



New Drug for Amoebiasis

Why in News

Recently, researchers from the **Jawaharlal Nehru University (JNU)** have developed new drug molecules against the protozoa '*Entamoeba histolytica*' that causes **amoebiasis**.

Key Points

▪ The Protozoa and High Oxygen Level:

- The protozoa is **anaerobic or microaerophilic** in nature such that it **cannot survive high concentrations of oxygen**.
 - Anaerobic organisms are those who exist in the absence of free oxygen.
 - A **microaerophilic** atmosphere is ideal for a **microorganism** that can grow under **reduced oxygen** and increased carbon dioxide levels.
- However, during infection, **it faces a high surge of oxygen** inside the human body. The organism synthesizes large amounts of cysteine to **counter oxidative stress**.

▪ Synthesis of Cysteine:

- This **pathogen deploys cysteine** as one of the essential molecules in its defence mechanism against **high oxygen levels**. It **expresses two crucial enzymes** for **synthesizing cysteine**.
 - Cysteines are enzymes that degrade proteins in the body.
 - Cysteine biosynthesis is crucial for the survival of *E. histolytica* and for similar protozoan parasites.

▪ JNU Research:

- Researchers have characterized and determined the molecular structures of both the crucial enzymes.
- They have also successfully screened for potent inhibitors for one of the enzymes, **O-acetyl L-serine sulphydrylase (OASS)**.
- Some of these inhibitors can **check the growth of this organism with high efficacy** by targeting their pathways.
- The identified molecules can lead to the **development of drug molecules**.

Protozoa

- Protozoans are the **single-celled eukaryotes, either free-living or parasitic**, which feed on organic matter such as other microorganisms or organic tissues and debris.
 - **Eukaryotes** are organisms whose cells have a nucleus enclosed within membranes, unlike prokaryotes, which have no membrane-bound organelles.
 - A **parasite is an organism** that lives on or in a host and gets its food from or at the expense of its host. E.g. plasmodium parasite which causes [malaria](#).
- **Habitat:** Mostly they are **aerobic** (with oxygen) but some are **anaerobic** (without oxygen) and

present in the rumen or human intestine.

- **Size and Shape:** The size and shape of Protozoa vary greatly, from microbial (1µm) to large enough and can be seen by the naked eye.
- **Nutrition:** Protozoans are **heterotrophs** and have **holozoic nutrition**.
 - **Holozoic nutrition** can be defined as a method of nutrition which **involves the ingestion of some complex organic substances** (such as parts of a plant or animal) that may be in the solid or the liquid form.

Entamoeba histolytica

- According to the [World Health Organization \(WHO\)](#), *Entamoeba histolytica* is the **third-leading cause of morbidity and mortality** due to [parasitic disease in humans](#).
 - Predominantly infecting humans and other primates, *E. histolytica* is estimated to infect about **35-50 million people** worldwide.
 - A **parasitic disease** is an infectious disease caused or transmitted by a parasite. E.g. Malaria.
- It causes **amoebiasis or amoebic dysentery**, which is highly prevalent in developing countries.

Amoebiasis

- It is a disease caused by the parasite ***Entamoeba histolytica***.
- Amoebiasis infection is most common **in tropical areas** with untreated water. E.g. India.
- It **spreads through drinking or eating uncooked food**, such as fruit, that may have been washed in contaminated local water.
- If symptoms occur, they may be mild and include cramping and diarrhoea.
- It can be treated through antibiotics.

[Source: PIB](#)

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