

### Diagnosis of Gastrointestinal Diseases



# The Gastrointestinal Tract

The Gastrointestinal tract (also called alimentary canal or digestive system) is the system of the body that mechanically and chemically breaks down food within 12-24h.

The digestive organs are usually divided into two main groups:

- the gastrointestinal tract
- the accessory organs



### Gastrointestinal (GI) tract

The GI tract is a continuous tube running from the mouth to the anus. It measures about 9 m.

#### It includes the following organs:

- mouth and pharynx
- esophagus
- stomach
- small intestine
- large intestine

#### Accessory Digestive Organs

Includes the following organs:

- teeth
- gallbladder
- salivary glands
- liver, and pancreas



# The Mouth

Both Mechanical and Chemical Digestion begin in the mouth.

#### Saliva

Saliva contains the enzyme *amylase*, also called **ptyalin**, which is capable of breaking down **starch** into simpler sugars such as maltose and dextrin that can be further broken down in the small intestine. Only about 30% starch digestion takes place in the mouth cavity

# The Esophagus

البلعات Esophagus transports bolus الطعامية and fluids to stomach.

Main diseases of the esophagus:

Esophagitis: دوالي المريء دوالي المريء Esophageal varicies: دوالي المريء Cancer of the esophagus Hiatal hernia: الفتق الحجابى



### The Stomach



#### **Gastrointestinal Tract: Stomch**

**Stomach:** an expanded J-shaped organ in the upper left region of the abdominal cavity, made up of 5 layers of s. muscle

Types of Gland (located in gastric mucosa):

- الغدد الفؤادية Cardiac Glands
- الغدد البوابية (Pyloric glands (many G cells)
- الغدد المفرزة للحمض Oxyntic glands



# Types of Cells





### **Gastric juice**

In the stomach, food mixes with acidic gastric juice, which contains the proenzyme of pepsin, and intrinsic factor (essential for absorption of vit B12), secretion of gastric juice is under the combined control of the vagus nerve and the hormone gastrin.

Other contents:

- HCL
- Electrolytes
- Mucus (mucus gel layer)



### GASTRIN

وهدات المعدة (G) cells in gastric pits) غاري of the mucosa.

- Function: stimulation of
- 1- gastric Ac. secretion
- 2- pepsin secretion
- 3- gastric motility
- 4- growth of gastric mucosa
- Stimulated by:
- تنبيه العصب المبهم 1- increased vagal discharge
- امتلاء المعدة gastric distention
- 3- food (AA and peptides)
- 4- calcium in blood
- Inhibited by:
- 1- gastric acidity
- 2- gastrointestinal hormones, e.g, secretin



### **Peptic Ulcer**

Peptic Ulcer is a group of chronic disorders characterized by an abnormal area of mucosa (sore in the lining of the stomach or duodenum) that has been damaged by the pepsin and HCI of gastric juice, with consequent inflammation of underlying and surrounding tissue.

The decrease in the stomach's mucus lining that leads to an ulcer is caused by one of the following:



### **Etiology:**

- Helicobacter pylori infection.
- Hyperacidity -
- Drugs anti-inflammatory (NSAIDs) & Corticosteroids.
- Cigarette smoking, Alcohol,
- Rapid gastric emptying
- Personality and stress
- Zollinger-Ellison syndrome
- Family history of stomach ulcers



### **Drugs that can cause PUD**

Methotrexate Cyclophosphamide Azathioprine Erythromycin Iron Corticosteriods potassium chloride NSAIDS



# **Diagnosis of Peptic Ulcer**

- 1- Endoscopy
- 2- Laboratory test for H. Pylori

3- Barium swallow: this series of Xrays of the upper digestive system creates images of the esophagus, stomach and small intestine

### Helicobacter pylori



Gram –ve Bacteria Colonizes 50% of the world population Virulent strains may cause gastritis, ulcers, adenocarcinoma & gastric mucosa-associated lymphoid tissue (MALT) lymphoma Class I carcinogen WHO)

## Diagnosis of H. Pylori

INVASIVE



Histopathology
 Rapid Urease Test
 Stool Ag
 Culture
 PCR
 Urea Breath Test
 Stool Ag
 Serology

## <sup>13</sup>C Urea Breath Test

- Detects active infection
- Sensitive and specific
- The urea breath test (UBT) exploits the hydrolysis of orally administered urea (labeled with with  ${}_{13}C$ ) by the enzyme urease, which H pylori produces. Urea is hydrolyzed to ammonia and carbon dioxide, which is excreted by the lungs. rea in urine Isotopically labeled CO2 can be detected in breath using various methods.



### Non – Invasive Tests 1) <u>Urea (14C) Breath Test</u>



95% Sensitivity, 100% Specificity, 100% PPV, 96 % NPV

Ideal for monitoring therapeutic outcomes
Patients not on PPI for 1 week

### Other Diagnostic Tests for H. pylori

#### Stool antigen tests (SATs)

Detects the presence of *H*. *pylori* <u>antigen</u> in a stool sample

Two types of SATs exist for the diagnosis of H. pylori infection, one based on enzyme immunoassay (EIA) and another on immunochromatography (ICA).

#### <u>H. pylori serology</u>

Detects <u>antibodies</u> to the bacteria

The serology test has a high (>90%) specificity and sensitivity. It is currently based on the **quantitation of immunoglobulin G antibodies against H pylori** by the means of an enzyme-linked immunosorbent assay (ELISA). This test is not suitable for follow-up of treated patients since Ab. persist even after H. pylori infection is eradicated

**Treatment**: a 7-day antibiotic regimen containing lansoprazole, amoxicillin, and clarithromycin (LAC),



### Zollinger-Ellison (Z-E) syndrome

A condition resulting from a *gastrin-secreting tumor (gastrinoma)* that results in an overproduction of gastric acid, leading to fulminant ulceration قرحة مداهمة of the esophagus, stomach, duodenum, and jejunum الصائم.

Laboratory Studies

#### **Fasting serum gastrin levels**

Fasting serum gastrin is the best single screening test for Zollinger-Ellison syndrome (ZES). Preferably, patients should not be taking gastric antisecretory medications at the time of the test