

Thesis Title The Role of Prolactin in Calcium Metabolism  
in Rat

Name Vimonwan Cheeveewattana

Degree Master of Science (Physiology)

Thesis Supervisory Committee

Nateetip Krishnamra, Ph.D.

Liangchai Limlomwongse, Ph.D.

Samaisukh Sophasan, Ph.D.

Date of Graduate 12 November B.E. 2536 (1993)

#### ABSTRACT

The investigation of the role of prolactin in calcium metabolism in weaned, young, and mature female rats was divided into 2 parts. In part I, to study the acute effect of prolactin on the excretion and distribution of absorbed calcium, 1.25 mM calcium gluconate solution containing  $^{45}\text{Ca}$  was instilled into the duodenum 60 minutes after intraperitoneal administration of normal saline or 0.02 mg prolactin/100 gm BW. There was an inverse relationship between biliary  $^{45}\text{Ca}$  secretion and tibial  $^{45}\text{Ca}$  accumulation with age. Control weaned rats had higher  $^{45}\text{Ca}$  contents (expressed as percent administered dose) in bile, gastrocnemius muscle and tibia than older rats. The effect of prolactin was not statistically observed in 120 minutes. However, there was a strong tendency for prolactin to reduce both the amount

of unabsorbed  $^{45}\text{Ca}$  in the intestinal lumen and the urinary  $^{45}\text{Ca}$  excretion.

In part II, to study the long term effect of prolactin on calcium metabolism, the effect of 14 day-subcutaneous injection of 0.25 mg prolactin/100 gm BW on a 3 day calcium balance was evaluated. On day 11, 12 and 13, 1.25 mM calcium gluconate solution containing  $^{45}\text{Ca}$  was intragastrically administered to 3 age groups of rats. In this experiment, the total calcium in all samples represented the actual amount of calcium or net change of calcium content regardless of origin while  $^{45}\text{Ca}$  represented absorbed calcium over the last 3 days. In control groups, food consumption, calcium intake, body weight gain, fecal calcium excretion, and gastrocnemius muscle calcium contents were found to decrease with age. In contrast, the urinary calcium excretion did not differ among the three groups. Weaned rats had a very active calcium metabolism with high rates of bone matrix formation (represented by serum alkaline phosphatase) and bone resorption (represented by urinary hydroxyproline excretion), higher gastrocnemius muscle calcium content and fecal  $^{45}\text{Ca}$  excretion but a lower urinary  $^{45}\text{Ca}$  excretion. Prolactin was found to increase the  $^{45}\text{Ca}$  retention in mature rats by lowering fecal and urinary  $^{45}\text{Ca}$  excretion. It also significantly reduced urinary  $^{45}\text{Ca}$  excretion in weaned but only showed a tendency to do so in young rats. It was clear that prolactin had an influence on bone metabolism in rats of developmental age i.e., it

significantly increased bone matrix formation in weaned rats and enhanced calcium deposit in tibia of young rats.