

***Taenia solium* among Refugees in the United States**

[Announcer] This program is presented by the Centers for Disease Control and Prevention.

[Mike Miller] Hi, I'm Mike Miller, and today I'm talking with Dr. Seth O'Neal, a medical epidemiologist from Oregon Health & Science University in Portland, Oregon. He specializes in the control of tapeworms. Our conversation today is based on his paper about the parasite *Taenia solium* among refugees in the United States, which appears in CDC's journal, *Emerging Infectious Diseases*. Welcome, Dr. O'Neal.

[Seth O'Neal] Thanks, Mike. It's a pleasure to speak with you today.

[Mike Miller] Dr. O'Neal, so let's begin. Tell us, what is *Taenia solium*?

[Seth O'Neal] Well, *Taenia solium*, which is commonly called the pork tapeworm, is a parasite which infects both people and pigs. It's an important parasite for public health because it can infect the human brain, causing seizures and other neurologic disease. In fact, in developing nations, this parasite is responsible for about one third of all seizure disorders.

[Mike Miller] And how do pigs get them?

[Seth O'Neal] The parasite has different life stages which occur in humans and pigs. The adult tapeworm lives in the human intestine where it makes eggs, which are passed in the feces. Pigs become infected by consuming human feces contaminated with tapeworm eggs, and these eggs can then develop into tapeworm larvae in the muscles and other tissues of the pig. This condition is known as cysticercosis. The disease mainly occurs in poor rural regions of the world where there are few latrines so people may defecate in the fields. And if pigs are allowed to roam free they will consume human feces and may become infected in that way.

[Mike Miller] Interesting. So how does it pass from pigs to people?

[Seth O'Neal] Well, the life cycle completes when people consume pork contaminated with the larval cysts, as these cysts can then go on to develop into the adult tapeworm within the human intestine. Adult tapeworms can live in the intestine for several years, and during this lifetime they can infect many people and pigs by shedding eggs.

[Mike Miller] But how would people know if they had them?

[Seth O'Neal] People who have an adult tapeworm living in their intestine usually don't know it. They may notice small tapeworm segments in their stool, but otherwise, there are few symptoms or signs of infection. People can also become infected by tapeworm larvae if they accidentally ingest tapeworm eggs. Just like in pigs, these eggs can go on to develop into tapeworm larvae within the human body. When the larvae develop within the brain they can cause seizures, headaches, cognitive disorders, strokes, and other neurologic problems. This is called neurocysticercosis.

[Mike Miller] Well, who are the people who mostly get them?

[Seth O'Neal] People who live in rural areas in developing countries are most at risk. But people who emigrate from these regions or travel to them are also at risk.

[Mike Miller] So are they contagious? Can people pass them to each other?

[Seth O'Neal] The parasite is passed from person-to-person only through tapeworm eggs. People who have an adult tapeworm in the intestine can infect themselves or others with tapeworm larvae, that's cysticercosis, if they don't wash their hands carefully. But people with cysticercosis don't pass the parasite to others unless they also have an adult tapeworm in their intestine.

[Mike Miller] Is there a way to test for them in people?

[Seth O'Neal] We can test stool samples to see if someone has an adult intestinal tapeworm. But diagnosing neurocysticercosis is more complicated. It requires taking images of the brain with either a CT scan or an MRI.

[Mike Miller] What about treatment? Is there a treatment for them?

[Seth O'Neal] Yeah, there are a couple of options for treating adult intestinal tapeworms. Both are taken in a single dose by mouth. Treatment of neurocysticercosis is much more complicated, though, and can require long-term medications and surgery. Our immune system can react strongly to dying larval cysts in the brain which can cause significant swelling. Controlling this inflammation is an important part of treatment of neurocysticercosis.

[Mike Miller] Since this treatment you describe can be dangerous, is there an alternative for people with known brain cysts?

[Seth O'Neal] Well, the risk of presumptive treatment for adult intestinal tapeworms comes from the fact that one of the drugs, praziquantel, can potentially damage any larvae that might be in the brain. Knowing whether someone has larvae in their brain before offering praziquantel is important so that medications to control swelling can be given at the same time, or other alternatives can be pursued. Treating the patient with a drug called niclosamide is a safe alternative as it does not affect cysts in the brain. However, niclosamide is not available in many parts of the world.

[Mike Miller] So, if adult tapeworms are found, do doctors then generally do a brain scan to look for the larvae?

[Seth O'Neal] Well, this really depends on the location of the patient. In rural areas of the developing world where people are most at risk, CT scans and MRI machines are often not available. However, where these technologies *are* available, doctors should consider ordering a brain scan prior to treating someone with praziquantel for intestinal tapeworms.

[Mike Miller] It seems like not getting the parasite in the first place is the best option. Are there any ways to prevent getting *Taenia solium*?

[Seth O'Neal] On an individual level, washing your hands well and avoiding undercooked pork can help prevent infection. From a broader perspective though, cysticercosis is one of only seven diseases currently considered to be a potential candidate for global eradication. This means that there is potential, as was achieved with smallpox, to permanently reduce new cases around the world to zero. We have a long way to go before achieving this landmark, but there is hope that increased awareness will fuel our efforts to combat this important disease.

[Mike Miller] Well, thanks, Dr. O'Neal. I've been talking with Dr. Seth O'Neal about his paper, *Seroprevalence of Antibodies against Taenia solium Cysticerci among Refugees Resettled in the United States*, which appears in the March 2012 issue of CDC's journal, *Emerging Infectious Diseases*. You can see the entire article online at www.cdc.gov/eid.

Now, if you'd like to comment on this podcast, send an email to ededitor@cdc.gov.

I'm Mike Miller, for *Emerging Infectious Diseases*.

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