Taenia Solium
The Pork Tapeworm

Youstina Matthew
Pork Meat
Distribution

- Rural areas of developing countries
  - Mexico
  - Central & South America
    - Brazil, Colombia, Guatemala, ...
  - Asia
    - India, Cambodia, Vietnam,...
  - Africa
    - Most of the continent except the strictly Muslim countries
- Imported & Introduced
  - USA, Canada
  - Argentina
- No reports in Muslim countries
  - Iran, Afghanistan, Pakistan

(Nash et al.)
Distribution → Anatomy → Lifecycle → Diseases → Symptoms and Pathologies → Prevention → Treatment
Structure of *T. Solium*

- Head
- Neck
- Strobila

https://gmch.gov.in/e-study/e%20lectures/Microbiology/22%20Taenia.pdf
Structure of Head

- Scolex (Head)
  - Rostellum
  - 2 Hooks
  - 4 Suckers

- Neck
  - Site of Strobilation
Types of Proglottids

• Immature
  • Neck
  • No organs

• Mature
  • Male & Female reproductive organs

• Gravid
  • Longer, larger & broader
  • Uterus (Fertilized Eggs)
Distribution

- Anatomy

- Lifecycle

- Diseases

- Symptoms & Pathologies

- Prevention

- Treatment
Life cycle of *Taenia solium*

**Pork (meat, ham, sausages etc)**

1. Human infected by eating raw or improperly cooked pork meat from infected pig

2. Eggs in stools

3. Pig (intermediate host)
   - Pig ingests embryonated eggs that hatch into oncospheres in the intestine, migrate to tissues, and develop to cysticerci.

4. Human 2 (accidental intermediate host)
   - Cysticerci release from pork meat in stomach
   - In intestine, cysticerci mature into adult tapeworm attaching to the intestinal mucosa by its scolex

(Aung and W Spelman)
Life cycle of *Taenia solium*

1. Human infected by eating raw or improperly cooked pork meat from infected pig.
2. Eggs in stools.
3. Pig ingests embryonated eggs that hatch into oncospheres in the intestine, migrate to tissues, and develop to cysticerci.
4. Larval form cysts (Cysticercus cellulosae) develop in pig muscles.

Pork (meat, ham, sausages etc)

Human 1 (definitive host)

Cysticerci release from pork meat in stomach

In intestine, cysticerci mature into adult tapeworm attaching to the intestinal mucosa by its scolex.

Human 2 (accidental intermediate host)

Ingestion of *T. solium* eggs by fecal contamination (contaminated food or water, autoinfection)

Eggs in stools

Gravid segment of tapeworm (Proglottid) leaves body in stools, discharging eggs.

Pig (intermediate host)

 TAENIASIS

(Aung and W Spelman)
Life cycle of *Taenia solium*

1. Human infected by eating raw or improperly cooked pork meat from infected pig.
2. Eggs in stools.
3. Pig ingests embryonated eggs that hatch into oocysts in the intestine, migrate to tissues, and develop to cysticerci.
4. Pig (intermediate host).

(Aung and W Spelman)
Life cycle of *Taenia solium*

**Human:**
- Ingestion of *T. solium* eggs by fecal contamination of food or water
- Eggs hatch in intestine
- Cysticerci develop in brain, skeletal muscle, eyes
- Cysticerci release from human or intermediate host
- Cysticerci develop into adult tapeworm
- Eggs are passed in stools

**Intermediate Host:**
- Embryos released in intestine and migrate to tissues
- Cysticerci develop in brain, skeletal muscle, eyes
- Cysticerci release from intermediate host
- Cysticerci develop into adult tapeworm

**Definitive Host:**
- Human infected by eating raw or improperly cooked pork meat from infected pig
- Cysticerci develop in brain, skeletal muscle, eyes
- Cysticerci release from human and mature into adult tapeworm
- Eggs are passed in stools

(Aung and W Spelman)
Life cycle of *Taenia solium*

Pork (meat, ham, sausages etc)

1. Human infected by eating raw or improperly cooked pig meat from infected pig

2. Gravid segment of tapeworm (Proglottid) leaves body in stools, discharging eggs

3. Pig ingests embryonated eggs that hatch into oncospheres in the intestine, migrate to tissues, and develop to cysticerci.

4. Embryos release in intestine and migrate to tissues.

Porcine Cysticercosis

Human Cysticercosis

Taeniasis

(Aung and W Spelman)
Neglected Tropical Diseases

1. Taeniasis
2. Cysticercosis (CC)
3. Neurocysticercosis (NCC)

http://www.teroes.com/2018/05/what-is-taeniasis.html
Taeniasis: Intestinal Infection

http://144penyakit.blogspot.com/2014/05/taeniasis-cacing-pita.html

Cysticercosis & Neurocysticercosis

(Sacchidanand et al.)

(Garcia)

(Dhar et al.)
Distribution

Anatomy

Lifecycle

Diseases

Symptoms & Pathologies

Prevention

Treatment
Symptoms for Taeniasis

- Pain in the upper abdomen
- Weight loss
- Vomiting & Nausea
- Jaundice
- Irritation around the anus
- Fatigue & dizziness
Symptoms for CC & NCC

• Headache
• Bump shape
• Fever
• Convulsions
• Allergic reactions
Neglected Tropical Diseases

- Lack of funding
- Inaccurate diagnostic tools
- Lack of data for drugs
- Lack of specificity in serological tests
  - ELISA
Proper Cooking

• Whole cuts of Meat
  • At least 145°F (63°C)
  • Rest for 3 minutes

• Ground Meat
  • at least 160°F (71°C)
How To Prevent *T. Solium*

- Washing hands and cooking meat properly
- Looking for, treating and reporting the sources of infection
- Treating the exposed contacts
- Health education
- Strict meat inspection
- Vaccination for pigs ex. TSOL18 antigen
Treatment

• Taeniasis
  • Mass chemotherapy (Praziquantel, Niclosamide)

• Cysticercosis/ Neurocysticercosis
  • praziquantel and/or albendazole, corticosteroid (controversial when combination occur)
  • Surgery
He was such a cute little piglet...
References (1)


References (2)


- “Meningitis | Parasitic | CDC.” Centers for Disease Control and Prevention, CDC, Centers for Disease Control and Prevention, www.cdc.gov/meningitis/parasitic.html.


References (3)


General References

• http://www.teroes.com/2018/05/what-is-taeniasis.html
• http://144penyakit.blogspot.com/2014/05/taeniasis-cacing-pita.html
• https://gmch.gov.in/e-study/e%20lectures/Microbiology/22%20Taenia.pdf