

# ***STOMACH***

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# ***FUNCTIONAL ANATOMY OF STOMACH***

- Stomach is a **hollow** organ.
- **Location:** just below the diaphragm on the **left side** in the abdominal cavity.
- **Volume:** empty stomach is 50 mL.
- Under normal conditions, it can **expand** to accommodate 1 L to 1.5 L of solids and liquids.
- It is **capable** of **expanding** still further up to 4 L.

# ***PARTS OF STOMACH***

➤ In humans, stomach has **four** parts:

**1. Cardiac region**

**2. Fundus**

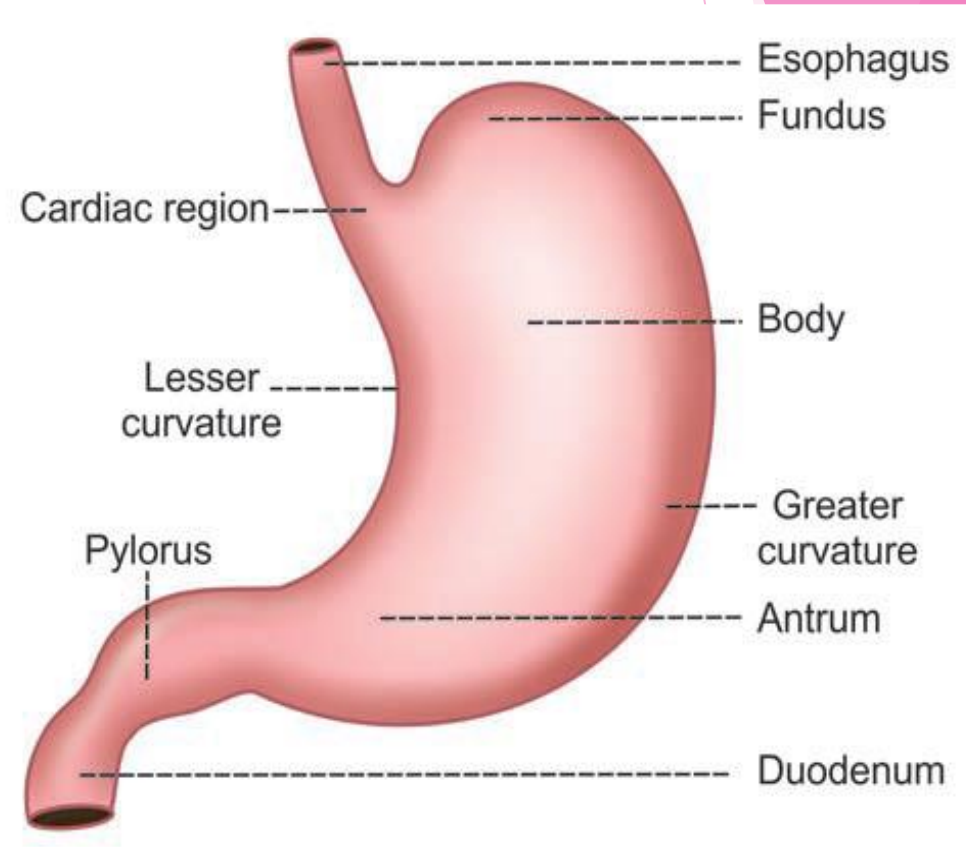
**3. Body or corpus**

**4. Pyloric region.**

➤ Stomach has two curvatures.

➤ One on the right side is **lesser curvature**.

➤ Other on left side is **greater curvature**.



# ***CARDIAC REGION***

- Cardiac region is the **upper part** of the stomach where **esophagus opens**.
- The opening is guarded by a sphincter called **cardiac sphincter**, which opens only towards stomach.
- This portion is also known as **cardiac end**.

# *FUNDUS*

- Fundus is a small **dome** shaped structure.
- It is elevated above the level of esophageal opening.

# ***BODY OR CORPUS***

- ▶ Body is the **largest** part of stomach forming about 75% to 80% of the whole stomach.
- ▶ It extends from just below the fundus up to the pyloric region.

# ***PYLORIC REGION***

- Pyloric region has **two parts**, antrum and pyloric canal.
- The body of stomach ends in **antrum**.
- Junction between body and antrum is marked by an angular notch called **incisura angularis**.
- Antrum is continued as the narrow canal, which is called **pyloric canal** or **pyloric end**.
- Pyloric canal opens into first part of small intestine called duodenum.
- The opening of pyloric canal is guarded by a sphincter called pyloric sphincter.
- It opens towards duodenum.

# ***STRUCTURE OF STOMACH WALL***

➤ Stomach wall is formed by **four layers** of structures:

**1. *Outer serous layer***

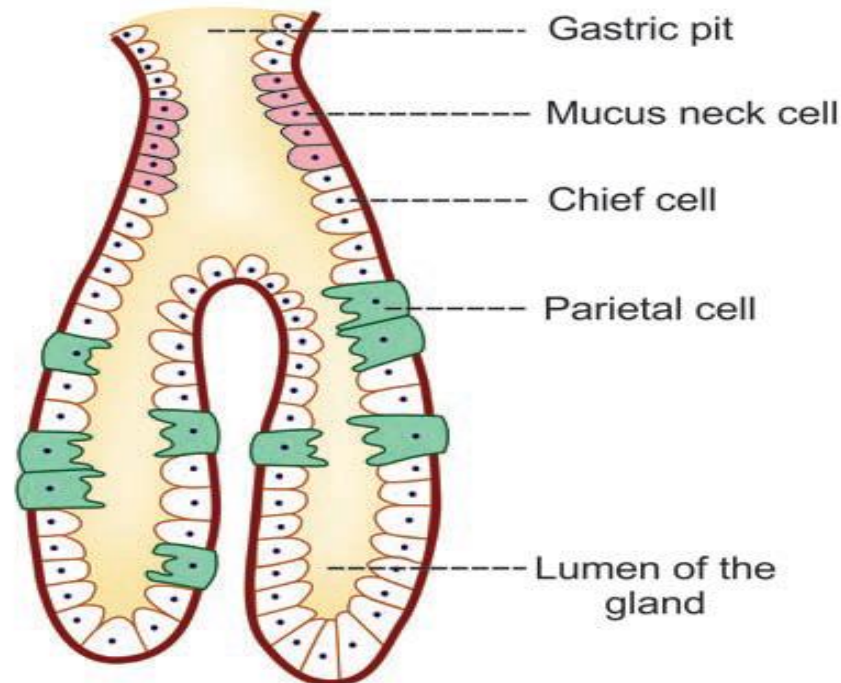
**2. *Muscular layer***

**3. *Submucous layer***

**4. *Inner mucus layer***

# ***GLANDS OF STOMACH – GASTRIC GLANDS***

- Glands of the stomach or gastric glands are tubular structures made up of different types of cells.
- These glands open into the stomach cavity via gastric pits.



# ***CLASSIFICATION OF GLANDS OF THE STOMACH***

➤ Gastric glands are classified into **three** types, on the **basis of their location in the stomach:**

- 1. Fundic glands or main gastric glands or oxyntic glands***
- 2. Pyloric glands***
- 3. Cardiac glands***

# ***1) FUNDIC GLANDS OR MAIN GASTRIC GLANDS OR OXYNTIC GLANDS***

- **Situated** in body and fundus of stomach.
- Fundic glands are considered as the **typical gastric glands**.
- These glands are long and tubular.
- Each gland has **three** parts, viz. body, neck and isthmus.

## **❑ *CELLS OF FUNDIC GLANDS:***

1. Chief cells or pepsinogen cells
2. Parietal cells or oxyntic cells
3. Mucus neck cells
4. Enterochromaffin (EC) cells or Kulchitsky cells
5. Enterochromaffinlike (ECL) cells.

## 2) *PYLORIC GLANDS*

- Present in the pyloric part of the stomach.
- Pyloric glands are short and tortuous in nature.
- These glands are formed by G cells, mucus cells, EC cells and ECL cells.

### *3) CARDIAC GLANDS*

- Located in the cardiac region of the stomach.
- Cardiac glands are also short and tortuous in structure, with many mucus cells, EC cells, ECL cells and chief cells are also present in the cardiac glands.

# FUNCTIONS OF GASTRIC GLANDS

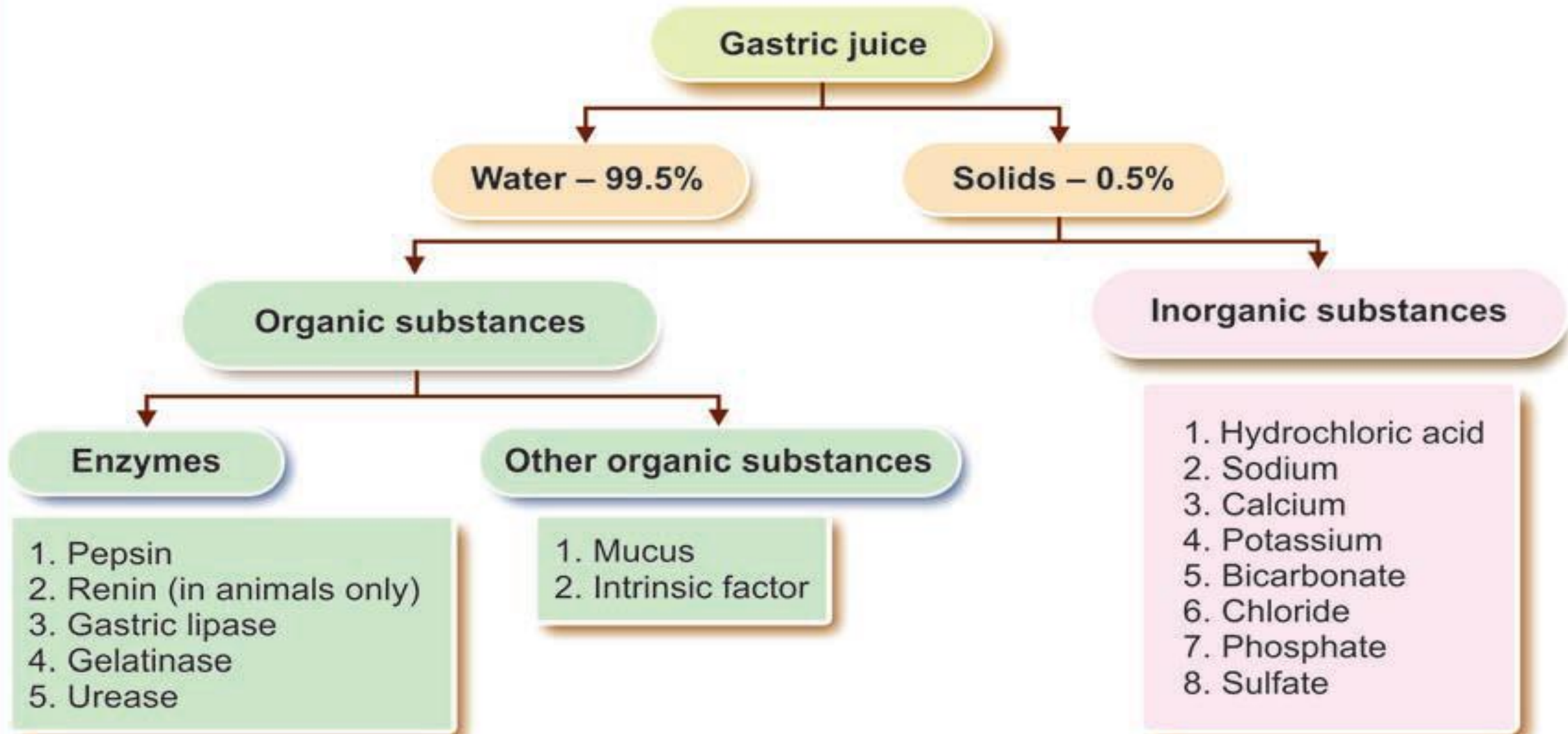
► Function of the gastric gland is to **secrete gastric juice**.

CELLS	SECRETORY PRODUCTS
Chief cells	Pepsinogen Rennin Lipase Gelatinase Urase
Parietal cells	Hydrochloric acid Intrinsic factor of Castle
Mucus neck cells	Mucin
G cells	Gastrin
Enterochromaffin (EC) cells	Serotonin
Enterochromaffinlike (ECL) cells	Histamine

# ***PROPERTIES OF GASTRIC JUICE***

- ❑ **Volume** : 1200 mL/day to 1500 mL/day
- ❑ **Reaction** : Gastric juice is **highly acidic** with a pH of 0.9 to 1.2.  
(Acidity of gastric juice is due to the **presence of hydrochloric acid**)
- ❑ **Specific gravity** : 1.002 to 1.004

# COMPOSITION OF GASTRIC JUICE



# ***FUNCTIONS OF STOMACH***

## **1. Mechanical function**

*a) Storage Function*

*b) Formation of Chyme*

( Peristaltic movements of stomach mix the bolus with gastric juice and convert it into the semisolid material known as chyme)

## **2. Digestive function**

## **3. Protective function**

# ***FUNCTIONS OF GASTRIC JUICE***

## **1) DIGESTIVE FUNCTION**

- Gastric juice acts mainly on **proteins**.
- **Proteolytic enzymes** of the gastric juice are pepsin and rennin.
- Gastric juice also contains some other enzymes like gastric lipase, gelatinase, urase and gastric amylase.

<b>Enzymes</b>	<b>Action</b>
<b>Pepsin</b>	Proteins $\longrightarrow$ Proteoses, peptones and polypeptides
<b>Gastric lipase</b>	Triglycerides of butter $\longrightarrow$ Fatty acids and glycerols
<b>Gastric amylase</b>	Starch $\longrightarrow$ Dextrin and maltose
<b>Gelatinase</b>	Gelatin and collagen of meat $\longrightarrow$ Peptides
<b>Urase</b>	Urea $\longrightarrow$ Ammonia

## 2) HEMOPOIETIC FUNCTION

- Intrinsic factor of **Castle**, secreted by parietal cells of gastric glands plays an important role in **erythropoiesis**.
- It is necessary for the absorption of vitamin B12 from GI tract into the blood.
- Vitamin B12 is an important maturation factor during erythropoiesis.
- Absence of **intrinsic factor** in gastric juice causes deficiency of vitamin B12, leading to **pernicious anemia**.

### 3) PROTECTIVE FUNCTION – FUNCTION OF MUCUS

- Mucus is a mucoprotein, secreted by mucus neck cells of the gastric glands and surface mucus cells in fundus, body and other parts of stomach.
- It protects the gastric wall by the following ways:

#### □ *Mucus:*

- i. **Protects** the stomach wall from **irritation** or **mechanical** injury, by virtue of its high viscosity.
- ii. **Prevents** the digestive action of pepsin on the wall of the stomach, particularly gastric mucosa.
- iii. **Protects** the gastric mucosa from hydrochloric acid of gastric juice because of its alkaline nature and its acid combining power.

## ***4) FUNCTIONS OF HYDROCHLORIC ACID***

- Hydrochloric acid is present in the gastric juice:
  - i. **Activates** pepsinogen into pepsin
  - ii. **Kills** some of the bacteria entering the stomach along with food substances. This action is called bacteriolytic action
  - iii. **Provides** acid medium, which is necessary for the action of hormones.

# PHASES OF GASTRIC SECRETION

## CEPHALIC PHASE: Only nervous

### Conditioned reflex

Sight, smell, thought of and hearing about food

### Unconditioned reflex

Presence of food in mouth

Stimulation  
Vagus nerve

Secretion of gastric juice

## GASTRIC PHASE: Nervous and hormonal

Bolus in stomach

Vagus nerve  
Local nerves  
Gastrin

Stimulation

Secretion of gastric juice

## INTESTINAL PHASE: Mostly hormonal

Chyme in intestine

Gastrin

Stimulation

Secretin  
CCK-PZ  
Somatostatin  
GIP  
VIP

Inhibition

Secretion of gastric juice

*THANK YOU*