

“The Last of Us”: Could Fungi Spell Doom? (Print)

Creating a post-apocalyptic world, HBO’s “The Last of Us” introduces viewers to what life could look like when a fungal infection spreads across the globe.

Infecting the food supply, the show (based on a video game) infers that the fungi cordyceps have mutated and quickly spread to humans.

What are cordyceps?

Cordyceps (specifically [*Ophiocordyceps unilateralis*](#) in the show) are a group of fungi which has hundreds of species. Cordyceps can infect certain insects, like [ants and tarantulas](#), by becoming parasites. They can even be parasitic to other fungi as well. The cordyceps fungus is known to cause insects to behave erratically, searching for a place with more sunlight and warmth. When the insect dies, a fungal growth emerges from its head, releasing spores and looking for its next victim.

“The Last of Us” tells the story of a fungal infection zombie apocalypse. Is this scenario realistic? Sharjeel Ahmad, MD, an infectious disease specialist with OSF HealthCare, dives into that question. The short answer is “no.” But a more complex perspective is needed, Dr. Ahmad stresses. It should include being aware of common fungal infections that are possible in humans.

The first thing to provide viewers with peace of mind comes down to mammals’ body temperature.

Body temperatures’ protection

“Our body temperature is quite high, and many of these fungi can’t survive in those body temperatures. So that’s one way we’re protected,” Dr. Ahmad says.

Certain fungal infections can happen in people with pre-existing lung damage (smoking, prior lung damage from infection or occupational exposure) or have a weakened immune system. Instead of losing sleep about cordyceps, Dr. Ahmad says [histoplasmosis](#) is much more common in the Midwest and is cause for more concern.

“If you’re living in Illinois, you’ve been exposed to it.”

The Centers for Disease Control & Prevention (CDC) says histoplasmosis is a lung infection, or pneumonia. It happens in only one to two people per 100,000 who breathe in spores from the fungus *Histoplasma* outside.

It’s the same with [blastomycosis](#), a lung infection caused by a soil-based fungus, *blastomyces*, which is located in roughly half of the United States. CDC’s estimated areas map shows *blastomyces* likely living throughout the Midwest and across the entire East Coast. *Blastomycosis* symptoms include fever, sweating, shortness of breath and cough.

Candida auris: a bigger concern

Candida auris (*C. Auris*) is an emerging fungal infection which has attracted clinical attention, Dr. Ahmad says. It’s a multi-drug-resistant yeast that spreads from person to person, especially in medical facilities.

“[Candida auris](#) was first discovered in the ear canal of a 70-year-old Japanese woman in Tokyo back in 2009. Now we have had this infection in many different countries, even in the U.S.,” Dr. Ahmad says. “It’s one of those species that can survive between 98.6 degrees Fahrenheit and 104 degrees.”

C. auris can cause different kinds of infection. Symptoms can mimic bacterial infections with symptoms being dependent on where in your body the fungus infects. CDC says people can have *C. auris* on their skin, but not have symptoms at all, meaning it’s possible for the fungus to spread on touched surfaces and to other people. Those

affected are normally experiencing serious underlying medical conditions and using a device such as a breathing or feeding tube, or a catheter.

Dr. Ahmad says that the overuse of antibiotics has also played a role in the development of the threat of drug-resistant fungal infection. Excessive use of broad-spectrum antibiotics can increase the risk of a fungal infection. He points out that the agricultural use of antifungal pesticides (similar to medical antifungal drugs) can contribute to the development of drug-resistant fungal strains.

“The Last of Us” situation is unlikely

Viruses are simpler creatures, Dr. Ahmad says, which means they can mutate more easily, adapt and spread from species to species. On the other hand, fungi are more complex so there are specific parameters needed to be met for them to infect a host.

"That jump theoretically could be possible but it's not like we're going to wake up one day and just like “The Last of Us,” and it goes through a contaminated food supply. I don't see that happening," Dr. Ahmad says.

Many fungal infections are not known to jump from human to human. They normally happen due to people being outside and inhaling spores which can come from things such as decaying logs, fallen trees, birds' nests, bat or bird droppings, and really any soil. The [University of Minnesota Extension says](#) common fungi in yards and gardens only live on decaying plant matter, so they do not impact living plants.

If there is a concern for fungal infection, it is important to get seen quickly to figure out what's going on per Dr. Ahmad. Outdoor workers including farmers, or those on a construction site can be infected, as the spores can aerosolize during demolition and cleanup projects.

"Sometimes we have a patient who is a smoker, and they come in for a low-dose CT lung cancer screening. They have zero symptoms, but a spot is found on the lungs that wasn't seen before. Through testing, the spot is found to be due to Histoplasmosis," Dr. Ahmad says.

[Coccidioidomycosis](#) (pronounced cahk-sid-ee-oy-doh-my-KOH-sis), commonly known as valley fever, can be found in the Southwestern United States in desert environments. While everyone is likely exposed to these spores, only a few will be impacted. It is more commonly seen in the Southwestern U.S. and South America, but it was also found in Washington State in 2015.

Increasing temperatures or changing weather patterns can evolve the geography of where fungi can affect people. People moving to new regions of the world, along with poorer living conditions can also play a role. Extreme weather events such as storms, heat waves, droughts and wildfires can promote the growth and spread of spores. Flooding can cause mold not just outside, but also inside people's homes.

Why don't fungal infections take over human brains?

"The human mind is very, very complex and is a different beast than an insect's brain. That kind of specialization, for the fungi to adapt and parasitize a human mind, controlling something as complex as the human cerebral cortex versus the brain of an insect, needs a high degree of adaptation and evolution. That does not happen quickly," Dr. Ahmad says.

Does spring worsen the risk?

Spring is here and fungal infections may impact more plants, but warmer weather does not necessarily mean humans should be worried about getting a fungal infection. Throughout the year, activities which can increase the risk of exposure to fungal spores, such as gardening can be dangerous for individuals with weakened immune systems. While wearing masks outside could provide some protection, Dr. Ahmad says it won't take away the threat completely.

“The Last of Us” season two premieres on Max on April 13. Dr. Ahmad says while the show is fictional, the increased attention to the rising threat of fungal infections overall is a positive thing.

"It makes for really good television, and it brings good awareness around fungal infections."