



- Gram negative curved rods
 - Often attached in pairs giving a “seagull” appearance
- Motile by polar flagella; darting motility in corkscrew fashion
 - Facilitate penetration and colonization of mucosal environment
- Species; *Campylobacter jejuni* – causes 80-90% of all illnesses

- *C. jejuni*

- commonly associated with poultry,
- naturally colonises the digestive tract of many bird species
- also common in cattle

- **Transmission**

- Raw or undercooked food products
- Through direct contact with infected animals

- Specimen- stool, blood, etc
- Wet preparation of stool: dark-field microscopy observe darting motility
- Culture on **Skirrow's medium**
 - Incubate in microaerophilic conditions at 42°C, for up to 48 hours
 - Gram stain – Gram negative comma- or S-shaped rods
 - Oxidase positive



- Rehydration - usually self-limiting
- Severe dysentery – erythromycin, ciprofloxacin
- Antimotility agents not recommended

Campylobacter Jejuni Food Poisoning



Detail of Intestinal Wall

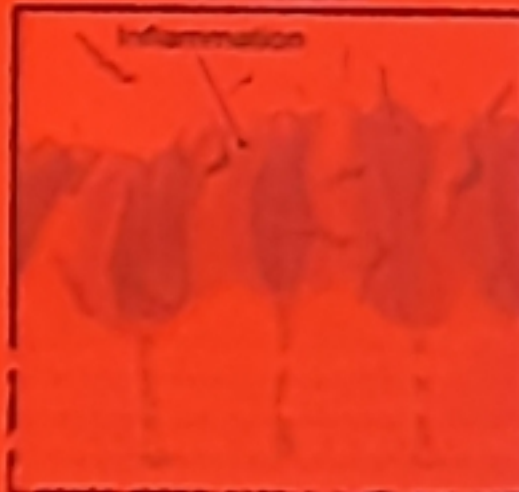
Colonization Of Campylobacter
Jejuni Bacteria Within Gut Intestine
From Contaminated Food



Cell Invasion And Toxin Production



Inflammatory Response To
Cell Invasion

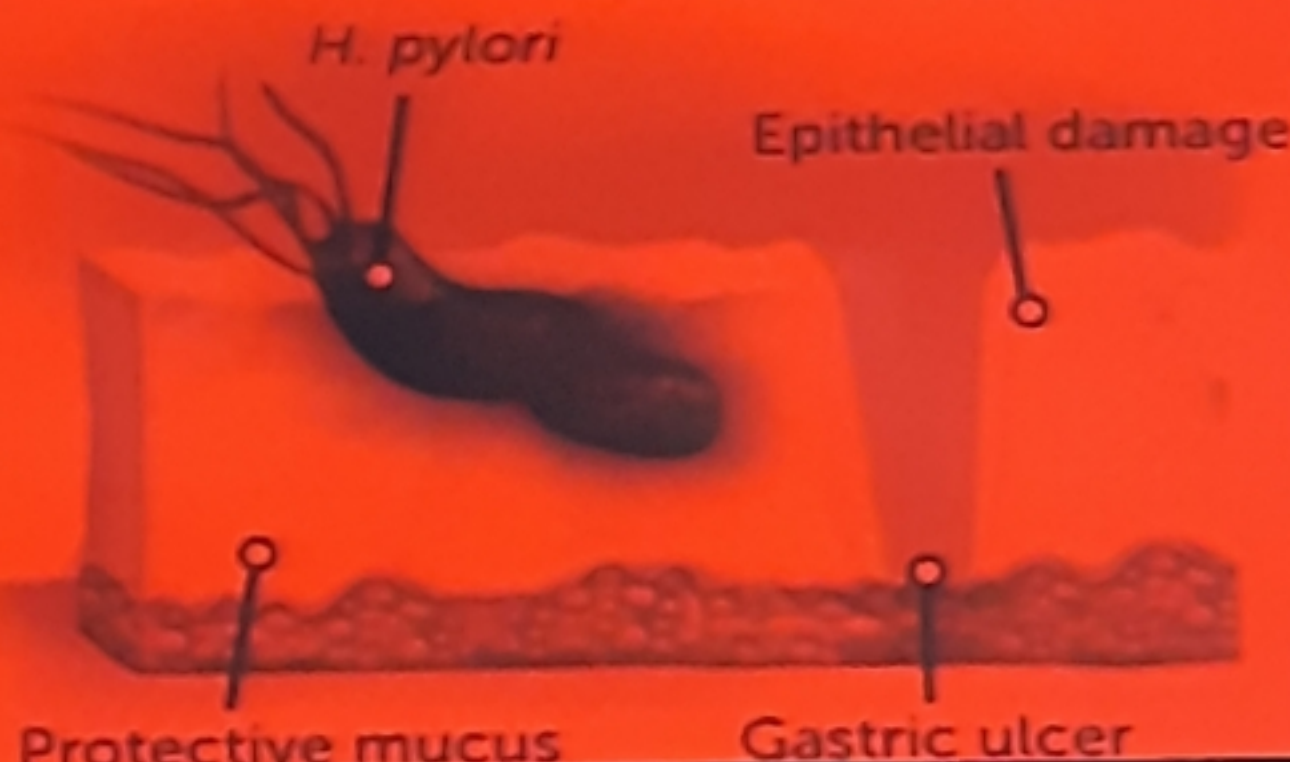


Diarrhea: H₂O Retained In Lumen



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Helicobacter





The Nobel Prize in Physiology or Medicine 2005

"for their discovery of the bacterium *Helicobacter pylori* and its role in gastritis and peptic ulcer disease"



Photo: C. Northcott

Barry J. Marshall

Ⓞ 1/2 of the prize

Australia

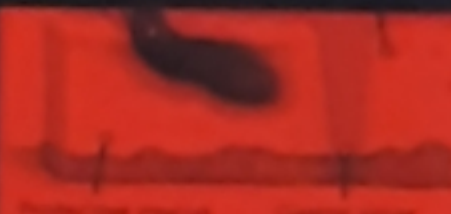


Photo: U. Mantau

J. Robin Warren

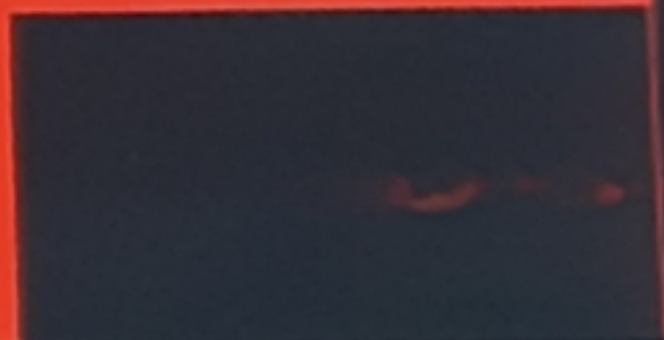
Ⓞ 1/2 of the prize

Australia



- Colonizes stomach \approx 50% of world population
- *H. pylori* is contagious, although the exact route of transmission is not known.
- Main risk factor for;
 - Gastric & duodenal ulceration
 - Stomach cancer
 - Gastric MALT (mucosa-associated lymphoid tissue) lymphoma

- Gram negative curved rod
- Microaerophilic: requires oxygen to survive, but requires environments containing lower levels of oxygen than are present in the atmosphere
- Produces oxidase, mucinase and urease enzymes



Virulence

- **Corkscrew motility** enables penetration into mucosal layer
- **Adhesins:** which help it adhere to epithelial cells
- **Mucinase:** Degrades gastric mucus; Localized tissue damage
- **Urease** converts urea into ammonia
 - Neutralize the local acid environment
 - Localized tissue damage
- **Vacuolating cytotoxin (VacA)** – apoptosis in eukaryotic cells generating large cytoplasmic vacuoles – epithelial cell damage

UREASE

Neutralize gastric acid gastric mucosal injury (by ammonia)

FLAGELLA

Bacterial mobility & chemotaxis to colonize under mucosa

LIPOPOLYSACCHARIDES

Adhere to host cells
inflammation

OUTER PROTEINS

Adhere to host cells

EXOTOXIN(S)

- Vacuolating toxin (*vacA*)
gastric mucosal injury

SECRETORY ENZYMES

- mucinase, protease, lipase
gastric mucosal injury

TYPE IV SECRETION SYSTEM

pill-like structure
for injection of effectors

EFFECTORS (*cagA* e.t.c.)

Actin remodeling,
IL-8 induction, host cell growth
and apoptosis inhibition

Organism attached to the mucus – secreting cells of gastric mucosa



Production of large amount of ammonia from urea by bacterial urease



Ammonia neutralizes HCl in stomach



Organism survival



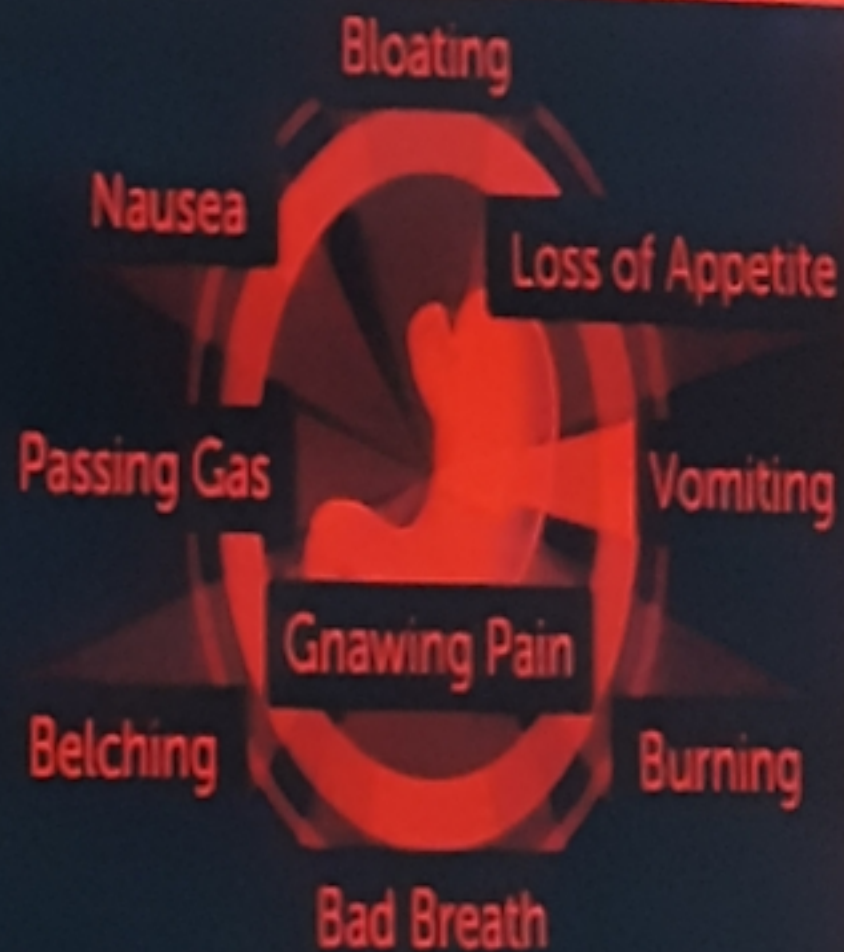
Plus inflammatory response



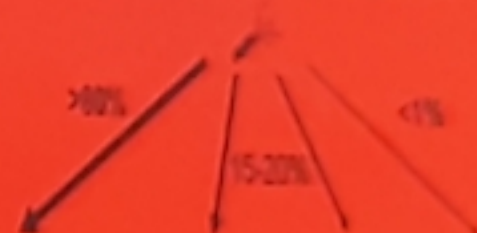
Damage to the mucus



Gastritis + peptic ulcers



The Clinical Outcomes of *Helicobacter pylori* Infections



Asymptomatic
or chronic gastritis

Chronic atrophic gastritis
intestinal metaplasia

Gastric or
Duodenal ulcer

Gastric cancer
MALT lymphoma

Lab Diagnosis

Non-invasive

- Blood antibody test- IgG detection
- Stool antigen test- detection of specific antigens in the stools
- carbon urea breath test

H. PYLORI RAPID TEST

- Rapid test for the qualitative detection of IgG antibodies specific to Helicobacter pylori in human stool (solid and liquid).
- Used as an aid in the diagnosis of H. pylori infection.
- The results are visible.
- Easy to use.
- Easy to store for future use.
- High sensitivity and specificity.
- Rapid interpretation of results.
- **CPT Code:**
 - 86300 (Stool Exam)
 - 86027 (Stool)
- ©2009 by IDEC Corporation

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IDE



Invasive - most reliable

- Gastric biopsy
 - Urease positive
 - Culture on Helicobacter Agar- takes 3-5days
 - Oxidase, urease positive



Figure 1. Gastric biopsy and culture of *Helicobacter pylori*

- A. Gastric biopsy of *H. pylori*
- B. *H. pylori* culture on sheep blood agar
- C. *H. pylori* culture on selective 100% agar

Treatment of H. pylori infection

First line treatment

Standard triple therapy	"legacy triple therapy"
Sequential therapy	"five plus five day therapy"
Concomitant therapy	"non-bismuth quadruple therapy"
Sequential-concomitant therapy	"hybrid therapy"
Bismuth quadruple therapy	underutilized in practice

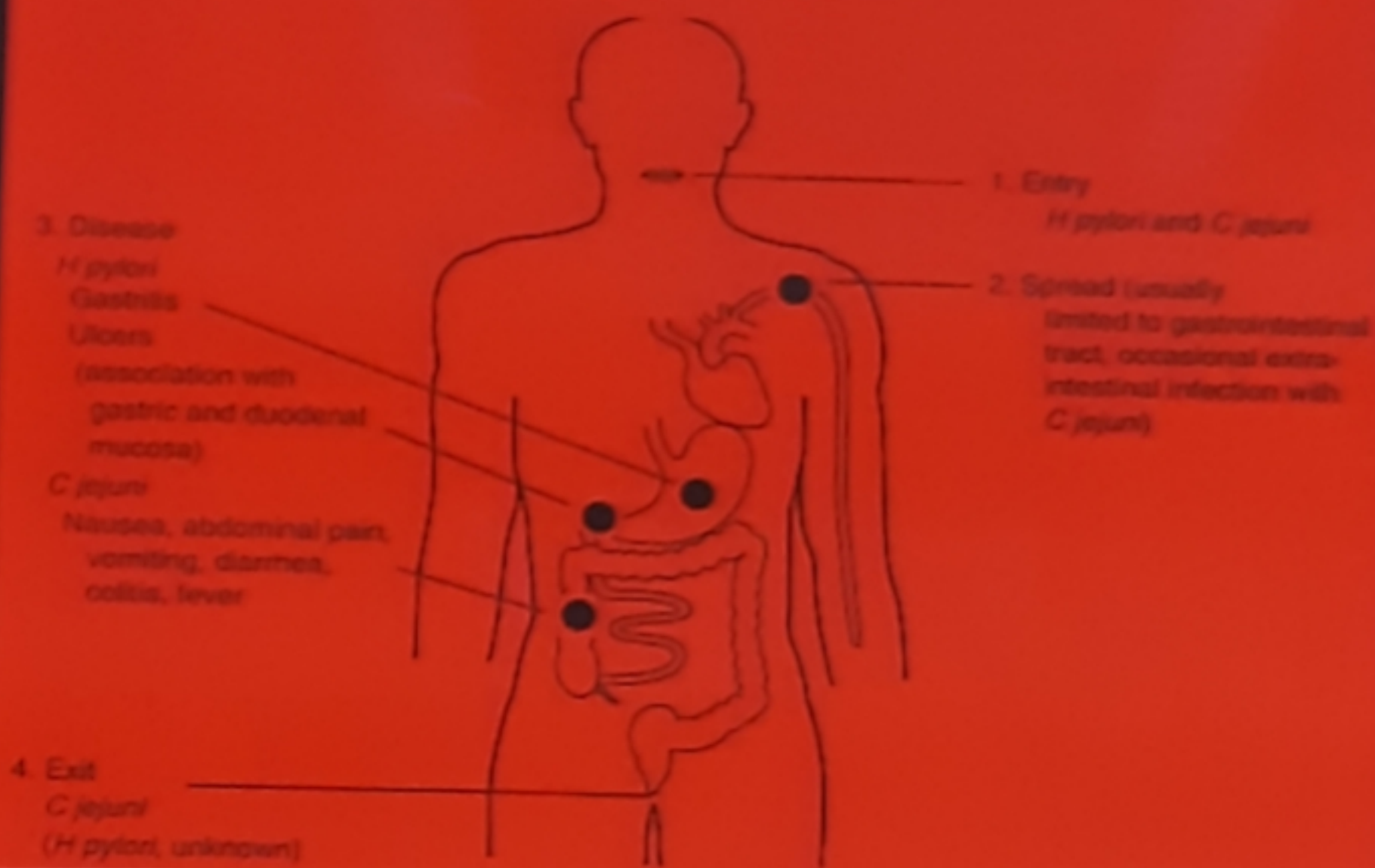
Second line treatment (one treatment failure)

Levofloxacin triple therapy

Third line treatment (at least 2 treatment failures)

Culture-guided therapy	Recommended
High-dose dual PPI therapy	Empirical
Furazolidone quadruple therapy	Empirical
Rifaximin-based triple therapy	Empirical - Last resort

Malfertheiner P et al. Gut 2012; 61: 646 - 664



1. What enzyme possessed by *Helicobacter pylori* helps to neutralize stomach acid and whose presence is tested for in biopsy specimens?
 - a. Coagulase
 - b. Urease
 - c. Hyaluronidase
 - d. DNase
 - e. Catalase

2. The following are characteristics of *Vibrio cholera* except
 - a. Gram negative curved rods
 - b. Oxidase negative
 - c. Motile
 - d. Produces yellow colonies on TCBS
 - e. The serogroups are based on the H antigen

3. Which of the following statement regarding *Campylobacter jejuni* is not correct?
 - a. It is commonly cultured in antibiotic containing media
 - b. Incubation temperature is 42°C
 - c. It is cultured in an atmosphere containing 5% O₂ and 10%CO₂
 - d. It is a normal flora of intestine.