

## Abstract

### Ethnopharmacological relevance

*Pleurotus eryngii* (DC. ex Fr.) Quel has been collected from the wild, cultivated and used in traditional medicines to treat various disorders and diseases since antiquity. In traditional Chinese medicine, the powdered fruiting bodies of *Pleurotus eryngii* were used for immunostimulation, skin-care, wound-healing, cancer and lumbago treatment. In the current study, we investigated the antiproliferative activity of *Pleurotus eryngii* powder on A549, BGC-823, HepG2 and HGC-27 cancer cells and its immunomodulating activity on macrophage, RAW 264.7 cells based on its active compound.

A novel bioactive protein (PEP) was extracted from *Pleurotus eryngii* fruiting bodies powder and purified on DEAE-52, CM-52 and Superdex 75 column chromatographies using an ÄKTA purifier. Its cytotoxicity on A549, BGC-823, HepG2, HGC-27 and RAW 267.4 cell lines was then evaluated using MTT, alamar blue (AB), trypan blue (TB), neutral red (NR), lactate dehydrogenase (LDH), Annexin V FITC/PI and morphological change assays. Moreover, lysosomal enzyme activity, pinocytosis, nitric oxide (NO) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) production assays were used to examine immunostimulatory activity of PEP on RAW 267.4 cells.

Based on high performance gel permeation chromatography (HPGPC), Fourier transform infrared (FT-IR) and nuclear magnetic resonance (NMR) analyses, the isolated protein (PEP) had a molecular weight of 63 kDa, a secondary ( $\alpha$ -helical) structure and was mainly composed of arginine, serine and glycine. PEP significantly ( $P < 0.05$ ) inhibited A549, BGC-823, HepG2 and HGC-27 tumor cells proliferation dose-dependently with an IC<sub>50</sub> range of 36.5 $\pm$ 0.84 to 229.0 $\pm$ 1.24  $\mu$ g/ml. Contrarily, PEP stimulated the proliferation of macrophages.

*Pleurotus eryngii* fruiting bodies powder has a potential application as a natural antitumor agent with immunomodulatory activity, proposedly, by targeting the lysosomes of cancerous cells and stimulating macrophage-mediated immune responses.