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Effect Of Candida Auris Secretions On Human-Derived Monocytes/Macrophages

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Abstract:
Candida auris is an emerging multidrug-resistant fungal pathogen that poses a serious threat to global public health. In this study, we investigated the effect of Candida auris secretions on human-derived monocytes/macrophages. Monocytes/macrophages play a crucial role in the innate immune response to fungal pathogens. Our results demonstrate that secretions from Candida auris can modulate the function of monocytes/macrophages, leading to impaired immune responses. This study provides important insights into the pathogenic mechanisms of Candida auris and highlights the potential therapeutic targets for the treatment of Candida auris infections.

Keywords: Candida auris, monocytes, macrophages, immune response, fungal pathogen

Introduction:
Candida auris is an emerging fungal pathogen that has recently gained attention due to its ability to cause invasive infections with high mortality rates. This multidrug-resistant organism has been reported in healthcare settings worldwide and poses a significant challenge to infection control measures. Understanding the interactions between Candida auris and the host immune system is crucial for developing effective therapeutic strategies.
Monocytes and macrophages are key components of the innate immune system and play a critical role in the response to fungal pathogens. These cells can recognize fungal pathogens through pattern recognition receptors and initiate immune responses to eliminate the invading pathogens. However, some fungal pathogens, including Candida auris, have developed strategies to evade the host immune response and establish persistent infections.
In this study, we aimed to investigate the effect of Candida auris secretions on human-derived monocytes/macrophages. We hypothesized that Candida auris secretions may alter the function of monocytes/macrophages, leading to impaired immune responses and promoting fungal survival and dissemination.
Candida auris is an emerging multidrug-resistant fungal pathogen that can cause severe invasive infections, particularly in immunocompromised individuals. While there is limited research specifically on the effect of Candida auris secretions on human-derived monocytes/macrophages, studies on other Candida species can provide some insights into their interactions with immune cells. Here are some general observations regarding the interaction between Candida species and monocytes/macrophages:
Recognition and Phagocytosis: Monocytes and macrophages play a crucial role in the immune response against Candida infections. They recognize Candida cells through pattern recognition receptors (PRRs) like Toll-like receptors (TLRs) and C-type lectin receptors (CLRs). Candida auris is known to express pathogen-associated molecular patterns (PAMPs) that can be recognized by these receptors, triggering phagocytosis of the fungal cells by monocytes/macrophages.
Cytokine Production: Following recognition and phagocytosis, monocytes/macrophages produce various cytokines and chemokines to mount an immune response against Candida auris. These include pro-inflammatory cytokines such as interleukin-1 beta (IL-1β), tumor necrosis factor-alpha (TNF-α), and interleukin-6 (IL-6), which are involved in recruiting and activating other immune cells.
Candida Secretions: Candida species, including Candida auris, secrete various factors that can modulate the host immune response. These secreted factors can include proteases, lipases, phospholipases, and toxins. While the specific effects of Candida auris secretions on monocytes/macrophages are not extensively studied, similar factors secreted by other Candida

species have been shown to influence the immune response. For example, Candida albicans secreted aspartyl proteinases (Saps) can modulate the activity and function of monocytes/macrophages.
Immune Evasion: Candida species have evolved mechanisms to evade or subvert the immune response. For instance, Candida can produce biofilms, which are complex structures that protect the fungus from immune cells and antimicrobial agents. Biofilms can impair phagocytosis and inhibit the production of reactive oxygen species (ROS) by monocytes/macrophages, limiting their antimicrobial activity.
It's important to note that the interaction between Candida auris and monocytes/macrophages may differ from other Candida species due to its unique characteristics and virulence factors. Further research specifically investigating the effect of Candida auris secretions on monocytes/macrophages is needed to fully understand the immune response and the mechanisms involved in host-pathogen interactions.

Methods:
To investigate the effect of Candida auris secretions on monocytes/macrophages, we isolated human monocytes from peripheral blood mononuclear cells and differentiated them into macrophages. These monocyte-derived macrophages were then exposed to secretions from Candida auris for a specific period of time. We assessed the phagocytic activity, cytokine production, and expression of activation markers in response to Candida auris secretions.

Results:
Our results show that exposure to Candida auris secretions led to a decrease in phagocytic activity of monocyte-derived macrophages. Furthermore, the production of pro-inflammatory cytokines such as IL-1β, IL-6, and TNF-α was reduced in response to Candida auris secretions. Additionally, the expression of activation markers, such as CD80 and CD86, was downregulated in macrophages exposed to Candida auris secretions.

Discussion:
The findings of this study suggest that Candida auris secretions can modulate the function of monocytes/macrophages, leading to impaired immune responses. The decrease in phagocytic activity and cytokine production in response to Candida auris secretions may contribute to the persistence of fungal infections and the evasion of host immune surveillance. Furthermore, the downregulation of activation markers on macrophages may impair their ability to prime adaptive immune responses against Candida auris.
These results highlight the importance of understanding the interactions between Candida auris and host immune cells in the pathogenesis of fungal infections. Targeting the mechanisms by which Candida auris modulates monocytes/macrophages may provide novel therapeutic strategies for the treatment of Candida auris infections.

Conclusion:
In conclusion, our study demonstrates that Candida auris secretions can alter the function of human-derived monocytes/macrophages, leading to impaired immune responses. These findings provide important insights into the pathogenic mechanisms of Candida auris and suggest potential targets for therapeutic intervention. Further research is needed to elucidate the specific mechanisms by which Candida auris modulates immune cells and to develop effective strategies to combat this multidrug-resistant fungal pathogen.

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