

# Difference Between Cyst and Trophozoite

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## Key Difference – Cyst vs Trophozoite

Protozoa is a subkingdom of the Kingdom Protista with more than 50,000 species and is found in almost every possible habitats. Protozoa are microscopic unicellular eukaryotes which can either be free living forms or parasitic forms living in the gut of higher level organisms. Protozoans reproduce by asexual methods and mostly through binary fission. The life cycle of a protozoan exhibits two main stages: the trophozoite stage and the cyst stage. **The trophozoite stage is the feeding stage of the protozoan whereas the cyst stage is the dormant, resistant and infectious stage of the protozoan.** This is the key difference between cyst and trophozoite.

## What is a Cyst?

Some protozoa form cysts that contain one or more infective forms which are capable of surviving for long periods before undergoing multiplication. Cysts are characterized by its highly resistant cell wall. This cell wall is involved in protecting the cyst under harsh environmental conditions and only allows proliferation when the cysts meet the optimum environment or the specific host. Excystation is the process by which the cyst is released upon receiving the ability to infect the host. Excystation can release one or more cysts. For example, the trophozoite of *Entamoeba histolytica*, which causes Amoebiasis, first forms a single cyst. As the cyst matures, nuclear division produces four nuclei, and four uninucleate meta cystic amoeba appear during excystation. Cysts isolated from fecal samples have a protective wall, enabling the parasite to survive in the outside environment for a period ranging from days to a year, depending on the species and environmental conditions. Some cysts show large secretory vesicles which secrete harmful chemicals upon excystation.



**Figure 01: *Entamoeba Histolytica* Cyst**

Cysts are infectious particles and are involved in causing diseases to humans and other organisms where the causative agent is a protozoan. Some disease causing protozoans involved in cyst formation include:

- *Entamoeba histolytica* – Amoebiasis
- *Plasmodium vivax* – Malaria
- *Giardia lamblia* – Giardiasis

## **What is a Trophozoite?**

Trophozoite is the active, feeding, multiplying stage of most protozoa and is the dominant stage of the protozoan. In parasitic species, this stage is usually associated with pathogenesis. Trophozoites can be either flagellated or non-flagellated and termed using different terminology. Trophozoites of most protozoans are pear shaped with bilateral symmetry. Trophozoite is nucleated with a central karyosome and median bodies. Fibrils run along the surface length of the parasite and are called axonemes.

The function of the median bodies is not known, but most believe that they are somehow involved with the adhesive disk and its formation. An adhesive disk (AD) is not always visible by light microscopy, and it occupies the ventral side of the anterior end.

Trophozoites are found attached to [epithelial cells](#) of the small intestine and are rarely found in stools. This attachment to the intestinal epithelium is mediated by the

adhesive disk. Trophozoite absorbs nutrients from the intestinal lumen via [pinocytosis](#), and no specialized feeding organelles have been described.

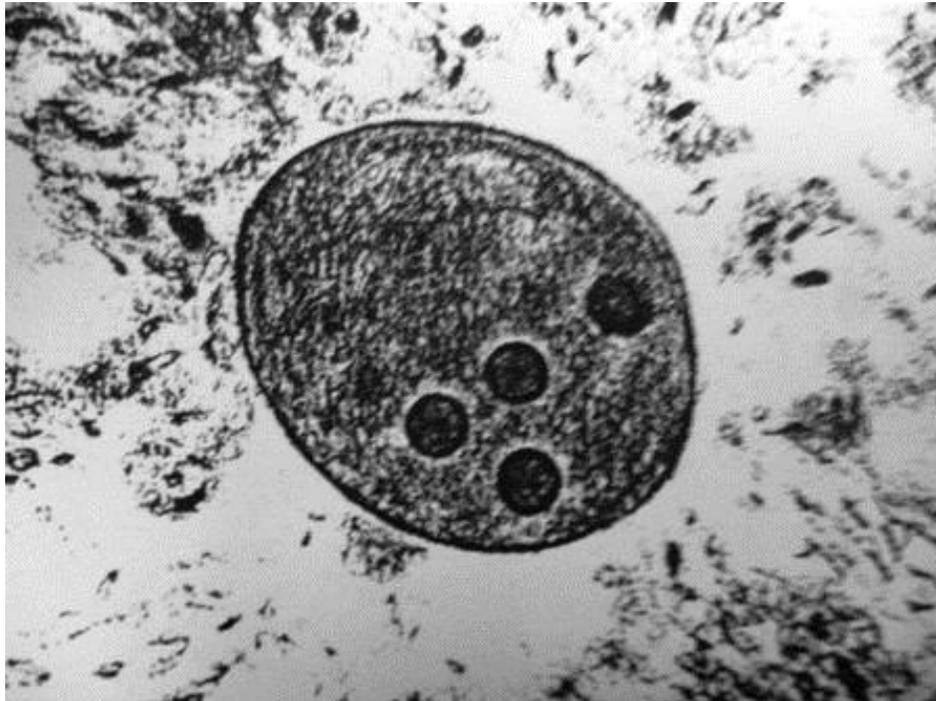


Figure 02: Trophozoite of *Entamoeba*

## What are the similarities between Cyst and Trophozoite?

- Cyst and Trophozoite are stages of a protozoan life cycle.
- Both are living structures.
- Both are nucleated.
- Both have the ability to multiply.
- Both can be observed through the light microscope.
- Both can be infectious.

## What is the difference between Trophozoite and Cyst?

### Trophozoite vs Cyst

Trophozoite stage is the feeding stage of the protozoan.

Cyst stage is the dormant, resistant infectious stage of the protozoan.

### Shape

Trophozoites are elongated, pear shaped structures.	Cysts are oval or circular shaped structures.
<b>Special characteristic Organelles</b>	
Karyosome and median bodies are present in trophozoite.	Some cysts contain secretory vesicles.
<b>Presence of Flagella</b>	
Flagella are present in trophozoite.	Flagella are absent in cysts.
<b>Excystation</b>	
Excystation is not observed in the trophozoite stage.	Excystation is observed in the cyst stage.
<b>Dormant/Resistant Properties</b>	
No dormancy is expressed in trophozoite stage.	Cysts are highly dormant structures capable of surviving under harsh conditions.

## Summary – Trophozoite vs Cyst

Protozoa are a versatile type of microorganisms existing in a variety of habitats. Most protozoa are categorized as infectious organisms as they are capable of entering the human body through the fecal-oral route or are carried by vectors such as mosquitoes resulting in diseases such as malaria. Hence it is important to know the different stages of the life cycle of the protozoa to determine the causative agent of the disease and antimicrobial agents should be designed to destroy the particular stages of the protozoans; cyst stage and the trophozoite stage. The trophozoite stage is the feeding stage of the protozoan whereas the cyst stage is the dormant, resistant and infectious stage of the protozoan. This is the difference between trophozoite and cyst stages of protozoa.

## References:

1. "Intestinal Protozoa." Intestinal Protozoa, [Available here](#). Accessed 6 Sept. 2017.
2. Yaeger, Robert G. "Protozoa: Structure, Classification, Growth, and Development." Medical Microbiology. 4th edition., U.S. National Library of Medicine, 1 Jan. 1996, [Available here](#). Accessed 6 Sept. 2017.

## Image Courtesy:

1. "Entamoeba Histolytica cyst" by Yasser ([CC BY 2.0](#)) via [Flickr](#)
2. "Entamoeba histolytica trophozoite" by Iqbal Osman ([CC BY 2.0](#)) via [Flickr](#)

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**APA:** Difference Between Cyst and Trophozoite. (2017, September 13). Retrieved (date), from <http://differencebetween.com/difference-between-cyst-and-vs-trophozoite/>

**MLA:** "Difference Between Cyst and Trophozoite" *Difference Between.Com*. 13 September 2017. Web.

**Chicago:** "Difference Between Cyst and Trophozoite." *Difference Between.Com*. <http://differencebetween.com/difference-between-cyst-and-vs-trophozoite/> accessed (accessed [date]).



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