

Case study

Giardia intestinalis

Sofia Olsson

Giardia intestinalis is a parasitic microorganism belonging to the phylum Metamonada. This parasite is highly infectious and causes severe, although not fatal stomach issues such as diarrhea. As this organism spreads through ingestion of fecal matter from an infected host, the condition is more common in places lacking food hygiene. As is common for the members of subgroup Fornicata, *G. intestinalis* has some reduced internal structures, including but not limited to reduced mitochondria. In the case of *G. intestinalis* taking the form of a mitosome. These reduced functions are seemingly the result of reductive evolution, due to the organism's parasitic lifestyle (Silar 2016).

The lifecycle of *G. intestinalis* has two stages, forming either cysts or taking a trophozoite form. Cysts are infectious dormant cells which reside in fecal matter, cysts are resistant to extreme conditions which enables the parasite to last longer outside of the host. When fecal matter comes in contact with a food source the cysts can enter a host body through ingestion. During digestion in the host, *G. intestinalis* cysts can form the mobile trophozoite form as a result of exposure to the acidic environment of the host stomach and bile and trypsin in the duodenum. The trophozoite can then undergo proliferation through mitosis and at a later stage differentiate, becoming cysts which leave the host body to further infect new hosts (Lagunas-Rangel *et al.* 2021).

Proliferation in *G. Intestinalis* has long been thought to be entirely asexual, with only cell division through mitosis being observed.

More recently, these claims have been contested following the findings of genes specific to meiosis within the *G. intestinalis* genome. Considering the amount of meiotic genes still present in the *G. intestinalis* genome, the loss of sexual reproduction in the species would be a recent one. Alternatively, *G. Intestinalis* might in fact still has the ability to sexually reproduce, although it has not been observed (Ramesh *et al.* 2005).

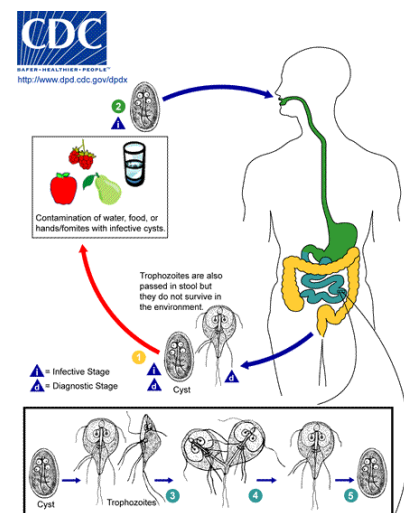


Figure 1: Infectious stages of *Giardia Intestinalis*. (Public domain)

References:

- Lagunas-Rangel FA, Yee J, Bermúdez-Cruz RM. 2021. An update on cell division of *Giardia duodenalis* trophozoites. *Microbiological Research* 250: 126807.
- Ramesh MA, Malik S-B, Logsdon JM. 2005. A phylogenomic inventory of meiotic genes; evidence for sex in *Giardia* and an early eukaryotic origin of meiosis. *Current biology*: CB 15: 185–191.
- Silar P. 2016. *Protistes Eucaryotes : Origine, Evolution et Biologie des Microbes Eucaryotes*. hal-01263138

