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Brief Communication

EVALUATION OF A HUMAN TSH RADIOIMMUNOASSAY AS A DIAGNOSTIC TEST FOR CANINE PRIMARY HYPOTHYROIDISM

By far the most frequent form of thyroid dysfunction in the dog is primary hypothyroidism (*Belshaw & Rijnberk* 1980). The most useful diagnostic test for this disease available today is determination of thyroxine (T_4) in plasma or serum prior to and after administration of thyrotropin (TSH) (*Belshaw & Rijnberk* 1979). In man, one of the most discriminating tests to assess primary hypothyroidism is determination of TSH (*Vagenakis & Braverman* 1976). In primary hypothyroidism the TSH secretion is increased as a result of reduced thyroid hormone feedback, and very high concentrations of TSH can be found. There is no TSH of canine origin commercially available at present, and it is therefore not possible to determine this hormone accurately in dogs. However, the measurement of canine TSH, using a human assay system, would be a useful diagnostic tool provided acceptable discrimination could be obtained between normal and hypothyroid dogs. A previous study (*Chastain* 1978) indicated that such a difference was improbable. In the present investigation, a comparatively larger material was used in order to elicit further information about the usefulness of a radioimmunoassay for human TSH as a diagnostic test for canine primary hypothyroidism. The investigation also included a TRH stimulation test in order to further evaluate the specificity of the assay.

Primary hypothyroidism was confirmed by determination of T_4 prior to and 4 h after i.v. injection of 10 IU of TSH. Dogs with a basal T_4 level of less than 20 nmol/l and an increase after TSH of less than 10 nmol/l were judged to be primary hypothyroid (*Belshaw & Rijnberk* 1980). Out of 150 dogs in which TSH stimulation was performed, 40 were found to be primary hypothyroid. As a reference group 20 dogs were randomly selected from those regarded as normal (T_4 increase after TSH exceeded 20 nmol/l).

TSH was determined by a homologous, solid-phase radioimmunoassay kit for human TSH, containing antibodies raised in sheep (Phadebas® TSH Test[1]). Total T_4 concentration was analysed by a sensitive radioimmunoassay utilizing an antiserum raised in rabbit[2] (*Larsson & Lumsden* 1980). The TRH stimulation test was performed in 8 Beagles (4 males and 4 females) by measuring the plasma TSH level prior to and at 10, 20, 30, 60 and 120 min after intravenous injection of 200 µg of TRH. In order to further evaluate the response to TRH, T_3 was measured by a radioimmunoassay kit (Farmos Diagnostica, T_3-^{125}I[3]) before and 2 h after the injection of TRH.

The TSH levels ($\bar{x} \pm s$) in the hypothyroid and the reference group were respectively 9.49 ± 6.73 µU/ml and 3.50 ± 1.67 µU/ml. This difference was highly significant ($P \leq 0.001$). However, there was a considerable overlap between the 2 groups, with 14 hyperthyroid dogs out of the 40 showing TSH values below the "warning limit" calculated as the percentile $P_{97.5}$ with 90 % confidence in the reference group (*Rümke & Bezemer* 1972).

The increase in TSH after TRH stimulation was not significant, indicating a weak cross-reaction between canine TSH and antibodies to human TSH in this system. The dose of TRH was about 5 times higher than the dose recommended for humans (*Burger & Patel* 1978) and should therefore be sufficient to provoke an elevation in TSH.

Table 1. Plasma T_3 concentration ($\bar{x} \pm s$) in 4 female and 4 male Beagles before and 2 h after i.v. injection of 200 µg of TRH.

Sex	n	T_3 (nmol/l) Before TRH	(P)	T_3 (nmol/l) After TRH
F	4	1.47 ± 0.15	n.s.	1.50 ± 0.14
M	4	1.37 ± 0.07	$P \leq 0.001$	1.82 ± 0.13
F + M	8	1.42 ± 0.12	$0.01 < P \leq 0.05$	1.66 ± 0.21

The T_3 response to TRH is shown in Table 1. The males showed a significant rise in T_3 at 2 h post-TRH, while in the females the T_3 concentration was unchanged. These results indi-

[1] Pharmacia Diagnostics AB, Box 17, S-751 07 Uppsala, Sweden.
[2] Kindly provided by Dr. Belshaw, Utrecht, The Netherlands.
[3] Farmos Group Ltd, P.O. Box 425, SF-20101 Turku 10, Finland.

cate that there is a biological activity of synthetic TRH in dogs, and increased concentrations of TSH can be expected after administration of TRH in adequate doses.

From this study it can be concluded that there is a significant difference in TSH levels between hypothyroid and euthyroid dogs. However, there is insufficient cross-reaction between canine TSH and antibodies to human TSH to recommend a radioimmunoassay for human TSH as a diagnostic tool for primary hypothyroidism in dogs, which confirms the results obtained by *Chastain.*

Mats Larsson
The Department of Clinical Chemistry, College of Veterinary Medicine, Swedish University of Agricultural Sciences, Uppsala, Sweden.

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Reprints may be requested from: Mats Larsson, the Department of Clinical Chemistry, College of Veterinary Medicine, Swedish University of Agricultural Sciences, S-750 07 Uppsala, Sweden.