

Heartburn

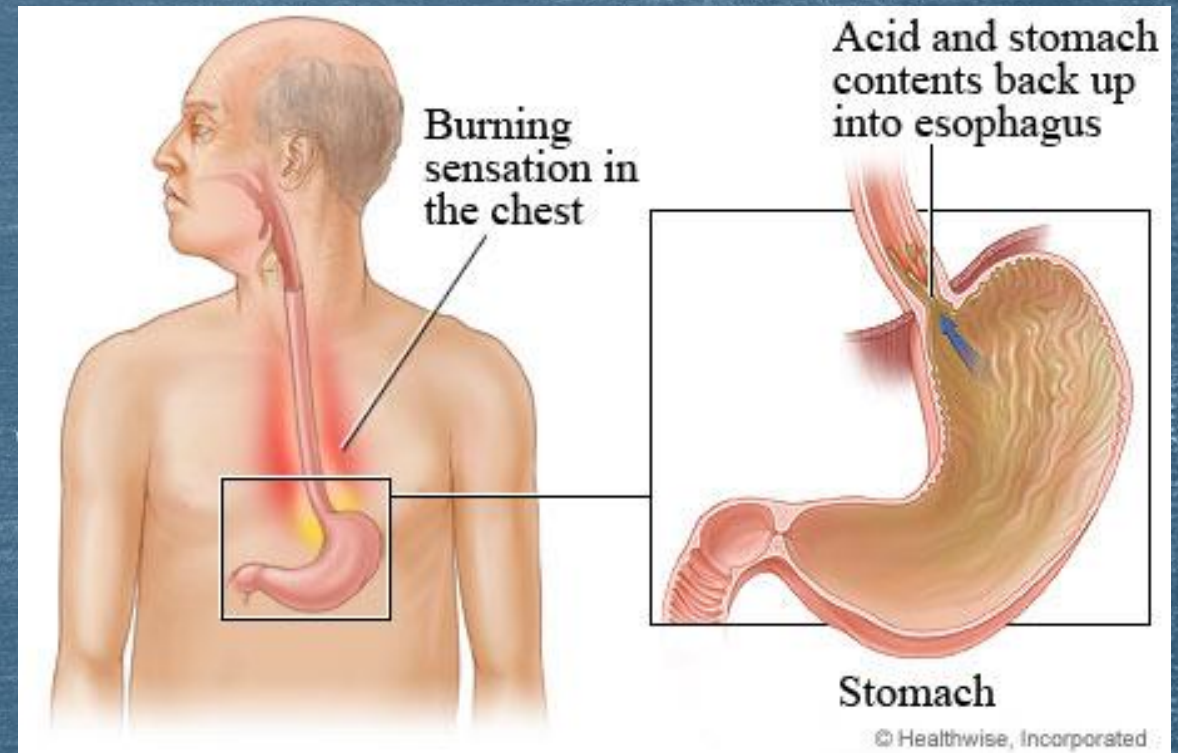
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What is Heartburn?


- ▶ Origins
 - ▶ Greek
 - ▶ Used to be spelled “herte-brine”, meaning lust
 - ▶ Associated with indigestion since 15th century
- ▶ A condition in which a person has a burning feeling in their stomach, which can rise up into their esophagus, and can be accompanied by burping up stomach acid
- ▶ Means stomach acid is entering bottom of the esophagus

When Heartburn Becomes a Problem

- ▶ Occasional heartburn is normal
- ▶ “GERD” (Gastroesophageal Reflux Disease)
 - ▶ Frequent Heartburn
 - ▶ Could lead to chronic cough or ulcers in esophagus




Hierarchy of Organization



Molecules	Cells	Tissues	Organs
Hydrochloric Acid	Epithelial Cells	Lower Esophageal Sphincter (muscle tissue)	Esophagus
Proton Pump (a protein)	Mucous Cells	Epithelial Tissue that lines the esophagus	Stomach

- **Hydrochloric acid**- stomach acid, gets into esophagus and burns it (located in stomach)
- **"Proton pump"**- important protein that starts stomach acid production (located in stomach)
- **Epithelial cells**- damaged when stomach acid comes into esophagus (located in esophagus)
- **Mucous cells**- secrete alkaline mucus that hydrochloric acid can't penetrate, keeps epithelial layer of stomach safe from burning (located in stomach)

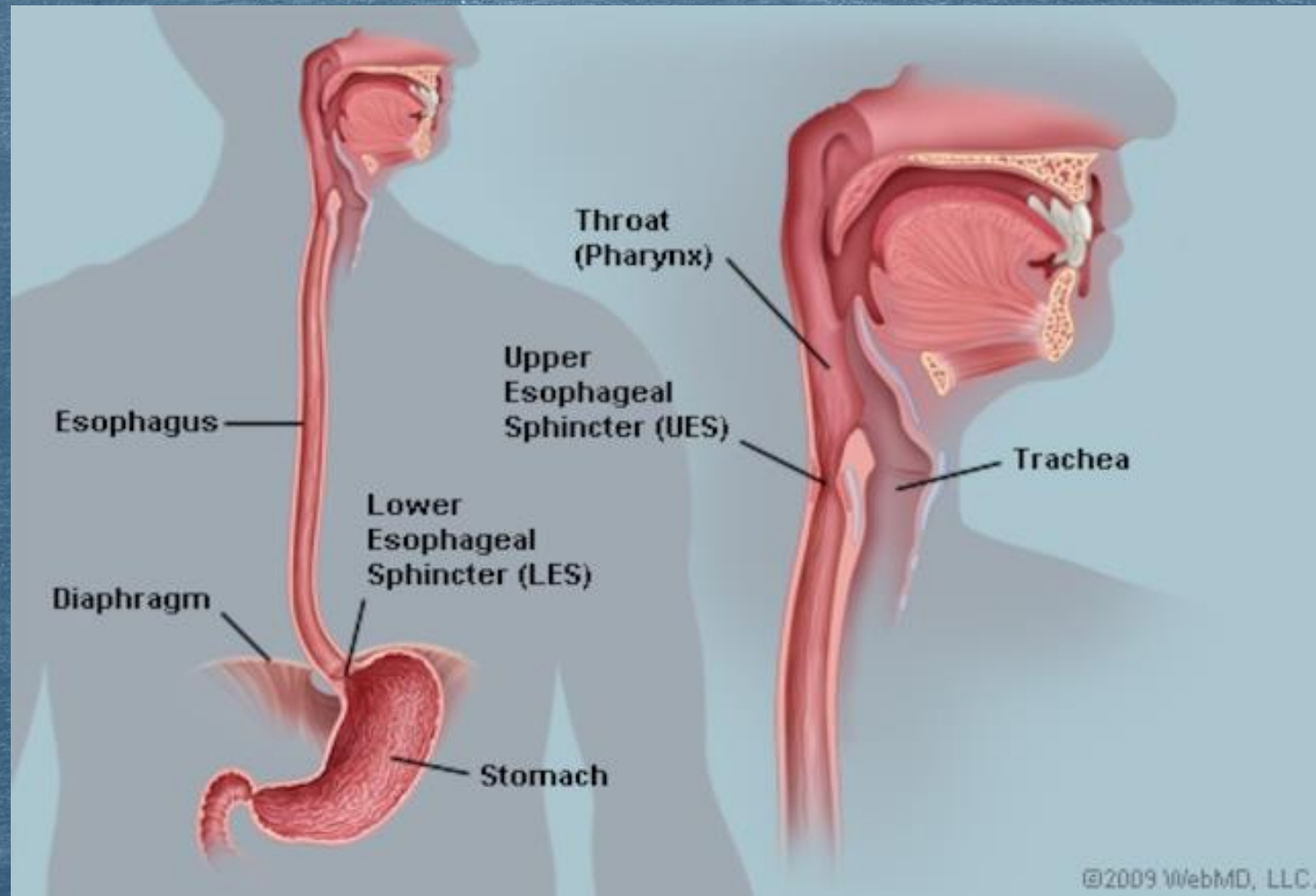
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- **Epithelial tissue**- lines esophagus, could get ulcers due to chronic heartburn (located in esophagus)
- **Lower esophageal sphincter**- tissue blocking stomach opening. Does not function properly during heartburn: either does not shut all the way, or muscles produce weak contractions
- **Stomach**- houses and produces stomach acid
- **Esophagus**- when stomach acid enters it hurt by high acidity of stomach acid when it enters it, and if the acid travels up it

Diagram



Heartburn Experiment

- ▶ Summary:

- ▶ Clinical trial- patients with NERD (a form of GERD) took new medication designed to reduce heartburn (dexlansoprazole MR)
- ▶ 3 groups: placebo, 30 mg dose, or 60 mg dose.
- ▶ Evaluated patients based on daytime heartburn (24 hour heartburn-free days) and nighttime heartburn

- ▶ Why?

- ▶ NERD patients (in comparison to other types of chronic heartburn) are less responsive to another therapy for heartburn- proton pump inhibitor, want to test new medication

Heartburn Experiment (cont.)

- ▶ Hypothesis:

- ▶ If patients with NERD take 30 mg or 60 mg dose of new medication, then will experience more 24 hour heartburn-free days and nights without heartburn

- ▶ Controls:

- ▶ Randomized, double-blind clinical trial
 - ▶ Placebo given to one patient group

Heartburn Experiment (cont.)

- ▶ Variable Being Tested:
 - ▶ Patients' response to 30 mg or 60 mg daily dose of dexlansoprazole MR
- ▶ Results: Two groups taking daily dose of new medication had
 - ▶ Greater percentage of 24 hour heartburn free days than placebo group
 - ▶ Greater percentage of heartburn-free nights than placebo group
 - ▶ Results did support hypothesis

Figure 2 from Heartburn Experiment

- ▶ Shows median percentage of 24-hour heartburn free days reported by each of the 3 study groups
- ▶ Percentages for doses of new medication are much higher than placebo percentage
 - ▶ Patients taking the medication had many more 24 hour heartburn-free days
- ▶ Statistically significant

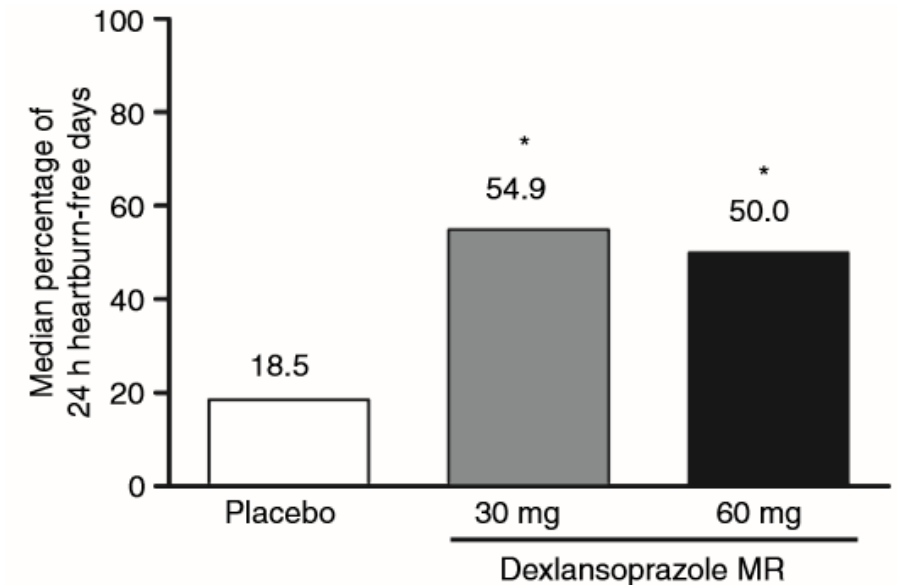


Figure 2. Median percentage of 24-h heartburn-free days.
* $P < 0.00001$.

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