CHAPTER I
INTRODUCTION

Natural products are the promising source for novel therapeutic agents for prevention and treatment of several severe diseases. Diet rich in bioactive phytochemicals has long been recognized to maintain health in body systems. Tea (*Camellia sinensis*) is one of the most widely consumed beverages in the world and has been proved to exhibit various potential biological properties. Not only that tea possesses attractive flavors, but it also provides a major source of bioactive components with medicinal functions. Types of tea differ in terms of processing (oxidation of tea leaves) and chemical compositions, which are mainly polyphenols, alkaloids (caffeine, theophylline and theobromine), amino acids, carbohydrates, proteins, volatile compounds, minerals, trace elements and other unidentified compounds [1]. Among these, polyphenol is the major antioxidant, which can also be found from fruits and vegetables.

Great numbers of investigations on tea suggested various biological properties of tea against many chronic diseases regarding its prevention and treatment. Tea polyphenols have been proved to be very effective antioxidants and also enhances the activity of detoxifying enzymes that serve as cellular antioxidants [1]. Tea properties also relate to anti–glycation activity recently found in green tea and black tea [2]. In addition, tea polyphenols have been extensively investigated for their potential functions as preventive agents against obesity [3, 4]. It was found that catechin from green tea and saponin from oolong tea were responsible for direct inhibition of the gastric and pancreatic lipases as well as stimulation of thermogenesis *in vitro* [5, 6]. Interestingly, white tea possessed substantial pancreatic lipase inhibitory activity, which was even more effective than that of green tea. On the contrary, black tea only exhibited trace activity against lipase [7]. Another investigation on nutraceutical properties of tea was focused on activity against angiotensin–converting enzyme (ACE), the key enzyme that controls hypertension. It

was previously suggested that flavonols in green tea and black tea could inactivate ACE as well as increase nitric oxide production in human endothelial cell *in vitro* [8]. These properties, in turn, suggested that these teas might possess potential functions to prevent and protect against cardiovascular disease and hypertension.

In addition to these conventional teas (or tea from *C. sinensis*), teas from different parts of native herbs including leaves, flowers, seeds, fruits and roots are also the cognitive beverages in Thailand. Interestingly, the increased behavior in drinking herbal teas among the native consumers is due to the belief in health benefits. Since these herbal teas are processed from natural products, less or no side effects comparing to synthetic medicines were expected. Even though many Thai herbal teas are claimed to promote weight loss as well as prevention and treatment of several chronic diseases, only little supported scientific evidences are available. Herbal teas such as *Phyllanthus emblica*, *Stevia rebaudiana*, *Orthosiphon aristatus*, *Carthamus tinctorius*, *Morus alba*, *Hibiscus sabdariffa*, *Chrysanthemum indicum*, *Aegle marmelos*, *Centella asiatica*, *Alpinia galanga* and *Zingiber officinale* are considered to be an important alternative source of antioxidants in addition to fruits and vegetables [2, 9-12]. Besides, *C. citrates*, *O. aristatus*, *M. alba*, *H. sabdariffa* and *C. tinctorius* herbal teas also possess anti–glycation properties, the biological functions directly related to oxidative stress [2, 10]. The bioactive compounds from teas can also act as inhibitors to many enzymatic reactions and, thus, function as preventive agents to many prominent diseases such as obesity and hypertension. It was found earlier that some medicinal plants such as *S. rebaudiana*, *C. asiatica*, *M. alba*, *O. aristatus* and *C. tinctorius* are capable of inactivating pancreatic lipases and cholesterol esterase [13, 14]. As well, *H. sabdariffa* and *C. asiatica* was reported to exhibit anti–ACE activities [15].

Therefore, conventional teas and Thai herbal teas are the potential dietary sources of bioactive components with medicinal properties. Although various studies have been emphasized on conventional teas, little information regarding biological functions against oxidative stress, glycation, lipase and ACE of Thai herbal teas is available. Thus, the investigation of the health benefits on these medicinal properties of Thai herbal teas in comparison to conventional tea (*C. sinensis*) is an interesting and necessary approach that can provide supportive evidence to promote the usage of Thai herbal teas as excellent choices of healthy beverages. As well, this information can

provide new dietary sources of bioactive compounds for further development of nutraceuticals for prevention and treatment of oxidative stress, obesity and hypertension.