

**Helminths**  
**intestinal nematodes**  
**Ascaris (roundworm)**  
**Enterobius (pinworm or threadworm)**  
**-Lecture-11**

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# HELMINTHS (WORMS)

## **:Characteristics**

**Eukaryotic, multicellular animals that usually have digestive, circulatory, nervous, excretory, and .reproductive systems**

**Worms with bilateral symmetry, head and tail, and tissue differentiation (endoderm, mesoderm, and .ectoderm)**

**Parasitic helminths spend most or all of their lives .in host**

# Taxonomic classification of helminths



– Examples of important metazoa •

## **intestinal nematodes •**

***Enterobius (pinworm or threadworm) •***

prevalent in cold and temperate climates but rare in the tropics –  
found mainly in children •

***Ascaris (roundworm) •***

Found world-wide in conditions of poor hygiene, transmitted by –  
the faecal-oral route

Adult worms lives in the small intestine –

Causes eosinophilia

***Ancylostoma and Necator (hookworms) •***

A major cause of anaemia in the tropics

***Strongyloides •***

inhabits the small bowel –

infection more severe in immunocompromized people (e.g. HIV/AIDS, •  
malnutrition, intercurrent disease)

***Trichuris (whipworm) •***

A soil transmitted helminth –

prevalent in warm, humid conditions –

Can cause diarrhoea, rectal prolapsed and anaemia in –  
heavily-infected people

# Examples of important metazoa –(systemic) or Tissue - dwelling nematodes

## :Filaria including

*Onchocerca volvulus* – Transmitted by certain types •  
of black fly, this microfilarial parasite can cause •  
visual impairment, blindness and severe itching of •  
the skin in those infected •

*Wuchereria bancrofti* – The major causative agent of •  
lymphatic filariasis •

*Brugia malayi* – Another microfilarial parasite that •  
causes lymphatic filariasis •



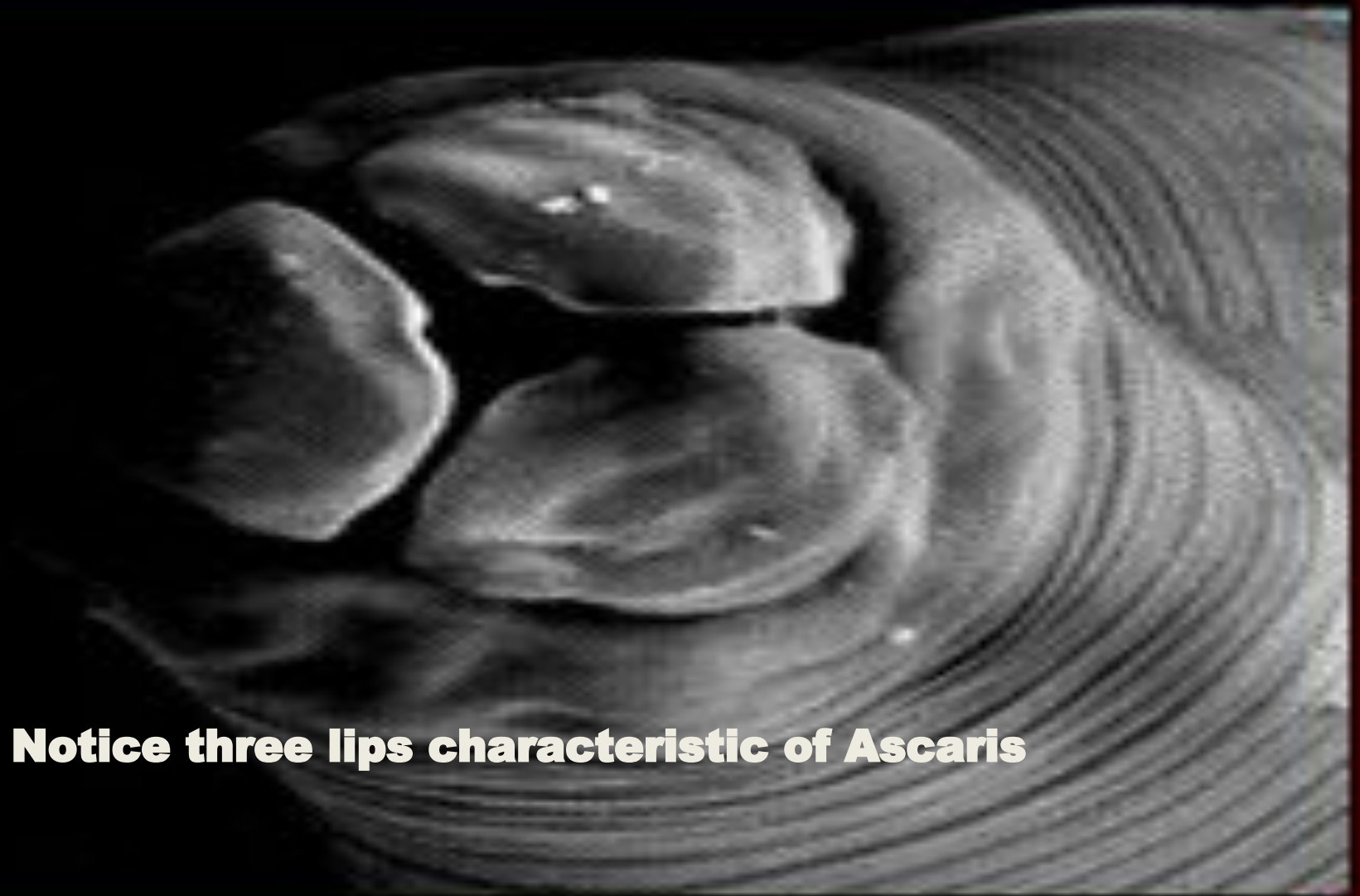
# ASCARIASIS •

## ETIOLOGY AND EPIDEMIOLOGY •

*Ascaris lumbricoides* are roundworms that are 20 to 35 cm long • and that reside in the lumen of the jejunum and in the midileum. Infection occurs by the oral route when soil containing embryonated eggs is ingested. Larvae are released from eggs in the small intestine, penetrate the gut, and migrate to the liver and then lungs through the blood or lymphatic circulation. After maturation in the lungs over a 4-week period, the parasites ascend the respiratory tract and are swallowed. Adult worms reach sexual maturity (i.e., female worms release eggs that are .detectable in feces) approximately 60 days after infection

Ascariasis affects approximately one fourth of the world's • population and probably is the most prevalent helminthiasis of humans. Infection is common in Africa, Asia, and Latin America, especially in areas of high population density and poor sanitary conditions

# Head of *Ascaris* (*Ascaris lumbricoides*)



**Notice three lips characteristic of *Ascaris***

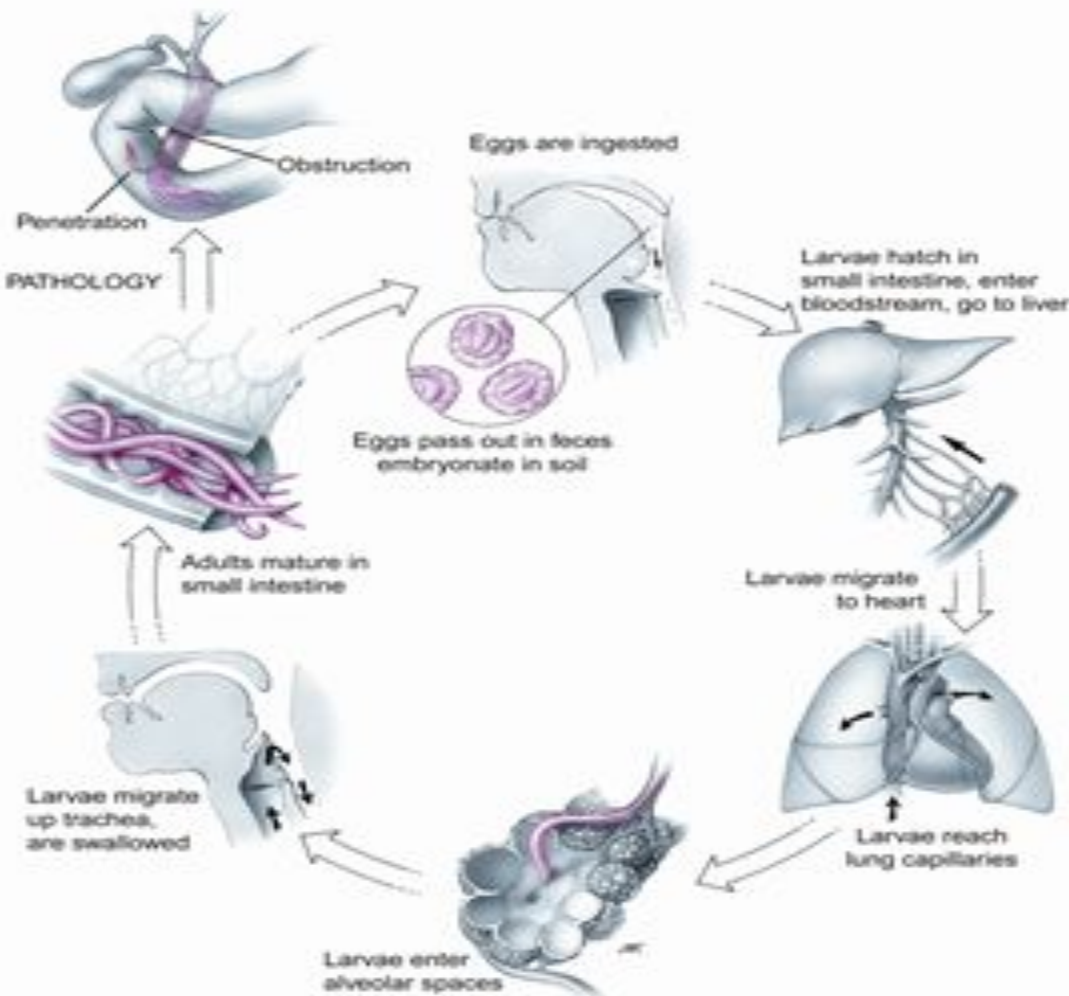


Ascaris (*Ascaris lumbricoides*)



# Life Cycle

*Ascaris lumbricoides*

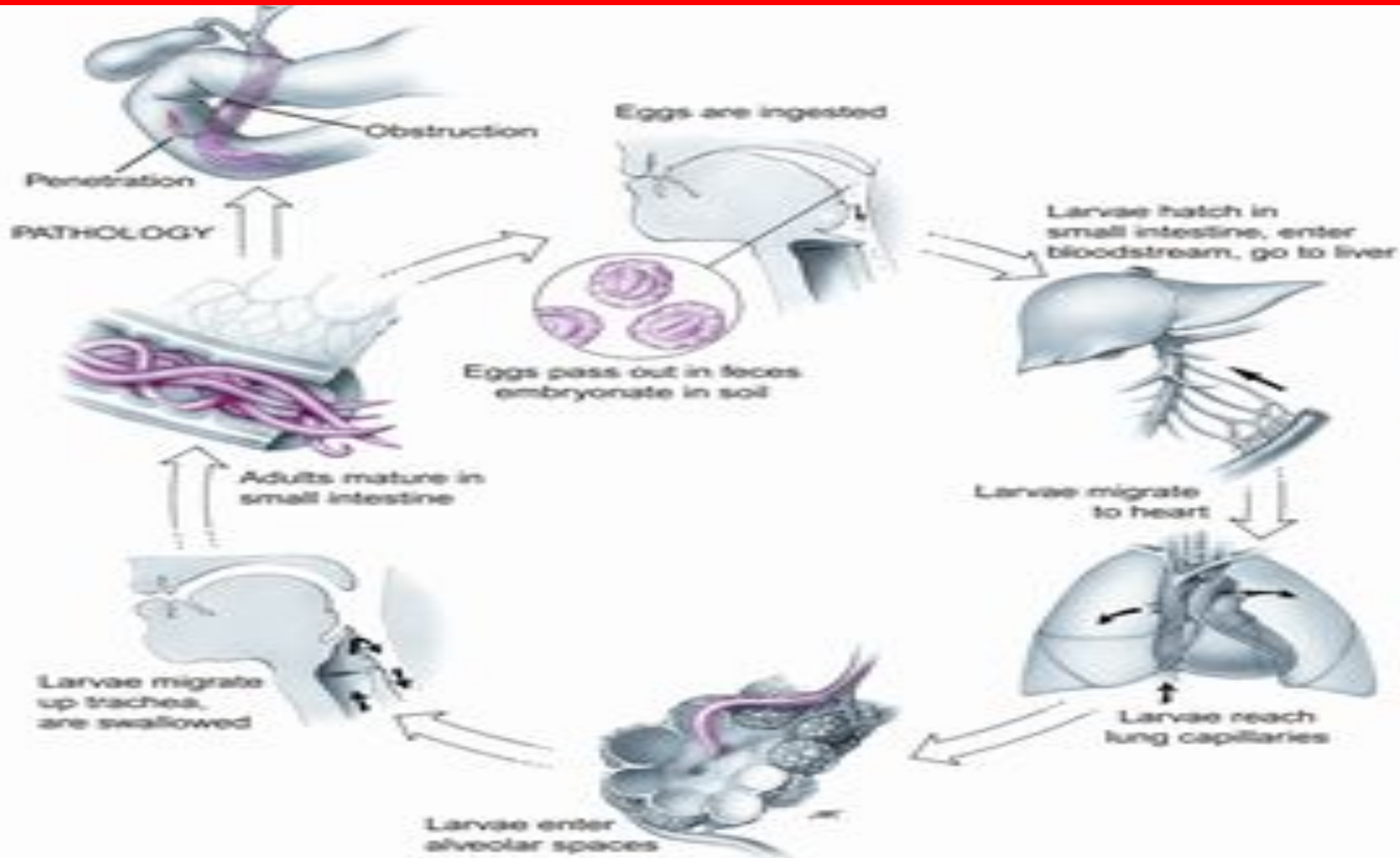


**Pre-patency:  
2 months**

**Pneumonitis:  
4 – 16 days after  
infection,  
short duration  
(~3 wks)**



# :this is the life cycle of -2



# **PATHOGENESIS AND CLINICAL • MANIFESTATIONS**

**Disease caused by *A. lumbricoides* is •  
infrequent and generally correlates with the  
intensity of infection. Most infected  
individuals are asymptomatic**

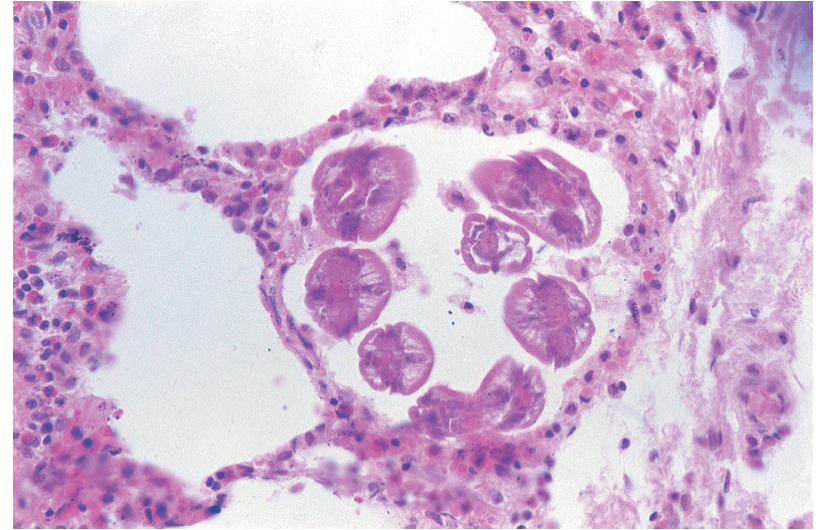
**Symptomatic cases can be divided into two •  
broad categories based on the phase of  
infection and site of pathology**

**.Pulmonary -1 •**

**.(Gastrointestinal tract-2 •**

**Pulmonary disease:** is caused by • the migration of larvae in the small vessels of the lung and their subsequent rupture into alveoli. Tissue damage is thought to result from the host immune response, which includes production of immunoglobulin E (IgE) and eosinophilia. Transient pulmonary infiltrates, fever, cough, dyspnoea, and eosinophilia lasting 1 to several weeks are the major clinical manifestations

# Löffler Syndrome (Pneumonitis): The signs & symptoms of pulmonary phase



**Transverse sections  
of Ascaris larvae in  
pulmonary alveoli**

**Intestinal signs and symptoms:** result • from obstruction caused by the presence of an exceptionally large number of parasites in the small intestine or migration of adult worms to unusual sites, such as the biliary tree or pancreatic duct. Intestinal obstruction almost always occurs in children younger than 6 years. The onset is sudden and characterized by colicky abdominal pain and vomiting. Heavily infected children are also prone to biliary disease or pancreatitis secondary to *Ascaris* lodging in the ducts draining these organs. A malabsorption syndrome characterized by steatorrhea and low vitamin A levels has been reported

*Ascaris* causing  
intestinal obstruction.

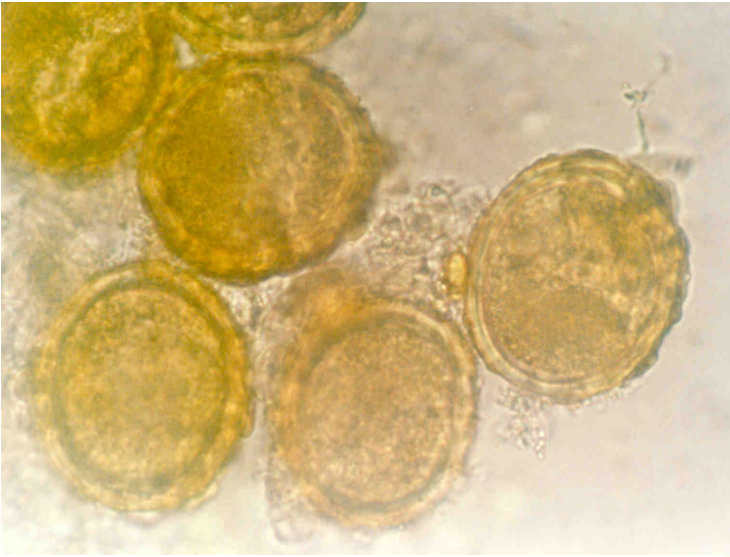




# DIAGNOSIS.

Intestinal infection is diagnosed by the • presence of the typical oval, thick-shelled *Ascaris* eggs in thick smears of fecal specimens. Some time the adult worms in their faeces or vomitus. Adult worm may be detected by barium studies. Pancreatic or biliary ducts obstruction by the adult worm should be suspected in children who have high egg outputs in conjunction with jaundice or pancreatitis. CBC revealed .eosinophilia

# ***Ascaris lumbricoides***



**Geographic  
prevalence highest  
in warm, wet  
climates**

**adult female = 1  
200,000 eggs/day**

# TREATMENT AND PREVENTION •

:Treatment for uncomplicated intestinal ascariasis •

Piprazine(4gm) in single dose •

Or mebendazole(100mg twice daily for 3 days) •

Or Albendazole (400mg single dose) •

Or Pyrantel pamoate (11mg/kg maximum 1gm). •

No specific treatment is recommended for pulmonary ascariasis because the condition is self-limited

The major means of preventing *Ascaris* infection is •  
improvement of hygienic and socioeconomic conditions. Mass chemotherapy successfully reduces worm loads but requires frequent treatment

# **:Mebendazole (Vermox)**

**Adult / pediatric > 2yrs: 100mg x 1 dose –  
Repeat in 2 weeks if symptoms do not –  
resolve**

**Indications: roundworm, pinworm, –  
hookworm, trichinosis, some tapeworms**

**MOA: blocks glucose uptake by parasite –  
until death ensues**

**:Precautions –**

**Pregnancy (category C) – animal •  
studies showed teratogenic effects**

**Breast feeding – excretion into breast •  
milk is unknown**

**Hepatic disease (eliminated by liver) •**

**Inflammatory bowel disease •**



# Albendazole

## Dosing –

Adult/peds >2 yrs: 400mg x 1 •  
dose

May repeat in 3 weeks •

MOA: same as mebendazole –

## :Precautions –

Liver dysfunction or biliary tract •  
disease

May cause bone marrow •  
dysfunction

Pregnancy Cat. C – animal studies •  
showed teratogenic effects

Breast feeding – not •  
recommended due to lack of  
clear data



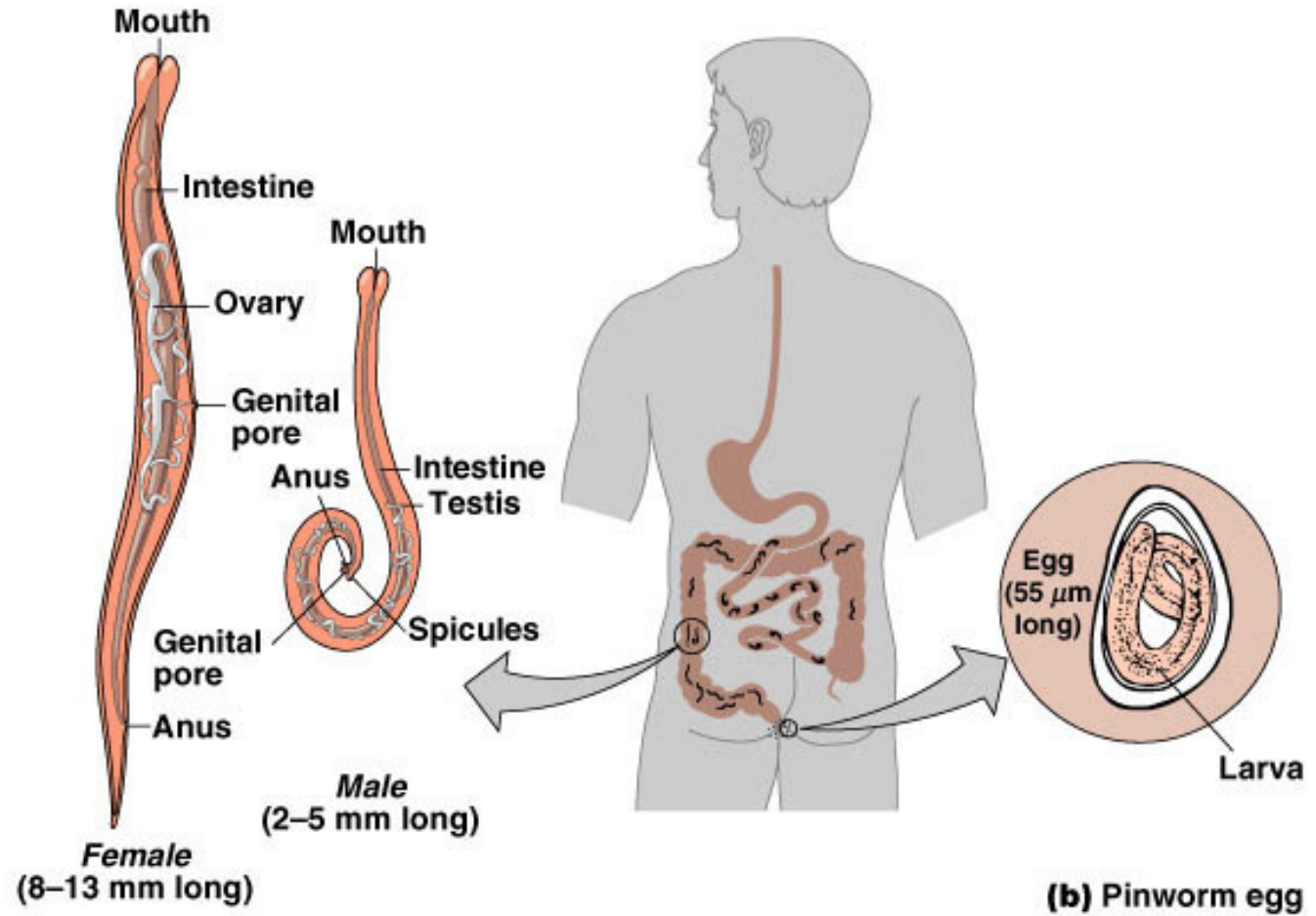
# ENTEROBIASIS •

***E. vermicularis* or pinworm infection is common in overcrowded settings and spreads rapidly in conditions in which person-to-person contact is frequent, such as in institutions for children. Infection occurs by the fecal-oral route. Embryonated eggs carried on the fingernails, bed clothing, or bedding are ingested and hatch in the upper small intestine. Larvae develop in large bowel into adult worms that are 2 to 5 mm long. Female worms migrate nightly out of the rectum and deposit large numbers of ova (11,000 per worm) in the perianal and perineal areas. Larvae in the deposited eggs become infective within several hours. Infectivity is usually maintained for 1 to 2 days**

# Enterobius vermicularis - Pinworm



(a) Adult pinworms



(b) Pinworm egg

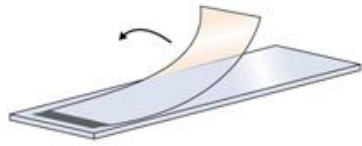
# **:Clinical features**

**Most pinworm infections are asymptomatic or associated with perianal pruritus and consequent sleep deprivation. *E. vermicularis* is a rare cause of appendicitis and, may cause vulvovaginitis, urethritis, .or peritonitis**

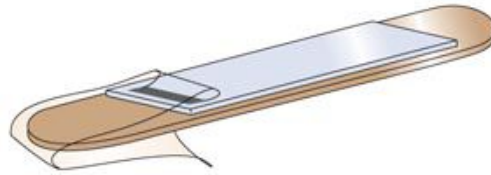


**:The diagnosis of pinworm infection •**

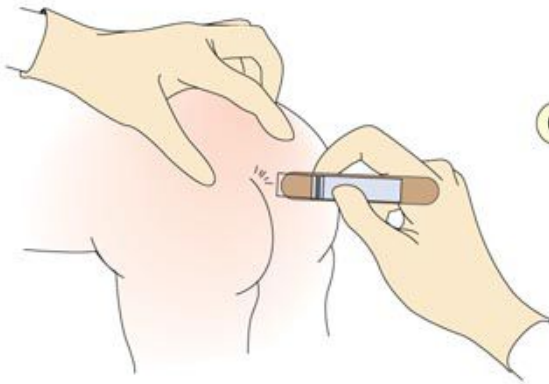
is easily made by identifying ova on •  
a piece of cellophane tape applied to  
the perianal area in the morning. *E.*  
*vermicularis* eggs are oval and  
slightly flattened on one side. It is  
unusual to find eggs in feces or adult  
worms in the perianal area.  
Repeated examinations may be  
.necessary



- A** Clear plastic tape is pulled back over the end of the slide to expose the gummed surface.

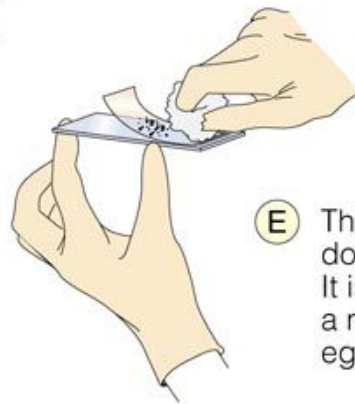
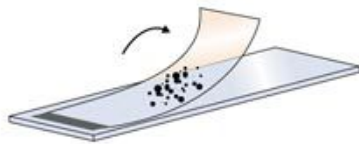


- B** The tape, still attached to the slide, is looped over a wooden stick.

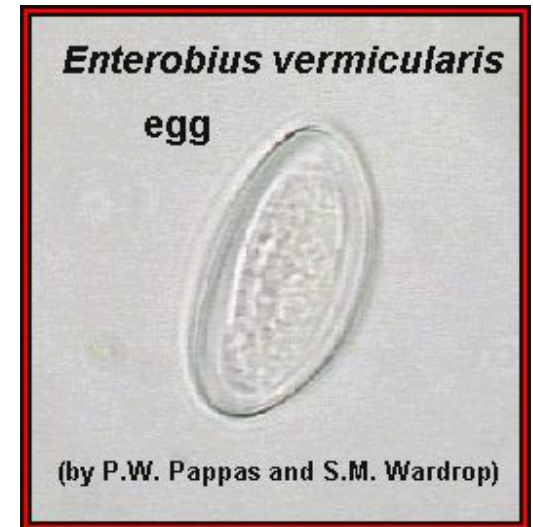


- C** The gummed surface of the tape is touched several times to the anal region.

- D** The tape is replaced on the slide.



- E** The slide is smoothed down with cotton or gauze. It is then examined under a microscope for pinworm eggs.



## Diagnosing Pinworm Disease

# TREATMENT.

Treatment is mebendazole(100mg single • dose) or albendazole(400mg single dose) given to affected individuals and to close associates, such as family members.

Same dose should be repeated after 10 days .Although personal cleanliness is recommended as a means of limiting transmission, there is no clear-cut demonstration that it prevents

infection

# Prevention & Control

Washing your hands with soap and warm water • after using the toilet, changing diapers, and before handling food is the most successful way to prevent pinworm infection. In order to stop the spread of pinworm and possible re-infection, people who are infected should bathe every morning to help remove a large amount of the eggs on the skin. Showering is a better method than taking a bath, because showering avoids potentially contaminating the bath water with pinworm eggs. Infected people should not .co-bathe with others during their time of infection

# Prevention & Control

## PREVENTION AND CONTROL

- ✦ Personal cleanliness and hygiene
- ✦ Short nail
- ✦ Frequent handwashing



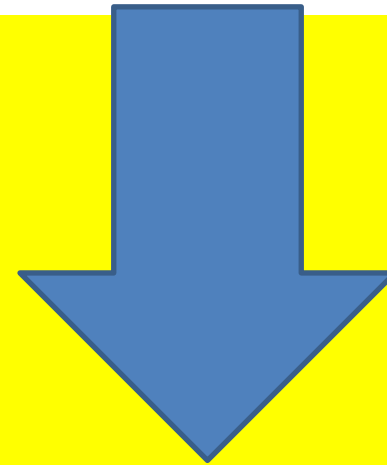
## PREVENTION AND CONTROL

- ✦ Showers and not bath tubs
- ✦ Underwear, night clothes, blankets, bedsheets- handled with care, boiled, laundered
- ✦ Chemotherapy for entire family



# Thank You

**Next lecture**



**Ancylostoma and (Hook worms)**  
**Necator (hookworms)**  
**Strongyloides stercoralis**  
**Trichuris trichura (whipworm)**