

Melanin from black yeasts: extraction, characterisation and inter-species comparison

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Fungal melanin is a complex biopolymer synthesised by various fungi, particularly black yeasts, where it plays an important role in virulence. While it is known that melanised fungal cells exhibit increased resistance to host immune defences, it is still uncertain whether melanin poses a direct threat to human health. Therefore, the main objective of this research is to investigate the role of melanin in fungal virulence. While the biotechnological potential of melanin, such as increased durability, bioremediation and environmental resistance, is well known, its antimicrobial properties have not yet been thoroughly explored. Understanding the behaviour of fungal melanin is crucial to ensure the safety and efficacy of melanin-based biotechnological products, such as engineered living materials (ELMs), especially in the human environment.

The first step in our study was to define and optimise a protocol to isolate the melanin particles produced by three black yeasts: *Aureobasidium pullulans*, *Aureobasidium melanogenum*, and *Exophiala dermatitidis*. There are numerous protocols for the isolation of melanin from fungi, bacteria, and cell lines; however, ultrasound-assisted extraction (UAE) yielded the highest recovery of melanin particles. In the next step, we characterised the isolated melanin particles using Fourier transform infrared spectroscopy (FTIR). While all three spectra showed typical melanin-associated absorption bands, distinct differences in peak positions and intensities indicate variations in melanin structure and composition between the three species

Keywords: melanin, fungi, black yeasts, virulence, FTIR, ELMs

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