

Malassezia yeasts—everywhere and sometimes dangerous

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Pityriasis versicolor (left) and folliculitis (right); two skin diseases caused by *Malassezia* yeasts. Credit: Aristeia Velegraki, National and Kapodistrian University of Athens, Greece. CC-BY

Malassezia yeasts have been found in human dandruff, deep-sea vents, and pretty much everywhere in between. The skin of most if not all warm-blooded animals is covered with these microbes, and while they

mostly live in peaceful co-existence with their hosts, they can cause serious diseases in humans and our furry friends. A Pearl (a short review) published on January 8th in *PLOS Pathogens* discusses the diseases caused by *Malassezia*, their detection, and treatment.

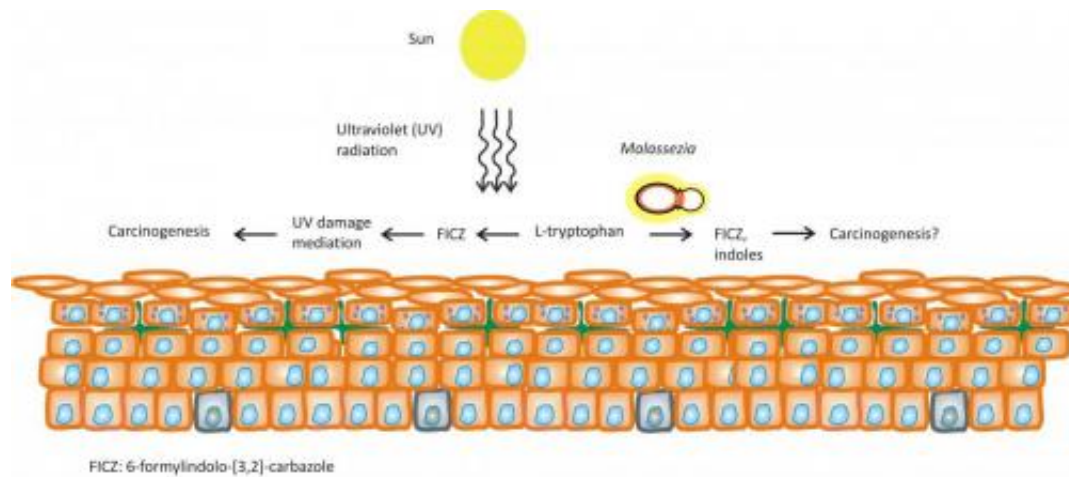
The article by Teun Boekhout, from the CBS-KNAW Fungal Biodiversity Center in Utrecht, The Netherlands, and colleagues from Greece and Italy, is the fifth and final one in a series on *Malassezia*, and focuses on its role as a pathogen. Most of the problems caused by *Malassezia* yeasts are [skin](#) diseases. Some of them, like dandruff and atopic eczema in humans or external ear infections in dogs, are very common.

While treatments exist for most of these, the researchers point out that when treating *Malassezia* skin diseases, "one should always bear in mind that *Malassezia* yeasts are integral components of the skin microbiota, and therefore the therapeutic target should be controlling the *Malassezia* population rather than eradicating it."

Malassezia bloodstream infections are less common, but premature infants and immunocompromised patients with extended stays in intensive care are at risk. Such infections are often linked to catheterization that facilitates internalization of the yeasts, either from the patient's own skin or from someone else's. Because routine tests in patients with blood infections of un-known origin often do not detect *Malassezia* right away, diagnosis might be delayed, which can be dangerous. However, once *Malassezia* is identified as the culprit, therapy with antifungal drugs is usually successful in eliminating the pathogen from the bloodstream.

As humans, we are covered head-to-toe with *Malassezia*—but that is not all. As Keisha Findley and Elisabeth Grice describe in their contribution to the series, healthy skin is actually cultivated by a well-balanced mix of

bacteria and fungi (yeasts and molds), and this "skin flora" does not appear to elicit defense reactions by our immune system. How *Malassezia* interacts with other skin microbes is not yet known, but researchers think that both changes in the flora and changes in the immune system can disturb this peaceful equilibrium and lead to a range of [skin diseases](#).



Malassezia yeasts might promote skin cancer similar to UV light. Credit: Kapodistrian University of Athens, Greece. CC-BY

One of the reasons why, despite our intimate association, we do not know more about *Malassezia*, is that the yeasts cannot easily be isolated and grown in a laboratory environment. *Malassezia* are lipophilic, meaning they like fat. Human skin contains sebaceous glands that produce fats to lubricate and waterproof the skin, and *Malassezia* breaks down these fats and uses them as its main energy source.

As the yeasts metabolize the skin surface fat, they form break-down products that can potentially trigger harmful reactions by the skin. For example, Boekhout and colleagues discuss the intriguing possibility that

Malassezia is involved in the development of skin cancer, because some of its fat breakdown products can activate known tumor-promoting pathways in the skin that are similar to those triggered by sun light.

How *Malassezia* strains that live in radically different environments (including the marine forms discussed by Anthony Amend in his Pearl) interact with their surroundings and obtain energy is still a mystery. However, *Malassezia* yeasts have been found pretty much any place scientists have looked for them—often in very large numbers—and are likely to play important roles in the both the healthy and diseased states of these environments.

More information: Paper: Boekhout, et al.:
[dx.plos.org/10.1371/journal.ppat.1004523](https://doi.org/10.1371/journal.ppat.1004523)

Already-published Pearls in *Malassezia* series:

Grice & Findley: www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1004436

Amend: www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1004277

Cabañes: www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1003892

Heitman et al: www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1002701

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