

# Lecture 1



Role of *H. pylori* in Peptic Ulcer and drugs used in Treatment

- Additional Notes
- Important
- Explanation
- Examples

# Peptic ulcer disease (PUD)

- ✓ Mucosal erosions in an acidic area.
- ✓ More arise in duodenum (are generally benign) than stomach (4% of stomach ulcer malignant tumor).
- ✓ Multiple biopsies are needed to exclude cancer.

## Signs and symptoms:

- ✓ Abdominal pain, epigastric
- ✓ Nausea and vomiting.
- ✓ Loss of appetite and weight loss.
- ✓ **Haematemesis** (vomiting of blood) due to gastric or esophagus damage.
- ✓ **Melena** ( blood in the stool)
- ✓ Rarely, Gastric or duodenal perforation leading to acute peritonitis

**Old management** : Gastrectomy is no longer used

# Helicobacter pylori (Campylobacter.pylori )

- ✓ Plays a role in: gastric and duodenal ulceration and probably also gastric cancer.
- ✓ Over 80% of individuals infected with the bacterium are **asymptomatic**.
- ✓ More than 50% of the world's population harbour H. pylori in their upper gastrointestinal tract.
- ✓ More prevalent in developing countries.
- ❖ **Route of transmission:** unknown, but individuals typically become infected in childhood.
- ❖ **Laboratory characteristics:**
  - **Morphology and staining**
    - ✓ Small
    - ✓ Gram negative.
    - ✓ spiral rods
    - ✓ **motile by polar flagella**
  - **Culture**  
Blood or chocolate agar in a moist **microaerophilic** <sup>(1)</sup> atmosphere
  - **Biochemical reactions**
    - ✓ catalase-positive
    - ✓ oxidase-positive
    - ✓ **strongly urease-positive.**
  - **Serology**
    - ✓ IgG and IgM to Cytotoxic Associated Gene A (CagA)
    - ✓ (VacA) for virulence strains.

(1) Require little free Oxygen

## ❖ **Diagnosis** : (dyspeptic patients for H.pylori)

Non-invasive methods	Invasive methods (most reliable)
<ul style="list-style-type: none"><li>✓ Blood antibody test (IgG, IgM or IgA).</li><li>✓ Stool antigen test.</li><li>✓ Carbon urea breath test (<math>C^{14}</math> or <math>C^{13}</math>).</li></ul>	<ul style="list-style-type: none"><li>✓ Endoscopy - Histological examination.</li><li>✓ Endoscopy - culturing the bacteria.</li></ul>

## ❖ **Genome**: (this slide has been added just for your information)

H pylori contain 40kb-long Cag pathogenicity island (PAI)

## ❖ **Pathophysiology**:

H pylori moves through stomach lumen (Using flagella) → binds to the epithelial cells → **Produces large amounts of urease enzyme** → break down urea into  $CO_2$  + ammonia → neutralizes gastric acid (H.pylori survive acidity)

- **Ammonia**, is toxic to epithelial cells
- **proteases, vacA protein and phospholipases** by H pylori could damage epithelial cells
- **Colonization** → chronic gastritis → more production of gastric acid → gastric and duodenal ulcers, atrophy and later cancer.
- **CagA protein** was found to contribute to peptic ulcer.
- **Substances Increases host cell mutation (cancer):**
  - 1- Free radical
  - 2- production of TNF- $\alpha$
  - 3- Interleukin 6

## ❖ Prevention

- ✓ Vaccination.
- ✓ Dietary methods: (eating broccoli, cabbage, honey, and drinking green tea).
- ✓ Proper sanitation and clean sources of drinking water

## ❖ Epidemiology

- ✓ Contagious with an unknown route of transmission
- ✓ Transmission occur mainly within families or community.
- ✓ Person to person (oral to oral or fecal-oral) route.

## ❖ Treatment

Antibiotic sensitivity of H.Pylori

In vitro *	in vivo *
sensitive to amoxicillin, tetracycline, metronidazole, macrolides (clarithromycin).	efficacy is often poor due to: <ul style="list-style-type: none"><li>✓ The low pH of the stomach</li><li>✓ failure to penetrate the gastric mucus → low concentration of antibiotic obtained in the mucosa of the stomach.</li></ul>

- ✓ **First line therapy:** proton pump inhibitor (PPI) + clarithromycin + amoxicillin **or** metronidazole
- ✓ **Second line therapy:** PPI + bismuth subsalicylate/subcitrate + metronidazole + tetracycline
  - Both for a minimum of 7 days

\* To know the different between these study : [In vitro vs In vivo](#)

## ❖ Con. Options of Treatment

A) Triple therapies		
Duration	Combination	Rate of eradication
1 week	Omeprazole + Clarithromycin + Tinidazole	95%-100%.
10 days	Ranitidine Bismuth citrate + Amoxicillin + Clarithromycin	no more than 75%.
10 days	Ranitidine Bismuth citrate + Clarithromycin + metronidazole	90%
1 week	Omeprazole + Amoxicillin + metronidazole	96%
B) Quadruple Therapies		
1 week	Omeprazole + Amoxicillin + metronidazole + Ranitidine Bismuth citrate	98%

- Side effects of the Quadruple Therapies:
  - ✓ Vaginal candidiasis in 10% of women.
  - ✓ Pseudomembranous colitis in 11% of patients.

# Quiz

3.b

1. H.Pylori culture in:

a) Aerobic

b) Anaerobic

c) microaerophilic

2.a

2. H.Pylori produce urease enzyme that breaks down urea into:

a)  $\text{NH}_3 + \text{CO}_2$

b)  $\text{NH}_4 + \text{CO}_2$

c)  $\text{NH}_3 + \text{O}_2$

1.c

3. The first line therapy for a patient with PUD :

a) Omeprazole + Clarithromycin + Tinidazole

b) PPI + clarithromycin + amoxicillin

c) Omeprazole + Amoxicillin + metronidazole + (PPI)

ANSWERS: