FOOD BORNE DISEASES

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CRYPTOSPORIDIUM

What is cryptosporidiosis

- Cryptosporidiosis is a disease that causes watery diarrhea. It is caused by microscopic germs—parasites called *Cryptosporidium. Cryptosporidium*, or “Crypto” for short, can be found in water, food, soil or on surfaces or dirty hands that have been contaminated with the feces of humans or animals infected with the parasite. During 2001–2010, Crypto was the leading cause of waterborne disease outbreaks,The parasite is found in every region throughout the world.

Cryptosporidiosis spreading

- Crypto lives in the gut of infected humans or animals. An infected person or animal sheds Crypto parasites in their poop. An infected person can shed 10,000,000 to 100,000,000 Crypto germs in a single bowel movement. Shedding of Crypto in poop begins when symptoms like diarrhea begin and can last for weeks after symptoms stop. Swallowing as few as 10 Crypto germs can cause infection.

Crypto can be spread by:

- Swallowing recreational water (for example, the water in swimming pools, fountains, lakes, rivers) contaminated with Crypto
- Crypto's high tolerance to chlorine enables the parasite to survive for long periods of time in chlorinated drinking and swimming pool water
- Drinking untreated water from a lake or river that is contaminated with Crypto
- Swallowing water, ice, or beverages contaminated with poop from infected humans or animals
- Eating undercooked food or drinking unpasteurized/raw apple cider or milk that gets contaminated with Crypto
- Touching your mouth with contaminated hands
- Hands can become contaminated through a variety of activities, such as touching surfaces or objects (e.g., toys, bathroom fixtures, changing tables, diaper pails) that have been contaminated by poop from an infected person, changing diapers, caring for an infected person, and touching an infected animal
- Exposure to poop from an infected person through oral-anal sexual contact
- Crypto is not spread through contact with blood.

Symptoms of cryptosporidiosis

Symptoms of Crypto generally begin 2 to 10 days (average 7 days) after becoming infected with the parasite. Symptoms include:

- Watery diarrhea
- Stomach cramps or pain
- Dehydration
- Nausea
- Vomiting
- Fever
- Weight loss

Symptoms usually last about 1 to 2 weeks (with a range of a few days to 4 or more weeks) in people with healthy immune systems.

The most common symptom of cryptosporidiosis is **watery diarrhea**. Some people with Crypto will have no symptoms at all.

The most at risk for cryptosporidiosis

- People who are most likely to become infected with *Cryptosporidium* include :
- Children who attend childcare centers, including diaper-aged children
- Childcare workers
- Parents of infected children
- Older adults (ages 75 years and older)
- People who take care of other people with Crypto
- International travelers
- Backpackers, hikers, and campers who drink unfiltered, untreated water
- People who drink from untreated shallow, unprotected wells
- People, including swimmers, who swallow water from contaminated sources
- People who handle infected calves or other ruminants like sheep
- People exposed to human poop through sexual contact

Contaminated water might include water that has not been boiled or filtered, as well as contaminated recreational water sources (e.g., swimming pools, lakes, rivers, ponds, and streams). Several community-wide outbreaks have been linked to drinking tap water or recreational water contaminated with *Cryptosporidium*. Crypto's high tolerance to chlorine enables the parasite to survive for long periods of time in chlorinated drinking and swimming pool water. This means anyone swallowing contaminated water could get ill.

Note: Although Crypto can infect all people, some groups are likely to develop more serious illness.

- Young children and pregnant women may be more likely to get dehydrated because of their diarrhea so they should drink plenty of fluids while ill.
- People with severely weakened immune systems are at risk for more serious disease. Symptoms may be more severe and could lead to serious or life-threatening illness. Examples of people with weakened immune systems include those with HIV/AIDS; those with inherited diseases that affect the immune system; and cancer and transplant patients who are taking certain immunosuppressive drugs.

Diagnosis

Cryptosporidiosis is a diarrheal disease that is spread through contact with the stool of an infected person or animal. The disease is diagnosed by examining stool samples. People infected with Crypto can shed the parasite irregularly in their poop (for example, one day they shed parasite, the next day they don't, the third day they do) so patients may need to give three samples collected on three different days to help make sure that a negative test result is accurate and really means they do not have Crypto. Healthcare providers should specifically request testing for Crypto. Routine ova and parasite testing does not normally include Crypto testing.

TOXOPLASMA

Toxoplasmosis

Toxoplasmosis is an infection caused by a single-celled parasite called Toxoplasma gondii. While the parasite is found throughout the world.
The Toxoplasma parasite can persist for long periods of time in the bodies of humans (and other animals), possibly even for a lifetime. Of those who are infected however, very few have symptoms because a healthy person's immune system usually keeps the parasite from causing illness. However, pregnant women and individuals who have compromised immune systems should be cautious; for them, a Toxoplasma infection could cause serious health problems.

How do people get toxoplasmosis?

A Toxoplasma infection occurs by one of the following:

- Eating undercooked, contaminated meat (especially pork, lamb, and venison) or shellfish (for example, oysters, clams or mussels).
- Accidental ingestion of undercooked, contaminated meat or shellfish after handling them and not washing hands thoroughly (Toxoplasma cannot be absorbed through intact skin).
- Eating food that was contaminated by knives, utensils, cutting boards and other foods that have had contact with raw, contaminated meat or shellfish.

Accidentally swallowing the parasite through contact with cat feces that contain Toxoplasma. This might happen by

- Cleaning a cat's litter box when the cat has shed Toxoplasma in its feces;
- Touching or ingesting anything that has come into contact with cat feces that contain Toxoplasma; or
- Accidentally ingesting contaminated soil (e.g., not washing hands after gardening or eating unwashed fruits or vegetables).
- Mother-to-child (congenital) transmission.

Receiving an infected organ transplant or infected blood via transfusion, though this is rare.

The signs and symptoms of toxoplasmosis

Symptoms of the infection vary.

- Most people who become infected with Toxoplasma gondii are not aware of it because they have no symptoms at all.
- Some people who have toxoplasmosis may feel as if they have the “flu” with swollen lymph glands or muscle aches and pains that may last for a month or more.
- Severe toxoplasmosis, causing damage to the brain, eyes, or other organs, can develop from an acute Toxoplasma infection or one that had occurred earlier in life and is now reactivated. Severe toxoplasmosis is more likely in individuals who have weak immune systems, though occasionally, even persons with healthy immune systems may experience eye damage from toxoplasmosis.

- Signs and symptoms of ocular toxoplasmosis can include reduced vision, blurred vision, pain (often with bright light), redness of the eye, and sometimes tearing. Ophthalmologists sometimes prescribe medicine to treat active disease. Whether or not medication is recommended depends on the size of the eye lesion, the location, and the characteristics of the lesion (acute active, versus chronic not progressing). An ophthalmologist will provide the best care for ocular toxoplasmosis.

- Most infants who are infected while still in the womb have no symptoms at birth, but they may develop symptoms later in life. A small percentage of infected newborns have serious eye or brain damage at birth.

Who is at risk for developing severe toxoplasmosis?

People who are most likely to develop severe toxoplasmosis include:

- Infants born to mothers who are newly infected with Toxoplasma gondii during or just before pregnancy.
- Persons with severely weakened immune systems, such as individuals with AIDS, those taking certain types of chemotherapy, and those who have recently received an organ transplant

What is the treatment for toxoplasmosis?

- Once a diagnosis of toxoplasmosis is confirmed, you and your health care provider can discuss whether treatment is necessary. In an otherwise healthy person who is not pregnant, treatment usually is not needed. If symptoms occur, they typically go away within a few weeks to months. For pregnant women or persons who have weakened immune systems, medications are available to treat toxoplasmosis.

How can I prevent toxoplasmosis?

- There are several steps you can take to reduce your chances of becoming infected with Toxoplasma gondii.
- Cook food to safe temperatures. A food thermometer should be used to measure the internal temperature of cooked meat. Color is not a reliable indicator that meat has been cooked to a temperature high enough to kill harmful pathogens like Toxoplasma. Do not sample meat until it is cooked. USDA recommends the following for meat preparation:

- For Whole Cuts of Meat (excluding poultry)

Cook to at least 145° F (63° C) as measured with a food thermometer placed in the thickest part of the meat, then allow the meat to rest* for three minutes before carving or consuming. *According to USDA, "A 'rest time' is the amount of time the product remains at the final temperature, after it has been removed from a grill, oven, or other heat source. During the three minutes after meat is removed from the heat source, its temperature remains constant or continues to rise, which destroys pathogens."

- For Ground Meat (excluding poultry)

Cook to at least 160° F (71° C); ground meats do not require a rest time.

- For All Poultry (whole cuts and ground)

Cook to at least 165° F (74° C) . The internal temperature should be checked in the innermost part of the thigh, innermost part of the wing, and the thickest part of the breast. Poultry do not require a rest time.

GIARDIA

What is giardiasis?

- Giardiasis is a diarrheal disease caused by the microscopic parasite *Giardia duodenalis* (or *"Giardia"* for short). Once a person or animal has been infected with *Giardia*, the parasite lives in the intestines and is passed in stool (poop). Once outside the body, *Giardia* can sometimes survive for weeks or even months. *Giardia* can be found in every region of the United States and around the world.

How do you get giardiasis and how is it spread?

- You can get giardiasis if you swallow the *Giardia* parasite (germ). *Giardia*—or poop from people or animals infected with *Giardia*—can contaminate anything it touches. *Giardia* spreads very easily; even getting tiny amounts of poop in your mouth could make you sick.

Giardiasis can be spread by:

- Swallowing unsafe food or water contaminated with *Giardia* germs
- Having close contact with someone who has giardiasis, particularly in childcare settings
- Traveling within areas that have poor sanitation
- Exposure to poop through sexual contact from someone who is sick or recently sick with *Giardia*
- Transferring *Giardia* germs picked up from contaminated surfaces (such as bathroom handles, changing tables, diaper pails, or toys) into your mouth
- Having contact with infected animals or animal environments contaminated with poop

What are the symptoms of giardiasis?

Giardia infection (giardiasis) can cause a variety of intestinal symptoms, which include:

- Diarrhea
- Gas
- Foul-smelling, greasy poop that can float
- Stomach cramps or pain
- Upset stomach or nausea
- Dehydration

Symptoms of giardiasis generally begin by having 2 to 5 loose stools (poop) per day and progressively increasing fatigue. Other, less common symptoms include fever, itchy skin, hives, and swelling of the eyes and joints. Over time, giardiasis can also cause weight loss and keep the body from absorbing nutrients it needs, like fat, lactose, vitamin A, and vitamin B12. Some people with *Giardia* infections have no symptoms at all.

How long after infection do symptoms appear?

- Symptoms of giardiasis normally begin 1 to 2 weeks after becoming infected.

How long will symptoms last?

- Symptoms generally last anywhere from 2 to 6 weeks. In people with weakened immune systems (e.g., due to illness such as HIV), symptoms may last longer. Healthcare providers can prescribe the appropriate antiparasitic medications to help reduce the amount of time symptoms last.

Who is most at risk of getting giardiasis?

- Anyone can become infected with *Giardia*. However, those at greatest risk are:
- People in childcare settings
- People who are in close contact with someone who has the disease
- Travelers within areas that have poor sanitation
- People who have contact with poop during sexual activity
- Backpackers or campers who drink untreated water from springs, lakes, or rivers
- Swimmers who swallow water from swimming pools, hot tubs, splash pads, or untreated recreational water from springs, lakes, or rivers
- People who get their household water from a shallow well
- People with weakened immune systems
- People who have contact with infected animals or animal environments contaminated with poop

How is giardiasis diagnosed?

- Contact your healthcare provider if you think you may have giardiasis. Your healthcare provider will ask you to submit stool (poop) samples to see if you are infected. Because it can be difficult to detect *Giardia*, you may be asked to submit several stool specimens collected over several days to see if you are infected.

What can I do to prevent and control giardiasis?

To prevent and control *Giardia* infection, it is important to:

- Wash your hands with soap and water during key times, especially:
  - before preparing food or eating, and
  - after using the bathroom or changing diapers.

- Avoid eating food and drinking water that might be contaminated with *Giardia* germs.
  - Properly treat water from springs, lakes, or rivers (surface water) while backpacking or camping if no other source of safe water is available.
  - Avoid swallowing water from swimming pools, hot tubs, splash pads, and untreated water from springs, lakes, or rivers (surface water) while swimming.
  - Store, clean, and prepare fruits and vegetables properly.

- Practice safe sex by reducing your contact with poop during sex or avoid having sex several weeks after you or your partner have recovered from giardiasis

SARCOCYST

What is sarcocyst?

- *Sarcocystis* species are ubiquitous in nature and are found worldwide. Two hosts are required to maintain the life cycle: an intermediate or prey host, in which cysts (sarcocysts) containing infectious zoites infect the muscles, and a definitive, final, or predator host that ingests the cysts, becomes infected with intestinal-stage parasites, and excretes oocysts or sporocysts into the environment. For the >150 species of *Sarcocystis*, most intermediate hosts include herbivorous mammals and humans and other primates but also some birds, reptiles, and possibly fish. Definitive hosts include carnivores or omnivores, including humans and some reptiles and raptorial birds . Although others may exist, only *Sarcocystis nesbitti* has been identified in humans and nonhuman primates serving as intermediate hosts, with a snake possibly serving as the definitive host. However, this identification is based on a comparison of available congeners that most closely matched those of species in which snakes were the final hosts and has yet to be confirmed. Two species, *Sarcocystis hominis* and *S. suihominis*, have been identified in humans and nonhuman primates serving as definitive hosts

Life Cycle Stages

- In intermediate hosts, including humans, only asexual-stage parasites are found (The initial stages of asexual development are known from animal studies but have not been seen in human tissues. The following descriptions are based on *Sarcocystis cruzi* development in cattle. Infection begins when oocysts or sporocysts in feces from a final host become ingested by a susceptible intermediate host. Exposure to trypsin and bile causes the plates that form the sporocyst wall to disunite, liberating four motile sporozoites contained within. The sporozoites pass into or through the gut wall and are first found within endothelial cells that line small arteries in all parts of the body. This is the first of approximately four cycles of asexual development, called merogony or schizogony, the number and timing of which may vary with the species. During each of the first three cycles, nuclear division eventually gives rise to merozoites, which are motile, crescent-shaped organisms with a structure similar to that of sporozoites. Subsequent generations are found downstream, in arterioles, and then in capillaries and in veins in all parts of the body until the last generation develops in skeletal, smooth, and cardiac muscles, and sometimes in neural tissue, where sarcocysts are formed.

- Sexual stages occur in definitive hosts. After a susceptible host has eaten meat containing mature sarcocysts, the wall of the sarcocyst becomes digested or broken. Bradyzoites within the sarcocysts are released and can soon be found intracellularly in villi of the small intestine. Each bradyzoite transforms into either a microgamont (male) or a macrogamont (female) stage). Microgametocytes become multinucleate, and a sperm-like microgamete forms around each nucleus. A single flagellated microgamete finds and fuses with a macrogamont. Their nuclei combine, and the fertilized macrogamont develops into an oocyst that sporulates *in situ*, forming two sporocysts that each contain four sporozoites). Although oocysts are immobile, they reach the lumen of the intestine and are excreted with feces, sometimes intact with a barely visible wall, appearing as a pair of sporocysts, or more often, the fragile wall breaks, and individual sporocysts are released. Sporocysts of virtually all species are indistinguishable from one another, measuring ~10 by 15 μm and containing four sporozoites and a cluster of residual granules

Species Infecting Animals

- Some species of *Sarcocystis* that infect agricultural and companion animals, such as cattle, sheep, and horses, are of economic importance because they cause illness that results in fever, lethargy, poor growth, poor feed use, reduced milk production, lameness, wool and hair loss, abortion, carcass condemnation at meat inspection, as well as death. Information obtained from such infections has been helpful in understanding aspects of clinical disease in humans. For example, data on hematology, serum enzyme level changes, the inflammatory response, histopathology, the location and timing of developmental stages, the febrile response, the negative impact on growth, abortion, and other factors have been well documented from experimental and outbreak studies of sarcocystosis in livestock and have been reviewed

Species Infecting Humans

- Humans can be either final or intermediate hosts). Humans can become final hosts after eating undercooked pork and beef harboring mature sarcocysts of *S. suihominis* and *S. hominis*, respectively. Tissues of many species of domesticated animals, wild mammals, birds, and reptiles that are eaten for meat throughout the world contain sarcocysts capable of infecting unidentified final hosts, possibly including humans and with unknown health consequences. Therefore, there may be additional undocumented species for which humans can serve as a definitive host. Although sporocysts in the feces are diagnostic for *Sarcocystis* infections of definitive hosts, they are so morphologically similar that species cannot be differentiated simply by the size and shape of sporocysts.
- Within the *Sarcocystis* life cycle, humans who are infected with muscular sarcocystosis are considered aberrant intermediate hosts because they accidently substitute for the natural hosts that routinely serve as prey for a definitive predator host. The number of species for which humans can serve as an intermediate host is unknown, but there may be seven or more species based on differences in sarcocyst wall morphology observed in human tissue specimens). Sarcocyst wall morphology has also been used to differentiate species in animals . The use of sarcocyst wall morphology to distinguish species has been controversial because morphology can be difficult to discern by light microscopy, can be affected during the processing of tissues, and can change with the age of the sarcocysts. Molecular methods have been used but have been extremely limited. Greater use will extend and confirm species identity and improve diagnosis of infections.

Intestinal Sarcocystosis Species and Symptoms

- s definitive hosts, humans can experience nausea, vomiting, acute and severe enteritis, or chronic enteritis, but many infections appear to be mild or asymptomatic. Differences depend on the number, and perhaps the species, of sarcocysts ingested. Few accurate data are available on the duration of infection or the numbers of oocysts and sporocysts excreted. Most case studies suffer from not knowing the time of onset of infection, the type or quantity of meat consumed, the species and number of sarcocysts consumed, and whether a patient ingested raw meat once or multiple times. The longest period of continuous sporocyst excretion (*I. hominis*) was 21 months or more for a patient in The Netherlands, while other patients excreted sporocysts for at least 6 months .A patient in Poland excreted sporocysts for at least 12 months. However, the most reliable information on the prepatent and patent periods is from human volunteer studies. In Germany, diaphragms from cattle and pigs were obtained from an abattoir, ground in a meat grinder, and found to contain zoites of *Sarcocystis*. This ground meat was then fed to volunteers who were not excreting oocysts or sporocysts in their stools. In the first experiment, two volunteers ate 500 g of raw beef diaphragm with onions and spices and began excreting sporocysts 9 days later, continuing for 40 days or longer. In the second experiment, four volunteers ate seasoned raw pork diaphragm and began excreting sporocysts 9, 13, and 17 days later; the fourth person remained uninfected. The patent period for the three volunteers was at least 30 days. Of seven volunteers in Brazil who ate raw kibbe (beef), six began to excrete *S. hominis* oocysts/sporocysts 10 to 14 days later and excreted them for 5 to 12 days

Diagnosis of Intestinal Sarcocystosis

- The basis for diagnosis of Intestinal Sarcocystosis includes enteritis and a history of having consumed undercooked meat, although infected persons can be asymptomatic. Confirmation requires identification of oocysts and or sporocysts in the stool. Sporocysts with sizes of ~10 by 15 μm are easily seen by LM in a wet preparation just below the coverslip in a droplet of aspirated fluid from the surface of a fecal float and will autofluoresce when viewed by fluorescence microscopy. Flotation is performed by mixing feces with concentrated solutions of zinc sulfate, sucrose, sodium or cesium chloride, Percoll, or similar high-density solutions, followed by centrifugation at 500 × *g* to sediment fecal debris while concentrating the parasites at the surface. Species cannot be distinguished from one another by this method because they are so similar morphologically. The presence of asexual stages and sporulated oocysts in the intestine is more applicable for postmortem diagnosis, but biopsy or postsurgical specimens can reveal the presence of infection when stool specimens appear negative.
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PREVENTION

- To prevent intestinal sarcocystosis, meat must be thoroughly cooked or frozen to kill the bradyzoites in the sarcocysts. Thorough cooking rendered bradyzoites noninfectious, as demonstrated in a volunteer study involving *S. suihominis* . If there is a toxic factor associated with the ingestion of sarcocysts, possibly as with *S. suihominis*), cooking also appears to destroy the effects. *Sarcocystis meischeriana* in pork was rendered noninfectious for dogs after meat was cooked at 60°C for 20 min, 70°C for 15 min, and 100°C for 5 min or frozen at −4°C for 48 h or at −20°C for 24 h .Likewise, whereas dogs fed uncooked chuck roast, round steak, hamburger, and rare roast beef became infected, other dogs fed cooked meat such as beef bologna and beef frankfurters or frozen meat such as hamburger or sandwich steaks did not become infected . Meat inspection might reduce some infections, but it would be costly and time-consuming, requiring the identification of organisms in meat. Unless heavily infected, sarcocysts would be difficult to detect by microscopic or antibody methods, and these tests would not determine the species and therefore could be misleading if the species does not infect humans. Molecular tests may determine the species, but obtaining infected tissues where sarcocysts are sparse would be impractical. To prevent infection of domesticated food animals, human feces containing sporocysts must not be permitted to contaminate water, bedding, and feed. Sanitation is the key; with the use of toilets and diligent hand washing, contamination can be reduced or eliminated.

- To prevent humans from acquiring muscular sarcocystosis, the possible ingestion of sporocysts must be eliminated. Clean drinking water can reduce exposure to sporocysts, but recreational water and contact with soil are potential risk factors. Where contaminated drinking water is suspected, boiling will provide disinfection. Filters with pores small enough to remove bacteria from water can also remove sporocysts of *Sarcocystis*. Chemical disinfection with chlorine or other agents used for water treatments is not effective in killing sporocysts of *Sarcocystis* .Where available, drinking safe bottled water from sealed containers is recommended. Food can be contaminated at many places along the production, distribution, and preparation line. Where fresh produce is suspected to be contaminated with sporocysts in irrigation water or by food handlers, food should be painstakingly washed with clean water and/or thoroughly cooked before being eaten.

ENTAMOEBA HISTOLYTICA

- Entamoeba histolytica is an anaerobic parasitic amoebozoan, part of the genus Entamoeba.
- [1] Predominantly infecting humans and other primates causing amoebiasis, E. histolytica is estimated to infect about 35-50 million people worldwide. [1] E. histolytica infection is estimated to kill more than 55,000 people each year.
- [2] Previously, it was thought that 10% of the world population was infected, but these figures predate the recognition that at least 90% of these infections were due to a second species, E. dispar.
- [3] Mammals such as dogs and cats can become infected transiently, but are not thought to contribute significantly to transmission.
- The active (trophozoite) stage exists only in the host and in fresh loose feces; cysts survive outside the host in water, in soils, and on foods, especially under moist conditions on the latter. The infection can occur when a person puts anything into their mouth that has touched the feces of a person who is infected with E. histolytica, swallows something, such as water or food, that is contaminated with E. histolytica, or swallows E. histolytica cysts (eggs) picked up from contaminated surfaces or fingers.[4] The cysts are readily killed by heat and by freezing temperatures; they survive for only a few months outside of the host

- [5] When cysts are swallowed, they cause infections by excysting (releasing the trophozoite stage) in the digestive tract. The pathogenic nature of E. histolytica was first reported by Fedor A. Lösch in 1875,[1] but it was not given its Latin name until Fritz Schaudinn described it in 1903. E. histolytica, as its name suggests (histo–lytic = tissue destroying), is pathogenic; infection can be asymptomatic, or it can lead to amoebic dysentery or amoebic liver abscess.

- [6][7] Symptoms can include fulminating dysentery, bloody diarrhea, weight loss, fatigue, abdominal pain, and amoeboma. The amoeba can 'bore' into the intestinal wall, causing lesions and intestinal symptoms, and it may reach the blood stream. From there, it can reach vital organs of the human body, usually the liver, but sometimes the lungs, brain, and spleen. A common outcome of this invasion of tissues is a liver abscess, which can be fatal if untreated. Ingested red blood cells are sometimes seen in the amoeba cell cytoplasm.

- Risk factors
- Poor sanitary conditions are known to increase the risk of contracting amebiasis E. histolytica.[8] In the United States, there is a much higher rate of amebiasis-related mortality in California and Texas (this might be caused by the proximity of those states to E. histolytica-endemic areas, such as Mexico), parts of Latin America, and Asia.
- [9] E. histolytica is also recognized as an emerging sexually transmissible pathogen, especially in male homosexual relations, causing outbreaks in non-endemic regions.
- [10] As such, high-risk sex behaviour is also a potential source of infection.[11] Although it is unclear whether there is a causal link, studies indicate a higher chance of being infected with E. histolytica if one is also infected with HIV.
- [12][13]E.histolytica may modulate the virulence of certain human viruses and is itself a host for its own viruses.
- For example, AIDS accentuates the damage and pathogenicity of E. histolytica.
- [13] On the other hand, cells infected with HIV are often consumed by E. histolytica. Infective HIV remains viable within the amoeba, although there has been no proof of human reinfection from amoeba carrying this virus.

- E. histolytica causes tissue destruction which leads to clinical disease. E. histolytica–induced tissue damage by three main events: direct host cell death, inflammation, and parasite invasion. Once the trophozoites are excysted in the terminal ileum region, they colonize the large bowel, remaining on the surface of the mucus layer and feeding on bacteria and food particles. Occasionally, and in response to unknown stimuli, trophozoites move through the mucus layer where they come in contact with the epithelial cell layer and start the pathological process. E. histolytica has a lectin that binds to galactose and N-acetylgalactosamine sugars on the surface of the epithelial cells, The lectin normally is used to bind bacteria for ingestion. The parasite has several enzymes such as pore forming proteins, lipases, and cysteine proteases, which are normally used to digest bacteria in food vacuoles but which can cause lysis of the epithelial cells by inducing cellular necrosis and apoptosis when the trophozoite comes in contact with them and binds via the lectin. Enzymes released allow penetration into intestinal wall and blood vessels, sometimes on to liver and other organs. The trophozoites will then ingest these dead cells. This damage to the epithelial cell layer attracts human immune cells and these in turn can be lysed by the trophozoite, which releases the immune cell's own lytic enzymes into the surrounding tissue, creating a type of chain reaction and leading to tissue destruction. This destruction manifests itself in the form of an 'ulcer' in the tissue, typically described as flask-shaped because of its appearance in transverse section. This tissue destruction can also involve blood vessels leading to bloody diarrhea, amebic dysentery. Occasionally, trophozoites enter the bloodstream where they are transported typically to the liver via the portal system. In the liver a similar pathological sequence ensues, leading to amebic liver abscesses. The trophozoites can also end up in other organs, sometimes via the bloodstream, sometimes via liver abscess rupture or fistulas. Similarly, when the trophozoites travel to the brain, they can cause amoebic brain abscess.