Canine Thyroid Function Tests

Diagnosis of hypothyroidism in dogs may be difficult and multiple tests are often required for an accurate diagnosis. It is necessary to rule out other potential factors causing decreased TT4 concentrations from true hypothyroidism. Thyroid function tests available at Gribbles Veterinary are total T4 (TT4), free T4 (fT4), thyroglobulin auto-antibodies (TgAA) and endogenous serum TSH (TSH).

<table>
<thead>
<tr>
<th></th>
<th>TT4</th>
<th>Free T4¹</th>
<th>TSH</th>
<th>TgAA¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turn-around time:</td>
<td>1 day</td>
<td>2-5 days</td>
<td>2-5 days</td>
<td>3 days</td>
</tr>
<tr>
<td>Cost of testing:</td>
<td>$21.73</td>
<td>$112.55</td>
<td>$58.32</td>
<td>$60.99</td>
</tr>
<tr>
<td>Sample required:</td>
<td>Red top</td>
<td>Red top, gel, EDTA</td>
<td>Red top, gel</td>
<td>Red top, gel</td>
</tr>
</tbody>
</table>

NZ Kennel Club Thyroid Panel² $208.69 – includes fT4, cTSH and TgAA

1. Exclusive to Gribbles Veterinary
2. Please check with the NZ Kennel Club for breeds that require mandatory testing or where thyroid testing is recommended
3. All prices are exclusive of GST

An accurate diagnosis of hypothyroidism should be made on the basis of multiple test results, clinical signs and history, and not on the basis of a single test/ sign alone.

HISTORY AND CLINICAL EXAMINATION

This is extremely important and the prior use of drugs needs to be considered, along with the presence of nonthyroidal disease, e.g. hepatic, renal disease, diabetes mellitus, etc. Also examine for clinical signs of hypothyroidism, such as coat and skin changes, bradycardia, weight gain, lethargy, neurological signs, etc. Thyroid hormones affect many body systems and thus a wide variety of clinical signs may be seen.

ROUTINE CLINICAL PATHOLOGY

Routine haematology and biochemistry testing should be carried out to rule out other nonthyroidal illness. Hypothyroidism may cause a mild non-regenerative normocytic, normochromic anaemia. Serum cholesterol and triglyceride concentrations are often increased, and there may be mild increases in ALT and AP due to hepatic lipidosis. Urinalysis is usually normal.

MEASUREMENT OF CIRCULATING THYROID HORMONES

Total T4 concentration is the hormone most commonly measured when hypothyroidism is suspected. While this may give an indication of hypothyroidism, values may be decreased depending on some of the above factors. A single low TT4 measurement should not be accepted as proof of hypothyroidism. A normal TT4 value will in most cases rule out hypothyroidism but if a decreased value is obtained the possibility of non thyroidal illness and/or drug administration needs to be ruled out.

Free T4 is the form of T4 that is directly available to the cell to influence metabolism. It is less altered by the above factors but low values may still be obtained with the usage of some drugs and also severe non thyroidal illness.

Following measurement of a single low TT4 concentration, further testing is essential for an accurate diagnosis.

ENDOGENOUS SERUM TSH (cTSH) MEASUREMENT

The majority of cases of hypothyroidism are caused by defects of the thyroid gland. These defects will theoretically cause decreased feedback inhibition of the pituitary and increased serum TSH concentrations. In practice, this is often the case but some cases of
hypothyroidism (25–40%) may also have normal/non-increased serum TSH concentrations, and some dogs (10–20%) with normal thyroid function may have increased serum TSH concentrations. There is, therefore, overlap in serum TSH concentrations between normal and hypothyroid dogs. Reasons for normal TSH concentrations in hypothyroid dogs include random fluctuations, secondary hypothyroidism, concurrent drug administration and disease suppressing TSH secretion, and chronic hypothyroidism eventually causing decreased TSH production due to down regulation of pituitary thyrotropes. When there is destruction of 60-70% of the thyroid gland there is an increase in TSH secretion but initially TT4 and fT4 concentrations are normal. Serum TSH concentrations, therefore, need to be considered in conjunction with routine clinical pathological results, clinical signs and history, in addition to TT4 and fT4 concentrations.

**AUTO-ANTIBODIES**

Thyroglobulin auto-antibodies, if present with low TT4 and increased cTSH, may indicate lymphocytic thyroiditis. Approximately 34-59% of hypothyroid dogs are reported to have circulating thyroglobulin auto-antibodies and thus a negative TgAA result does not rule out hypothyroidism, but may indicate idiopathic atrophy of the thyroid gland.

**HISTOPATHOLOGY**

Thyroid biopsy may differentiate lymphocytic thyroiditis or idiopathic atrophy. Skin histopathology may also be useful. A biopsy from the flank is suggested as showing underlying hormonal problems and compared to one from the groin that will be more likely to demonstrate perivascular dermatitis.

**Recommendations for the Evaluation of Thyroid Disease in Dogs**

1. Full history, clinical examination, and results of routine blood work (CBC and chemistry) and urinalysis.
2. Initial single screening tests include baseline serum TT4, or fT4.
3. Treatment trials may be indicated if serum TT4/ fT4 are low and clinical signs/ history are supportive of hypothyroidism.
4. Additional testing (cTSH and TgAA) if TT4 concentrations are normal but clinical signs/ history are supportive of hypothyroidism.
5. Screening protocols using two tests include either serum TT4 or fT4 and cTSH.
6. Treatment is not indicated if fT4 is normal and cTSH is increased. Tests should be repeated in 8-12 weeks.
7. Testing TgAA is indicated if serum TT4 is normal, cTSH is increased and clinical signs/ history are supportive of hypothyroidism.
8. A full thyroid panel should include serum TT4, fT4, cTSH and TgAA.
9. Treatment is indicated if all test results are abnormal and clinical signs/ history are supportive of hypothyroidism, regardless of TgAA result.
10. Treatment is not indicated if all test results are normal and clinical signs/ history are not supportive of hypothyroidism, regardless of TgAA result. Positive TgAA supports possible presence of lymphocytic thyroiditis and requirement to monitor thyroid parameters every 3-6 months.
11. If discordant thyroid test results are obtained, the decision to treat should be based on evaluation of the dog (clinical signs/ history), clinician’s index of suspicion for hypothyroidism, and evaluation of each test result. Serum fT4 is the most accurate test of thyroid function.


If you have any questions or require any further information, please contact your business development manager or your local Gribbles Veterinary laboratory.