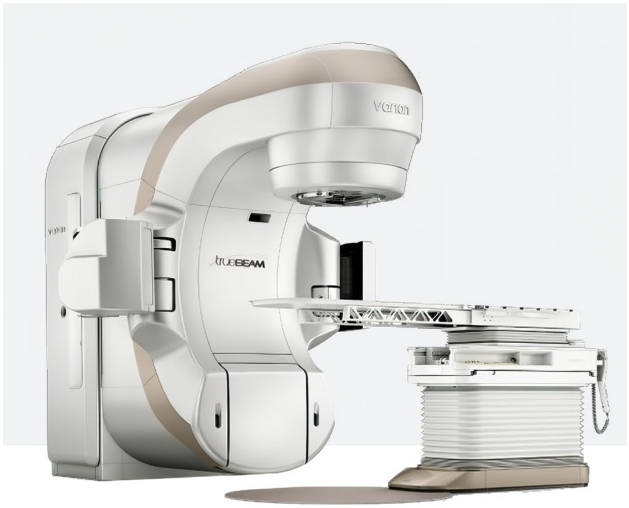
Southfields
veterinary specialists

RADIOTHERAPY

RADIOTHERAPY FOR THYROID/ CAROTID BODY TUMOURS



What type of thyroid tumours do you treat? Is surgery useful?

The most common type of tumour we treat is thyroid carcinoma which arises from the hormone-producing cells of the thyroid gland (follicular cells).

Dogs often have relatively few symptoms, and most patients present with a mass that is not affecting their quality of life. Some patients may have a cough or noise on excitement if the tumour is causing pressure on the airway. Rarely, the tumour secretes hormones which can cause hyperthyroidism (overactive thyroid) and conversely patients with thyroid tumours may be hypothyroid (underactive thyroid), although this is rarely tumour related. We recommend checking thyroid function in all dogs before treatment. Some dogs can have large tumours compressing the airway, which can be life-threatening.

Surgery can be a very good option for tumours which are small to medium-sized, easily movable and non-invasive. Surgery would be our first recommendation for those patients, assuming no tumour spread is evident at presentation. Outcomes after surgical removal can be excellent in many cases (often years) and often do not need any additional treatment on top of surgery.

The type of thyroid tumours we commonly treat with radiation (also called radiotherapy/RT) are non-surgical candidates if the tumour is large and invasive or in cases where the owner declines surgery. We can also treat recurrent tumours (that have grown back after surgery) and sometimes we give radiation to the primary tumour in patients that have tumour spread instead of surgery. We also treat unusual presentations of thyroid tumours with RT, for example, those arising from “ectopic” (distant) thyroid tissue, which can arise anywhere from underneath the tongue to the heart. We sometimes treat tumours that are similar in behaviour to thyroid carcinomas, which arise from special cells within the carotid artery (carotid body tumour), which also cause a mass in the neck.

Radiotherapy for thyroid tumours

Radiation therapy involves treatment with high-energy x-rays, the aim being to kill the tumour. We use a machine called a linear accelerator, Patients lie on the treatment couch and the machine delivers a focussed beam of x-rays from multiple angles 360˚ around the patient.

Radiation for thyroid carcinoma can be performed with definitive intent (meaning we are trying to get the best outcome possible by giving a high total dose of radiation) or with palliative intent (lower dose protocols where we try to slow tumour growth or improve symptoms, but without the expectation of long-term survival).

There are various protocols we can offer to dogs with thyroid carcinoma:

Fractionated RT (FRT) (meaning we are trying to give the biggest dose to the tumour possible to try and get the best outcome, with the total dose being split into multiple small treatments). This is usually 16 daily treatments (Monday through Friday).

Stereotactic Radiation Therapy (SRT). This is a newer type of radiotherapy technique which has come about due to significant technical developments in radiotherapy over the last few years. SRT usually consists of 3-5 treatments delivered once daily over 3-5 consecutive days (Monday to Friday; there are no treatments at weekends). It is a highly focused technique with the goal of treating the tumour but as little surrounding normal tissue as possible. The risk of acute side effects (see below) associated with this protocol is low and sore skin or throat and cough tend to be mild if they occur. The risk of late side effects is at least the same as with fractionated radiation, if not a little higher due to the high dose given with each treatment. Therefore, this technique may not be possible for all tumours – particularly those that are very large, invasive or involve certain areas of the neck. The protocol is much more convenient for pets and humans due to significantly fewer treatments and anaesthetics. There is only limited data, but the outcomes with SRT do not seem to be as good as with FRT. This may be true, or simply reflect the fact that larger/worrisome tumours may be more likely to be treated with SRT as they may be more candidates for repeated anaesthesia.

Palliative radiation therapy – this is when we give a low/modest dose of radiation to try and provide an improvement in symptoms but with short protocols and with little short-term (acute) toxicity. The goal/expectation is not long-term survival but to try and make pets more comfortable for the time they have left. Most protocols are once per day for 5 consecutive days, or once per week for 4-6 weeks. Sometimes the choice is based on tumour size/location/type and sometimes is based on owner preference.

Individual protocols: may be used in certain situations, for example due to a patient's concurrent medical conditions or temperament.

Your pet's radiation oncologist will always advise you which protocol they think is the best. Most likely you will be given options, depending on your pet, their individual circumstances and your treatment goals.

Each radiation treatment is performed under a short, light general anaesthetic. Prior to the start of treatment, a planning CT scan of the neck will be needed to help us prepare a bespoke treatment plan for your pet. This helps us to maximise the radiation dose to the tumour whilst sparing the nearby tissues. This will be required at Southfields even if your pet has had a recent CT scan, as we need patients to be in a very particular and fixed position so that the treatment can be carried out with pinpoint accuracy.

Unfortunately, even with radiotherapy, we usually cannot cure your pet's tumour. However, radiotherapy can be a very satisfactory treatment for improving quality of life, reducing the risk of side effects and controlling the tumour for a good duration. RT is well tolerated by most patients; particularly with newer technologies to help avoid side effects and in many cases make treatment courses much shorter.

Will any further tests be recommended prior to RT and does thyroid carcinoma spread to other parts of the body?

Your pet should have baseline blood tests to make sure the blood system and organ function (including the thyroid) is all normal and able to withstand anaesthesia.

We recommend that your pet has imaging of their lungs and/or abdomen (to look at organs such as the liver) prior to starting treatment, to check for tumour spread (metastasis-uncommon with early presentation, more common with larger tumours). Minimally, this should be done by X-ray or preferably by CT which is more sensitive and can also pick up (rare) tumours spread to bone/muscle.

Your pet may still be a candidate for RT if they have a tumour spread, but most likely the course will be palliative.

Will my pet's tumour-related symptoms improve after RT?

Thyroid tumours are sensitive to radiotherapy, though the response can be different for each patient. Most will shrink after RT.

The full effect of the treatment may be slow and can take months or even years for the tumour to slowly shrink to the smallest size. In some patients, we might only be able to stop it from growing further. In these patients, the benefit may not be as obvious as there will be less improvement in symptoms.

The hope is that as most tumours at least stop growing, any symptoms will not get any worse (whilst the tumour is under control). Many tumours do shrink with RT, so we hope that the risk of any symptoms relating to the tumour will improve.

Potential side effects related to radiotherapy:

Acute side effects (predictable and temporary)

+ **Hair loss (alopecia) in the treated site:** potentially more likely in non-moulting breeds
+ **Sore skin (radiation dermatitis):** very rarely significant but may be with larger tumours and in breeds with lots of loose skin around the neck, or thin-skinned dogs like sighthounds
+ **Laryngitis/tracheitis:** inflammation of the throat/airway can cause coughing
+ **Pharyngitis/mucositis:** soreness of the throat inside the lining of the mouth and palate. This may temporarily affect appetite or cause some short-term retching but soft food and pain medications usually prevent this from being concerning. May cause some drooling or stringy saliva
+ **Anaesthesia complications/stress-related problems:** a small number of dogs will develop gastric upsets/diarrhoea from the combination of anaesthesia and travelling/boarding for RT. Rarely patients can inhale food into the lungs during anaesthesia which can cause life-threatening pneumonia
+ **Death:** This is exceptionally rare, but pets with thyroid tumours can suddenly deteriorate during treatment; e.g. due to anaesthesia complications

In thyroid tumour patients, these side effects are usually mild and rarely problematic these days. They are short-term, predictable and self-resolving.

Delayed complications

These are uncommon, and typically arise from 3 months after a course of radiation is completed (usually after 6 months or sometimes years after treatment completion). Serious complications are rare with FRT (risk <5%).

+ **Airway damage (laryngeal paralysis):** some patients with thyroid tumours may develop problems with the mobility of the opening to the airway which can cause noise upon breathing and increase their risk of inhaling food. This can be related to the tumour, the patients' age/breed, hypothyroidism or possibly the RT treatment. We rarely know the cause
+ **Permanent cough:** this is rarely a problem for dogs
+ **Leukotrichia:** white hair regrowth in the radiotherapy treatment site is normal but not common in dogs with thyroid tumours
+ **Neurologic changes:** brain/spinal cord damage etc are extremely rare with modern radiotherapy
+ **Radiation-induced tumours:** an exceedingly rare complication (typically seen years after initial treatment) and is usually the development of a tumour arising within the treated site
+ **Hypothyroidism (underactive thyroid):** can occur in at least half of patients treated – though this is easily manageable with supplements

The goal of radiotherapy is to reduce the risk of serious late side effects as much as possible – we aim for <5% overall however in certain individuals the risk may be higher (this will be discussed by your oncologist). The risk may be higher or not fully known, particularly in cases where a novel technique is being used or where SRT is being utilised.

What is the prognosis?

Broadly speaking, median survival times (MSTs) with radiation are in the region of 2 years. Median survival is similar to an average. It means it is the time at which 50% of patients have died of their tumour, and 50% are still alive.

Unfortunately, no guarantees come with any type of cancer therapy. Very rarely, some patients develop cancer spread or local tumour progression very quickly after treatment.

The goal of palliative-intent radiotherapy is to improve symptoms rather than extend survival significantly – but this can still buy some pets a few months of being more comfortable.

If your oncologist thinks your pet may have a better or worse outcome than the average, then they will discuss this with you.

Chemotherapy and medical management:

There is no good evidence that chemotherapy is beneficial to dogs with thyroid tumours although some older studies showed that a subpopulation of dogs will respond to drugs such as carboplatin or doxorubicin so these may be discussed in specific situations.

A drug known as a TKI (tyrosine kinase inhibitor) can have benefits in controlling both primary and recurrent thyroid tumours and spread elsewhere in the body and it is sometimes used in combination with RT (for example if the patient has spread in the lungs). This can also be used instead of RT in cases when this is declined and can control thyroid tumours for many months. The trade name of this drug is Palladia™ and it requires regular monitoring, such as blood and urine checks to ensure no important side effects are occurring.

Palliative Care:

Should you not wish to proceed with any anti-cancer treatment, palliative care should be considered. Palliative care is where we treat the symptoms associated with the tumour without giving any direct anti-cancer treatment. We often recommend anti-inflammatories (NSAIDs) and/or painkillers, but the exact treatment will depend on the symptoms that your dog has.

What about cats?:

Thyroid tumours in cats are different as they are mostly benign and are mostly treated with injectable radiation (Radioiodine-available at other centres). However, in rare cases where external beam radiation is recommended the general principles are similar and so the recommended treatment plan is likely to be similar.

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