Trichinella spiralis and Trichinosis Disease

Presented by: Sepahrad Zamani
Parasite: *Trichinella spiralis*

- Phylum → Nematoda
- Class → Enoplea
- Order → Trichurida
- Family → Trichinellidae
- Ovoviviparous
- Roundworm
- Females 2-4 mm and males 1-1.5 mm

(Foreyt et al., 1999)
Life Cycle

Pig consumes contaminated meat scraps

Ingestion of undercooked/raw pork containing encysted larvae

Formation of encysted larvae in muscle

Newborn larvae enter the circulation

Larvae get to small intestine and invade the epithelium

Larvae molt 4 times to become adults, which then mate
Life Cycle

- Encysted larvae are ingested.
- The pepsin and HCl dissolve the cyst and release the larvae, which pass into the small intestine, where they invade the epithelium.
- The larvae undergo four molts to become adults.
- Adults mate in the small intestine and produce larvae, which enter the circulation and then muscle cells.
- The host muscle cell is transformed into a nurse cell to surround and encapsulate the larva by collagen and layers of connective tissue.
• Adults live 10 days to several weeks

• Larvae can live for several years

• Female worms can produce 500–1,500 newborn larvae

• The encysted larvae in muscle is the infective and diagnostic form

• Infection occurs primarily among carnivores such as bears and foxes, or omnivores such as domestic pigs and wild boar.
A. Adult worms that developed in the small intestine; the small worms are newborn larvae (immature L1), which are infective to muscle.

B. Infective muscle larva in muscle cell surrounded by a collagen capsule (blue).

C. Infective muscle larva, staining of longitudinal section of excysted larvae.

(Mitreva and Jasmer, 2006)
Disease: Trichinosis (Trichinellosis)

- Food-borne
- Zoonotic
- An intestinal and tissue infection in humans and other mammals

Different phases of the disease

- 1) **Enteral Phase** (12 hrs – 48 hrs after ingestion)

  Penetration of larvae into intestinal mucosa and development to adults

- Symptoms ➔ diarrhea, nausea, abdominal pain, and vomiting
- Pathologies ➔ presence of the parasite in the GI tract
• 2) **Migratory Phase** (2 – 6 weeks after infection)

• Newborn larvae enter the circulation and migrate through tissues.

• **Symptoms** → trouble walking, breathing, and chewing (depending on the muscle)

• **Pathologies** → physical damage to tissues as well as causing allergic responses from the host. Induces a type I hypersensitivity reaction, leading to increased levels of mast cells, eosinophils, and parasite specific IgE production.
3) **Parenteral Phase**: penetration of larvae to muscle fibers

Once in the muscle fibers, they encyst undergo development, become infective within 15 days and remain for months to years.

- **Symptoms** ➔ muscle pain and tenderness, swelling of the eyelids or face, conjunctivitis, weakness.

- **Pathologies** ➔ Physical damage and tissue invasion
In cases of heavy invasion, larvae can migrate to vital organs, causing potentially dangerous, even fatal, complications, including:

- **Myocarditis** — an inflammation of the myocardium, the thick muscular layer of your heart wall

- **Encephalitis** — an inflammation of the brain

- **Meningitis** — an inflammation of the membranes (meninges) and cerebrospinal fluid surrounding your brain and spinal cord

- **Pneumonia** — an inflammation of the lungs, can be lethal due to respiratory arrest
Diagnosis

• Blood tests: eosinophilia and IgE formation

• Muscle biopsy: A small piece of muscle is removed and examined under a microscope to look for larvae.

Treatment

• Albendazole
• Mebendazole
• Corticosteroids
Epidemiology

(Gottstein et al., 2009)
Risk Factors for Trichinosis

- Improper food preparation
- Rural areas
- Consumption of wild or non-commercial meats

Prevention

- Avoid undercooked meat.
- Cook ground pork and beef to at least 160 °F (71 °C).
References


• Pozio E., La Rosa G., Rossi P., Murrell K.D. Biological characterization of *Trichinellaisolates* from various host species and geographical regions. J. Parasitol. (1992b);78:647–653.

