Analysis of the *Candida auris* Phenotypes and a Mutant

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Prämiertes Projekt

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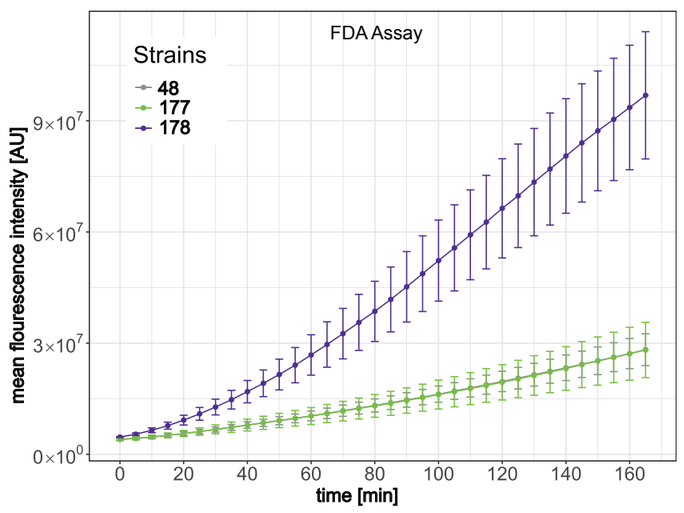
Abstract

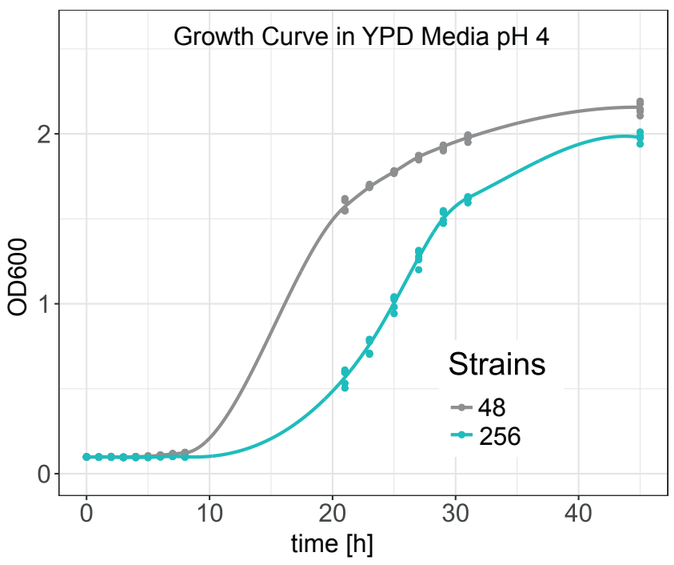
The newly emerging human pathogen *Candida auris* constitutes a threat to healthcare facilities worldwide. The dangerous characteristics of the fungus include multidrug resistance and heat resistance. Additionally, the pathogenic yeast is difficult to detect, posing a risk for immunocompromised people [1]. This study compared a mutant strain with a deleted transcription factor, the white and brown phenotype and the wildtype (WT). The results have shown that the examined transcription factor could be linked to phenotype switching in *C. auris*. In the next years, it is likely that more multidrug- and heat-resistant pathogens like *C. auris* will emerge. It is certain that more fundamental research about this fungus is needed to better understand the organism and counteract its spreading.

Research Questions

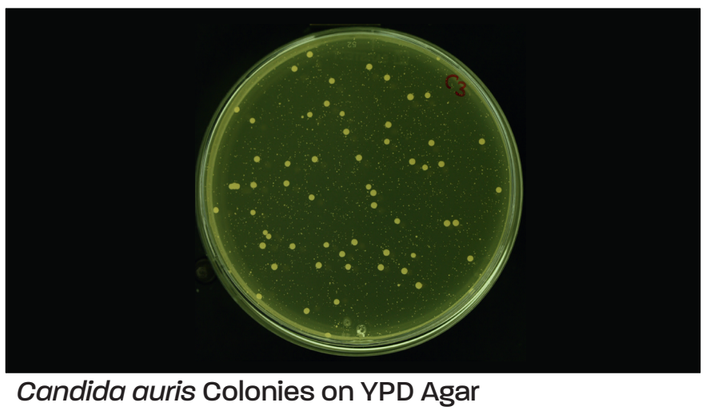
Do the mutant and phenotype strains of *C. auris* exhibit differences in growth behaviour, membrane permeability and stress reaction when compared to the WT?



FDA Assay of Wildtype (48) and White (177) and Brown (178) Phenotype



Growth Behaviour of Wildtype (48) and Mutant Strain (256) in YPD Media pH 4



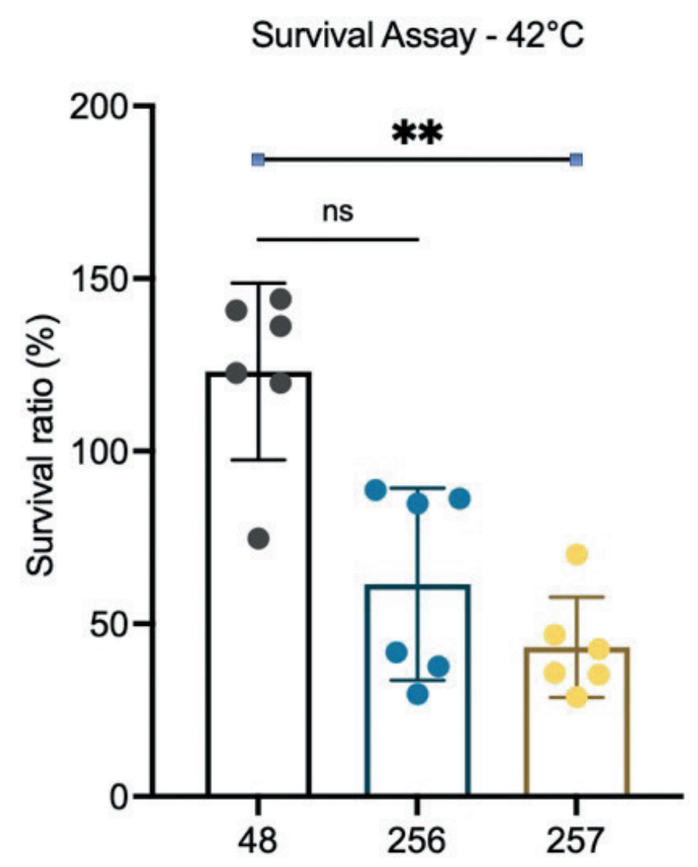
Candida auris Colonies on YPD Agar

Method

In this study, three methods were used to get a better understanding of the *Candida auris* wildtype, a mutant and the two phenotypes. In order to observe the growth behaviour, the strains were incubated in media with different pH levels and carbon sources. Over a period of two days, the optical density was measured to quantify growth. The survival ratio of the *C. auris* strains was measured at 42 °C and in the presence of Amphotericin B, an antifungal agent, to determine the influence of heat and antimycotics on the fungi strains. To detect differences in membrane permeability, the cellular uptake of Fluorescein diacetate was measured. Fluorescence can be detected when the Fluorescein diacetate accumulates in the cytoplasm and is hydrolysed into Fluorescein [2].

Results and Discussion

While the white phenotype behaves exactly like the parent generation under all examined conditions, the brown phenotype exhibits different behaviour. In comparison to the parent strain and white phenotype, the brown phenotype has increased membrane permeability and grows better with non-fermentable carbon sources. The mutant strain performs worse than the parent strain in all growth assays and has a decreased survival ratio. Its membrane permeability is elevated as well. As both phenotypes displayed differences in growth and membrane function in comparison to the parent generation and the deletion of the examined transcription factor resulted in similar differences, it is possible that the examined transcription factor is linked to phenotype switching in *Candida auris.*



Survival Assay of Wildtype (48) and Mutant Strain (256, 257) at 42°C

REFERENCES

[1] H. Du, J. Bing, T. Hu, C. L. Ennis, C. J. Nobile, und G. Huang, „Candida auris: Epidemiology, biology, antifungal resistance, and virulence“, PLoS Pathog., Bd. 16, Nr. 10, S. e1008921, 2020

[2] P. Breeuwer, J. L. Drocourt, N. Bunschoten, M. H. Zwietering, F. M. Rombouts, und T. Abee, „Characterization of uptake and hydrolysis of fluorescein diacetate and carboxyfluorescein diacetate by intracellular esterases in Saccharomyces cerevisiae, which result in accumulation of fluorescent product“, Appl. Environ. Microbiol., Bd. 61, Nr. 4, S. 1614–1619, 1995