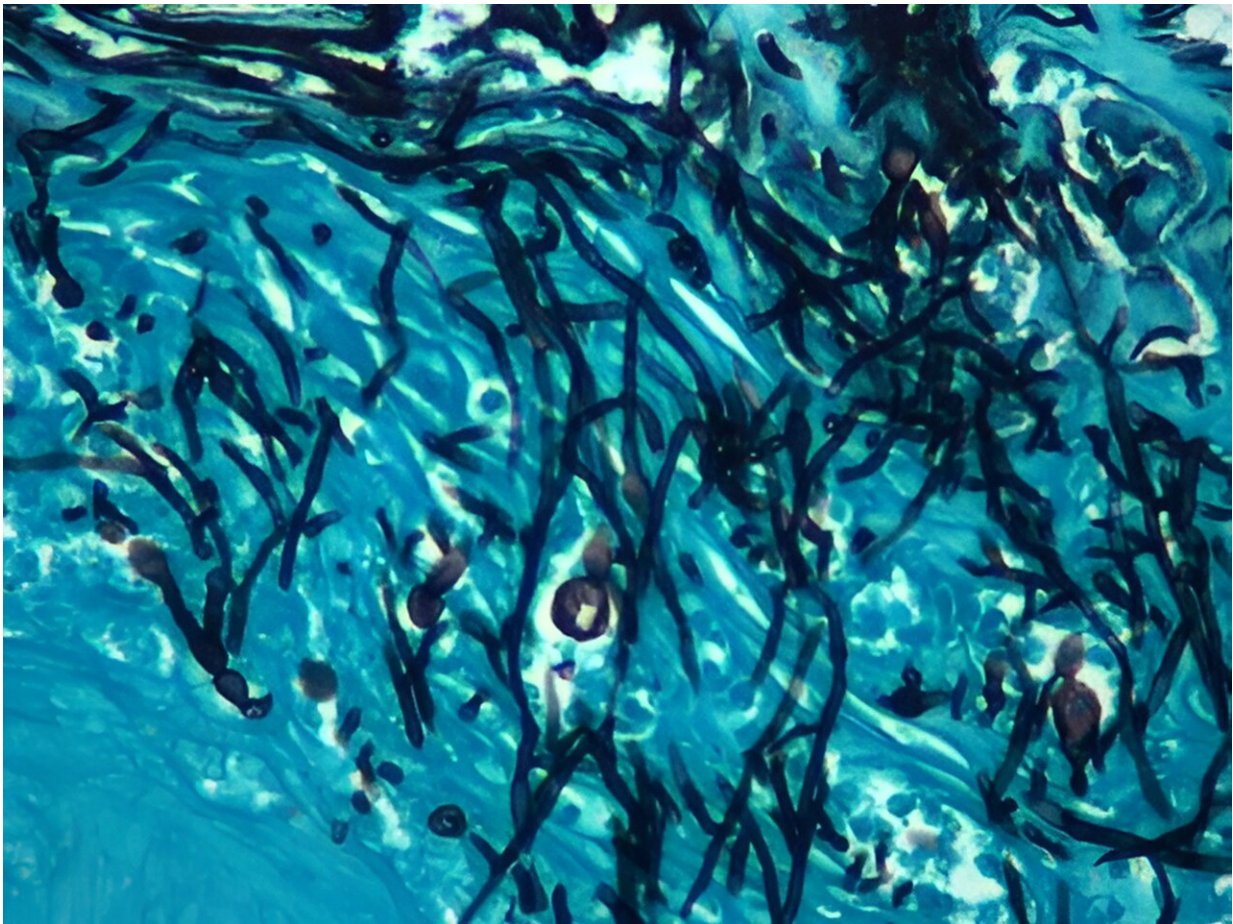


Could our body's 'bleach' be key to fighting a common fungal pathogen?

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These are *C. albicans* cells growing invasively into tissue in a mouse model of an oral infection. The candida hyphae are stained black, and the tissue is stained a blue/green. Credit: James Konopka, Stony Brook University

A study that assesses the effects of hypochlorous acid (HOCl), commonly known as bleach, as it is generated during the immune response of a cell (phagocytosis) when fighting a common fungal pathogen, *Candida albicans*, reveals that HOCl is a potent killing agent.

The laboratory finding, highlighted in a paper [published](#) in the journal *mBio*, also uncovers some of HOCl's mechanisms of action in that killing process. The work could be a significant step toward using HOCl as a novel therapeutic strategy against *C. albicans*, and potentially other pathogens.

C. albicans causes much infection worldwide. It is particularly virulent in [immunocompromised patients](#) and is the cause of dangerous systemic infections in this population. There have been many effective treatments against the fungal pathogen, but for decades drug resistance has been problematic when treating infections caused by *C. albicans*.

Most studies looking at this [immune response](#) against the [fungal pathogen](#) have focused on [hydrogen peroxide](#) (H_2O_2), not HOCl. Phagocytes capture the fungal invader and in the process two oxidants are created— H_2O_2 and HOCl. Myeloperoxidase converts H_2O_2 created during the oxidative burst in the phagosome into HOCl, the more potent killing agent.

"We discovered that hypochlorous acid kills cells by targeting the [plasma membrane](#) and oxidizing cellular components in a very different way than hydrogen peroxide," says James Konopka, Ph.D., lead author and Professor in the Department of Microbiology and Immunology in the Renaissance School of Medicine at Stony Brook University.

"It disrupts the *C. albicans* plasma membrane, produces a very different transcriptional response than hydrogen peroxide, is more effective and disruptive to the plasma membrane, and therefore has a more distinct

effect on killing these fungal cells."

Konopka explains that neutrophils are the critical cell type for controlling infections by *C. albicans* and other fungal pathogens. They are distinct because they make high levels of myeloperoxidase compared to other phagocytes, such as macrophages. This study shows the important aspect of the neutrophil response, essential to the oxidative process that produces this fungal-killing HOCl or bleach.

While the laboratory results will not have any immediate impact on new treatments against *C. albicans* infections, Konopka believes the findings provide a basis for designing new therapeutic strategies against this pathogen that causes infections worldwide.

More information: Lois M. Douglas et al, *Candida albicans* resistance to hypochlorous acid, *mBio* (2023). [DOI: 10.1128/mbio.02671-23](https://doi.org/10.1128/mbio.02671-23)

Provided by Stony Brook University

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