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BLASTOCYSTOSIS : ETHIOLOGY, BIOLOGY AND PREVALENCE

V. Boeva- Bangyozova [1], M. Panayotova [2] , B. Chakarova [3]

[1] Department of Infectious diseases, Parasitology and Tropical medicine (Division of Parasitology), Faculty of Medicine, Medical University of Sofia
[2] Department of Pediatrics, Faculty of Medicine, Trakia University, Stara Zagora, E-mail: marlenapanayotova@abv.bg
[3] Department of Epidemiology, Infectious and Parasitic diseases, Faculty of Medicine, Trakia University, Stara Zagora

ABSTRACT

Blasocystosis is a protosoic invasion which clinical course displays as a healthy carrier or an enterocoltiic syndrome. The infection is famous as Zierd-Garavelli disease. Residing the small bowel and colon Blastocystis hominis is a tipycal anaerobic and opportunistic infection. It is presented in several morphologic forms : vacuol, unvacuol, multivacuol, amebyc and cystic ones. Transmission factors are food, drinks, hands and dust contaminated with cysts. Toxoallergic reaction causes the pathologic findings and leads to nonspecific inflammation of colonic mucosa. The enzymes produced by Blastocystic organisms cleave secretory Ig A of host and provide persistening in the human body. The disease appears to follow the course same as enterocolitis in immunocompromized people (eg. AIDS , leucaemia, diabetes). It is characterized with eosinophilly, stool leucocytosis and occult bleeding. Treatment regimens include Metronidazol, Tinidazole, Paromomycin, Bisseptol and Furazolidon. There is possibility of self- limiting of the infection.

Key words: blastocystosis, opportunistic infection, protozoonosis, metronidasole, apoptosis

Blastocystosis is a protosoic disease presenting with diarrhoea or without symptoms.It is widespread opportunistic parasitosis which has a strong influence on the symptoms of the patients affected with AIDS and viral enteral infection.

Short historical data. The first morphological description of the parasite was done by Alexeieff (1911) as a microorganism with the name of Blastocystosis enterocola. In 1912 it was identified by E.Brumt as saprophytic fungus which is harmless to the human and was named Blastocystosis Hominis. In 1967 Zierdt C.H. et al describe it as protosoic. From 1976 the majority of authors considered it as a typical nonobligated (opportunistic) protosoic organism from subdivision Sarcodina (Amebi). Later Zierdt (1991) shows the role of B.hominis in enteral diseases and includes it to the enteral parasites. Because of this reason Blastocystosis is also notorious as Zierdt - Garavelli's disease. Based on molecular and genetic research Cavalier-Smith,T.(1998) suggests B. Hominis to be qualified to a new class Blastocystea, subtype Opalinata, part of subkingdom Heterokonta, kingdom Chromista.

Ethiology and biology. The source of the disease is the parasite Bl.hominis, described above. In taxonomic plan the place of the parasite has not been determined yet. The genetic research determine genetic heterogenity of the kind. Blastocystic isolates in different people show different number chromosomes (9-13). Noel et al. (2006) found out through genetic analysis an isolate of Bl.ratti which quolified to Bl.hominis. Stensvold,C.R. et al.(2007) suggest standartization of the subtypes. To avoid mistakes for now it is assumed that with B.hominis to be signed the parasite isolated from humans and respectively Bl.species the one from animals (birds and mammalians).

Bl hominis inhabits the small bowel and colon of the humam body and the animals. In humans B.hominis inhabits the cecum, proximal part of colon tranzverzum and at some degree in the distal part, where the parasite is found in the vacual, unvacual, granular, multivacual, amebic and cystic forms.

In human stool samples usually are observed unvacual, multivacual and cystic forms. If the parasite is cultivated in nutritious artificial environment vacual, granular and amebic forms are found.

Granular form is a spherical body with diameter of 4-200 μm. It is wraped with bilaminar membrane and is characterized with a big central vacuol (that takes up to 75% of the cell's capacity), rounded by a thin cytoplasmic strip with cell organels and 1-4 nuclei. The granual form has a spherical body as well with diameter of 10-80 μm.. It lacks vacuol.It is ussually observed in old cultures. The content consists of a big number closely situated granuls which are believed to be the result of the parasite metabolism and are most likely food reserve. Both of the forms reproduce trough binaric cell-division.

Multivacual trophozoit is round or egg-like form with small measures - from 5-8 μm. It posseses a wide outer casing. In the cytoplasm there is a big number of small transparent vacuals. It has not been determined whether they are independent formations or have connections between them forming a net.

Unvacuol forms can be found only within material taken by colonoscopy.They have measures around 5 μm.and also posses 1-2 nuclei and lack vacuols. They only have cell membrane.

Amebic form was discovered by Tann and Zierdt (1973). It is round and is measured from 2,6-7,8 μm. It has 1-2 nuclei and 1-2 pseudopodes.It does not have cell membrane and outer casing. It lacks central vacuol, Golgy complex and mitochondria. It is considered to be pathogenic form.

Cystic form was discovered by Mehlhorn (1988) in stool of the patient affected by AIDS. It is round with measures 3,7-5 μm (sometimes 5-10 μm).They are covered with thick outer membrane. It has 2-4 nuclei,in its cytoplasm there is a big quantity of glycogen and lipid drops. It is considered to be the invasive form of the parasite.

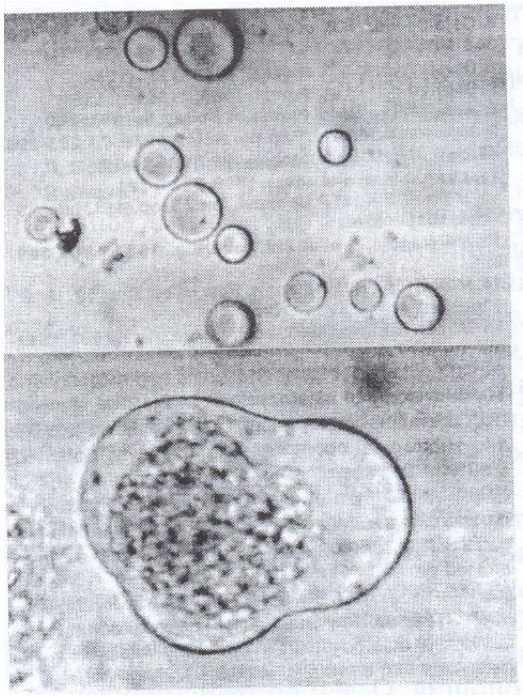

Fig.1. *a,b B.hominis in stool probe (after R.Kurdova et al.,1995)*

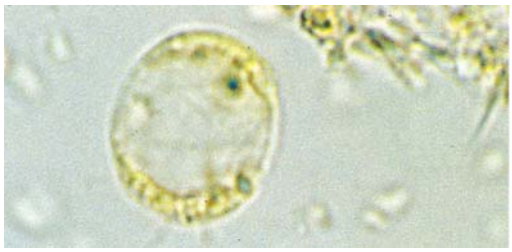

Fig. 2. *B. hominis (after W. Peters & H.M.Gilles, 1989) (coloured with Iodine , x 1800)*

The biological cycle of the parasite has not been studied enough. Thick-wall cysts get into stool of final host and contaminate the outside environment. They are responsible for the outer transmission along the stool to oral way. The infection represents swallowing of thick-wall cysts, which invade the mucosa of the small bowel. (fig.3). They excist and rupture under the influence of the gastric juice and intestinal enzymes and transform into unvacual forms. After frequent asexual reproduction (mitosis) vacual forms are formed. It is presumed that the vacual form transforms into multivacual one. The litter passes through the phases of the pre-cyst, schisogony and incysting into thick-wall cysts, securing the autoinvasion. After multiplication of the vacual form amebic one is formed which increases in number, transforms in pre-cyst and after schisogony incysts into thick-wall cyst , the last is excysting into the stool.. A possibility of incistating of vacual forms is assumed. When multivacual forms are cultivated vacual ones are formed.

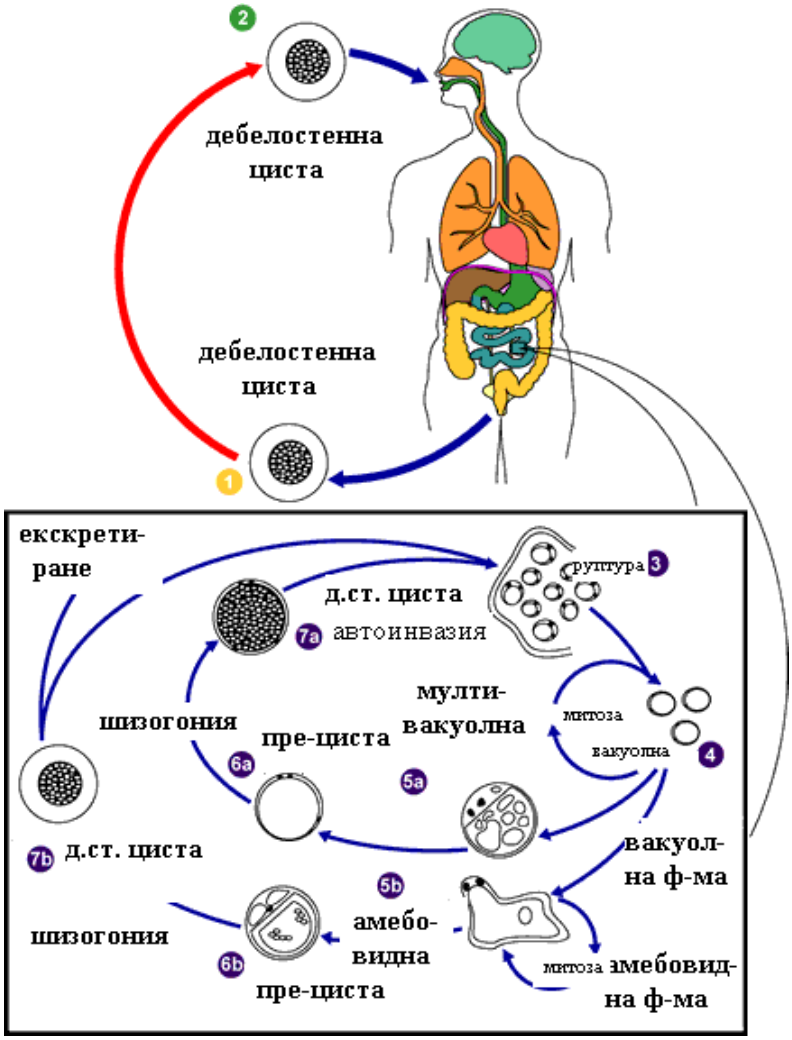

Fig.3. *Biological cycle of Blastocystis hominis (no Singh M., Suresh K., Ho.L.C.et al.- Parasitol.Res, 1995; 81: 449)*

Legend: to fig.3: 1. Separation of thick-wall cysts through stool in outer environment;2.Infection by swallowing of thick-wall cysts and invasion of the intestinal mucosa; 3. Rupture of the cysts; 4. Asexual reproduction (mitosis) and formation of vacuol forms and their multiplication; after mitosis the vacuol forms transform into ameba ones and their multiplication; 5-a. Multivacual form; 5-b. ameba form; 6-a. pre-cyst; 6-b. pre-cyst; 7-a. After schisogony - the thick-wall cysts is responisible for the autoinvasion; 7-b. After schisogony – the thick-wall cyst excreting into the stool.

Epidemiology. Blastocystosis is an intestinal protosoonosis. The source of the infection is the human (sick or healthy carrier). Most likely a natural tank are the animals (birds, mammalians including the monkeys). The mechanism of infection is stool to oral. It is possible a sexual way of infection. Factors of infection are fecal polluted with cysts water and food (fruits, vegetables), hands, dust etc.

There have been registered sporadic cases, group and family infections and epidemiologic explosion.The parasite affects both sexes, but more often children and older people. Most often are infected people in their active ages (30-40 yrs), in comparison with children. Frequently victims of the infection are the homosexual people and the older people. Often the blastocystosis is detected among tourists who have been to tropical countries or come from countries with warm climate "traveling diarrhoea". It is also observed seasonal prevalence of the disease related to the climatic factors (increase of the frequency and intensity of the carriers in the months before the monsoons).

The cysts are resistant in outer environment. They do not destroy in distilled water and also in nutritious circles consisting parasiticide drugs. The rest of the forms quickly disintegrate in unpleasant conditions.

Usually the parasite is found in warm countries where the frequency of the invasion varies from 30 to 50%. In the developed countries of America and Europe this per cent is lower - 1,5-18%. Higher frequency is observed among the population of economic undeveloped regions and in people traveling to tropic countries.

In Bulgaria the first research and epidemiological surveys were done by R. Kurdova and co-authors (1995). They found B. hominis in 64 (9.90%) among all of the 646 people from Bulgarian cruise that had frequently flown to tropic and subtropic countries. There have been diagnosed 7(12,28%) patients with blastocistosis related to AIDS. In 2006 in our country 277 (0,12%) people infected with B. hominis were found. Still the blastocystosis is not diagnosed from the medico-diagnostic laboratories in 11 regions of the country (2,3,4,12).