Virulence determinants of the human pathogenic fungus *Aspergillus fumigatus* protect against soil amoeba predation.

Hillmann F, Novohradská S, Mattern DJ, Forberger T, Heinekamp T, Westermann M, Winckler T, Brakhage AA (2015) Virulence determinants of the human pathogenic fungus *Aspergillus fumigatus* protect against soil amoeba predation. *Environ Microbiol* 17(8), 2858-2869.

Abstract

Filamentous fungi represent classical examples for environmentally acquired human pathogens whose major virulence mechanisms are likely to have emerged long before the appearance of innate immune systems. In natural habitats, amoeba predation could impose a major selection pressure towards the acquisition of virulence attributes. To test this hypothesis, we exploited the amoeba *Dicytostelium discoideum* to study its interaction with *Aspergillus fumigatus*, two abundant soil inhabitants for which we found co-occurrence in various sites. Fungal conidia were efficiently taken up by *D. discoideum*, but ingestion was higher when conidia were devoid of the green fungal spore pigment DHN-melanin, in line with earlier results obtained for immune cells. Conidia were able to survive phagocytic processing and intracellular germination was initiated only after several hours of coincubation which eventually led to a lethal disruption of the host cell. Besides phagocytic interactions, both amoeba and fungus secreted cross inhibitory factors which suppressed fungal growth or induced amoeba aggregation with subsequent cell lysis, respectively.

On the fungal side, we identified gliotoxin as the major fungal factor killing *Dictyostelium*, supporting the idea that major virulence attributes, such as escape from phagocytosis and the secretion of mycotoxins are beneficial to escape from environmental predators.

Involved units

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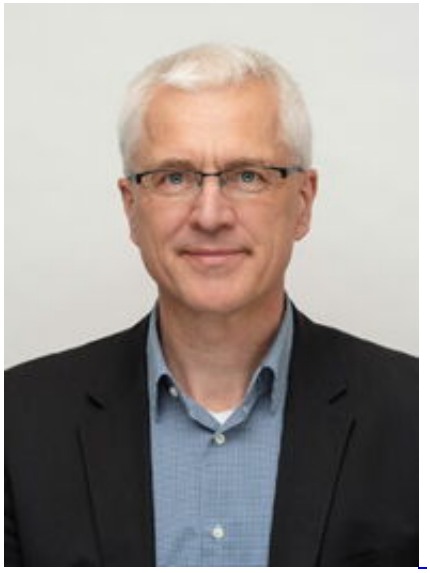

Axel A. Brakhage

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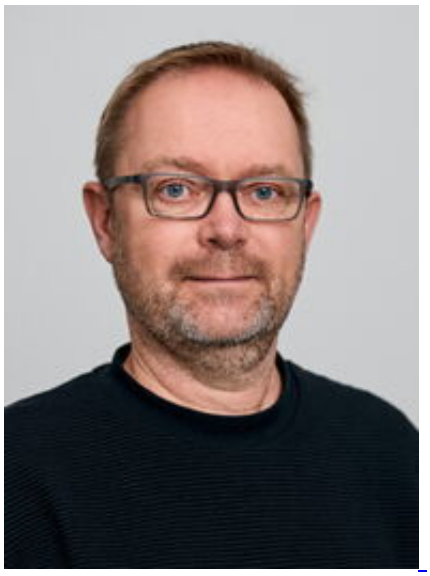

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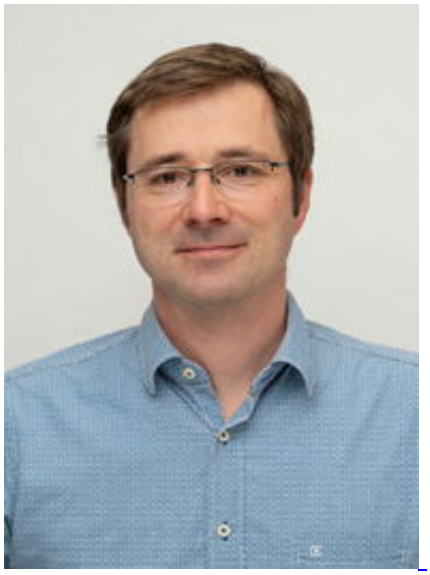

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doi: 10.1111/1462-2920.12808

PMID: 25684622