

# Deadly New Airborne Fungus Spreading in Oregon

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A newly discovered strain of an airborne fungus has caused several deaths in Oregon and seems poised to move into California and other adjacent areas, according to scientists at Duke University Medical Center.

"This novel fungus is worrisome because it appears to be a threat to otherwise healthy people," said Edmond Byrnes III, a graduate student in the Duke Department of Molecular Genetics and Microbiology. "Typically, we see this fungal disease associated with transplant recipients and HIV-infected patients, but that is not what we are seeing."

Byrnes and other Duke co-authors work in the laboratory of senior author Joseph Heitman, MD, PhD, chair of the Department of Molecular Genetics and Microbiology.

Their new work on the emergence and virulence of the new genotypes of *Cryptococcus gattii* fungi in the United States was published online in PLoS Pathogens on April 22.

The mortality rate for recent *C. gattii* cases in the Pacific Northwest is running at approximately 25 percent out of 21 cases analyzed in the United States, compared to a mortality rate of 8.7 percent out of 218 cases in British Columbia, Canada, the researchers said. Most have a more complicated clinical course than people infected with the more common *Cryptococcus neoformans*.

Because the strain is so virulent when it infects some humans and animals, the researchers are calling for greater awareness and vigilance. Testing involves culturing the fungus and then sequencing its DNA to learn whether it is the virulent or more benign strain, which could affect treatment plans.

Some strains of *C. gattii* are not more virulent than *C. neoformans*, for example, but doctors need to know what type they are dealing with, Byrnes said. Using molecular techniques, the geneticists uncovered clues that showed the Oregon-only fungal type most likely arose recently, in addition to an outbreak of *C. gattii* that began in Canada in 1999 that has now spread into Washington and Oregon.

Symptoms can appear two to several months after exposure, and may include a cough lasting weeks, sharp chest pain, shortness of breath, headache (related to meningitis), fever, nighttime sweats, and weight loss. In animals the symptoms are a runny nose, breathing problems, nervous system problems, and raised bumps under the skin.

While *C. gattii* can be treated, it cannot be prevented; there is no vaccine.

The new type of *C. gattii* reproduces both sexually and asexually. The more virulent strain may have genetically recombined with related but less harmful strains. This novel genotype is highly virulent compared with similar isolates of *Cryptococcus* that are not causing disease outbreaks.

The researchers found that the novel genotype (VGIIc) is now a major source of *C. gattii* illness in Oregon. Because *C. gattii* types had been found in tropical areas before, co-lead author Wenjun Li, MD, PhD, of Duke Molecular Genetics and Microbiology, speculates that environmental changes may be responsible for the evolution and emergence of this pathogen.

Determining the exact origin of the VGIIc type is difficult, and sampling thus far has failed to turn up isolates in Oregon soil, water, or trees.

"We are trying to put together the evolutionary story of where these types come from by closely studying the genetics of all samples possible," said Yonathan Lewit, a research associate also in Duke Molecular

Genetics and Microbiology. He said that cell components called mitochondria may play a role in the increased virulence of certain types.

VGIIc, the new Oregon strain, has yielded dozens of isolates in many specimens, including domesticated animals: cats, dogs, an alpaca, and a sheep. "Most of those are nonmigratory animals," Byrnes said,

explaining that the animals probably didn't bring the pathogen from some other region, and most likely acquired it locally.

Other authors include Hansong Ma, Kerstin Voelz and Robin May of the Department of Molecular Pathobiology at the University of Birmingham, United Kingdom; Ping Ren and Vishnu Chaturvedi of the Mycology Laboratory at Wadsworth Center in Albany, N.Y.; Dee Carter of the Department of Molecular and Microbial Biosciences, the University of Sydney, Australia; and Robert Bildfell of the Department of Biomedical Sciences, Oregon State University, Corvallis.

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