

## Disease-causing genes spread easily in emerging lethal fungus infection

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A rare, emerging fungal disease that is spreading throughout Canada and Northwestern USA can easily pass its deadly genes to related fungal strains within the species but less readily to more distant relatives, according to new research from the University of Birmingham.

The findings will help to understand the origins of infectious outbreaks and predict the likelihood of the disease spreading to other populations and geographical areas.

*Cryptococcus gattii* is a type of fungus that was previously only found in warmer climates throughout the tropics. However, since 1999 outbreaks of highly virulent strains of the fungus have been reported in the cooler climates of Canada and Northwestern USA, causing serious illness in otherwise healthy people and domestic and wild animals and proving fatal in some cases.

To try to understand how likely it is that the disease will spread further, a team of researchers in the US and UK interbred different strains of the fungus to test how easily the characteristics of these more dangerous strains can be transferred to other less harmful strains.

The results show that genes conferring traits that make the fungus more dangerous are easily passed to the offspring when the two parent strains are closely related. When the strains are distantly related to each other, the genes are much less likely to spread.

**Professor Robin May** (<http://www.birmingham.ac.uk/schools/biosciences/staff/profile.aspx?ReferenceId=5448&Name=professor-robin-may>) from the School of Biosciences at the University of Birmingham, who co-led the study with Dr. Joseph Heitman, MD, PhD from Duke University, said: "That the fungus can easily pass on the genes that make it more dangerous means that we could potentially see new strains of *C. gattii* cropping up spontaneously, causing outbreaks of disease in areas that were previously unaffected.

"Although this is still a very rare disease, with only around 400 people having been affected in the last decade, the results of our study show that surveillance efforts will be vital to stop it from spreading."

Part of the reason the 'hypervirulent' strains are so dangerous is that they have the unusual ability to survive inside cells of the infected person's immune system, where they rapidly reproduce.

The findings reveal that these characteristics can be inherited from the parent fungi through the genome and also through genetic material contained within the mitochondria, tiny structures inside the fungal cells. Mitochondrial DNA is normally inherited from only one parent but the team show that this particular strain of fungus can get mitochondrial genes from both parents.

*C. gattii* is found in the soil and in association with certain trees such as eucalyptus, pine or fir trees. It is transmitted to humans and other animals by inhaling spores of the fungus that are carried in the air. After infecting the lungs, cells of the fungus can travel through the bloodstream to infect other areas of the body, including the brain. The most common symptoms are shortness of breath, coughing, fatigue, fever, and headache.

The study, published online today in the journal PLOS Genetics, was funded by the Wellcome Trust, Medical Research Council and the US National Institutes of Health.

### Notes to Editors

#### Reference

K. Voelz et al. Transmission of hypervirulence traits via sexual reproduction within and between lineages of the human fungal pathogen *Cryptococcus gattii*. PLOS Genetics, 5 September. [epub ahead of print]

To interview Professor Robin May, please contact [Kara Bradley \(mailto:k.j.bradley@bham.ac.uk\)](mailto:k.j.bradley@bham.ac.uk) at the University of Birmingham press office on 0121 414 5134.

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