

Thesis Title            The Acute Stimulatory Effect of Prolactin on Passive Calcium Absorption in Rat Intestine

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#### ABSTRACT

In situ technique was performed to investigate the acute effect of prolactin on passive calcium absorption in weaned, mature and aged rats. After the rats were given intraperitoneal injection of normal saline or 0.02 mg prolactin/100 g BW 1 hour before the experiment, electrolyte solution containing 20 mM  $\text{CaCl}_2$  labeled with  $^{45}\text{Ca}$  was instilled into the intestinal loops. The bidirectional fluxes of calcium i.e., lumen to plasma (L-P), plasma to lumen (P-L) or net absorption, were determined after 30 minute incubation.

The results showed that passive calcium absorption, which was mainly paracellular, took place throughout the length of the intestine. Age appeared to have little influence on paracellular calcium absorption. Prolactin enhanced passive calcium absorption in mature rats but not

in weaned or aged rats. In mature rats, the following effect were observed. Prolactin enhanced the L-P calcium flux in proximal jejunum resulting in an increase in net calcium absorption. It stimulated both L-P and P-L fluxes of calcium in the ileum, therefore net absorption did not change. A decrease of P-L flux in cecum after the administration of prolactin caused increase in net calcium absorption. Since prolactin increased passive L-P calcium transport in proximal jejunum and ileum, these two responsive segments were selected for further study.

When sodium was replaced by the same concentration of choline, passive calcium absorption varied from segment to segment. The stimulatory effect of prolactin previously seen in mature rat was not observed in the absence of luminal sodium. These results together with data from our previous laboratory reports suggested that prolactin stimulated-passive calcium absorption was secondary to prolactin-induced sodium movement.

To further elaborate the mechanism by which prolactin stimulated passive calcium absorption, [<sup>3</sup>H]mannitol, an extracellular probe, was used as an index of paracellular transport. It was found that prolactin increased both plasma contents of <sup>45</sup>Ca and [<sup>3</sup>H]mannitol. The fact that changes in plasma <sup>45</sup>Ca content paralleled with that of plasma [<sup>3</sup>H]mannitol content indicated the enhancing effect of prolactin on paracellular calcium movement. The elevated plasma <sup>45</sup>Ca content, interpreted as increased absorption of calcium, was confirmed by a

significant increase in L-P calcium flux demonstrated in the concurrently performed in situ proximal jejunal sac experiment.