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Endocrine regulation of calcium and phosphorus concentration in camel's milk.

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Some qualitative aspects of the milk of the dromedary suggest that the ability to produce milk of high nutritive value for offspring or for human beings during long periods of drought is important when evaluating the role of this animal in arid areas (Yagil & Etzion, 1980, J Dairy Res, 47, 159-66). The regulation of mineral composition of camel's milk is unknown. Parathyroid hormone (PTH), although playing a major role in the regulation of plasma calcium (Ca) and inorganic phosphorus (Pi) plasma concentrations, does not seem essential for lactation-associated bone mineral mobilization (Hodnett DW *et al*, 1992, Am J Physiol, 262, E230-3). On the opposite, PTH-related peptide (PTHrP), secreted by the lactating caprine (Ratcliffe WA *et al*, 1992, J Endocrinol, 133, 87-93) and bovine (Barlet JP *et al*, 1993, Acta Endocrinol, 129, 332-6) mammary gland, increases milk Ca and Pi concentrations (Barlet JP *et al*, 1992, J Endocrinol, 132, 353-9). Thus, we have studied the influence of PTH and PTHrP on Ca and Pi concentration in camel's milk.

At the Research Station of Laayoune (Morocco), synthetic human PTH (1-34) and PTHrP (1-34) fragments dissolved in sterile saline were given (4 nmol/kg body wt, at 9 am, for 1h iv infusion) to 2 groups of 4 lactating camels during the 2nd month after parturition. A 3rd (control) group received solvent (50 ml) alone. After oxytocin injection (5 x 6 IU/animal) each camel was hand milked at 8, 9, and 10 am and at 1 and 3 pm. Milk collected at each milking was measured and a sample collected. Blood samples were simultaneously collected by jugular puncture. In plasma and milk samples Ca was measured by atomic absorption spectrophotometry and Pi by colorimetry.

Both PTH and PTHrP increased plasma Ca and decreased plasma Pi, while no change was simultaneously demonstrated in controls. During the week before the experiment, the mean daily milk production for these 12 animals was 3.8 ± 0.9 l (mean ± SEM). Milk production and Ca and Pi concentrations in milk from camels treated with PTH were never different from that measured in controls. On the opposite, in PTHrP-treated camels, milk Ca and Pi concentrations (g/l) increased from 0.93 ± 0.03 and 0.79 ± 0.03 before treatment to 1.35 ± 0.15 ($P<0.05$) and to 1.21 ± 0.05 ($P<0.05$) at the end of the infusion, respectively. Although milk production was unchanged, mammary Ca and Pi secretions (mg/h) increased from 583 ± 93 and 488 ± 64 before treatment to 1015 ± 154 ($P<0.05$) and to 926 ± 16 ($P<0.05$) during infusion, respectively. This demonstrates that in lactating camels, as in other domestic ruminants, exogenous PTHrP transiently but significantly increases mammary Ca and Pi secretion , while PTH does not influence milk mineral composition.