

## Understanding Cushing's Disease in Dogs

Medical Information	
Causes	Pituitary gland tumors
	Adrenal gland tumors
	Chronic use of steroid medications
Symptoms	Excessive thirst
	Excessive urination
	Weight gain
	Incontinence (urine leaking)
	Increased appetite
	Pot-bellied appearance
	Muscle wasting
	Skin and hair changes
	Increased susceptibility to infections.
Treatments	Slow, careful removal of external sources of cortisol
	Lysodren (mitotane)
	Trilostane
	Surgery
Alternative Therapies	Melatonin
	Flaxseed lignans
	Herbal Remedies

Cushing's disease was first discovered and described in humans in 1912 by a neurosurgeon named Harvey Cushing. It has subsequently been found to occur in many species, including horses, cats, and dogs. Its scientific name is hyperadrenocorticism. The disease is the result of excessive levels of cortisol (a steroid hormone) in the body for a long period of time. Cortisol is naturally produced in a dog's body by the adrenal glands. These are small structures that sit on top of the kidneys.

### **The Normal Role of Cortisol in the Body**

Below are the main important roles that cortisol plays in normal body functions:

- Mobilizes fat stores for energy.
- Maintains proper blood sugar levels.
- Decreases inflammation in the body.
- Maintains the function of the immune system (at higher doses, suppresses it).
- Supports muscle and ligament health, regulates calcium levels, and maintains bone density.
- Regulates proper circulation in the kidneys.
- Supports brain function.

During stressful times, cortisol is one of the hormones that helps to adjust conditions in the body to aid the dog deal with a dangerous situation. Some of these adjustments are the increase of sugar levels in the blood to produce higher energy levels and the increase of the dog's blood pressure for greater oxygenation of the muscle tissues.

### **Breed, Age, and Sex Predilections of Cushing's Disease in Dogs**

Middle-aged and elderly dogs are most commonly affected by Cushing's disease. It is a little bit more common in female dogs than males. Breeds that are more commonly diagnosed with Cushing's include:

- Yorkshire terriers
- Miniature schnauzers
- Poodles
- Beagles
- Dachshunds
- Staffordshire terriers
- Jack Russell terriers
- Boxers
- Boston terriers
- German shepherds
- Golden retrievers
- Labrador retrievers

## Signs of Cushing's Disease in Dogs

Signs of Cushing's disease usually develop slowly in dogs. Because of this, it is sometimes difficult for a pet owner to recognize them. In fact, they are often mistaken for normal aging signs. Below are some of the main signs seen in dogs with Cushing's disease (not all signs will be seen in every dog):

- **Excessive thirst.**
- **Excessive urination.**
- **Weight gain.**
- **Incontinence (urine leaking).**
- **Increased appetite; begging for or stealing human food or garbage.**
- **Pot-bellied appearance.**
- **Muscle wasting.**
- **Skin and hair changes.** Dogs with Cushing's disease often exhibit a tell-tale group of skin conditions related to the abnormally high cortisol levels in the system. These skin changes are:
  - Thinning hair on the trunk of the body: the head and legs remaining thickly-furred.
  - Thin skin.
  - Lack of hair regrowth after shaving.
  - Dark patches of skin on the abdomen.
  - Blackheads on the skin.
  - Raised, hard bumps under the skin, especially over the abdomen: these are calcium deposits and this condition is called *calcinosis cutis*.
  - Increased panting.
  - High blood pressure.
- **Increased susceptibility to infections.**
  - The occurrence of multiple urinary tract infections in an older dog commonly triggers a hunt for Cushing's disease.

The two major signs of Cushing's disease, excessive thirst and excessive urination, are often referred to by veterinarians as PU/PD. This means polyuria/polydipsia: increased urination/increased drinking. Dogs normally drink around one ounce of water per pound of bodyweight per day (this can vary with exercise and weather conditions). Dogs with Cushing's disease drink much more than this amount.

Dogs with Cushing's disease are also at a higher risk than other dogs for developing the following illnesses with their associated clinical signs:

- Diabetes mellitus
- Calcium oxalate bladder stones

## Causes of Cushing's Disease in Dogs

The pituitary gland, a small structure at the base of the dog's brain, monitors the amount of cortisol in the body at all times. If more is needed or if a stressful event occurs, the pituitary gland releases ACTH, or corticotropin. ACTH tells the adrenal glands to release more cortisol. The three types of Cushing's disease in dogs represent three ways in which this process is disrupted:

**Pituitary-dependent (PD or PDA).** The vast majority (about 85%) of dogs with Cushing's disease are afflicted with this variation of the illness. The pituitary gland, the small structure in the brain that is responsible for directing the actions of the dog's adrenal glands, develops a tumor which causes the gland to overproduce ACTH. This results in chronic overproduction of cortisol by the adrenal glands.

**Adrenal-dependent (ADH).** In a small percentage of dogs with Cushing's disease, one of the adrenal glands themselves has developed a tumor that is directly producing too much cortisol.

**Iatrogenic.** This type of Cushing's disease is the result of the chronic use of steroid medications in the animal. These drugs are used for a wide variety of illnesses in dogs. They are powerful anti-inflammatories and immune-system suppressors, so a huge number of maladies respond positively to their use. However, if a dog has to take a high enough dose for a long enough time to treat a chronic illness, signs of Cushing's disease can develop.

## Diagnosis of Cushing's Disease in Dogs

Unfortunately, Cushing's disease is not a simple illness to diagnose. Cortisol levels naturally fluctuate in the body all the time, so simply taking a blood sample to test the level tells the veterinarian only what the level was at that instant, not whether it is persistently high. Also, sometimes tests may appear to be negative for Cushing's disease at one time, but they will be positive when done at a different time. Therefore, diagnosis requires multiple steps, and it can get a bit costly.

First, your veterinarian will take a thorough history from you, including listening to any of the above signs that you have noticed in your dog. Then he or she will perform a thorough physical examination. During this check-up, depending on the size of your dog, the doctor may be able to feel an enlarged liver as well as observe some of the above signs, such as thinning hair.

After the examination, your veterinarian will run a set of basic blood and urine tests.

- **Urinalysis** results in dogs with Cushing's disease show a dilute urine because the dog is drinking more than normal. There may or may not be evidence of a urinary tract infection.
- **Alkaline phosphatase (Alk Phos, ALP) levels** are very commonly elevated in dogs with Cushing's disease.
- **ALT levels** are often elevated, as are **cholesterol levels**. These are both high as a result of the impact of increased cortisol on the liver.

If your veterinarian suspects Cushing's disease after the initial examination and basic blood and urine tests, he or she will need to run some more specific tests. Below are some of the tests that your veterinarian may choose to conduct to help verify the presence of Cushing's disease in your dog:

- **Urine cortisol-creatinine ratio (UC: CR).** This is a fairly inexpensive screening test that is very good for ruling out Cushing's disease. This means that, if the UC: CR test is negative, your dog is very unlikely to have the illness. If your dog's UC: CR test is positive, more tests are required because not all dogs with high UC: CR have Cushing's disease.
- **Low dose dexamethasone test (LDDST).** This is a test that is a bit more expensive to run than a UC: CR, and it requires your pet to stay in the veterinary hospital for the day. This is generally considered the most useful test for diagnosing Cushing's disease, and your veterinarian may choose to run this if your dog's UC: CR result is high. Your dog is given an injection of dexamethasone, a man-made type of cortisol. The pituitary gland should recognize the dexamethasone and decrease the amount of ACTH that it is sending to the adrenal glands, to decrease cortisol production. Blood samples are taken from the dog before, 4 hours after, and 8 hours after the dexamethasone is given. Lab tests can tell the difference between the dexamethasone and natural cortisol, so the test results will report whether the adrenal glands were properly suppressed by the pituitary gland, and for how long.
- **ACTH stimulation test (cortrosyn test).** In this test, synthetic ACTH (cortrosyn) is given to the dog, and blood samples are taken before and after the injection. A dog with Cushing's disease will respond to the ACTH injection by producing far more extra cortisol than will a normal dog. This test is more expensive than the low dose dexamethasone test. It is the most useful test for monitoring the response of a dog that is under treatment for Cushing's disease.
- **High dose dexamethasone test.** This test may be run once Cushing's disease has been diagnosed in an attempt to determine whether your dog has a pituitary gland or an adrenal gland tumor. The test is run the same as an LDDST test, except the dose of dexamethasone that is given is higher. If the tumor is in the adrenal glands, the natural cortisol levels should not drop after this injection. If the pituitary gland is the source of the problem, the higher dose of dexamethasone should trigger it to decrease its secretion of ACTH, lowering natural cortisol levels. However, as many as 30% of pituitary gland tumors do not respond this way.
- **Ultrasound.** This visualization technique may be able to show an adrenal gland tumor. However, they are sometimes too small or hidden to see with this test.
- **MRI or CT scan.** These highly-specialized visualization techniques may be able to reveal adrenal tumors better than ultrasound. They may also be able to show a pituitary gland tumor if it is large enough, but that is not often the case. This is an expensive, specialized test and it is not conducted very often for the diagnosis of Cushing's disease.
- **Hair Testing.** This is a new, potential diagnostic tool that is not widely available or used. Cortisol builds up in the hair shafts, so testing these levels may give a good indication of whether they are chronically high. However, bathing and exposure to sunlight may decrease the levels of the cortisol present in the hair and cause a false negative test.

## Treatments for Cushing's Disease in Dogs

The treatment of Cushing's disease in dogs is as complicated as the diagnosis, and it can be dangerous. During treatment with some medications, it is possible for a dog to suffer from an Addisonian crisis. Addison's disease is the direct opposite of Cushing's disease: there is not enough cortisol in the body to maintain proper function. It is a more severe, immediately life-threatening condition when it develops, and it can occur secondary to the treatment of Cushing's disease. Below are the various treatments used to control Cushing's disease in dogs:

- **Slow, careful removal of external sources of cortisol.** This is the treatment for iatrogenic Cushing's. Carefully, the medication that the dog is being given needs to be decreased and stopped. This will reverse the signs of Cushing's disease.
- **Lysodren (mitotane).** This medication works by destroying small bits of the adrenal gland. The medication is begun with an induction phase. During this period, it is given a few times a week, and the owner must monitor the pet very carefully. If too much of the adrenal gland tissue is inadvertently destroyed, an Addisonian crisis will result. Your veterinarian will carefully explain what to watch for and give you some oral cortisol replacement medication to use if you see any signs of a problem. After the induction phase, the dog is put on a maintenance dose of lysodren for the rest of his life. However, due to the ever-changing nature of cortisol production, frequent monitoring blood work (usually an ACTH stimulation test) needs to be performed as well as diligence maintained on the part of the owner to watch for any signs of negative side effects.
- **Trilostane.** This medication works well for pituitary and adrenal gland-based tumors. It is a newer drug than lysodren. It is given more frequently than lysodren, and it costs more. It was originally thought to be safer than lysodren, but time has revealed that there is still the possibility of an Addisonian reaction. Because trilostane interferes with the production process of cortisol in the body rather than by destroying adrenal gland tissue, it isn't known why this reaction occurs.
- **Surgery.** Adrenal glands can be removed surgically. However, adrenal gland tumors are usually very difficult or impossible to see, and there are often many post-surgical complications. The surgery must usually be done by a specialized veterinarian, is quite expensive, and is high-risk given that this disease is generally diagnosed in older pets.

Many veterinarians do not recommend treatment at all in dogs with mild signs of Cushing's disease. This is because of the possibility of an Addisonian crisis and the difficulty of regulating treatment in this disease due to the waxing and waning nature of cortisol production in the body.

Many signs of Cushing's disease are similar to those of simple aging, and pets can be quite comfortable living with them. However, the PU/PD and incontinence can be a big problem in the household. Also, progression of untreated Cushing's disease can lead to secondary issues like diabetes mellitus, liver, kidney, or neurologic problems, or blindness (from growth of a pituitary tumor).

## Alternative Therapies

- **Melatonin.** This holistic medication might help to lower cortisol levels in dogs with Cushing's disease.
- **Flax seed lignans.** These supplements might lower estrogen levels in dogs, and there is some speculation that this might help with Cushing's disease.
- **Herbal therapies.** There are a number of Chinese and Western herbal formulations that are used by holistic veterinarians to modulate the effects of increased cortisol on the dog's system, or to lower those levels.
  - Pet Wellbeing recommended product: [Adrenal Harmony Gold](#)

by Dr. Jan Huntingford - Monday, April 27, 2015

<http://www.petwellbeing.com/blog/dogs/understanding-cushings-disease/>