



Infection with *Campylobacter jejuni*

Author(s) (*corresponding author)

Elisabetta Di Giannatale*, Istituto Zooprofilattico Sperimentale "G. Caporale"-Italy (e.digiannatale@izs.it)

Reviewers

Eva Engvall Olsson, SVA, EU-RL for *Campylobacter* (Uppsala, Sweden) (eva.olsson@sva.se)

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Etiology

The family *Campylobacteriaceae* includes the genus *Campylobacter* with organisms that are Gram-negative, spiral-shaped, non-spore forming, motile, microaerophilic, with a single polar flagellum at one or both ends. Several species of *Campylobacter* may cause disease in humans and animals, but the thermotolerant *Campylobacter jejuni* and *C. coli* are the two most important causes of foodborne disease in human. *C. fetus subsp. venerealis*, *C. fetus subsp. fetus*, and sporadically *C. jejuni* are responsible of infertility and abortions in ruminants. *C. fetus* may also be of zoonotic concern because occasionally associated to human septicemia. Additional zoonotic species include *C. helveticus*, *C. lari*, and *C. upsaliensis*.

Affected species (wildlife, domestic animals, humans)

Campylobacter spp. are ubiquitous, distributed worldwide among farm and wild animals and in environmental water sources. These bacteria are prevalent in food-producing animals such as poultry, cattle, pigs and sheep. Poultry is frequently colonised with *C. jejuni* (65–95%) less often with *C. coli* and rarely with other *Campylobacter* species. Cattle and sheep are found to be colonised mainly with *C. jejuni*, *C. coli*, *C. hyointestinalis*, and *C. fetus*, whereas pigs are predominantly colonised by *C. coli*.

C. jejuni has been also detected in every major vertebrate taxa including wild birds, pets, large game mammals such as cervids and wild boar, small carnivores, wild rodents in and around agricultural fields, and in insects. Although the animals are asymptomatic carriers of *Campylobacter*, *C. jejuni* and *C. coli* may be recovered from animals with diarrhea. However, it has not been proven that *Campylobacter* play role in the disease process in such cases. Nevertheless *C. jejuni* is known to cause abortions in sheep, and lately, a highly virulent clone that causes outbreaks of ovine abortions has been described in the United States. Humans are susceptible to infection with multiple *Campylobacter* spp.; the major human pathogens are *C. jejuni* and *C. coli*

Epidemiological characteristics and disease course

The principal reservoir of thermophilic *Campylobacter*, are the intestinal tract of mammals and birds. *C. jejuni* and *C. coli* are transmitted by the fecal-oral route, and contaminated foods represent a significant risk for human campylobacteriosis. The incubation period for *Campylobacter* infections is generally short (few days). *Campylobacter* can readily contaminate various foodstuffs, including meat, raw milk and dairy products, and, less frequently, fish and fishery products, mussels and fresh vegetables.

The primarily source of *C. jejuni/coli* infections in human is believed to be the handling and/or consumption of contaminated meat, especially poultry meat, unpasteurized dairy products, untreated water and contact with pets and livestock; the infective dose is low (<500 organisms).

The importance of wildlife as source of infection in humans is to a large extent unknown, but should not be ignored. Wild birds that congregate in flocks are believed to contaminate agricultural fields.

Clinical signs

The general opinion is that *C. jejuni* does not usually cause clinical disease in adult animals except for abortion in ruminants. However, sporadic cases of enteritis and very rare cases of hepatitis in ostriches have been reported in older literature. According to those reports, clinical signs may be more severe in young animals, clinical signs generally lasting 3 to 7 days, and some animals may have intermittent diarrhea for weeks and occasionally for months. Other reports have described *Campylobacter* spp. as linked to disease outbreaks in semi wild and wild animals, with negative effects on the health, productivity, and welfare. It has been described implicated in a serious episode of abortions and in a colitis with severe diarrhea episode and death in mink (*Mustela vison*). *C. jejuni* was also associated with

diarrhea and intestinal intussusceptions in a raccoon (*Procyon lotor*).

In humans, *C. jejuni/coli* infection is associated with acute enteritis and abdominal pain lasting for 7 days or more. Incubation period is typically 2-4 days. Campylobacteriosis is characterized by diarrhea (frequently bloody), fever, abdominal pain, nausea and vomiting. Infections are generally self-limiting. Extra-intestinal infections or post-infection complications such as reactive arthritis and neurological disorders can also occur. *C. jejuni* has become the most recognized antecedent cause of Guillain–Barré syndrome, a polio-like form of paralysis that can result in respiratory failure and severe neurological dysfunction and even death.

Criteria for diagnosis

Campylobacter jejuni can be isolated and identified from feces of colonized animals. There are no serological assays in routine use for the detection of *C. jejuni/C. coli* in livestock.

Recommended diagnostic method(s) and preferred samples (incl. recommended amount and appropriate storage)

Samples

From animal: fresh faeces, cloacal swabs, or ceaca should be taken.

From food: fresh food matrix should be taken.

Samples should be transported directly to the laboratory for analysis. Transportation time should not exceed 48h. For transports that take longer time, the samples should be sent in cool boxes with temperature not exceeding 8°C. For samples with low numbers of Campylobacter, transport medium should be added.

Culture and identification of thermotolerant *Campylobacter*

For detection and identification of *Campylobacter* in faeces/caeca, refer to the protocol described in Chapter 2.9.3 *Campylobacter jejuni* and *Campylobacter coli*, Terrestrial Manual (version online, 2014).

For detection and enumeration of thermotolerant *Campylobacter* in food and animal feeding stuffs, refer to the horizontal method ISO 10272-1:2006 isolation methods and ISO 10272-2:2006 enumeration methods, respectively.

For isolation and enumeration of thermotolerant *Campylobacter* in water, refer to ISO 17995:2005.

Rapid identification methods based on polymerase chain reaction (PCR)

PCR-based methods for direct detection of *Campylobacter* in animal faecal samples and enriched meat samples have been described in the literature. For *Campylobacter* species identification, 16S rRNA gene is adopted, while *mapA* and *hipO* genes are usually targeted for *C. jejuni*, and *ceu* gene for *C. coli*.

Serological tests

There are no serological assays in routine use for the detection of colonisation of *C. jejuni* and *C. coli* in livestock. In literature antigen-capture enzyme-linked immunosorbent assays (ELISAs) have been described for all host species. A standardised assay has recently been described in humans for use in sero-epidemiological studies.

APHAEA protocol (for harmonization at large scale)

Microbiological examination by enrichment, culture on solid agar plate of samples and identification by means of appropriate morphological, physiological, biochemical and molecular typing tests. Enrichment should not be used in case of faeces or intestinal contents.

Laboratories that can be contacted for diagnostic support

European Union Reference Laboratory (EU-RL) for Campylobacter, Uppsala (Sweden)

Ingrid.hansson@sva.se

Recommended literature

OIE. 2014. *Terrestrial manual* (<http://www.oie.int/>).

WHO, *The global view of Campylobacteriosis: report of an expert consultation*, Utrecht, Netherlands, 9-11 July 2012 - See more at: <http://apps.who.int/iris/handle/10665/80751#sthash.IWH5kXij.dpuf>
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