Gastrointestinal Protozoa (continuation)

**giardia lamblia**

* flagellate »» moves by flagella, four pairs sticking on sides.

* pear-like shape

* two nuclei »» very prominent nucleolus „, under microscope »» owl eye appearance عيون البومة

* kite shape: P طيارة ورقة بشراشيب

* viewed on the sides »»
  - looks like " lady bug "
  - convex dorsal aspect
  - flattened ventral aspect »» ventral sucker to stick itself to the wall of small intestine / villi ( brush border ).

* cause damage to microvilli ( which increase the surface area of absorption ) »» malabsorption

* two morphological forms: 1) cyst 2) trophozoite
  > cyst ( by which the organism transmitted from one to another ) with 2-4 nuclei, passes into feces

* feco-oral route ( by contaminated food or water, mainly water )

*children are most commonly affected*, they are less hygienic „, immunology of them is less than that of adults

**symptoms »»**
- repetitive watery diarrhea
- malabsorption / wide damage, numerous in number „, liquid stool, grayish, sticky, whitish ( excess fat in feces / not absorbed »»» steatorrhea ) and **foul smelling**

**diagnosis »»**
- examination of stool and looking for cysts
**Balantidium (sac) coli (life in large intestine)**

* **Very large** (up to 80 microns)
* **Ciliate** family → moves by cilia
  > Cilia can be seen in cyst under the protective layer
  can play a role in nourishment of the organism by absorption of nutrient from the surrounded liquid
* **Anteriorly** → opening (cytostome) like a mouth
* **Posteriorly** → opening (cytopyge) like the anal canal
* **Vacuoles**: containing digested materials
* **Two nuclei**
  one is bigger than the other → macronucleus, kidney shape, responds for vegetative functions
  the 2nd is smaller → micronucleus, responses for reproduction

**Feco-oral rout**

* **Two morphological forms**: 1) cyst (no division as in ameba) 2) trophozoite
* **Reservoir** → hogs which harbors the organism in its large intestine, that not mean an intermediate host (there is no intermediate host for this organism)

* **Infection is acquired** → food or water that is contaminated by 1) human feces 2) hog feces

**Symptoms**
- Diarrhea that may be bloody diarrhea → that gives rise to a clinical picture of dysentery

**Diagnosis**
- Examination of stool, looking for cysts
Coccidia family

1) *Isospora belli*
2) *cryptosporidium*

* **sexual and asexual** reproduction (both cycles occur in human)
* **No intermediate host**

* **not v. important** in normal people they not or rarely to cause disease
  >> in immune-compromised people, may cause diarrhea that may be fatal looks like cholera
* **in small intestine**, trophozoite can gives rise / asexually to merozoite (can infecte other cells) that produce **gametocytes** (macro/ female and micro/ male) >> fuse together (sexually) to produce **Oocyst** that passes into feces... divided into **sporocystes**, each gives rise to **four sporozoite**

**cryptosporidium cyst**:
1) **with thin wall**, give rise to sporozoite in the small intestine / autoinfection
2) **thick wall** ... passes through feces and infect someone else

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**Diagram**

- CDC
- http://www.dpd.cdc.gov/dpdx

- Immature oocysts with sporocystes
- Mature oocysts with sporozoites
- Oocysts in feces
- Infecive Stage
- Diagnostic Stage
- Sporozoites
- Asexual
- Merozoites
- Microgamete
- Fertilization
- Macrogamete
- Sexual
metozoa / worms

Nematodes
all have male and female

** Enterobius virmicularis **

* known ad *pinworm or threadworm*, Oxyrias
* small worm / about 1cm in length
* in **large intestine of human** ( human is the only host )
* **short life span** .. up to 8 weeks
* **very common in children**
* **feco-oral route**

** life cycle **
both male and female »» copulate »» fertilized eggs within the female ... migrate to anal canal and lays eggs in the perianal skin /not in the intestine

** eggs **
- asymmetrical ,, looks like an almond or coffee bean
  convex on one side and flat on the bottom
- embryo in it , so these eggs are infective .

** symptoms **
- itching in perianal skin / pruritus ani
  specially at night while changing clothes »»» itch , eggs become under their fingernails »»» re-infect themselves /autoinfection through eating or sucking their fingers .
- * insomnia* due to sever itching

** diagnosis : **
- eggs in perianal skin / seen by mother
  - Cello or Scotch tape method
    clear tape or sticky swap applied to anus in the morning before defecation .. so eggs stick to the tape and can be examined microscopically

** treatment **
one dose of anti-helminth( vermox ) drug .. further dose is recommended after 10 days since autoinfection is possible
*Pinworm*

*Pinworm* (pinworm) is a type of parasitic worm that affects the human intestines. The adult worms live in the large intestine and are passed in the stool. Eggs are released in the stool and can contaminate food, water, and surfaces. The eggs can then be ingested or inhaled, allowing the larvae to develop into adult worms. The worms can cause symptoms such as abdominal pain, diarrhea, and rectal itching.

**Direct Cycle**

- Eggs distributed in environment
- Female worms rupture, releasing eggs
- Eggs ingested
- Gravid female worms migrate to perianal area
- Adult worms in colon

**Diagram:**

- A child is shown picking up a toy from the floor.
- The eggs are shown being distributed in the environment.
- The child ingests the eggs, which develop into adult worms in the colon.
- The adult worms release eggs, which can contaminate the environment and continue the cycle.

**Image:**

A close-up image of a pinworm is shown, highlighting its characteristic features.

**Arabic Translation:**

*مثل الدبوس* (مثل الدبوس) means *like the pinworm*.
**Trichuris Trichiura**

please refer to the handout >>> symptoms

*big worm* about 3-5 cm in length

* thin anterior end (that contains mouth to embed itself into the mucosa of intestine) and thick posterior end

*long life span* up to 6 years

*mainly in cecum and colon* (in heavy infestations)

*80% >> unhygienic habits*

** eggs
- lemon shaped or tea tray shape
- no embryo = eggs are not mature = not infective

** life cycle
male and female »»» copulate »»» fertilized eggs passes into feces , and mature in moist soil for 4-6 week and after that embryo is formed and eggs become infective ... infection is established through ingesting of infective eggs while playing with contaminating soil.

when ingested escapes in small intestine and penetrate a villus

** symptoms
- usually asymptomatic infection
- abdominal pain and tenderness
- diarrhea (heavy infestations).
- may lead to anemia, due to bleeding that result from this worm ... not considered as frank blood loose

** diagnosis
examination of feces .. looking for eggs
Figure 6-4. Life cycle of Trichuris trichiura.

- Eggs in soil embryonate in 2-5 weeks
- Undeveloped eggs pass in feces
- Adult worms in cecum, appendix, or large intestine of humans
- Returns to intestinal lumen and migrates to cecum
- Larvae penetrates intestinal villi (3-10 days)
- Larva hatches from egg in small intestine
- Embryonated egg ingested by humans
- Children ive largely at ground level
Ascaris lumbricoides

please refer to the handout :P

* the biggest one 20-30 cm / white – pink in color
* a muscular worm / reside within the rugae of the small intestine

** eggs
- are not infective
- need a period of time up to five weeks to mature under propitiate conditions
- mammillated and oval shaped / pineapple
- non smooth in texture
- yellowish or brownish in color

** life cycle
male and female »» copulate »» fertilized eggs ( undeveloped ) that passes into feces then 
- developed after staying 4-6 weeks in propitiate conditions in soil , transmission occur by getting 
- contaminated soil under fingernails then ingest them .
in small intestine .. eggs hatch and produce larvae that penetrate the wall of intestine to the 
circulation , ending in the capillaries of lungs . they break into alveoli then to the pharynx where they are re-swallowed reaching the small intestine as adult worm .

** symptoms ( depends on the number of worms )
- usually asymptomatic
- died worm with feces
- may cause intestinal obstruction
- may reach the appendix ..causing appendicitis
- may reach ampulla of vater causing cholangitis or pancreatitis
- may appear through the umbilicus / through ligament of meckel in meckle's diverticulum
- may reach the peritonim and cause peritonitis
- vomiting
- adverse effect on nutritional status of children by suppressing appetite or interfering with digestion

** treatment
piperazine
Visceral larvae margin
due to the presence of larvae that are not neutral to the human host
It is mainly encountered in young children (playing with pets)

*Toxocara canis* (dogs) and *cati* (cats)
- parasites of the cat and dog
- pass eggs in the faeces of the host to be eaten by other dogs or cats, where they hatch in the small intestine
  - migrate to blood, liver, lungs, bronchi, swallowed and mature in the small intestine.
- If the eggs are ingested by humans, the larvae become distributed in the organs of the body >> eosinophilic granulomas /inflammation.

**symptoms:**
- Lesions >> liver consisting
- increase i.n blood globulins.
- but heavy severe infection has been known to cause death
- Affection of the eye >> choroiditis or iritis (Nematode endophthalmitis).

**Diagnosis:**
- Actual demonstration of the larvae is the most definitive diagnosis.
- Stool examination is of no use as the parasite never finishes its life cycle in the human.

بالتوفيق جميعاً ^_^
الله يفتحها عليكم و يسر أموركم