

Anti-cancer activities of *Ganoderma lucidum*: active ingredients and pathways

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ABSTRACT

Ganoderma lucidum, commonly referred to as Lingzhi, has been used in Asia for health promotion for centuries. The anti-cancer effects of *G. lucidum* have been demonstrated in both *in vitro* and *in vivo* studies. In addition, the observed anti-cancer activities of Ganoderma have prompted its usage by cancer patients alongside chemotherapy.

The main two bioactive components of *G. lucidum* can be broadly grouped into triterpenes and polysaccharides. Despite triterpenes and polysaccharides being widely known as the major active ingredients, the different biological pathways by which they exert their anti-cancer effect remain poorly defined. Therefore, understanding the mechanisms of action may lead to more widespread use of Ganoderma as an anti-cancer agent.

The aim of this paper is to summarise the various bioactive mechanisms that have been proposed for the anti-cancer properties of triterpenes and polysaccharides extracted from *G. lucidum*. A literature search of published papers on NCBI with keywords “Ganoderma” and “cancer” was performed. Among those, studies which specifically examined the anti-cancer activities of Ganoderma triterpenes and polysaccharides were selected to be included in this paper.

We have found five potential mechanisms which are associated with the anti-cancer activities of Ganoderma triterpenes and three potential mechanisms for Ganoderma polysaccharides. In addition, *G. lucidum* has been used in combination with known anti-cancer agents to improve the anti-cancer efficacies. This suggests Ganoderma’s bioactive pathways may compliment that of anti-cancer agents. In this paper we present several potential anti-cancer mechanisms of Ganoderma triterpenes and polysaccharides which can be used for the development of Ganoderma as an anti-cancer agent.

Keywords: *Ganoderma lucidum*, cancer, bioactive pathways, triterpene, polysaccharide