

CHAPTER I

INTRODUCTION



Mushrooms are one of a group of plants that produce no chlorophyll and are called fungi (Meadows J, 2000). Mushrooms are food and medicine. The use of mushrooms as a functional food is most notable in the East, where application of mushrooms to maintain health was formally recorded as 100 AD in China. In the past few decades the cultivation of mushroom expanded all over the world becoming an economically important agricultural industry (Sugui *et al.*, 2003). From the available data it is known that mushrooms are nutritious food. Compared with other vegetables they are high in protein and have a good balance of vitamins and minerals. They contain little fat and digestible carbohydrate, making them suitable for low-calorie diets (Mattila *et al.*, 2002; Oliveira *et al.*, 2002; Sugai *et al.*, 2003). Nowadays, mushrooms have been incorporated into tonics, teas, soups and healthy food dishes, as well as herbal formulas (Sugui *et al.*, 2003). In addition, button mushroom (*Agaricus bisporus*, เห็ดกระดุมหรือเห็ดแชมปิญอง), Shiitake mushroom ([*Lentinus edodes* (Berk.) Pegler], เห็ดหอม), oyster mushroom ([*Pleurotus ostreatus* (Jacquin: Fries) Kummer], เห็ดนางรม), and abalone mushroom ([*P. cystidiosus* Miller], เห็ดเป่าฮื้อ) are popular in Taiwan (Yang, Lin, and Mau, 2002). Recently, these commercial mushrooms were found to be medically active in several therapies such as lowering blood pressure and blood lipid concentration, antitumor, antiviral, and immunomodulating treatments (Chang, 1996; Yang *et al.*, 2002). For example, lentinan, polysaccharide isolated from the fruiting body of *Lentinus edodes*, could inhibit tumorigenesis mainly by activating the immune system and inducing gene expression of immunomodulatory cytokines and their receptors (Sugui *et al.*, 2003). Other significant epidemiological evidence showed the correlation between daily mushroom consumption and a low rate of cancer mortality in Japan. (Chang 1996; Sugui *et al.*, 2003). On the other hand, there are some scientific evidences indicating that some compounds found in button mushroom contain a number of aromatic hydrazines,

among which the most abundant is agaritine, an established class of indirect- acting chemical carcinogens (Gruter, Friederich, and Wurgler, 1990; Walton, Coomb, and Catteral *et al*, 1997; Walton, Coomb, and Walker *et al*, 1997). Testing of food products in short- term mutagenicity assays, such as Ames test and somatic mutation and recombination test (SMART) have led to the identification of either mutagens or antimutagens present in human diet: natural constituents, food contaminants and products of food processing and cooking.

The somatic mutation and recombination test (SMART) in *Drosophila melanogaster* using wing or eye imaginal disc cells have been established in order to screen chemical compounds for genotoxicity, detect the induction of various types of mutation and mitotic recombination for a genotoxic carcinogen metabolically activated by the cytochrome P- 450 enzyme system (Schlatter and Lurtz, 1990; Graf and Van, 1992). The high- bioactivation cross- used in the present study is highly sensitive to the genotoxic effects of URE because it has high constitutive level of cytochrome P-450 activity (Graf and Van, 1992). Therefore, the present study provides additional information regarding the antimutagenic properties of mushrooms *Lentinus edodes* (Shiitake, เห็ดหอม), *Pleurotus cystidiosus* (Abalone mushroom, เห็ดเป๋าฮื้อ), *Pleurotus ostreatus* (Oyster mushroom, เห็ดนางรม), and *Agaricus bisporus* (Button mushroom, เห็ดกระดุมหรือเห็ดแชมปิญอง) against urethane using in the somatic mutation and recombination Test.

Objective

1. To determine the mutagenic activity of selected mushroom extracts namely; *Agaricus bisporus* (button mushroom, เห็ดกระดุม), *Lentinus edodes* (shiitake mushroom, เห็ดหอม), *Pleurotus ostreatus* (oyster mushroom, เห็ดนางรม), and *Pleurotus cystidiosus* (abalone mushroom, เห็ดเป๋าฮื้อ) using somatic mutation and recombination test (SMART)
2. To investigate the mutagenic modification of selected mushroom extracts on urethane induced SMART by two different feeding methods: simultaneous feeding study and pre-feeding study.

Expected research outcome

The availability of information regarding the mutagenicity modulation effect of *Agaricus bisporus* (Button mushroom), *Lentinus edodes* (Shiitake mushroom), *Pleurotus ostreatus* (Oyster mushroom), and *Pleurotus cystidiosus* (Abalone mushroom) that are likely to benefit for consumer.