cLBT – A step forward in monitoring canine lymphoma

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Lymphoma continues to be one of the most common malignancies affecting dogs. Ongoing research is critical to improving treatment outcomes, according to the author, who looked into the role a canine lymphoma blood test (cLBT) plays in the detection and monitoring of lymphoma and how UK vets can benefit from using this test in their daily practice.

Cases of canine lymphoma are pretty regular in UK-based small animal veterinary practice. As for the most common haematopoietic tumour, around 25 new cases per 100,000 dogs are diagnosed each year.

However, the annual incidence rate may be much higher when considering cases where diagnosis is unconfirmed.

The arrival of cLBT as a tool for lymphoma diagnosis and remission monitoring will undoubtedly help vets move forward in terms of providing clients with prognostic information for their pets and planning treatment.

The test is a simple, quick and effective way to test blood proteins related to the presence of lymphoma, allowing veterinary professionals to closely monitor a dog in remission and act quickly to set in motion a suitable response in the face of impending relapse.

As a relatively new diagnostic and prognostic tool (**Panel 1**), cLBT shows great promise and provides invaluable information for veterinary teams and owners.

One of the areas the test is proving useful in is in lymphoma remission monitoring. Canine lymphoma can respond very well to first round chemotherapy, but the disease invariably recurs and reinduction therapy may be less effective due to the development of resistance to chemotherapy drugs.

It may be the case that reinduction or rescue therapies harness greater results when recurrence is detected in its earliest stages and the test enables you to identify this and act quickly and decisively.

Panel 1. Progress for patient and owner

The development of cLBT marks progress for patient and owner care, allowing an owner to see the full picture when it comes to his or her pet's response to treatment and making informed decisions during what can be an extremely stressful time.

The test is the work of veterinary oncologists, veterinary practices and mathematicians in the UK, the US and the Netherlands. The development was carried out in two phases:

- Firstly, to discover suitable and measurable biomarker tests for canine lymphoma.
- Secondly, to refine a testing system using mathematical models capable of quantifying and monitoring disease progress in dogs diagnosed with lymphoma.

Two biomarkers were discovered using mass spectrometry. These were acute phase proteins (APPs): C-reactive protein (C-RP) and haptoglobin (HAPT). C-RP levels increase in conditions such as canine lymphoma and C-RP testing is now routine in the diagnostic work-up of non-Hodgkin's lymphoma in humans.

C-RP alone lacks specificity in the diagnosis of lymphoma in dogs. Therefore, by adopting a multi-variant analytical approach employing both C-RP and HAPT values and using other clinical information, such as the presence of lymphadenopathy, cLBT was developed. This test overcomes the limitations found by measuring single APPs.

Carrying out cLBT is straightforward. Using 1ml of serum collected from the patient it is possible to measure the levels of C-RP and HAPT. To generate a test result, these readings are analysed with an algorithm to assist in the diagnosis of lymphoma. It can be used as part of blood work during an initial appointment.

The benefits of cLBT as a diagnostic tool are no sedation is required and results can be available within 24 hours of a sample receipt. When patients showing common lymphoma symptoms, such as generalised lymphadenopathy or when polyuria/polydipsia and lethargy are presented, cLBT enables the veterinarian to consider a diagnosis of malignant lymphoma early on in the diagnostic process.

Lymphoma is generally considered to be one of the most common causes of hypercalcaemia in dogs. However, the associated disease may be in an occult location and cannot be detected peripherally. Therefore, cLBT offers a diagnostic test that can significantly increase the index of suspicion for the presence of lymphoma in a dog's body.

This makes it a very valuable add-on test to complement routine biochemistry, aiding in a more targeted investigation and rapid diagnosis of neoplasia as the underlying cause for the

hypercalcaemia. Another benefit of using the test is it is less invasive.

A new method

Traditionally, monitoring for remission and subsequent relapse has been performed by palpation of peripheral lymph nodes with respect to the most common multi-centric form of the disease. However, such assessment can be imprecise and is only capable of detecting gross changes in size and texture of the nodes.

Biochemical methods based on detection of circulating biomarkers of lymphoma have the potential to provide greater objectivity while also detecting changes preceding palpable peripheral lymphadenopathy.
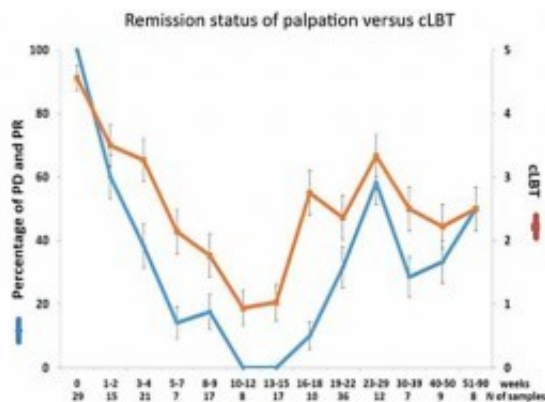

Figure 1. Percentage of samples from 57 dogs showing remission status (expressed as partial remission; PR) or progressive disease (PD) status as assessed by the veterinarian at the time of sampling to the cLBT score at the same time point for each dog. Below each time period is the number of samples assessed at that point. Error bars illustrate 95 per cent confidence intervals.

According to a study of 57 dogs undergoing lymphoma chemotherapy during and after treatment (Alexandrakis et al, 2014), cLBT was able to predict disease recurrence up to eight weeks in advance of the appearance of peripheral lymphadenopathy, giving veterinary teams more time to plan and implement reinduction or rescue therapies (**Figure 1**).

The precise impact of potential early reinduction treatment on overall survival times in canine lymphoma patients has yet to be fully evaluated, but represents a considerable step forward in the precision of patient monitoring.

A test score for the dog, ranging from zero to five, is generated using cLBT. Statistical modelling from the study demonstrates the value of the score for predicting the patient's disease status either diagnostically or while receiving chemotherapy treatment:

- the study revealed complete remission (free from lymphoma) – cLBT score