

# Cancer Screening Tests for Small Animals



Stephanie E. Schleis, DVM

## KEYWORDS

- Cancer • Companion animals • Screening tests • Diagnosis

## KEY POINTS

- Biomarkers are best used in combination with other clinical findings.
- At risk breeds should be screened for the ABCB1-1 $\Delta$  mutation prior to chemotherapy administration.
- No screening test should be used in isolation for diagnosis and treatment.

## INTRODUCTION

Cancer is increasingly more common in our aging patient population. Increased owner expectations and advances in veterinary diagnostic capabilities have led to the development and commercial availability of several tests for the diagnosis and treatment of cancer in companion animals.

Early detection of disease may lead to more curable tumors and a less disease-debilitated patient population. However, the role of early detection in human oncology is controversial with regard to the risk-to-benefit ratio for patients. Considerations must be given to the invasiveness of procedures undergone when a screening test is positive compared with the number of patients who actually have the disease and benefit from further scrutiny. Another consideration is that, although for some cancers early detection is of survival benefit, there are others for which no evidence suggests early implementation of treatment improves the quality or quantity of life. These same discussions hold true in veterinary oncology.<sup>1</sup>

With the aid of objective, scientific data where available, some of the more recent cancer detection tests, albeit not an exhaustive list, are discussed herein. This article provides the reader with a basic understanding of the tests and their appropriate use for cancer diagnosis, monitoring, or predictive value for detecting cancer in a healthy patient (**Table 1**).

---

Disclosure: The authors have nothing to disclose.

Department of Clinical Sciences, Bailey Small Animal Teaching Hospital, Auburn University, 1010 Wire Road, Auburn, AL 36839, USA

E-mail address: [ses0034@auburn.edu](mailto:ses0034@auburn.edu)

Vet Clin Small Anim 44 (2014) 871–881

<http://dx.doi.org/10.1016/j.cvsm.2014.05.007>

[vetsmall.theclinics.com](http://vetsmall.theclinics.com)

0195-5616/14/\$ – see front matter © 2014 Elsevier Inc. All rights reserved.

<b>Table 1</b>	
<b>Definitions</b>	
Sensitivity	Proportion of patients with the disease who test positive.
Specificity	Proportion of patients without the disease who test negative.
Predictive value	Probability of disease given a particular test result. Influenced by how commonly the disease occurs in a specific population.
Biomarker	Characteristics, including substances or compounds, that are objectively measured and evaluated as indicators of normal biology, pathology, or the response to treatment.

Data from Modiano JF, Sharkey LC. A practical guide to diagnostic testing for veterinary cancer patients. 2012. Available at: [www.akcchf.org/news-events/library/articles/cancerdiagnostics-1.pdf](http://www.akcchf.org/news-events/library/articles/cancerdiagnostics-1.pdf). Accessed November 1, 2013.

## TESTS FOR LYMPHOMA

### *Veterinary Diagnostics Institute TKcanine+*

This test is a recently marketed canine blood test by Veterinary Diagnostics Institute (VDI; Simi Valley, CA, USA) for the diagnostic, prognostic, and therapeutic monitoring of dogs with lymphoma and hemangiosarcoma. It employs an indirect, modified 2-step, competitive chemiluminescence immunoassay to quantify the serum level of thymidine kinase 1 (TK1), and an enzyme-linked immunosorbent assay for the quantification of serum levels of canine C-reactive protein (cCRP).

Thymidine kinase is an enzyme involved in the 1-step salvage pathway of pyrimidine synthesis. It exists in 2 forms, with TK1 located in the cytosol and TK2 located in the mitochondria.<sup>2</sup> TK1 is associated with cellular proliferation; its activity is greatly increased in the S phase of the cell cycle. TK1 can be measured in the serum because the enzyme can leak through the cell membrane with high levels of expression (Fig. 1).<sup>2-4</sup>

TK1 expression is limited to proliferating cells, and hematopoietic malignancies have very high cell proliferation rates.<sup>2-5</sup> In human oncology, serum TK1 levels provide information on prognosis and treatment efficacy in leukemia, multiple myeloma, and Hodgkin and non-Hodgkin lymphoma.<sup>2,4,5</sup> In veterinary species, high levels of serum TK1 compared with normal range are detected in canine lymphoma, splenic hemangiosarcoma, and feline lymphoma.<sup>2-8</sup> Solid tumors in dogs and humans do not show consistently increased levels precluding serum TK1 levels as a general biomarker for all cancer histologies.<sup>3</sup> However, it is used in humans for breast, lung, and colorectal cancer.<sup>4</sup> A recent study also showed increased levels of inactive TK1 in the serum of dogs with solid tumors using an immunoaffinity/Western blot assay for detection of the protein, not solely activity. The types of solid tumors included mammary tumors (n = 4), hepatic tumors (n = 2), osteosarcoma (n = 2), synovial cell sarcoma (n = 1), mastocytomas (n = 5), plasmacytoma (n = 1), fibrosarcoma (n = 1), melanoma (n = 2), histiocytic sarcoma (n = 1), lung carcinoma (n = 1), and infiltrative fibrolipoma (n = 1).<sup>9</sup>

Other conditions can cause an increase in the activity of serum TK1, including pre-malignant conditions, viral infections, and inflammatory conditions.<sup>3</sup> For example, TK1 was found to be significantly elevated in dogs with pyometra.<sup>10</sup> Based on unpublished data, minor increases in TK1 were noted concurrently with positive tests for rickettsial disease in dogs.<sup>3</sup> Although the specificity of TK1 as a biomarker for malignancy is high, its low-end sensitivity, especially for solid tumors, is poor owing to these other instances where TKI levels can be above the normal range.<sup>3</sup>

Download English Version:

<https://daneshyari.com/en/article/2460259>

Download Persian Version:

<https://daneshyari.com/article/2460259>

[Daneshyari.com](https://daneshyari.com)