

# NTM Lecture Series for Patients

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NATIONAL JEWISH HEALTH

## Overview of GERD

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# Disclosures

- I have no financial disclosures
- The off-label use of the medications baclofen and bethanechol will be discussed in this talk

# Learning Objectives

- I. Understand how GERD may effect NTM pulmonary disease
- II. Understand options for reflux testing
- III. Understand how reflux management may differ when trying to prevent aspiration

# Outline

- I. Definitions & Epidemiology
- II. Relationship Between GI Tract and Lungs
- III. GERD and NTM
- IV. Reflux Testing
- V. Treatment of Reflux

# Definitions & Epidemiology

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# What is GERD?

- **GERD (Gastroesophageal Reflux Disease)**: symptoms or complications resulting from the reflux of gastric contents into the esophagus or beyond, including the oral cavity and/or lungs
  - **Heartburn**: uncomfortable feeling of burning/warmth rising up behind the sternum toward the neck
  - **Regurgitation**: retrograde movement of GI contents up the esophagus, often causing an acid/sour taste and/or sensation of liquid/food in chest or throat
- **Laryngopharyngeal Reflux (LPR)**: retrograde movement of gastric contents into the larynx, pharynx, and upper aerodigestive tract
- **Aspiration**: entry of material from the oropharynx or GI tract into the larynx and lower respiratory tract

## How Common is GERD?

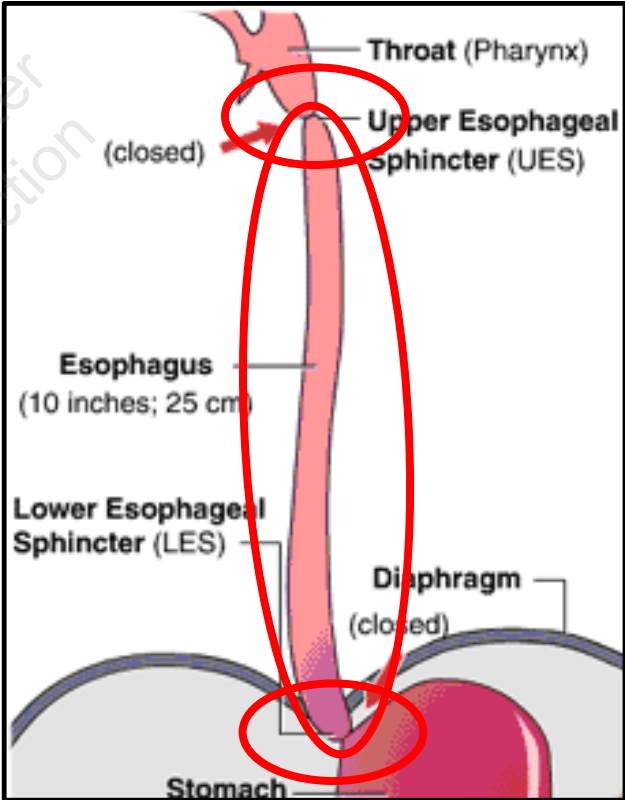
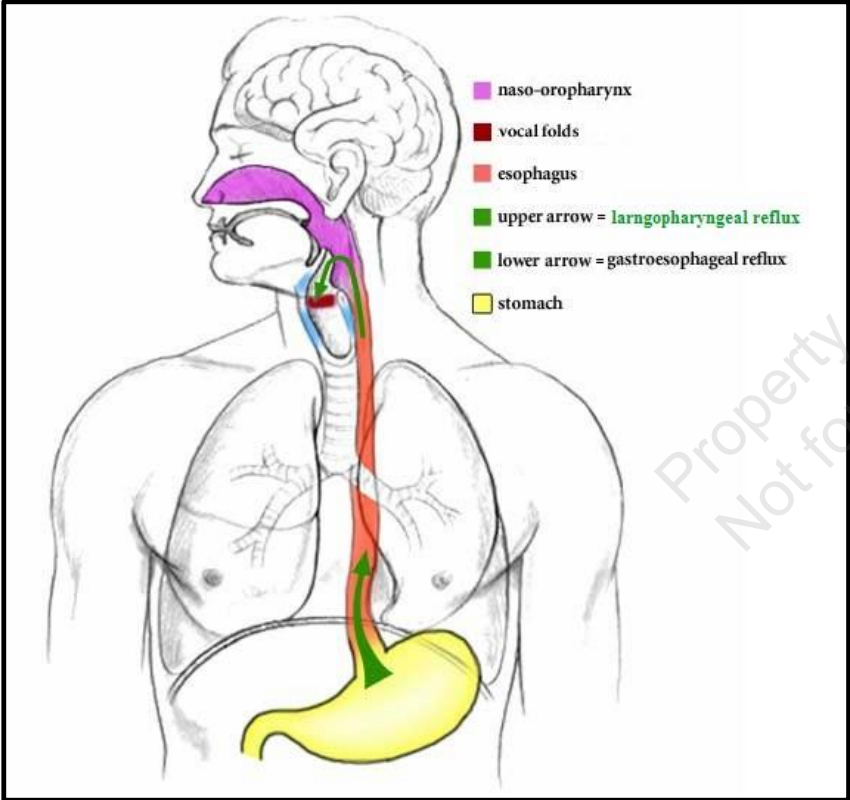
- 60% of adults experience reflux symptoms over a 12 month period
- 30-40% had reflux symptoms in the last month
- 20-30% have weekly symptoms
- 10% have symptoms  $\geq$  twice weekly

# Relationship Between GI Tract and Lungs

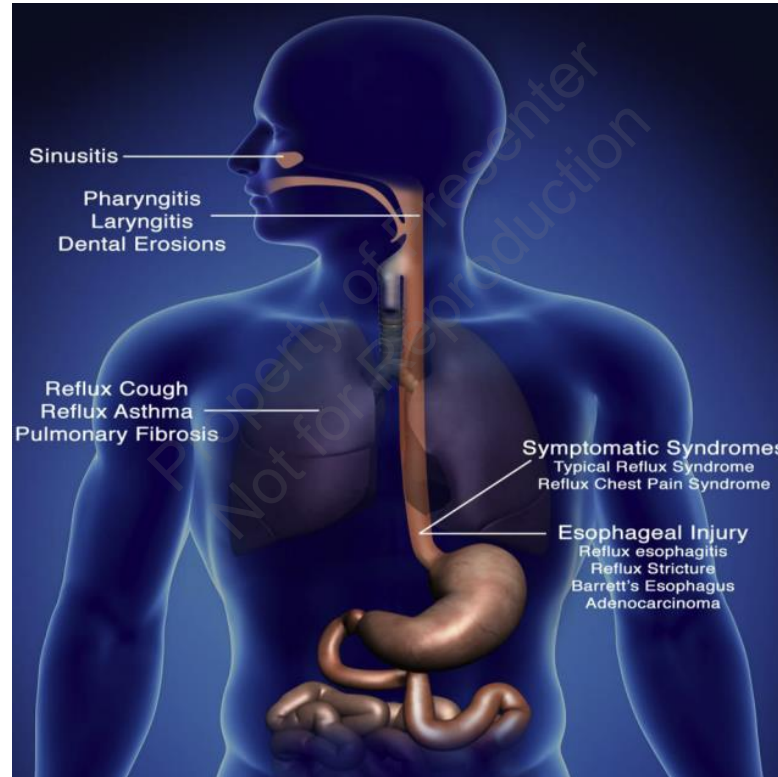
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# Devine Design?



# Manifestations of GERD



# GERD and NTM

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## How Does GERD Relate to NTM?

- NTM are ubiquitous environmental organisms
- Ingested NTM may reflux from the stomach and be aspirated into the lungs
- In the proper host setting, this may result in chronic infection

# GERD and NTM

**Table 4—Prevalence of GERD and Consumption of Acid-Suppressive Medication in Cases (MAC+) and Controls (MAC-)\***

Variables	MAC+	MAC-	p Value (Fisher Exact Test)
GERD	25 (43.1)	16 (27.6)	< 0.0001
Antacids	4 (6.9)	14 (24.1)	0.038
H2RAs	15 (25.9)	6 (10.3)	0.013
Proton-pump inhibitor	12 (20.7)	7 (12.1)	0.127
Prokinetic agents	4 (6.9)	0	0.039
Any acid suppression	27 (56.3)	26 (44.8)	0.165

\*Data are presented as No. (%).

# GERD and NTM

Table 3—Demographic Characteristics of GERD-Positive and GERD-Negative Patients With the Nodular Bronchiectatic Form of NTM Lung Disease\*

Characteristics	GERD Positive (n = 15)	GERD Negative (n = 43)	p Value
Age, yr	56 (43–63.5)	57 (53–66.5)	0.320
Female gender	13 (87)	37 (86)	1.000
Body mass index, kg/m <sup>2</sup>	20.0 (18.6–21.7)	20.6 (19.5–22.2)	0.316
Smoking status			
Non-smoker	14 (93)	40 (93)	1.000
Ex-smoker	1 (7)	3 (7)	
Etiology			
<i>M avium</i> complex	5 (33)	22 (51)	0.368
<i>M abscessus</i>	10 (67)	21 (49)	
AFB smear positive	12 (80)	19 (44)	0.033
Involved lobes on HRCT, No.			
Bronchiectasis	4 (3–4)	2 (2–3)	0.008
Bronchiolitis	4 (3–5)	2 (2–4)	0.005
Pulmonary function tests			
FVC, % of predicted	93.0 (83.0–102.0)	87.0 (77.5–93.5)	0.170
FEV <sub>1</sub> , % of predicted	92.5 (76.5–107.0)	88.0 (72.5–102.0)	0.508
FEV <sub>1</sub> /FVC, ratio	76.0 (67.0–84.0)	74.0 (71.0–80.0)	0.880
Peak expiratory flow, % of predicted	92.0 (80.0–111.5)	96.0 (74.5–99.0)	0.748

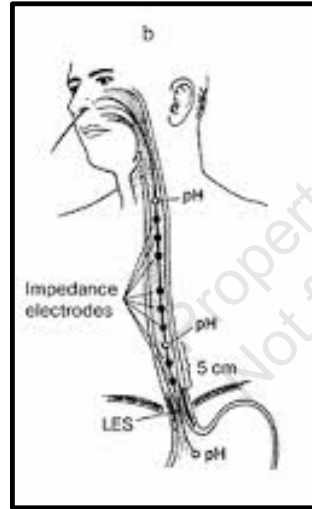
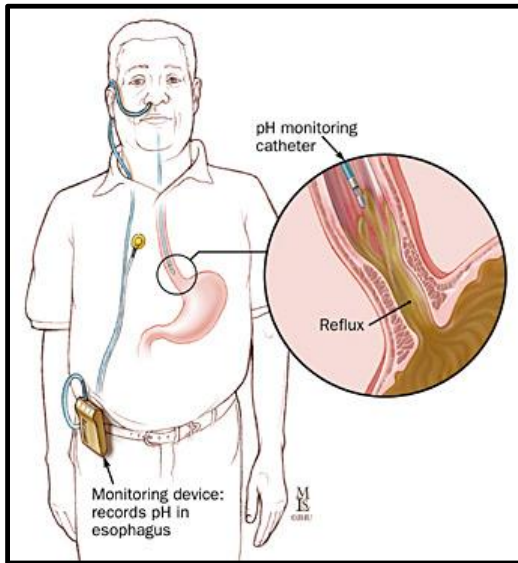
\*Data are presented as the median (interquartile range) or No. (%). Bronchiolitis was defined as the presence of small centrilobular nodules (< 10 mm in diameter) or branching nodular structures (tree-in-bud pattern) on HRCT.

# Reflux Testing

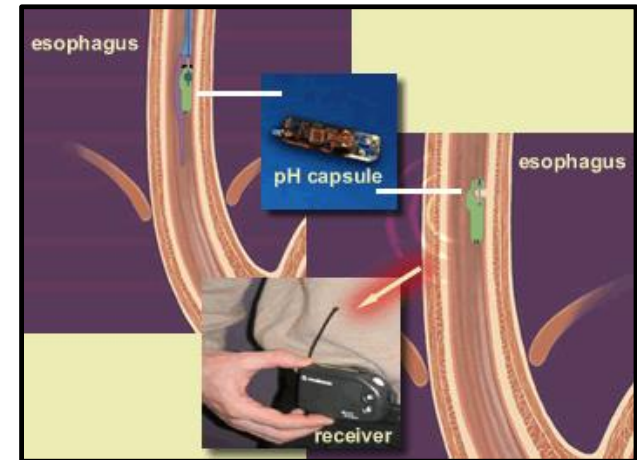
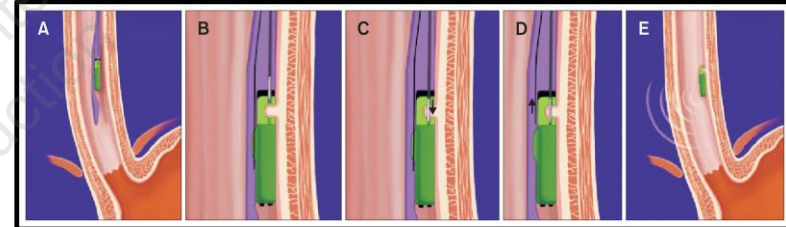
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# Reflux Testing

## pH-Impedance Testing



## Bravo pH Testing





# pH-Impedance vs. Bravo

	pH-Impedance	Bravo
Time	22-24 hrs	48-96 hrs ✓
Where in Esophagus	Top and bottom ✓	Bottom
Discomfort	Yes	Minimal ✓
Detects Acid	Yes ✓	Yes ✓
Detects Non-acid	Yes ✓	No
Ease of Interpretation	Nuanced	? Easy

# Treatment of Reflux

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# How Can We Reduce Reflux?

1. Lifestyle modifications
2. Medications
3. Anti-reflux procedures

# Lifestyle Modifications for GERD

**Table 3. Efficacy of lifestyle interventions for GERD**

Lifestyle intervention	Effect of intervention on GERD parameters	Sources of data	Recommendation
Weight loss (46,47,48)	Improvement of GERD symptoms and esophageal pH	Case-Control	Strong recommendation for patients with BMI>25 or patients with recent weight gain
Head of bed elevation (50-52)	Improved esophageal pH and symptoms	Randomized Controlled Trial	Head of bed elevation with foam wedge or blocks in patients with nocturnal GERD
Avoidance of late evening meals (180, 181)	Improved nocturnal gastric acidity but not symptoms	Case-Control	Avoid eating meals with high fat content within 2-3h of reclining
Tobacco and alcohol cessation (182-184)	No change in symptoms or esophageal pH	Case-Control	Not recommended to improve GERD symptoms
Cessation of chocolate, caffeine, spicy foods, citrus, carbonated beverages	No studies performed	No evidence	Not routinely recommended for GERD patients. Selective elimination could be considered if patients note correlation with GERD symptoms and improvement with elimination

BMI, body mass index; GERD, gastroesophageal reflux disease.

# Management of Suspected Extraesophageal Reflux – AGA Recs

**Grade B: recommended with fair evidence that it improves important outcomes**

- I. Acute or maintenance therapy with once- or twice-daily PPIs (or H<sub>2</sub>RAs) for patients with a suspected extra-esophageal GERD syndrome (laryngitis, asthma) with a concomitant esophageal GERD syndrome.

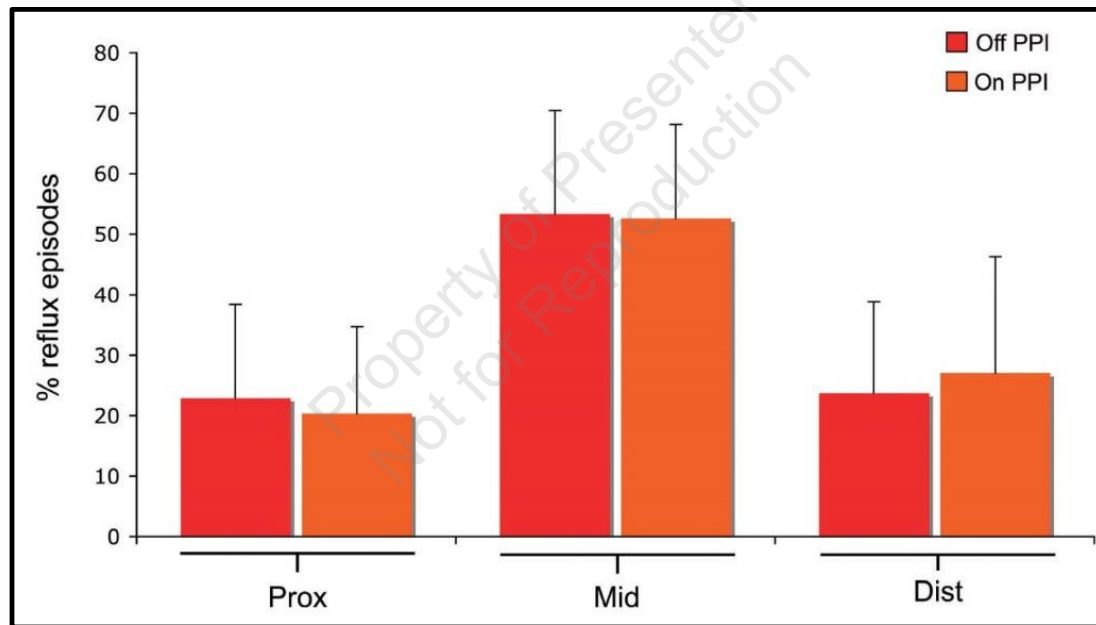
**Grade D: recommend against, fair evidence that it is ineffective or harms outweigh benefits**

- I. Once- or twice-daily PPIs (or H<sub>2</sub>RAs) for acute treatment of patients with potential extraesophageal GERD syndromes (laryngitis, asthma) in the absence of a concomitant esophageal GERD syndrome.

**Grade Insuff: no recommendation, insufficient evidence to recommend for or against**

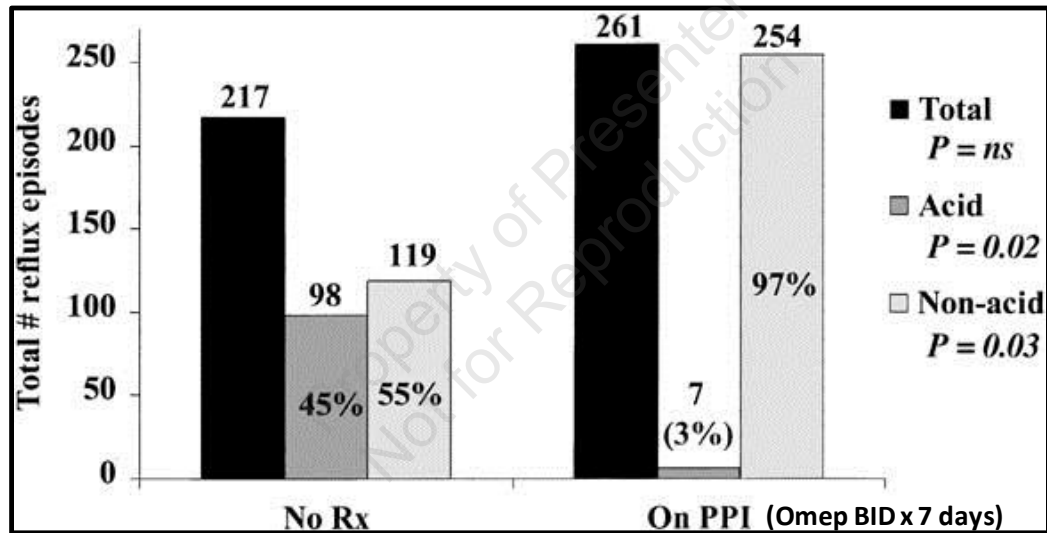
- I. Once- or twice-daily PPIs for patients with suspected reflux cough syndrome.

# Why Aren't Acid Reducers the Right Choice?



*Am J Gastroenterol.* 2008 Oct;103(10):2446-53.

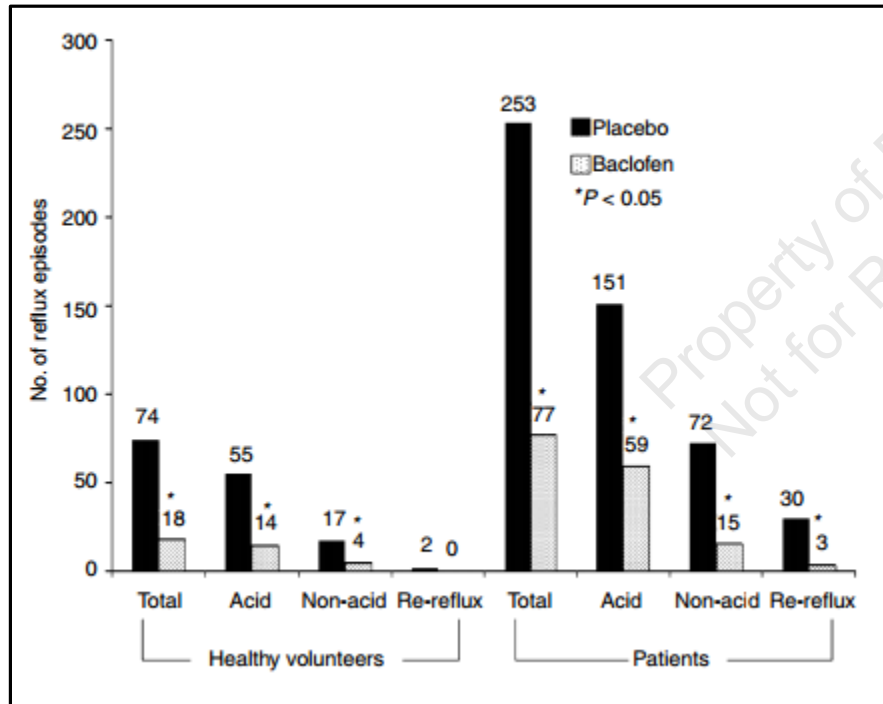
# Why Aren't Acid Reducers the Right Choice?



**\*\* PPIs REDUCE ACID, NOT REFLUX \*\***

# Are There Medications That Reduce Reflux?

## Baclofen



*Aliment Pharmacol Ther.* 2003 Jan;17(2):243-51.

## Bethanechol

- Improves esophageal motility/clearance
- Increases LES pressures
- Anecdotal evidence of reducing reflux
- \*\* No reflux studies \*\*

*Yale J Biol Med.* 1999 Mar-Jun;72(2-3):173-80.

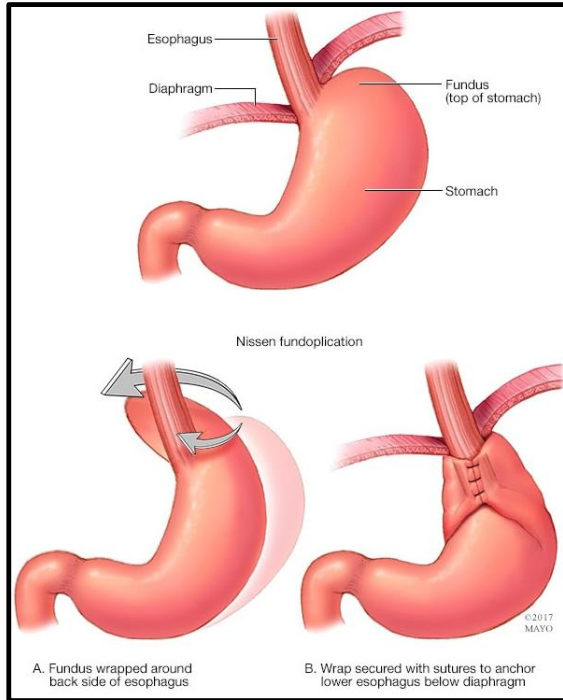
*J Clin Gastroenterol.* 2007 Apr;41(4):366-70.

*Gut.* 1999 Sep;45:346-54.

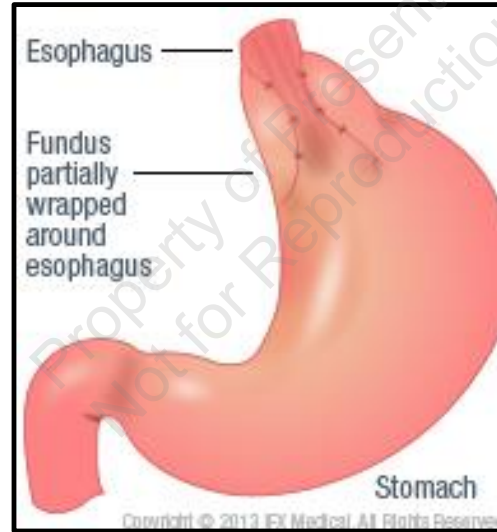


# Antireflux Surgeries

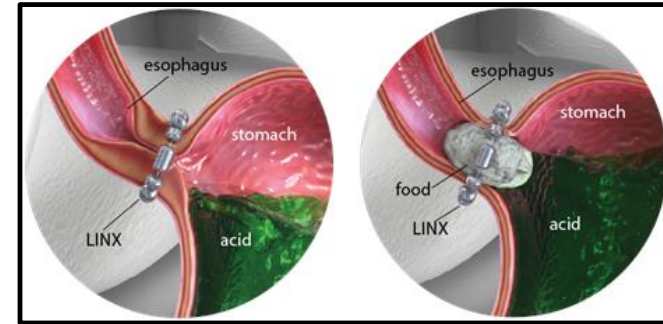
## Nissen Fundoplication



## Partial Fundoplication



## LINX Procedure



## Take Home Points

- Not all reflux is acid
- The GI tract and airway are close together
- Choose the proper reflux test and interpret properly
- Acid reducers don't reduce reflux
- Lifestyle mods, meds, and surgery can reduce reflux

# Thank You



# References

- 1) *Am J Gastroenterol*. 2013 Feb;108:308-28
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- 3) *Chest*. 2007 Jun;131(6):1825-30
- 4) *Chest*. 2007 Apr;131(4):1166-72
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- 6) *Am J Gastroenterol*. 2008 Oct;103(10):2446-53
- 7) *Gastroenterology*. 2001 Jun;120(7):1599-1606
- 8) *Aliment Pharmacol Ther*. 2003 Jan;17(2):243-51
- 9) *Yale J Biol Med*. 1999 Mar-Jun;72(2-3)173-80
- 10) *J Clin Gastroenterol*. 2007 Apr;41(4):366-70
- 11) *Gut*. 1999 Sep;45:346-54