

## Medicinal Properties of *Tremella* Pers. Species Polysaccharides (Review)

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Jelly mushrooms from the genus *Tremella* have been known for hundreds of years as beneficial for health in Oriental medicine. The famous old Chinese pharmacology “Pen Tsao” stated that *T. fuciformis* Berk. has significant medicinal value in the treatment of several diseases such as tuberculosis, blood hypertension, the common cold, among others. *T. fuciformis* has been recommended by medicinal workers through the ages as a famous and precious medicinal mushroom. It is believed to be sweet, mild, and nontoxic, able to strengthen semen, enrich kidneys, make up “yin” deficiency, lubricate lungs, promote the secretion of saliva, nourish the stomach, and stop coughing; it is also an antipyretic, able to lubricate the intestines, strengthen vital energy, harmonize with blood, stimulate the heart, and nourish the brain.

A wide spectrum of pharmacological effects of *Tremella* species is due to the action of the acidic heteropolysaccharide glucuronoxylomannan. Glucuronoxylomannans of *Tremella* species differ in their structure, and are not the same even when obtained from different strains of one species. A promising feature of *Tremella* glucuronoxylomannans is that their medicinal properties are not so strongly dependent on high molecular weight as is reported for  $\beta$ -(1→3)-glucans from medicinal mushrooms, whose molecular weights range from 500 to 2000. Gao and co-workers reported that even acidic hydrolysate fractions of *T. fuciformis* fruiting body glucuronoxylomannans with a molecular weight of between 1 and 53 induce human monocytes to produce interleukin-6 (IL-6) as efficiently as non-

hydrolyzed heteropolysaccharide. This indicates that the activity may be caused by a common  $\alpha$ -(1→3)-mannan structural basis, and the change of molecular weight had no obvious influence on the activity of the heteroglycans. The products of Smith degradation and lithium degradation of *T. fuciformis* heteroglycan with molecular weight of 400, or the product of deacetylation also induced monocytes to secrete IL-1 as efficiently as the original polysaccharide, thus indicating that xylose and glucuronic acid residues as well as acetyl groups are not important in the side chains for promoting cytokine-stimulating activity.

The antitumor activity of *Tremella* is due to immunomodulating effects of both humoral and cellular immune factors in the body. *Tremella* glucuronoxylomannans also stimulate vascular endothelial cells; possess pronounced antiradiation effects; stimulate hematogenesis; demonstrate antidiabetic, antiinflammatory, hypcholesterolemic, antiallergic activities; and show hepatoprotective effects. They can be recommended to improve immunodeficiency, including that induced by AIDS, physical stress, or aging, and prevent senile degeneration of microvessels, maintaining better blood perfusion conditions in vital organs.

While five different fractions of glucuronoxylomannan were detected in *T. fuciformis* fruiting body, acidic glucuronoxylomannan comprised only 22.8%. In our experiments with *Tremella mesenterica* Retz.: Fr. pure culture, the yield of acidic glucuronoxylomannan comprised 40% of the whole alcohol precipitate of the culture broth.