

Parasites and Foodborne Illness

Parasites are organisms that live on and obtain their food from other living creatures.

Some parasites live in only one species of animal, but many parasites can live in multiple host animals, including humans. Human foodborne parasites are mainly worms and protozoa.

Foodborne parasites may cause asymptomatic infections, short-lived acute diseases or may persist in the body, causing chronic health effects.

Foods most involved: Parasites can be found in foods such as beef, pork, milk, fish, fruits and raw vegetables. They may also be found in untreated water sources used by animals.

Common foodborne parasites in Canada are the protozoans *Cryptosporidium* sp., *Cyclospora cayetenensis*, *Giardia* sp., *Toxoplasma gondii*, and the worms *Anisakis simplex* and *Trichinella* sp.

Cryptosporidium

- Protozoan parasite infects intestinal tract, causes Cryptosporidiosis
- Passed in the feces of animals and can contaminate food, the environment and water supplies
- Symptoms: watery diarrhea, abdominal cramps, nausea, vomiting, mild fever, dehydration
- Onset: 7 to 10 days, 10-100 oocysts can cause infection
- Transmission: fecal-oral route

Cyclospora

- A protozoan parasite that infects the intestinal tract causes Cyclosporiasis
- Infections occur during tropical travel or from consumption of imported contaminated produce such as fresh herbs (basil and cilantro), lettuce and berries (raspberries and blackberries)
- Passed in the feces of animals and can contaminate food, the environment and water supplies
- Symptoms: watery explosive diarrhea, abdominal cramps, nausea, vomiting, loss of appetite,

weight loss, occasional fever.

- Onset: 7 to 10 days; the infective dose varies
- Transmission: fecal-oral route, not spread by person-to-person contact

Giardia

- Protozoan parasite infects the intestinal tract, causes Giardiasis
- Most common parasitic infection in Canada is also called beaver fever
- Passed in the feces of animals and can contaminate food, environment and water supplies
- Symptoms: diarrhea, abdominal cramps, gas, bloating, frequent loose and pale greasy stools, nausea, poor absorption of fats and vitamins, weight loss, fatigue.
- Onset: 1 to 2 weeks after ingestion of one or more cysts
- Transmission: fecal-oral route, contact with feces of an infected person (changing a diaper, sexual contact). Outbreaks are common in daycare and senior care due to poor hygiene practices.

Toxoplasma gondii

- Protozoan parasite causes Toxoplasmosis, posing severe risks to fetuses of pregnant women
- Commonly infects birds and animals in North America. Present in muscles of infected birds/animals and in feces.
- Symptoms: many infections are asymptomatic. Sick people may have a fever, sore throat, sore muscles, tiredness, swollen glands in the neck, armpits or groin, and in some cases, temporary blurred vision or loss of vision
- Onset: 5 to 23 days after ingesting contaminated food, water and oral exposure to contaminated fingers; infective dose is not known
- Transmission: oral via consumption of raw or undercooked meats, unpasteurized milk, poor handwashing after cleaning cat litter boxes or exposure to gardens or sandboxes containing cat feces

Anisakis simplex

- Parasitic roundworm causes Anisakiasis
- Commonly infects bottom-feeder marine fish such as cod, haddock, fluke, Pacific salmon, herring, flounder, monkfish, and squid
- Symptoms: Non-invasive infections result in a tickling or tingling sensation in the throat and cough. Invasive infections have the worm burrowing into and attaching to the stomach or intestine wall, resulting in ulcers, severe abdominal pain, nausea, vomiting and diarrhea. The worm does not multiply in the human body and dies in about 3 weeks. However, the pain from ulcers may persist for several months after the worm has died.
- Onset: within 24 hours of ingestion to about 2 weeks. One worm is enough to cause an infection
- Transmission: oral

Trichinella sp.

- Parasitic roundworm causes Trichinosis
- Commonly infects pigs and wild game such as bears, wild boar, elk, and moose. Improved swine feeding practices, slaughterhouse inspections, and pork processing have nearly eliminated *Trichinella* in commercial pork in Canada. The parasite is found in infected animals' intestines, tongues and skeletal muscles.
- Symptoms: Initial symptoms of an infection caused by worms include diarrhea, abdominal discomfort, nausea and vomiting. As the worms mature in the human bowel, they produce larvae that can travel to various parts of the body, such as the liver, muscles, brain, and eyes. This can lead to later symptoms such as muscle pain, fever, weakness, and swelling around the eyes. While early infections are easily treatable, later stages of the disease can take a long time to recover from.
- Onset: 1 to 4 weeks, 5-100 larvae can cause infection
- Transmission: fecal-oral, not spread by person-to-person contact

Control:

Basic parasite control strategies are cooking, freezing, proper cleaning, sanitation, hygiene and pest control practices to avoid transmission and cross-contamination.

- Purchase food from approved sources and suppliers
- Use potable water: Boiling water from untreated sources like springs, streams, ponds, lakes, rivers, or shallow wells can kill parasites that may be present. However, it is important to note that chlorination may not be effective against certain parasites like *Cryptosporidium* that are resistant to chlorine.
- Cook all food to recommended internal temperatures to kill parasites if present
- Freeze raw food at -20°C for 7 days or -35°C for 15 hours to kill parasites
- Dispose of animal and human waste safely to prevent transmission by the fecal-oral route. Compost waste to kill parasite eggs before using the waste as fertilizer (manure).
- Ensure effective pest control to prevent the spread of infective stages of parasites to food
- Wash raw fruits and vegetables thoroughly to remove cysts, oocysts and eggs of parasites
- Follow food safety best practices:
 - Avoid cross-contamination between raw and cooked ingredients
 - Avoid unpasteurized milk or juices
 - Practice good personal hygiene and proper handwashing after handling raw food products or after diaper changes in daycare or senior care
 - Clean and sanitize all food contact surfaces after handling raw foods, before using those surfaces for other foods

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