

Dogs at war with fungus

November 13 2020, by Maartje Kouwen



Evolution of the fungus *Aspergillus fumigatus* in the dog's nose. The normal green wild type in the left. On the right two white variants from dogs that form less spores. Credit: Hans de Cock

The fungus that some dogs carry in their nose evolves within the dog's nose. The genetic changes indicate adaptation of the fungus to the dog. That's also of importance for humans, since infection with this fungus can be deadly. Researchers of Utrecht University gained these new insights in research on natural infections of dogs that came with an inflammation at the veterinarian. The study thus also shows that studying natural infections is an alternative to experiments with laboratory animals. They publish their findings 12 November in *Nature Biofilms and Microbiomes*.

The [fungus](#) *Aspergillus fumigatus* causes an inflammation of the nasal

cavity in [dogs](#), which can spread to the frontal cavity. The fungi form a biofilm on the surface of the epithelium. This can lead to a severe and sometimes chronic inflammatory reaction. The fungus can even grow into the brain if the dog is not treated in time.

Utrecht-based scientists conducted [genetic research](#) on dogs and the fungus. "We discovered that the dog and the fungus are fighting for nutrients. The fungus suppresses the dog's immune system, specifically the Th17 response," says last author Hans de Cock from Utrecht University. "We also see that the fungus genetically adapts to the host during growth, a phenomenon we call in-host adaptation, which allows the fungus to survive better in the cavities of the dog."

This is the first time that scientists have studied the fungus in natural infections in dogs—so no experimental animals were involved. The researchers were actually studying the fungus in humans. The dogs were taken to the vet with an [infection](#); removing the fungus is a standard part of the treatment. That provided useful specimens for the researchers. It allowed them to study the large genetic variation and discover the adaptation of the fungus.

"With gene expression analyses, we gained insight into the dog's defenses and the behavior of the fungus, both at gene expression level and evolution in the patient," says De Cock. "This research shows that the study of natural infections is an alternative to experiments with laboratory animals."

Previous research has shown that certain breeds of dog are more susceptible to this fungus—including a [labrador retriever](#) and golden retriever—and that genetic predisposition seems to play a role in this. The new insights provide leads for better treatment of the fungus in dogs.

This fungus also causes problems for people. "This is one of four notorious fungi responsible for 1.5 million deaths among people worldwide. We therefore want to find out as much as possible about these pathogens that cause all kinds of different infections".

More information: I. D. Valdes et al. The sino-nasal warzone: transcriptomic and genomic studies on sino-nasal aspergillosis in dogs, *npj Biofilms and Microbiomes* (2020). [DOI: 10.1038/s41522-020-00163-7](https://doi.org/10.1038/s41522-020-00163-7)

Provided by Utrecht University Faculty of Science

Citation: Dogs at war with fungus (2020, November 13) retrieved 3 May 2024 from <https://phys.org/news/2020-11-dogs-war-fungus.html>

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