Campylobacter jejuni

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Τι είναι το *Campylobacter jejuni*?

- Μικροοργανισμοί
- Λογάρια, λογαριασμένα
- Φυλλοκομούς
- Κινητή
- Gram αργοφόρο
- Microaerophilic
- Θερμοφιλικό (42-43 ºC)
The motility imparted by the polar flagella of these pathogens is required for colonization of the mucus lining of the gastrointestinal tract.
Infectious disease caused by bacteria of genus Campylobacter.

- 99% C. jejuni, 1% other.
- Affects the small intestine.
- Not recognized as cause of human food borne illness prior to 1975.
- Most common bacterial cause of diarrheal illness in the United States - More cases than Shigella and Salmonella combined.
Most common cause of food borne illness in the United States.

15 cases diagnosed/100,000 people annually.

Approximately 100 people die each year.

Most cases go unreported or undiagnosed

- Estimated 1-4 million cases in U.S. yearly.
Leading cause of food borne illness worldwide.
Many countries do not have national survey programs for Campylobacteriosis; worldwide incidence numbers do not exist.
Prevalent in developing countries.
Study by University of Lagos, Nigeria showed that in developing countries, 40-60% of children under 5 with diarrhea were positive for Campylobacter spp.
Worldwide, gastroenteritis is second only to respiratory infections in causing deaths.
Map showing *Campylobacter* risk per 100,000 returning travellers to Sweden from different regions of the world. In regions with a distinct seasonality, the month with the highest risk (OR) is given.
Who is affected?

- All warm-blooded animals can become affected. Some animals carry the disease without exhibiting symptoms.
- Any person can become infected.
- Children under 5 and young adults ages 15-29 are most often affected.
- Most deaths occur among the elderly and the immune-suppressed.
Ποια είναι τα συμπώματα?

- Diarrhea
  - Usually watery and sticky
  - Can contain blood and fecal leucocytes
- Fever
- Abdominal pain
- Nausea and vomiting
- Headache
- Muscle pain
Υπάρχουν επιπλοκές?

- Guillain-Barre Syndrome
  - Immune system attacks own nerves
  - 40% implicated C. jejuni infection
- Arthritis, Reiter’s Syndrome
- Hemolytic Uremic Syndrome
- Septicemia
  - Leading to infection of nearly any organ, including appendix, abdominal cavity, heart, nervous system, etc.
Produces a toxin called Cytolethal Distending Toxin (CDT).

CDT activity requires activation of three genes: cdtA, cdtB, and cdtC.

CdtB is nuclease that damages DNA and causes cell cycle arrest.

Causes cell death.
Modelo de acción de CdtB

Normal cells + CDT → Nuclear import → CdtB → Damaged DNA

DNA replication → G1 Growth

Cell division/mitosis → G2 Growth

Continued inhibition of Cdc2

G2 Arrest

Cellular distension → Eventual death
Περιόδος επώσης και διάρκεια συμπτωμάτων

- Onset of symptoms 2-10 days after ingestion.
- Duration of illness 2-21 days, typically 5-7 days.
- Relapses occur in 25% of cases.
Πώς γίνεται η διάγνωση?

- Present in feces of infected individuals
- Cultured sample of stool from ill person
- Isolation requirements:
  - Special antibiotic containing media
  - Microaerophilic atmosphere
  - 5% oxygen
  - 2-10 % carbon dioxide
The enteric species (C. coli and C. jejuni) are best isolated at 42°C since this is their optimal growth temperature and the higher temperature will suppress the growth of many other enteric organisms.

- The organisms grow well on CBA a chocolate, and poorly on Mac plates. Skirrows media (Selective agar: vancomycin, polymyxin B, and trimethoprim)

- They grow best at reduced O₂ and increased CO₂ concentrations of 10%

- It may take 48 hours for the small, translucent colonies to appear.
**Καλλιέργεια Campylobacter**

- **Biochemistry**
  - Oxidase +
  - Catalase + (except sputorum)
  - ID by above, growth requirements, and G stain morphology
Most infections are usually self-limited.
- > 95% of infections clear up on their own.
- Affected persons should drink plenty of fluids to avoid dehydration.
- Antidiarrheal medications such as loperamide (imodium) may help symptoms.
Antibiotics used in severe cases of gastroenteritis.

- Macrolide antibiotics including **Erythromycin** are effective and may shorten course of illness.
- Resistance developing to **Fluoroquinolone** antibiotics due to use in poultry feed.
Πως μολύνονται οι άνθρωποι?

- Single, sporadic cases
  - Eating raw or undercooked poultry meat
    - Fact: Even one single drop of juice from raw chicken meat can infect a person.
  - Handling raw poultry
  - Contact with infected fecal matter
Πως μολύνονται οι άνθρωποι?

- **Outbreaks**
  - Unpasteurized or under-pasteurized milk
    - Children on class trip **drinking unpasteurized milk**
    - Dairy under-processed surplus raw milk for schools.
  - Contaminated water source
    - Bennington, VT using **non-chlorinated water**.
Πως μολύνονται τα τρόφιμα και το νερό?

- **Poultry**
  - 63-88% of all chickens carry latent infection.
  - Spread through flock through drinking water and feces.
  - Spread to meat from intestines during slaughter.
  - Present in giblets (εντοσθία πουλερικών), especially liver.

- **Milk**
  - Infected udder (μαστός).
  - Contact with manure (κοπριά).

- **Surface water**
  - Infected manure from cows or wild birds.
  - Enters streams through runoff.
Πρόληψη

- Food Industry
  - Provide chickens with chlorinated water.
  - Avoid fecal contamination of udders or milk.
  - Strictly adhere to pasteurization time and temperature requirements.
  - Avoid fecal and/or intestinal contamination in meat processing.
Individuals

- Avoid drinking unpasteurized milk or untreated surface water.
- WASH HANDS!!!
  - after having contact with pet feces.
  - after using the restroom
Πρόληψη

WASH HANDS!!!
Individuals

- Use safe food handling practices
  - Cook all poultry products thoroughly
  - Wash hands before handling foods.
  - Wash hands after handling raw foods of animal origin.
  - Prevent cross-contamination in the kitchen.