

A LABORATORY SURVEY OF AUTOIMMUNE THYROIDITIS AND HYPOTHYROIDISM IN SELECTED SIGHTHOUND BREEDS



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Introduction:

Autoimmune or lymphocytic thyroiditis is the main pathologic process causing hypothyroidism as an adult-onset condition in dogs. Affected dogs have normal thyroid function at birth and grow in a normal manner. Then a response is triggered where the body's immune system reacts to the thyroid follicles (structures in the thyroid glands that produce the thyroid hormones) as foreign tissue. The immune system attacks and ultimately destroys the follicles with the end stage of an irreversible loss of functional thyroid tissue. Thyroglobulin is a large protein made by the cells in the thyroid follicle that contains thyroid hormone and serve as the storage reservoir. The thyroglobulin autoantibodies (TgAA) measured in the laboratory are a product of the immune response in the thyroid gland. From the start of this pathologic process, it will be months to years, until the end stage of hypothyroidism is reached. There is a growing body of data indicating that many euthyroid sighthound breeds can have lower T4 and/or free T4 values than the laboratory reference ranges established from a variety of dog breeds.



Materials and Methods:

The objective of this survey was to assess prevalence of different categories of thyroid function or pathology based on combinations of total thyroxine (T4), free thyroxine (free T4), thyroid stimulating hormone (TSH), and thyroglobulin autoantibody (TgAA) results in Rhodesian ridgeback, borzoi, greyhound and saluki dogs. Submissions to the Diagnostic Center for Population and Animal Health (College of Veterinary Medicine, Michigan State University) for thyroid testing from 1/1/2005 through 1/1/2009 were searched. Results were tabulated with respect to laboratory reference ranges derived from multiple pure-bred and mixed breed normal results. The distribution of T4 and free T4 were similar (see table).

Results:

Euthyroid

The finding of T4 and/or free T4, TSH and TgAA within the laboratory reference range supports a diagnosis of euthyroidism, or normal functioning of the thyroid gland. 67.1% Rhodesian ridgebacks, 53.2% borzoi, 34.8% greyhounds and 43.6% salukis were within the general laboratory reference ranges for T4, TSH and thyroglobulin autoantibodies. The percentages of dogs with free T4 results in the normal range were similar. The finding of T4 values below the normal range with a normal TSH and negative TgAA was highest in the greyhound at 57.7%, saluki 32.1%, borzoi 30.3% and only 9.1% in Rhodesian ridgebacks. Low free T4 values were found in 51.5% of the greyhounds, 28.7% of the salukis, 30.0% of the borzoi and 11.4% of the Rhodesian ridgebacks. However it is well recognized in greyhounds and salukis that T4 and/or free T4 values in euthyroid dogs extend below general laboratory reference ranges. If only TSH and TgAA values are used to assess the presence of thyroid pathology, 92.5% of greyhounds, 75.7% of the salukis and 83.5% of the borzoi would be considered euthyroid. Free T4 is used by the Orthopedic Foundation for Animals (OFA) in their thyroid database. When normal and low free T4 values were combined, the results were again similar, and 92.3% of the greyhounds, 73.3% of the salukis and 82.7% of the borzoi would be considered normal.

Hypothyroidism

Low T4 and elevated TSH with either negative (end stage) or positive thyroglobulin autoantibodies (active thyroiditis) provide optimal support for a diagnosis of hypothyroidism, if consistent with the clinical signs. 5.7% Rhodesian ridgebacks, 4.4% borzoi, 10.7% salukis would be classified as hypothyroid, but this was found in only 2.9% of the greyhound samples.

Autoimmune Thyroiditis

The finding of thyroglobulin autoantibodies (positive TgAA) indicates autoimmune or lymphocytic thyroiditis, which is inherited. Positive TgAA results were found in a total of 16.8% of Rhodesian ridgeback, 11.5% of borzoi, 12.8% of saluki and 3.1% of the greyhound samples. In samples with a low T4 and elevated TSH, Rhodesian ridgebacks were more likely to have positive thyroglobulin autoantibodies. The overall low prevalence of thyroglobulin autoantibodies suggests that hypothyroidism and/or autoimmune thyroiditis is uncommon in greyhounds.

Thyroid Function in Healthy Salukis

Shiel, Sist, Nachreiner, Mooney, Thyroid Function in Healthy Salukis, Proceedings, 2008 World Small Animal Veterinary Association Congress

Blood samples were obtained from 335 clinically normal (Country of Origin and AKC) Salukis from 1 to 15 years of age and various levels of activity, and analyzed at the AHDL, CVM, MSU. Analysis of the data showed that Salukis, in comparison to mixed breed ranges, have:

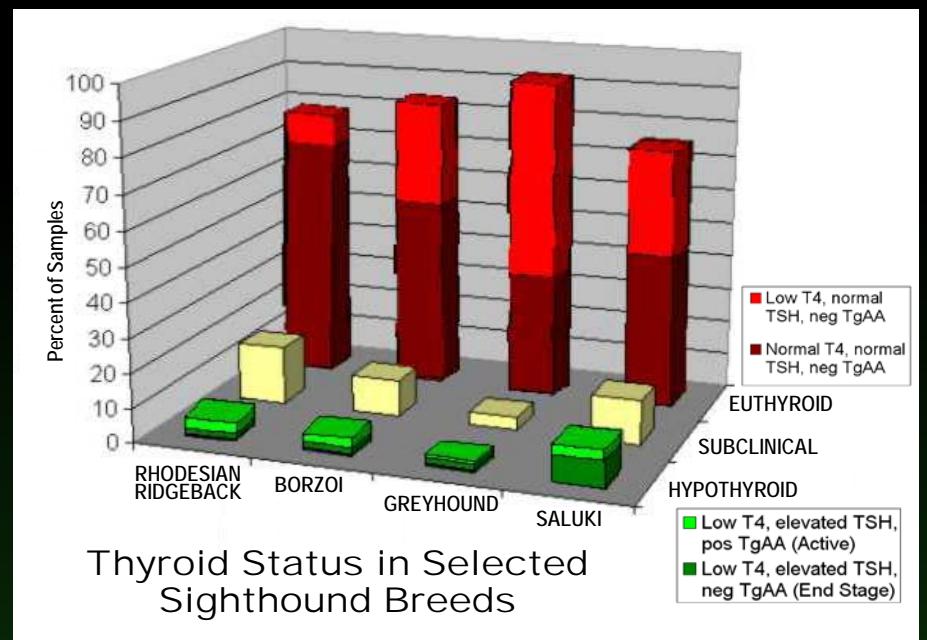
Percentage of samples by breed of dog for each category of total thyroxine (T4), free T4 (fT4), thyroid stimulating hormone (TSH), and thyroglobulin autoantibody (TgAA) results (n=number of samples)

Category of Result	RHODESIAN RIDGEBACK (n=1905) (n=1402)	BORZOI (n=380) (n=298)	GREYHOUND (n=2393) (n=1928)	SALUKI (n=140) (n=101)
Normal T4, normal TSH, neg TgAA Normal fT4, normal TSH, neg TgAA	67.1 64.8	53.2 52.7	34.8 40.8	43.6 44.6
Normal T4, normal TSH, pos TgAA	9.2	5.5	0.8	4.3
Normal T4, elevated TSH, neg TgAA	3.8	1.8	0.9	3.6
Normal T4, elevated TSH, pos TgAA	2.1	1.6	0.0	2.1
Low T4, normal TSH, neg TgAA Low fT4, normal TSH, neg TgAA	9.1 11.4	30.3 30.0	57.7 51.5	32.1 28.7
Low T4, normal TSH, pos TgAA	1.6	1.8	2.0	2.8
Low T4, elevated TSH, neg TgAA	1.8	1.8	2.6	7.1
Low T4, elevated TSH, pos TgAA Low fT4, elevated TSH, pos TgAA	3.9 4.9	2.6 3.4	0.3 0.4	3.6 3.0

DCPAH mixed breed reference ranges

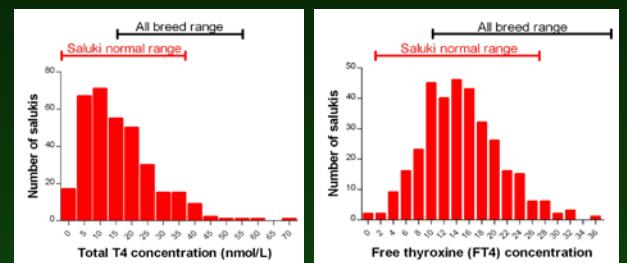
Normal T4 15-67 nmol/L, low T4 <15 nmol/L
Normal free T4 8-26 pmol/L, low <8 pmol/L

Normal TSH ≤ 37 mU/L, elevated TSH > 37 mU/L
Negative TgAA ≤ 25%, elevated TgAA > 25%



Lower T4 and free T4 values

- which tend to be lower in more active/conditioned dogs
- tend to decrease with age
Low levels of thyroid hormones measured in Salukis likely do not represent hypofunction of the thyroid gland if clinically normal.



Conclusion:

The incidence of autoimmune thyroiditis and the subsequent development of clinical hypothyroidism vary significantly among sighthound breeds. Early testing for thyroglobulin autoantibodies (TgAA) provides valuable information for breeders wishing to decrease the incidence of clinical hypothyroidism through selective breeding. Breed specific reference ranges should be considered when interpreting thyroid test results and diagnosing hypothyroidism in sight hounds. These differences in thyroid hormone concentrations in sight hounds should also be considered when registering dogs in the OFA thyroid database.

