Musculoskeletal Parasites

Musculoskeletal Parasites

Trichinella spiralis

Taenia solium

Case Scenario

A 31-year-old Japanese man initially noticed a single **subcutaneous painless nodule** in the left neck. He subsequently noted the gradual appearance of additional lesions. **Worm fragments** were previously passed in **stool**.

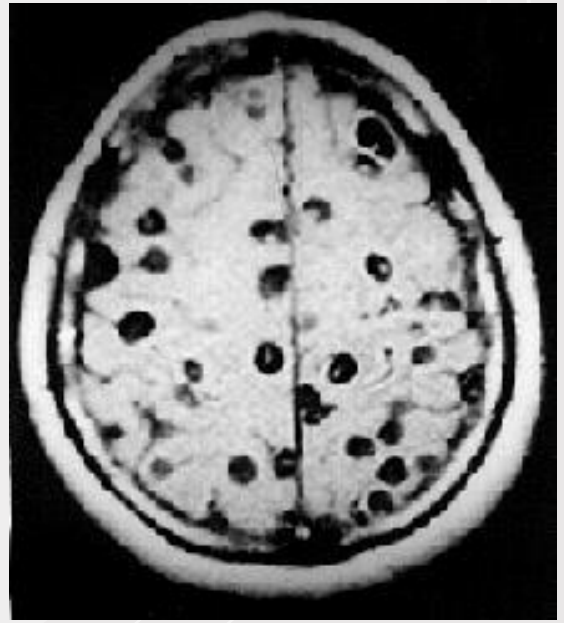
He used to consume meals including **grilled pork** and fresh vegetables.

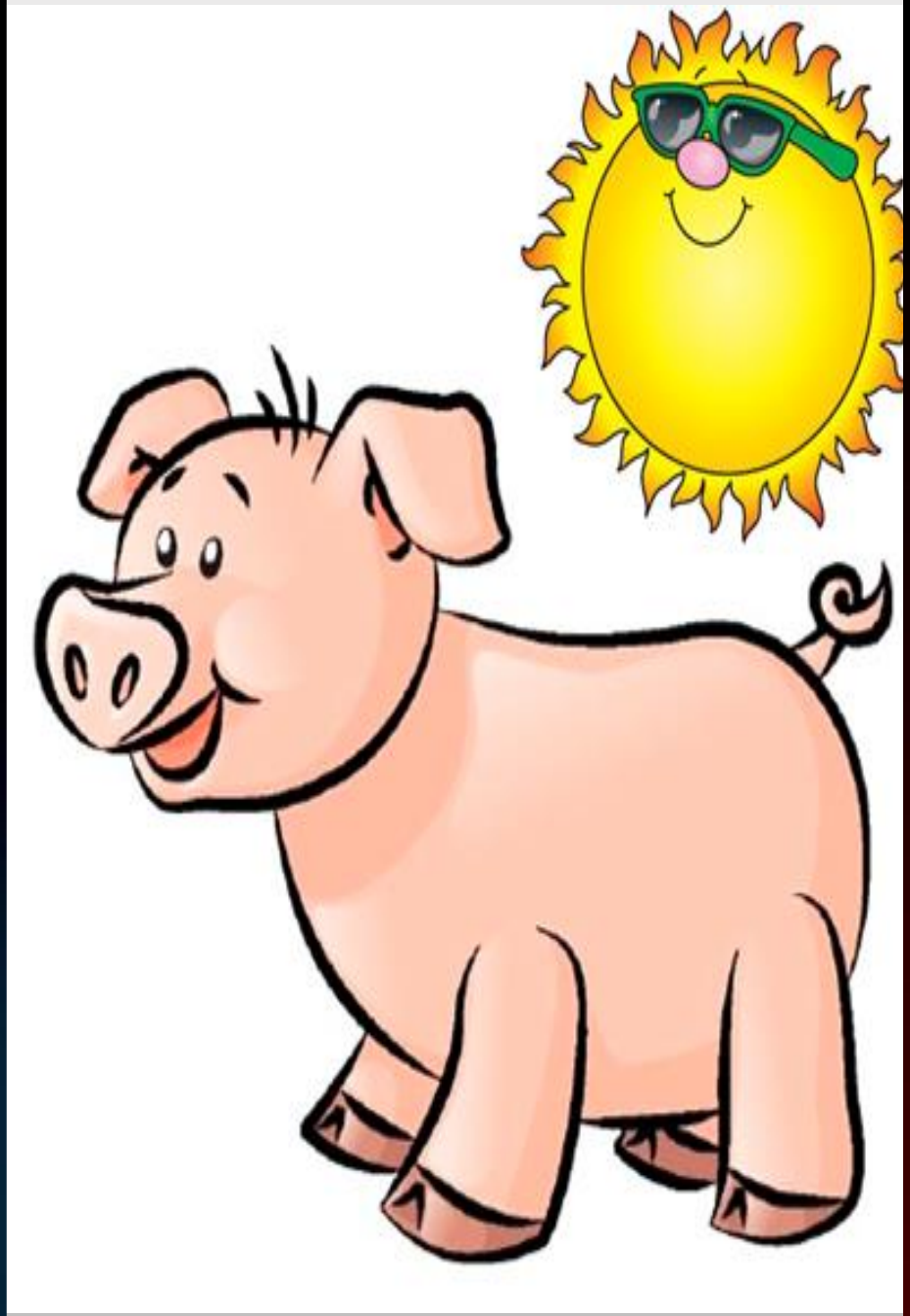
Skin biopsy specimens obtained from his body trunk appeared as a **white cyst**, and showed characteristics of **scolex** and an invaginated neck

CYSTICERCOSIS:

Definition: invasion of the human tissues by the larval stage of *Taenia solium* (**Cysticercus cellulosa**).

In this case man acts as an **intermediate host**.





Taenia solium
(Pork tapeworm)

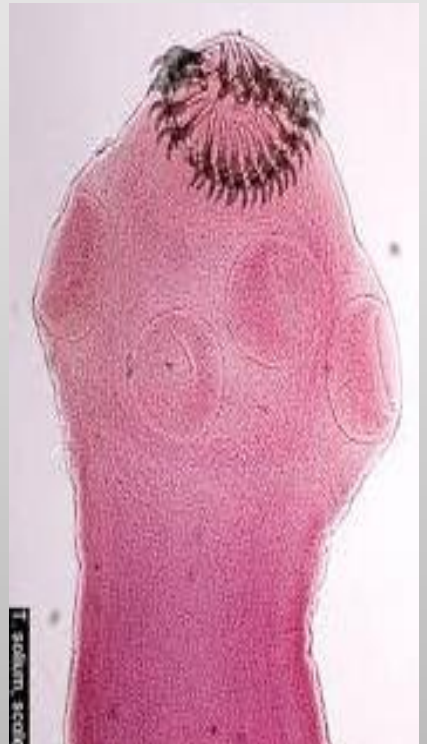
Geographical distribution:

- **Cosmopolitan** distribution wherever raw or insufficiently cooked **pork** is ingested.
- Thus it is very rare in Islamic countries.

➢ Morphology:

1) Adult:

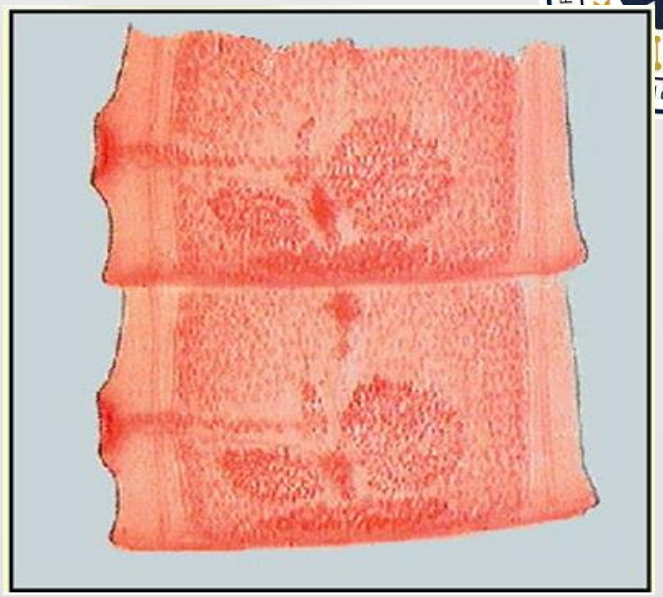
- 4 meters with 1000 segments.
- **Scolex**: globular with a rostellum armed with double rows of taenoid hooks.



➢ Morphology:

1) Adult:

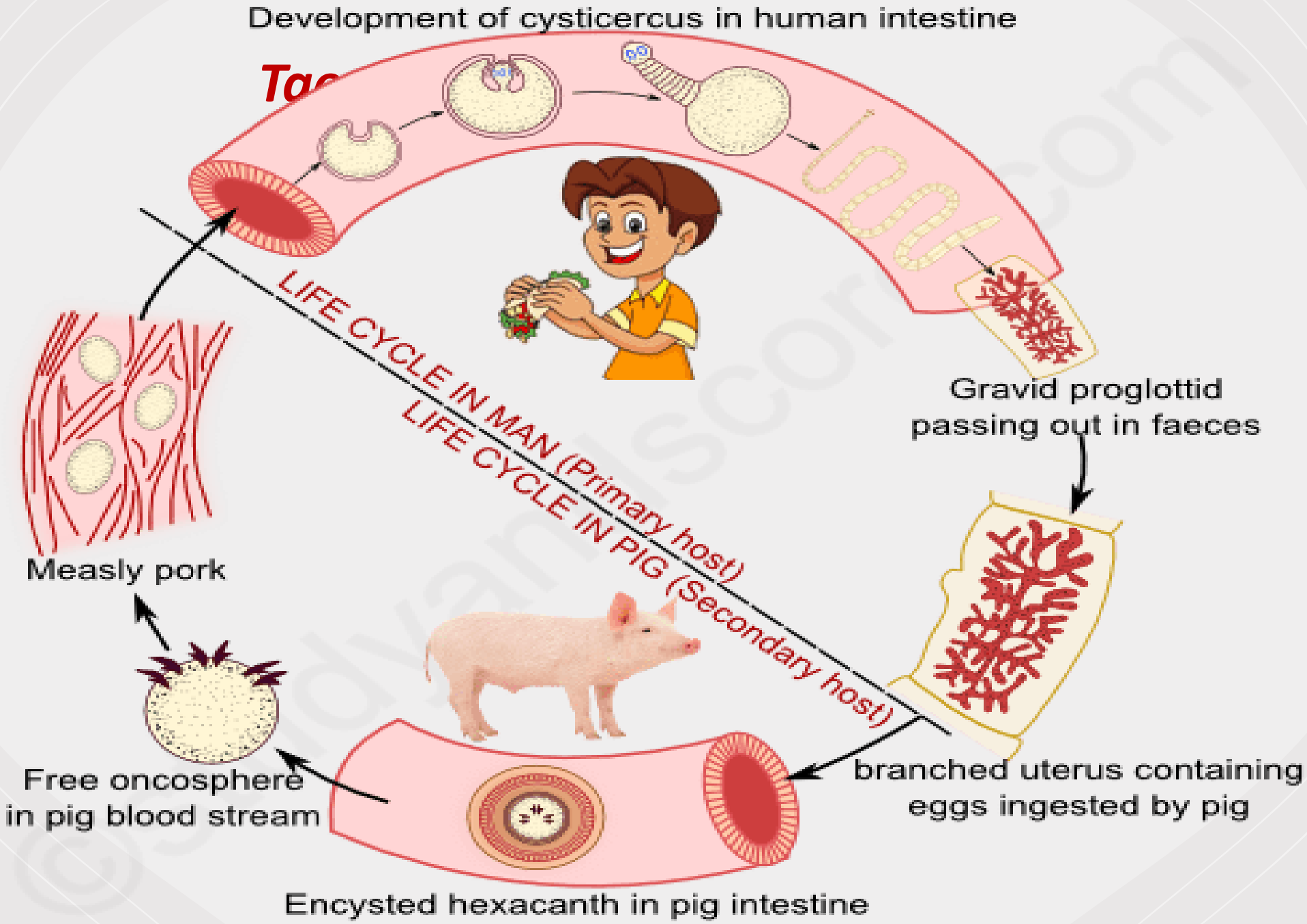
- ***Mature segments:*** contain about150 **testes**. The **ovary** is trilobed.



- ***Gravid segment:*** the uterus possesses 9-11 lateral branches on each side.

2) Egg

- Size: 30-40 μ
- Shape: spheroid.
- Shell: thick, **radially striated**
- Colour: yellowish-brown.
- Contents: hexacanth embryo (**onchosphere**)



TAENIA SOLIUM - LIFE CYCLE

Taenia solium Life cycle:

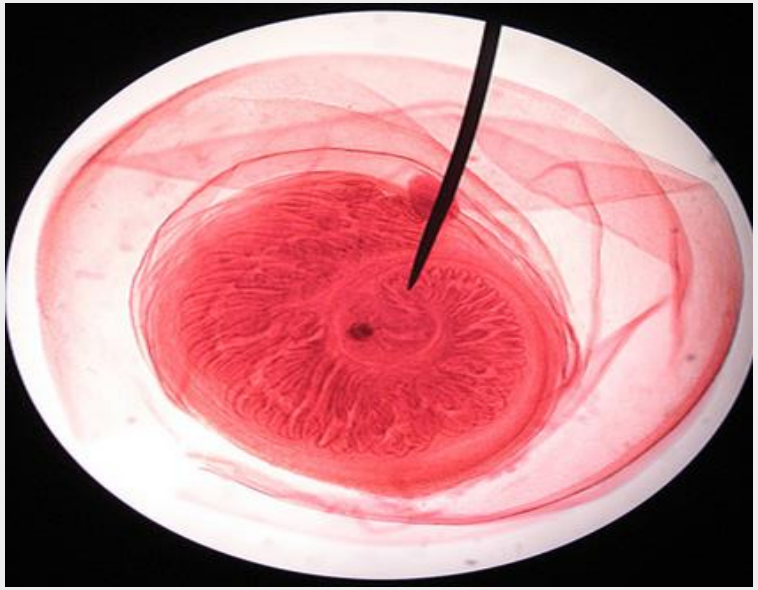
- **Habitat**: the small intestine
- **Definitive host:** Man
- **Reservoir host:** No
- **Intermediate host:** pig
- **Stages in the life cycle:** egg, hexacanth embryo, cysticercus cellulosa.
- **Infective stage:** cysticercus cellulose
- **Diagnostic stage:** egg, gravid segment

- Gravid segments pass **with** defecation.
- They dry in the soil, rupture and release the eggs which are morphologically **indistinguishable** from those of *T. saginata* but **not stained** with Zeihl-Neelsen stain.

➢Mode of infection:

(1) Human beings are infected with *T. solium* following consumption of imperfectly cooked pig's meat containing the cysticercus cellulosa.

- Cysticerci are spherical or ovoid cysts with the head invaginated appearing as a **milky spot**.
- **Microscopically** the rostellum, suckers and hooks are apparent; this larval stage is known as **cysticercus cellulosa**



Pathogenicity and clinical picture

1-Taeniasis solium: Man ingests cysticercus cellulosa in pig's muscles, and the adult parasite develops.

2- **Cysticercosis:** Man ingests eggs of *T. solium*, and develops cysticercus cellulosa in the extra-intestinal tissues.

Diagnosis of Taeniasis solium

1. **Stool examination** reveals the presence of the **gravid segments**, rarely **eggs**.

- Eggs cannot be differentiated from those of *T. saginata* morphologically, but they **do not** take the Zeihl-Neelsen stain.

Diagnosis

Gravid segments:

- ***The gravid segments of T. solium:***

1) Uterus with 9-11 lateral branches,

2) Segments detach in groups

(five with stool).

- ***The gravid segments of T. saginata:***

1) Uterus with 15-20 (18) lateral branches,

2) Segments detach singly

(creeping out without defecation).

Treatment

-**Atebrine** is **preferable** as it leads to expulsion of the parasite but causes nausea and vomiting. So, anti-emetic must be given one hour before Atebrine to avoid antiperistalsis and subsequently internal autoinfection.

-**Niclosamide** and **Paromomycin** should be **avoided** as they disintegrate the worm releasing large number of eggs in the lumen of intestine which increase possibility of cysticercosis due to internal autoinfection.

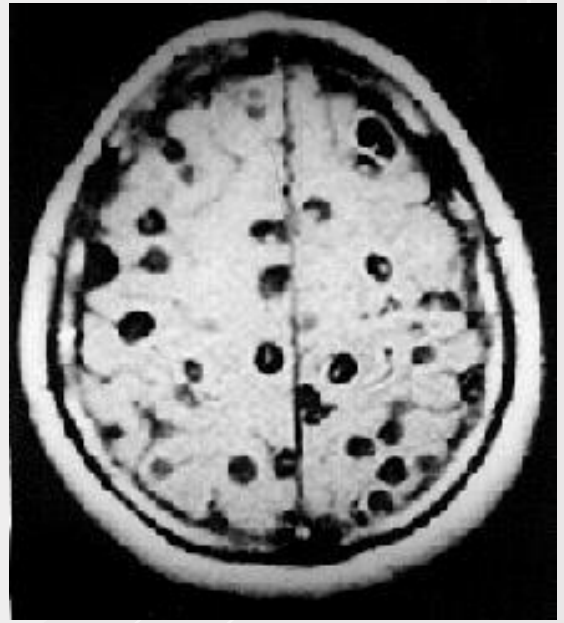
Prevention and control:

1. Prompt treatment of infected persons to eliminate the danger of auto infection.
2. Infected persons should not take emetics or nauseating drugs.
3. Proper sanitary disposal of human faeces.
4. Proper inspection of pork for cysticerci.
5. Proper cooking of pork products.
6. Treatment of infected persons

CYSTICERCOSIS:

Definition: invasion of the human tissues by the larval stage of *Taenia solium* (**Cysticercus cellulosa**).

In this case man acts as an **intermediate host**.



•Mode of infection:

(1) Ingestion of food or water contaminated by the **eggs** of *Taen* *solium.*

(2) Auto- infection either:

a- **External autoinfection (Exogenous):** the patient harbouring the adult parasite contaminates his fingers with *Taenia solium* eggs from his own stool.

b- **Internal autoinfection (Endogenous):** antiperistaltic movements of the intestine (in case of vomiting or taking emetic drugs) leads to regurgitation of the gravid segments to the stomach.

- The gravid segments become broken up and liberate the eggs.
- On returning to the intestine, the eggs hatch. Eggs hatch in the intestine→ **onchospheres** penetrate the intestinal wall →venous circulation→ right side of the heart→the lung → left side of the heart →the systemic circulation where they settle in different tissues and develop into cysticerci.
- **Subcutaneous tissues, muscles, viscera, brain** and **orbit** are commonly affected.

Pathogenicity:

The **cyst** produces local cellular **reaction** and **infiltration** with neutrophils, eosinophils and lymphocytes. Presented by mild fever and eosinophilia.

Clinical picture:

depends upon the **organs** affected and the **number** of cysticerci.

- **In vital organs** (heart or brain): serious manifestations may lead to death.
- **In skeletal muscles**, myositis and muscle pain are present.
- **Cerebral cysticercosis** results in severe headache, convulsions and paralysis.

Diagnosis of Cysticercosis

1. **Biopsy** for histopathological examination.
2. **X-ray** for calcified cyst.
3. **Ultrasound**, **C.T.** (computerized tomography) and **MRI** (magnetic resonance).
4. **Serological tests** may be helpful in diagnosis as I.H.A.T and ELISA.

Treatment

1. Surgical removal when possible.
2. Praziquantel combined with corticosteroids as anti-inflammatory in case of meningitis or cerebral oedema.
3. Albendazole is also effective

Prevention and control:

1. Early treatment of persons harbouring the adult worms to avoid autoinfection.
2. In patients harbouring the adult parasite, no nauseating drugs should be given.
3. Avoid the use of human excreta as manure.
4. Personal cleanliness, fly control and proper washing of raw vegetables.

MCQ1: Biopsy of muscle nodule showed white cyst contains scolex with a rostellum armed with double rows of taenoid hooks and an invaginated neck.

What is the causative parasite?

a. *Taenia solium*

b. *Heterophyes heterophyes*

c. *Taenia saginata*

d. *Trichinella spiralis*

e. *Fasciola gigantica*

MCQ4: Patient complaining of myalgia, pain in his right thigh. Worm fragments were previously passed in stool. Muscle biopsy specimens showed multiple white cysts, contains characteristics of scolex and an invaginated neck.

What is the diagnostic stage?

a. trichina capsule

b. encysted metacercaria

c. cysticercus cellulose

d. filariform larvae

e. Cercocystic cysticercoid

Summary & Wrap up