

Gastric Fluid Analysis



Gastric Fluid

An anatomical diagram of the human digestive system. The esophagus is shown at the top, leading to the stomach, which is depicted in a reddish-orange color. The stomach is shown in a cross-section, revealing its internal structure, including the fundus and antrum. Below the stomach, the small intestine is shown in a blue and purple color, with its characteristic coiled appearance. The background is a dark blue gradient.

- Also called as Gastric Acid/Juice
- A colorless to grayish or yellowish watery fluid with a low specific gravity secreted by the surface epithelium, gastric cells and the various glands of the gastric tract.

Gastric Fluid Analysis



- It is a medical procedure used to examine the secretions and other liquid substances occurring in the stomach.
- By means of a tube passed through the nose and into the stomach, gastric fluid can be obtained from the stomach.
- The most common reason for this test is to look for blood in the upper gastrointestinal tract.
- Gastric fluid also can be cultured to test for tuberculosis if an adequate sputum sample cannot be obtained for culture.

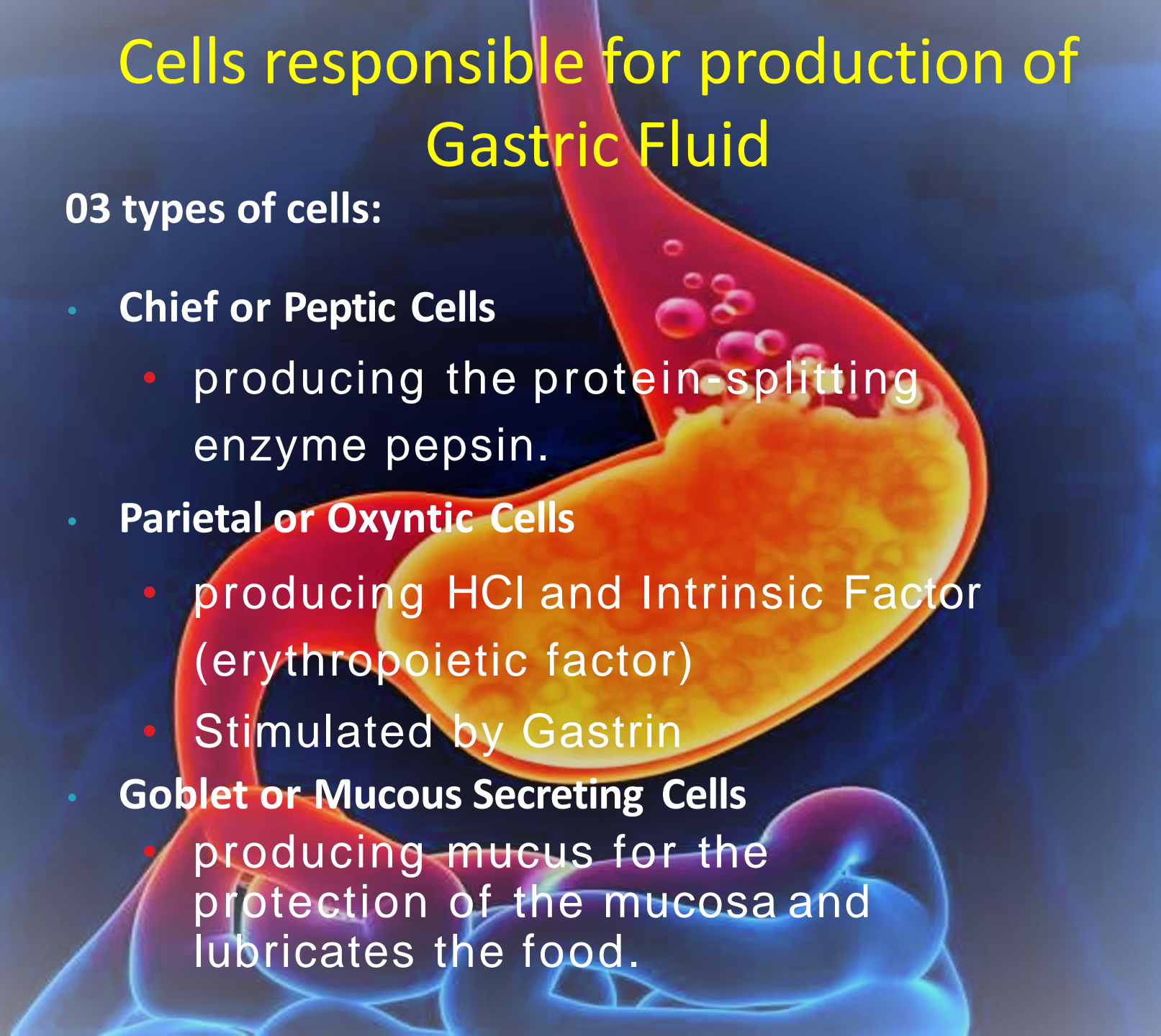
Importance



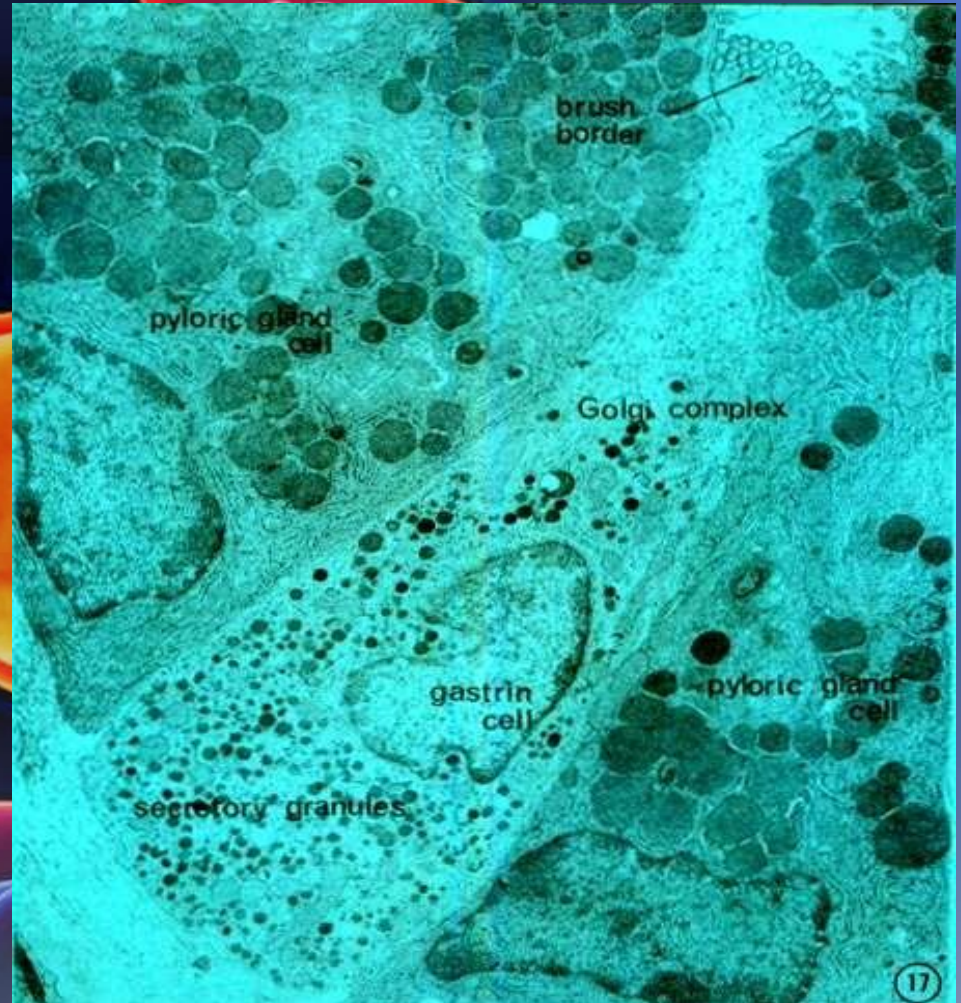
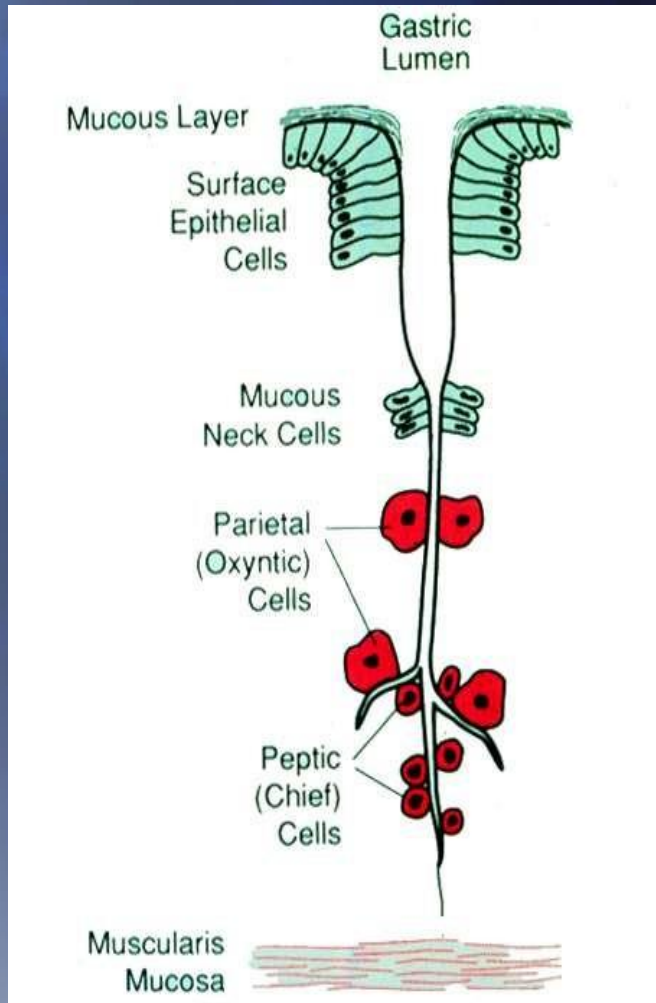
- Diagnosis of gastric diseases and assist in the selection of therapy i.e. peptic ulcer
- It measures the amount of acid produced by a patient w/ symptoms of peptic ulcer.
- Diagnosis of Zollinger-Ellison syndrome (adenoma of Islet of Langerhans) condition of gastric hypersecretion produced by a gastrin secreting tumor of the pancreas.
- Assess completeness of surgical vagotomy
- Determine of proper surgical procedure for peptic ulcer treatment

Cells responsible for production of Gastric Fluid

03 types of cells:

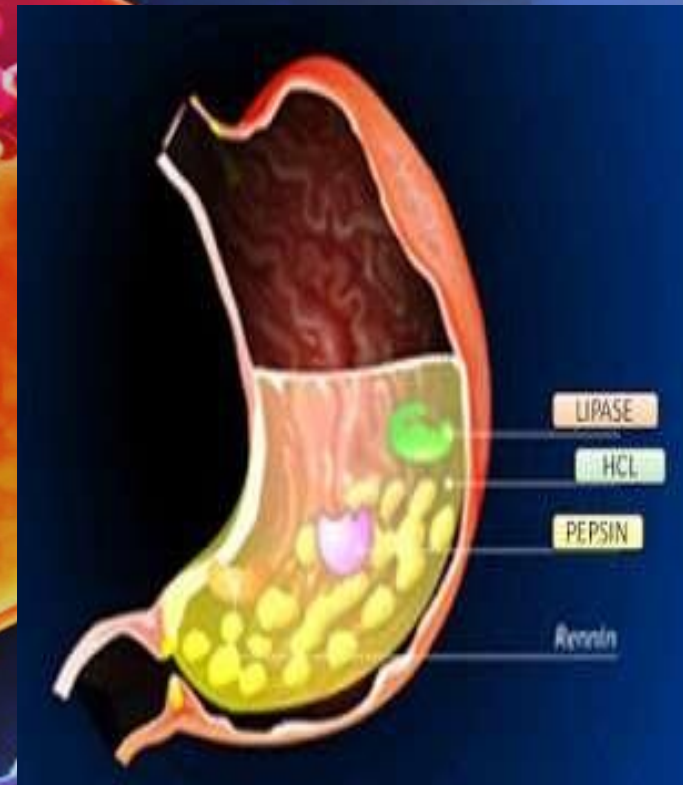
- **Chief or Peptic Cells**
 - producing the protein-splitting enzyme pepsin.
 - **Parietal or Oxyntic Cells**
 - producing HCl and Intrinsic Factor (erythropoietic factor)
 - Stimulated by Gastrin
 - **Goblet or Mucous Secreting Cells**
 - producing mucus for the protection of the mucosa and lubricates the food.
- 

Gastric Gland and Surface Pit from Body of the Stomach



Gastric Secretions

Substance	Cells	Region
HCl	Parietal Cell (Oxyntic Cell)	Fundus-Body
Intrinsic Factor	Parietal Cell	Fundus-Body
Pepsinogen-antrum	Chief Cell	Fundus-Body
Mucus-Antrum	Mucus Cell	Fundus-Body



Gastric Juice Composition



1. HCl
2. Water
3. Mineral Acid-Acid Phosphatase
4. Electrolytes
 - Ca, Ph, Mg, Na
5. Mucus
6. Digestive and Non-Digestive Enzymes
 - Pepsin
 - Gastrin
 - Gastric Lipase
 - RENNIN
 - LDH, AST, ALT and Ribonuclease
7. Particles of Food- undigested and partly digested

Collection of the Specimen



- Done by Physician or Well-Trained Personnel

Patient Prep

- The patient must be in a fasting state for 12-15 hours with no medication during the last 24 hours.
- Contamination with saliva neutralizes the gastric acidity therefore it should be prevented.
- Should be resting and relaxed
- Time specimen should be collected for the purpose of comparison.

2 Types of Gastric Juice Collection

An anatomical diagram of the human digestive system. The esophagus is shown as a red tube at the top, leading to a large, yellowish-orange stomach. Below the stomach, the small intestine is depicted as a complex, coiled structure in shades of blue and purple. The background is a dark blue gradient.

Using an evacuated tubes:

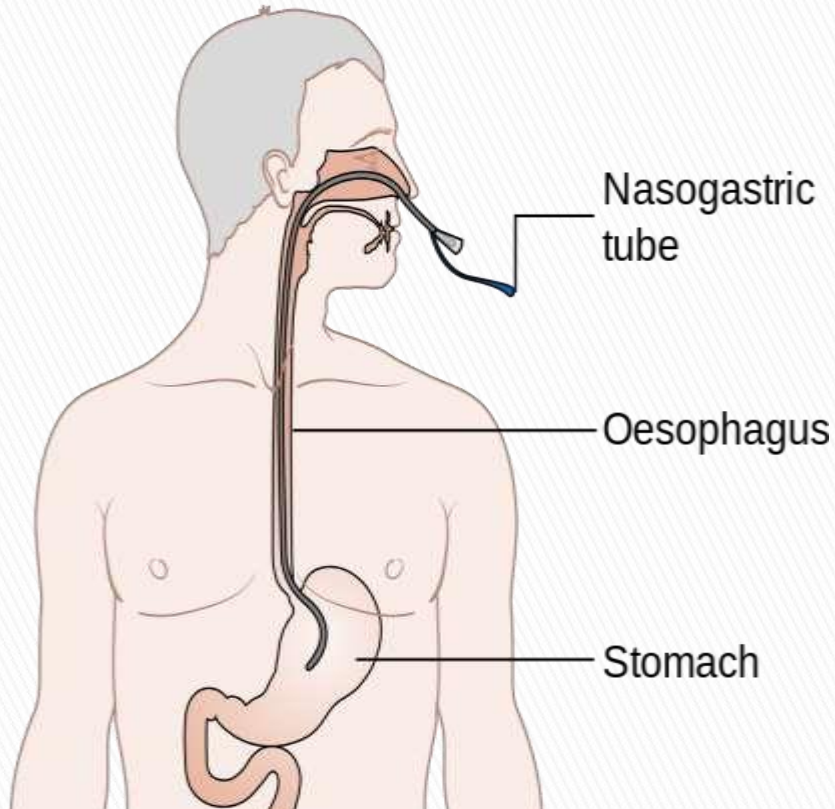
1. Levin tube –inserted in the nose
(nasal intubation)
1. Reh fuss tube –inserted in the mouth
(oral intubation)

Levin Tube

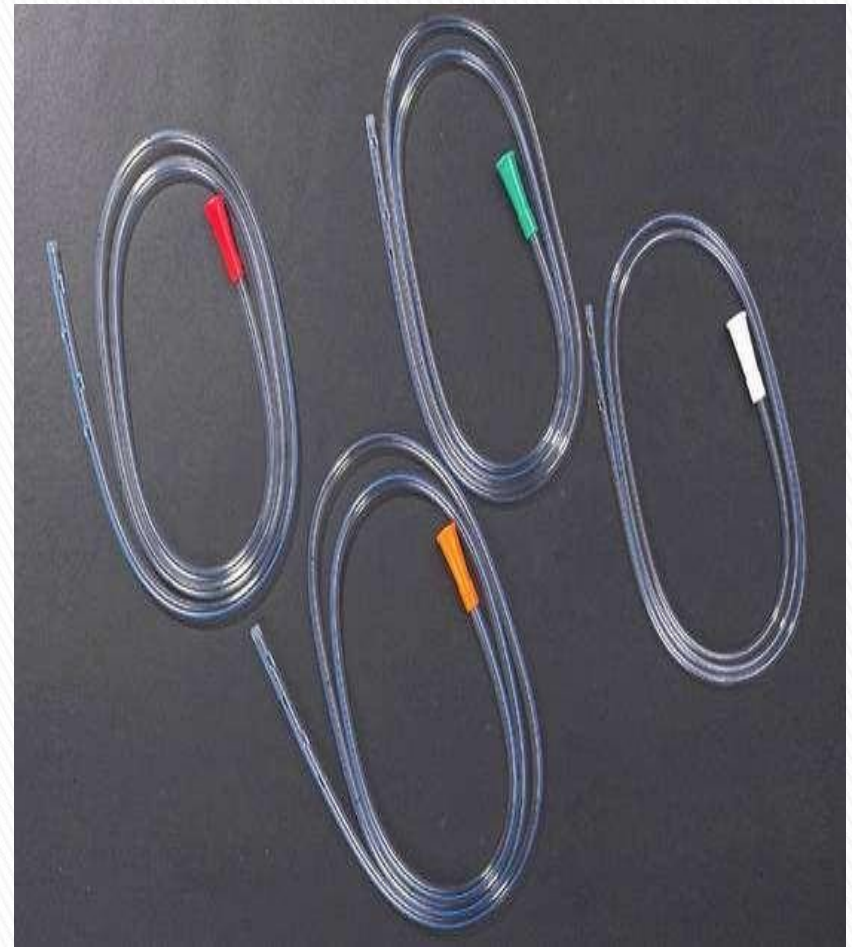
An anatomical illustration of the human gastrointestinal tract. The esophagus is shown as a red tube entering the stomach, which is depicted as a yellowish-orange sac. A Levin tube, a single-lumen tube, is shown inserted into the stomach. The small intestine is shown as a blue, coiled tube below the stomach. The background is a dark blue gradient.

- A single lumen tube used for stomach decompressing, withdrawing specimens, washing the stomach free of toxic substances and irrigating the stomach and treat upper GI bleeding.
- Can also be used to administer meds or for feeding.
- Sizes: French 14-24
- Length: 125cm long

Levin Tube



Nasogastric Levin Tube
Insertion



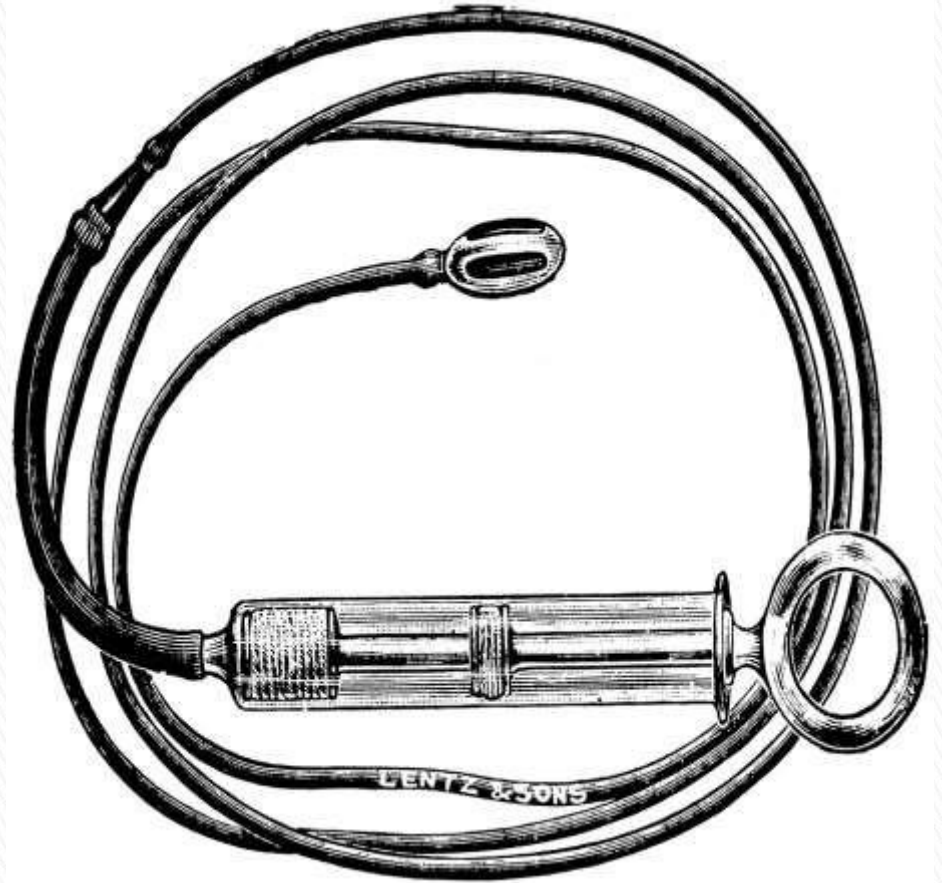
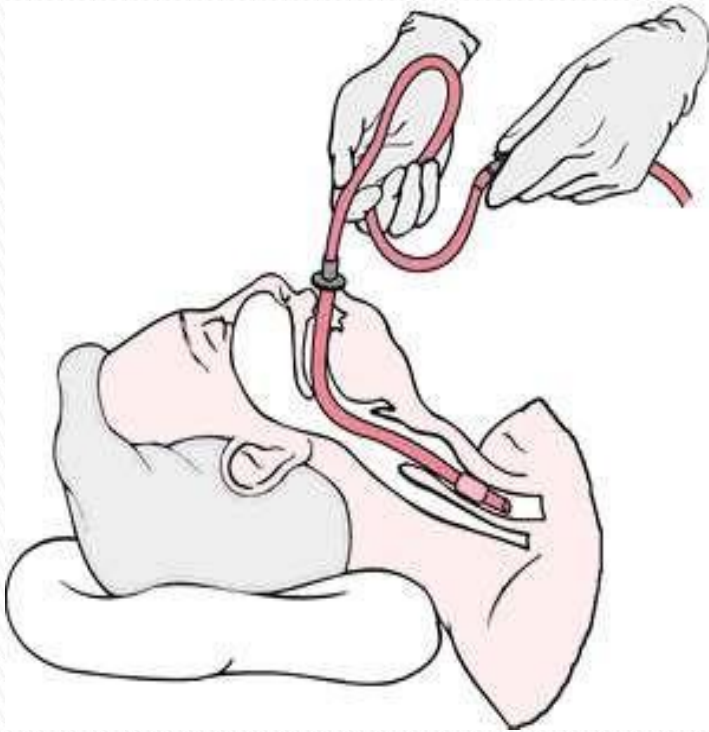
Levin Tube varies different colors,
depending on the lumen size.

Rehfuss Tube

An anatomical illustration of the human digestive system. The esophagus is shown as a red tube entering the stomach, which is depicted as a large, yellowish-orange sac. A red tube, the Rehfuss tube, is inserted into the stomach. The small intestine is shown as a blue, coiled tube below the stomach. The background is a dark blue gradient.

- A flexible tube that is used especially for withdrawing gastric juice from the stomach for analysis and that has a syringe at the upper end and an attachment with a slot at the end passing into the stomach.
- Small oral tube with a metal “oral tip” which helps the patient to swallow the tube and by its weight, it falls into the dependent portion of the stomach.
- Used for gastric juice analysis and for emptying stomach.
- A tube with a calibrated syringe, formerly used for aspiration of stomach contents in gastric analysis; replaced by plastic disposable stomach tube's.

Rehfuss Tube



Insertion through Buccal Cavity

Rehfuss Tube

Methods of Collection



Tube or Intubation Method

- Gastric fluid is obtained by inserting a gastric tube into the stomach through buccal cavity or the nasal cavity.

Tubeless or Diagnex Blue Method

- An ion exchange resin coupled with a blue dye (Azure A) is given orally.
- In presence of free gastric acid (HCl), Azure A is released from its resin binding in exchange for H^+ .
- Azure A is rapidly reabsorbed from the intestines and travels into the blood, to the kidneys and excreted in the urine.

Contraindication of Evacuation Tubes



- Pregnant female
- Severely ill patients
 - Liver Cirrhosis
 - Esophageal Varices or Diverticulum
 - Stenosis or malignant tumor of the Esophagus
 - Severe gastric hemorrhage
 - Cardiac Decompensation
 - Marked Arteriosclerosis

Diagnex Blue Method



- It is a means of gastric analysis based on the fact that free hydrochloric acid releases a dye (Azure A) from a resin base. Once the dye is released it is absorbed from the intestinal tract and excreted in the urine.
- If no hydrochloric acid is present in the stomach the dye will not appear in the urine.
- The test is valuable as a screening device to rule out achlorhydria and is much less disturbing than other methods of gastric analysis, which require the passage of a stomach tube.
- It does not, however, give conclusive evidence sufficient for diagnosis of cases in which there is no secretion of hydrochloric acid.

PROCEDURE



Basal Gastric Secretion (BGS)

- A tube is placed in the stomach for fluid collection to measure the amount of secretion during 12-15 hours fasting rate.
- Four 15- (or 30) minute specimens are collected and volume, pH, titrated acidity and calculated acid output is determined on each.
- Total gastric secretion during this period is termed as Basal Acid Output(BAO).

Basal Acid Output (BAO)



- The minimum amount of gastric hydrochloric acid produced by an individual in a given period.
- Normal adult volume is 2 to 5 mEq/hr. or 0-6mEq/hr (Henry)
- It is used infrequently in the diagnosis of various diseases of the stomach and intestines, such as gastric ulcers and Zollinger-Ellison syndrome.

Maximal Gastric Secretion (MGS)



- Involves stimulation of fluid formation through the use of Stimulants.
- Total acid secreted in the hour after stimulation is Maximal Acid Output (MAO).

Maximal Acid Output (MAO)

- The total acid secretion for the period of 60 min after administration of a gastric stimulant that cannot be increased by higher doses of the stimulant.
- Normal Value: 5-40mEq/hr (Henry)

Gastric Stimulants

- Histamine
- Pentagastrin
- Histalog(Betazole)



TEST MEALS



Ewald's Meal (Break fast)

- Bread and tea without sugar or water.
- Routinely used.

Boas

- Oatmeal
- Recommended for lactic acid

Reigel

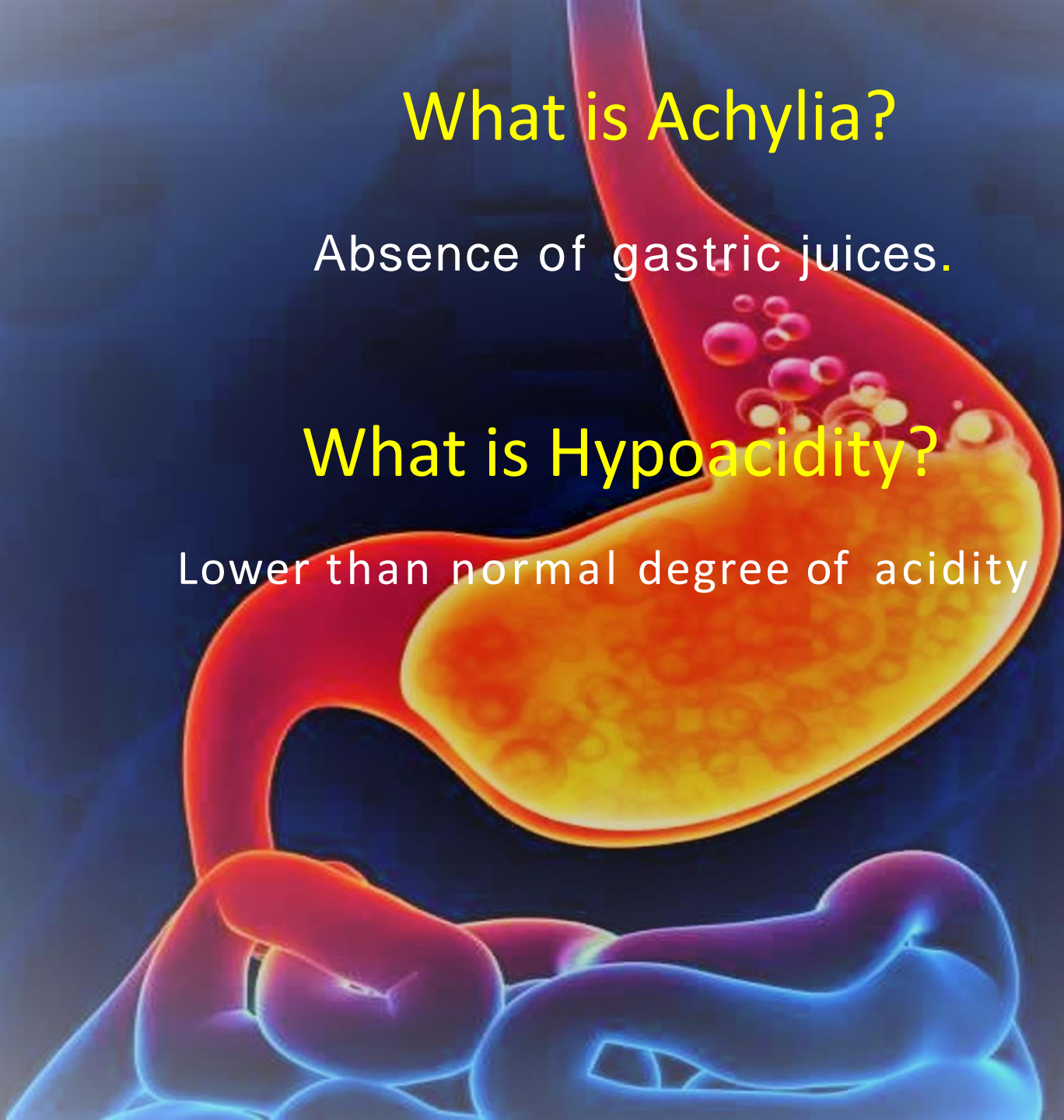
- Beefsteak and mashed potato.
- Recommended for detection of Achylia and Hypoacidity.

What is Achylia?

Absence of gastric juices.

What is Hypoacidity?

Lower than normal degree of acidity



Gastric Juice, Typical Reference Values

Fasting Residual	20-100ml
pH	<2
Basal Acid Output (BAO)	0-6mEq/hr (mmol/hr)
Maximum Acid Output (MAO)	5-40mEq/hr (mmol/hr)
BAO/MAO ratio	<0.4

Normal Gastric Fluid

Appearance	Translucent, Pale Gray and slightly viscous, NO food, blood, drugs or bile present
Volume	50-75ml
Odor	Faintly Pungent
pH	1.6-1.9 (1.5-3.5)
Mucus	Separates into 3 layers *on standing
Specific Gravity	1.001-1.010 average of 1.007

Normal & Abnormal Gastric Analysis Results

Conditions	BAO	MAO	BAO/MAO
Normal	2.5	25	10
Pernicious Anemia	0	0	0
Duodenal Ulcer	5	30	17
Zollinger-Ellison Syndrome	18	25	72

Abnormalities in Color

Color	Significance
Yellow to Green	Bile which is occasionally regurgitated in the normal stomach and frequently accompanies excessive gagging during intubation.
Red	Blood from minor trauma during intubation.
Coffee Ground	Old blood (from gastritis, ulcer or carcinoma or swallowed from the mouth, nasopharynx or lungs).
Opaque Gray	Seen after a test meal.
Yellow	Presence of fresh bile.
Greenish	Presence of old bile.

Abnormalities in Odour

Odor	Significance
Fecal Odor	(+) in intestinal obstruction or gastro-colic-fistula
Foul or Putrid Odor	(+) in carcinomatous ulcer
Alcohol Odor	(+) in alcohol coma or after alcohol test meal
Ammoniocal Odor	(+) in cases of uremia
Rancid Odor	Due to butyric (fatty acid) and lactic acid Present in sour milk-indicating stenosis and fermentation

Abnormalities in Volume

Fasting State	20-50mL
After a Test Meal	20-80mL
Chemical Stimulant	45-150mL
Volume should be:	
Increased in:	Hypomotility, pyloric obstruction, Z-E Syndrome
Decreased in:	Gastric Hypermotility

Chemical Examination of Gastric Fluid

Total Acidity	HCl+combined acids = 40-70mEq/L
Free HCl	20-40mEq/L
Free Acidity	Free HCl, organic acids and acid salts.

Normal pH	1.6-1.8
High Acidity	1.4 or lower
Low Acidity	2.0 or 2.8

Euchlorhydria	Normal gastric Acidity
Achylia	Absence of all acids
Anacidity	Failure of the stomach acidity to fall lower than 6.0 in a stimulation test.
Achlorhydria	Physiologic failure of pH to fall below 3.5 or 1.0 pH unit with gastric stimulation. Absence of free HCl
Hypochlorhydria	Physiologic failure of pH to fall below 3.5, although it decreases 1.0pH unit or more upon gastric stimulation Decreases free HCl
Hyperchlorhydria	Increase free HCl above normal.

An anatomical illustration of the human digestive system. The stomach is shown in a reddish-pink color, filled with a yellowish-orange liquid representing gastric juice. The small intestine is depicted in a blue-purple color, coiled below the stomach. The background is a dark blue gradient. Overlaid on the stomach is the text "Microscopic Examination of Gastric Juice" in a yellow, sans-serif font.

Microscopic Examination of Gastric Juice

Normal Structure	Pathologic Structure
Yeast Cell-small amount	Fragments of Tissues
Epithelial Cell	RBC
Starch Granules	Yeast-large amount
Bacteria-lesser amount	Pus Cell
Fat Globules/Droplets	Muscle Fibers
Food Remnants	Bacteria-large amount

Tests for free HCL

Diagnex Blue Method

Boa's Method

Topfer Method

- Reagent: Dimethylaminobenzene 0.5gm, 95%Ethanol 100ml
- used for titration of acid with 0.1 N sodium hydroxide and phenolphthalein.

Gunzberg Method

- Gunzberg's reagent is made by dissolving two grams of phloroglucinol and one gram of vanillin in 100 millilitres of 95% ethanol. Hydrochloric acid catalyses Gunzberg's reagent to form a red complex.
- Procedure: Two drops of gastric juice are mixed with two drops of Gunzberg's reagent in an evaporating dish. The mixture is evaporated and if red is seen, free hydrochloric acid is present.



Thank You