

* All Parasites Info:

* Entamoeba Histolytica: {Trophozoites or Cysts}

- only pathogenic amoeba in large intestine. Feco-oral route transmission
- causes amoebic dysentery (possible miss diagnosis with regular diarrhea)
- Related to places with poor hygiene.
- Inhabits large intestines: Cecum / R. & L. colonic flexures / sigmoid/rectal region.
- causes less peristalsis \rightarrow can invade and cause dysentery.
- most commonly asymptomatic \rightarrow cyst passers / healthy carriers \rightarrow parasite lives in lumen of intestines without invading \rightarrow can infect others directly or indirectly.
- D.H = man, R.H = man/dogs/pigs/rats/monkeys.
- disease: amoebiasis or amoebic dysentery.
- Trophozoite stage = Tissue/Vegetative form \Rightarrow active / motile / feeding form.
- trilaminar P.M, protoplasm of trophozoite contains a central nucleus characterized by a karyosome surrounded by a ring of fine chromatin, distinct ectoplasm, granular endoplasm that contains food vacuoles and ingested RBC's. Presence of RBC's inside the cystoplasm = pathogenic sign \Rightarrow help differentiate
- Cyst stage = quiescent/hardened phase due to unfavourable conditions \Rightarrow encyst to protect themselves to survive. amoebas that remain in intestinal lumen without invading are excreted as cysts (luminal form) mature or immature.
- immature cysts = uninucleate / binucleate ξ mature cysts = quadrinucleate = infectious.
- infection through: contaminated food, drinks, hands / flies, cockroaches that carry the mature cysts from contaminated feces to exposed food. / Ext. or Int. autoinfection = feco-oral or hand to mouth infection. / Homosexual transmission after fecal matter exposure.
- Infective Stage = Quadrinucleate (mature) cyst. / Diagnostic Stage = Cyst form or trophozoite form.
- mature cysts excyst in small intestine under favorable conditions releasing eight trophozoites that multiply by binary fission \rightarrow trophozoites then may remain in large intestine and re-encyst \Rightarrow cyst passer \Rightarrow invades mucosa & submucosa causing dysentery (acute or chronic)
- Cysts live in water for up to weeks.
 trophozoite in stool cysts in stool

* Cont'd *E. histolytica*:-

- in severe cases → extra-intestinal amoebiasis: Right liver lobe → lungs, brain, skin
- so basically, hepatic amoebiasis / Secondary amoebic encephalitis or skin in untreated cases.
- Tenesmus ⇒ urgent feeling to empty bowels although they are empty.
- invasive amoebiasis causes complications: hemorrhage / peritonitis / appendicitis / granuloma.
- ulcers occur at inhabitant sites due to low peristalsis ⇒ flask shaped ulcer
- invasion → liver → amoebic liver abscess / diffuse amoebic hepatitis. Right lobe of liver. fever / hepatomegaly / right hypochondrium pain.
- invasion → lungs → lung abscess → pneumonia + chest pain, cough, fever. Lower part of the right lung ⇒ spread from liver through diaphragm or very rarely trophozoites may reach the lung via blood circulation.
- invasion → brain → SAE → brain abscess → fatal.
- Skin → Cutaneous amoebiasis (amoebiasis cutis) due to extension to peri anal region or through rupture on abdominal wall.

x Other Amoebae:-

1. *E. coli*
 2. *E. dispar*
 3. *E. heartmanni*
 4. *E. moshkovskii*
- } intestinal commensal amoeba

5. *E. gingivalis* ⇒ correlated to gingivitis (periodontal disease) } buccal cavity amoeba

6. Free living amoeba:- most amoebas are free-living, small portion are pathogenic.

a: non-pathogenic:- coprozoic amoebas.

b: pathogenic:-
Naegleria fowleri → 1° amoebic meningoencephalitis (PAM)
Acanthamoeba → Keratitis / granulomatous amoebic encephalitis (GAE)

↳ swimming in contaminated water.

- * *Giardia lamblia* = *G. duodenalis/intestinalis*, Trophozoite & Cyst forms
- Causes Giardiasis, only protozoa in duodenum & jejunum. (upper part of small intest. lumen)
- non-invasive → only diarrhea
- trophozoite is heart shaped, four pairs of flagella, 2 nuclei with prominent central karyosome, 2 axostyles that separate the 2 nuclei & divides organism to two halves. 15 μm
- Ventral adhesive disk → attachment → swaying/falling-leaf motility → diagnosis.
- Cysts are found in stool → large numbers → encyst in colon. ellipsoid / thick walled / highly resistant, 8-14 μm, 2 nuclei *immature* / 4 nuclei *mature*.
- weakly pathogenic → asymptomatic cyst passers → large cyst in stool can still be asymptomatic for some people *but* to others can cause: irritation / inflammation / below-grade fever / nausea / vomiting / acute diarrhea / crypt hypertrophy / villous atrophy / cell damage.
- attachment of trophozoites → malabsorption → steatorrhea = greasy / foul smelling stool
- Poor hygiene / tend to be outbreaks *جس* → contaminated food / water / ... oral-anal sex
- Cysts can live up to 3 months unlike *E. histolyticus* = weeks.
- mainly water-borne infection even in chlorinated water.
- infective stage is cyst stage, diagnostic stage = both trophozoites and cyst stage
- Cysts are detected more than trophozoites as they are fragile and found in fresh, watery stool. Each cyst → two trophozoites each 2 nuclei
- Stool / duodenal secretions / jejunal biopsy / enzyme immunoassays / string test = 4-6 h, trophozoites observed.

* Cryptosporidium :- Hidden Spores

- causes cryptosporidiosis
- *C. hominis* & *C. parvum* infect intestine of immunocompromised ppl. → severe diarrhea, dehydration. / inhabits the brush border.
- Spores reside in villi crypts.
- *Cryptosporidium* have a sexual phase - oocysts. Parasites of rodents / fowl / rhesus monkeys / cattle / herbivores.
- Self-limiting, mild gastroenteritis, diarrhea (transient) → immunocompetent ppl.
- chronic / severe non-bloody diarrhea, nausea & vomiting, pain, anorexia → weight loss → death → immunocompromised.
- modified acid fast stain **red oocysts** / antigen detection by fluorescent Ab or EIA. Nitroimidazole is the drug of choice. 72-88% cure rate.

* Balantidium coli :- intestinal ciliated protozoa, Giant protozoa

- largest protozoa to infect humans, Balantidiasis or Balantidial dysentery
- inhabit small & large intestines
- either:- attachment = watery diarrhea **OR** invasion = dysentery
- trophozoite = ciliated, 60 x 45 μm or larger, steady progression & rotation around long axis.
- most infections are asymptomatic except when they invade large bowel and terminal ileum causing erosions & ulcers = Balantidial dysentery.
- Drugs of choice:- Oxytetracyclines, may be followed by Iodoquinol / Metronidazole
- Has two nuclei:- Macro = sausage shaped. micro = nested in macro.

* Sexually Transmitted Protozoan infections :-

- Trichomonas :- urogenital flagellated protozoa

- no cyst stage only trophozoites → require direct contact to cause infection **STD**

- can't survive outside the body (some exceptions present)

- Pyriform shaped = like a pear. has 5 flagella, 4 anterior & 1 along the undulating membrane.

- Trichomonas tenax ⇒ oral cavity, Trichomonas hominis ⇒ intestine } normal flora, non-pathogenic.

- Trichomonas vaginalis ⇒ urogenital tract in females, urethra in males. causes trichomoniasis. 5-30 × 2-14 μm, wobbling/rotating motion. Females are more susceptible. contact of squamous epithelium of genitourinary tract results in its destruction and neutrophilic inflammatory reaction and petechial hemorrhages.

- in females: ~~dysuria~~ ^{pain} dysuria / ^{pain during intercourse} dyspareunia / low-grade inflammation ⇒ vulva, vagina, cervix

• frothy, yellow-green / creamy discharge → malodorous discharge.

• lower genital tract infection in (F) results in vulvovaginitis

- Strawberry Cervix.

- males :- prostate/seminal vesicles/^{common} urethral infections + dysuria

- wet mount examination ⇒ motion of T. vaginalis in wet samples ⇒ corkscrew motility

- Treatment: Topical & systemic metronidazole / tinidazole, ornidazole ⇒ fewer side-effects

- Must cure the patient's partner as well.

no cyst/trophozoite

* Haemflagellates: Amastigote / Promastigote / Epimastigote / Trypomastigote

- Kinetoplast = extranuclear DNA = origin of flagella

- Trypanosoma + Leishmania
vector borne

* Trypanosoma: - ^{glossina/}tsetse fly

- Causes: African trypanosomiasis = African sleeping disease = east: ^{T. brucei complex}T. brucei rhodesiae, ^{G. morsitans}

west: ^{G. palpalis}T. brucei gambiense - American trypanosomiasis = Chagas disease →

→ T. cruzi - zoonosis, Reduviid bugs / Triatomine = kissing bug

- end stage of African = uncontrolled sleep → CNS affected = fatal

- African = extracellular infection, American = intra+extra

- Kissing bug → defecates near the bite → rubbing at the bite site → protozoa might enter the bite place or conjunctiva → Romanus sign ⇒ unilateral eye swelling

- D.H.: Humans / dogs / cats / rats

- Trypomastigote in blood ⇒ extracellular (African)

- Amastigote in tissue ⇒ intracellular (American)

- American → hollow organs → esophagus, colon, heart → cardiomegaly → arrhythmias even after a long time of exposure.

* Leishmania: - Blood & Tissue flagellates.

- causes leishmaniasis.

- Vector is sand fly = Phlebotomus

- cutaneous leishmaniasis was an endemic in Jordan, now it's less prevalent ^{way}

- Life cycle requires two hosts = vertebrate mammalian host + invertebrate vector = female sand fly.

- obligate intracellular ⇒ diagnostic = amastigote. infects phagocytic cells & macrophages then infects reticuloendothelial system = liver/spleen/bone marrow.

- can remain in skin or enters lymphoid organ causing visceral leishmaniasis

- infective stage = Promastigote

* Cont'd Leishmania :

Transmission through: Bite of sand fly / blood transfusion / Mom to baby / direct contact man to man through nasal secretions = Nasopharyngeal leishmaniasis / organ transplantation.

Leishmania spp: Cutaneous: ~~3~~ L. tropica / L. major / L. infantum. confined to dermis & epidermis. other names: oriental sore / baghdad boil / aleppo button.

mucocutaneous: L. Braziliensis. other names: Nasopharyngeal leishmaniasis & espundia

visceral: L. donovani. when it enters secondary lymphoid organs. other names: kala azar = black fever. endemic in ~~#~~ India / SE Asia. abdominal distension

Good Luck!