Preface

Natural products have been the major molecular and structural resources for drug discovery. In modern medicine, natural products for the prevention or treatment of tumors are attractive because of their very low clinical toxicity compared to synthetic chemical anti-tumor drugs. In the long pursuit for developing new anti-tumor compounds with low toxic potential, several polysaccharides from different biological origins, e.g. yeast, algae, bacteria, higher plants and fungi, have been investigated. Mushrooms have a great potential for the production of useful bioactive metabolites and they are a prolific resource for drugs. The spectrum of pharmacological activities of mushrooms is fascinating. Discovery and evaluation of new polysaccharides from the various medicinal mushrooms as new safe compounds for cancer treatment has become a hot spot of research.

Mushrooms are a taxonomic group that include well over 12,000 species which have macroscopic fruit-bodies large enough to be seen by the naked eye. Some of the most recently isolated and identified compounds originating from the medicinal mushrooms have shown promising immunomodulatory, antitumor, cardiovascular, antiviral, antibacterial, antiparasitic, hepatoprotective and antidiabetic properties. Mushroom-derived polysaccharides are now considered as compounds which are able to modulate animal and human immune responses and to inhibit growth of certain tumors. While mushroom glucans are mostly non-cytotoxic, the same is not true for glucan-protein complexes. All of these compounds, have been shown to potentiate the host’s innate (non-specific) and acquired (specific) immune responses and activate many kinds of immune cells that are important for the maintenance of homeostasis. However, for most of the mushroom derived anti-cancer compounds, a detailed understanding of their exact mode of action has not yet been elucidated.

Many mushroom polysaccharides have been shown to have considerable antitumor activity in several xenographs, but only a limited number has undergone clinical trials. In many cases there have been significant improvements in quality
of life and survival. Increasingly, several of these compounds are now used extensively in Japan, Korea and China, as adjuvant therapy to standard radio- and chemotherapy. Perhaps the most encouraging observations is the ability of the mushroom-derived polysaccharides when taken prior to and during radiotherapy and chemotherapy to significantly reduce the side-effects of these treatments. The safety criteria for the mushroom polysaccharides have been exhaustively studied with little evidence of any toxicity.

Clinical efficacy of mushroom polysaccharides will depend on understanding their precise scope of activity verifiable through in vitro and in vivo animal and tissue culture tests. Phellinus rimosus is a less extensively studied species of the genus Phellinus. The present study aims at the isolation and characterization of polysaccharides from P. rimosus and to elucidate its anti-neoplastic properties using in vitro and animal experimental models.

The thesis is divided into eleven chapters. Chapter 1 and 2 covers Introduction and Review of literature. In Chapter 3, the materials and methods of the present study are described. Chapter 4 describes the methodology for the isolation and characterization of polysaccharide-protein complex from the fruiting bodies of P. rimosus (PPC-Pr) and Chapter 5 describes the demonstration of the anti-tumor activity of the compound. In Chapter 6, anti-oxidant as well as free radical scavenging properties of PPC-Pr is described in detail. The anti-inflammatory activity as well as the in vivo anti-oxidant activity of PPC-Pr is presented in Chapter 7. In Chapter 8, studies on the cytotoxic, anti-proliferative and apoptotic activities of PPC-Pr are described. In Chapter 9, the isolation of neutral polysaccharide from the PPC-Pr and its chemical characterization are presented. Possible structure of neutral polysaccharide was elucidated using advanced techniques. Antineoplastic properties like anti-tumor, anti-inflammatory and anti-oxidant activities of the neutral polysaccharide are described in Chapter 10. The experimental findings are summarized and the projected significant conclusions are presented in Chapter 11. This chapter is followed by profuse literature citations.