AMOEBIASIS: ENTAMOEBA

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ACM Lecture 27th April 2022

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- Historical details
- Classification
- Epidemiology
- Types and Life cycle
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Introduction

- Amoebiasis, enteric protozoan disease caused by *Entamoeba histolytica* causing up to 100,000 fatal cases & affecting 50 million people annually (Othman et al.,2019)

- Third major reason of mortality, after Malaria & Schistosomiasis (WHO, 2009)

- Clinical manifestations vary from asymptomatic to severe signs, including extra-intestinal abscesses

Historical details

- *Entamoeba histolytica* was **first observed by Lösch in 1875 in Leningrad**
- Lösch observed amoebas in ulcers of the colon at necropsy
- Induced disease in a dog by a rectal inoculation with human feces

Brumpt 1925

- *E. histolytica:* capable of causing invasive disease
- *E. dispar:* which never causes disease

Earlier rejected…Later accepted

- In 1993, 68 years after the original discovery of *E. dispar*
- *E. histolytica* & *E. dispar* were formally accepted as different yet closely related species

Classification of *Entamoeba histolytica*

Phylum :- Protozoa

Class :- Lobosea

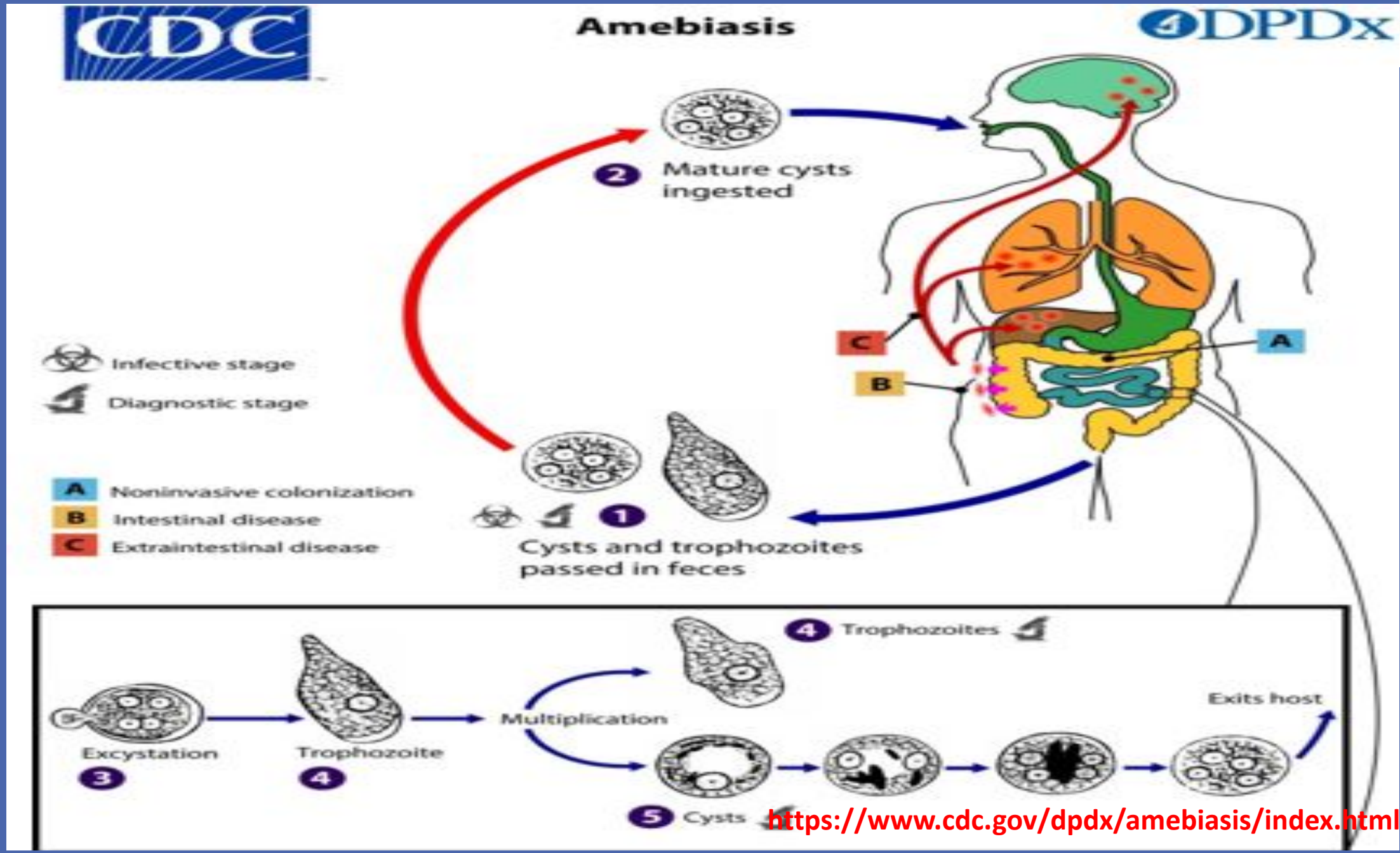
Order :- Amoebiae

Family :- Sarcodina

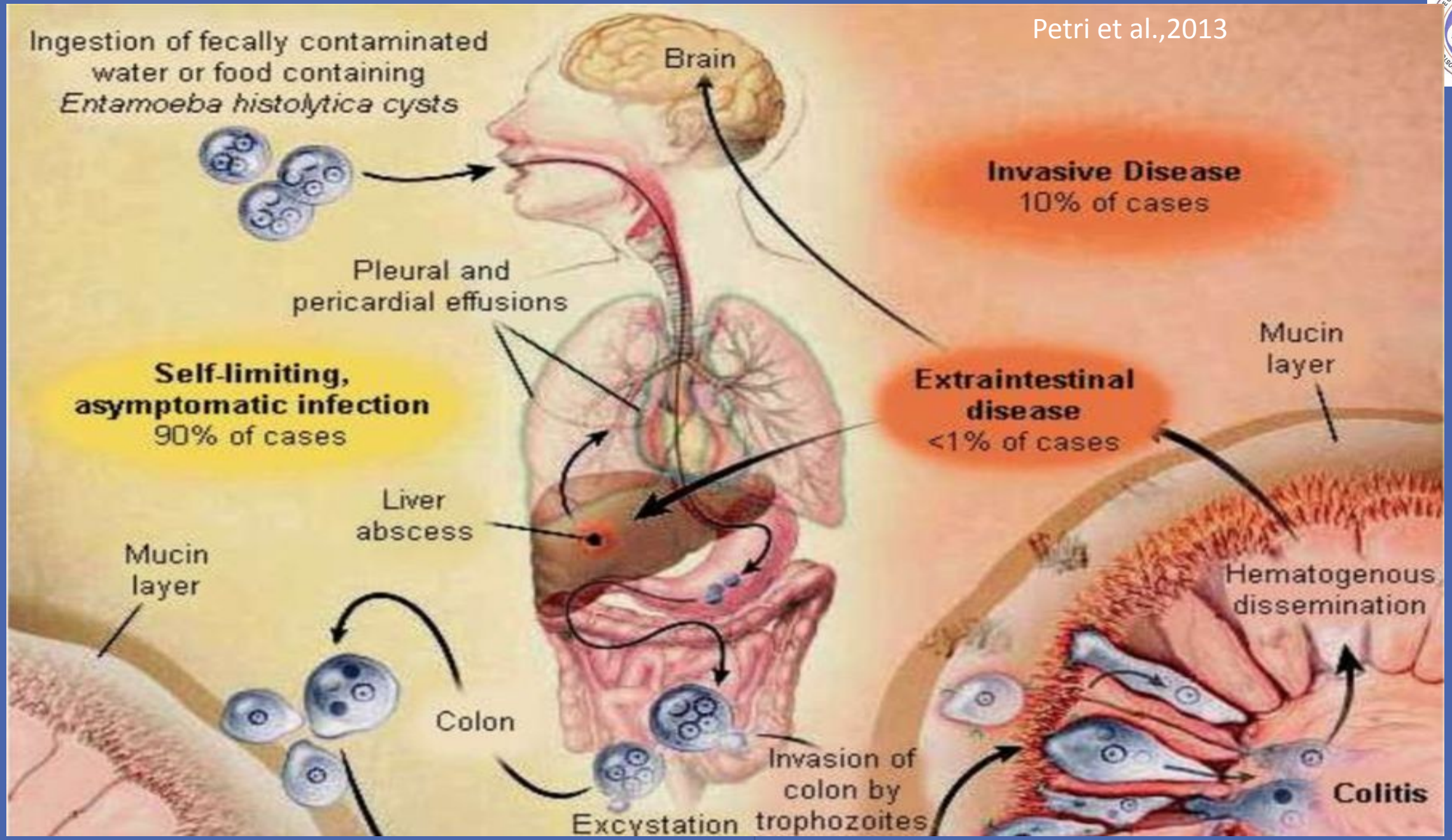
Genus :- Entamoeba histolytica

https://www.slideserve.com/kiefer/entamoeba-histolytica

Life cycle of *Entamoeba histolytica*



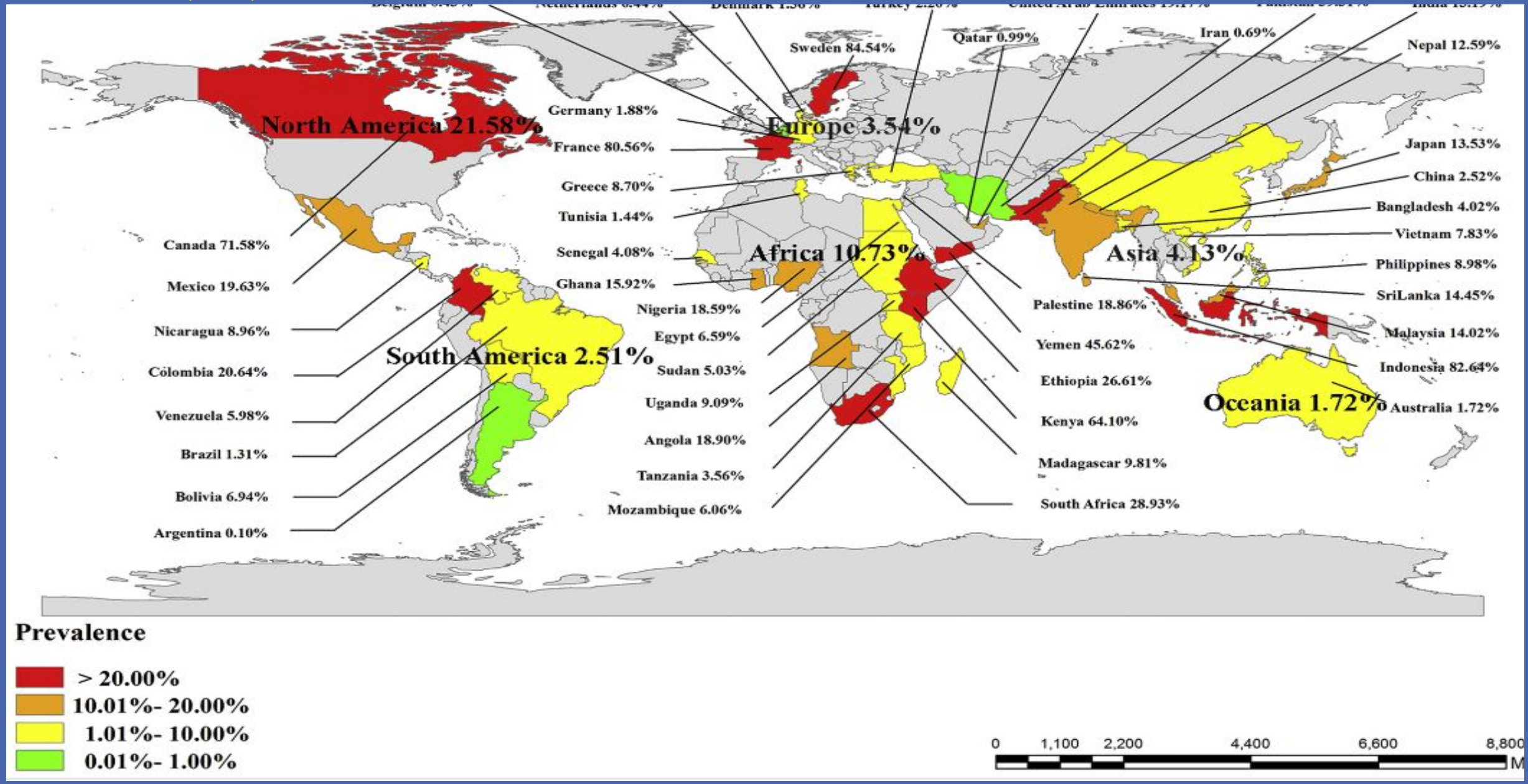
https://www.cdc.gov/dpdx/amebiasis/index.html


Petri et al.,2013
Ingestion of fecally contaminated water or food containing *Entamoeba histolytica cysts*
Brain
Invasive Disease
10% of cases
Pleural and pericardial effusions
Self-limiting, asymptomatic infection
90% of cases
Extraintestinal disease
<1% of cases
Mucin layer
Liver abscess
Mucin layer
Hematogenous dissemination
Colon
Invasion of colon by trophozoites
Excystation
Colitis

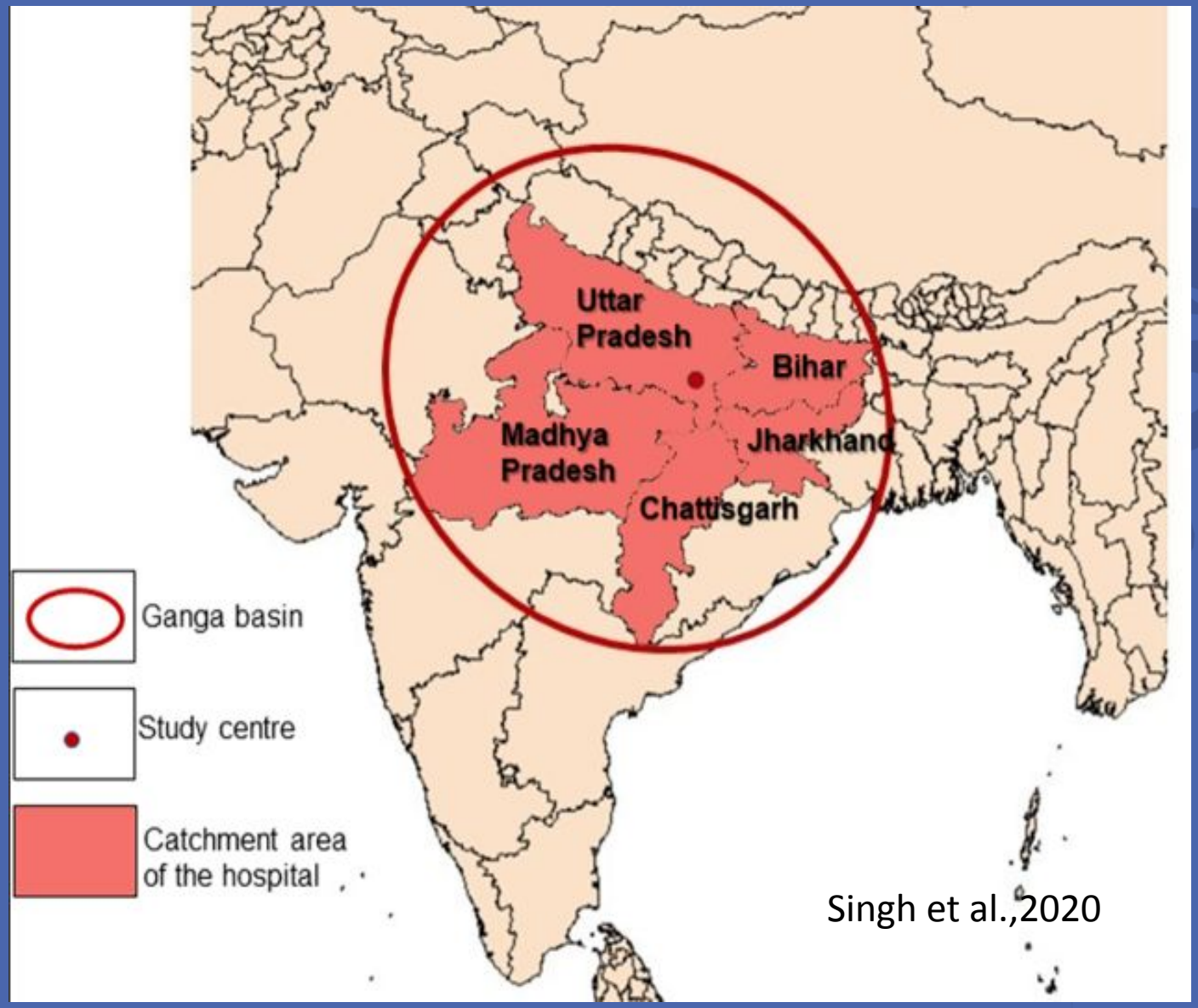
Epidemiology and Indian Scenario

Prevalence and geographic distribution of *Entamoeba* species in humans, as determined by molecular methods.

Z. Cui, et al(2019)



Indian Scenario



Singh et al.,2020

PLOS NEGLECTED TROPICAL DISEASES

OPEN ACCESS PEER-REVIEWED

RESEARCH ARTICLE

Epidemiology of clinically relevant *Entamoeba spp. (E. histolytica/dispar/moshkovskii/bangladeshi)*: A cross sectiona study from North India

Aradhana Singh, Tuhina Banerjee, Uzma Khan, Sunit Kumar Shukla

- Microscopy detected *Entamoeba* spp. in **5.4%** stool and 6.4% liver aspirate samples

- Nested multiplex PCR, prevalence of *Entamoeba* spp. in intestinal and extra-intestinal cases was 6.6% (20/301) and 86.4% (108/125) respectively and in asymptomatic population was 10.5%(Singh et al.,2021)

Prevalence of intestinal parasites in the patients with suspected gastrointestinal infections

Upninder Kaur, Taruna Kaura, Sofia Rani, Rakesh Sehgal

Department of Medical Parasitology, Postgraduate Institute of Medical Education and Research, Chandigarh, India

Correspondence Address:
Dr. Rakesh Sehgal
Department of Medical Parasitology, Postgraduate Institute of Medical Education and Research, Chandigarh - 160 012
India

Login to access the email ID

- **1042/2404 samples were found to be positive for intestinal parasites**
- **The predominant parasite isolated was *Giardia lamblia* with a prevalence rate of 68.9% followed by *Entamoeba histolytica* (14.9%)**

Entamoeba moshkovskii and *Entamoeba dispar*-associated Infections in Pondicherry, India

Subhash Chandra Parija and Krishna Khairnar

Department of Microbiology, Jawaharlal Institute of Postgraduate Medical Education and Research, Pondicherry 605 006, India

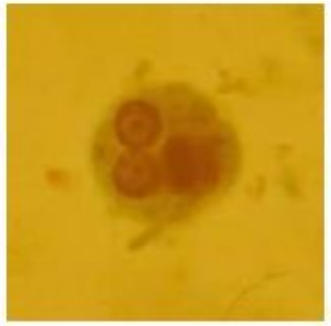
E. dispar **(8.8%) and** ***E. moshkovskii*** **(2.2%) compared to** ***E. histolytica*** **(1.7%) in patients**

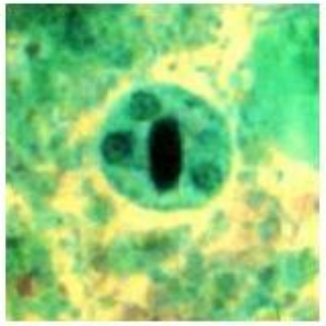
High prevalence of *Entamoeba moshkovskii* infection in HIV seropositive patients of Barak Valley, Assam, India

Joyobrato Nath[1,2], Sankar K Ghosh[2], Prithwiraj Bhattacharjee[3], Jaishree Paul[4], Baby Singha[1*]

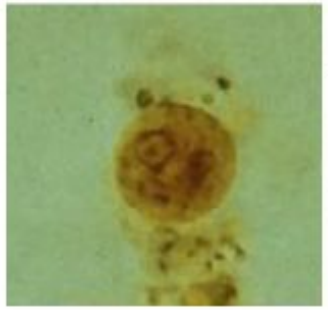
From 2nd International Science Symposium on HIV and Infectious Diseases (HIV SCIENCE 2014) Chennai, India. 30 January - 1 February 2014

Entamoeba species

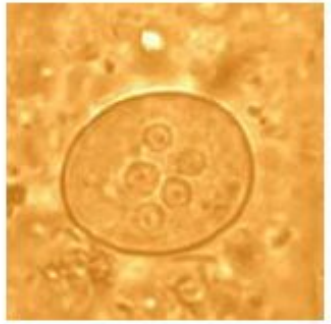




Entamoeba histolytica / E. dispar
10 – 20 µm
Quadrinucleate
Central karyosome



E. hartmanni
5-10 µm
Central karyosome
Fine chromatin



Entamoeba coli
10-35 µm
Octanucleate
Large eccentric karyosome
Coarse chromatin

Entamoeba genus **contains many species – 6 reside in intestinal lumen**

- *Entamoeba histolytica*
- *Entamoeba dispar*
- *Entamoeba moshkovskii*
- *Entamoeba Bangladeshi*
- *Entamoeba polecki*
- *Entamoeba coli*
- *Entamoeba hartmanni*

Which one is pathogenic and which one is commensal ?

- *Entamoeba histolytica*

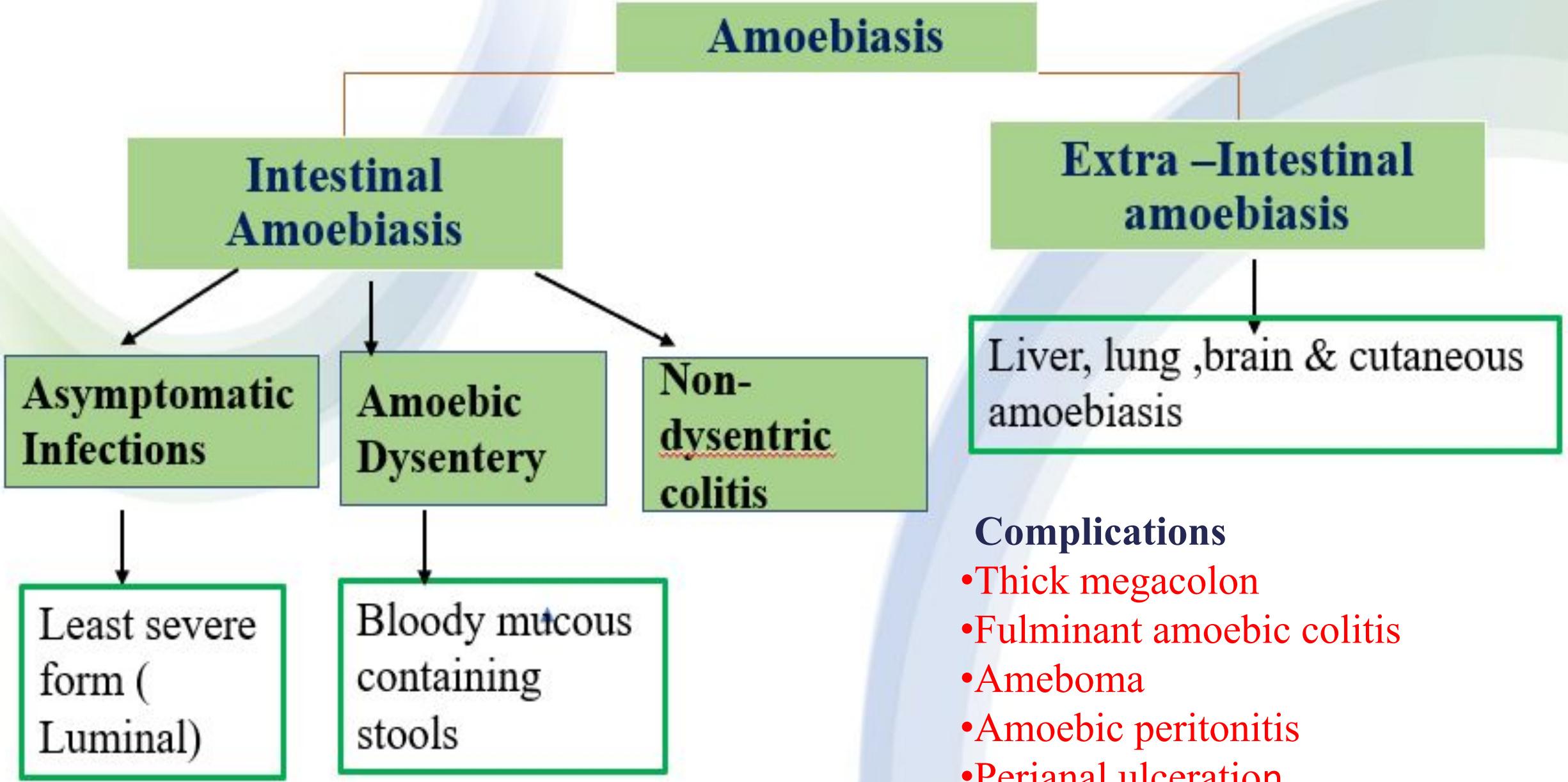
Only species definitely associated with pathological sequelae in humans

- ***E. dispar & E. moshkovskii***

Recovered from patients with GI symptoms

Still no definitive evidence of a causal link

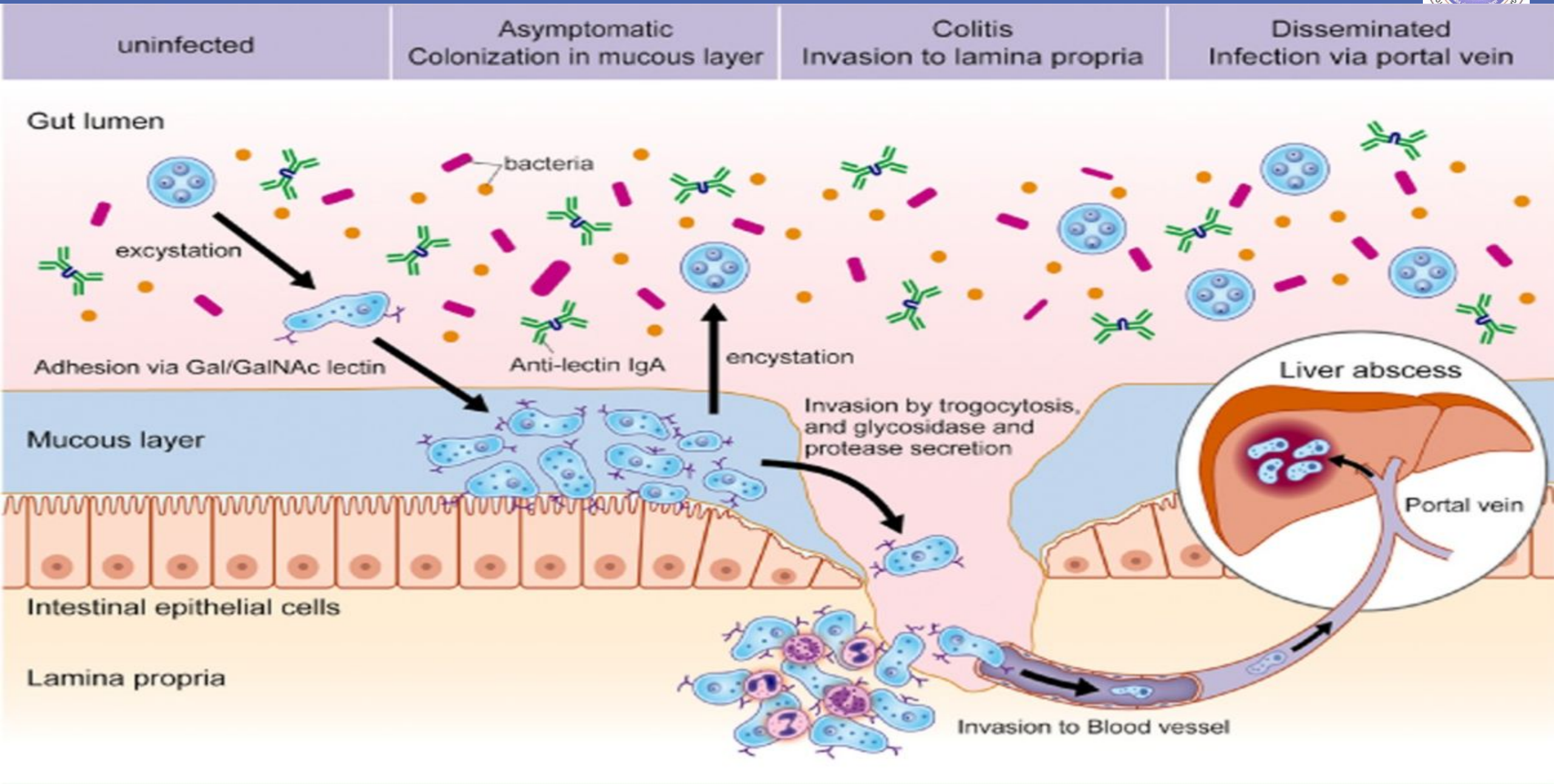
Still a big query: Pathogenic or commensal



Complications

- Thick megacolon
- Fulminant amoebic colitis
- Ameboma
- Amoebic peritonitis
- Perianal ulceration

Pathogenesis of amoebic infection(wantabe et al.,2015; petri jr et al.,2017)



Pathogenesis of amoebic infection

Excystation -lumen of terminal ileum , adhesion of trophozoites to mucous layer of host IECs occurs via a Gal/GalNAc

↓

In some cases, after adhesion to the mucous layer, trophozoites colonize within the mucous layer & shed cysts into the lumen

↓

In symptomatic cases, the amebae degrade the mucous layer in part via cysteine protease activities, destroy epithelial cells via trogocytosis & invade into the lamina propria

↓

After an infection has occurred, the parasite may be carried by the bloodstream from the intestines to the liver & other sites

Pathogenesis of amoebic infection

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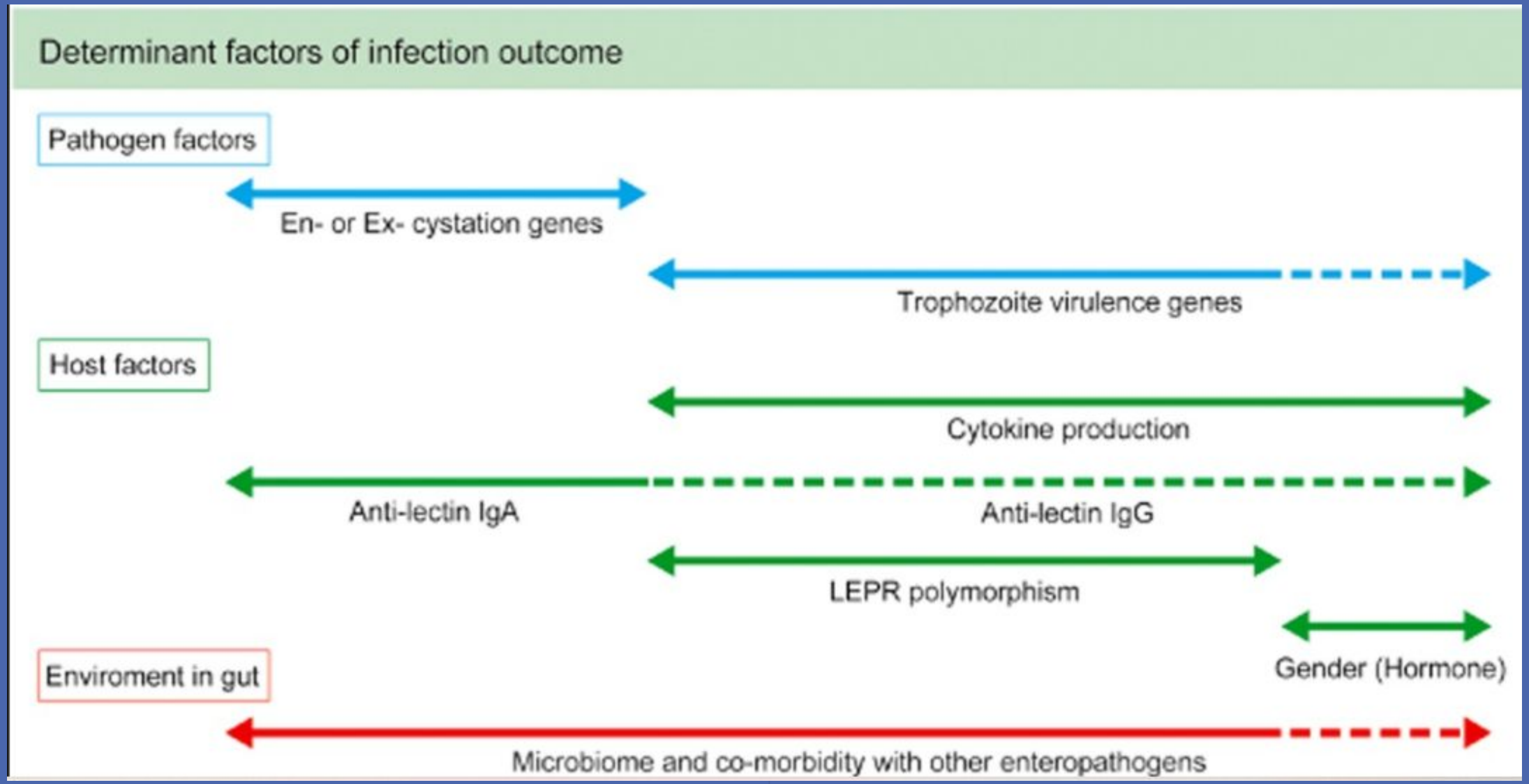
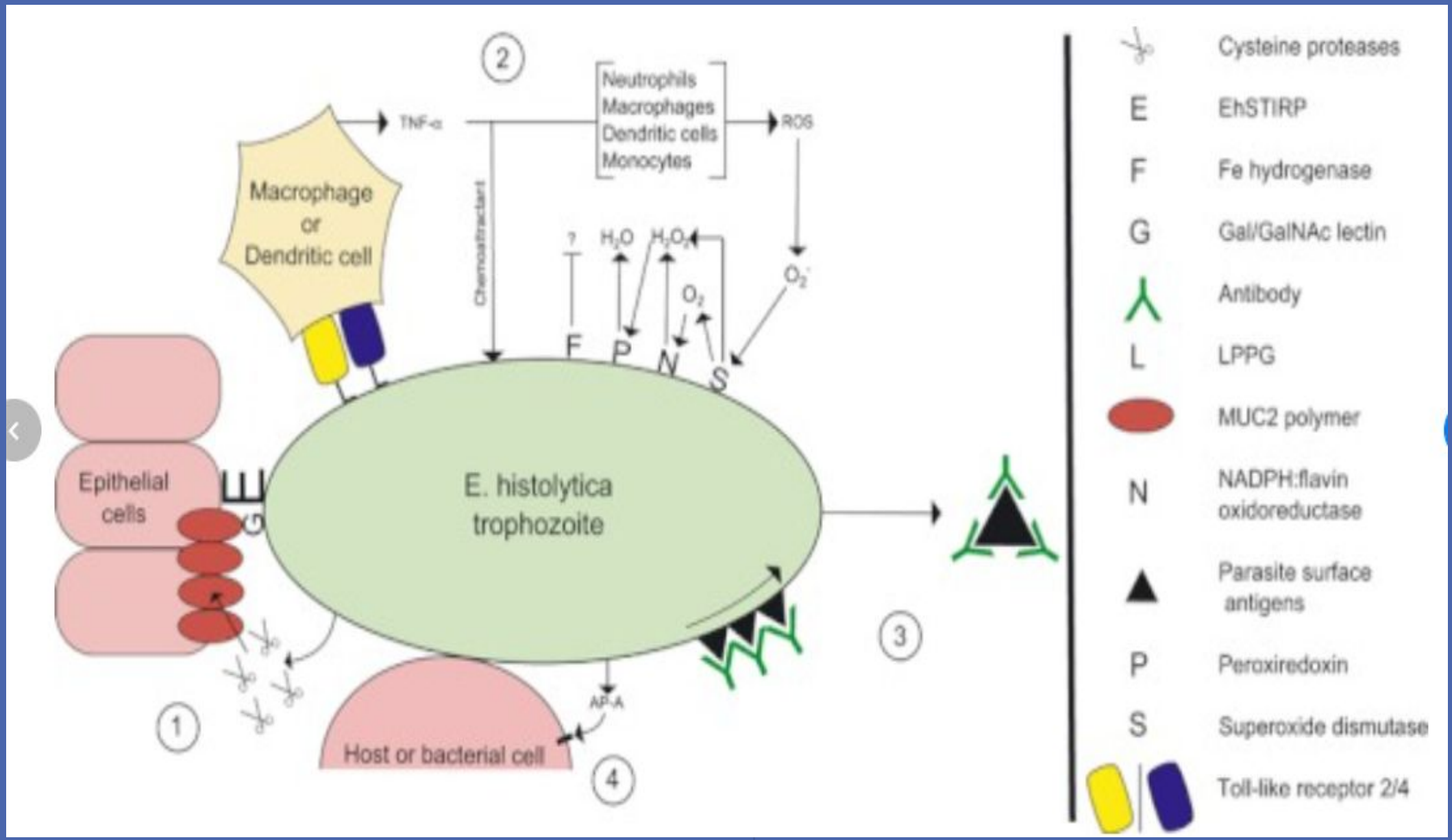
After an infection has occurred, the parasite may be carried by the bloodstream from the intestines to the liver & other sites

- Not all individuals are equally susceptible to infection and invasive disease occurs as a result of exposure to *E. histolytica* (**wantabe et al.,2015; petri jr et al.,2017)**



Key virulence factors of *Entamoeba histolytica* involved in pathogenic infections that have been identified(Wilson & hail et al.,2011)

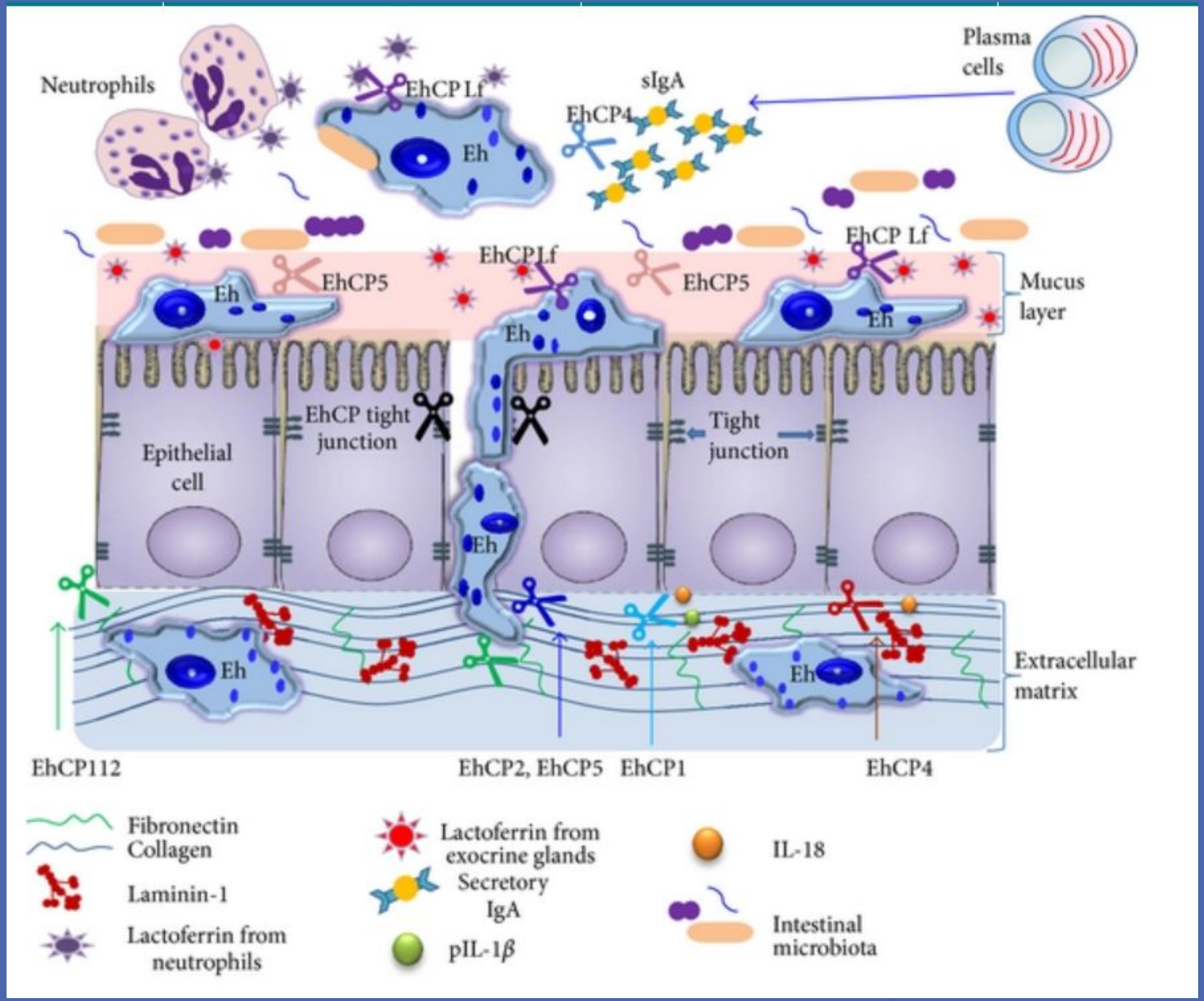


Secreted molecules Involved in Pathogenesis

- Amoeba also invades by degrading or damaging the relevant tissues/cells by secreting a number of enzymes that are capable of digesting even hard tissues or extracellular matrices

1.Cysteine Proteases

2.Amoebopores

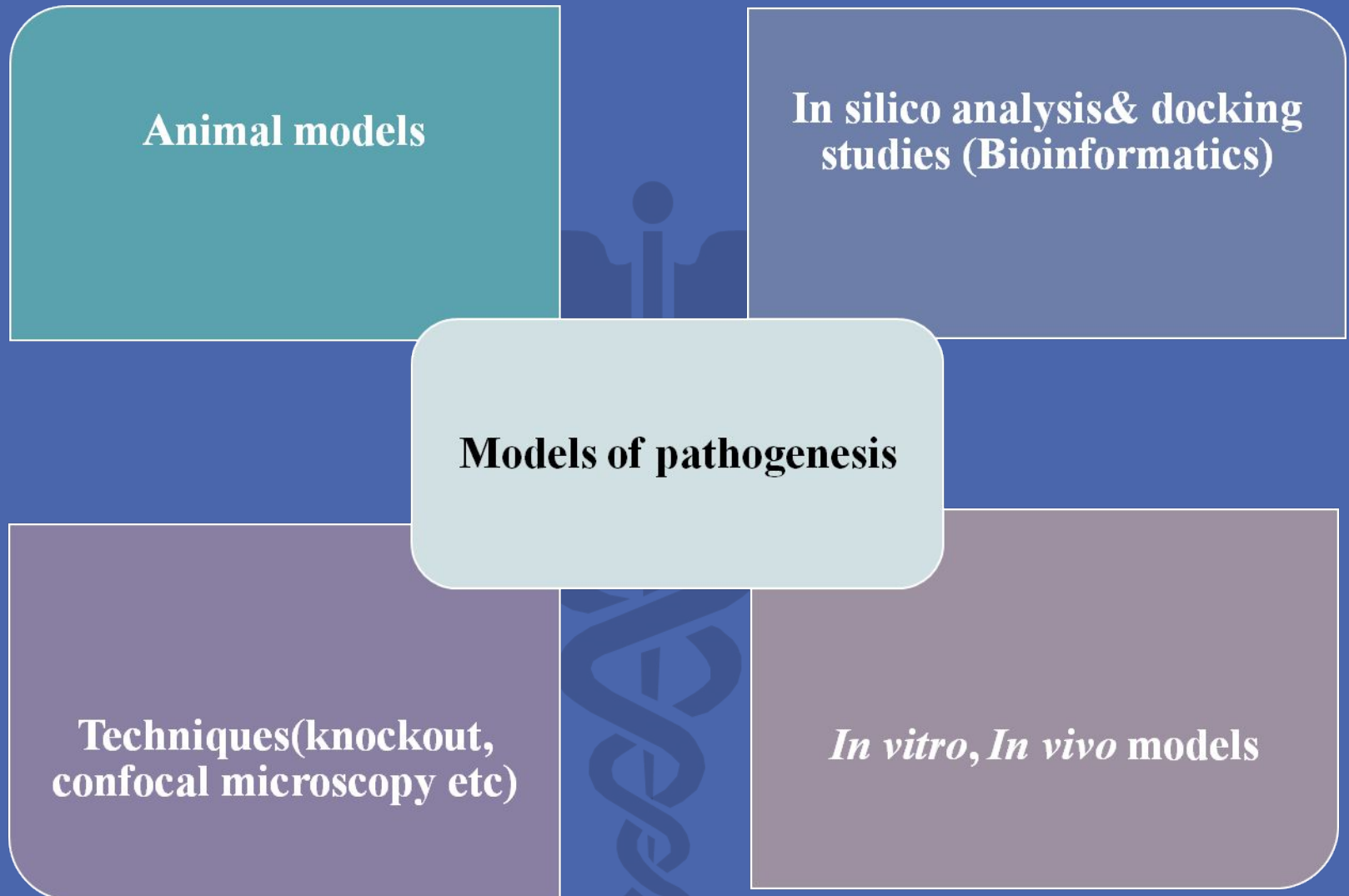


- Cysteine proteases major class of secreted hydrolases of *Entamoeba*
- CPs degrade extracellular matrix proteins as well as mucin 2, a major component of colon mucus
- *Eh*CP5 is present on the surface of the amoeba and participate in the disruption of the mucin barrier of the colon

Luna-lopez et al.,2013

Amoebapores

- Family of pore-forming peptides that is thought to be involved in cytolysis of target cells
- 3 different amoebapores (a, b, c) encoded by separate genes

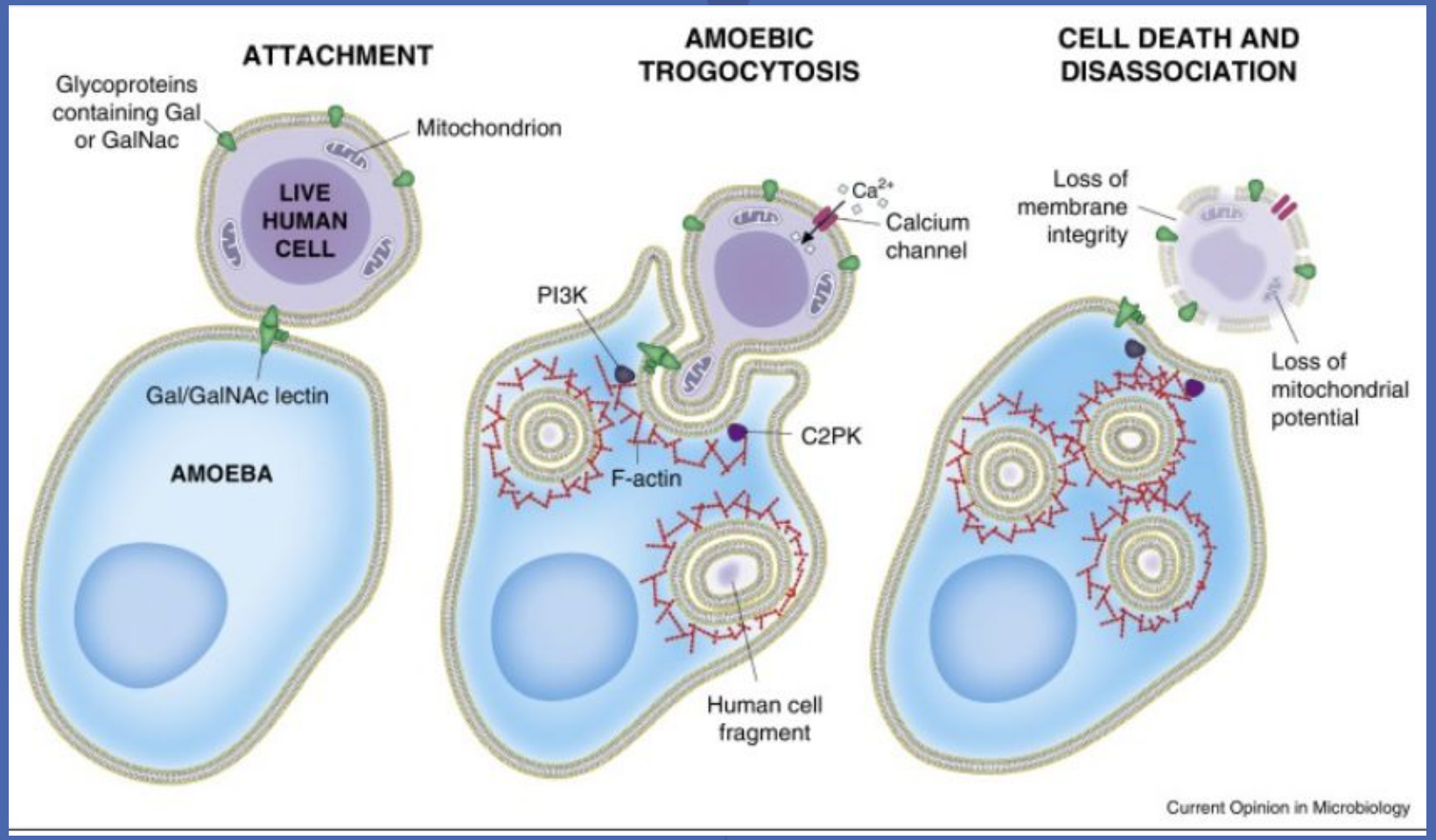

Animal models
In silico analysis& docking studies (Bioinformatics)
Models of pathogenesis
Techniques(knockout, confocal microscopy etc)
In vitro, *In vivo* models

Updates in pathogenesis of Amoebiasis

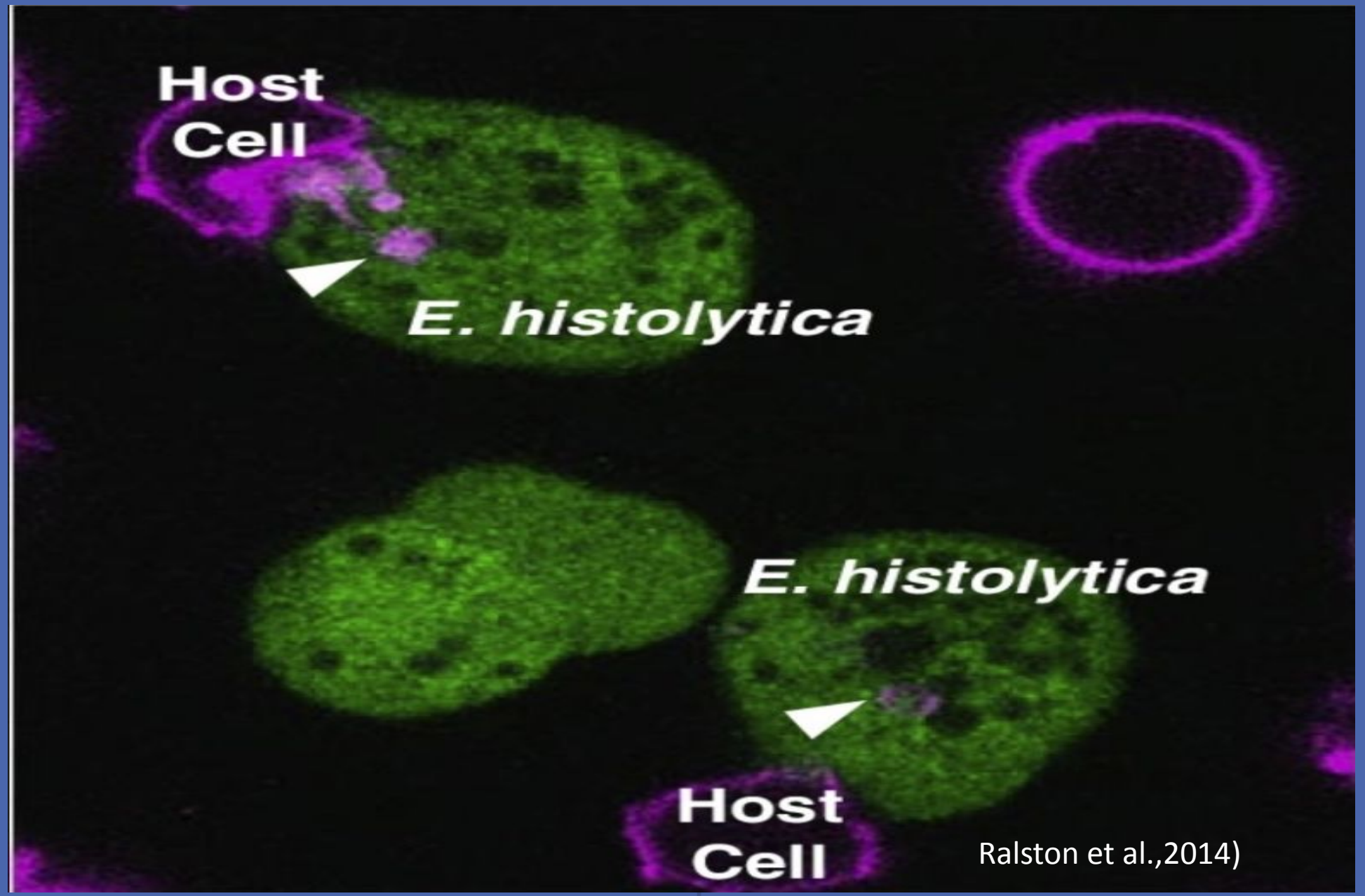
Trogocytosis

E. histolytica kills human cells through a mechanism that termed as trogocytosis ("trogo-" means "nibble

During trogocytosis, amoebae kill human cells by extracting and ingesting "bites" of human cell membrane and intracellular contents



Ralston et al.,2015)



Ralston et al.,2014)

Trogocytosis

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mBio. 2019 Mar-Apr; 10(2): e00068-19.
Published online 2019 Apr 30. doi: 10.1128/mBio.00068-19

PMCID: PMC6495370
PMID: 31040235

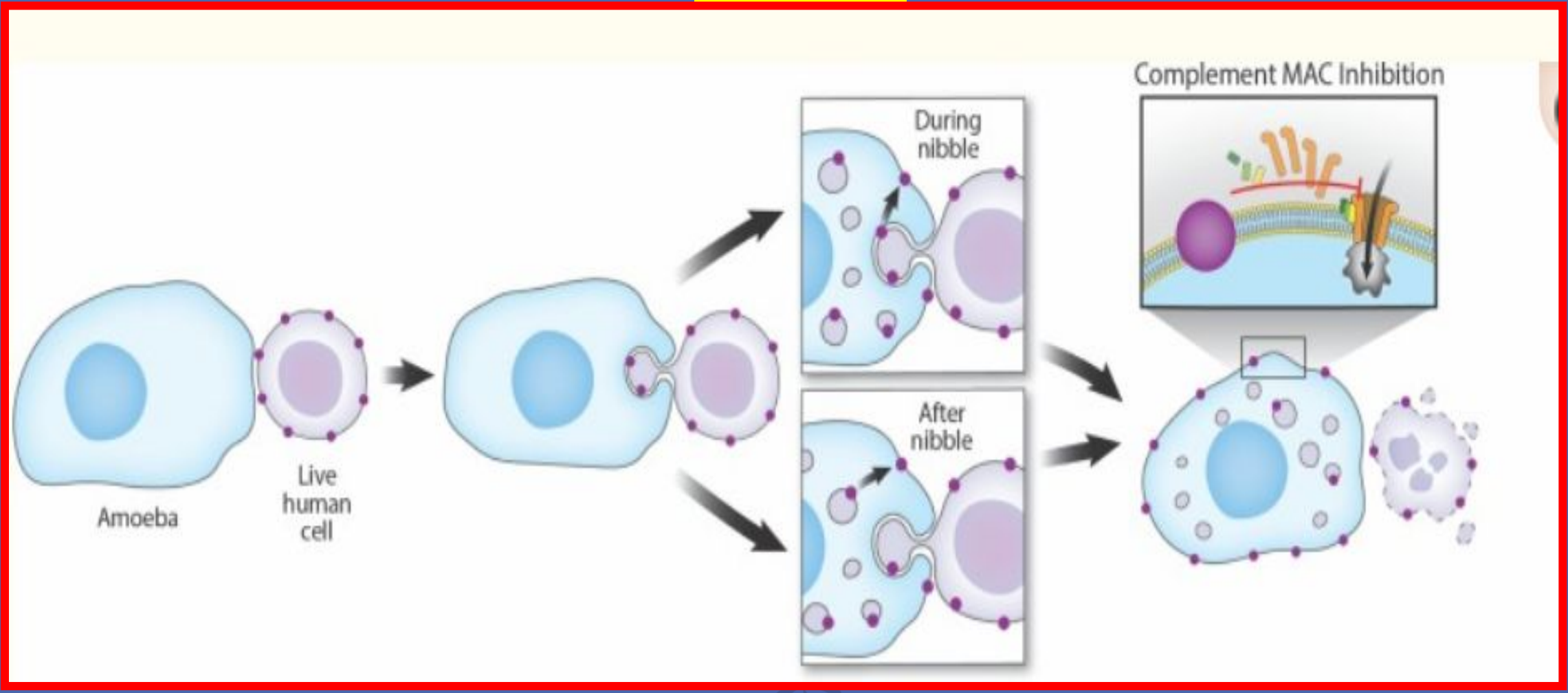
Trogocytosis by *Entamoeba histolytica* Mediates Acquisition and Display of Human Cell Membrane Proteins and Evasion of Lysis by Human Serum

Hannah W. Miller,[a] Rene L. Suleiman,[a] and Katherine S. Ralston[a]

Patricia J. Johnson, Editor
Patricia J. Johnson, University of California Los Angeles;

- **Amoebae acquire and display human cell membrane proteins**
- **Interaction with human cells leads to protection from lysis by human serum**
- **Protection from human serum occurs only after amoebae have undergone trogocytosis of live cells but not phagocytosis of dead cells**

Proposed model of protection from serum lysis(Miller et al.,2019)



Membrane proteins acquired during the process of nibbling a and then expressed on the surface

PLOS PATHOGENS

PLoS Pathog. 2019 Aug; 15(8): e1008016.

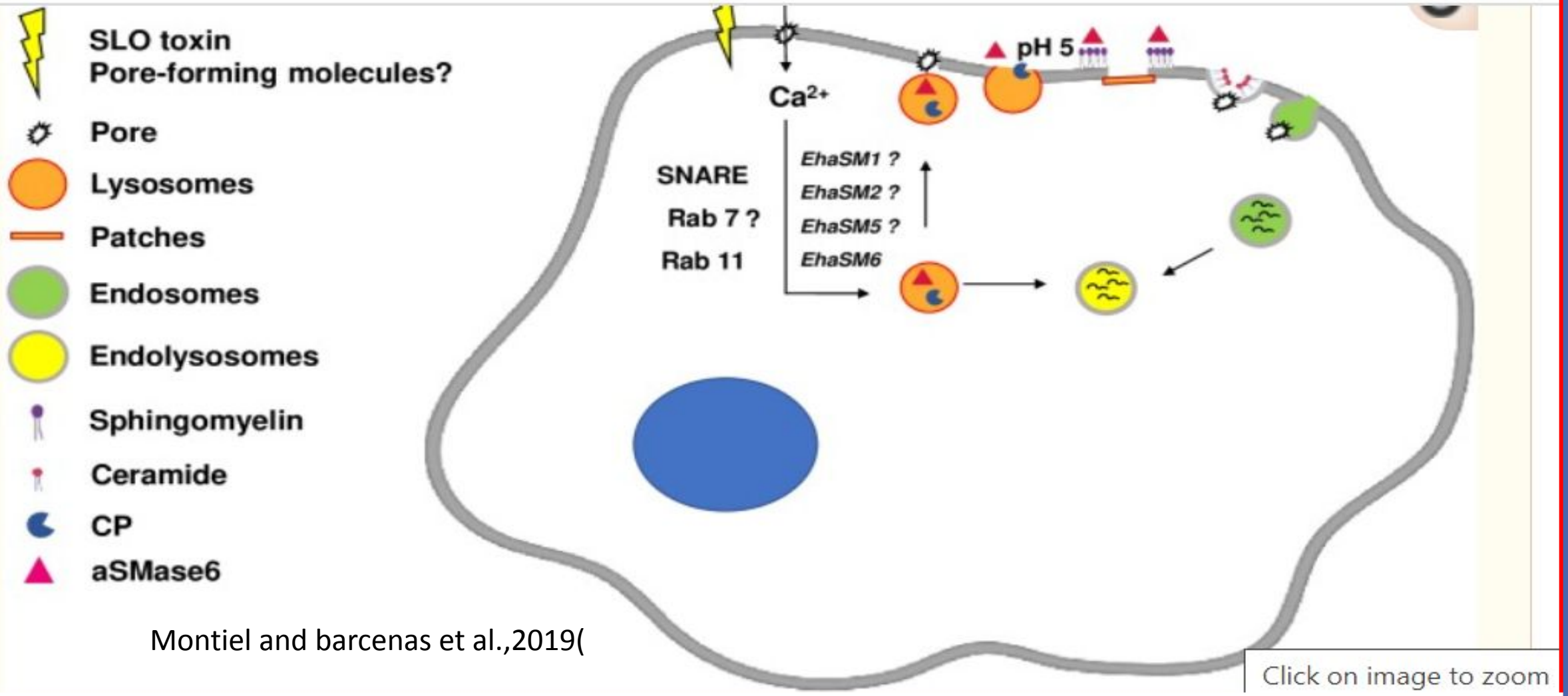
PMCID: PMC6713333

Published online 2019 Aug 28. doi: 10.1371/journal.ppat.1008016

PMID: 31461501

Plasma membrane damage repair is mediated by an acid sphingomyelinase in *Entamoeba histolytica*

Montiel and barcenas et al.,2019(

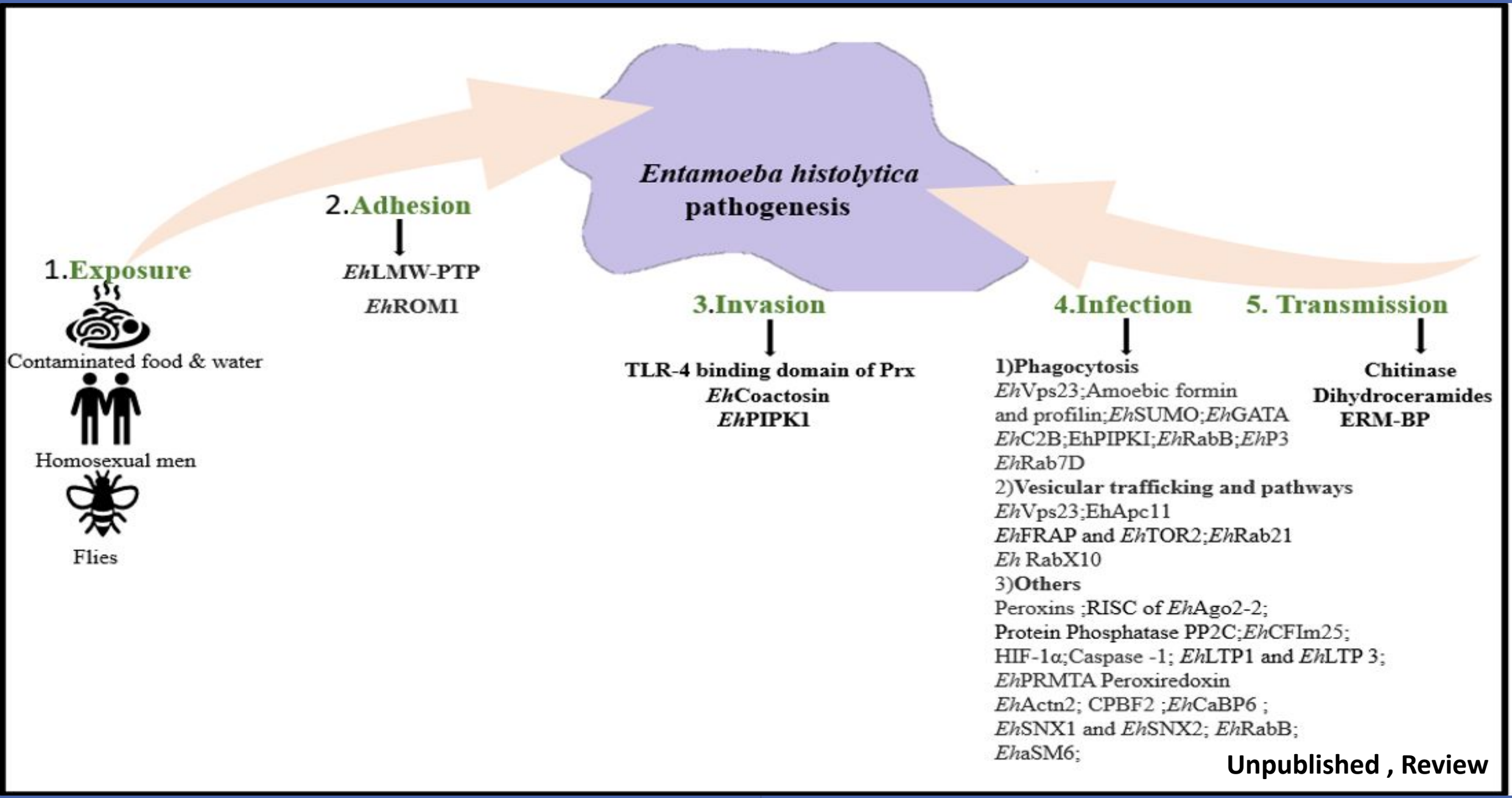


Montiel and barcenas et al.,2019(

Click on image to zoom

Model for plasma membrane repair mediated by secreted lysosomal aSMase6 in *E. histolytica*.

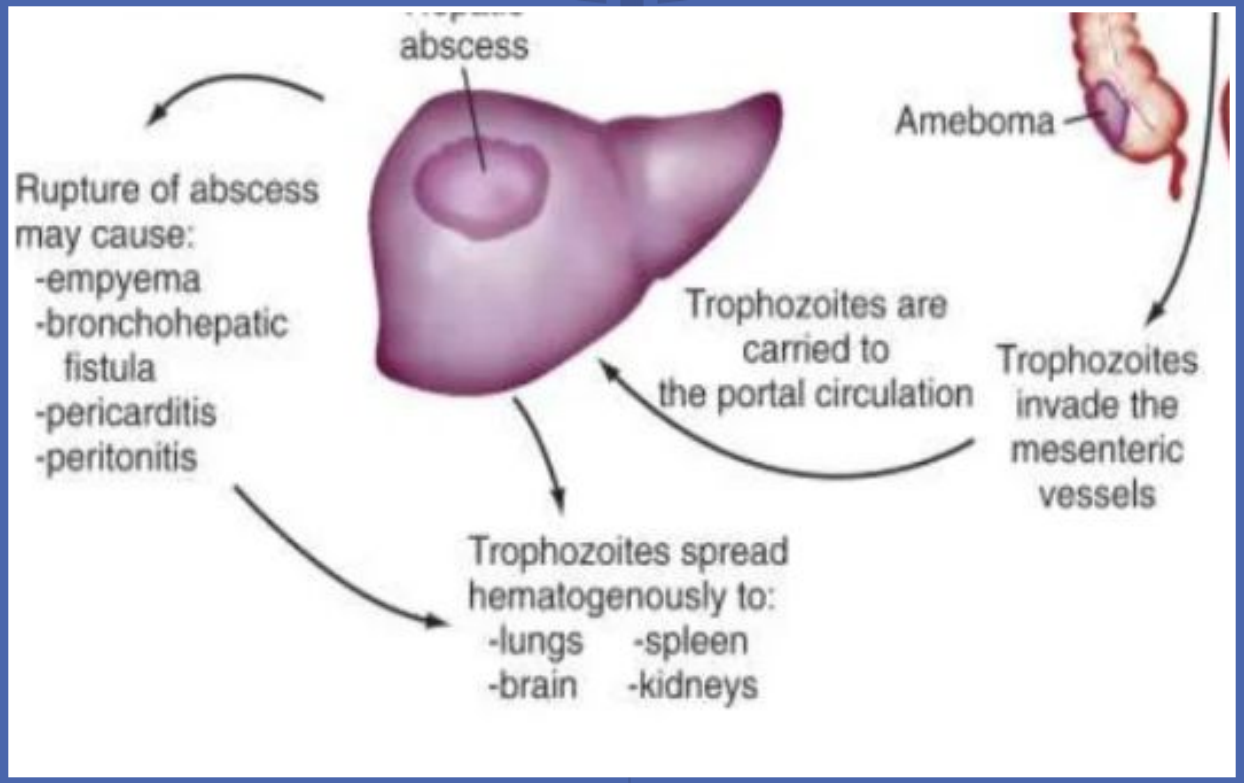
The pore caused by SLO to the PM of *E. histolytica* allows the entry of extracellular Ca^{2+} into the cytoplasm. The elevation in the intracellular concentration of Ca^{2+} triggers the exocytosis of the lysosomes which discharge their content into the extracellular space, including the aSMase6. The aSMase6 hydrolyzes sphingomyelin membrane in ceramide, the latter favors the formation of endosomes that internalize the lesions.


Entamoeba histolytica
pathogenesis
1.Exposure
Contaminated food & water
Homosexual men
Flies
2.Adhesion
EhLMW-PTP
EhROM1
3.Invasion
TLR-4 binding domain of Prx
EhCoactosin
EhPIPK1
4.Infection
1)Phagocytosis
EhVps23;Amoebic formin
and profilin;EhSUMO;EhGATA
EhC2B;EhPIPKI;EhRabB;EhP3
EhRab7D
2)Vesicular trafficking and pathways
EhVps23;EhApc11
EhFRAP and EhTOR2;EhRab21
Eh RabX10
3)Others
Peroxins ;RISC of EhAgo2-2;
Protein Phosphatase PP2C;EhCFIm25;
HIF-1α;Caspase -1; EhLTP1 and EhLTP 3;
EhPRMTA Peroxiredoxin
EhActn2; CPBF2 ;EhCaBP6 ;
EhSNX1 and EhSNX2; EhRabB;
EhaSM6;
5. Transmission
Chitinase
Dihydroceramides
ERM-BP
Unpublished , Review

Extra intestinal Amoebiasis

Amoebic liver abscess

- It is the most common extraintestinal manifestation of amebiasis
- The protozoa passes from colonic lesion via portal vein into the liver, usually into the upper and posterior portions of right lobe
- It begins with intrahepatic portal thrombosis and infarction
- Cytolytic activity starts, liquefaction of the surrounding stromal tissue takes place, resulting in large single abscess



Cutaneous amoebiasis

•It may occur from either direct extension of a liver abscess through the abdominal wall, or as extension of a rectal amoebiasis to the anus or perineum

• Rarely, primary cutaneous disease has been described (particularly contamination of pre-existing wounds), and sexual transmission may occur

Figure 4.. *Images of cutaneous amebiasis lesions present on chest*

Zamora et al.,2021)

Pulmonary amoebiasis

It can develop in following ways

- Rupture of amoebic hepatic abscess through diaphragm
- Lymphatic spread from liver through diaphragm
- Hematogenous spread

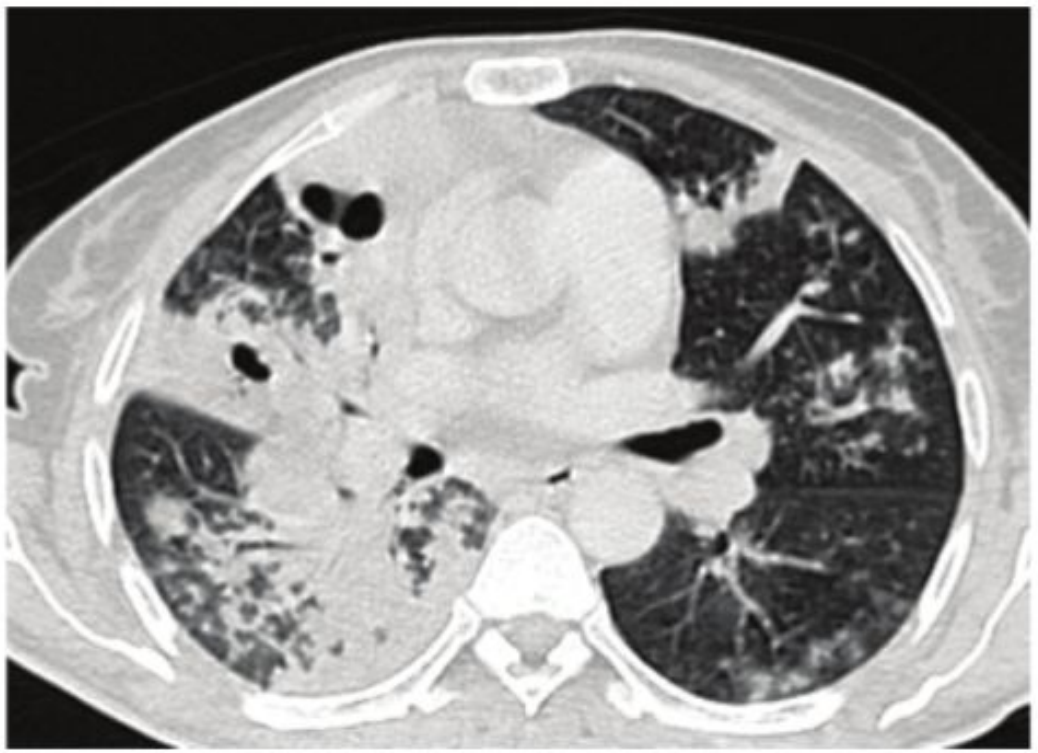


Figure 1: Chest CT: Axial plan in lung window. Right pulmonary parenchymal condensation with multiple excavated lesions.

Hachicha et al.,2017)

Aissa et al., J Pulm Respir Med 201
DOI: 10.4172/2161-105X.100

Journal of
Pulmonary & Respiratory Medicine

Case Report OMICS Internatio

Pleuropulmonary Amoebiasis: Know to Think About

A Aissa[1], M Hachicha[1], A Daadoucha[1], I Ben Othmen[1], S Aissa[2], H Barhoumi[3], M Benzarti[2] and R Alouini[1]

[1]*Departement of Imaging, Ibn El Jazzar Hospital, Kairouan, Tunisia*
[2]*Departement of Chest Diseases, Farhat Hached Hospital, Sousse, Tunisia*
[3]*Department of Anesthesia, Surgical Unit Aghlabites, Kairouan, Tunisia*

Abstract

Amoebiasis is the third leading cause of mortality due to parasitic infection worldwide after malaria and schistosomiasis. The direct pulmonary *Entamoeba histolytica* is rarer than reactive events called "neighborhood". We report the role of imaging in the diagnostic orientation in a case of amoebic pleuropulmonary damage (associated with serology and parasitology). Before an excavated pulmonary lesion, imaging can be a great contribution in the working diagnosis of pulmonary parasite *Entamoeba histolytica*.

Case Report

A 56-year-old diabetic patient was admitted to intensive care unit for impaired general condition, oscillating fever, dry cough and weight loss. These symptoms were not resolved by antibiotics which aimed for community-acquired pneumonia. The evolution was marked by a worsening with persistent fever and installation of a brownish vomiting. The chest X-rays showed a diffuse alveolar filling associated with bilateral excavated images which the largest was right apical. A Complementary CT revealed bilateral and asymmetrical alveolar syndrome with parenchymal condensation some of which are confluent, containing multiple excavated images (Figures 1 and 2). There was a draining bronchus issued from the right lower lobe which was better visualized on MinIP reconstruction (Figure 3).

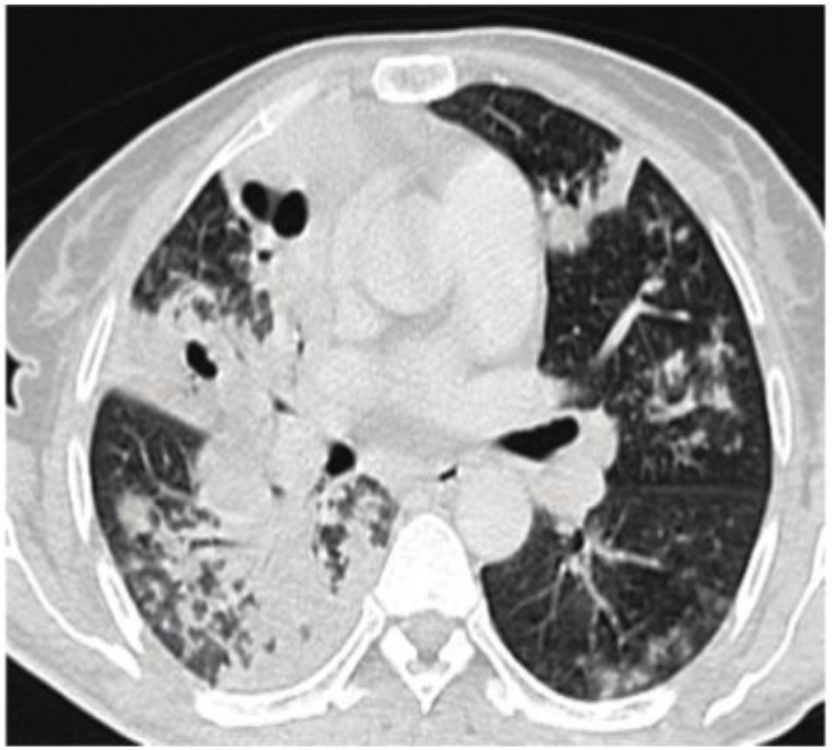


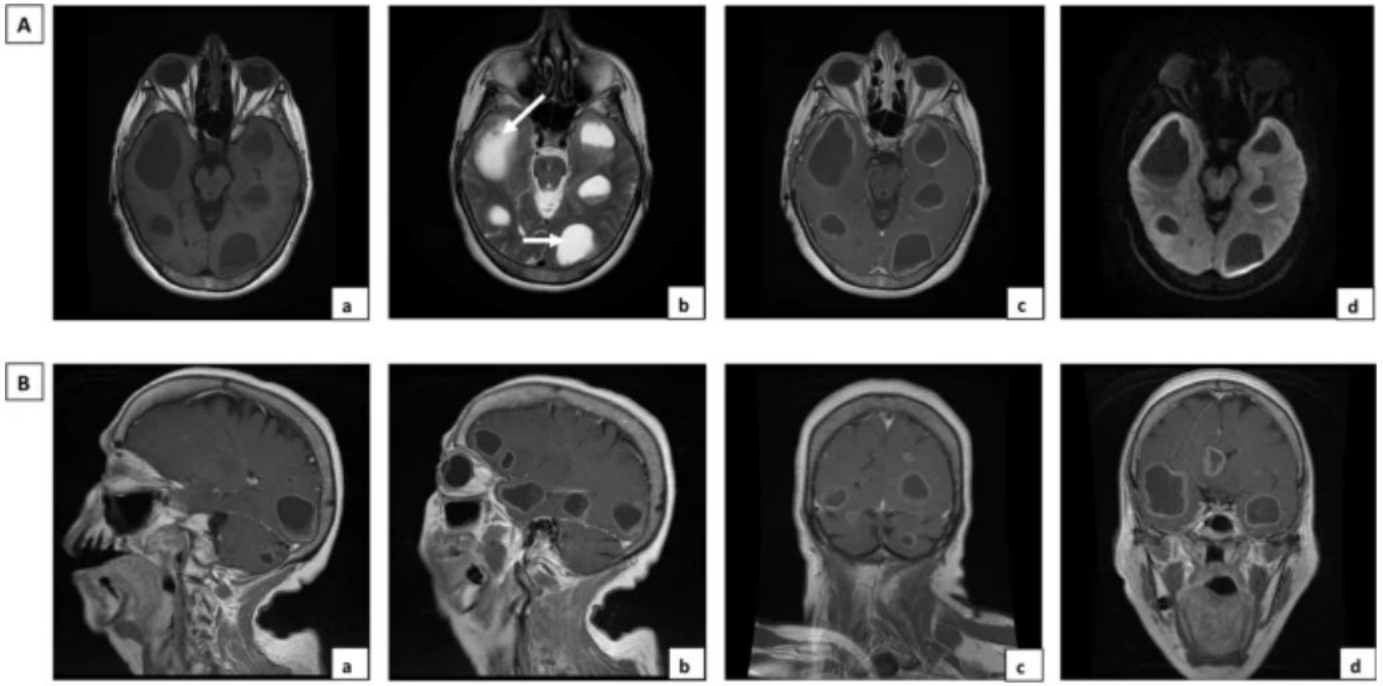
Figure 1: Chest CT: Axial plan in lung window. Right pulmonary parenchymal condensation with multiple excavated lesions.

Hachicha et al., 2017)

Cerebral amoebiasis

- It is a rare form of invasive amebiasis with fatal outcome
- It is produced when trophozoites invade the central nervous system

Fig. 1



Cranial nuclear magnetic resonance image. A. Multiple cystic lesions with ring enhancement after contrast administration, without restricted diffusion, in temporal and occipital lobes. (a) Axial T1SE,

Victorua hernadez et al.,2020

Case report | Open Access | Published: 14 September 2020

Case report: multiple and atypical amoebic cerebral abscesses resistant to treatment

Joaquin Alvaro Victoria-Hernández, Anayansi Ventura-Saucedo, Aurelio López-Morones, Sandra Luz Martínez-Hernández, Marina Nayeli Medina-Rosales, Martín Muñoz-Ortega, Manuel Enrique Ávila-Blanco, Daniel Cervantes-García, Luis Fernando Barba-Gallardo & Javier Ventura-Juárez

We report a case of a 71-year-old female who reported an altered state of consciousness, disorientation, sleepiness and memory loss. She had no history of hepatic or intestinal amoebiasis. A preliminary diagnosis of colloidal vesicular phase neurocysticercosis was made based on nuclear magnetic resonance imaging (NMRI). A postsurgery immunofluorescence study was positive for the 140 kDa fibronectin receptor of *E. histolytica*, although a serum analysis by ELISA was negative for IgG antibodies against this parasite. A specific *E. histolytica* 128 bp rRNA gene was identified by PCR in biopsy tissue. The final diagnosis was cerebral amoebiasis. The patient underwent neurosurgery to eliminate amoebic abscesses and was then given a regimen of metronidazole, ceftriaxone and dexamethasone for 4 weeks after the neurosurgery. However, a rapid decline in her condition led to death.

Clinical presentation

Asymptomatic carriers (non invasive form)

- 90% without symptoms
- does not damage lumen

Invasive forms:

Amoebic colitis

- flask shaped ulcers superficial or deep
- abd pain, diarrhea, blood, fever
- tenesmus, peri-anal ulcers

Fulminant colitis - <0.5%

- severely ill with high fever
- intestinal bleeding
- perforation
- paralytic ileus

Amoeboma

- 1% of cases
- inflammatory thickening of intestinal wall
- palpable mass with trophozoites

Symptoms of amoebic colitis

Symptoms	*Percentage*
1. Diarrhea	100
2. Dysentery	99
3. Abdominal pain	85
4. Fever	68
5. Dehydration	5
6. Length of symptoms	2 to 4 weeks

Extra-intestinal

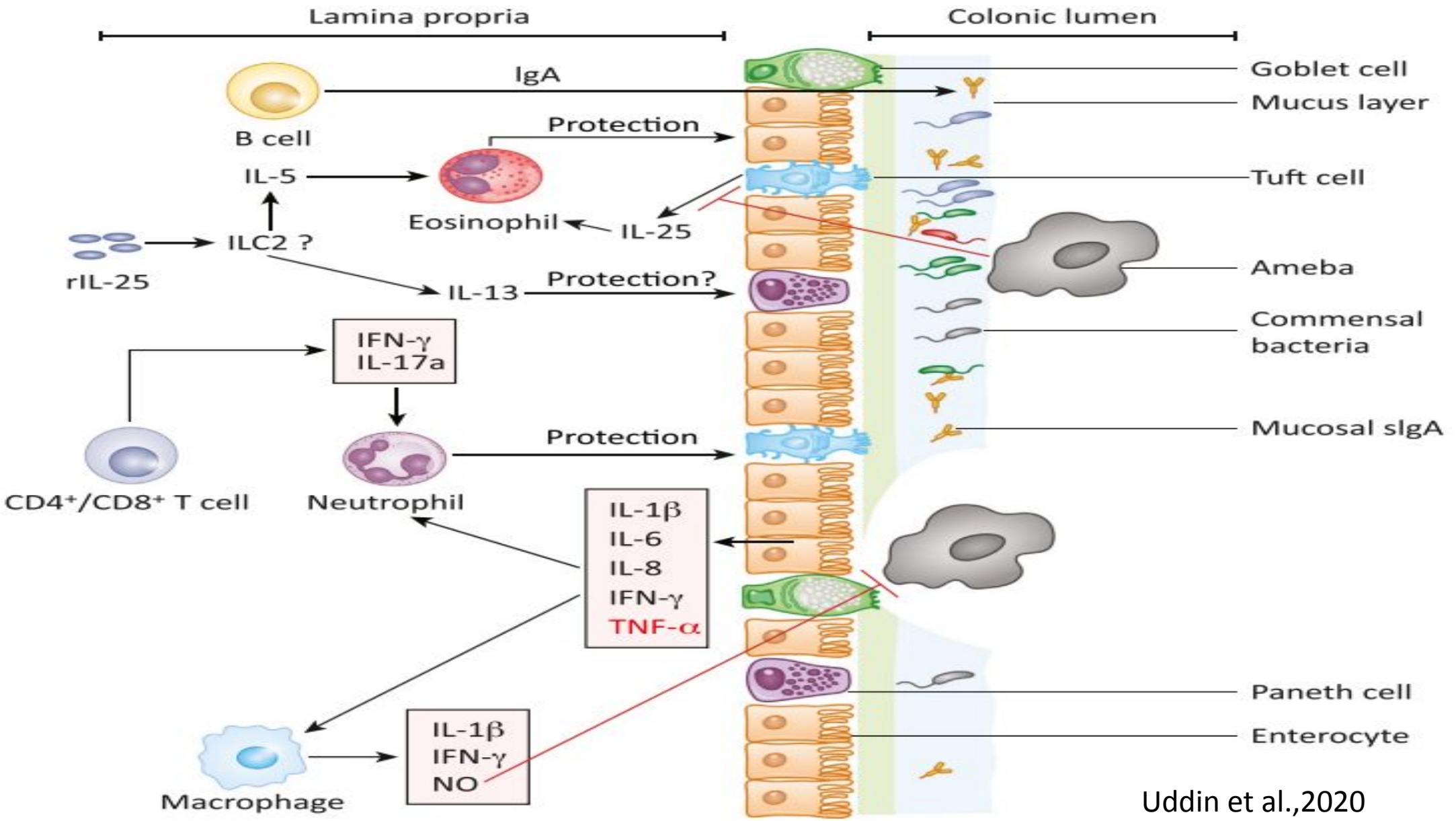
- Amoebic liver abcess
  - via portal system
  - 5% of invasive disease
  - 10 times more common in men
- Pleuropulmonary
  - direct spread from liver abcess (10%)
  - haematogenous spread
- Brain
  - abrupt onset & rapid progression
  - death in 12-72 hrs

FLASK SHAPED ULCER

https://phil.cdc.gov/Details.aspx?pid=416

Immune response

Host Protective Pathways to Amebic Infections



Uddin et al.,2020

The underlying cellular immune pathology of *Entamoeba histolytica*-induced hepatic amoebiasis

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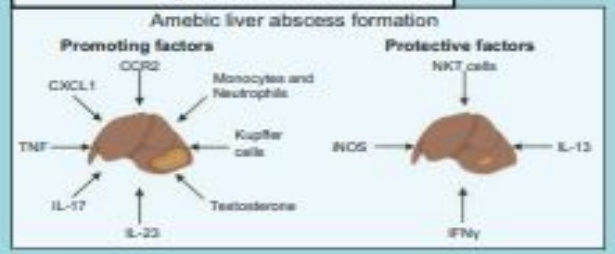
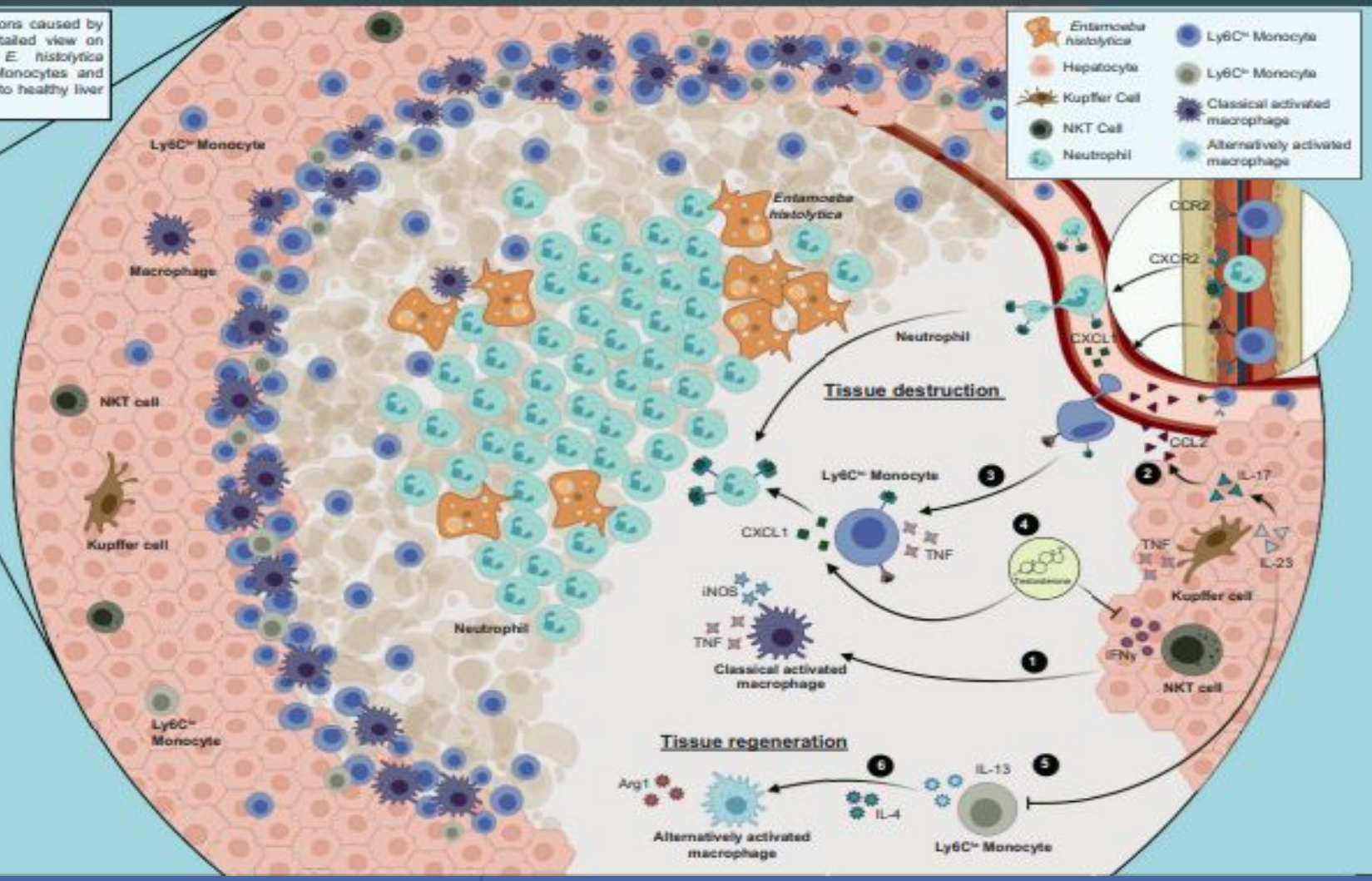
Characteristic histological organization resulting from the immune reactions caused by *Entamoeba* (E.) *histolytica*-induced liver abscess formation, with a detailed view on immune-cell-mediated tissue destruction and regeneration. Here, *E. histolytica* trophozoites are surrounded by neutrophils and lysed liver tissue. Monocytes and macrophages are mainly localized at the edge of the abscess adjacent to healthy liver tissue.

Murine liver

Immune cells and the destroyed liver tissue form a cytokine environment, which in turn leads to further tissue destruction. At an early stage of infection, NKT cells release IFNγ, which activates the TNF- and iNOS-secreting macrophages responsible for better parasite killing ❶. The CCL2 expression is promoted by the early presence of IL-23 and IL-17 ❷. CCL2 is responsible for the recruitment of CCR2-expressing Ly6C^{hi} monocytes from the bone marrow through the blood stream to the site of infection, where these cells express the potent neutrophil recruiting factor CXCL1 ❸. Testosterone further promotes immune pathology by inhibiting the IFNγ release by NKT cells and increasing the CXCL1 production of Ly6C^{hi} monocytes ❹. Tissue regeneration is mediated by IL-13 from Ly6C^{lo} monocytes. In combination with IL-4, IL-13 leads to the generation of alternatively activated macrophages, which release Arginase 1 and promote tissue regeneration ❻. This mechanism can be inhibited by IL-23 ❺.





Sellau et al.,2021

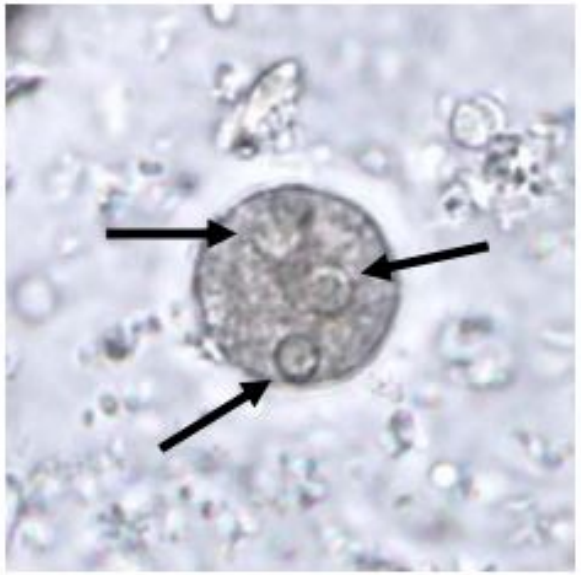
Diagnosis

Diagnostic techniques (Fotedar et al.,2007)

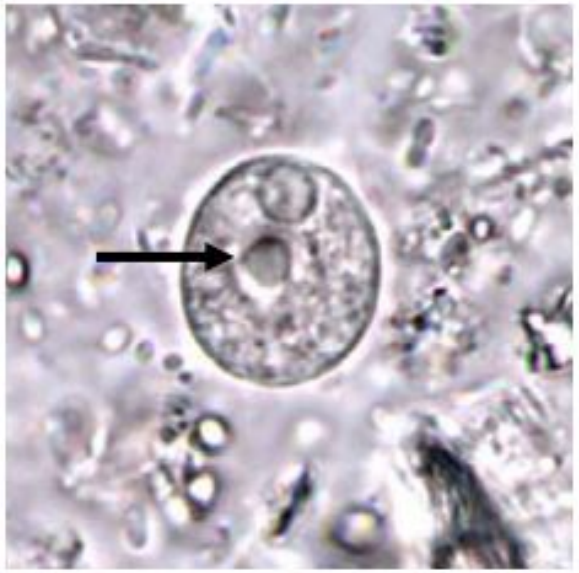
Test	Specimen	Sensitivity	Specificity	Time	Technical expertise	Cost
1.**Microscopy (wet mount/permanent stain)**	Stool	25-60%	10-50%	1-2hr	yes	low
2. Antigen detection(ELISA)	Stool Serum	>95 65(early)	>95 >90	3hr	none	low
3. Antibody detection	Serum(acute infection) Serum(convalescent infection)	75-80 >90	>85 Yes	2-3hr	For certain antibody assays	low
4. Culture & isoenzyme	Stool	>antigen &PCR (error in case of mixed infection)	>70	1-2 weeks	yes	High, labour intensive
5. PCR based assays	Stool	>90	>90	1-2 days	yes	High

Microscopy

- Wet mount
  https://www.cdc.gov/dpdx/resources/pdf/benchAids/entamoeba_bench



E. histolytica/E. dispar cyst with three visible nuclei (arrows).

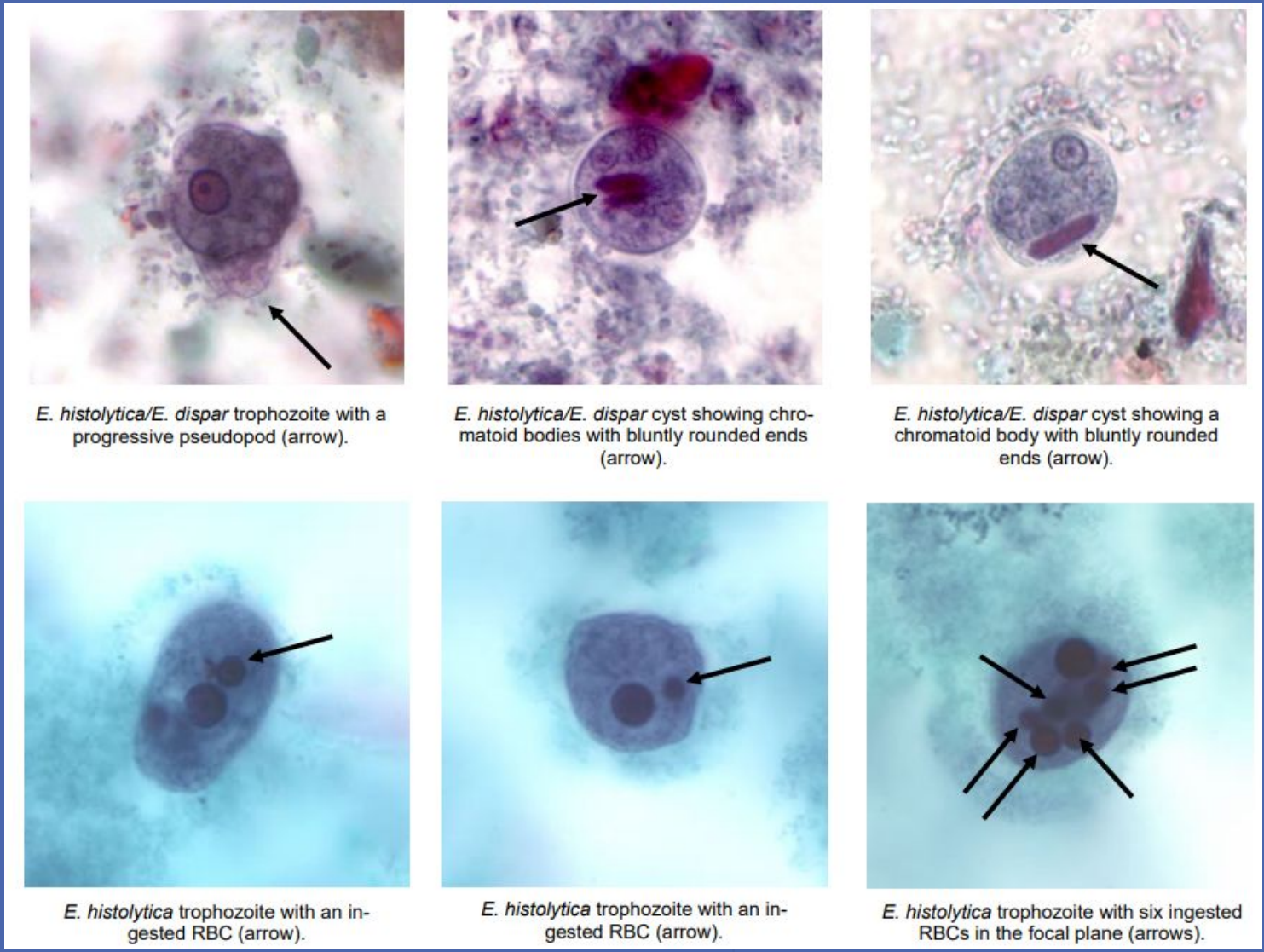


E. histolytica/E. dispar cyst with one visible nucleus and a glycogen vacuole (arrow).

E. histolytica/E. dispar cyst in iodine with one visible nucleus and a glycogen vacuole (arrow).

E. histolytica/E. dispar cyst in iodine with two visible nuclei and a chromatoid body (arrow).

- Trichome staining https://www.cdc.gov/dpdx/resources/pdf/benchAids/entamoeba_benchaid.pdf



E. histolytica/E. dispar trophozoite with a progressive pseudopod (arrow).

E. histolytica/E. dispar cyst showing chromatoid bodies with bluntly rounded ends (arrow).

E. histolytica/E. dispar cyst showing a chromatoid body with bluntly rounded ends (arrow).

E. histolytica trophozoite with an ingested RBC (arrow).

E. histolytica trophozoite with an ingested RBC (arrow).

E. histolytica trophozoite with six ingested RBCs in the focal plane (arrows).

- Can't differentiate among morphologically similar species

Departmental studies

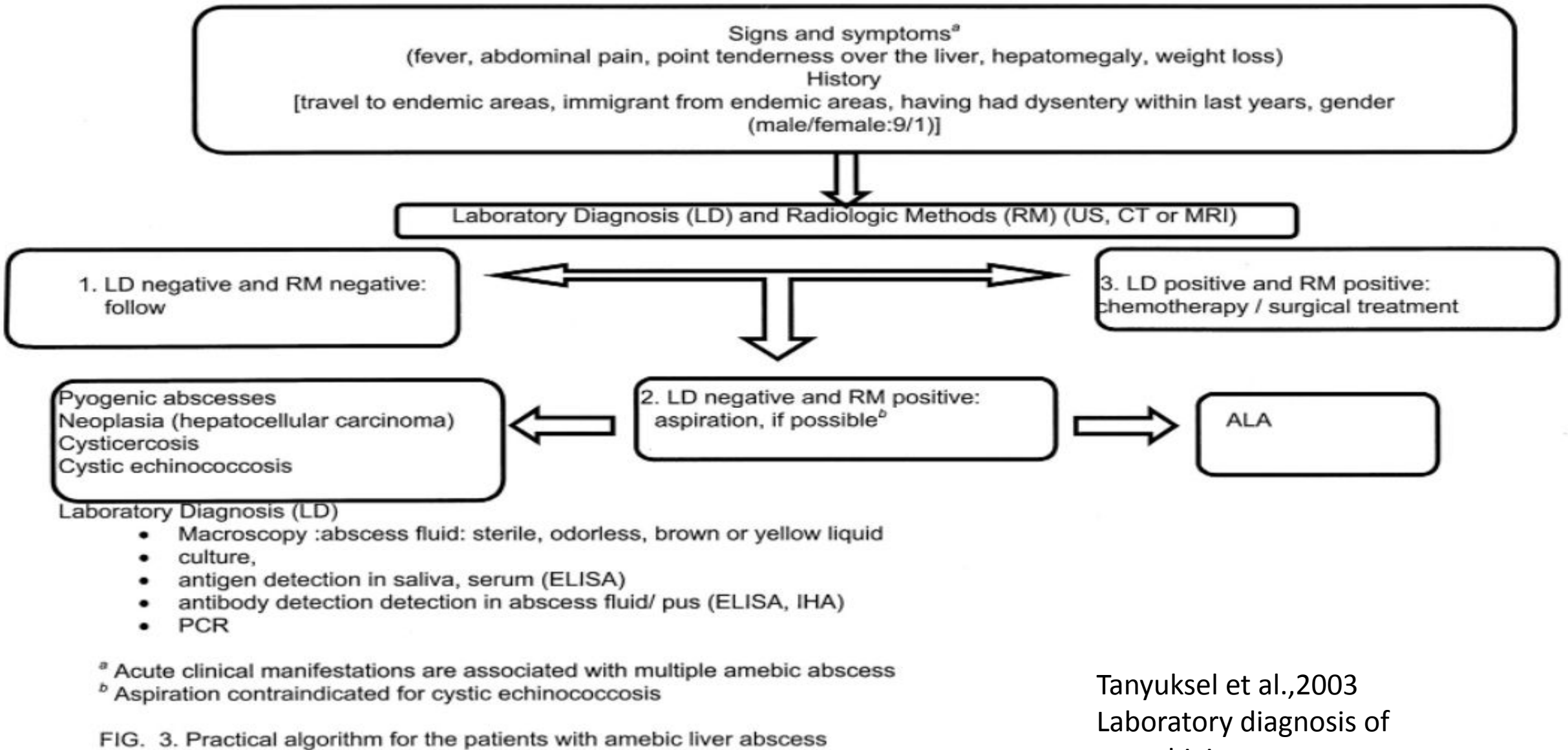


FIG. 3. Practical algorithm for the patients with amebic liver abscess

Tanyuksel et al.,2003
Laboratory diagnosis of amoebiais

FIG. 3. Practical algorithm for diagnosis of patients with amebic liver abscess.

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doi: 10.1128/JCM.00778-06

PMCID: PMC15
PMID: 169

Differential Detection of *Entamoeba histolytica*, *Entamoeba dispar*, and *Entamoeba moshkovskii* by a Single-Round PCR Assay

Zulhainan Hamzah,[1] Songsak Petmitr,[2] Mathirut Mungthin,[3] Saovanee Leelayoova,[3] and Porntip Chavalitshewinkoon-Petmitr[1,*]

confirmed the high specificity of the assay. We propose the use of this PCR assay as an accurate, rapid, and effective diagnostic method for the detection and discrimination of these three morphologically indistinguishable *Entamoeba* species in both routine diagnosis of amoebiasis and epidemiological surveys.

> World J Microbiol Biotechnol. 2013 Jan;29(1):27-32. doi: 10.1007/s11274-012-1154-7.
Epub 2012 Oct 6.

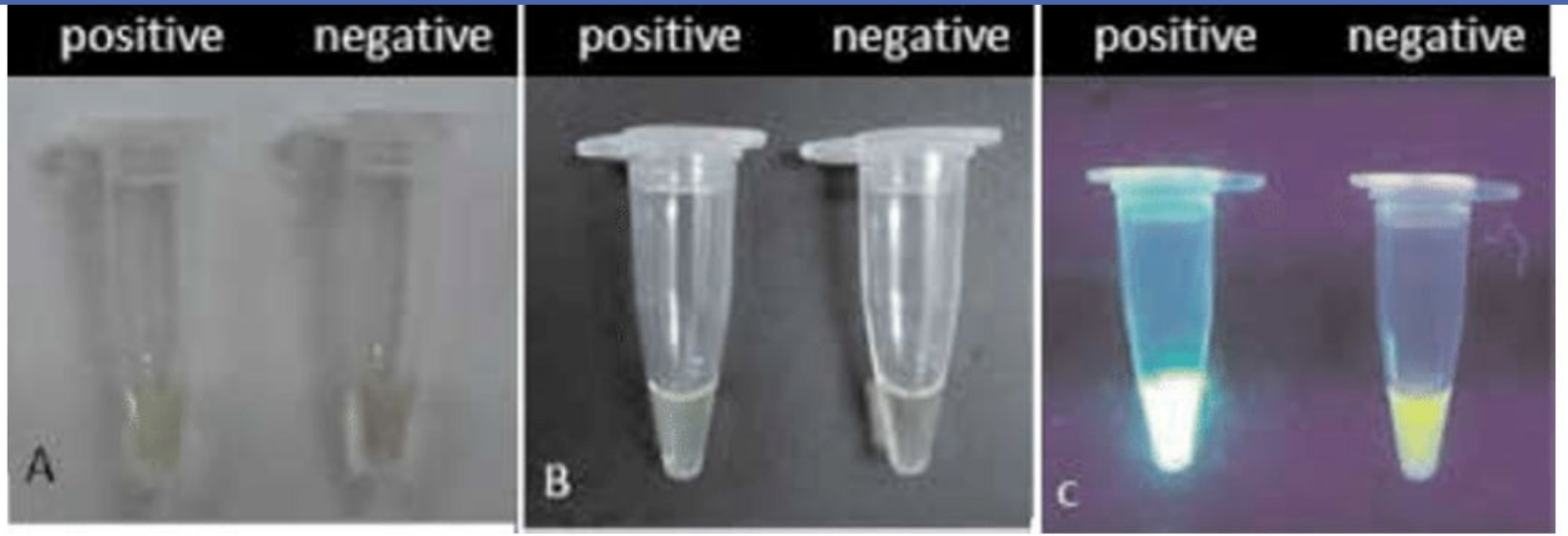
Loop-mediated isothermal amplification (LAMP) assay for rapid detection of Entamoeba histolytica in amoebic liver abscess

Preeti Singh [1], Bijay Ranjan Mirdha, Vineet Ahuja, Sundeep Singh

Affiliations + expand

PMID: 23054695 DOI: 10.1007/s11274-012-1154-7

thirty-six (72 %, 36/50) were positive for E. histolytica with conventional PCR assay and forty-one (82 %, 41/50) were positive by LAMP assay. Thus, five additional positive cases, missed by conventional PCR were positive with LAMP assay. Apart from rapidity, operational simplicity of LAMP assay high specificity and sensitivity, one-step amplification, higher yield and immediate visual detection may serve as a better diagnostic tool for diagnosis of ALA.



Visual detection of LAMP products after the addition of SYBR green 1 against a white (A) and dark (B) background and under UV illumination (C). Positive reactions turned green under ambient light and fluoresced bright green under UV illumination, while the negative control remained dull orange under ambient light and did not emit strong green fluorescence under UV light.

Development of loop-mediated isothermal amplification for rapid detection of Entamoeba histolytica

Rivera et al.,2013

Treatment

Table. Treatment regimens for amebiasis

Condition	Drug	Adult dosing
Asymptomatic	Paromomycin OR	25 to 35 mg/kg/day PO in three divided doses x 7 days
	Iodoquinol OR	650 mg PO TID x 20 days
	Diloxanide furoate (*Luminal agent only*)	500 mg PO TID x 10 days
Intestinal disease* (mild to moderate)	Metronidazole OR	500 to 750 mg PO TID x 7-10 days
	Tinidazole (*Followed by luminal agent as above*)	2 g PO daily x 3 days
Liver abscess or severe intestinal disease	Metronidazole OR	750 mg PO or IV TID x 10 days
	Tinidazole (*Followed by luminal agent as above*)	2 g PO daily x 5 days

*Nitazoxanide 500 mg PO BID x 3 days may be considered as an alternative to nitroimidazoles for mild to moderate amebiasis, followed by a luminal agent.

Brocker & becler et al.,2018)

Departmental studies

Scientific Research Publishing

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ISSN Online: 2327-509X
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Identification and Characterization of Heparan Sulphate Binding Proteins of *Entamoeba histolytica*

Upninder Kaur[1], Sumeeta Khurana[1], Uma Nahar Saikia[2*], Mohan Lal Dubey[1], Rakesh Sehgal[1]

However, 61.0 kDa HSBP revealed 2 spots which had isoelectric point between pH 4 and 5. The result showed that this parasite has proteins which interact with heparan sulphate whose molecular formula is $C_{14}H_{23}NO_{21}S^{-2}_{3}$. These proteins may have a role in binding of parasite to heparan sulphate on host cells. Further characterization by MALDI-TOF analysis of HSBPs from *E. histolytica* demonstrated HSBPs to be novel protein in this parasite which has been isolated, purified and characterized first time by our group in the present study.

Liver Abscess in Children–experience From a Single Tertiary Care Center of North India: Etiology, Clinical Profile and Predictors of Complications

Sadhna Bhasin Lal [1], Vybhav Venkatesh [1], Aditi Kumar [1], Neha Anushree [1], Keerthivasan Seetharaman [1], Aradhana Aneja [1], Sreedhara B Chaluvashetty [2], Rakesh Sehgal [3]

Affiliations + expand

PMID: 33847292 DOI: 10.1097/INF.0000000000003053

months and mean time to resolution of LA was 46.5 ± 16 days.

Conclusions: ALA is the commonest cause of pediatric LA in endemic regions and is difficult to differentiate from PLA clinically. Percutaneous catheter drainage is safe and effective modality for the management of LA in children. A higher alanine transaminase, prolonged prothrombin time/international normalized ratio and low serum albumin levels (<3 g/dL) at presentation identify complicated LA.

Evaluation of loop mediated isothermal amplification for the diagnosis of amoebic liver abscess

April 2016 · International journal of infectious diseases: IJID: official publication of the International Society for Infectious Diseases 45(1):378

DOI:10.1016/j.ijid.2016.02.811

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Article

Multilocus sequence typing system (MLST) reveals a significant association of Entamoeba histolytica genetic patterns with disease outcome

December 2013 · Parasitology International 63(2)

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Punam Chowdhury

Rakesh Sehgal
Postgraduate Institute of Medical Educati…

Journals.plos.org/plosntds/article/figure?id=10.1371/journal.pntd.0007744.g001

- Thank you