# **Rare case surprises scientists as cancer cells go from tapeworm to human**

By Washington Post, adapted by Newsela staff 11.25.15

WASHINGTON — Scientists from the Centers for Disease Control and Prevention (CDC) have identified a puzzling and unsettling new cancer-like condition in a 41-year-old man. He is believed to have become ill through a common stomach bug. The case is the first known transmission of cancer cells from a parasite to a human. It involves an HIV patient from Colombia who developed multiple, large tumors in various parts of his body. Local doctors removed samples of those tumors and found that the cells acted like cancer cells in their destructiveness but were strange in other respects. For one, they were about 10 times smaller than normal human cancer cells. The doctors contacted the CDC for help. Atis Muehlenbachs is a pathologist at the CDC who investigates unexplained mystery illnesses and deaths. He wasn't sure what to make of the cell samples when he and his team received them in 2013. The cells' growth pattern was cancer-like, they noticed, with overcrowding and a high rate of multiplication. But the cells also fused together, which is rare for human cells.

**Dwarf Tapeworm DNA Discovered**

One early theory, Muehlenbachs said in an interview Nov. 4, was that they could be a new type of infectious organism that could spread from person to person. But after performing dozens of tests, the team discovered the cells contained DNA snippets of a dwarf tapeworm. That analysis was verified by a researcher and tapeworm expert at the Natural History Museum in London. "In the initial months, we wondered if this was a weird human cancer or some unusual, bizarre emerging protozoa-amoeba-like infection," he recalled. "Discovering these cells had tapeworm DNA was a big surprise — a really big surprise."

The CDC researchers now think the Colombian man may have ingested some microscopic tapeworm eggs, most likely in contaminated food. Because of the man's weakened immune system, the tapeworms multiplied rapidly inside his gastrointestinal tract and the cells invaded other parts of his body. It's unclear whether the cells in the tapeworm eggs exhibited cancer-like properties before they entered the man's body or whether some interaction between the parasite and his body then caused them to become cancerous.

**Parasite Transmission "Very Unusual"**

"This is the first time we've seen parasite-derived cancer cells spreading within an individual," Muehlenbachs said. "This is a very unusual, very unique illness." The case study is worrisome for numerous reasons. We know that many creatures, such as various sea animals, are prone to developing cancer, while others, like elephants, are almost immune to it. But until now, scientists had not believed that any human parasite could contain cancer cells or transfer them to people. We've also known that certain parasitic infections could put people at higher risk for specific cancers. But the reason was wholly different, namely that people fighting these infections are in a weakened state. The presence of cancerous cells in tapeworms also raises numerous questions about where the mutant cells originated — from something in the environment? — and whether other organisms that live inside or on people could transmit cancer cells.

**Experts Don't See Human-To-Human Risk**

Cancer is generally not considered to be a transmissible disease, although there have been very rare cases of humans passing on cancerous cells to other humans. Typically, this has been through organ transplants or from mother to fetus during pregnancy. There are also some animal species — such as Tasmanian devils and domestic dogs — that are known to have transmissible cancer cells circulating within their populations. The CDC does not believe there is any risk of the tapeworm cancer cells being spread directly from one person to another.

It's unclear how common this type of tapeworm cancer illness is in humans, but some experts believe it's likely that there are more cases out there. The Colombian man came to the attention of researchers in his hometown of Medellin when he sought care because of fatigue, fever, a cough and weight loss. The patient had been living with HIV for at least seven years and had not been sticking with his therapy. A CT scan showed tumors ranging in size from 0.4 to 4.4 centimeters in his neck, lymph nodes, lungs and liver. Stool samples showed tapeworms inside his body.

**Most People Clear Infection Quickly**

Tapeworm infections are very common worldwide, especially in the developing world, with an estimated 75 million people infected at any given time. Most do not show symptoms and clear the parasites quickly. But in people with compromised immune systems, tapeworms tend to thrive and can live in their hosts for years.

By the time the CDC researchers figured out what was going on, the man's condition had deteriorated and he was in hospice care. He died 72 hours later, without any opportunity for treatment. His official cause of death was HIV/AIDS, with cancer a contributor to his weakened state. Muehlenbachs said further study was limited by the patient's death and the fact that researchers have been unable to grow tapeworm cancer cells in the lab. He also said he's not sure the current range of treatments could have helped given the nature of the man's tumors.

In fact, the pathologist is cautious about calling the Colombian's illness "cancer" because those cells were different from normal human cancer cells, even though they behaved similarly. Instead, Muehlenbachs referred to it as "an infection with parasite-derived cancer which causes a cancer-like illness." While he believes this type of case is rare, no one knows for sure. Muehlenbachs said further investigation is needed to determine whether it is limited to tapeworms or whether the situation is more complicated.

**Your Assignment (On a separate piece of paper)**

**Quiz**

**1. Read the excerpt from the article.**

We've also known that certain parasitic infections could put people at higher risk for specific cancers. But the reason was wholly different, namely that people fighting these infections are in a weakened state.

**Which idea is BEST supported by the excerpt? (2 pt)**

1. Until now parasites have never been found to actually transmit cancer to people.
2. Scientists were already aware of some of the ways parasites transmitted cancer to people.
3. In the past, some scientists believed parasites could pass on certain cancers.
4. People who get infections from parasites will most likely also get cancer.

**2. Which of the following answer choices BEST supports the idea that scientists' initial hypotheses about the cause of the man's tumors were incorrect? (2 pt)**

1. He is believed to have become ill through a common stomach bug.
2. He was not sure what to make of the cell samples when he and his team received them in 2013.
3. One early theory, Muehlenbachs said in an interview Nov. 4, was that they could be a new type of infectious organism that could spread from person to person.
4. "This is the first time we've seen parasite-derived cancer cells spreading within an individual," Muehlenbachs said. "This is a very unusual, very unique illness."

**3. Which two excerpts refer to ideas that would be MOST important to include in a summary of the article? (2 pt)**

1. The case is the first known transmission of cancer cells from a parasite to a human.
2. The cells' growth pattern was cancer-like, they noticed, with overcrowding and a high rate of multiplication.
3. The presence of cancerous cells in tapeworms also raises numerous questions about where the mutant cells originated — from something in the environment? — and whether other organisms that live inside or on people could transmit cancer cells.
4. Muehlenbachs said further study was limited by the patient's death and the fact that researchers have been unable to grow tapeworm cancer cells in the lab.
5. 1 and 2
6. 1 and 3
7. 3 and 4
8. 2 and 4

**4. The discovery of this cancer has created a new area of investigation in the scientific community.**

**Which of the following details from the article BEST illustrates this idea? (2 pt)**

1. The patient had been living with HIV for seven years before scientists started investigating his cancer.
2. One of the lead scientists is not yet certain the illness is actually cancer and calls it "cancer-like."
3. Current cancer treatments might not have been able to help this particular patient.
4. This type of cancer is likely to be extremely rare and therefore difficult to investigate further.