AMEBIASIS

Causative agent: ***Entamoeba histolytica***

Entamoeba histolytica is found throughout the world and is the causative agent of diarrhea and amebic dysentery. *Entamoeba histolytica* infection rates are higher in warm climates, particularly in poor sanitation areas. Close to 500 million people are thought to be infected at any one time.

Transmission: fecal and oral, either directly, or indirectly through contaminated water.

Life Cycle, Morphology, And Physiology

Humans are the principal hosts and reservoirs of *E histolytica*. Transmission from person to person occurs when a cyst passed in the stool of one host is ingested directly or indirectly, such as through food or water, by another. ingestion of a single cyst has been known to produce infection.

Entamoeba histolytica possesses both trophozoite and cyst forms. The trophozoites are microaerophilic, dwell in the lumen or wall of the colon, feed on bacteria and tissue cells, and multiply rapidly in the anaerobic environment of the gut. Even though they are called amitochondriate, they do possess nuclear-encoded mitochondrial genes and a remnant organelle. Unusual features of trophozoites includes polyploid chromosomes, repetitive DNA, multiple origins of DNA replication, genes lacking introns, and unique endocytic pathways.

Features of Trophozoites: 12-20 μm in diameter; directional motility; granular, vacuolated endoplasm; and sharply demarcated, clear ectoplasm with finger-like pseudopods.

Electron microscopic studies demonstrate microfilaments, an external glycocalyx, and cytoplasmic projections thought to be important for attachment. Trophozoites are facultative anaerobes that require complex media for growth.

Cyst- Initially, a cyst contains a single nucleus, a glycogen vacuole, and one or more large, cigar shaped ribosomal clusters known as chromatoid bodies. With maturation, the cyst becomes quadrinucleate, and the cytoplasmic inclusions are absorbed.

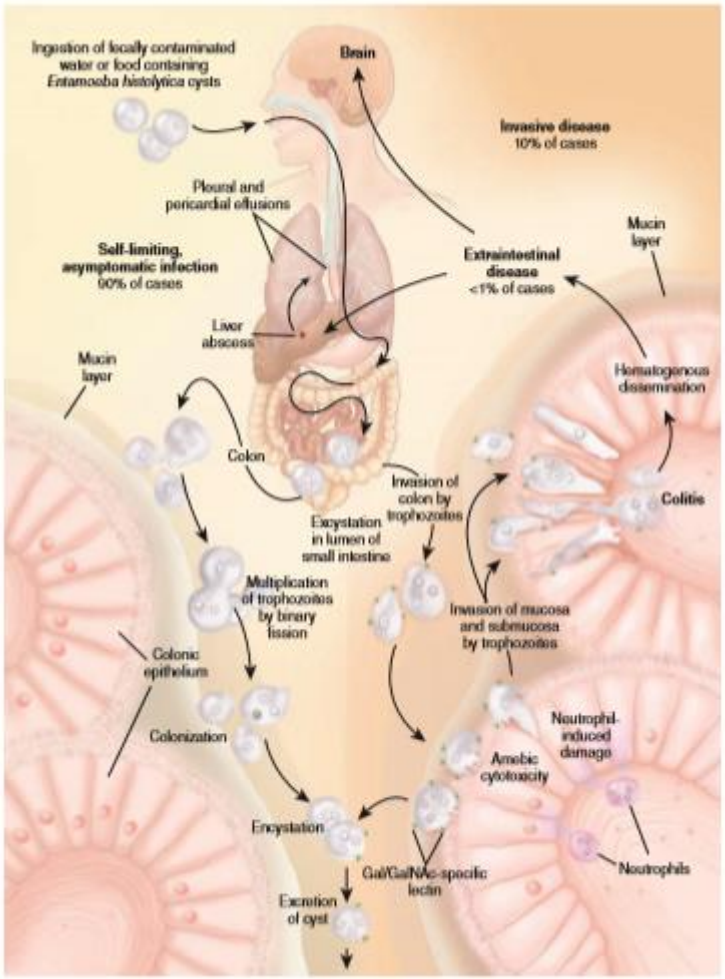
Characteristic features of mature cysts- In contrast to the fragile trophozoite, mature cysts can:

- survive environmental temperatures up to 55°C
- chlorine concentrations normally found in municipal water supplies

- normal levels of gastric acid

Pathogenesis

Production of extracellular proteinases capable of activating complement and degrading collagen, the presence of a galactose-specific lectin (Gal/GalNAc) capable of mediating attachment of the organism to colonic mucosa, and perhaps most important the capacity to lyse host cells on contact. This has been termed parasite-mediated or contact-dependent cytotoxicity. After adherence, the ameba releases a pore-forming protein that polymerizes in the target cell membrane, forming large tubular lesions. Cytolysis rapidly follows.



Cysteine proteinases, secreted by the amebas, have also been identified as a major virulence factor. They can degrade portions of the extracellular matrix, including fibronectin, laminin, and type I collagen, and they can interfere with the complement pathway and humoral IgA and IgG responses.

Ultimately, this may lead to extraintestinal spread of the trophozoites which may occur in approximately 1% of established infections. Cyst formation does not take place at extraintestinal sites.

Protein malnutrition, high-carbohydrate diets, corticosteroid administration, childhood, and pregnancy all appear to render the host more susceptible to invasion.

Immunity

Pathogen elicits both humoral and cellular immune responses in humans, it is still not clear which, and to what degree, these responses are capable of modulating initial infection or thwarting reinfection.

In endemic areas, the prevalence of gastrointestinal colonization increases with age, suggesting that the host is incapable of clearing *E histolytica* from the gut. Innate defense begins with the mucous lining of the intestinal epithelium. What is clear is that infected hosts produce a rather strong mucosal IgA response and much of this is directed against the carbohydrate domain of the Gal/GalNAc lectin present on the ameba's surface.
Immunity is incomplete and does not correlate with antibody response. Trophozoites shed antibody and resist complement lysis.

Manifestations

- Relationship usually commensal
- Diarrhea, flatulence, and abdominal pain most common
- Stool consists of watery, foul-smelling passages that contain mucus and blood
- Hepatic abscess may have acute or insidious onset. It might extend to other tissues
- Extension of an abscess from the left lobe of the liver to the pericardium is the single most dangerous complication. It may produce rapid cardiac compression and death

Diagnosis

- Stools examined for trophozoites and cysts in stained or wet preparations
- Indirect hemagglutination test and enzyme immunoassays appear to be the most sensitive
- Several rapid tests, including latex agglutination, agar diffusion, and counterimmunoelectrophoresis, are available to smaller laboratories

Treatment

Noninvasive infection- Paromomycin is useful. Treatment is directed toward relief of symptoms, blood and fluid replacement, and eradication of the organism.
Invasive amebiasis- drug preferred is metronidazole. Can be combined with diloxanide, to improve cure rates in intestinal disease.

Prevention

- Sanitary disposal of human feces
- Improvement in personal hygienic practices
- Provision of safe drinking water