Review

The medicinal value of the mushroom *Grifola*

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This review contains the most recent information on the various substances isolated and identified in the maitake mushroom *Grifola*, their source and significance. The majority of the references concern the anti-tumour polysaccharides that have been extracted from fruiting bodies and mycelia, but certain species can also act as metabolic regulators and contain enzymes, essential amino acids, lipids and vitamins. The use of edible fungi in the development and application of beneficial biological activities offers an advantage in that the active principle is safe and can be tolerated by humans. Cultivation of such edible mushrooms would provide an adequate supply but is unnecessary if mycelial cultures grown in large-scale fermentations can produce the same active principle. It is hoped that this article will be informative in that the search continues for new uses for edible fungi and for educating the public about their potential value.

For French summary, see next page.

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Nutritional Value

The amount of crude protein provided by mushrooms ranks below most meats but well above most other foods, including milk. The proteins of the commonly cultivated mushrooms contain all of the essential amino acids as well as most commonly occurring non-essential amino acids and amides. The total nitrogen content, non-protein nitrogen content and the amino acid composition of 33 mushroom species with a high content of essential amino acids was reviewed by Casalichio et al. (1975b). They have also extracted, separated and identified several organic components of Basidioomyeete earpophores (Casalichio et al. 1975a). The amino acid profiles of protein and non-protein nitrogen of common cultivated mushrooms was determined by Ogawa et al. (1987), while the polyamine contents of various species of fungi have been examined by Hamana & Matsuzaki (1985).

The lipids of different species of mushrooms vary and include representatives of all classes of these compounds. Mushrooms contain a high proportion of unsaturated fatty acids which are essential for the diet. When compared with animal products which are often high in saturated fatty acids, mushrooms become an attractive health food. Although Grifola is not cultivated as a food, it is edible when young, and studies have been conducted on its lipid content. Endoh et al. (1981) considered total lipid content, fatty acids and sterols in five species of Polyporaceae, including Grifola, and Mitsuhashi et al. (1973) investigated C18 fatty acids in three species, including Grifola. Yokokawa (1980) and Yokokawa et al. (1978) have compared the fatty acid and sterol content of ten species, including G. gigantea. The sterol lipids and the triacylglycerols from fruiting bodies of G. frondosa were characterized by Ohnishi et al. (1985, 1987).

Mushrooms are also a good source of vitamins and probably contain every mineral present in their growth substrate. Takeuchi et al. (1985) have identified and determined the pre-vitamin D3 and vitamin D3 content in the fruiting body of G. frondosa and discussed its production without solar radiation. Muratsubaki et al. (1986) studied the compositional changes in the fruiting body formation in G. frondosa, including crude protein, amino acid, ash, and K+, Mg2+, Ca2+ and Na+ content. Changes that occur in the chemical components of maitake after boiling or storage were examined by Takama et al. (1981).

Medicinal Value

According to Li Shi-chen's Compendium of Materia Medica, Grifola umbellata 'opens up the texture and interspace of the skin, muscle, etc. including the sweat pore, cures gonorrhreal swelling, beriberi, leucorrhrea, gestational urination, disturbances, foetus swelling and difficulty in urination'. The mild, sweet-tasting sclerotium of G. umbellata is a diuretic. Following traditional Chinese folk remedies, decoctions made with water have been taken to treat acute nephritis, systemic dropsy, thirst and difficulty in urination. Decoctions made with other fungi, rhizomes and seeds have been used for oedema, urethral maladies, vomiting, sunstroke and diarrhoea. When mixed with other fungi and rhizomes and ground to a powder to make a paste, it becomes a treatment for jaundice. For cirrhosis and ascites, it is placed along with other ingredients within a fish which is cooked and then eaten (Ying et al. 1987). While there may be an element of folklore in the use of mushrooms for medicine as recounted above, current research has shown that extracts of Grifola can act as metabolic regulators and demonstrate antibiotic, antitumour and immuno-modulating activity.

Metabolic Regulators

It has been reported by K. Adachi et al. (1988) that an orally administered extract of the maitake of Grifola frondosa contains a hypotensive substance that lowers blood pressure in spontaneously hypertensive rats. Kabir et al. (1987) have shown similar