

Thesis Title Influence of Prolactin on Bone Metabolism in Rat.
Name Jarugool Seemoung
Degree Master of Science (Physiology)
Thesis Supervisory Committee
 Nateetip krishnamra, Ph.D.
 Liangchai Limlomwongse, Ph.D.
 Pawinee Piyachaturawat, Ph.D.
Date of Graduation 19 October B.E. 2538 (1995)

ABSTRACT

The first part of the present study aimed to evaluate the acute effect of prolactin on the distribution of administered ^{45}Ca in compact (femur and tibia) and trabecular bones (sternum and lumbar vertebrae 5-6). Three age groups of female Wistar rats were used i.e., weaned, young and sexually mature rats. To find the appropriate experimental protocol for the dose response study of prolactin, time intervals between prolactin administration, ^{45}Ca injection, and the removal of bones were varied. Prolactin at a dose of 0.01 mg/100 g body weight had no acute effect on total bone calcium contents in sexually mature rats, but induced a biphasic response in ^{45}Ca accumulation in femur. When ^{45}Ca injection and bone harvesting were performed 30 and 60 minutes after prolactin administration, femur ^{45}Ca was increased. But when

^{45}Ca injection and bone harvesting were at 60 and 90 minutes, femoral ^{45}Ca decreased. Femur of mature rats and femur, tibia, and lumbar vertebrae 5-6 of weaned rats exhibited dose dependent response to 0.01 and 0.02 mg prolactin/100 g body weight, while bones of young rats only responded to the higher dose of prolactin. It was speculated that prolactin exerted an acute effect on the osteocyte-surface osteoblast complex in bone. The enhancing effect of prolactin on femoral ^{45}Ca was abolished in ovariectomized mature rats. Two week treatment with 17- β estradiol restored the ability of ovariectomized rats to respond to prolactin by increasing femoral ^{45}Ca content to a value even higher than that seen in sham. The response of estradiol-supplemented ovariectomized rats to prolactin was reduced by concurrent progesterone treatment. These results suggested that sex hormones regulated prolactin action in bones of sexually mature rats.

The second part aimed to demonstrate the effect of two week treatment of 0.25 mg prolactin/100 g body weight on bone turnover. In this study each of the three age groups of rats were divided into the basal group and the sample group. The latter was studied two weeks later and was subdivided into control and prolactin-treated group. Results showed that bone density was similar in four bones of each basal group, while weaned rats demonstrated the lowest degree of mineralization. A significant increase in the degree of mineralization of the control group compared to the basal group was seen in the sternum and vertebrae of mature rats and in femur, tibia and vertebrae of control weaned rats. Young rats, on the other hand, did not show any change

in bone mineralization. Prolactin was found to significantly increase bone resorption in femur, tibia, sternum and vertebrae of sexually mature rats by 52%, 61%, 83% and 44%, respectively, while increasing bone formation in femur, tibia and sternum by 44,65 and 108%, respectively. For weaned rats, the percent increases in bone resorption were 19%, 25%, 35% and 22% in femur, tibia, sternum and vertebrae, respectively. There were no effect on bone formation. In young rats, on the other hand, there was no response to prolactin in bone resorption but bone formation increased by 55,52 and 76% in femur, tibia and sternum, respectively.