

# Cyclophyllidean cestode

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Assistant Professor

# Examples

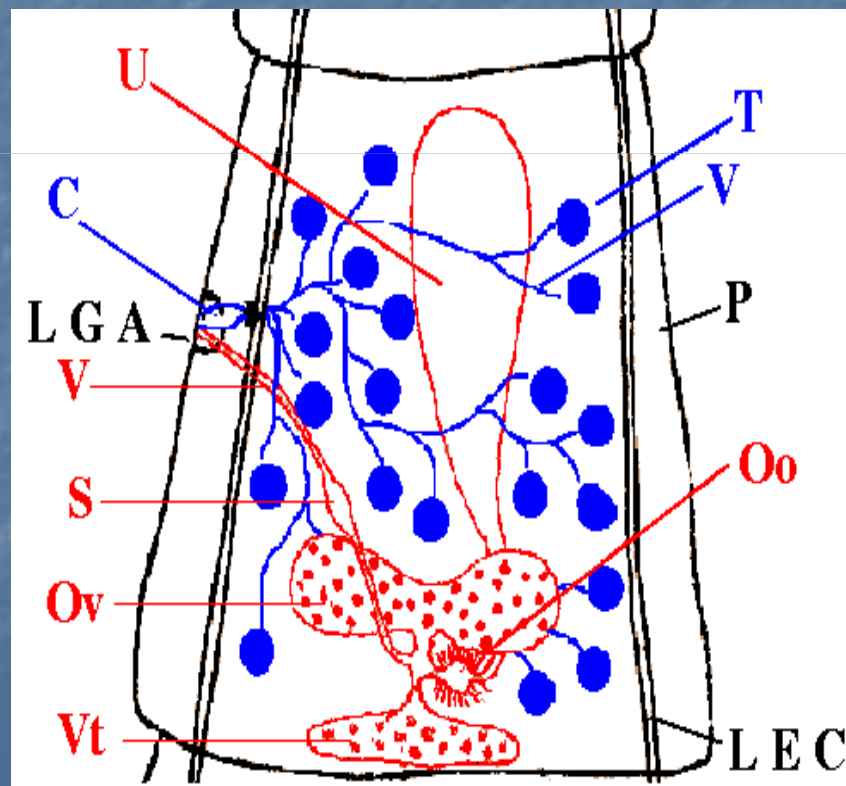
- *Taenia saginata*
- *Taenia solium*
- *Echinococcus granulosus*
- *Hymenolepis nana*
- *Multiceps multiceps*
- *H. diminuta*

# General features

- **Size**
  - Large or small consisting of chain of segments
- **Head**
  - Quadrate in outline, having 4 cup like suckers
  - Rostellum with hooklets may or may not be present



- Genital pore
  - Lateral aspect on each segment
- Discharge of eggs
  - No uterine opening so discharge of eggs occur when segment ruptures





- Eggs

- Not operculated
- Fully embryonated when discharge from segment – oncosphere containing 3 pairs of hooklets – hexacanth embryo



- Larva

- Takes place in intermediate host
- Two types of development are seen
  - Cysticercoid
    - Entire larva is **solid** except proximal portion – which is vesicular contains invaginated head
  - Cysticercus

# Cysticercoid

*Hymenolepis nana*

Cysticercoid



0.1mm

Peter Darben

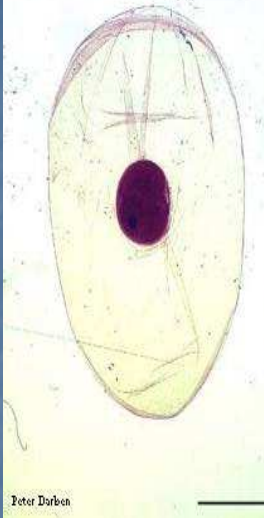


# Cysticercus

- Whole larva is transformed into a **bladder or cyst** from which head or scolex of future worm sprouts
- Cysticercus proper
  - Bladder or cyst with one scolex only e.g. Taenia
  - Scolex remains invaginated within cyst wall which can be seen with naked eye as milk spot
- Coenurus
  - Bladder like cyst containing many scolices e.g. Multiceps
- Hydatid cyst
  - Bladder or cyst that multiplies by budding and produces many daughter and grand daughter cysts
  - Brood capsules are formed on wall of these cysts, inside which lie many scolices

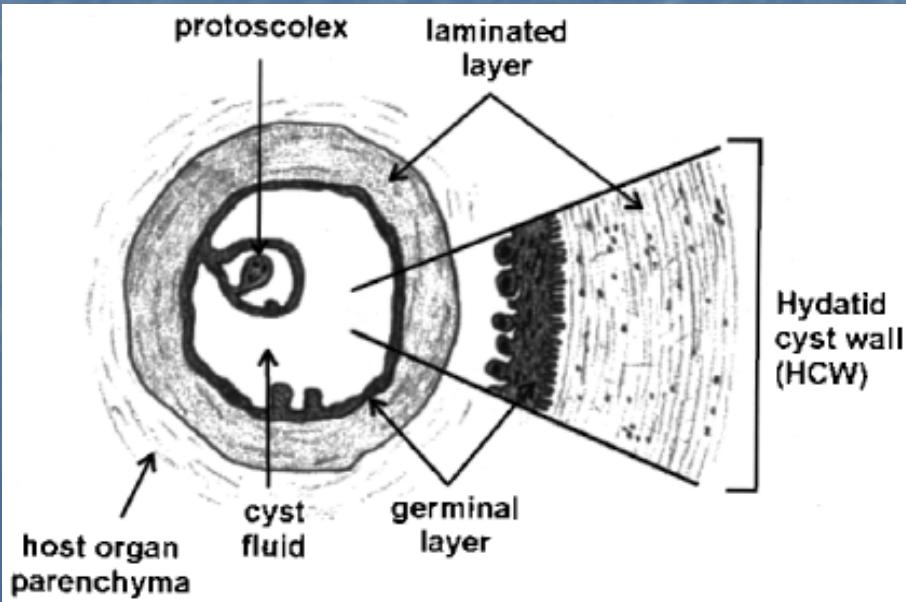
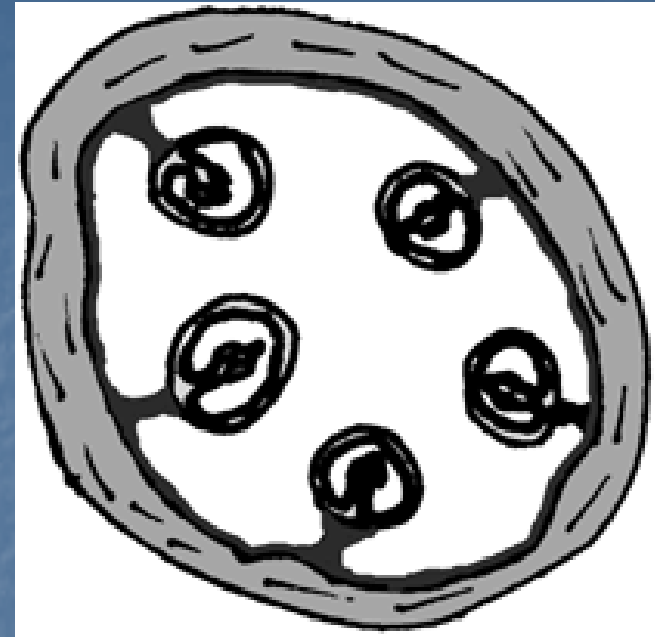
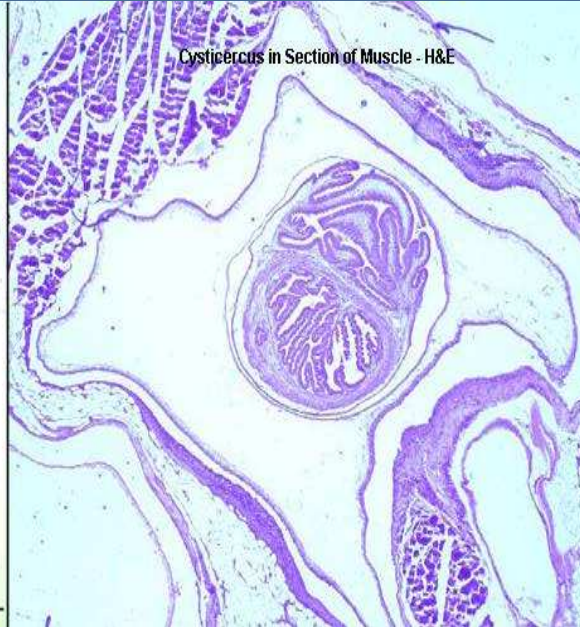


*Taenia solium*  
Cysticercus



Peter Dorben

Cysticercus in Section of Muscle - H&E





## PSEUDOPHYLLIDEA



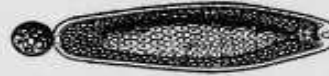
EGG



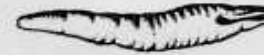
CORACIDIUM



ONCOSPHERE



PROCERCOID LARVA



PLEROCERCOID OR  
SPARGANUM LARVA

## CYCLOPHYLLIDEA



EGG



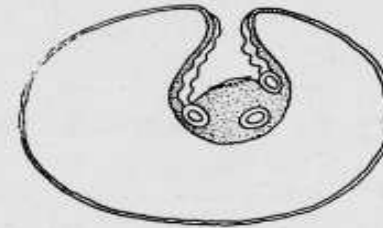
EMBRYOPHORE



ONCOSPHERE



CYSTICERCOID LARVA  
found in  
*Hymenolepis* and *Dipylidium*



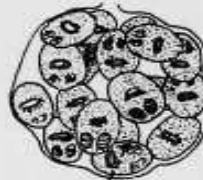
CYSTICERCUS LARVA  
found in *Taenia*



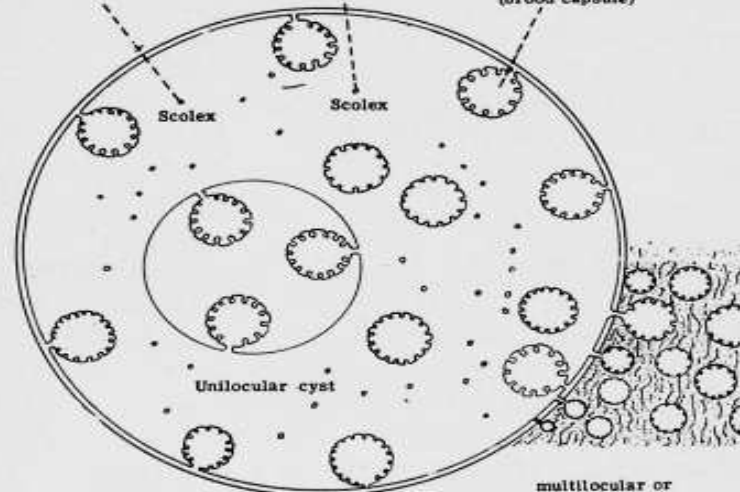
head evaginated



head invaginated



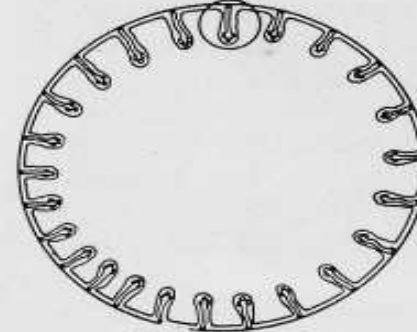
DAUGHTER CYST  
(brood capsule)



HYDATID LARVA  
found in *Echinococcus*

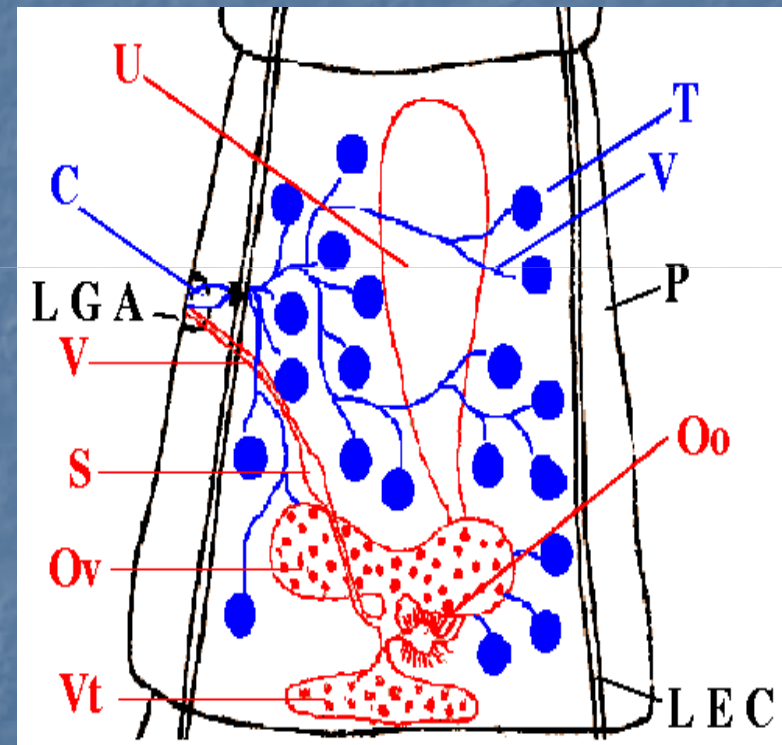
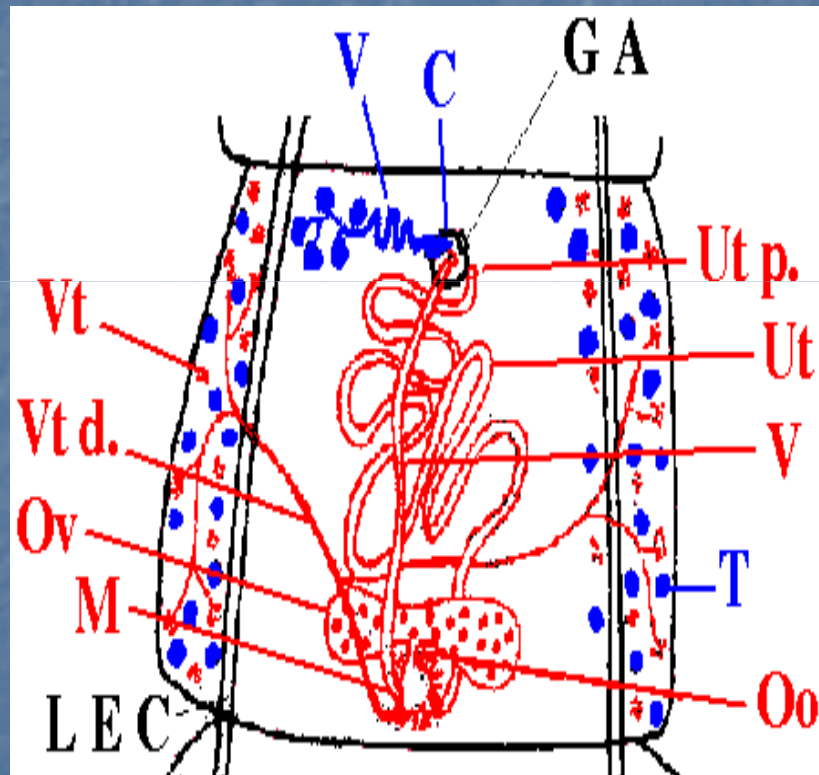


SCOLEX



COENURUS LARVA  
found in *Multiceps*

# Difference in segment of Pseudophyllidean & Cyclophyllidean



# Difference In Eggs of Pseudo & Cyclophyllidean cestode





# Taenia saginata

- Also called as
  - “beef tape worm”, “unarmed tapeworm of man”
- These are large, tape-like flattened worm with many segments
- Goet -1782 - differentiated it from Pork tapeworm
- Leuckart -1861 demonstrated that cattle acts as an intermediate host

# Epidemiology

- Distribution

- World wide and found where beef is eaten
- Ethiopia, Taiwan, Philippines, Iran & India
- More common in Muslims than Hindus

- Transmission

- Man - definite host
- Cattle ( cow ) – intermediate host
- Mode of infection – through ingestion of raw or undercooked meat of cattle containing *Cysticercus* (larva)

# Habitat

- Adult parasite – small intestine of man
- Life span – 10 years
- Remains attached to mucosa by scolex and moves against peristaltic movement





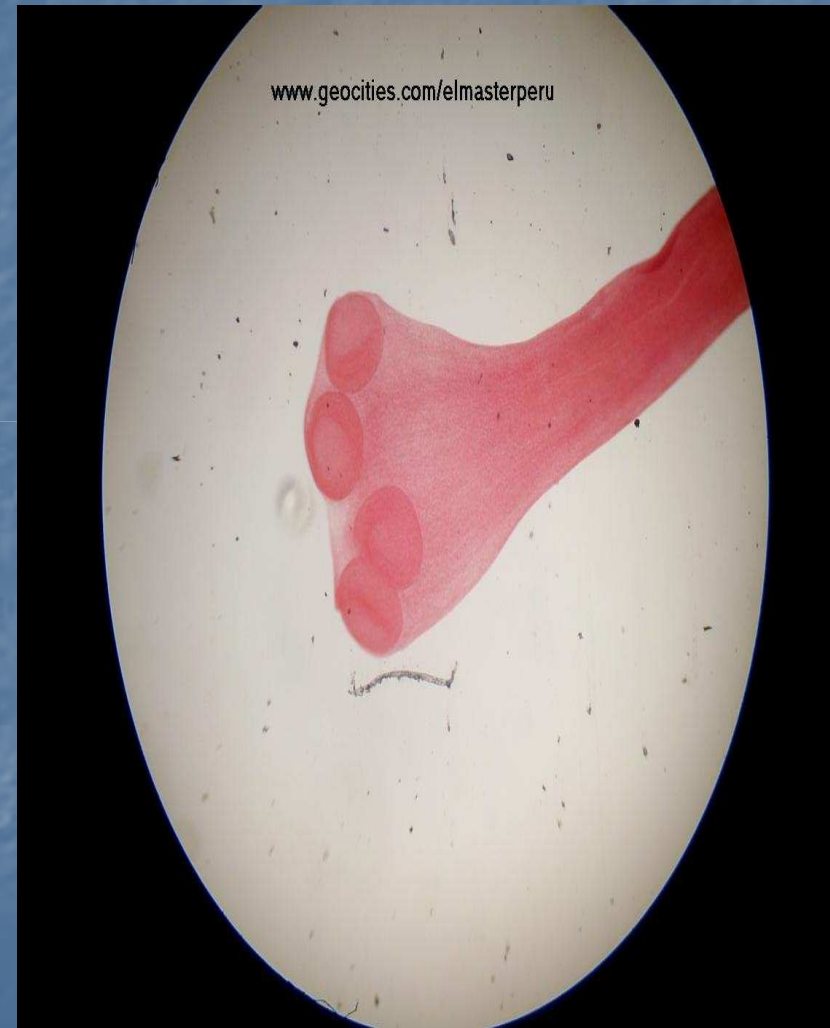
# Morphology

- **Adult worm**
  - **5-10 meters in length**
  - **Whitish & semitransparent**
  - **Head, neck & Proglottids**

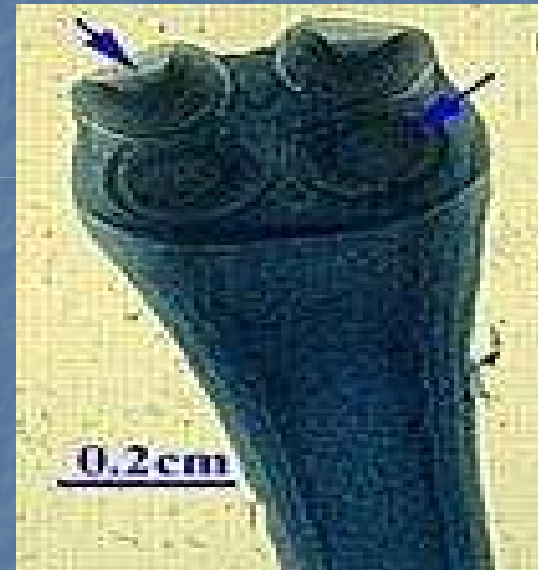


# Head

- Pear-shaped
- 1-2 mm in diameter
- Quadrate in cross section
- 4 circular suckers at angles
- Does not have rostellum or hooklets
- Neck – fairly long, fragile & narrower than head



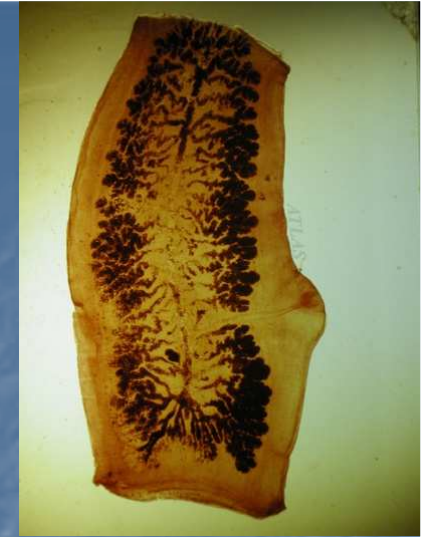
# Head

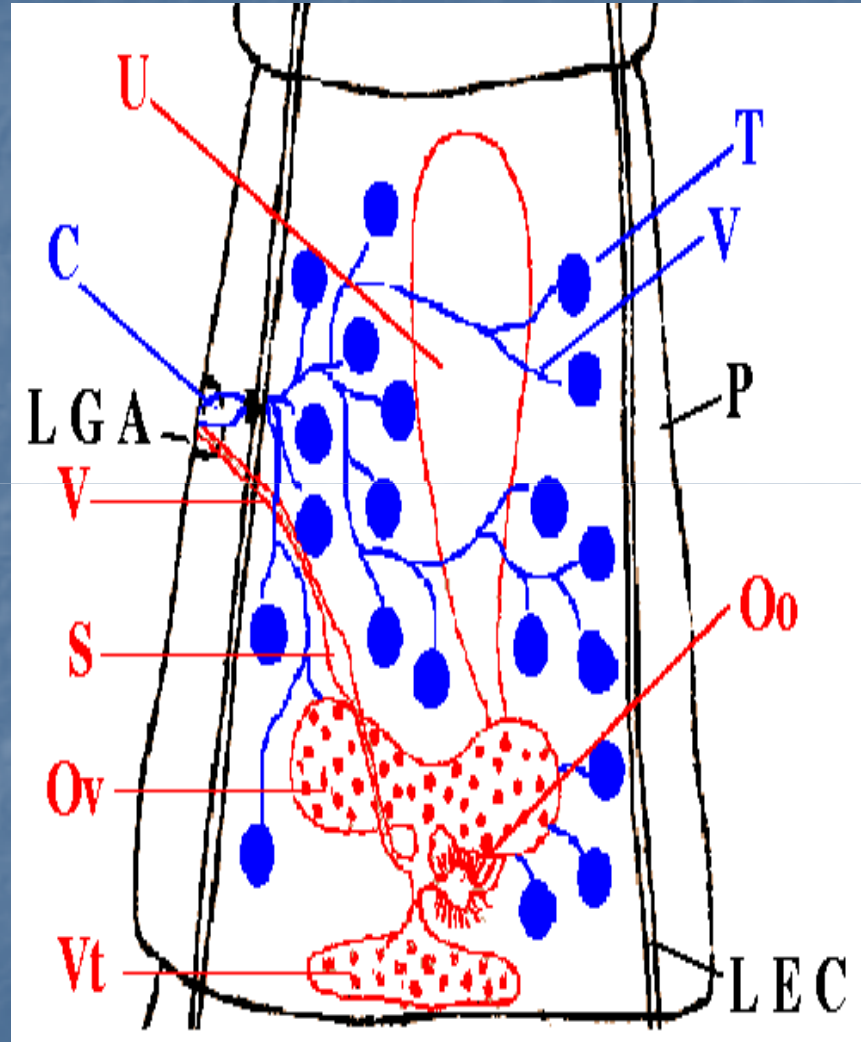
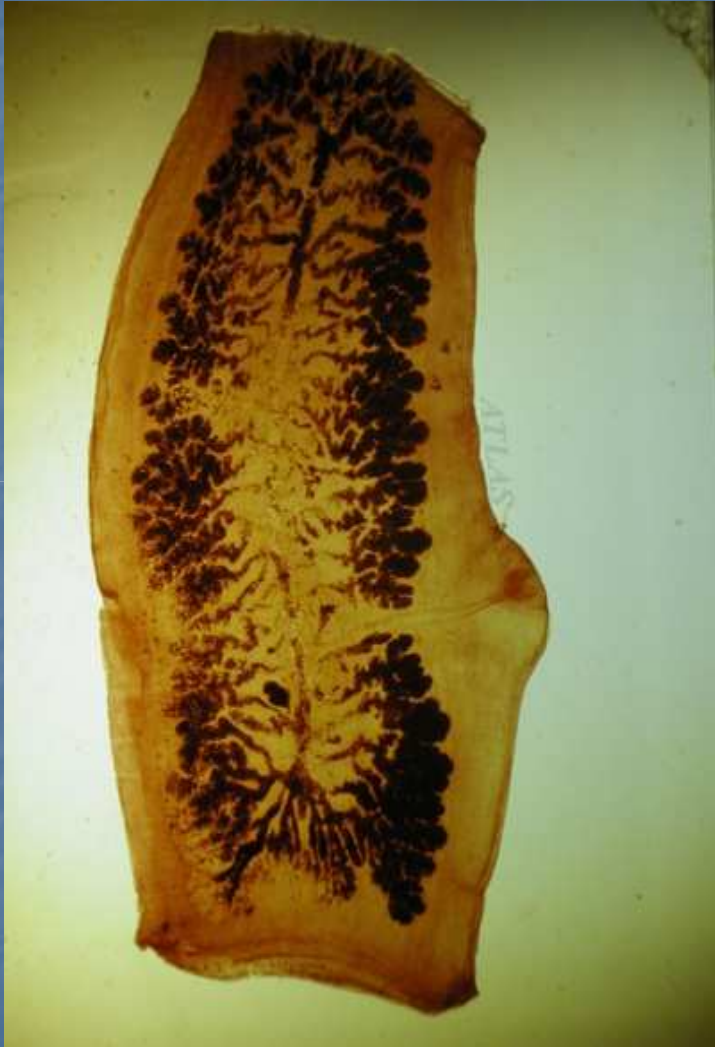




# Proglottids

- 1000-2000 segments
- Length > breadth (3-4 : 1)
- 2 cm L : 0.5 cm B
- Consists of male & female reproductive organs
- Testes – Numerous 300-400 in numbers
- Gravid uterus –central stem having 15-30 uterine branches
- Ovary – two –bilobed
- Common genital pore – laterally at hind end of each segment alternating regularly between right & left margins
- Segments are highly muscular –break off from strobila and migrate actively out of anus





# Eggs

- No uterine opening – discharge through rupture of segments
- Worm discharges > 5 00 000 eggs/day
- Similar to *Taenia solium* or *Echinococcus*
  - Spherical & brown
  - 33-43  $\mu$  in diameter
  - Having 2 shells –
    - Outer – egg shell
    - Inner – embryophore
  - Within egg-Hexacanth embryo
  - Infective to cattle only
  - Does not float in saturated salt solution - Heavier

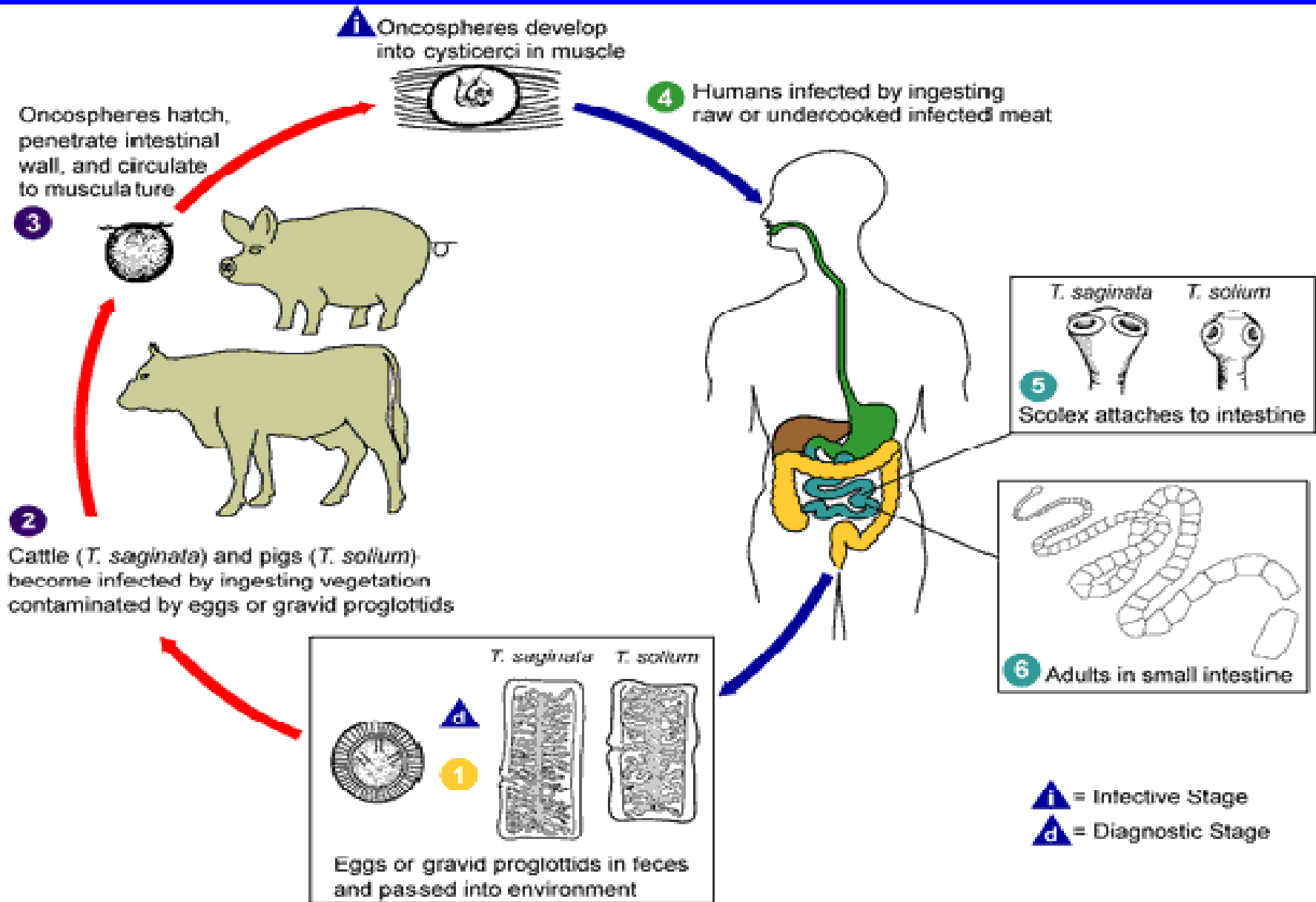




# Life cycle

- Two host are required
  - Definite host – Man ( Adult worm)
  - Intermediate host – Cattle (*Cysticercus bovis*)

# Life cycle



# Cysticercus bovis

- Larval form developing in muscles of cattle
- 0.5 to 1 cm diameter cyst containing invaginated scolex
- Infective to man
- Remain alive for 8 months in flesh & can develop further when ingested by man
- After 8 months calcified & embryo dies



# CLINICAL SYNDROME

- Mostly asymptomatic, called as Taeniasis
- Adult tapeworm in intestine causes nausea, vomiting, abdominal discomfort, chronic indigestion, hunger pain, diarrhoea alternating with constipation
- The larvae of *T.saginata* doesn't develop in man

# Diagnosis

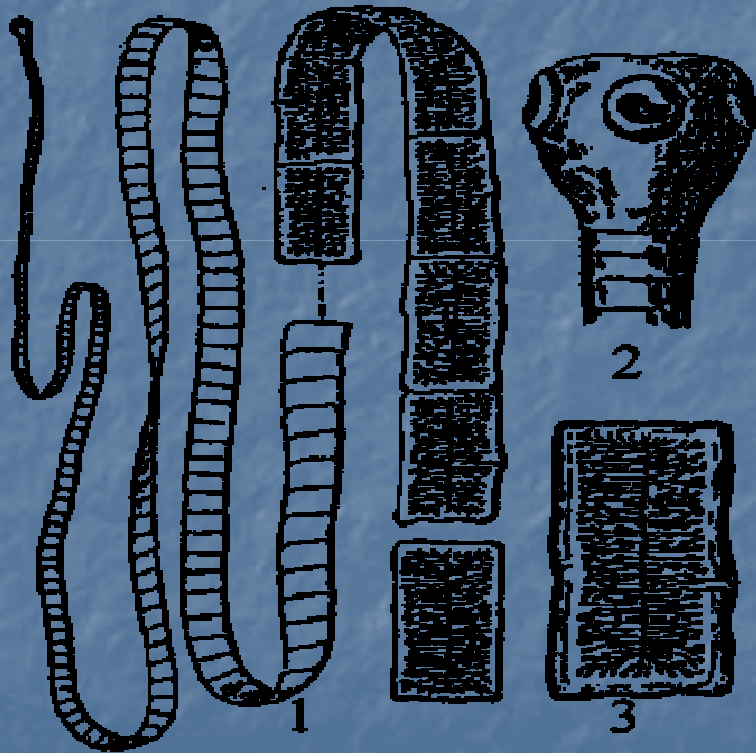
- Direct evidence
  - Microscopic examination of stool
    - Eggs
    - Segment or Proglottids
  - Macroscopic examination for Proglottids
- Serology
  - IHA, ELISA, IFA

# Treatment

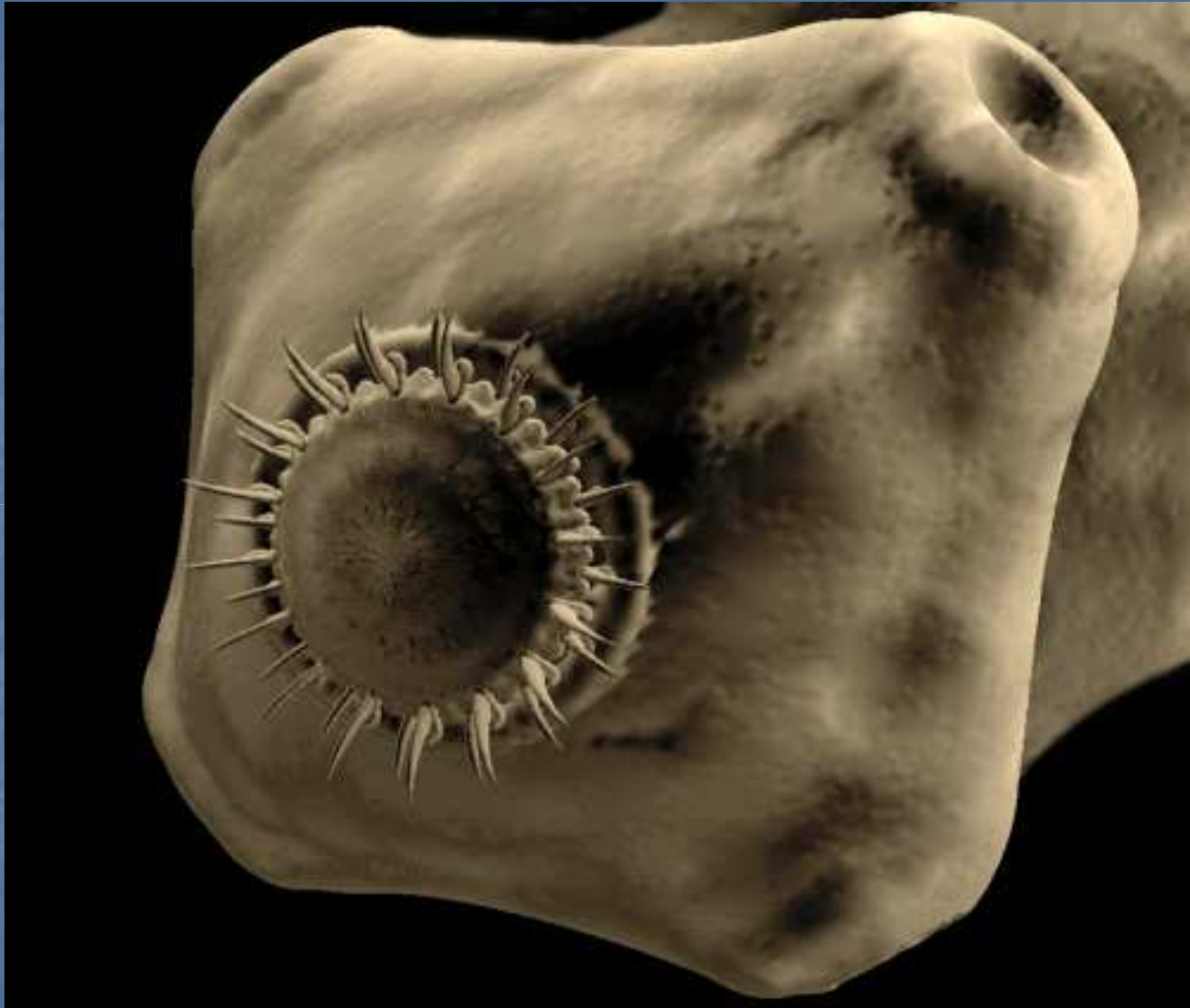
- Praziquantel – 10 mg/kg
- Nicolosamide is another alternative



# Taenia solium





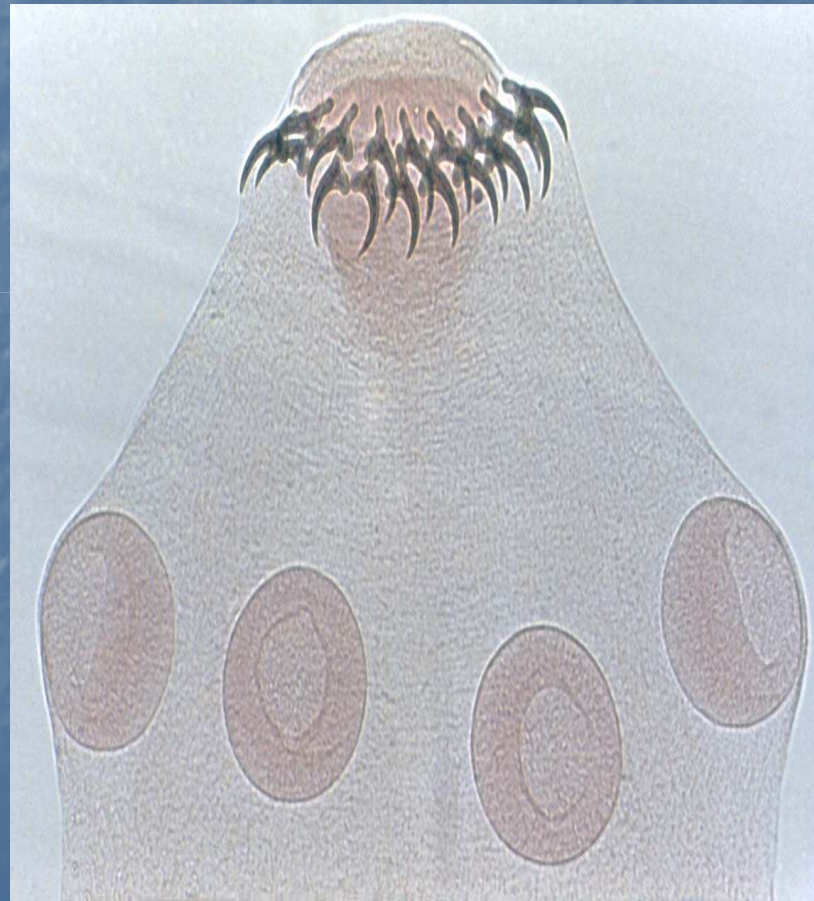




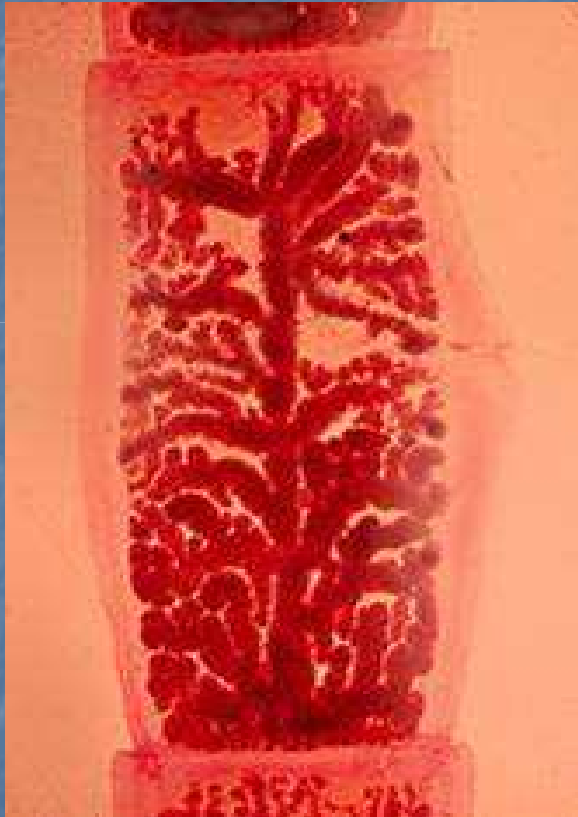
# Head



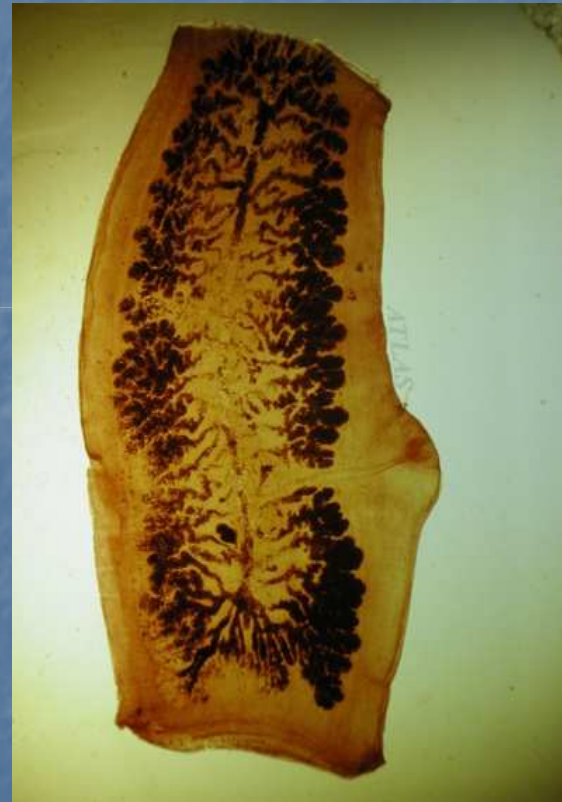
# Head of *T.solium*



# Segments



*T. solium*



*T. saginata*



# Eggs

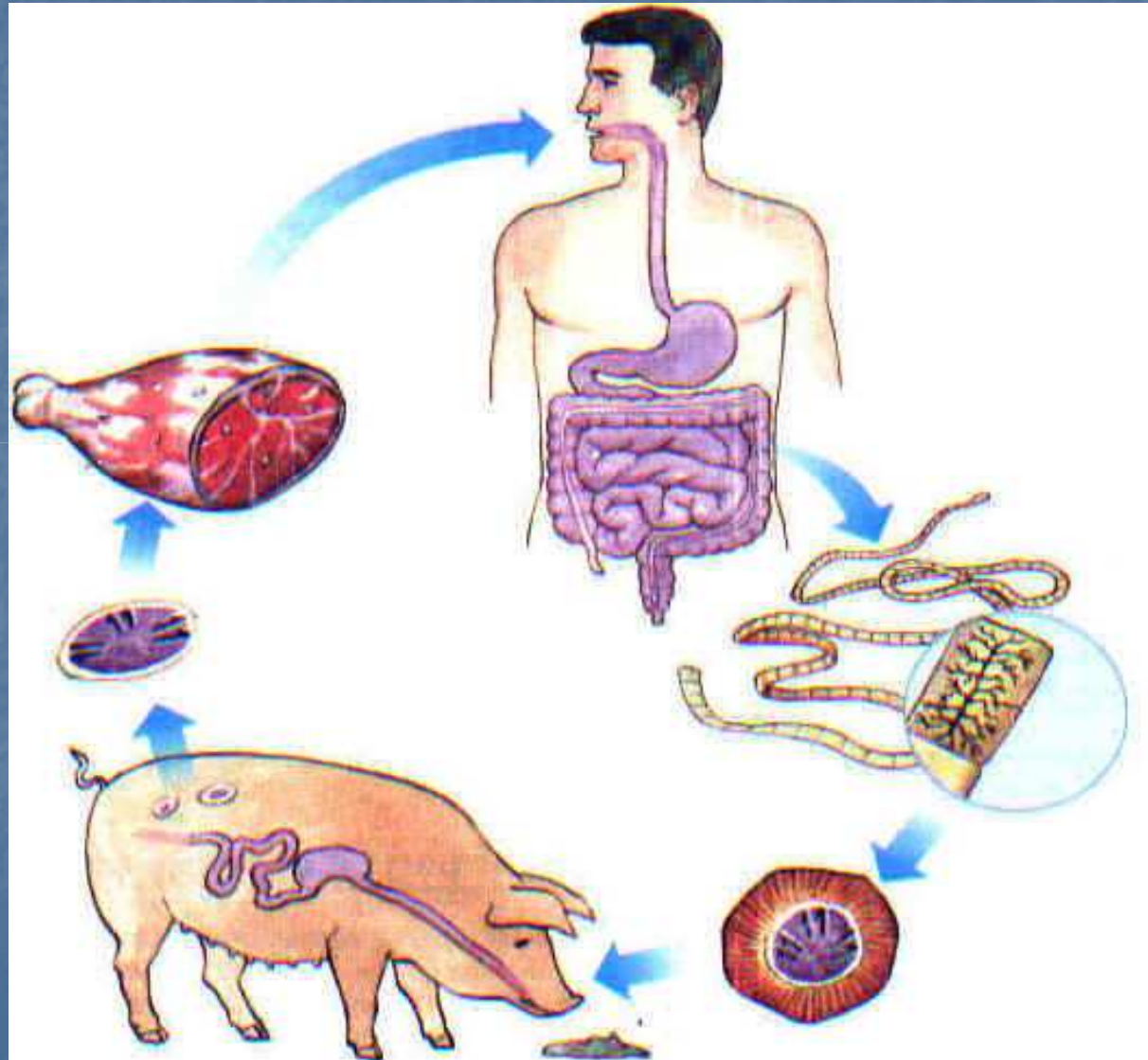


# Larva - *Cysticercus cellulosae*





# Life cycle





# Clinical manifestations

- Two different forms in humans:
  - Human taeniasis
  - Human cysticercosis

# Clinical manifestations

- Taeniasis (tape worm infestation)
  - Minimal symptoms or none at all
  - In severe infestations;
    - Malnutrition
    - Abdominal discomfort
  - Occasionally patients may notice the passage of proglottids within their stools

# Human cysticercosis



# Cysticercosis

- Caused by larval form of *T.solium*
- Man is usually definite host of *Taenia* but it may act as intermediate host in *T.solium* harboring larva of *T.solium*- *Cysticercus cellulosae*
- Occurs either by
  - ingesting eggs or
  - by autoinfection

- Eggs are liberated in stomach from segments



- Penetrate gut wall, reaches circulation



- Filter out in various organs like subcutaneous tissue, brain & skeletal muscles

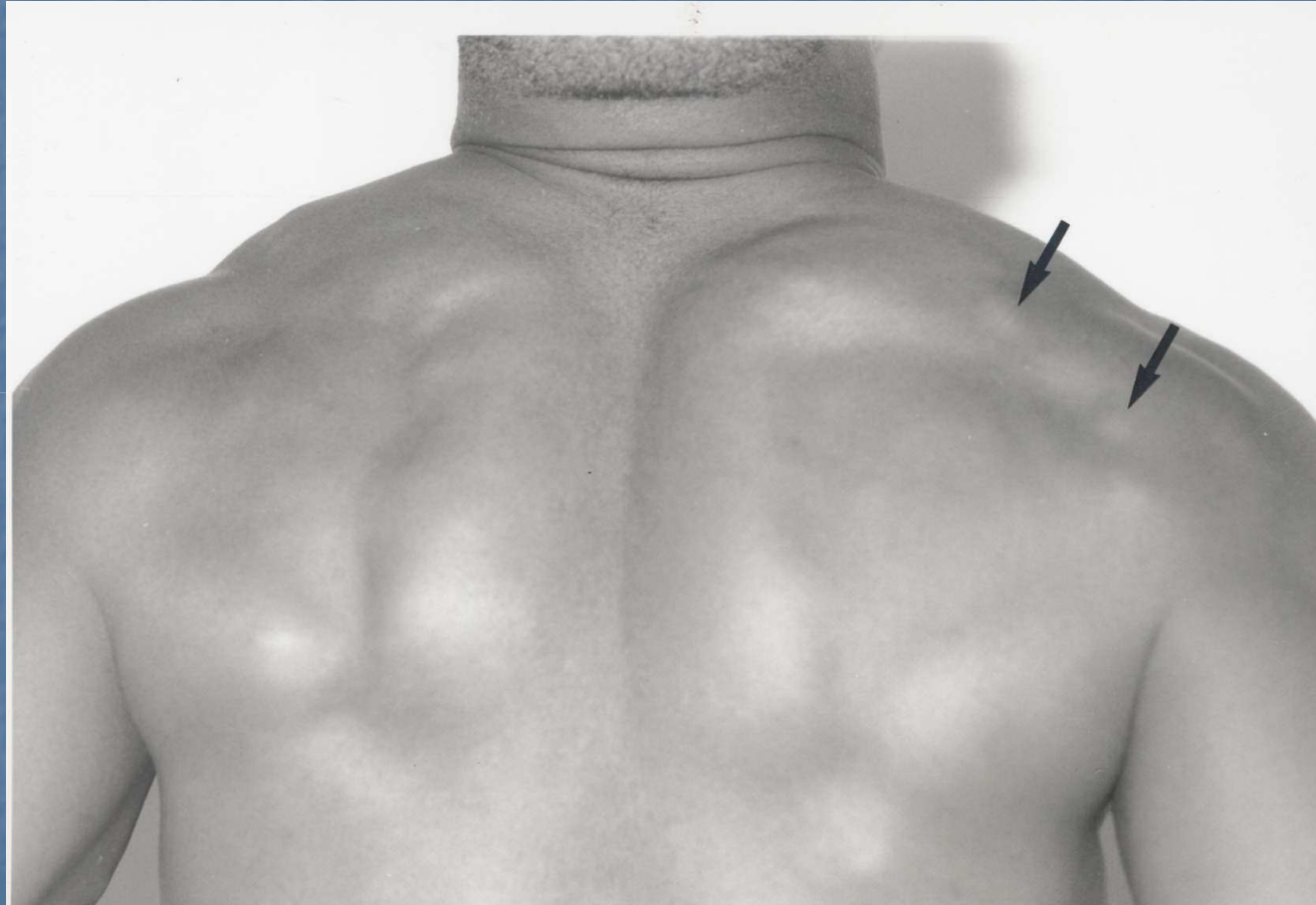


- Wherever larva settles it produces cysticerci 0.5-1 cm in width by 0.5 cm in length

# Clinical manifestations

- Cysticercosis
  - Divided into extraneural
    - Skin:
      - Small painless mobile nodules
    - Muscle:
      - Asymptomatic or pseudohypertrophy
    - Eyes:
      - Asymptomatic or variable degrees of visual loss
  - Neurocysticercosis











# Neurocysticercosis

- After entering the CNS the cysticerci are viable and elicit very little inflammation
- It can remain like this for long time protected by the Blood-Brain-Barrier
- After variable amount of time the cyst starts to degenerate resulting in inflammation

# Neurocysticercosis

- Cysts cause disease by acting as mass lesions, blocking CSF flow (called as SOL)
- MOST of the symptoms direct result of the host inflammatory response due to cyst degeneration
- Therefore clinical manifestations depend on:
  - Number
  - Location
  - Size
  - Hosts immune response to the cysts

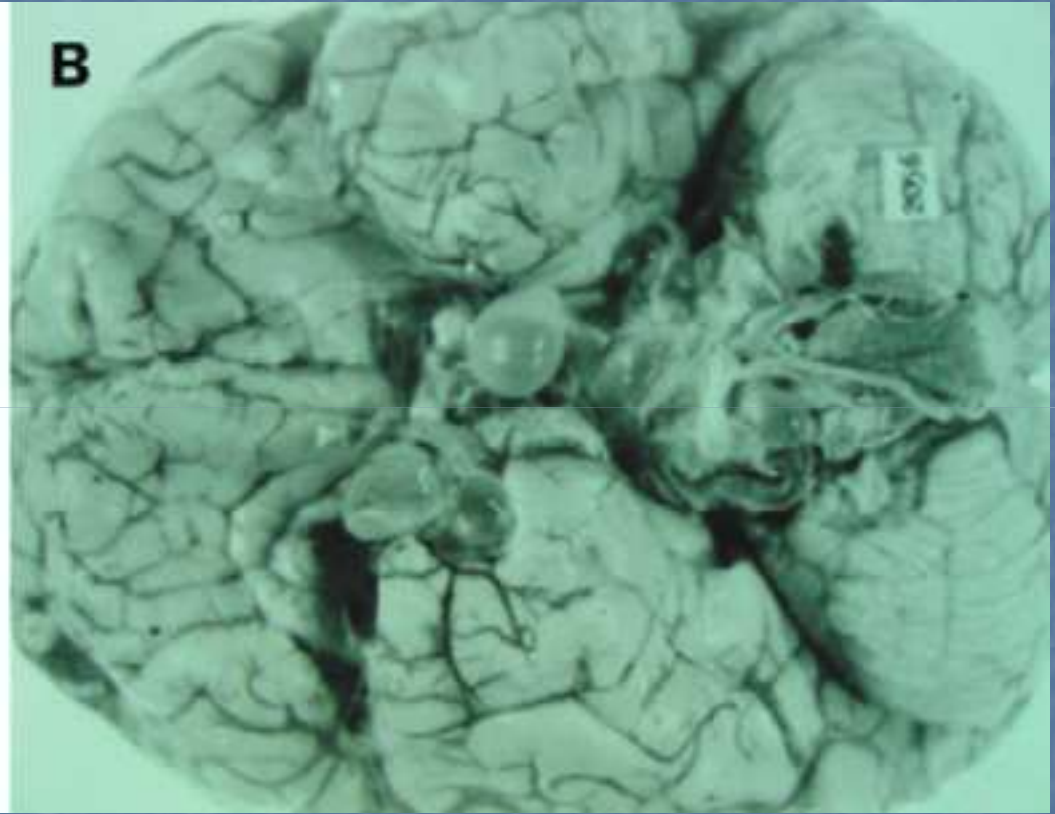
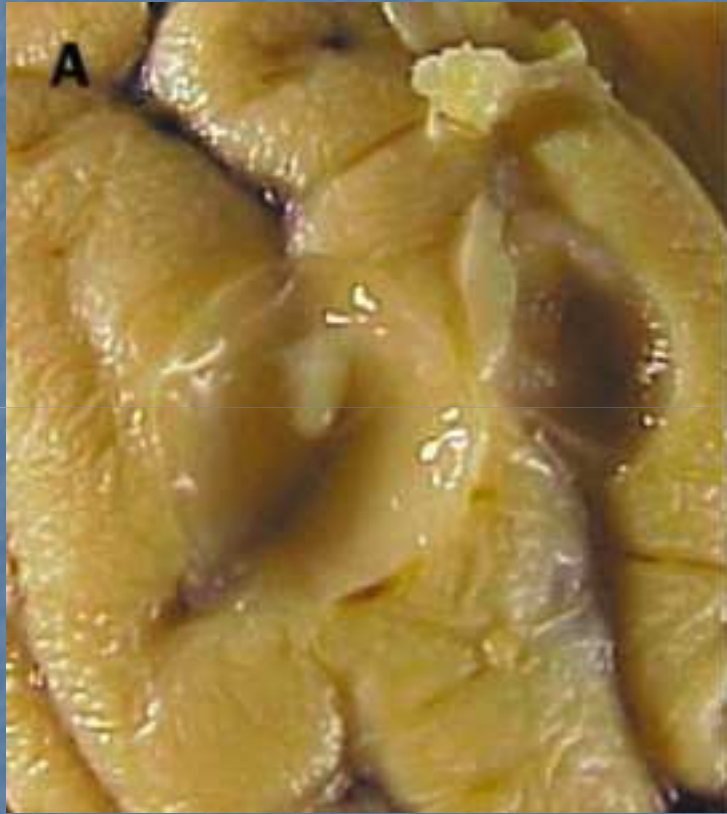
# Neurocysticercosis

- Epilepsy
- Headaches
- Paraparesis
- Strokes
- Dementia

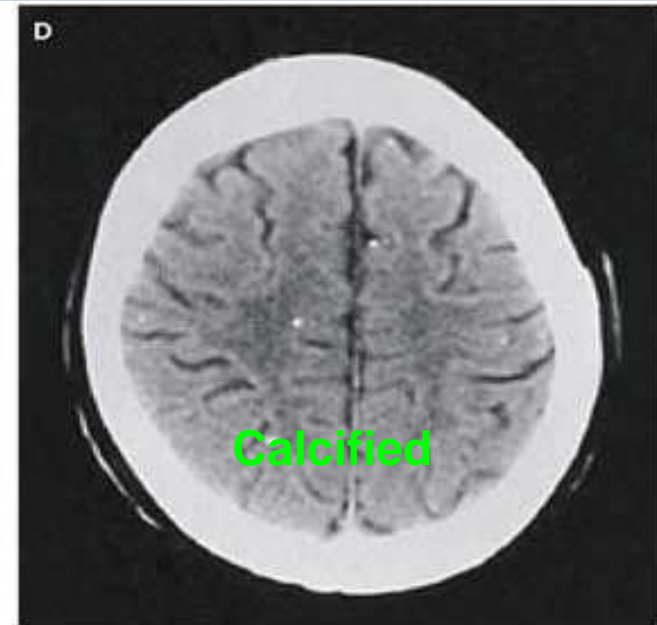
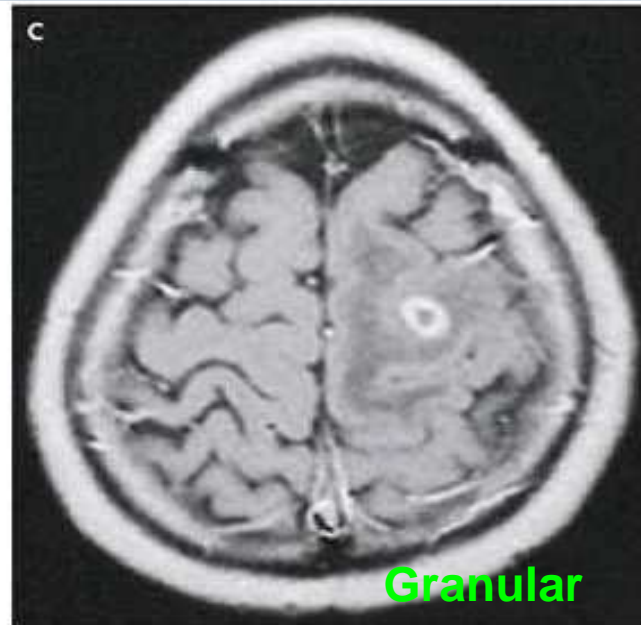
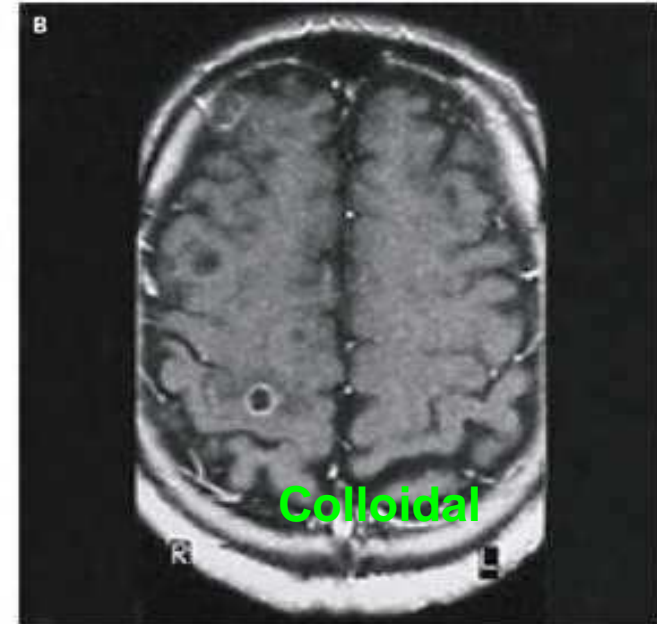
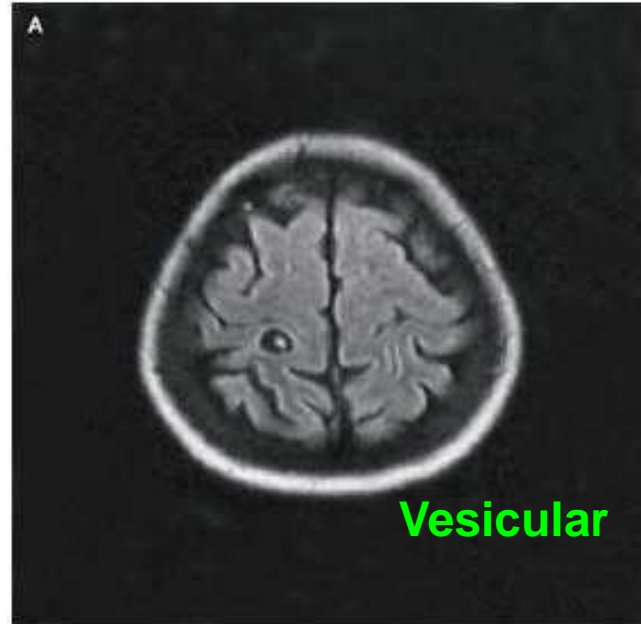


# Neurocysticercosis

- Diagnosis
  - X-rays of the muscles
  - Imaging of the brain and spinal cord (CT & MRI)
  - Serology
  - CSF examination

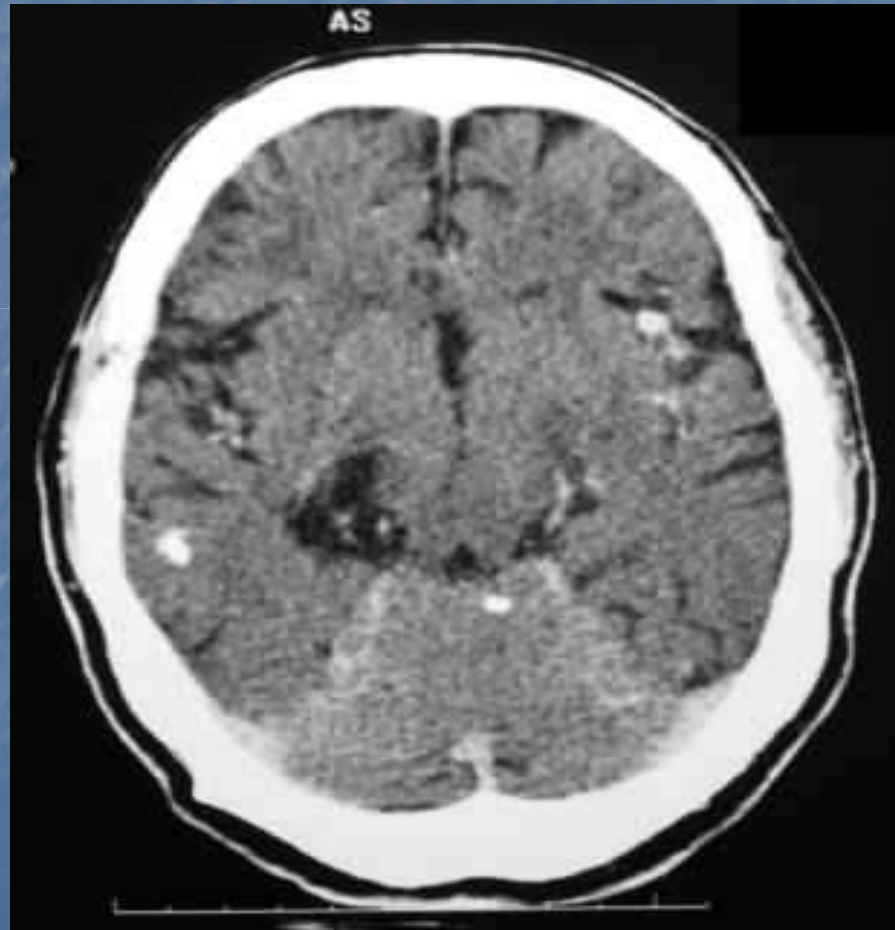


- Brain imaging:





# Neurocysticercosis



# Treatment

- The decision if and how to treat patients with neurocysticercosis is complex and controversial
- When a decision is made to treat it involves three different interventions
  - Anti-parasitic agent (albendazole or praziquantel)
  - Anti-inflammatory agent (prednisone)
  - Surgery (shunting or surgical removal of a cyst)

# Epidemiological control

- Health education
- Improved hygiene and sanitation
- Treatment of Taeniasis
- Improved pig husbandry
- Effective disposal of pig carcasses
- Vaccination of pigs
- Chemotherapy for infected swine





*Courtesy* – FOYACA SIBAT









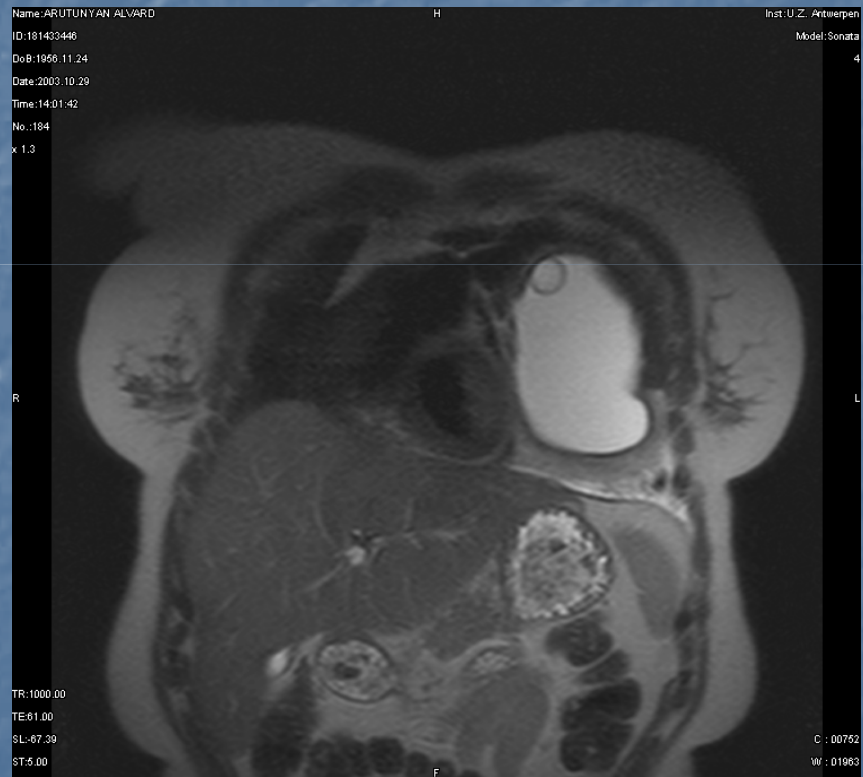


# Thank you



- **Case 1:** Female, 47 years .
- **Haemoptysis**, fever and left-sided thoracic pain.
- Chest X- ray: :mass in the left lung.
- CTscan: large cystic structure, smaller cystic lesion inside. No other organs involved.
- MRI: no contact with the diaphragm.
- Serological testing for echinococcosis: negative.
- Tentative diagnosis: pulmonary hydatid cyst.
- Treatment: albendazole and surgery.
- Histopathological confirmation.





- **Case 2:** man ,37 years.
- **Dyspnoea**, pain in the right hypochondrium.
- Chest X-ray: cyst in the left upper lobe.
- CTscan: cystic structure in left upper lobe and in the liver.
- Serology for *E.granulosus*: slightly positive.
- Tentative diagnosis: echinococcal disease.
- Treatment: albendazole and surgery( lobectomy of the left upper lobe).
- Histopathological confirmed.

