Echinococcus granulosus

Presented By,

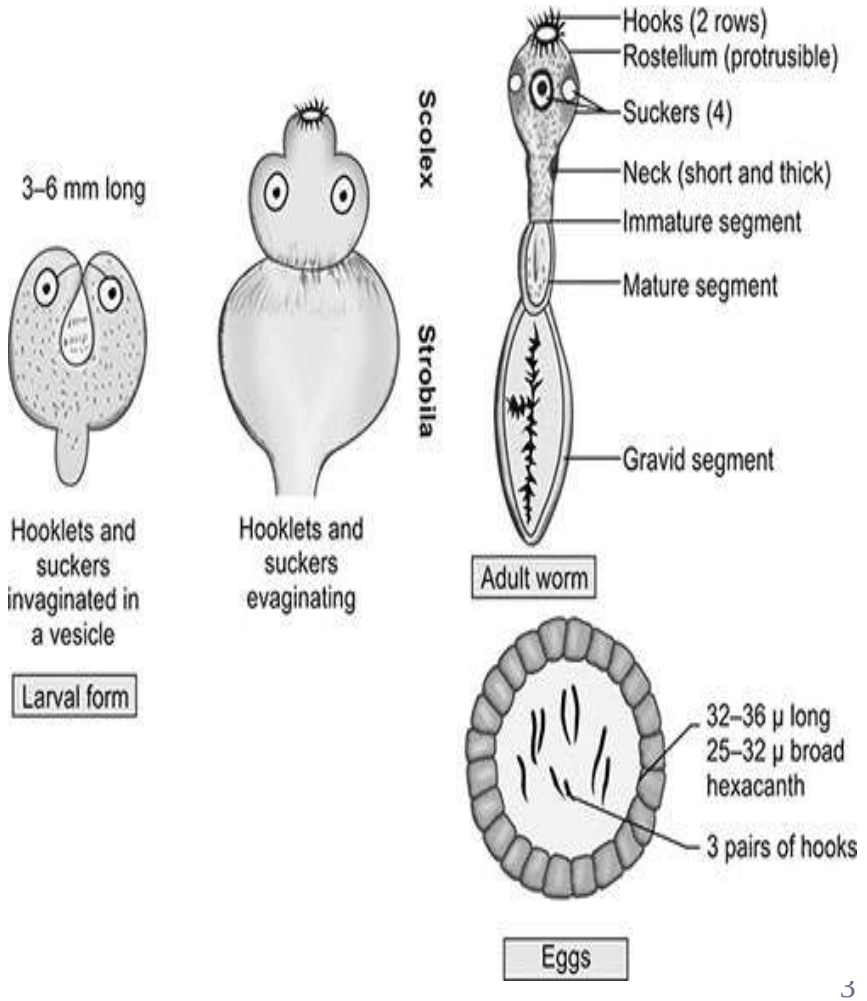
Dr.Asma

Echinococcosis

- Human echinococcosis is a parasitic disease caused by tapeworms of the genus echinococcus.
- The two most important forms of the disease in humans are
- Cystic echinococcosis (hydatidosis) and alveolar echinococcosis.
- Humans are infected through ingestion of parasite eggs in contaminated food, water or soil, or after direct contact with animal hosts.
- More than 1 million people are affected with echinococcosis at any one time.

Morphology

- Tape-worms form three different developmental stages:
  - Eggs
  - Larvae
  - Adults



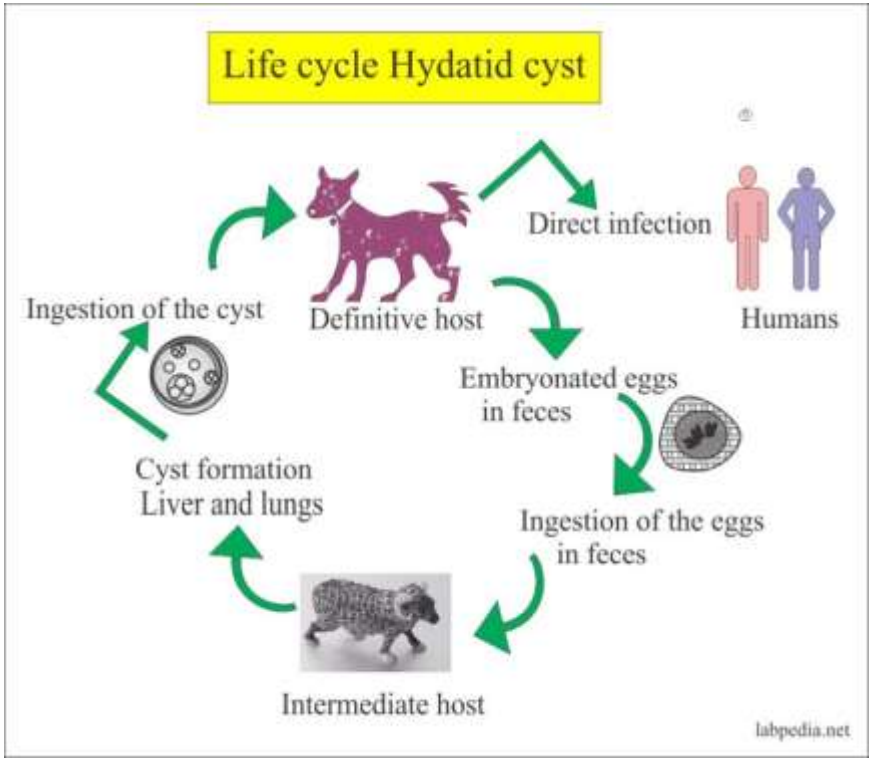
- **Adult** E. granulosus worms are small (2-6mm long) and have a scolex with only three attached segments. The scolex has four lateral suckers and the rostellum is non-retractable and armed with a double crown of 28-50 recurved hooks.
- The anterior segment is immature, the middle segment is mature with functional testes and ovaries, and
- The posterior segment is gravid with the uterus filled with eggs.
- **Eggs** are typical for most taeniid species and are small and round (30-43µm in diameter), thick-shelled and contain a hexacanth (6-hooked) embryo (oncosphere).
- **Encysted larval** (metacestode) stage is known as a bladder-worm or hydatid, and it produces multiple infective stages.

Geographic Distribution

- *Echinococcus granulosus* occurs practically worldwide, and more frequently in rural, grazing areas where dogs ingest organs from infected animals.
- *Echinococcus granulosus* is found in;
  - Africa
  - Europe
  - Asia
  - The Middle East
  - Central and South America
  - In rare cases, North America

Hosts

- *Echinococcus granulosus* definitive hosts are wild and domestic canids.
- Natural intermediate hosts depend on genotype.
- Intermediate hosts for zoonotic species/genotypes are usually ungulates, including sheep and goats, cattle, camels, and cervids.

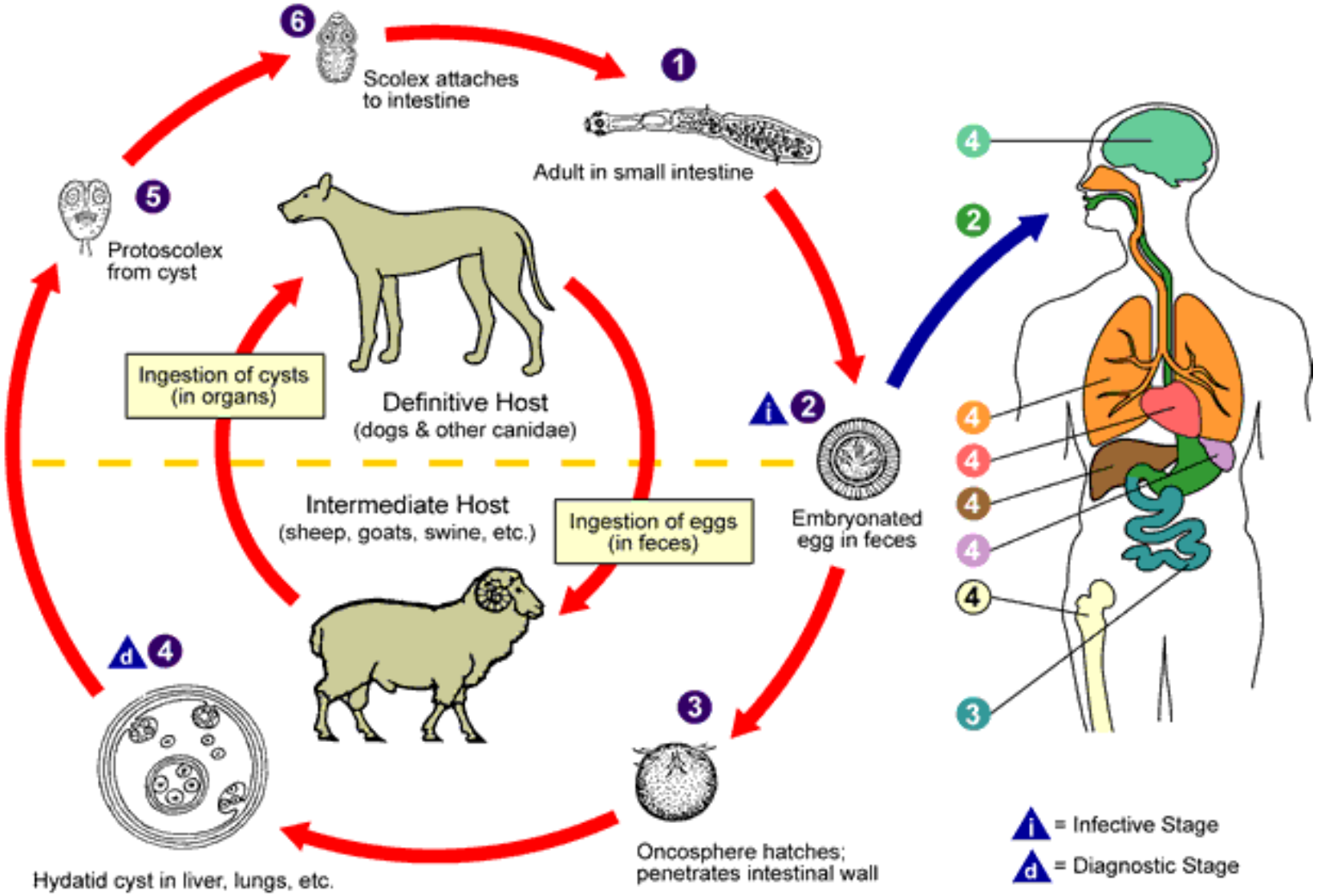


Life Cycle

The life cycle of this organism outside of a human can be summed up in six stages:

- The adult *Echinococcus granulosus*, which is about 3-6 mm in length, resides in the bowel of its definite host.
- Gravid proglottids release eggs that are passed in the feces.
- These eggs are then ingested by a suitable intermediate host, including sheep, goat, swine, cattle, horses and camels.
- The eggs then hatch in the bowels and release **oncospheres** that penetrate the intestinal wall.
- These oncospheres then migrate through the circulatory system to various organs of the host.
- At the organ site, the oncosphere develops into a **hydatid cyst**. This cyst enlarges gradually, producing **protoscolices** and **daughter cysts** that fill the cyst interior.

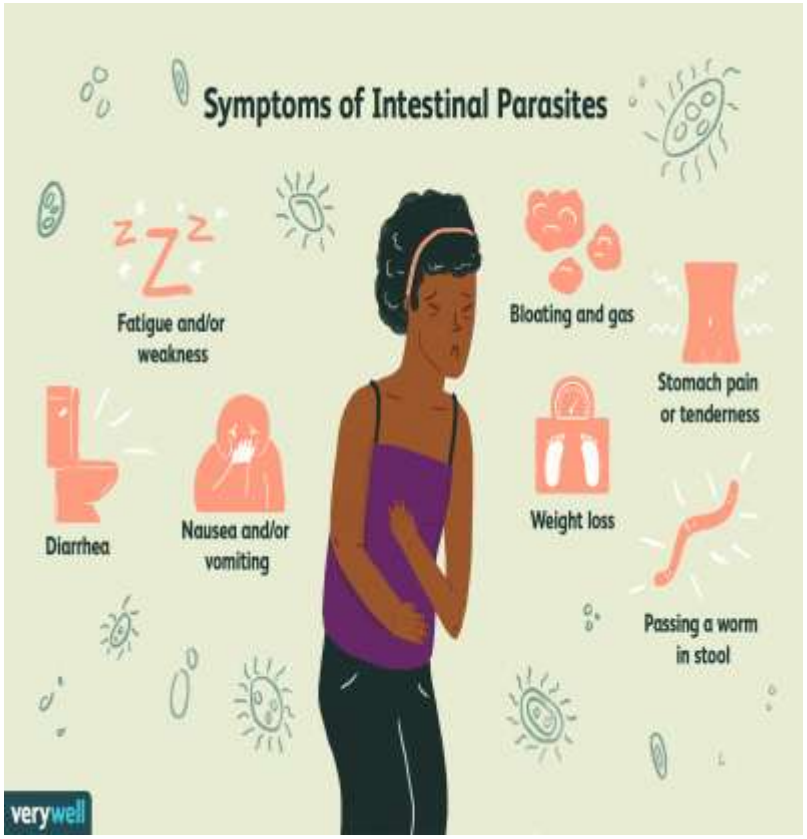
- These cyst-containing organs are then ingested by the definite host, causing infection. After ingestion, the protoscolices evaginate, producing **protoscolexes**.
- The **scolexes** of the organisms attach to the intestine of the definite host and develop into adults in 32-80 days
- The life cycle then continues in **humans**:
  - Humans can become infected if they ingest substances infected with *Echinococcus* eggs.
  - The eggs then release **oncospheres** in the small intestine.
  - At these places, oncospheres migrate through the circulatory system and produce **hydatid cysts**.



Life Cycle of *Echinococcus granulosus*

Symptoms

- Abdominal pain, nausea and vomiting are commonly seen when hydatids occur in the liver.
- If the lung is affected, clinical signs include chronic cough, chest pain and shortness of breath.
- Other signs depend on the location of the hydatid cysts and the pressure exerted on the surrounding tissues.
- Non-specific signs include anorexia, weight loss and weakness.



Diagnosis

- The presence of a cyst-like mass in a person with a history of exposure to sheep, dogs in an area where *E. granulosus* is endemic suggests a diagnosis of cystic echinococcosis.
- Imaging techniques, such as CT scans.
- Ultrasonography, and MRIs, are used to detect cysts.
- After a cyst has been detected, serologic tests may be used to confirm the diagnosis.

Treatment

- In the past, surgery was the only treatment for cystic echinococcal cysts.
- To replace surgery, effective treatments for cystic echinococcosis are;
  - Chemotherapy
  - Cyst puncture
  - PAIR (percutaneous aspiration, injection of chemicals and reaspiration)
  - Anti-infective drug treatment
- However, surgery remains the most effective treatment to remove the cyst and can lead to a complete cure.
- Some cysts are not causing any symptoms and are inactive; those cysts often go away without any treatment.

Prevention & Control

- **Cystic echinococcosis** is controlled by preventing transmission of the parasite.
- Prevention measures include limiting the areas where dogs are allowed.
- Preventing animals from consuming meat infected with cysts.
- Prevent dogs from feeding on the carcasses of infected sheep.
- Control stray dog populations.
- Restrict home slaughter of sheep and other livestock.
- Do not consume any food or water that may have been contaminated by fecal matter from dogs.
- Wash your hands with soap and warm water after handling dogs, and before handling food.
- Teach children the importance of washing hands to prevent infection.

HOOK WORMS

Presented by:

Dr.Asma

Background

- Human hookworm disease is a common helminth infection
- Predominantly caused by the nematode parasites *Necator americanus* and *Ancylostoma duodenale*.
- Organisms that play a lesser role include *Ancylostoma ceylonicum*, *Ancylostoma braziliense*, and *Ancylostoma caninum*.
- Hookworm infection is acquired through skin exposure to larvae in soil contaminated by human feces.
- Soil becomes infectious about 9 days after contamination and remains so for weeks, depending on conditions.

Geographic Distribution

- Hookworm species have a worldwide distribution.
- Mostly in areas with moist, warm climates where larvae can survive in the environment.
- Both *Necator americanus* and *Ancylostoma duodenale* are found in Africa, Asia, Australia and the Americas.
- Only *N. americanus* is found in south India and predominates in the America.

Ancylostoma duodenale

- *Ancylostoma duodenale*, the old world hook worm is a very common nematode parasite in the small intestine of man.
- It causes “ancylostomiasis” in man.
- This hookworm ranked as the most important helminthic infection of man.

Morphology

- Adult *A. Duodenale* worms are grayish white or pinkish with
- The head slightly bent in relation to the rest of the body.
- This bend forms a definitive hook shape at the anterior end for which hookworms are named.
- They possess well developed mouths with two pairs of teeth.
- While males measure approximately one centimeter by 0.5 millimeter.
- The females are often longer and stouter.
- Additionally, males can be distinguished from females based on the presence of a prominent posterior copulatory bursa

Geographic Distribution

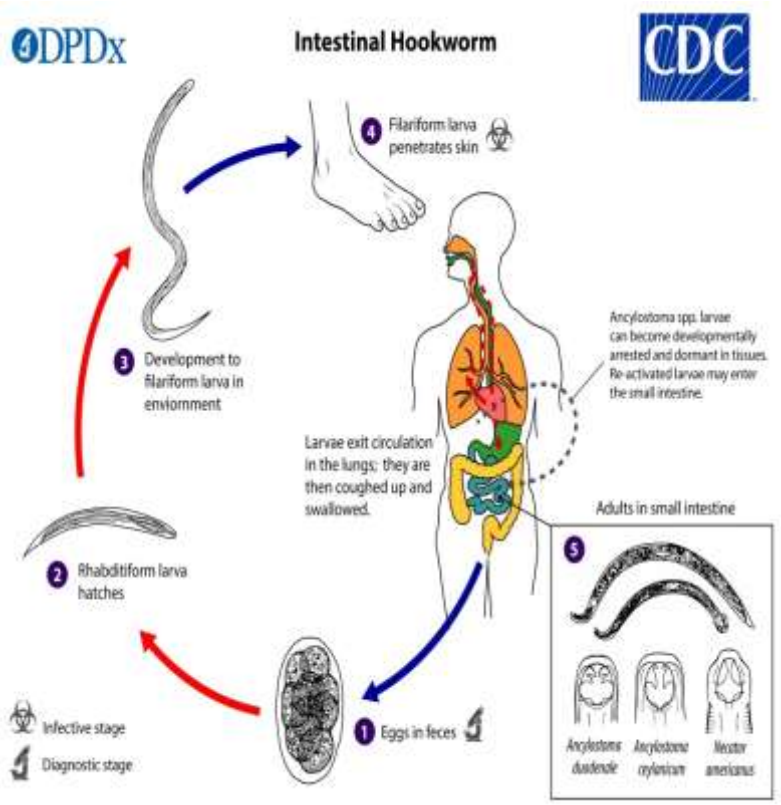
- The infection of the parasite has been reported among the rural people of the tropical countries.
- It may also occur in temperate countries where the temperature and humidity are favourable for the development of the larvae in the soil.
- Incidence of the hookworm has been reported from Europe, Egypt, India, Bangladesh, Sri Lanka, Central and North China, and Pacific Islands.

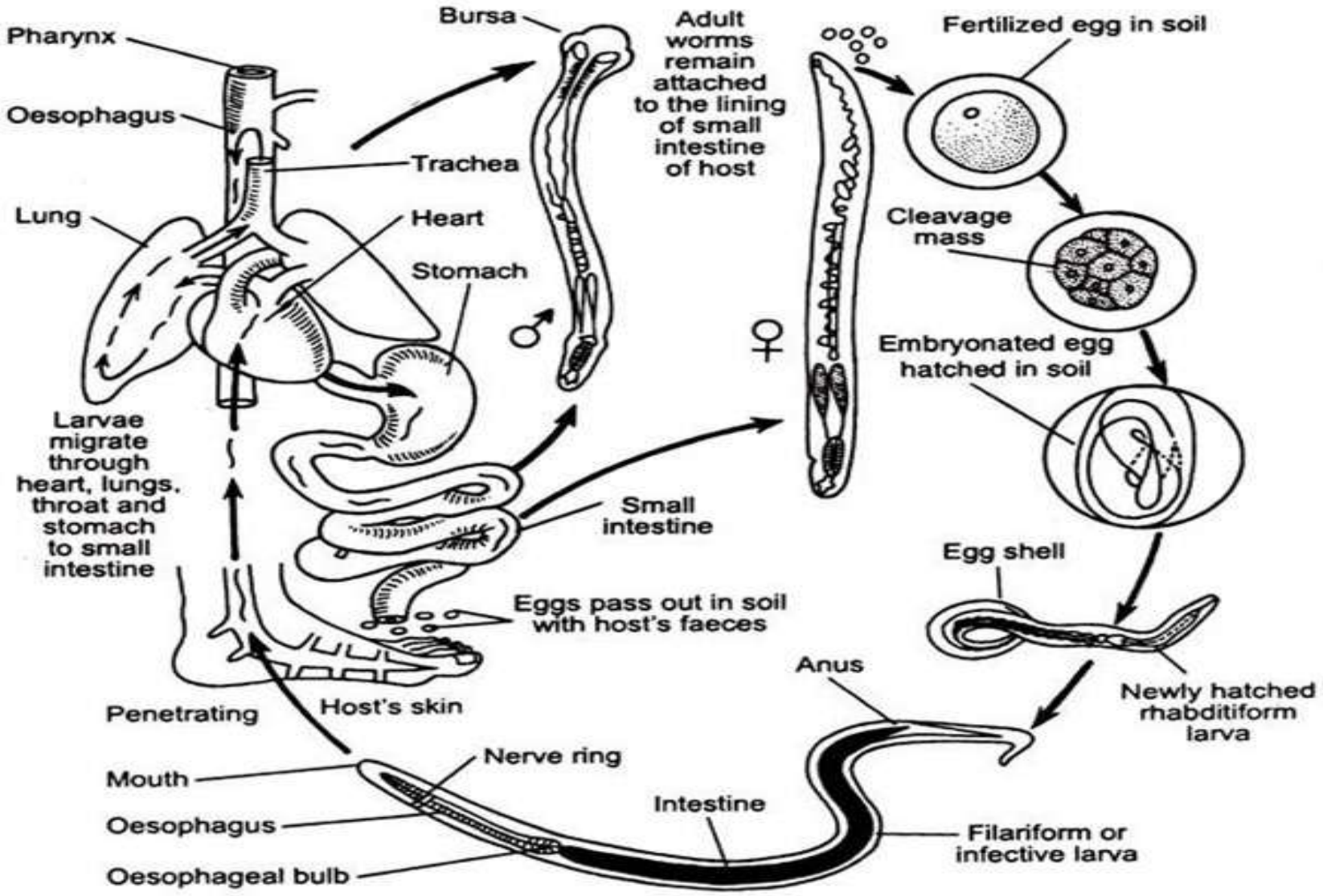
Habitat

- The adult hookworms reside in the small intestine-of man particularly in the jejunum.
- Less often in the duodenum
- Rarely in the ileum
- The adult worms anchor the wall of the small intestine by their anterior ends.

Life Cycle

- The life cycle of *Ancylostoma duodenale* is completed within a single host (man), hence it is called monogenetic.
- No intermediate host is recorded in the life cycle of *A. duodenale*.





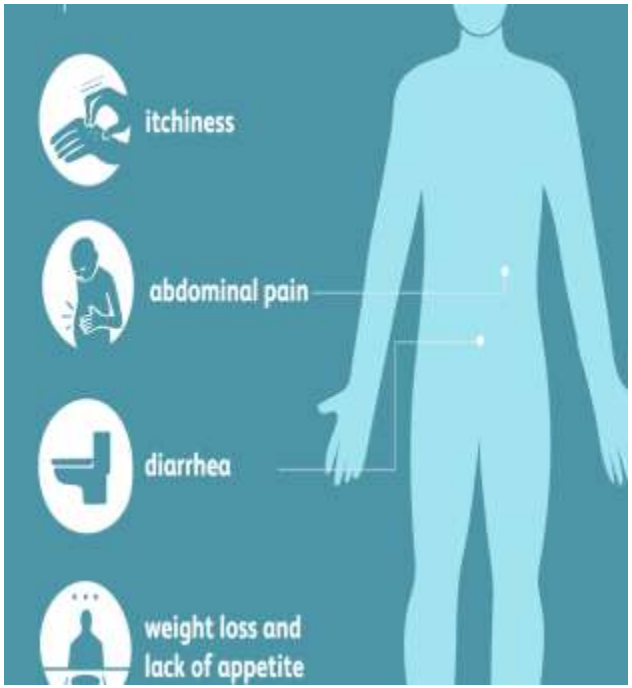
Life Cycle of *A. duodenale*

Treatment

- The hookworm infection can be checked by administering
  - Tetrachlorethyl
  - Hexylresorcinol
  - Carbon tetrachloride
  - Blephenium etc

Symptoms

- A skin rash in one area that is typically red, raised, and itchy
- Weight loss
- Loss of appetite
- Breathing complications, such as wheezing and a cough
- Fever
- Stomach pain
- Diarrhea
- Extreme tiredness and weakness
- Iron deficiency anemia or malnutrition
- Physical and thought development problems in children due to severe anemia
- Heart failure and widespread tissue swelling as a result of severe anemia



Diagnosis

- A number of tests can help diagnose a hookworm infection and its effects.
- These include:
  - A stool sample to check for hookworm eggs.
  - Blood samples to check for the presence of anemia or a lack of certain nutrients.

Treatment

- A doctor will normally recommend taking certain medications;
  - Albendazole
  - Mebendazole
  - Pyrantel pamoate — for 1 to 3 days to treat the parasitic infection.
- These drugs are antihelminthics, or anti-parasitic drugs.

Prevention & Control

Preventive measures can include:

- Wearing shoes, especially in soiled areas with a high risk of contamination
- Using a barrier to prevent the skin from touching the soil when sitting on the ground
- Avoiding consuming soil or unwashed foods that may be contaminated with hookworm
- Not passing stool in the soil or outdoors

- Not using fertilizer made from human feces
- Covering children's sandboxes
- Taking safety precautions, such as wearing gloves and shoes when gardening
- Treating pet dogs and cats for hookworm


Thank
you