Comparative anti-inflammatory characterization of wild fruiting body;liquid-state fermentation;and solid-state culture of Taiwanofungus camphoratus in microglia and the mechanism of its action

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摘要

Abstract

Taiwanofungus camphoratus (syn. Antrodia camphorata), a medicinal mushroom in Taiwan, is reputed to provide several therapeutic benefits, but the wild fruiting body is very rare. In this study, we used Taiwanofungus camphoratus extracts from wild fruiting bodies and two types of artificial cultivation (solid-state culture and liquid-state fermentation) to examine their anti-inflammatory effects in microglia cells and their possible roles in protection against neurodegenerative diseases. First, EOC13.31 microglia was treated with various kinds of Taiwanofungus camphoratus extracts and lipopolysaccharide (LPS) and interferon-gamma (IFN-gamma) to evaluate the iNOS expression. Western blot and RT-PCR analysis showed that among the various kinds of extracts from wild fruiting bodies, methanol extracts were the most potent inhibitors of iNOS expression. Secondly, the potency of methanol extracts could be ranked as follows: extracts of wild fruiting body>solid-state culture>liquid-state fermentation. To clarify the mechanisms involved, methanol extracts from fruiting body were found to inhibit the phosphorylation of extracellular signal-regulated protein kinases (ERK), c-Jun NH2-terminal protein kinases (JNK) and signal transducer and activator of transcription-1 (STAT-1) induced by LPS/IFN-gamma. Methanol extracts from fruiting body also inhibited NF-kappaB activation through the prevention of inhibitor kappaB (IkappaB) degradation. Moreover, methanol extracts from wild fruiting body inhibited both the iNOS and cyclooxygenase-2 (COX-2) expression induced by beta-amyloid in microglia in a dose-dependent manner. In an animal model, we confirmed that methanol extracts from

fruiting bodies were able to suppress ear edema, indicating that they have anti-inflammatory activity in vivo. These results suggest that Taiwanofungus camphoratus exhibits an anti-inflammatory activity that might contribute to the prevention of neurodegenerative diseases.