INTRODUCTION

Chrysomya megacephala (F.) is a blowfly species of medical importance worldwide. In Thailand, it is the most abundant species in many fly surveys. Adults are eusynanthropic (e.g. living, feeding or breeding in the human environment) which enables them to be a potential mechanical carrier of several pathogens to humans. These pathogens, including bacteria, virus, protozoa or helminthes eggs, can cause illness and diseases in humans. The presence of either small or large numbers of adult flies is pestiferous for humans and animals. Moreover, the larva is also a myiasis-producing agent (the infestation of fly larva in living organisms) in both humans and livestock. The life cycle of *C. megacephala* is quite short, especially during the high temperature of summer. The metamorphosis (egg, larva, pupa and adult) is completed within 2-3 weeks, while the adult has longevity for 2-3 months. Due to it being a medically important fly, particularly during an epidemic of diseases caused by it, a control measure of the fly population is needed.

The control of flies means integrated pest management; in which many methods should be incooperated. One of the main strategies is physical management; the improvement of environmental sanitation. Chemical control (using insecticides) is a potential application, particularly during an epidemic of diseases. The most common insecticides used in fly control are organophosphates and carbamates, which both result in an acute toxic effect on the central and peripheral nervous systems. This is due to the inhibition of acetylcholinesterase at the nerve endings, which act mainly at the acetylcholine esterase enzyme. Behavioral changes and lesions in the brain have

also been found in long term exposure to these substances in both mammal and invertebrate animals. The long term exposure to insecticide should also produce the lesion in the insect brain. The knowledge of insect brain structure including that of flies will be useful to investigate the impact of insecticides in the future, for both the mechanism of new insecticides and toxic effects that may occur in other insects and mammals.

The study of the fly's brain or supra-esophageal ganglion in normal flies or those that have been exposed to insecticides is very limited. The brain is the best known vital organ of the fly's nervous system. It consists of three parts: the protocerebrum, deutocerebrum and tritocerebrum. The protocerebrum is considered the most important portion containing the neurosecretory neurons, which secrete several important prothoracicotropic hormones (PTTH). The PTTH directly stimulates the endocrine organs to secrete other essential hormones that manipulate overall physiological or behavioral processes. Behaviorally, the activities of adult flies have been noted to relate with their age. Sluggishness and/or inability to fly in the old fly have been reported. The neurons in the brain of the young and old male housefly of *Musca domestica* are different; those in the old exhibit some alterations, including the loss of ribosomes and cristae, and reduction of the matrical density in mitochondria, cytoplasmic degeneration. The presence of autophagic vacuoles and dense residual bodies has been observed.

So far, no information concerning the ultrastructural study of the brain in young and old *C. megacephala* has been found in the literature. Adults of this fly species bear a relatively large head in both sexes; thus, their use as an animal subject for studying the brain of the fly will provide a better understanding of their brain

structure, and eventually their function. Such information leads to the objective of this research: to ultrastructurally investigate the brains of young and old flies using light and transmission electron microscopy. These data will be useful as basic knowledge for probable clarification of various types of unclear behavior in *C. megacephala*, and eventual establishment of a fly control strategy.