Hyperthyroidism in cats

Hyperthyroidism is a very common disorder of older cats. It is caused by an increase in production of thyroid hormone from the thyroid glands, situated in the neck.

Thyroid hormone has an important role in controlling the body's metabolic rate, i.e. the general activity level, so cats with hyperthyroidism tend to burn up energy too rapidly and typically suffer weight loss despite having an increased appetite and increased food intake.

In most cases (more than 95% of affected cats) the increased thyroid hormone production is due to a benign change and both of the thyroid glands are usually involved, although one gland may be more severely affected than the other. The cause of this benign change is currently unknown. However, the cat usually responds well to treatment and if it is recognised early and treated appropriately, then the outlook for the affected cat is generally good.

Unfortunately in rare cases there is a malignant tumour (thyroid adenocarcinoma) underlying the hyperthyroidism and in these cases treatment is much more difficult.

Signs and symptoms

Hyperthyroidism is rarely seen in cats under 8 years of age and there is no sex or breed predisposition. Affected cats may develop a variety of clinical signs which are usually quite subtle at first, but then become more severe as the disease progresses.

The 'classic' signs of hyperthyroidism are weight loss, increased appetite (polyphagia), increased irritability and restlessness or even hyperactivity. Many affected cats have a rapid heart rate (tachycardia) and develop an unkempt coat. Mild to moderate diarrhoea is also a common problem. Other, less common, signs may include increased thirst (polydipsia), increased urination (polyuria) and occasional vomiting.

Most hyperthyroid cats will show some degree of polyphagia and restlessness, but in some advanced cases there will be generalised weakness, lethargy and loss of appetite and the signs will be less characteristic.

Secondary complications

Cats with hyperthyroidism are also predisposed to the development of some other problems. Hypertrophic cardiomyopathy, a form of heart disease in which the heart muscle becomes abnormally thickened, is a common complication of long-standing hyperthyroidism. This may initially require additional treatment but fortunately, once the underlying hyperthyroidism has been controlled the hypertrophic cardiomyopathy will usually also improve, or even resolve completely.

Hypertension (high blood pressure) is another potential complication of hyperthyroidism and can cause damage to the eyes and kidneys. As with hypertrophic cardiomyopathy, the hypertension may need specific treatment initially, but usually resolves once the hyperthyroidism is well controlled.
Kidney disease does not occur as a direct effect of hyperthyroidism, but the two diseases often occur together because both are common in older cats.

**Reaching a diagnosis**

Once hyperthyroidism is suspected, a thorough physical examination and some blood tests will be required to confirm the diagnosis.

On examination an enlarged thyroid gland can often be palpated (felt) as a small, soft mass in the neck. However, in some cats there is no palpable thyroid mass because the overactive tissue is present in an unusual (ectopic) site, usually within the chest cavity.

The diagnosis is confirmed by determination of serum thyroid hormone levels. In most affected cats levels of both thyroxine (T4) and tri-iodothyronine (T3) are elevated but the T4 level is usually more reliable. Other laboratory tests may also be abnormal; elevations of liver enzymes (ALT and SAP) are common and concurrent renal failure may also be present and should be identified prior to starting any treatment. If secondary hypertrophic cardiomyopathy is suspected then an electrocardiogram (ECG) and/or a chest X-ray may be helpful.

In rare cases there may be a normal T4 level in a cat in which there is a strong suspicion of hyperthyroidism and in these cases further testing will be necessary. The simplest approach is to repeat the T4 test at a different time and this is often sufficient to confirm the diagnosis. If this is not helpful then more involved diagnostic tests may be required.

**Treatment**

There are three main options for the treatment of hyperthyroidism, each with its advantages and disadvantages.

1. **Medical management**
   - **ANTI-THYROID DRUG THERAPY**
     Anti-thyroid drugs reduce the production of thyroid hormone; they do not provide a cure, but they do allow long-term control of hyperthyroidism. Carbimazole (Neo-Mercazole; Nicholas) is commonly given at an initial dose of 5mg three times daily, until the thyroid hormone level falls to within the normal range. This usually takes two to three weeks, after which the dosing frequency can be reduced, usually to 5mg twice or even once daily. Treatment must then be maintained for the rest of the cat's life.

     For most cats carbimazole is a safe and effective treatment for hyperthyroidism. Side effects are rare and if they do occur they are usually mild and reversible. Poor appetite, vomiting and lethargy are the most likely side effects and may resolve after the first few weeks of treatment. More serious problems, including reduced white blood cell counts, reduced platelet counts or liver disorders, are rare but if they do occur then an alternative treatment must be used.

     Anti-thyroid drug treatment has the advantage of being readily available and economical, but it is not curative. Life long treatment, usually involving twice daily oral dosage, will be required to control the production of thyroid hormone and for some owners, and some cats, this may be difficult to achieve. Routine blood tests should be checked periodically during treatment to monitor for potential side effects.

   - **ALTERNATIVE MEDICAL TREATMENTS**
     For those cats which develop adverse reactions to carbimazole, or where it is not effective, an alternative drug treatment is often sought. Recent work has suggested that some other drugs may be effective for some cats for short term control of hyperthyroidism (eg for pre-surgical management), but there is currently limited information regarding their safety and efficacy.

2. **Surgical thyroidectomy**
   Surgical removal of all the affected thyroid gland tissue (thyroidectomy) can produce a permanent cure and is the treatment of choice for many hyperthyroid cats. However, even after successful surgery, signs of hyperthyroidism may recur at some time in the future due to increased activity of previously unaffected thyroid tissue.

   Anaesthesia for thyroidectomy can be problematic. To reduce hyperthyroid-related anaesthetic complications patients should be pre-treated with anti-thyroid drugs to control their thyroid hormone level for three to four weeks before surgery. Any associated heart disease must also be treated where necessary.
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Good surgical skills and experience are necessary to minimise the risk of post-surgical complications. The major risk is associated with inadvertent damage to the parathyroid glands, which lie very close to the thyroid glands and have an essential role in maintaining stable blood calcium levels.

Damage results in a reduction in parathyroid hormone secretion, which is usually only temporary, but can be life-threatening if it causes a significant fall in blood calcium (hypocalcaemia). This is most likely to occur when both thyroid glands are removed at the same time, since this can result in damage to both parathyroid glands. To minimise the risk of this complication in those cats that require removal of both thyroid glands it may be appropriate to perform the procedure in two stages, removing the most affected gland first and allowing six to eight weeks for recovery of parathyroid hormone production before removing the second thyroid gland.

If hypocalcaemia does occur it usually develops within the first few days following the surgery. Clinical signs include muscle twitches and weakness which can progress rapidly to convulsive seizures. Treatment is with supplemental calcium by intravenous injection and then by mouth. Additional treatment with activated vitamin D3 is also beneficial to allow this calcium to be used effectively. Most cats recover normal parathyroid function after a few days or weeks, but in severe cases treatment may need to be maintained for a few months before normal calcium regulation returns.

3. Radioactive iodine therapy

Radioactive iodine (I 131 ) can be used to provide a safe and effective cure for hyperthyroidism. The radioactive iodine is taken up by active thyroid tissue, but not by any other body tissues. The radiation therefore selectively destroys all affected thyroid tissue, including any ectopic thyroid tissue that would be inaccessible to surgery, but spares adjacent normal tissues, including the parathyroid glands.

A single subcutaneous injection of I 131 is curative in around 95% of cases and in those cats where hyperthyroidism persists the treatment can be repeated. Very occasionally a permanent reduction in thyroid hormone levels (hypothyroidism) occurs following treatment, but thyroid hormone supplementation is rarely required. A high dose of I 131 is also the only effective treatment for most cases of thyroid adenocarcinoma.

The advantages of this treatment option are that it is curative, has no serious side-effects, does not require an aesthetic and is effective in treating all affected thyroid tissue at one time, regardless of the location of the tissue. However, it does involve the handling and injection of a radioactive substance. This carries no significant risk for the patient, but precautionary protective measures are required for people who come into close contact with the cat. For this reason the treatment can only be carried out in a specially licensed facility and the cat must be kept in the licensed hospital unit until the radiation level has fallen to within acceptable limits. This usually means that the cat must be hospitalised for between three and six weeks following treatment and, during the early part of this time, when radiation levels are highest, handling of the cat must be kept to a minimum.

The licensed facilities currently available in the UK are at the University veterinary schools at Bristol and Glasgow, the Animal Health Trust at Newmarket and at the Barton Veterinary Hospital in Canterbury.

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