# Mood swings and unexplained aggression can be caused by low thyroid.

**By Shannon Wilkinson**

Many people are aware that hypo-thyroidism (low thyroid function) is a medical condition that can cause an afflicted dog to become lethargic, dull, and fat. But far too few dog owners are aware of the behavioral symptoms that hypothyroid can cause. This is unfortunate, since these symptoms include unexplainable aggression, so-called "rage syndrome," severe phobias, and cognitive disorders. Lacking an explanation for the sudden onset of these serious behaviors, and gaining no improvement through training, many owners tragically opt to euthanize these troubled dogs.

If an afflicted dog is very lucky, however, his owner will ask a veterinarian to order blood tests that can confirm a diagnosis of hypothyroidism; the treatment is simple and not expensive.

It's important to ask, however, since not many veterinarians are aware of the prevalence of hypothyroid's behavioral signs.

**Dogs who suddenly become aggressive should be tested for low thyroid. Unaware the behavior may be linked to a medical problem, some owners turn to training methods. This may help, but can't solve the underlying problem. Other owners may give up.**

**Vets in the know**

Hannibal, a seven-year-old Rottweiler, who was adopted by Whitney Pressler, DVM, of Salem, New York, when he was about two and a half years old, was one of the lucky hypothyroid dogs. "Hannibal is normally a very mushy dog, in your face, asking to be petted and cuddled – a very interactive personality," Dr. Pressler says. But in September of 2004, Hannibal's personality changed drastically. In the space of a week, he went after two dogs, grabbing them by the scruff, and nipping at the gloves of a runner passing by.

Dr. Pressler had never seen Hannibal exhibit behavior like that before. As she pondered the behavior change, she realized that during the preceding few months, Hannibal had been more quiet and nervous, even a bit disoriented at times, than he was in his earlier years.

Fortunately for Hannibal, Dr. Pressler was aware of the possibility that her dog's scary new behavior may have a biological origin. She took a sample of Hannibal's blood and sent it to W. Jean Dodds, DVM, of Hemopet in Southern California, for testing (including a full thyroid panel) and interpretation.

Dr. Dodds, a leading researcher with a special interest in thyroid-related issues in dogs, found Hannibal's thyroid levels to be "incredibly low," says Dr. Pressler, and recommended that Hannibal be started on supplemental thyroid medication immediately. "He was 100 percent his normal self within a week," says Dr. Pressler.

Dr. Pressler's experience with Hannibal is not unusual, says Dr. Dodds. She has seen many dogs with low thyroid who behave as if they have an attention deficit disorder. "It's like they're not home," she explains. This abnormal behavior can be intermittent and erratic, escalating to aggression such as Hannibal exhibited.

In most cases, these behavioral symptoms precede physical symptoms, particularly those generally recognized by most veterinarians as being associated with hypo-thyroidism, such as weight gain and coat changes. Hannibal's case was no different. "His coat was a little bit dull, but certainly not what I see in my patients in an exam when I think the dog is definitely hypothyroid," says Dr. Pressler.

**What thyroid does**

Part of the endocrine system, the thyroid is a butterfly shaped gland located in the neck, just below the larynx, and partially wrapped around the trachea. It secretes two major hormones, thyroxine (T4), and to a lesser degree, triiodothyronine (T3). These hormones play an important role in controlling metabolism, affect the heart, regulate cholesterol synthesis and degradation, and stimulate the development of red blood cells (erythropoiesis). Thyroid hormones are also essential for the normal growth and development of neurologic and skeletal systems, in addition to other roles.

Dogs may suffer from low thyroid due to a number of causes. Owners should be aware that it is an inheritable trait; Dr. Dodds has observed numerous cases of hypothyroid running in certain families in certain breeds – something breeders of affected animals would rather not hear.

Canine hypothyroidism is most frequently due to autoimmune thyroiditis – where the immune system fails to recognize the thyroid and attacks its cells. This condition is diagnosed by testing the dog's blood for the presence of autoantibodies developed in response to the immune system attack on the thyroid hormones. The immune system attack on the thyroid renders the gland incapable of producing the amount of hormones the body needs for optimal function.

"We believe that if you biopsy the thyroid gland, at least 80 percent of all hypothyroid dogs will be seen to have lymphocytes (white blood cells) in the thyroid gland," says Dr. Dodds. The lymphocytes indicate that an autoimmune process is at work, destroying the gland.

Less than 10 percent of canine hypothyroid cases are secondary, that is due to deficiency of thyroid stimulating hormone (TSH). TSH deficiencies are generally a result of a problem with the pituitary gland.

**Low thyroid and behavior**

The way that low thyroid function negatively affects behavior, says Dr. Dodds, is "mechanistically unclear." One theory links hypothyroidism with problems with the hypothalamic-pituitary-adrenal (HPA) axis, a major part of the neuroendocrine system that controls reactions to

stress. Some hypothyroid patients have chronically elevated levels of cortisol, the “stress” hormone, which would chemically mimic a state of constant stress. Chronic stress is linked to depression and impaired mental function, as well as other issues.

The continual high level of cortisol could suppress pituitary function and decrease the production of thyroid stimulating hormone (TSH), resulting in reduced production of thyroid hormones.

**Range of behavior problems**
Dr. Dodds and other veterinarians and researchers have been linking changes in behavior to hypothyroidism for more than a dozen years. The various types of abnormal behavior can be grouped into three categories: aggression, extreme shyness, or seizure-like activity.

The cases involving aggression are often similar to Hannibal’s. A previously even-tempered animal lashes out at another animal or human without any warning. One such dog under the care of Dr. Dodds was successfully participating in performance events. One day the dog’s behavior changed radically and he “would go berserk” every time he saw people he didn’t know. Soon he was banned from the training facility because his aggressive behavior had escalated to dangerous levels. Sadly, it’s not unusual for dogs with untreated hypothyroidism to become so aggressive that their owners are no longer able to manage them.

On the other end of the behavioral spectrum are the dogs that become very shy and fearful due to hypothyroidism. While not a threat to humans, extreme manifestations of this kind of behavior still render the dog difficult, if not impossible to keep as a family pet. In addition, these animals are unlikely to be able to continue any activities such as obedience, showing, or working.

The final type of behavioral aberrations seen with hypothyroidism is sudden onset of seizure activity. According to Dr. Dodds, these dogs “appear perfectly healthy outwardly, have normal hair coats and energy, but suddenly have a seizure for no apparent reason.” The seizures may be infrequent, and may include aggressive behavior immediately before or after the seizures.

**Which dogs are most at risk?**
It used to be that the stereotypical dog with hypothyroidism was middle-aged and a mid- to large-sized breed. Today, says Dr. Dodds, “the majority of dogs diagnosed with hypothyroidism are young adults. They’re one and a half, not four or five like we used to see.”

And there no longer seems to be a link between size and thyroid dysfunction. The top 20 most-affected breeds range in size from Rhodesian Ridgebacks to Maltese.

Hypothyroidism is becoming a particular problem with rare breeds, says Dr. Dodds, because of the increasing concentration of the inheritance of the problem within inbred breeds. About 70 percent of the 140 breeds recognized by the American Kennel Club (AKC) recognize hypothyroidism as a major concern in their breeds.

Dr. Dodds also notes that environmental and chemical stresses, better diagnostics, and more awareness of the problem (with resultant testing) increase the reported incidence of hypothyroidism.

Dr. Dodds feels that dogs with autoimmune thyroiditis should not be bred, and relatives should be screened annually for thyroid dysfunction once they reach puberty.

**Diagnosis requires a full panel**
Any time a dog presents with a behavior problem, particularly one of sudden onset, it is recommended that the owner take the dog to a veterinarian for a full physical exam, complete thyroid panel, blood chemistry/CBC, and urinalysis. After all, a dog can have something as simple as a urinary tract infection and be in horrible pain, causing the unusual behavior.

You have to be particular about the thyroid test, however. Insist on having your dog’s blood sent to a reputable laboratory and tested for all the thyroid hormones and autoantibodies to those hormones. In-office thyroid tests, or simple tests of your dog’s “total” T4 levels, are inadequate for diagnosing hypothyroidism.

Research done at Auburn University indicates that in-house T4 tests are unreliable and inaccurate about 52 percent of the time in dogs. “Having treated lots of animals for hypothyroidism, the most important thing I can recommend is the panel versus the total T4. Every time I think that you can tell something from doing just a total T4, I’m mistaken,” says Dr. Pressler.

In addition to the possibility of inaccurate readings, the total T4 can be in the “standard” reference range, but too low for a particular dog’s age, breed, or size. And the other levels found in a full thyroid panel give a much clearer picture about how the thyroid is functioning. A complete thyroid panel tests these six levels, plus TgAA:

- Total levels of thyroid hormones thyroxine (T4), and
- Triiodothyronine (T3);
- The availability of T4, as indicated by “Free T4” (FT4);
- The availability of T3, as indicated by “Free T3” (FT3);
- The autoantibody levels of T4 (T4AA), and
- T3 (T3AA).

If the test is being performed as a genetic screening for breeding stock or for breeds at high risk, Dr. Dodds also recommends checking the thyroglobulin autoantibodies (TgAA). Thyroid stimulating hormone (TSH) may also be tested, but it isn’t nearly as reliable for dogs as it is in identifying hypothyroidism in people.

Dr. Dodds says that testing for autoantibodies is particularly important, because elevated levels of autoantibodies indicate thyroiditis, regardless of T4 or T3 levels. “Those animals are having inflammatory immune-mediated lymphocytes attack and damage the thyroid gland,” she explains. It’s important to proactively treat these dogs, she adds, because when you’re dealing with behavior issues, the dog could end up with serious aggression before the total T4 ever tests too low.

Don’t let recent “normal” tests keep you from suspecting thyroid issues, should your dog’s behavior change suddenly. Hannibal had a full blood panel in July, which included T4, which came in at 1.4. At that point, he was acting normally. His behavior started to change subtly until he had the three incidences of aggression, and he was diagnosed as hypothyroid in November.

Hannibal’s case illustrates another point: Results that are in the normal levels as dictated by the lab aren’t necessarily normal for your dog. Dr. Dodds has fine-tuned the optimal levels for different ages and breed types. Generally speaking, younger dogs should have higher thyroid levels (in the top half of the “normal” range). Geriatric and large- or giant-breed dogs have “normal” levels that are closer to the bottom part of the normal range. Sighthounds normally have very low basal thyroid levels.

Many vets believe that if a dog is on medications such as phenobarbital or steroids, the thyroid test results won’t be accurate. That’s not true, according to Dr. Dodds. You simply have to take into account the impact the medications will have on the thyroid results; those medications reduce the thyroid values by 20 to 25 percent. If this is taken into account, you can still properly diagnose a dog with hypothyroidism and other concurrent health issues.

**Treatment suggestions**
The standard treatment for hypothyroidism is hormone replacement with a synthetic T4 compound, L-thyroxine, often called by the brand name Soloxine. Depending on the dosage, a month’s supply for an average-sized dog costs between $5 and $10. Once diagnosed, Dr. Dodds starts treatment. The standard dose is 0.1 mg per 12-15 lbs of optimum bodyweight twice daily.

“The half life is 12-16 hours, so we don’t recommend putting them on once a day ever,” says Dr. Dodds, despite some people’s experience that their dogs do “fine” on once a day dosing, and some medication labels give once per day dosing instructions.

Dr. Dodds cites a study published by the British Endocrine Society to back up her experience and recommendations. In the study, comparisons were made between animals given medication twice daily and once daily. The blood levels of thyroid in dogs who were given hormone replacement just once daily exhibited a roller coaster ride of a high peak and a deep valley. Twice daily dosing sends a better message to the rest of the endocrine system. “If you’re trying to regulate the pituitary gland so that the animal doesn’t put lymphocytes in its thyroid gland, you want to do it in concert with the half-life,” explains Dr. Dodds.

Interestingly, giving thyroid medication to a dog with normal T4 and T3 results doesn’t cause the levels to go too high. “We treat in this situation to inhibit the pituitary gland so it doesn’t stimulate the thyroid gland anymore,” says Dr. Dodds. When the thyroid gland isn’t being stimulated with thyroid stimulating hormone (TSH) by the pituitary, the lymphocytes leave the tissue, the body can heal itself, and you’re replacing the needed thyroid hormones.

Finally, Dr. Dodds suggests that thyroid medication be given to the dog directly by mouth, rather than in the food bowl. Owners who feed their dogs home-prepared diets are warned not to give the medication within a half-hour of a calcium-rich meal, such as meaty bones or a dairy-rich food, as it will interfere with absorption of the medication.

**Additional treatments**
In addition to thyroid medication, Dr. Dodds recommends certain supplements and remedies for dogs with hypothyroidism and behavior issues in particular. “We use flower essences to calm agitated dogs. Give them Rescue Remedy before or during high-stress situations,” she suggests.

Glandular supplements are an obvious choice for dogs with endocrine dysfunction (see “Grand Glands,” WDJ March 2003). But when you’re dealing with a risky behavior case, medication is the right place to start, says Dr. Dodds. She’s had patients who are reluctant to use any kind of drug.

“I can understand where they’re coming from; they want to use glandulars, but they keep shoveling them in and they don’t work. That’s no good, especially if you have a behavior case, where you can’t take a chance.”

However, once the case is under control on medication, and the dog’s behavior has returned to normal, if the owner wants to, glandular supplements can be added to the regime. “We have quite a few cases that take thyroxine and glandulars. Sometimes when we do that we can reduce the amount of drug we have to give,” explains Dr. Dodds.

Ask your holistic vet to help you choose a glandular supplement for a dog with immune-mediated hypothyroidism. While standard thyroid glandular supplements may be beneficial, a multiple glandular, or one that contains thymic gland, may be harmful. Immune support and modulation can be provided by plant sterols and sterolins, which help control immune-mediated and autoimmune disease processes. Sterols occur naturally in fruits, vegetables, seeds, and other sources. They are also available as concentrated supplements.

When choosing commercial foods, Dr. Dodds recommends types that contain only natural preservatives, such as mixed tocopherols (vitamin E), citric acid (vitamin C), and rosemary extract. She also suggests that all of her patients receive regular supplementation with vitamin E, Ester-C, echinacea, and garlic.

**What to expect of treatment**
Most of the cases that Dr. Dodds sees have responses like Hannibal's. "I would say at least 80 percent of the cases have a remarkable improvement; it's unusual to have them not improve."

Even more gratifying, the improvement is often quick. Most animals show improvement from two days to two weeks after starting treatment; some may take up to 30 days. Interestingly, a collaborative study between Dr. Dodds and Tufts University has shown many dogs experiencing aggression issues, as a symptom of hypothyroidism, show a favorable response to thyroid replacement therapy within the first week of treatment, even when it took about three weeks to correct the metabolic deficit.

Follow-up blood work should be performed six to eight weeks after medication is started. Blood should be drawn four to six hours after dosing to monitor the dog's response. Dr. Dodds considers results that are between the upper third of the lab's "normal" reference range to 25 percent above that to be optimal.

She also recommends a complete thyroid profile at the time of the recheck. "It is essential for animals with autoimmune thyroiditis to determine if the autoantibodies are waning," she explains.

In most dogs, the autoantibodies begin to decline after treatment starts. This is significant in that it indicates that the autoimmune destruction of the gland is declining or even stopping. But it doesn't mean the dog is cured. It's important to maintain the dog's medication to keep a recurrence of the thyroiditis at bay.