

Evaluation of anti-inflammatory properties of hot water extract from *Coprinus comatus* using HL-60 and 3T3-L1 cells

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Abstract

In this study, the amount of ergothioneine (EGT) in hot water extracts of *Coprinus comatus* (Coprino extracts) was studied, and the anti-inflammatory activities of the extracts were evaluated using a cell system by simultaneously monitoring superoxide anion radical generation and intracellular Ca^{2+} levels in neutrophil-like HL-60 cells. The protective roles of the Coprino extracts and EGT against inflammatory oxidative damage of 3T3-L1 adipocytes induced by tumor necrosis factor alpha (TNF- α) were also examined. Based on these results, it is reasonably safe to conclude that Coprino extracts have a higher anti-inflammatory activity than EGT alone.

Keywords : *Coprinus comatus*, ergothioneine, anti-inflammatory activity

I Introduction

Coprinus comatus (Coprino), known as the chicken drumstick mushroom, the shaggy ink cap, lawyer's wig, or shaggy mane, is an edible mushroom commonly found worldwide. Because of its good nutritional properties, delicious taste, and unique shape (like chicken drumstick), Coprino is often used as an ingredient in soup and various other dishes. Generally, the mushrooms are used as "dasi," boiled in hot water. Coprino is also highly valued in traditional medicine. Studies have reported that Coprino has antioxidant¹⁾, immunomodulatory, antitumor^{2, 3)}, and hypoglycemic⁴⁾ effects. While these researches mainly focused on alkalic-extractable polysaccharides and biological activity assays of the ethyl acetate extract, medicinal mushrooms are often decocted in hot water.

Coprino also contains a high amount of ergothioneine (EGT), a natural water-soluble amino acid that is essential in humans⁵⁾. EGT has been reported to show anticancer,

antioxidant, immunomodulatory, and hypoglycemic activities⁶⁾ (Fig. 1). Ito *et al.*⁷⁾ isolated EGT from *Grifola gargar* and discovered that EGT protected against oxidative damage due to inflammation in adipocytes induced by tumor necrosis factor alpha (TNF- α). Recently, Kazumura *et al.*^{8, 9)} developed an *in vivo*-like method that can easily and rapidly evaluate such biological activity by simultaneously monitoring chemiluminescence and fluorescence. The

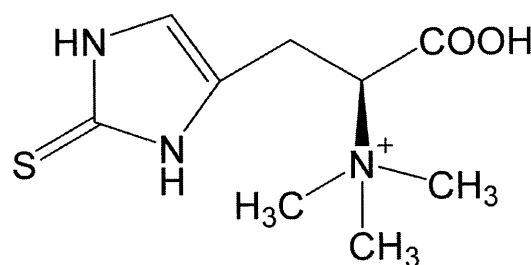


Fig. 1. Chemical structure of EGT