

Anti-cancer and Anti-inflammatory Triterpenes from Mushroom *Ganoderma Lucidum*

Daniel Sliva

Cancer Research Laboratory, Methodist Research Institute, Indianapolis, IN, U.S.A.;
Department of Medicine, and Indiana University Cancer Center, School of Medicine,
Indiana University, Indianapolis, IN, U.S.A.

Abstract

Ganoderma lucidum (Lingzhi, Reishi) is one of the most valuable medicinal mushrooms that has been used as herbal remedy in Asian countries for more than two thousands years. *G. lucidum* was used as a cancer chemotherapy agent in the Imperial Court of ancient China and is commonly used in the forms of tea, powder, and dietary supplements to promote health. Although some of the health effects of *G. lucidum* can be attributed to polysaccharides (mainly β -glucans and glycoproteins) through the stimulation of the immune system, *G. lucidum* also contains highly oxidized lanostane-type triterpenes (ganoderic acids, ganoderic alcohols and their derivatives). Triterpene fractions containing ganoderic acid F suppressed angiogenesis *in vitro* and inhibited growth and liver metastasis of lung carcinoma cells in mice. Ganoderic acid X activated ERK and JNK kinases and induced apoptosis of human hepatoma cells, whereas ganoderic acids A and F suppressed the growth and invasive behavior of breast cancer cells through the inhibition of transcription factors AP-1 and NF- κ B. Ganoderic acid D, ganoderiol A, lucidumol B, and ganodermadiol inhibited 5α -reductase activity and ganoderol B suppressed androgen-induced growth of prostate cancer cells. Ganoderic acids A, F, DM and T-Q and lucideinic acids A, D₂, E₂, and P demonstrated anti-inflammatory activity in mice. In conclusion, these natural mushroom triterpenes can be used for the development of novel agents with possible anti-cancer and anti-inflammatory properties.