Poria cocos (Schwein.) F.A. Wolf in Japanese Traditional Herbal Medicines: Insights from Kampo Case Studies and Implications for Contemporary Research

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The mushroom *Poria cocos* (Polyporaceae) is used in approximately 30% of all Kampo (traditional Japanese herbal medicine) formulas. It consists of several pharmacologically active ingredients, including the vitamin D precursor ergosterol and the triterpene pachymic acid.

In Kampo, *P. cocos* is known as bukuryo and is only used in combination with other herbs. To date, little research has been done on this mushroom in isolation. However, extracts have demonstrated the inhibition of tumor promotion, inflammation, induction, and red cell lysis by reactive oxygen species. In clinical use, poria is part of the multi-herb formulas used for enhancing immunocompetence; in treating *suidoku* (traditional Kampo medicine diagnosis, which roughly translates into "water overload")and various women's health issues, and has many more indications. Currently, poria is part of a United States Food and Drug Administration (FDA)-approved trial of a non-estrogenic multi-herb formula for the management of menopausal hot flashes.

In Japan, 148 Kampo formulas are prescribed by physicians on a regular basis. These are pharmaceutical grade, government-regulated prescription medicines that medical students are taught to prescribe and that are covered by the National Health Service. Some poria-containing formulas are more than 1800 years old. Significant clinical experience and preclinical research exists on the dozens of *Poria*-containing formulas that are prescribed today.

Poria cocos, as a formula ingredient, is not from a fruiting body but is actually cut from the mycelial mass that grows in the ground under certain species of pine in Japan and China. The harvested mycelial mass is wet and soft; the form used in Kampo herbal medicines is dry and hard. Traditionally, poria was cut into small (<1 cm^3) cubes and set in the sun to dry. This treatment, by necessity, would expose the large surface area of the mushroom mycelia to solar UV-B radiation, which in turn would transform the ergosterol to ergocalciferol—vitamin D_2.

One of Kampo's most famous practitioners, Keisetsu Otsuka, in 1965 published *Kampo Shinryou San Ju Nen,* which summarized 374 representative cases from his practice in the years 1931–1959. This presentation will share two translated case studies in which two *Poria cocos*-containing formulas (*yoku-kan-san* and *hachi-miji-ou-gan*) were prescribed with remarkable success. These cases will be analyzed from the perspective of contemporary scientific and medical knowledge to argue that vitamin D from sun-dried poria was the active ingredient most responsible for the patients' recovery. Implications for both the interpretation of historical use and the generation of contemporary research will be discussed.

This presentation will argue that *Poria cocos* deserves greater attention as an agent for promoting human health. Certainly *P. cocos*, like other medicinal mushrooms, can be a significant source of vitamin D. In addition, many mushroom triterpenes are also pharmacologically active, and *P. cocos* documented actions are not all attributable to vitamin D.

Furthermore, *P. cocos* is certainly safe for human ingestion. Single-dose toxicity testing demonstrated that the LD_{50} of *P. cocos* was more than 50 g/kg, p.o. in mice. Repeated-dose toxicity testing, 5 g/kg or 10 g/kg orally administered to rats once daily for 14 days, demonstrated no changes in general symptoms, food consumption, water ingestion, and body weight. Spontaneous locomotor activity was suppressed on the 9th and 10th days. In the hematological tests, BUN was affected at 10 g/kg (*Tox Sci,* 1998, **23**, 229–233). In addition, *P. cocos* appears to be quite safe for long-term use. The Ames test as well as micronucleus and chromosomal aberration assays, used for carcinogenicity testing, were all negative (Yin X. J. et al., 1991. *Mut Res*, **260**, 73–82).