

CHAPTER I

INTRODUCTION



Mushrooms are macrofungus with a spore-bearing fruiting body (Chang and Miles, 1992). Mushrooms are considered to be healthy foods because they are poor in calories and in fat but rich in protein, minerals and dietary fiber (Manzi *et al.*, 1999). The commercial mushrooms such as button (*Agaricus bisporus*), shiitake (*Lentinula edodes*), oyster (*Pleurotus ostreatus*), and abalone (*Pleurotus cystidiosus*) are popular in worldwide. The medicinal use of mushrooms has a very long tradition in Asian countries, whereas their uses in Western hemisphere have been slightly increasing only since the last decades. Current studies have indicated that these edible mushrooms may have potential as natural antioxidants (Cheung, Cheung and Ooi, 2003; Cheung and Cheung, 2005) and therapeutic foods, useful in preventing diseases such as hypertension, hypercholesterolemia and cancer (Bobek, Ozdin and Kuniak, 1997; Bobek, Ozdin and Galbury, 1998; Cheung and Cheung, 2005; Gu and Belury, 2005; Ribeiro and Salvadori, 2003; Sugui *et al.*, 2003; Wang *et al.*, 2003).

Cancer is one of the main causes of death in worldwide, and dietary habits are regarded as possible causative factors in the development of considerable proportion of human cancer (Sugimura, 2002). There have been many reports concerning the production of mutagens in protein-rich foods, such as beef, pork, mutton and chicken, prepared by frying, grilling, broiling or boiling (Skog, 1993). There are strong indications that mutagens/carcinogens in heated foods are of considerable importance in the etiology of cancer. The main food mutagens found in cooked meat products are heterocyclic amines (Morales *et al.*, 1990; Starvic, 1994). All the mutagenic heterocyclic amines were carcinogenic in rodents and showed mutagenicity in Ames/*Salmonella* assay. Most of them induced cancer in the liver and other organs (Bogen, 1993; Pfau and Marquardt,

2001; Wakabayashi *et al.*, 1992). In recent decades, a number of laboratories have reported that many common foods contain nonnutritive components that may provide protection against chronic diseases which possess antimutagenic, anticarcinogenic and other beneficial properties (Ho *et al.*, 1994; Stavric, 1994). Experiences from Asian and Eastern Europe countries showed that mushrooms could play an important role in prevention and treatment of cancer (Molitoris, 1994). Other significant epidemiological evidence showed the correlation between daily mushroom consumption and a low rate of cancer mortality in Japan (Borchers *et al.*, 1999).

To test mutagenic activity of food products in short term, Ames test is a very sensitive and simple procedure for detecting mutagens using a group of histidine-requiring strains of *Salmonella typhimurium* which reverts to histidine independence after the induction of specific kinds of genetic alteration in the DNA. The active forms of most known carcinogens are mutagens, and there is substantial evidence that screening systems to detect mutagens can also serve to detect many potentially carcinogenic compounds (Tokima *et al.*, 1977).

In the present study, special attention was paid to the possibility that extracts from edible mushrooms, i.e. button, shiitake, oyster and abalone may contain different modulators that could modulate the formation of mutagen precursor during extended period cooking of beef and the formation of direct mutagen produced from interaction between nitrite and beef concentrate using Ames test as an indicator.

Objectives

1. To investigate the mutagenicity of concentrates from beef boiled with some edible mushrooms namely, button mushroom (เห็ดกระดุม), shiitake mushroom (เห็ดหอม), oyster mushroom (เห็ดนางรม), and abalone mushrooms (เห็ดเป๋าฮื้อ).
2. To determine the mutagenicity of extracts from these selected

mushrooms after nitrite treatment in the Ames test.

3. To investigate the mutagenic modification effect of some edible mushroom extracts on the mutagenicity of beef concentrate after nitrite treatment.