

Fungal weapon turns against the maker

Candidalysin destroys host cells and activates immune response

By Alena Gold

Jena. An international research team led by Bernhard Hube from the Leibniz Institute for Natural Product Research and Infection Biology in Jena has solved another mystery of the yeast *Candida albicans*: They discovered that its fungal toxin Candidalysin boycotts its pathogenic effect by attracting immune cells. The scientists published their results in the journal *Nature Communications*.

Like many microorganisms, *Candida albicans* lives as a commensal, i.e. harmless beneficiary in the human digestive tract. It is part of a healthy microbiome. However, if the microbiome becomes unbalanced and the number of yeast cells increases, human macrophages intervene to regulate the fungus. They absorb the fungus, which in return grows thread-like and produces the toxin Candidalysin. This toxin attacks the macrophages and destroys them. Thus *Candida albicans* escapes the grasp of the immune system and continues to multiply until the person eventually falls ill.

But it does not always come to that, as the research team from Germany, Great Britain, the USA and Canada has now discovered: the macrophage recognizes the toxin before it unfolds its deadly effect and triggers inflammation. This attracts other immune cells, especially neutrophils. These finally eliminate the yeast. Candidalysin thus contributes on the one hand to the virulence of the pathogen by destroying host cells; on the other hand it fights itself by activating the immune defence. As a virulence factor, the toxin thus promotes the disease. However, under certain circumstances it prevents it and is then an avirulence factor. "It is possible that the dual function of Candidalysin we found is the result of the joint evolution of pathogen and host: The human immune system has learned to recognise the weapon of the pathogen and then launches the counterattack," says group leader Bernhard Hube, head of department at the Leibniz-HKI and professor at the Friedrich Schiller University Jena. "We will now elucidate which conditions favour the avirulence property of Candidalysin over its toxicity," Hube adds.

(2078 signs)

Original publication

Kasper L, König A, Koenig PA, Gresnigt MS, Westman J, Drummond, RA, Lionakis MS, Groß O, Ruland J, Naglik, JR, Hube B (2018) The fungal peptide toxin Candidalysin activates the NLRP3 inflammasome and causes cytolysis in mononuclear phagocytes. *Nature Communications*, DOI: [10.1038/s41467-018-06607-1](https://doi.org/10.1038/s41467-018-06607-1).

Pictures

18-10-15_Bernhard Hube.jpg

Group leader Bernhard Hube

Source: Anna Schroll, Leibniz-HKI

18-10-15_Candida.jpg

Hyphae of the yeast *Candida albicans* are taken up by epithelial cells.

Source: Bernhard Hube, Leibniz-HKI, EMZ of FSU Jena

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