

## Gastric Digestion 1: Swallowing, the Esophagus, & Gastric Secretions

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### Swallowing & the Esophagus

#### Swallowing

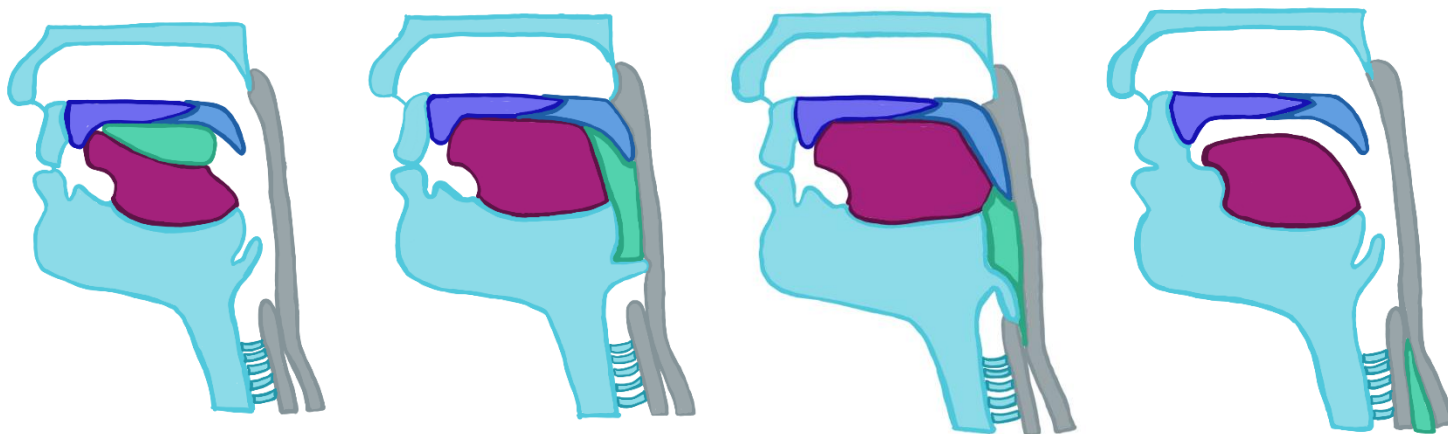
Normal adults swallow:

When a swallow is triggered, the first step in swallowing (or \_\_\_\_\_) occurs, which is the only voluntary stage. The following three stages in swallowing are \_\_\_\_\_:

- 1) Oral Phase: \_\_\_\_\_  
\_\_\_\_\_
- 2) Pharyngeal Phase: \_\_\_\_\_  
\_\_\_\_\_
- 3) Esophageal Phase: \_\_\_\_\_  
\_\_\_\_\_

The entire process of swallowing takes \_\_\_\_\_

#### Steps in Swallowing



## Esophageal Anatomy

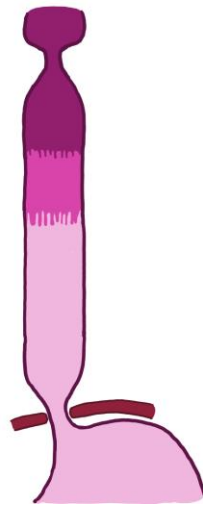
The main purpose of the esophagus is \_\_\_\_\_

The typical dimensions of the esophagus in adults are: \_\_\_\_\_ long, \_\_\_\_\_ diameter

The length of the esophagus is \_\_\_\_\_

Movement of material in the esophagus is controlled by two sphincters, or “\_\_\_\_\_” at the top and bottom. Both of these sphincters (\_\_\_\_\_) are normally \_\_\_\_\_

- Upper esophageal sphincter: between the \_\_\_\_\_
- Lower esophageal sphincter: between the \_\_\_\_\_



## Esophageal Motility

Once a bolus passes through the UES, \_\_\_\_\_ propels the bolus through the esophagus \_\_\_\_\_.

The primary peristaltic wave first \_\_\_\_\_, then \_\_\_\_\_.

The peristaltic wave creates a wave of \_\_\_\_\_ and moves through the esophagus at \_\_\_\_\_.

After a swallow, \_\_\_\_\_ is a peristaltic wave that is initiated in the esophagus and are \_\_\_\_\_ → Typically \_\_\_\_\_

### Gastric Anatomy and Basic Function

The stomach is a \_\_\_\_\_ organ where \_\_\_\_\_  
that connects the \_\_\_\_\_ to the \_\_\_\_\_

The main functions of the stomach are to:

- 1) Serve as a \_\_\_\_\_
- 2) Control the \_\_\_\_\_
- 3) Continue \_\_\_\_\_
- 4) Enzymatic hydrolysis of \_\_\_\_\_
- 5) Decrease in the amount of \_\_\_\_\_

Gastric Component	Key Attributes & Function
Lower Esophageal Sphincter	
Cardia	
Fundus	
Body	
Antrum	
Pylorus	
Pyloric Sphincter	
Greater Curvature	
Lesser Curvature	
Rugae	



In many anatomical descriptions, the terms proximal and distal are utilized to describe relative location within the body, where: proximal refers to \_\_\_\_\_

Conversely, distal refers to \_\_\_\_\_

If we look at our overall gastric anatomy, we can identify the proximal vs. distal gastric regions as:



*Example image of porcine gastric rugae*



*Example image of porcine gastric pylorus*

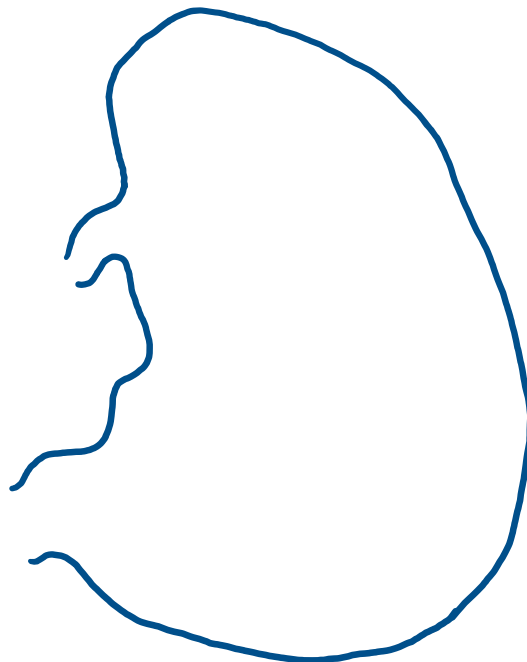


## Gastric Secretions

Gastric secretions are important in:

Gastric Secretory Product	Source (Cells where Secreted)	Function
Hydrochloric acid (HCl)		
Intrinsic factor		
Pepsinogen		
Mucus		
Bicarbonate		
Trefoil factors		
Histamine		
Gastrin		
Gastric-releasing peptide, Acetylcholine (Ach)		
Somatostatin		

## Functional Regions of the Stomach & Gastric Secretory Products



### Gastric Secretory Glands

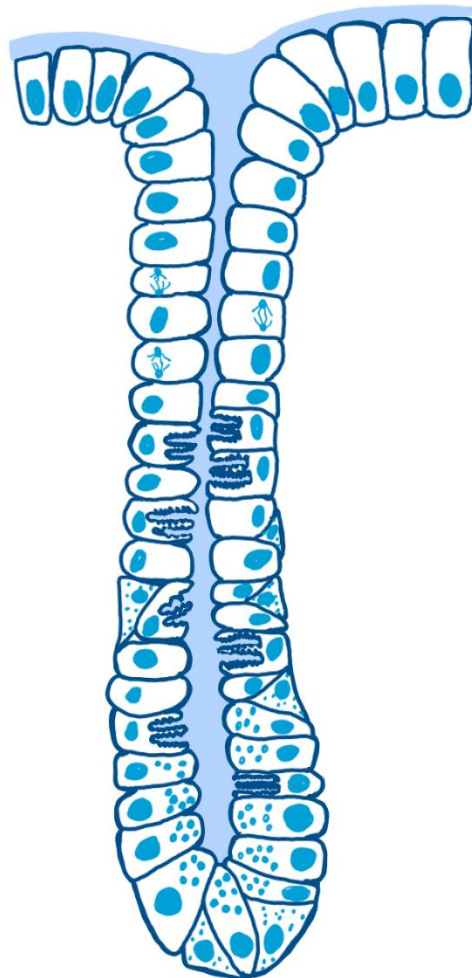
Gastric glands are located in the \_\_\_\_\_ and \_\_\_\_\_ of the stomach and contain \_\_\_\_\_

Sometimes these glands are referred to as \_\_\_\_\_ glands

In the gastric antrum, secretory glands do not contain \_\_\_\_\_ or \_\_\_\_\_ cells, but rather contain \_\_\_\_\_ and \_\_\_\_\_

Enteroendocrine cells these include several types of cells such as \_\_\_\_\_ that secrete various compounds that act to \_\_\_\_\_

### Gastric Gland Structure in the Fundus & Body



## **Regulation of Gastric Secretions**

The component of gastric secretions that has been researched in the most detail is \_\_\_\_\_,  
by the \_\_\_\_\_

Since \_\_\_\_\_ secretion by \_\_\_\_\_ is influenced by similar regulatory factors, the secretion of \_\_\_\_\_ and \_\_\_\_\_ typically rise simultaneously.

## **Basal Gastric Secretions**

Between meals, the stomach secretes basal (baseline) acidic secretions.

Acid output in the basal secretions is \_\_\_\_\_, with a pH of \_\_\_\_\_

## **Postprandial Gastric Secretions**

Postprandial means \_\_\_\_\_

Maximum gastric secretory output: \_\_\_\_\_, or \_\_\_\_\_

There are 3 phases of postprandial gastric secretions based on what impacts secretion rate:

1. Cephalic
2. Gastric
3. Intestinal

**Cephalic Phase:** gastric secretions initiated by \_\_\_\_\_,  
even \_\_\_\_\_

→ Why? \_\_\_\_\_

Accounts for \_\_\_\_\_ of maximum gastric secretory response

Response varies with meal: \_\_\_\_\_

Can test to determine the gastric secretions in the cephalic phase by:

How secretions are modified:

- \_\_\_\_\_ stimulated
- \_\_\_\_\_ inhibited

**Gastric Phase:** initiated by \_\_\_\_\_

Accounts for \_\_\_\_\_ of maximum secretory response

How secretions are modified:

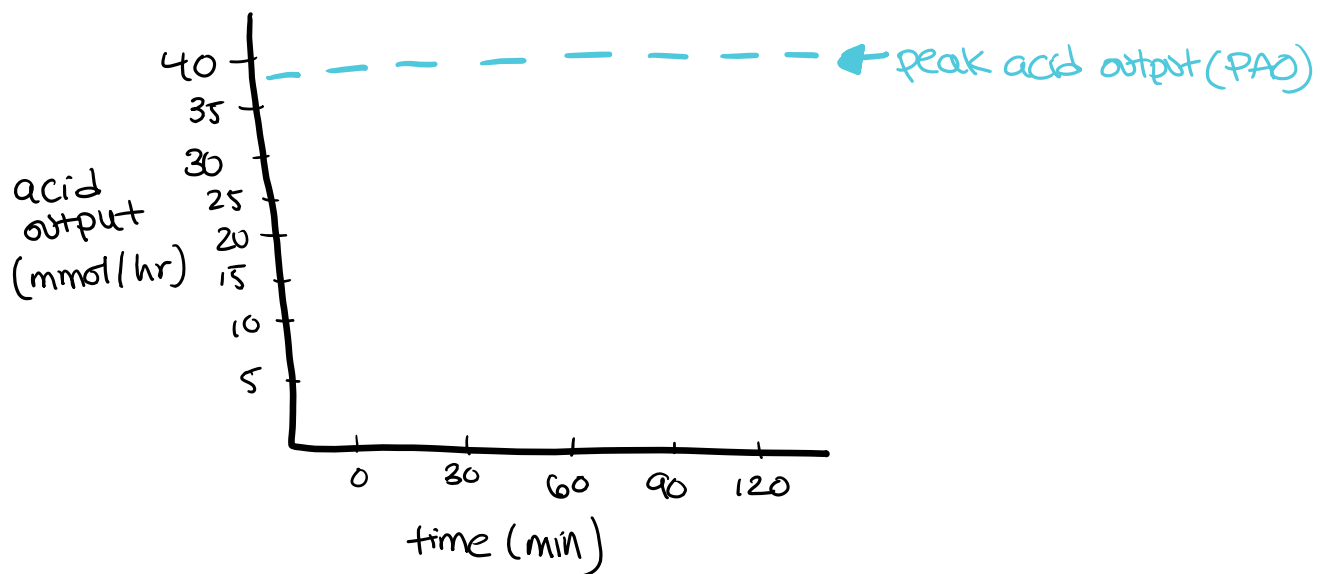
- \_\_\_\_\_ increases regulation initiated in cephalic phase
- \_\_\_\_\_ in the antrum also stimulate gastric secretions

**Intestinal Phase:** starts as the meal \_\_\_\_\_

as gastric pH decreases to \_\_\_\_\_

How secretions are modified:

- \_\_\_\_\_ stimulated to release \_\_\_\_\_ which inhibits secretions
- Inhibited by presence of \_\_\_\_\_ in small intestine

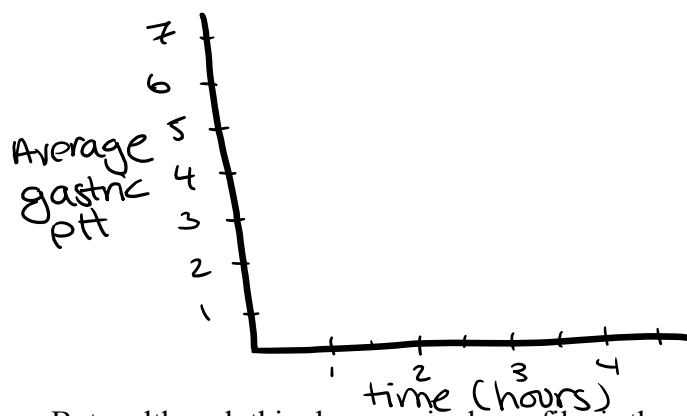




### Postprandial Gastric pH Distribution

Due to gastric secretions of \_\_\_\_\_, the pH of the ingested meal will drop as the meal

Average gastric pH after a meal



But...although this shows a single profile, is the pH uniform throughout the stomach?

In humans, there has been evidence of an “acid pocket” or layer of gastric acid on top of the meal



Why would this make sense with what we know about gastric secretions?

Why might this be important?

Also, the pH drop (and distribution) of a meal during gastric digestion may vary due to:

1) Variations in \_\_\_\_\_

Buffering capacity:

2) Variations in \_\_\_\_\_

3) Variations in \_\_\_\_\_

4) Variations in \_\_\_\_\_

Why might the gastric pH be important in food digestion?

Let's take a look at some intragastric pH profiles after different meals to see how these factors may impact the biochemical environment in the stomach: