



Tikrit University

College of Medicine

Depart. of Microbiology

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جامعة تكريت

كلية الطب

فرع الأحياء المجهرية

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الصف الثالث

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### Objectives of lecture:

1. Identify the *Helicobacter pylori*.
2. Recognize the microscopical & macroscopical characteristic features of *Helicobacter pylori*.
3. Explain the main pathogenesis of *Helicobacter pylori*.
4. Explain the diagnosis of *Helicobacter pylori*.
5. Outline the treatment of *Helicobacter pylori*.

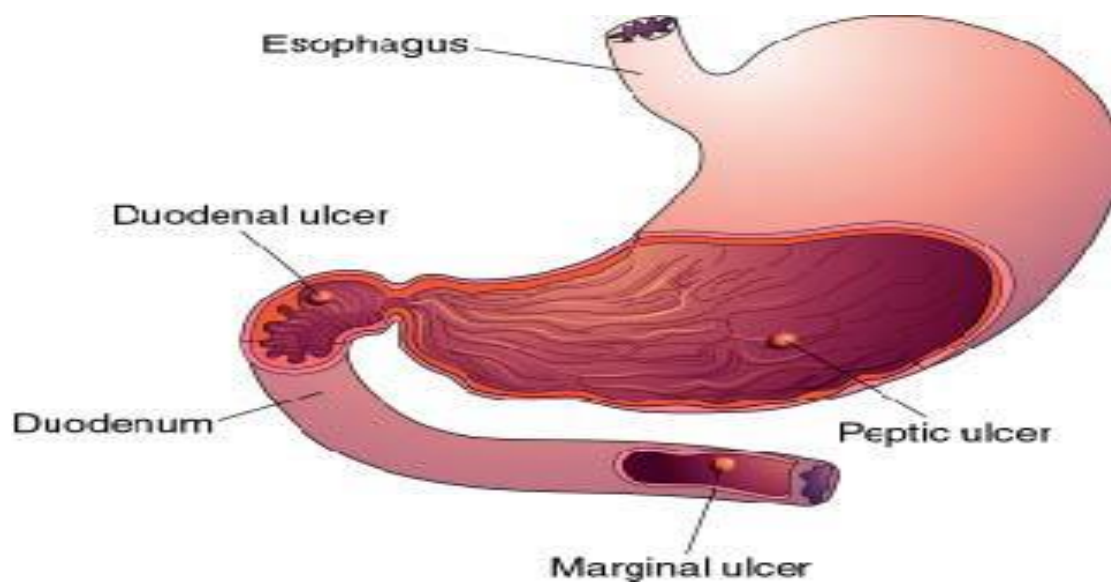
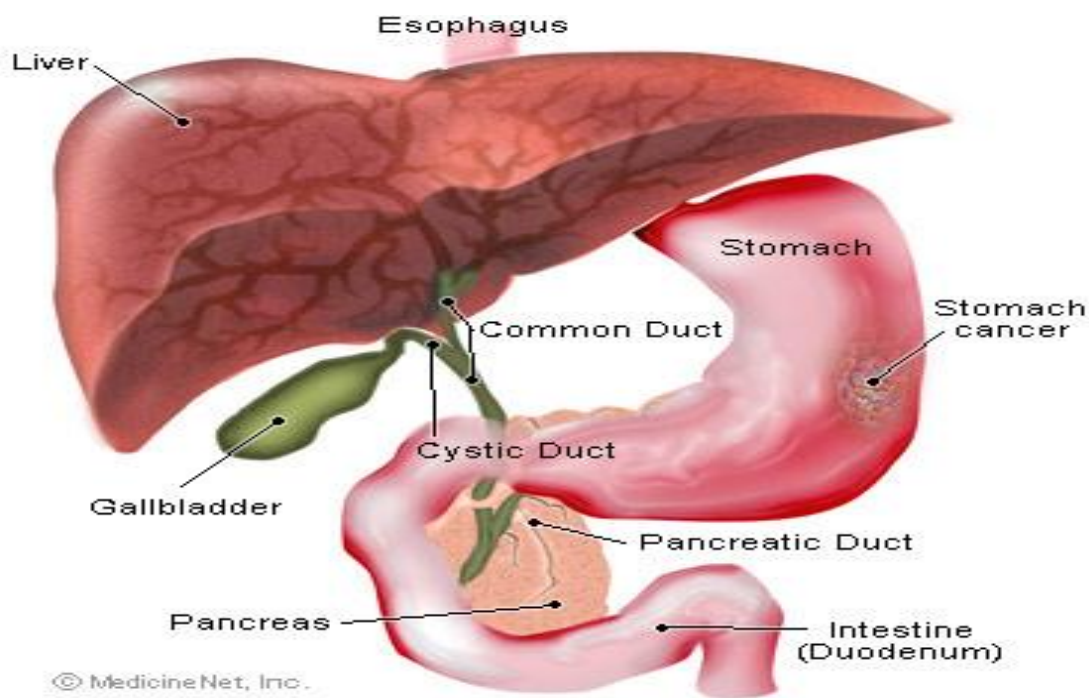
### The main references:

1. Medical microbiology (Jawetz, Melnick & Adelberg`s).
2. Medical Microbiology an introduction to infectious diseases (Sherris).
3. Diagnostic microbiology (Bailey & Scott`s).
4. Pictures from the net.

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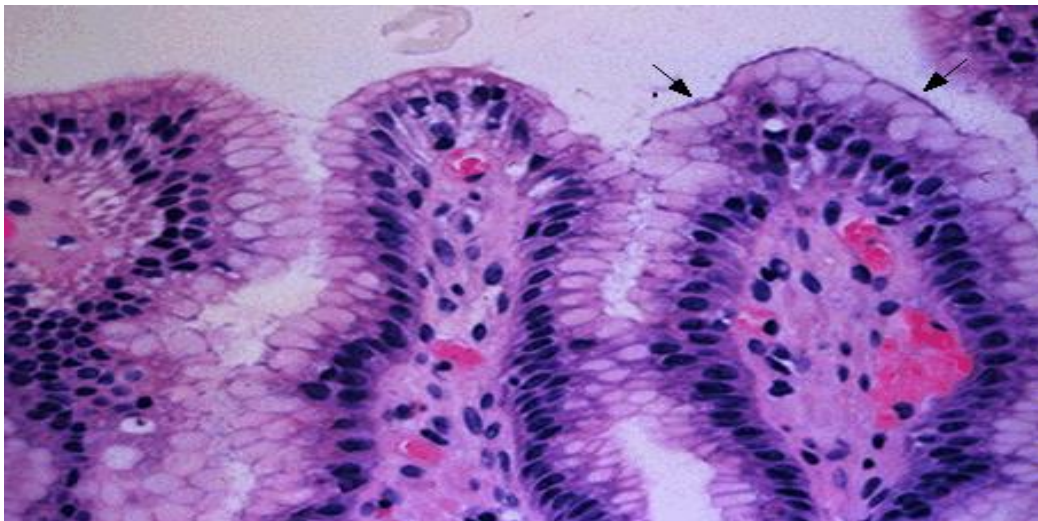
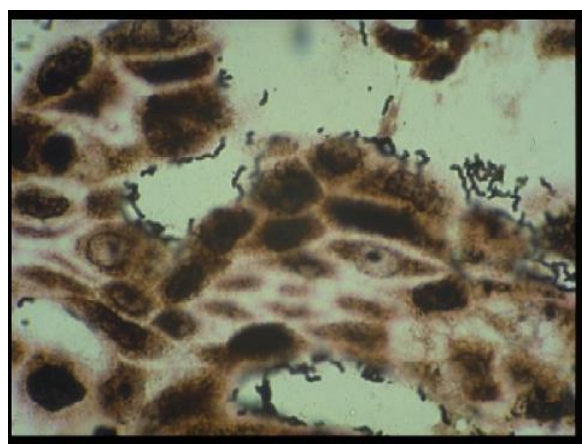
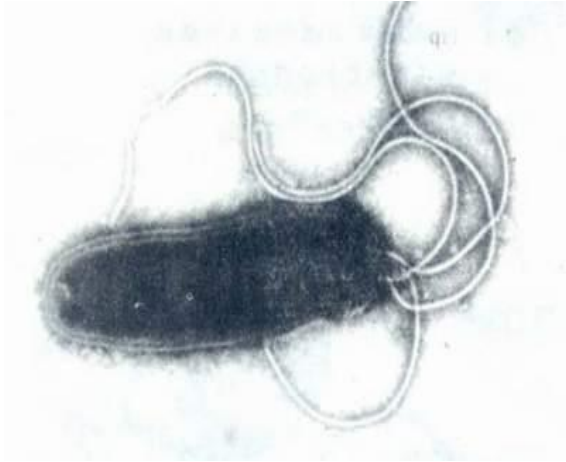
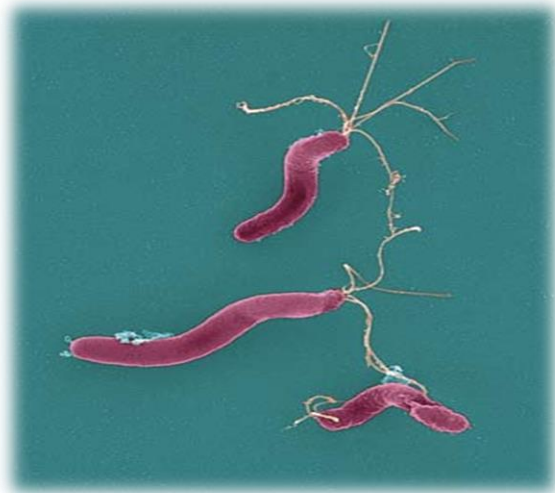
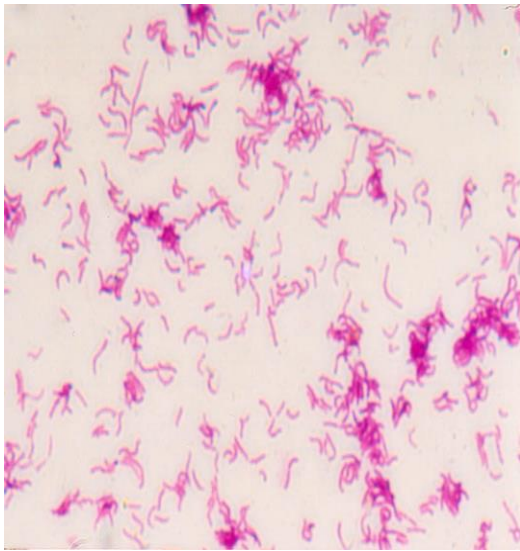
### *Helicobacter pylori*

- The stomach secretes gastric juice every day. Gastric juice consists of digestive enzymes and concentrated hydrochloric acid. It used to be thought that the stomach contained no bacteria and was actually sterile, but *H. pylori* changed that view.
- *H. pylori* are G -ve, rod bacilli, widely distributed in nature. It is associated with gastritis, peptic ulcer (Gastric ulcer & Duodenal ulcer) & gastric carcinoma.
- Other species of *Helicobacter* infect gastric mucosa but rare & cause B-cell mucosa associated lymphoma.



### Microscopical features:

*H. pylori* is G-ve, rod, curved & spiral shaped. It has multiple flagella at one pole, actively motile & non spore forming.



**Helicobacter pylori adherence on gastric crypt cells** High power view of surface and foveolar epithelium shows numerous *Helicobacter pylori* organisms lining the surface of the cells (arrows). Courtesy of Robert Odze, MD.

## Cultural features:

- It is fastidious bacteria so that needs selective media including **Skirrow's** media with vancomycin, polymyxin B & trimethoprim. Also, chocolate medium with antibiotics such as vancomycin, nalidixic acid & amphotericin, at 37 °C for 3-6 days in the incubator with microaerophilic condition under 5-10% CO<sub>2</sub>, will give colonies which are 1-2 mm in diameter, circular & translucent.
- Other growth cultural characteristic features including:
  1. Oxidase +ve
  2. Catalase +ve
  3. Urease +ve strongly.

## Pathogenesis:

- *H. pylori* grow at pH of 6.0-7.0
- *H. pylori* killed or not grow at pH within gastric lumen.
- Gastric mucosa is relatively impermeable to acid & has a strong buffering capacity.
- On the lumen side of the mucus, the pH is **low 1.0-2.0** while on the epithelial cells side the pH about **7.4**
- *H. pylori* found deep in the mucus layers near the epithelial surface.
- *H. pylori* produce **protease** which modifies the gastric mucosa & further reduce the ability of acid to diffuse through the mucus.
- *H. pylori* produce **urease** which production of ammonia & lead to buffering the acidity of gastric juice.
- *H. pylori* is actively motile even in mucus & is able to find its way to epithelial surface.
- *H. pylori* overlies gastric - type (which cause gastric ulcer) but not intestinal – type epithelial cells (which cause duodenal ulcer).
- In human volunteers ingestion of *H. pylori* result in the development of gastritis & hypochlorhydria. Also duodenal ulcer.
- Antimicrobial therapy lead to eradication of *H. pylori* and improvement of gastritis & duodenal ulcer.
- The absolute mechanism by which *H. pylori* produce P.U & gastric inflammation & damage are not well defined but probably involve both bacterial & host factors:

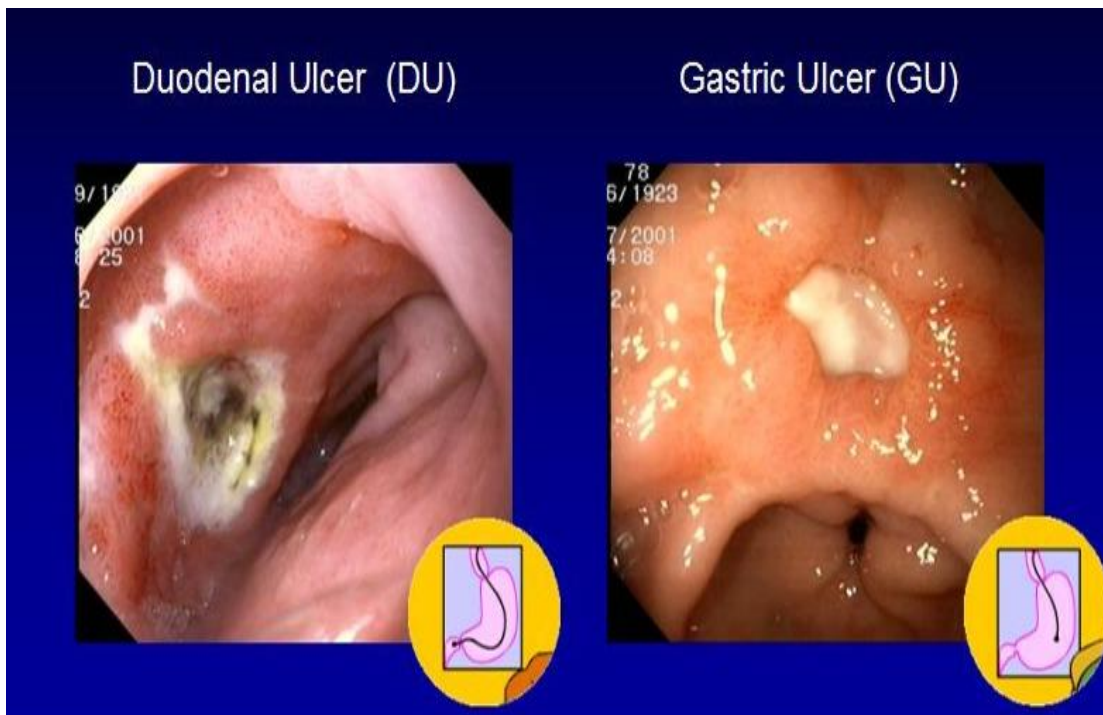
### 1. Bacterial Factors

The bacterial will invade the epithelial cells surface to limited degree. The bacterial produce toxins, enzymes & LPS (endotoxin of G-ve) may damage the mucosal cells & ammonia produced by urease activity may damage the cell also.



## 2. Host Factors

- \* Achlorohydria
- \* Received drugs which decrease the gastric acidity
- \* Specific blood group
- \* Genetic factors
- \* Special food spicy, coffee, tea....



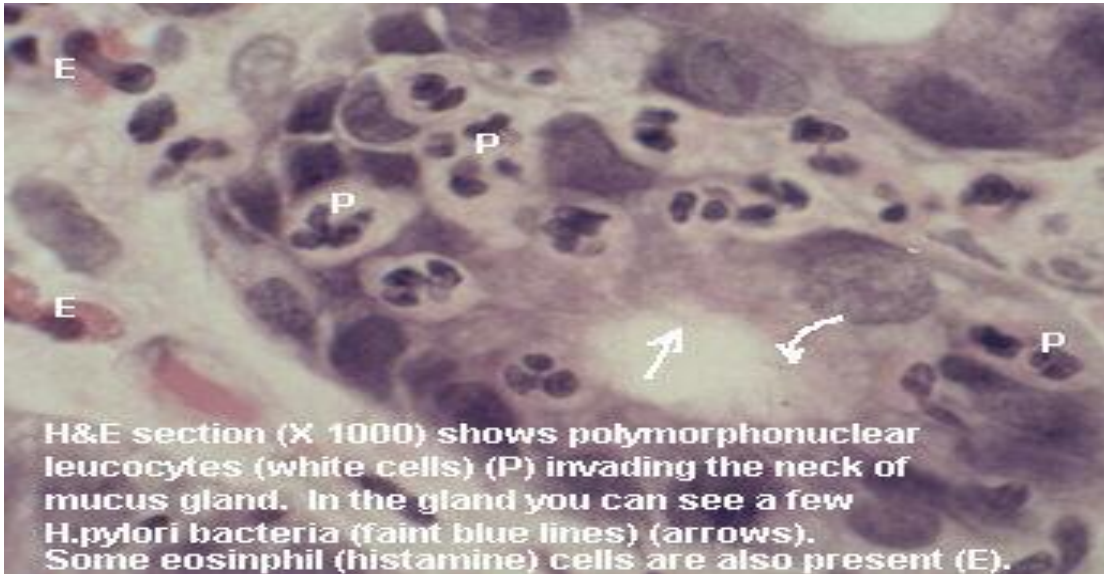
## Clinical features

- Acute infection can produce upper gastrointestinal illness with nausea, vomiting & fever may present also. Acute symptoms last 2 weeks. *H. pylori* can stay colonized for years or even life time.
- About **90%** of patients with D.U have *H.pylori* infection.
- About **50-80%** of patients with G.U have *H.pylori* infection.
- *H. pylori* also have role in the gastric carcinoma & lymphoma.

## Lab. Diagnosis:

1. **Spaciemens or samples:** Gastric biopsy can be used for histopathological examination, or put in saline & used for culture & blood collected for determination of Ab in serum.

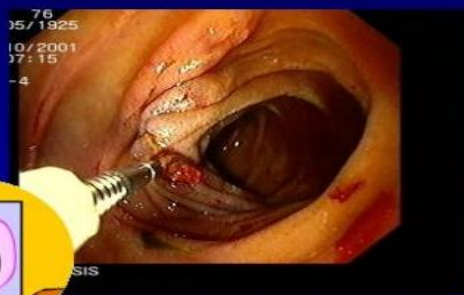
2. **Stained smear:** Routine stains of biopsy with gastroscopy shows gastritis & Giemsa or special silver stain can show curved or spiral bacteria.
3. **Culture:** as above.
4. **Serological examination:** The serum Ab persist even if *H.pylori* infection is eradicated & play role in diagnosis of active infection or following therapy.



## Clipping a Duodenal Ulcer

Peering through the pylorus into the duodenum, we see some blood and a vessel sticking out of the wall, just at the front edge of a small but deep ulcer.

In the second photograph, a disposable metal clip is applied to the ulcer. The patient remained well and left hospital three days later.



## Treatment:

Triple therapy metronidazole + amoxicillin (or tetracycline) + subsalicylate (or bismuth subcitrate), for 14 days eradicate *H.pylori* in about 70-95% of patients.

*Thank you*