

Unexpectedly high rate of multiple strains in fungal infection

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New research shows that nearly 1 in 5 cases of infection with the potentially deadly fungus *Cryptococcus neoformans* are caused by not one but multiple strains of the pathogen. Researchers from the Institut Pasteur and the University of Minnesota Medical School report their findings today in the inaugural issue of *mBio*, the first online, open-access journal published by the American Society for Microbiology.

"Koch's postulates are criteria establishing a causal relationship between a microbe and a disease that lead to the assumption that the disease is caused by a single strain or its evolved forms," says Françoise Dromer of the Institut Pasteur, an author of the study. "Using molecular analysis of unpurified isolates, we demonstrated that mixed infections in humans are more common than previously thought, occurring in almost 20 percent of patients diagnosed with cryptococcosis."

C. neoformans is a life-threatening [fungal pathogen](#) that is responsible for an estimated 1 million cases of meningoencephalitis. It affects up to 30 percent of HIV-infected patients in sub-Saharan Africa and Southeast Asia and despite adequate treatment is still fatal in almost 20 percent of cases.

Cryptococcosis is usually considered to represent the reactivation of a dormant infection. A single isolate of *C. neoformans* has been thought to be responsible for the disease, but isolation of numerous different strains at the same geographic site suggested infection with multiple stains was possible. Only anecdotal reports of mixed infections have been

published to date.

The researchers analyzed clinical cultures collected during a prospective study on cryptococcosis. Using molecular analysis of unpurified isolates they uncovered an unexpectedly high frequency (almost 20 percent) of mixed infections. They further demonstrated that these mixed infections could result from infestation by multiple strains acquired from the environment and that the strains were also evolving during infection.

"The concept of one strain/one infection does not hold true for *C. neoformans* and may apply to other environmentally acquired fungal pathogens. The possibility of mixed and/or evolving infections should be taken into account when developing therapeutic strategies against these pathogens," says Dromer.

More information: mbio.asm.org

Provided by American Society for Microbiology

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