B.Sc (Zoology) Hons
Dr. VISHWANATH SAH
Deptt. of Zoology
J.N. College, Madhubani

08/4/21 Part I (H)

ENTAMOEBA HISTOLYTICA

Three species of Entamoeba are found in man.

(i) E. histolytica is a pathogenic parasite found in the colon and a variety of other organs and tissues causing amoebic dysentery, amoebic abscess of liver, spleen, kidney, diaphragm etc. which are collectively called amoebiasis.

(ii) E. gingivalis is commonly found in tarter on teeth and in gum. Though largely feeding on bacteria, it has been found to aggravate the diseases of teeth and gum like pyorrhoea etc. It sometimes reaches the tonsils and infects them.

(iii) E. coli is found in colon. It feeds exclusively on bacteria, food debris and is considered a harmless commensal.

History

Losch first saw an amoeba in the dysentic stool of man in 1875 which he named Amoeba coli.

Leidy (1879) placed all amoeboid organisms found in the alimentary canal of animals and man in the genus Entamoeba. The pathogenic nature of this parasite was first suggested by Koch and Gaffky in 1886. Councilman and Lafleur (1891) were the first to study the pathology of amoebic dysentery and amoebic liver abscess. Quincke and Roos (1893) gave the differences b/w E. histolytica and E. coli.

The name E. histolytica for the pathogenic amoeba in man was given by Schaudinn (1903). The structure of this parasite has been studied by Noller (1922) and Kofoid (1927). The precyst stage was studied initially by Elmassian (1909) and Walker and Sellards (1913). Hartmann and Prowazek (1907) first saw the cyst stage. Broeck and Drobohlav (1927) successfully cultured the parasite in the laboratory and paved the way for the study by Dobell (1919-28) on the binary fission and mitosis, by Cleveland and Sanders (1939) on excystment. The ultrastructure of Entamoeba has been studied by Miller and coworkers (1961) and Fletcher and Coworkers (1962).

Distribution

E. histolytica is almost worldwide in distribution but more common in tropical and semitropical countries where sanitation and personal hygiene is poor.

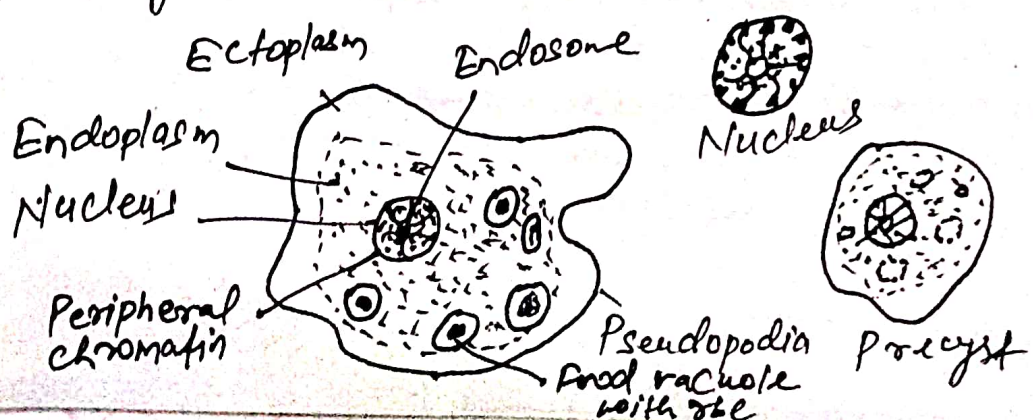
Structure

E. histolytica is found in three stages in man i.e, the trophozoite or actively feeding form, the precyst and the infective resistant stage - the cyst. The species appears in man in two racial forms.

(i) A small race or minuta form which always lives in the lumen of colon. It is not a tissue invading form, feeding largely on tissue debris, food remains and bacteria. It is largely harmless.

(ii) A large race or magna forms which invades the tissue feeding on enzymatically dissolved host cells, erythrocytes and tissue fragments. It is highly pathogenic.

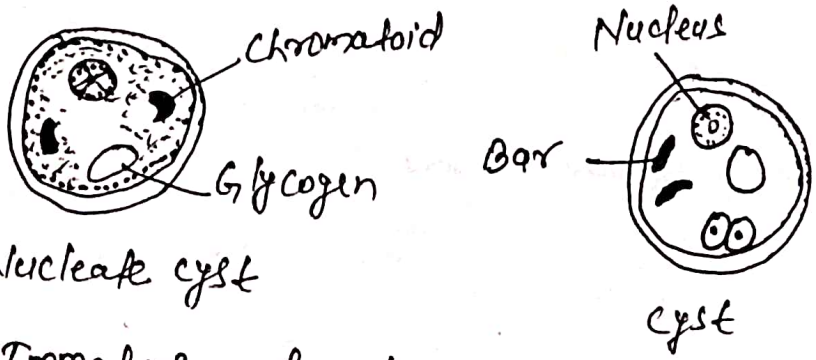
Trophozoite – This stage is rarely found in human stool but can be cultured in the laboratory. It measures from 7 to 50 µm in diameter, the small race ranging in size from 7 to 12 µm and the large race from 15 to 50 µm. A freshly-expelled vegetative form is very active, moving in flowing locomotion with the help of a prominent lobe-like pseudopodium. The cytoplasm is clearly distinguished into an outer, clear, hyaline and refractile ectoplasm surrounding a granular greenish endoplasm. A single nucleus is slightly eccentrically placed. In stained individuals, the nucleus has a characteristic appearance. The nuclear membrane is thin to the inside of which is arranged a thin but prominent layer of chromatin granules. In the centre of the nucleus is a small



Karyosome. Between the karyosome and the peripheral chromatin layer faint radially disposed linin fibres are seen. The nucleus measures 3-7 µm in diameter. In the endoplasm a number of food vacuoles mostly containing RBC and cell fragments are seen in various stages of digestion. Trophozoite is found in intestinal ulcers and abscess of the organs. Trophozoite of minuta form is always found in colon lumen. The occasional presence of RBC, the delicate nuclear membrane lined internally with small chromatin granules, and minute centrally located karyosome (=endosome) distinguish the trophozoite of E. histolytica from those of E. coli, Endolimax nana and Iodamoeba bustchli which are also found in the human colon.

Precyst – The precyst is smaller than trophozoite. It is colourless, devoid of food vacuoles, relatively sluggish with little pseudopodial formation. The nuclear membrane is thicker and the karyosome larger than that of the trophozoite. It measures 12-15 µm in diameter in the magna form, in the small race it is about half the size. Precysts of both races are always found in the lumen of colon and is incapable of tissue invasion. It sometimes passes out with the stool. Vacuoles with stored glycogen begin to appear at this stage. Deeply staining bodies which are bar-like with rounded ends are often seen in precyst. These are chromatoid bars.

Cyst – The precyst secretes a thin (0.5 µm) cyst wall of scleroprotein and becomes cyst which is 12-20 µm in diameter in the large race and is half as small in the small race. A freshly-formed cyst is uninucleate.



1. Nucleate cyst

Cyst

Immature and mature cyst of E. histolytica

but as it matures it becomes quadrinucleate by two successive divisions of the nucleus. The mass of glycogen and chromatoid bars at first increases but as the cyst matures, appears to have been largely utilised.