Nematode (Round Worm)

It is estimated that 25% of the world's population is infected with this nematode.

Ascaris lumbricoides

(Intestinal round worms of humans)

A. Lumbricoides is the giant roundworm of human, belonging to the phylum Nematode. It is the largest and most common parasitic worm in human.

It is responsible for the disease called Ascariasis in small intestine of human.

Ascariasis is prevalent worldwide and more so in Tropical and Subtropical countries.

Ascariasis can occur at all ages, but is more prevalent in 5-9 years old group. The incidence is higher in poor rural population.

The adult females of this species can measure up to **18** inches long (males are generally shorter)

Morphology

The adult worm: is the largest round worm parasitizing the human intestinal tract. It is elongated, cylindrical, and tapers both anteriorly & posteriorly to relatively blunt conical ends. The head is provided with three fleshy lips.

The digestive & reproductive organs float inside the body cavity which contains an irritating allergic fluid .The irritant action is due to the presence of atoxin called a scarone or a scarase.

Egg: The fertilized egg of *Ascaris lumbricoides* at the time of oviposition is spherical or sub-spherical, measures 65-75um X 35-50um & consists of the following observable structures:

1-A coarsely granular, spherical ovum that usually does not completely fill the shell.

2-A thin inner most membrane that is highly impermeable.

3-A relatively thick, colorless middle layer that is smooth on both inner &outer surfaces.

4-An outer most, coarsely mammilated.

Life cycle

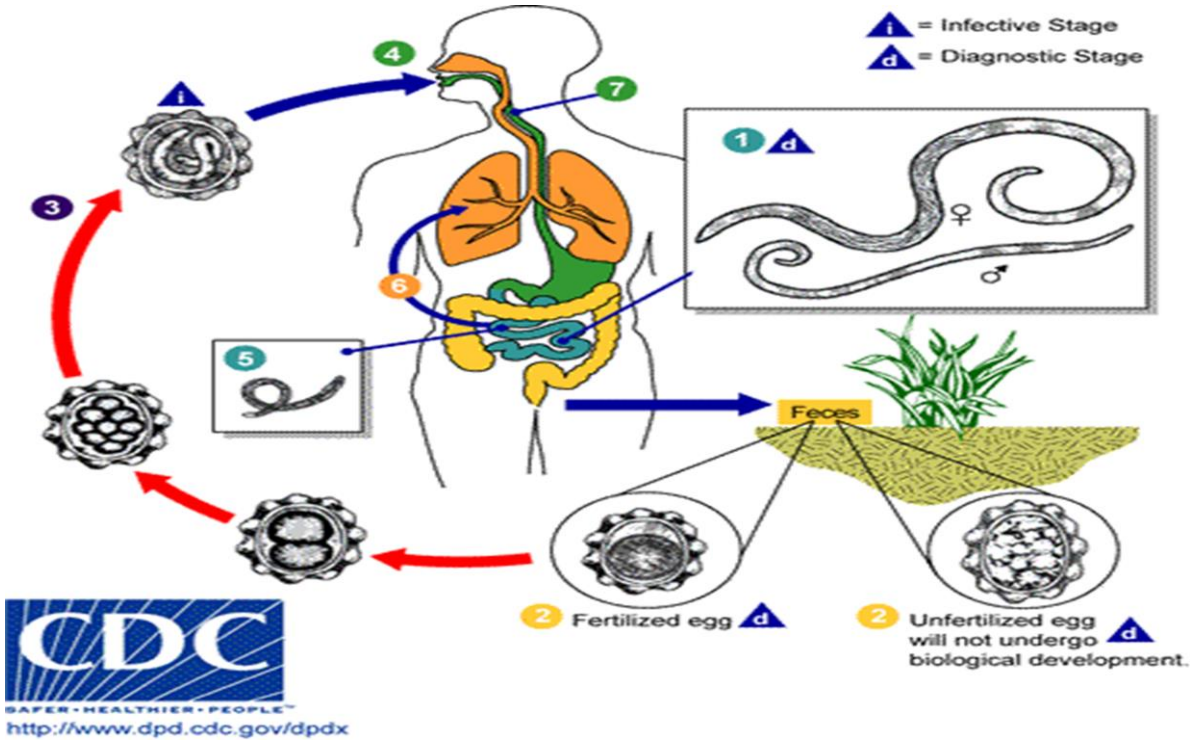
A single female can produce up to 200,000 eggs each day. About two weeks after passage in the feces the eggs contain an infective larval stage (Infective Stage).

Humans are infected when they ingest such infective eggs. The eggs hatch in the small intestine to juvenile worm.

The juvenile worm penetrates the small intestine and enters the circulatory system, and eventually the juvenile worm enters the lungs.

In the lungs the juvenile worm leaves the circulatory system and enters the air passages of the lungs.

The juvenile worm then migrates up the air passages into the pharynx where it is swallowed, and once in the small intestine the juvenile grows into an adult worm.



Pathogenesis

The migration of the larvae through the lungs → hemorrhage of lung, and there is an inflammatory response accompanied by edema.

Accumulation of fluids in the lung results in "ascaris pneumonia" and this can be fatal.

The large size of the adult worms also presents problems, especially if the worms physically block the gastrointestinal tract→ intestinal obstruction.

Ascaris may migrate into and blocked the bile or pancreatic duct or in which the worms have penetrated the small intestine resulting in acute and fatal peritonitis.

CLINICAL FEATURES

- Abdominal pain, diarrhoea, vomiting and slight temperature.
- It blocks intestine and appendix.
- They may enter bile or pancreatic duct and interfere with digestion.
- Injure the intestine and cause peritonitis.
- They produce toxins which irritate the mucous membrane of the gut, or prevent digestion of protein by host by destroying an enzyme trypsin.
- In children they cause stunted growth and makes the mental capacity dull.
- Larvae causes inflammation and haemorrhage in the lungs which results in pneumonia – may prove fatal.

Diagnosis

1- Finding characteristic eggs in the feces of the infected host.

2- Finding of three large lips adult worm by endoscopy.

3- Presence of moderate and severe hypochromic, microcytic anemia and hypoproteinemia with edema.

Treatment

Mebendazole (500 mg), Albendazole (400 mg) and Levamizole **(single dose of 2.5 mg/kg)** are effective or Pyrantel pamoate given as a single dose of 10 mg/kg.

Prevention

- Sanitary disposal of feces to prevent contamination of soil is necessary in areas with endemic infection
- Hygienic habits such as cleaning of hands before meals.

- Health education.

Enterobius vermicularis (Round Worm)
(Soil-transmitted helminths)

- *Enterobius vermicularis*, commonly known as pinworm or seatworm
- *E. vermicularis* is parasitic only to humans
- Adults inhabit the ileocecus, (cecum and adjacent ascending colon and distal ileum).
- The infection of *E. vermicularis* may cause Enterobiasis
- World-wide distribution, it is commonly found in kindergarten and primary school students

Morphology

Adult

Female -- fusiform body with a long, thin, tapering tail, 8 to 13mm

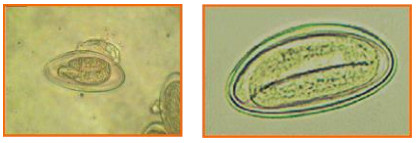
Male -- "6" shape, curved tail, 2 to 5mm. Males die right after mating, thus are rarely seen, White in color.

Egg

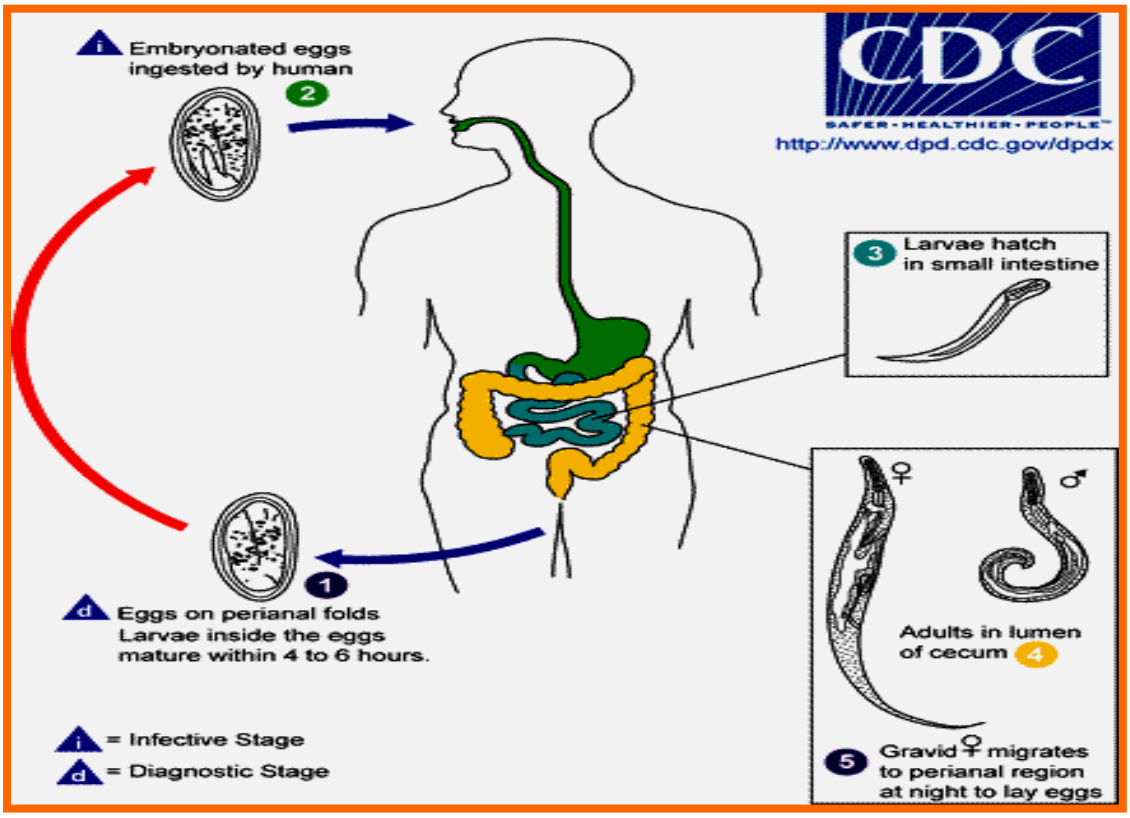
Oval in shape, 50~60×25µm in average, a larva inside

Clear, colorless and doubly refractive egg shell, flattened on one side

persimmon seed-like



Life cycle



- Humans are the only host in nature
- No intermediate host (direct life cycle)
- No larval migration between organs

Infection

Eggs

Stage: Infective & Diagnostic

Self-infection: anus-hands-mouth route

Cross-infection: contact transmission, Inhalation, Retroinfection

Adults

Cecum and adjacent large and small intestines, Adhering to intestinal mucosa.

Gravid female crawl out of anus at night and deposit eggs on the perianal and perineal region (anal sphincter relaxed), Life span of Female 1~2 months→ Put 15000 eggs/♀

Pathogenesis

- Enterobiasis is usually asymptomatic, the adults may cause slight irritation of the intestinal mucosa.
- The most typical symptom is perianal pruritus (itching and irritation), (nocturnal migration of the gravid females to the anus and deposition of eggs in the perianal folds of the skin → excoriations and bacterial superinfection.
- Heavy infection in children may result in restlessness, sleeplessness, anorexia, weight loss, nervousness, irritability, abdominal pain and vomiting
- Sometimes, pinworm may migrate up the female reproductive tract, cause vaginitis.
- Occasionally, invasion of the female to the appendix →appendicitis, the peritoneal cavity or the urinary bladder may occur

Laboratory Diagnosis

- Microscopic identification of eggs collected in the perianal area by cellophane (Graham Scotch) tape method or anal swabs. This must be done in the morning, before defecation and washing
- Detection of adult on anal skin

Treatment and prevention

- **Albendazole/Mebendazole: 95% effective (**(100 mg twice daily) for 3 days)
- Repeated retreatment may be necessary for a radical cure
- Personal hygiene and eating habits
- Sanitary disposal of clothing, bed linen, and environment & Health education

Trichuris trichiura
(Whipworm)

Morphology:

- Adult: looks like a buggy whip, the anterior 3/5 is slender and the posterior 2/5 is thick. It is pinkish gray in color.
  - ➢ Female: 3-5 cm in length and has a long slender esophageal region.
  - ➢ Male: smaller than the female and has a curved tail.
- Egg: barrel or spindle in shape, 50 x 20µm in size. It is brownish and translucent polar plug at either ends. The content of the egg is an u ed cell

Life Cycle

1. Site of inhabitation: cecum
2. Infective stage: embryonic egg
3. Infective mode and route: oro-fecal
4. Without intermediate host and reservoir host
5. The life span of the adult is about 3-5years.

Adults —deposit→ Eggs —3weeks→ Infective eggs —ingested by man→ larvae hatch out in small intestine —invade the intestinal wall→ return to the intestinal lumen —develop 3-10 days→ Adults

Pathogenesis:

1. Light infection: Asymptomatic

2. Middle infection: Clinical manifestations are usually abdominal pain, anorexia, diarrhea &/or constipation .

3. Heavy infection: Bloody diarrhea, emaciation, prolapse of the anus may occur.

Diagnosis:

Discover the eggs in feces by saturated brine flotation method.

Treatment and prevention: Same as those of Enterobiasis

Take Mebendazole/Albendazole (100mg/ twice) for 3 days for a treatment course and repeat next week