Digestive System - Gastric Juice

By

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Functions of Stomach:

1. Mechanical functions:

Stomach receives food material and acts as a reservoir of food. Movements of stomach help in proper mixing of food with digestive juices and also help to propel the food into the duodenum.

2. Secretion:

Stomach secretes gastric juice which acts as digestive fluid. HCl acts as an antiseptic against swallowed bacteria.

3. Digestion:

With the help of gastric juice, stomach digests protein up to peptone stage. It also digests fat to some extent with the help of gastric lipase. Gastric rennin coagulates milk. HCl causes hydrolysis of foodstuff.
4. Absorption:
Small quantities of water, saline, alcohol and certain drugs are absorbed from stomach.

5. Excretion:
Stomach excretes certain toxins and alkaloids like morphine etc.

6. Stimulatory functions:
Stomach manufactures two chemical substances which act as stimulants. They are:

- **Gastrin**: Manufactured by pyloric mucous membrane. It is a true peptide hormone and stimulates gastric secretion.

- **Castle’s intrinsic factor**: This factor is present in gastric juice and gastric mucous membrane. It interacts with extrinsic factor (Vit B₁₂) and helps in its absorption.
7. Reflex action:

Various reflexes are initiated from stomach. They are:

- Gastro-salivary reflex: \textit{irritation of stomach stimulates salivation}

- Gastro-ilial reflex: \textit{About half an hour after meal, increased peristaltic movements occur in the last part of ileum.}

- Gasto-colic reflex: \textit{Mass peristalsis is initiated in the colon about half an hour after taking food.}

- Presence of food in the stomach reflexly stimulates pancreatic secretion and probably bile expulsion
Composition of Gastric juice:

Human gastric juice has following characteristics:

1. Total quantity: 500-1000 ml per meal (1,200 – 1,500 ml/day)
2. Reaction: strongly acid
3. Total acidity: 0.45 -0.6%. It includes free HCl, HCl combine with protein, and lactic acid
4. pH: 0.9 – 1.5
5. Specific gravity: 1.002 – 1.004
6. Freezing point: 0.59°C
Composition:

1. Water: 99.45%

2. Total solids: 0.55%
   - Inorganic: 0.15% (NaCl, KCl, CaCl$_2$, Calcium phosphate, Magnesium phosphate, bicarbonate etc.)
   - Organic: 0.40%
     - Mucin
     - Intrinsic factors
     - Enzymes: pepsin, gastric renin, gastric lipase, gelatinase,
       urease, carbonic anhydrase, lysozyme, cathepsin, gastracin, parapepsin I and II

3. Free HCl: 0.4 – 0.5%
Functions of gastric juice:

• The enzyme pepsin, with HCl, digests proteins up to the stage of peptone

• Rennin coagulates casein of milk

• Gastric lipase digest fat to some degree

• HCl acts as an antiseptic and causes some hydrolysis of all foodstuffs

• Excretion: toxins, heavy metals, certain alkaloids etc are excreted through gastric juice.