Serum levels of TSH and thyroid hormones after TRH administration in the reindeer

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The reindeer is native to the northern regions of Eurasia with the con-specific caribou in North America. The lifecycle of the reindeer has been well documented. The heat period extends from late August until October. Calving occurs from May to early June. The reindeer is semi-domesticated. Human care is, however, restricted to uncontrolled selection, herding and slaughtering. Under severe winters supplementary feeding is increasing.

In northern latitudes great variations occur annually in ambient remperature, day length and nutritional conditions, and thus the reindeer are forced to undergo cyclic changes in food intake, body weight and metabolic rate.

Thyroid hormones are of intrest since they are coupled with a variety of physiological processes including metabolism, growth, development, nervous system function and reproductive competence (Nieminen et al., 1984).

In this study we have investigated annual changes in resting levels of thyroid hormones and pituitary TSH and their sensivity to exogenous TRH.

The present study was carried out at the Kaamanen Reindeer Research Station in northern Finland. 0.5 mg of synthetic TRH was injected i.m. to ten female reindeer, 0.9 % NaCl was administered in the same manner to four control animals. Blood samples were taken before and at 30 min intervals up to 120 min after administration of TRH. This experiment was repeated four times; in winter, in spring, in summer and in autumn during the rut. All animals were restricted by hand. Serum TSH, T3 and T4 levels were determined by radioimmunoassay (Jaffe & Behrman, 1974). Statistical analysis were performed using Student's t-test.

Great individual variations occured in basal serum TSH, T3 and T4 levels. In summer, in spring and in autumn during the rut the first significant rise of approximately 130 % ($p < 0.01$) in TSH was observed 30 min after TRH injection. In winter the response to TRH was slow (38 %) and TSH concentrations remained at low levels. In spring the basal levels of TSH seemed to be higher ($p < 0.05$) and the repsonse to TRH was greater than during other seasons. In control animals the concentrations of TSH remained at the basal level during all experiments. The highest basal level of T3 was detected in winter and the lowest level in summer. In response to TRH the peak serum T3 concetrations were detected in summer at 60 min and in spring at 120 min. In autumn during the rutting period the rise of 139 % in T3 levels was observed after 120 min from TRH injection. After the rut the highest levels were found at 90 min after injection. The lowest basal levels of T4 were detected in winter and the highest in spring. The highest rise (19.4 % at 30 minutes) after TRH injection was found in winter. In summer the peak levels of T4 occurred 90 min after TRH injection and at 120 min during other seasons.

Conclusions: The rutting period appeared to stimulate the secretion of TSH and thyroid hormones. The response of TSH to TRH is most pronounced in spring. In summer basal levels of T3 are at the lowest and the response to TRH is weaker than during other seasons. The effect of TRH on the T4 levels is highest in winter.

References

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