# Hypothyroidism and Other Endocrine Disorders in Boxers

*Expanded notes from the ABC 2002 Health Seminar, Speaker: Dr. Peter Graham, DCPAH, MSU*
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## Thyroid Diseases

Hypothyroidism – a glandular disorder resulting from insufficient production of thyroid hormones – is largely considered to be the most prevalent genetic condition in dogs today. Hypothyroidism is the result of thyroiditis, an inflammation of the thyroid gland. More than half of the reported cases of thyroiditis are lymphocytic (also called autoimmune or inflammatory thyroiditis). This type of thyroiditis is identified by the presence of thyroid autoantibody (TgAA) in the blood. An autoantibody is a substance in the body that attacks other body cells. There is a genetic predisposition to autoimmune thyroiditis, however recent studies at Purdue University have shown that vaccination causes an increase in thyroglobulin antibodies.[1]

The symptoms associated with thyroiditis include weight gain; lethargy or weakness; cold intolerance or heat-seeking behavior; dermatological symptoms such as poor quality coat, alopecia (hair loss), seborrhea (dry, flaky or oily skin), hyperpigmentation, or myxedema (dry skin, swelling around lips and nose); secondary dermatological symptoms such as pyoderma and pruritis (infected or itching skin); or bradycardia (slow heart rate). Rare or unconfirmed symptoms include neuropathy; xanthoma (skin lesions); corneal lipids; female infertility; behavioral changes; and seizures. There is a "tragic" facial expression that is characteristic of thyroiditis.

There are three stages of thyroiditis in dogs. Stage 1 is called subclinical thyroiditis, and is characterized by positive TgAA (TgAA+) with all other levels (T4, TSH, and TSH response) normal. Stage 2 is called subclinical hypothyroidism and is determined by TgAA+, normal T4, elevated TSH, and subnormal TSH response. Stage 3 is clinical hypothyroidism, consisting of TgAA+, low T4, high TSH, and subnormal TSH response.

The incidence of thyroiditis varies by breed. Mixed-breed dogs are the "control" and are the lowest affected group of dogs, with 9.17 percent affected. The Boxer is number three[2] on the list of purebred dogs, with 14.6 (OFA) and 22.1 (MSU) percent of dogs affected. This represents an (averaged) affected rate of approximately double the control. The majority of outwardly "healthy" affected dogs - 75% - have circulating TgAA. Other indications of hypothyroidism are low T4, high TSH, and sub-normal TSH response.

Michigan State University's Diagnostic Center for Population and Animal Health does extensive research into canine hypothyroidism, and is one of the eight laboratories approved by the OFA to provide thyroid test results for certification. Most cases of thyroiditis seen at MSU are from Michigan, Wisconsin, Illinois, Ohio, California, and the northeastern United States. Table 1 lists the components evaluated in a panel done at MSU, and the normal levels.

**Table 1**

| Component | Normal |
|---|---|
| Total T4 | 15 – 50 |
| Total T3 | 1.0 – 2.5 |
| Free T4 | 12 – 33 |
| Free T3 | 2.8 – 6.5 |
| TSH | 0 – 0.68 |
| TgAA | < 200% |
| T4AA* | < 20 |
| T3AA* | < 10 |
| **These can interfere with T4 & T3 readings* | |

[1] Evaluation of antithyroglobulin antibodies in pet and laboratory dogs after routine vaccination. JAVMA, vol 221 number 4, August 15, 2000. J. Catharine Scott-Moncrieff MA Vet MB MS dip ACVIM, Juan Azcona-Olivera DVM, PhD, Nita W. Glickman MS MPH , Lawrence T. Glickman VMD DrPH, Harm HogenEsch DVM PhD. http://www.vet.purdue.edu/epi/antibody.htm

[2] At the time of Dr. Graham's presentation (May 2002), the Boxer was sixth on the list. The ranking is the same with both the OFA and Michigan State University. http://www.offa.org/thystabreed.html

When having blood drawn for a thyroid screening, pre-draw fasting is preferred. Estrus in females is not a consideration, but if the animal is obviously sick, the test should not be performed as this can interfere with the results. One should wait two to three months after giving a vaccination to do the test. Steroid drugs will interfere with test results, as may antihistamines. Testing should begin at one year of age, and should be repeated yearly until age 4, then continued every other year. According to the OFA, the majority of dogs develop autoantibodies have them by three to four years of age[3], however it is not uncommon for older dogs (7 years of age or older) to have decreased thyroid function. This is not necessarily an autoimmune condition, but can have serious health consequences if left untreated. A negative result at any one time does not guarantee that the dog will not develop thyroiditis in the future.

From January 1, 2001 to April 1, 2002, there were 2,473 blood samples from Boxers submitted to MSU for a thyroid panel. Of these, 482 dogs were already taking medication for thyroid problems. 60 of these – a scant three percent – were sent for "pre-breeding screening" per the information provided by the veterinarian (13 were for submission to OFA). The remaining 1,931 were assumed to be sent for diagnosis. Of those, 1,063 submissions included information from the veterinarian as to the symptoms leading to the test. 69% of the dogs were exhibiting alopecia, 9% had flank alopecia, 48% suffered from obesity, and 31% had experienced weight loss.

The results for those 1,931 submissions sent for diagnosis were as follows: 1,093 (57%) had clearly normal thyroid function. 165 (9%) were clearly hypothyroid – 114 of these cases (6% of the total submissions for diagnosis) were of lymphocytic origin and 51 (3% of the total) were of idiopathic (unknown) origin. 156 dogs (8%) had subclinical thyroiditis and 255 had subclinical hypothyroidism – 117 of those were TgAA positive (6% of total) and 138 were TgAA negative (7% of total). 14 dogs (1%) were possibly hypothyroid with positive TgAA, and the remaining 248 were classified as other or undiagnosed. The other or undiagnosed results could be due to non-thyroid-related issues, medications, dogs that were hypothyroid with normal TSH, or dogs that were hyperthyroid.

In general among all breeds and mixed breeds, the cases of hypothyroidism are approximately 50% lymphocytic (autoimmune) and 50% idiopathic. In Boxers, autoimmune hypothyroidism accounts for 70% of the cases. The predisposition to hypothyroidism definitely has a genetic component. Most dogs are found to be at certain stages of thyroiditis at a specific age. Stage 1 is most often diagnosed at two to three years of age, stage 2 at four years, and stage 3 at six to seven years of age.

In a DCPAH study of 171 dogs with positive TgAA, more than 50% showed no symptoms at all. Approximately 25% showed symptoms of subclinical thyroiditis, 14% showed symptoms of subclinical hypothyroidism, and 15% showed symptoms of hypothyroidism. This study showed that, of TgAA+ dogs that show no symptoms at all, 1 in 20 will become hypothyroid within 1 year, 1 in 5 will have early/partial failure of the thyroid, and 6-15% will become TgAA negative. The reason for this latter is unknown, but is suspected to be due to either transient thyroiditis or a false positive test result.

**Other health issues and hypothryoidism**

Although breeders commonly mention fertility problems related to hypothyroidism, the relationship between the two is controversial, and is generally seen only in textbook hypothyroid cases. Nonetheless, many breeders have had successful conception in bitches that have missed previously once thyroid supplementation is started.

Symmetrical alopecia is a common skin condition in dogs, and the causes can be endocrinal, non-endocrinal, or unknown. Flank alopecia in Boxers is more often not hypothyroid-related, but is a seasonal follicular dysplasia, a condition that usually self-resolves in a few months and often returns the following year. Some breeders have claimed success with various remedies, including canned pumpkin or melatonin; however it is unsubstantiated whether the remedies resolved the condition, or whether the condition would have self-resolved without the remedies.

Dr. Graham and many researchers claim that giving kelp to a TgAA+ dog will progress subclinical hypothyroidism to clinical faster than anything else will. However, many nutritionists and holistic

[3] http://www.offa.org/thygeninfo.html

veterinarians disagree with this and have seen the opposite result. There do not seem to be any contraindications to giving kelp to a dog with normal thyroid function.

Hypothyroidism can cause dysrhythmias, and thus, if the dog is diagnosed with these and with hypothyroid, it is better to low-dose treat the hypothyroidism first. (High doses are commonly given but not recommended in this situation.) There have been many anecdotal reports of Boxers with hundreds or even thousands of VPCs upon Holtering, who where later treated for hypothyroidism; subsequent Holters showed few or zero VPCs.

Hypothyroidism and allergies often show the same problems at the same rates, but they are not necessarily causative of each other. If simple remedies for allergies fail to improve the condition, a thyroid test might be a good idea to rule out any abnormal function, before progressing to dermatological consultations and allergy testing.

## Adrenal Diseases

The most common adrenal disease is hypoadrenocorticism (Cushing's disease). The vast majority of these cases (85-90%) are pituitary dependent. Adenoma and adenocarcinomas are adrenal dependent. Cushing's may also have iatrogenic (external factor) causes, usually due to the use of exogenous steroids (those not produced by the body).

Cushing's in canines generally occurs in mid to old age (7-8 years and older), and females are affected more often than males. Symptoms of Cushing's include polydipsia (excessive thirst), polyuria (excessive urination), polyphagia (excessive hunger), muscle wasting, weakness, potbelly, panting, skin thinning, calcinosis cutis (calcium deposits in the skin), pigment changes, symmetrical hair loss, and reproductive dysfunction.

There are several methods for diagnosis of Cushing's, and many false positive results are returned. These methods include giving low-doses of dexamethasone, an ACTH response test, evaluation of the urinary cortisol:creatin ratio, and, for steroid-induced cases, an alkaline phosphatase test. Differential diagnosis can be made by dexamethasone suppression (low, high, or mega-dose) or evaluation of endogenous (produced by the body) ACTH. Aggressive treatment of Cushing's can cause the opposite condition (Addison's disease).

**For More Information**
The following links offer more information on thyroid issues in dogs. This is obviously an incomplete list, and as is the nature of Internet articles, the links may change at any time. Items prefaced by an asterisk (*) are Adobe .pdf files and will require Adobe Reader to view (available free at http://www.adobe.com).

*Canine Thyroid and AutoImmune Disease – http://tinyurl.com/6ajb3
Canine Primary Hypothyroidism & Autoimmune Thyroiditis – http://www.oxfordlabs.com/vpthyovw.html
*Hypothyroidism in the Dog – http://www.akcchf.org/research/articles/whitepapers/uf00hypoth.pdf
*International Symposium on Canine Hypothyroidism – http://tinyurl.com/4gomf
Interpreting Thyroid Test Results – http://salukiclub.org/breedinfo/healththy.htm
*Is Hypothyroidism *Really* the Leading Canine Genetic Disease? – http://www.offa.org/issue1.pdf
MSU Diagnostic Center for Population and Animal Health – http://www.adhl.msu.edu
MSU Canine Thyroid Registry – http://www.ahdl.msu.edu/Labs/Endocrinology/CTR.htm
OFA Thyroid Information – http://www.offa.org/thyinfo.html
OFA Thyroid Database – http://www.offa.org/thystatbreed.html
What's the Big Deal About the Little Thyroid? – http://www.gdhfa.org/ThyroidLaBrie.htm