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Melanocytes and melanin represent a first line of innate immunity against Candida albicans

Cecilia V Tapia [1], Maryanne Falconer [2], Fabián Tempio [3], Felipe Falcón [3], Mercedes López [3], Marisol Fuentes [2], Claudio Alburquenque [2], José Amaro [2], Sergio A Bucarey [4], Anna Di Nardo [5]

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PMID: 24934806 DOI: 10.1093/mmy/myu026

Abstract

Melanocytes are dendritic cells located in the skin and mucosae that synthesize melanin. Some infections induce hypo- or hyperpigmentation, which is associated with the activation of Toll-like receptors (TLRs), especially TLR4. Candida albicans is an opportunist pathogen that can switch between blastoconidia and hyphae forms; the latter is associated with invasion. Our objectives in this study were to ascertain whether C. albicans induces pigmentation in melanocytes and whether this process is dependent on TLR activation, as well as relating this with the antifungal activity of melanin as a first line of innate immunity against fungal infections. Normal human melanocytes were stimulated with C. albicans supernatants or with crude extracts of the blastoconidia or hyphae forms, and pigmentation and TLR2/TLR4 expression were measured. Expression of the melanosomal antigens Melan-A and gp100 was examined for any correlation with increased melanin levels or antifungal activity in melanocyte lysates. Melanosomal antigens were induced earlier than cell pigmentation, and hyphae induced stronger melanization than blastoconidia. Notably, when melanocytes were stimulated with crude extracts of C. albicans, the cell surface expression of TLR2/TLR4 began at 48 h post-stimulation and peaked at 72 h. At this time, blastoconidia induced both TLR2 and TLR4 expression, whereas hyphae only induced TLR4 expression. Taken together, these results suggest that melanocytes play a key role in innate immune responses against C. albicans infections by recognizing pathogenic forms of C. albicans via TLR4, resulting in increased melanin content and inhibition of infection.

Keywords: Candida; Toll-like receptors; antifungal activity; melanin; melanocytes.

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