  
Exhibit Dates: May 4-6, 2014  
McCormick Place  
Chicago, IL



*Non-erosive reflux disease (NERD) — acid reflux and symptom patterns*

S. D. MARTINEZ†, I. B. MALAGON†, H. S. GAREWAL†, H. CUI‡ & R. FASS†  
 †Department of Medicine, Section of Gastroenterology and Hematology/Oncology, Southern Arizona VA Health Care System and Arizona Health Sciences Center, and ‡Department of Biometry, Arizona Cancer Center, Tucson, AZ, USA

→ **50%**  
*pH-metry alone*

**Impedance-pH reflux patterns can differentiate non-erosive reflux disease from functional heartburn patients**

Edoardo Savarino · Patrizia Zentilin · Radu Tutuian · Daniel Pohl · Lorenzo Gemignani · Alberto Malesci · Vincenzo Savarino

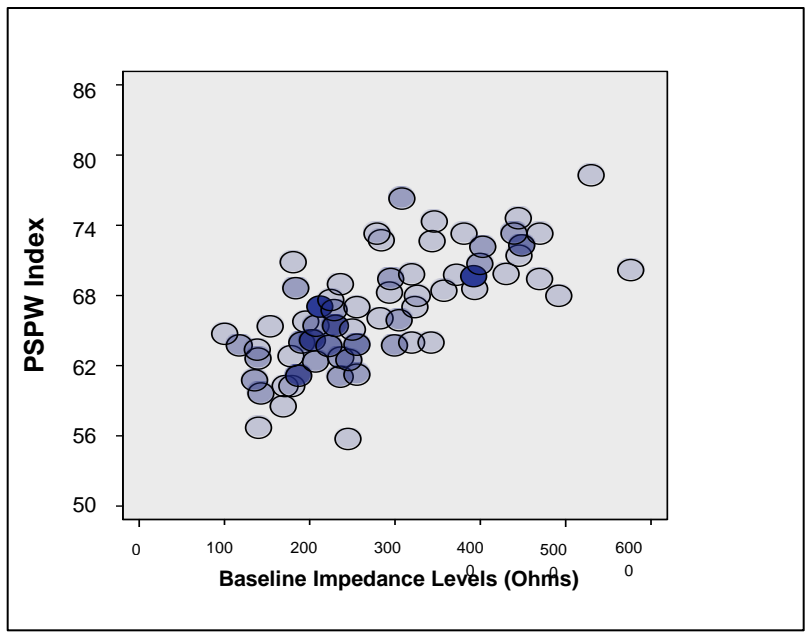
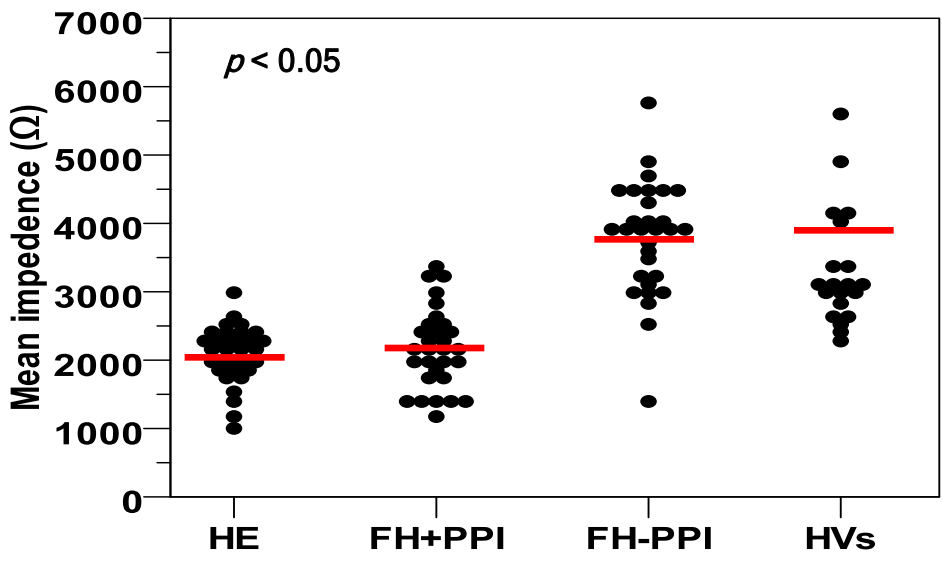
→ **74%**  
*MII-pH 24-h*

**Esophageal baseline impedance levels in patients with pathophysiological characteristics of functional heartburn**

N. DE BORTOLI,\* I. MARTINUCCI,\* E. SAVARINO,† P. PIAGGI,‡ M. BELLINI,\* A. ANTONELLI,§ V. SAVARINO,¶ M. FRAZZONI\*\* & S. MARCHI\*

→ **89%**  
*MII-pH -baseline and PSPW*

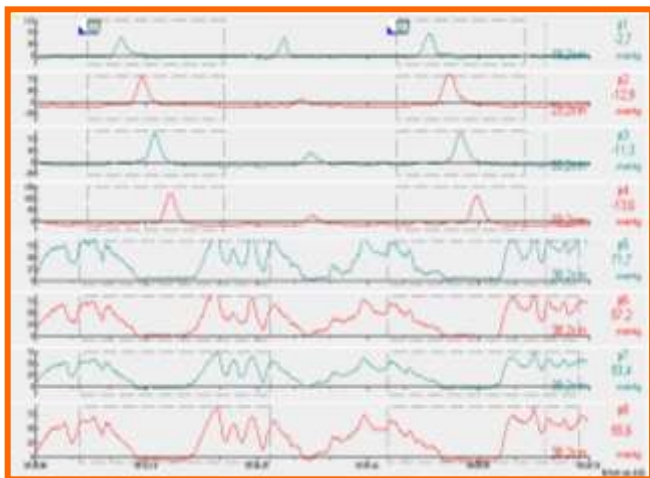
**DIAGNOSTIC ACCURACY**



# ABNORMAL MOTILITY OF THE ESOPHAGUS

(Eosinophilic Esophagitis; Achalasia; Primary Motor Disorder of the Esophagus)

## STANDARD ESOPHAGEAL MANOMETRY



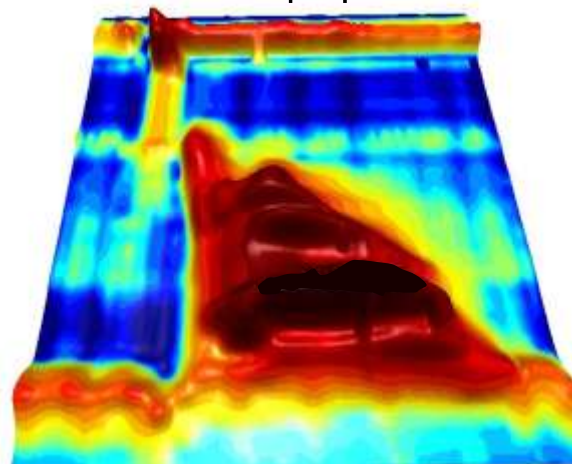
9E-12-100A



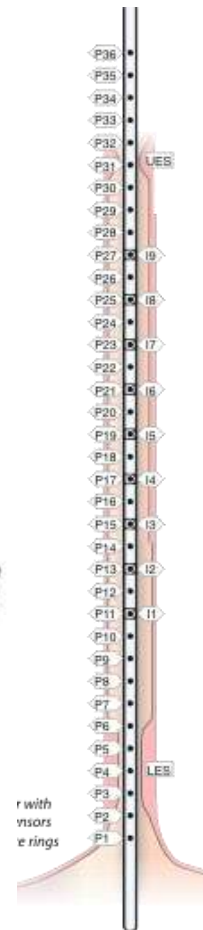
8 CHANNELS

## HIGH RESOLUTION MANOMETRY

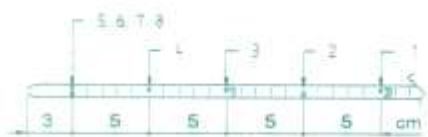
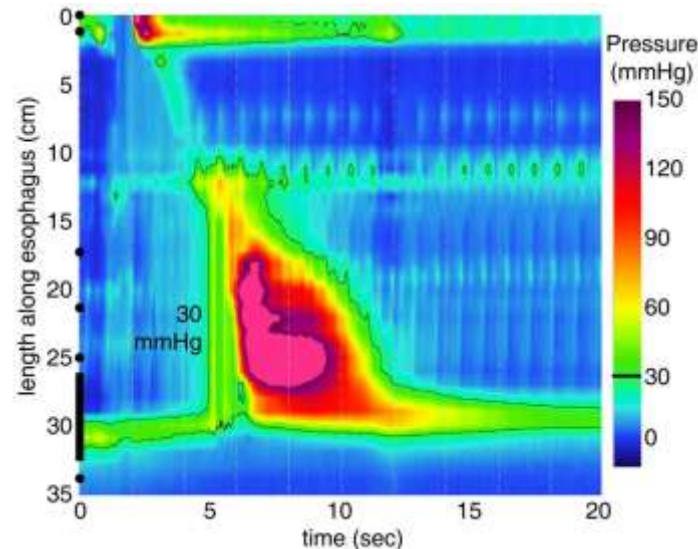
Landscape plot



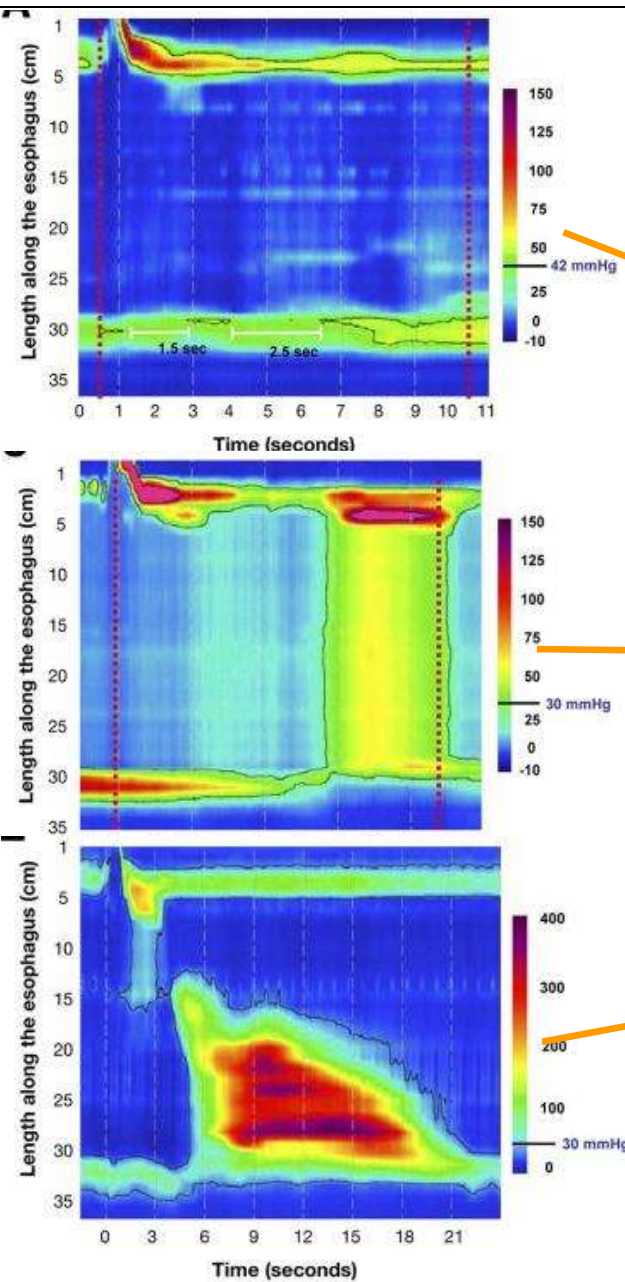
36 X 12 CHANNELS



Pressure Topography Plot



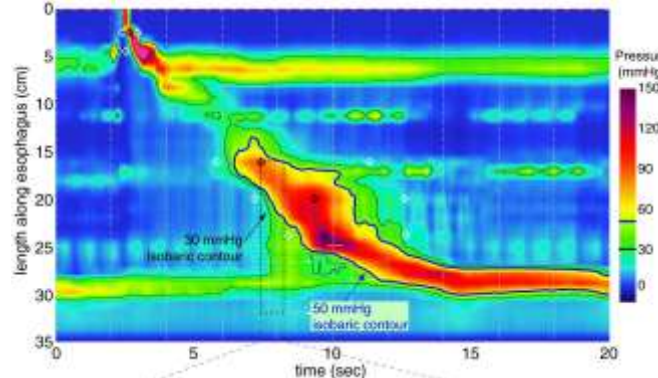
# SUBTYPES OF ACHALASIA



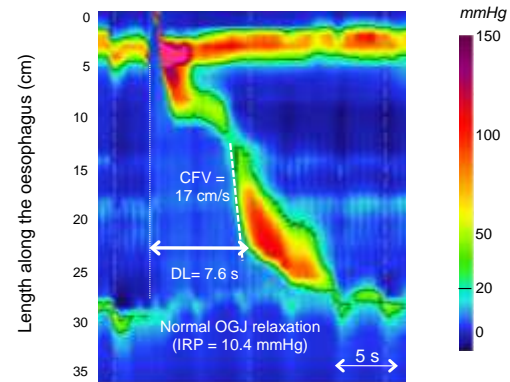
# IMPROVEMENT OF DIAGNOSIS: 45%

Achalasia Intervention	Type I Classic	Type II compression	Type III Spasm	All Types
Botulinum toxin	0% (0/2)	86% (6/7)	22% (2/9)	39% (7/18)
Pneumatic dilation	38% (3/8)	73% (19/26)	0% (0/11)	53% (24/45)
Heller Myotomy	67% (4/6)	100% (13/13)	0% (0/1)	85% (17/20)
All (any) interventions	44% (7/16)	83% (38/46)	9% (2/21)	56% (47/83)

# ESOPHAGO-GASTRIC JUNCTION OUTFLOW OBSTRUCTION



**IMPROVEMENT OF DIAGNOSIS: 100%**



# EOSINOPHILIC ESOPHAGITIS

**IMPROVEMENT OF DIAGNOSIS: 70%**

**Rapid contractions with normal latency**  
 Rapid contraction with  $\geq 20\%$  of swallows  
 DL > 4.5 s

Clinical pre-diagnosis that requires histopathological confirmation

# CONCLUSIONS

- New technologies improve our knowledges in esophageal diseases and especially improve our diagnostic power
- Baseline impedance value and PSPW will be considered in the new Classification of GERD
- High Resolution Manometry took us a lot of new informations about esophageal physiology and pathophysiology.
- It will be used to re-evaluate (re-write) the classifications of motor esophageal diseases.

*“A fundamental rule in new technology says that whatever can be done will be done.”* Adrew Groves

## OUR COLLABORATIONS



Department of Medicine  
Feinberg School of Medicine  
Northwestern University



UNIVERSITY OF LYON



UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA



Academic Medical Center

University of Amsterdam



UNIVERSITÀ DEGLI STUDI  
DI GENOVA

**u<sup>b</sup>**

**Home Institution:**  
University of Bern

**UNIVERSITÄT  
BERN**