

## Chapter VIII

### Conclusion

White kwao krua or *Pueraria mirifica* (PM), which containing high amounts of phytoestrogens, was proved to be disturb reproductive systems in adult cyclic and aged menopausal cynomolgus monkeys and disturb calcium and related hormone in aged menopausal monkeys.

From this present study, a single treatment of PM prolonged the menstrual cycle length in adult cyclic monkeys in a dose dependent manner. However, there were no changes in hormonal pattern during the menstrual cycle of the adult cyclic monkeys.

The long-term treatment of PM also prolonged the menstrual cycle of adult cyclic monkeys in dose dependence. Adult cyclic monkeys treated with the highest dose (PM-1,000) completely stop menstruation throughout the 90-day of treatment and 60-day of post-treatment period. Serum gonadotropin, estradiol, and progesterone levels decreased significantly in adult cyclic monkeys in a dose-dependent manner. Changes in the menstrual cycle length and serum hormonal levels recovered after the cessation of PM treatment in monkeys treated with PM-10 and PM-100. These finding demonstrated that PM greatly influences the menstrual cycle and suppresses the ovulation by lowering serum levels of gonadotropins.

Aged menopausal monkeys treated daily with PM had a decrease with depend on dose of serum FSH and LH levels. The decrease of serum hormonal levels can be recovered with the durations dependent on doses. The higher dose takes the longer time to recover. From this study, it is suggested that PM can be used as an

alternative medicine in aged menopausal women for the estrogen effect, because the effect is reversible after stop using.

In the study of effect of PM on the excretory patterns of urinary hormones in both adult cyclic and aged menopausal monkeys, there were found that the excretory patterns of gonadotropins and estradiol in urine are closely similar to those in serum concentration. In each of gonadotropins and estradiol, there was a significant positive correlation between the levels in serum and urine ( $P < 0.01$ ), but not in progesterone ( $P = 0.24$ ). When urinary pattern of hormone during PM treatment compared to the levels in pre-treatment period, changes of urinary pattern of FSH and estradiol was found in adult cyclic monkeys treated with PM-100 and PM-1,000 and in aged menopausal monkeys treated with all doses of PM. However, changes of urinary FSH level were clearly observed more than that of urinary estradiol. Accordingly, urinary FSH levels are considered as a good indicator of estrogenic effect of PM on hormonal levels in monkeys.

From the study on the effect of PM on serum PTH and calcium levels, this study clearly showed that PM induced the decreasing PTH levels and followed by the decline of serum calcium levels. The highest dose (PM-1,000) have more effective for the decrease of PTH and calcium levels than the lowest dose (PM-10). The effect, however, did not depend on doses because the significant decrease could not observe in PM-100 group. The reason why there are no effect of PM-100 on serum PTH and calcium levels could not be explained in this study. The decrease in serum PTH and calcium levels did not cause from the endogenous estrogens in the monkeys because of low levels of estradiol during the treatment period.