

目錄

1. 前言
2. 探討真菌多醣免疫調節能力和機制
 - A. 茯苓兩種多醣的免疫調節活性及其機制
 - B. 蛹蟲草多醣通過調節 MAPK 通路對 RAW 264.7 巨噬細胞的免疫調節作用
 - C. 冬蟲夏草多醣 CP80-1 通過 Dectin-1/Syk/NF- κ B 信號通路對 RAW264.7 細胞進行免疫調節
3. 結論

摘要

近年來，真菌多醣因其具備免疫調節、抗炎、抗腫瘤及益腸道健康等多重生物活性，而在食品科學及生物醫學領域廣受關注。代表性來源如牛樟芝 (*Antrodia cinnamomea*) 所含之多醣具顯著抗炎作用，靈芝 (*Ganoderma lucidum*) 中的 β -D-葡聚糖則展現多樣免疫活性。本文綜整三項研究成果：其一，茯苓 (*Poria cocos*) 中兩種多醣 (PCWPW、PCWPS) 能透過結合甘露糖受體活化巨噬細胞，並藉由 NF- κ B/MAPK 通路促進 TNF- α 釋放。其二，蛹蟲草 (*Cordyceps militaris*) 高分子量多醣 (HCMP) 可透過 MAPK 磷酸化促進巨噬細胞吞噬作用與細胞激素分泌，同時展現抗炎效果。其三，冬蟲夏草 (*Cordyceps cicadae*) 多醣 (CP80-1) 則可活化 Dectin-1/Syk/NF- κ B 訊號通路，提升 NO、TNF- α 及多種細胞激素分泌。綜合結果顯示，不同來源之真菌多醣皆能調控巨噬細胞免疫反應，其作用機制涉及多重受體與訊號通路，展現發展為天然免疫調節劑與功能性食品之潛力。

Study on the Immunomodulatory Mechanisms of Fungal Polysaccharides

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Outline

1. Introduction
2. Study on the Immunomodulatory Mechanisms of Fungal Polysaccharides
 - A. Immunomodulatory Activity and Its Mechanisms of Two Polysaccharides from *Poria cocos*
 - B. Immunomodulatory Effect of *Cordyceps militaris* Polysaccharide on RAW 264.7 Macrophages by Regulating MAPK Signaling Pathways
 - C. Immunomodulation of RAW264.7 cells by CP80-1, a polysaccharide of *Cordyceps cicadae*, via Dectin-1/Syk/NF- κ B signaling pathway
3. Conclusion

Abstract

In recent years, fungal polysaccharides have garnered significant attention due to their broad biological activities, including immunomodulation, anti-inflammatory effects, anticancer properties, and gut health promotion. Representative sources include *Antrodia cinnamomea*, which produces anti-inflammatory polysaccharides, and *Ganoderma lucidum*, which contains β -D-glucans with diverse bioactivities. This report reviews three studies: (1) Two polysaccharides from *Poria cocos* (PCWPW and PCWPS) enhance TNF- α release via the mannose receptor and activate the NF- κ B/MAPK signaling pathway. (2) A high-molecular-weight polysaccharide (HCMP) from *Cordyceps militaris* activates RAW264.7 macrophages through MAPK phosphorylation, enhancing phagocytosis and cytokine secretion while exerting anti-inflammatory effects. (3) *Cordyceps cicadae* polysaccharide CP80-1 regulates macrophage functions through the Dectin-1/Syk/NF- κ B pathway, increasing nitric oxide, TNF- α , and interleukin secretion. Collectively, fungal polysaccharides demonstrate remarkable immunomodulatory potential by engaging macrophage receptors and multiple signaling pathways, underscoring their promise as natural immunomodulators and functional food ingredients.

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