WHAT YOU NEED TO KNOW ABOUT CYSTICERCOSIS

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- **Taeniasis is an intestinal infection caused by adult tapeworms.**
- **Three tapeworm species cause taeniasis in humans, Taenia solium, Taenia saginata and Taenia asiatica. Only T. solium causes major health problems.**
- **T. solium taeniasis is acquired by humans through the ingestion of tapeworm larval cysts (cysticerci) in undercooked and infected pork.**
- **Human tapeworm carriers excrete tapeworm eggs in their faeces and contaminate the environment when they defecate in open areas.**
- **Humans can also become infected with T. solium eggs by ingesting contaminated food or water or because of poor hygiene via the fecal-oral route.**
- **Ingested T. solium eggs develop to larvae (called cysticerci) in various organs of the human body. When they enter the central nervous system they can cause neurological symptoms (neurocysticercosis), including epileptic seizures.**
- **T. solium is the cause of 30% of epilepsy cases in many endemic areas where people and roaming pigs live in close proximity.**
- **More than 80% of the world's 50 million people who are affected by epilepsy live in low and lower-middle income countries.**

Transmission and burden

Taeniasis is an intestinal infection caused by 3 species of tapeworm: *Taenia solium* (pork tapeworm), *Taenia saginata* (beef tapeworm) and *Taenia asiatica*.

Humans can become infected with *T. saginata* or *T. asiatica* when they consume infected beef meat or pig liver tissue, respectively, which has not been adequately cooked, but taeniasis due to *T. saginata* or *T. asiatica* has no major impact on human health. Therefore, this fact sheet refers to the transmission and health impacts of *T. solium* only.

Infection with the *T. solium* tapeworm occurs when humans eat raw or undercooked, infected pork. Tapeworm eggs pass with the faeces and are

infective for pigs. Infection in humans with the *T. solium* tapeworm causes few clinical symptoms. However as well as being infective for pigs, *T. solium* eggs may also infect humans if they are ingested, causing infection with the larval parasite in the tissues (human cysticercosis). This infection can result in devastating effects on human health. The larvae (cysticerci) may develop in the muscles, skin, eyes and the central nervous system. When cysts develop in the brain, the condition is referred to as neurocysticercosis. Symptoms include severe headache, blindness, convulsions, and epileptic seizures, and can be fatal. Neurocysticercosis is the most frequent preventable cause of epilepsy worldwide, and is estimated to cause 30% of all epilepsy cases in in countries where the parasite is endemic.

Cysticercosis mainly affects the health and livelihoods of subsistence farming communities in developing countries of Africa, Asia and Latin America. It also reduces the market value of pigs and cattle, and makes pork unsafe to eat. In 2015, the WHO Foodborne Disease Burden Epidemiology Reference Group identified *T. solium* as a leading cause of deaths from food-borne diseases, resulting in a considerable total of 2.8 million disability-adjusted life-years (DALYs). The total number of people suffering from neurocysticercosis, including symptomatic and asymptomatic cases, is estimated to be between 2.56–8.30 million, based on the range of epilepsy prevalence data available.

***T. solium* cysticercosis was added by WHO to the list of major Neglected Tropical Diseases (NTDs) in 2010 with NTD roadmap goals of making available a validated strategy for control and elimination of *T. solium* taeniasis/cysticercosis and those interventions to be scaled up in selected countries by 2020.**

Symptoms

Taeniasis due to *T. solium*, *T. saginata* or *T. asiatica* is usually characterized by mild and non-specific symptoms. Abdominal pain, nausea, diarrhoea or constipation may arise when the tapeworms become fully developed in the intestine, approximately 8 weeks after ingestion of meat containing cysticerci.

These symptoms may continue until the tapeworm dies following treatment, otherwise it may live for a number of years. It is considered that untreated infections with *T. solium* tapeworms generally persist for 2–3 years.

In the case of cysticercosis due to *T. solium*, the incubation period prior to the appearance of clinical symptoms is variable, and infected people may remain asymptomatic for many years.

In some endemic regions (particularly in Asia), infected people may develop visible or palpable nodules (a small solid bump or node that can be detected by touch) beneath the skin (subcutaneous). Neurocysticercosis is associated with a variety of signs and symptoms depending on the number, size, stage, and location of the pathological changes as well as the host's immune response, but can also be clinically asymptomatic. Symptoms may include chronic headaches, blindness, seizures (epilepsy if they are recurrent), hydrocephalus, meningitis, dementia, and symptoms caused by lesions occupying spaces of the central nervous system.

Treatment

Taenaisis can be treated with praziquantel (5-10 mg/kg, single-administration) or niclosamide (adults and children over 6 years: 2 g, single-administration after a light meal followed after 2 hours by a laxative; children aged 2–6 years: 1 g; children under 2 years: 500 mg).

In neurocysticercosis, since the destruction of cysts may lead to an inflammatory response, treatment of active disease may include long courses with praziquantel and/or albendazole, as well as supporting therapy with corticosteroids and/or anti-epileptic drugs, and possibly surgery. The dosage and the duration of treatment can vary greatly and depend mainly on the number, size, location and developmental stage of the cysts, their surrounding inflammatory edema, acuteness and severity of clinical symptoms or signs.

Prevention and control

To prevent, control and possibly eliminate *T. solium*, proper public health interventions with an approach spanning veterinary, human health and

environmental sectors are required. Eight interventions for the control of *T. solium* can be used in different combinations designed on the basis of the context in the countries:

- **treatment of taeniasis cases;**
- **intervention in pigs (vaccination plus anthelmintic treatment) together with strategic mass drug administration for taeniasis;**
- **health education, including hygiene and food safety;**
- **improved sanitation;**
- **improved pig husbandry; and**
- **improved meat inspection and processing of meat products.**

SOURCE; World Health Organization.