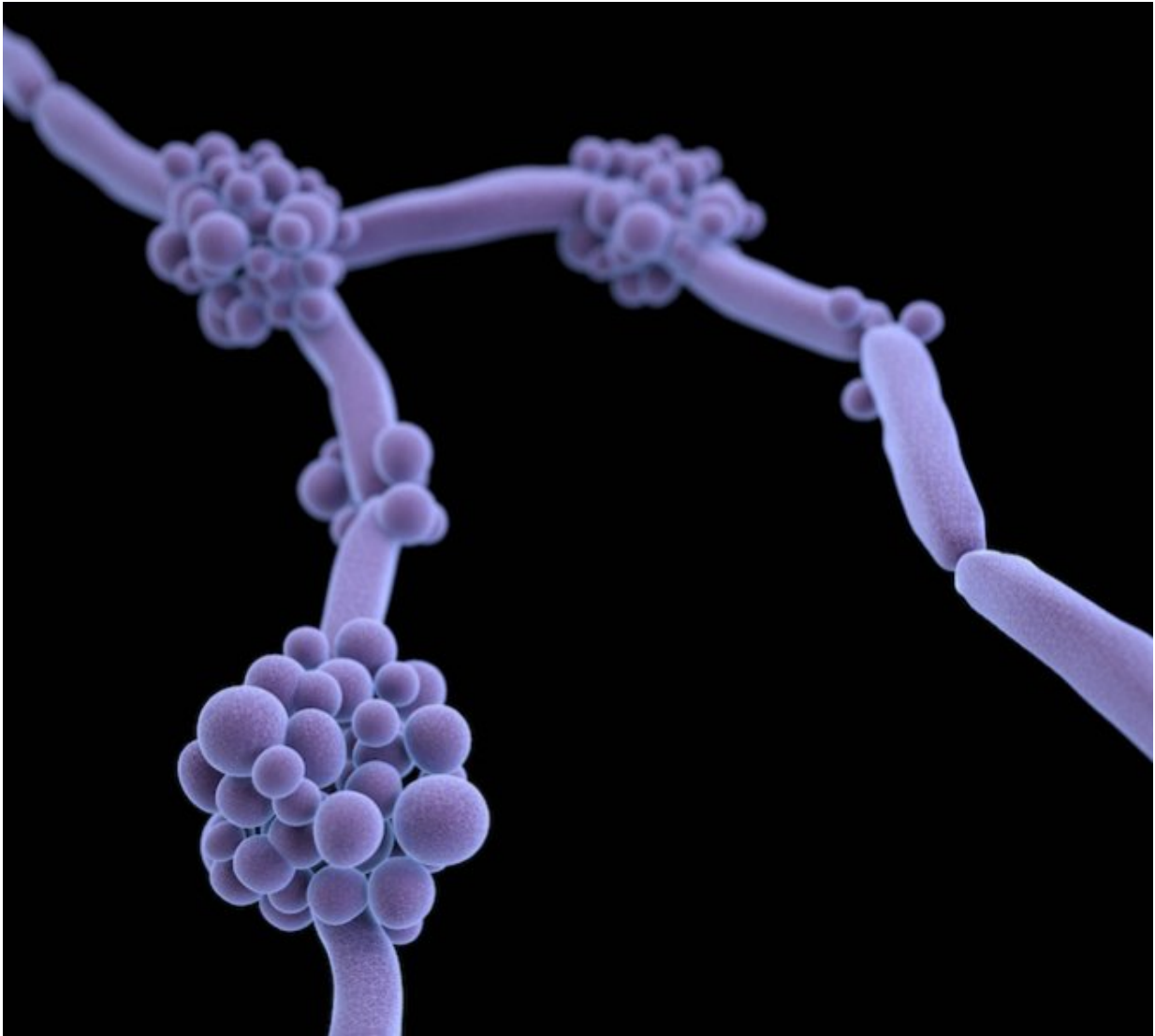


International screening of the effects of a pathogenic fungus

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Candida albicans, which is related to Candida auris. Credit: CDC

The pathogenic fungus *Candida auris*, which first surfaced in 2009, is proving challenging to control. It is resistant to many fungicides and not easy to diagnose. Researchers from Radboud university medical center, Canisius-Wilhelmina Hospital (CWZ) and international colleagues have discovered that the human immune system recognizes the fungus well. The study has been able to pin-point the fungus' Achilles heel for new, effective drugs. Meanwhile, the threat posed by this emerging public health pathogen should not be underestimated.

In 2009, an unknown [fungus](#) was discovered in the infected ear of a seventy-year-old Japanese woman; this was called *Candida auris*. Where *C. auris* suddenly came from was not clear, but soon after that, different strains appeared all over the world. It turned out to be a persistent, difficult to control fungus, which was also usually resistant to fungicides.

Last year, the *New York Times* published an alarming article about the growing problem. The authors cited the example of a man infected with *C. auris* who died after 90 days at Mount Sinai Hospital. The fungus, which in the meantime had settled in the mattress, curtains, walls, telephone, basically everywhere in the hospital room, could only be removed with a lot of effort. Only after special cleaning and removal of part of the ceiling and the tile floor did the hospital control the fungus.

Reduced immunity

"We started to investigate *C. auris* with international colleagues because there was virtually nothing known about this fungus," says Mariolina Bruno of Radboud university [medical center](#)'s Department of Internal Medicine. The research results have now been published in *Nature Microbiology*. The study shows that the fungus is especially dangerous for people with compromised immunity. Bruno notes, "A well-functioning immune system recognizes the fungus clearly and can control it well."

A careful study of the human immune response to the *C. auris* infection demonstrated that specific components of the cell wall of the fungus play an essential role in this recognition. David Williams, of East Tennessee State University says, "These are unique structures that you do not encounter with other fungi. Those specific chemical structures stimulate the immune system enough to take action and clear the fungus."

Resistant to fungicides

The fact that *C. auris* is considered a serious and emerging infectious disease is mainly due to its resistance to many disinfectants and fungicides. People with an invasive *C. auris* fungal infection have thirty to sixty percent chance of dying, precisely because of the immunity of the fungus to many fungicides. Alistair Brown, of the University of Exeter comments, "Our research not only shows that these cell wall components are important for the detection by the immune system, but also that they are indispensable to the fungus. Drugs that selectively block the production and operation of these components are currently being investigated for safety and effectiveness. Perhaps one of these is the ideal candidate to tackle the fungus."

Since these cell wall components are indispensable to *C. auris*, the risk of resistance to such a new drug is small. In order to develop resistance, the fungus must at least remain alive so that it can gradually adapt to the new drug.

Diagnosis and monitoring

Candida auris is related to the much better-known *Candida albicans*, which can cause vaginal fungal infections. In the study, *C. albicans* has therefore served as comparison material. Bruno: "On the one hand, we

see that *C. auris* evokes a better immunity reaction than *C. albicans*. On the other hand, *C. auris* appears less pathogenic, but once in the bloodstream, both fungi are usually life-threatening."

What makes the problem even worse is that *C. auris* is not so easy to identify. This makes it easy to confuse with other fungi, which can lead to a delay in treatment. Jacques Meis, a physician-microbiologist at the CWZ says, "You should determine the fungi type on a molecular level, enabling you to immediately see which fungus you are dealing with, but not every laboratory has the facilities for that." Earlier this year, he and Paul Verweij (Radboud university medical center) called for the nation-wide monitoring of serious fungal infections to gain a better understanding of the burden of disease and mortality rates.

Global warming?

The question why *C. auris* suddenly appeared in 2009 has still not been answered. The fungus was not found in stored patient material from previous years, so it seems to be a new or mutated fungus. Perhaps global warming plays a role, suggests American microbiologist Arturo Casadevall in *TIME*. Most fungi thrive at relatively low temperatures, but due to an increase in the average temperature, it is conceivable that a fungus breaks through its thermal restriction and can suddenly colonize the human body.

"An interesting point of view," says Bruno, "but without further evidence, it is as yet highly speculative. Apart from the actual origin history or 'birth' of *C. auris*, the article in *Nature Microbiology* provides information on how the interaction between humans and the fungus *C. auris* occurs: how the fungus stimulates the immune system, what *C. auris*' pharmacological Achilles heel is and what the opportunities for immunotherapy are."

More information: Mariolina Bruno et al, Transcriptional and functional insights into the host immune response against the emerging fungal pathogen *Candida auris*, *Nature Microbiology* (2020). [DOI: 10.1038/s41564-020-0780-3](https://doi.org/10.1038/s41564-020-0780-3)

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