

Dietary supplements that works - verify then trust

Volume 3 Issue 6 - 2016

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Received: June 01, 2016 | **Published:** June 06, 2016

Opinion

“The Halifax Project” international group recently summarized a comprehensive approach to cancer prevention and treatment by targeting many specific, high priority anti-cancer mechanisms and pathways.¹ Although targeted therapies are principally effective, they are also highly toxic, expensive, and prone to relapses. Therefore, combinational therapies with several natural compounds and dietary supplements targeting specific signaling pathways are viable alternatives for both cancer prevention and treatment. Several medicinal and edible mushrooms and mushroom-based dietary supplements have demonstrated chemo preventative and anticancer activities in cell culture and animal studies.² The most recognized and appraised among these mushrooms is the medicinal mushroom *Ganoderma lucidum*, which was used for more than two millennia in traditional Chinese medicine.³ Not surprisingly *G. lucidum* was evaluated in clinical trials. The majority of these clinical trials with *G. lucidum* was performed for the treatment of different cancers and for the treatment of cardiovascular risk factors.^{4,5} However, the majority of clinical studies did not meet the proper clinical protocols.

Unfortunately, properly performed clinical trials did not demonstrate the expected effects of *Ganoderma lucidum* in cancer patients and cardiovascular risk factors in patients with metabolic syndrome and type 2 diabetes, and demonstrated only slightly improved immune responses in cancer patients. Although these trials were performed according to the standard procedures for randomized controlled trials and controlled clinical trials, the major obstacle in these trials was the use of non-standardized preparations of *G. lucidum* including polysaccharide extracts, different *Ganoderma* liquids, tablets, or the whole *G. lucidum* powder.

We have previously demonstrated through scientific analysis that different *G. lucidum* extracts have different biological activity. More specifically, that some extracts were active, demonstrating anti-cancer activity and the suppression of the major inflammatory molecule NF- κ B, whereas other did not show any biological activity.⁶ The amount and composition of biologically active compounds in *G. lucidum* extracts depend on the specific strain, growing conditions, processing and extraction procedures. Therefore, it is practically impossible to know if the *G. lucidum* extracts, tablets, liquid or the other isolates used in the clinical trials were active. Two major groups of biologically active compounds isolated from *G. lucidum* are triterpenoids (ganoderic acids, ganoderic alcohols, and their derivatives) and polysaccharides (mainly glucans and glycoproteins). *G. lucidum* polysaccharide extracts could have immunomodulatory or “opposite” anti-inflammatory activities, depending on the branching of these polysaccharides. The same applies to the activity of *G. lucidum* triterpenes: some of them have specific activities whereas others are inactive.⁷ We have recently evaluated the triterpene extract from *G. lucidum* containing 20% of triterpenes, and this extract did not possess any biological activity (unpublished). Therefore, all *G. lucidum* extracts or purified fractions need to be evaluated for the expected activities, e.g. anticancer, immunomodulatory, anti-inflammatory, anti-diabetic, anti-obesity,

anti-aging and other activities in the specific cell culture experiments, before their further evaluation in pre-clinical studies and clinical trials.

Generally, all nutraceuticals and dietary supplements are facing the same problem. The literature is describing the certain efficacy of isolated compounds or extracts but the products on the market are ineffective. On the other hand, one batch can be certified for the efficacy but the new batch of the same product is ineffective because the producer used a supplier with untested compounds and the new batch was not properly tested.

Conclusion

In conclusion, high quality, efficient dietary supplements must be produced from scientifically tested compounds and the final dietary supplement product needs to be verified not for just the chemical compositions but also for the real efficacy in a cell based biological assay.

In other words - verify then trust!

Acknowledgments

None.

Conflicts of interest

Author declares there are no conflicts of interest.

Funding

None.

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