

# Thymidine Kinase (TK)

## Relevant Papers

J Vet Intern Med. 2004 Sep-Oct;18(5):696-702.

**Serum thymidine kinase activity in dogs with malignant lymphoma: a potent marker for prognosis and monitoring the disease.**

[von Euler H](#), [Einarsson R](#), [Olsson U](#), [Lagerstedt AS](#), [Eriksson S](#).

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Comment in:

[J Vet Intern Med. 2004 Sep-Oct;18\(5\):595-6.](#)

Serum thymidine kinase (sTK) activity was evaluated as a tumor marker for canine malignant lymphoma (ML). The objective was to investigate if sTK, as in humans, could be used as a prognostic marker for survival time in dogs with ML and if sTK could identify early signs of progression of disease in treated dogs. Serum samples from 52 dogs with ML were tested for initial TK activity. Samples from 21 normal dogs and 25 dogs with nonhematologic neoplasms were used for comparison. Forty-four dogs with ML were treated. Serum TK activity was measured in treated dogs before each treatment and every 4 weeks thereafter until relapse. Dogs with ML had 2-180 times higher TK activity (TK 5-900 U/L) than normal dogs (TK <7 U/L) based on the mean + 2 standard deviations. In the group of other neoplasms, only 2 dogs had a moderate increase (6.4 and 7.5 U/L) compared with the controls. Mean sTK activities in the dogs with ML that had gone into complete remission (CR) were not significantly different from activities in healthy controls (P = .68). Mean sTK at least 3 weeks before and at the time of relapse was significantly higher than activity measured at CR (P < .0001). Dogs with ML that initially had sTK >30 U/L had significantly shorter survival times (P < .0001). Furthermore, sTK activity reflected the clinical staging of ML. Measuring sTK can be used as a powerful objective tumor marker for prognosis and for predicting relapse before recurrence of clinically detectable disease in dogs with ML undergoing chemotherapy.

PMID: 15515587 [PubMed - indexed for MEDLINE]

Res Vet Sci. 2006 Feb;80(1):17-24. Epub 2005 Sep 2.

**A non-radiometric method for measuring serum thymidine kinase activity in malignant lymphoma in dogs.**

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The aim of this study was to evaluate an enzyme-linked immunosorbent assay (ELISA), for determination of serum thymidine kinase 1 (sTK1) activity in dogs with malignant lymphoma (ML) and compare it with a thymidine kinase (TK) radioenzymatic assay (TK-REA). The TK-REA has recently been shown to be useful in determining the clinical stage and prognosis in canine ML. In addition, serum lactate dehydrogenase (LDH) was measured. Forty-five dogs were included in the study. Sixty serum samples from these dogs, stored in a tumour serum sample bank (stored at -20 degrees C), were analysed. Apart from 37 dogs with ML, four normal dogs as well as two dogs with mammary carcinomas, one dog with bladder carcinoma, and one dog with malignant fibrous histiocytoma were included. Staging of ML was based on the modified World Health Organization (WHO) staging system for canine ML. The diagnosis of all tumours was verified by histopathology. The TK activity (units per litre [U/L]) ranged from 1.0 to 607.9 in the TK-REA analysis and from 1.1 to 510 in the TK-ELISA (normal reference value <7U/L). The range for LDH was between 12 and 1194 U/L (normal reference value <228 U/L). There was a significant correlation between the TK-REA and the TK-ELISA. The correlation coefficient (CC) was 0.97 and the standard error of the estimate (SEE) was 3.7 U/L. There was no correlation between LDH and either the TK-REA or the TK-ELISA (CC=0.53 for both assays; SEE=26.7 and 12.7 U/L, respectively). Most of the variation in LDH was still within the normal reference range. The mean LDH in dogs with high-stage (stage IV+V) disease was 201.9 U/L. The corresponding values for the TK-REA and TK-ELISA were 109 and 109.9 U/L, respectively. The significant relation between the TK-REA and the TK-ELISA was confirmed by Bland-Altman analysis. The TK-ELISA assay, because of its relative simplicity, will permit measurement of TK in cases of ML in dogs to become a routine procedure.

PMID: 16140350 [PubMed - indexed for MEDLINE]

# Thymidine Kinase (TK)

## Relevant Papers

### Monitoring therapy in canine malignant lymphoma and leukemia with serum thymidine kinase 1 activity - evaluation of a new, fully automated non-radiometric assay

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**Pages:** 505-510

**Abstract:** Thymidine kinase 1 (TK), which is involved in the synthesis of DNA precursors, is only expressed in S-G2 cells. Serum TK levels correlate to the proliferative activity of tumor disease. Determinations of TK levels have so far relied on radio enzyme assay (REA) and experimental ELISA methods, which have limited the clinical use of this biomarker, although recent studies in dogs with malignant lymphoma (ML) demonstrate its wide potential. A non-radiometric method based on a competitive immunoassay with specific anti-3'-azido-deoxythymidine monophosphate (AZTMP) antibodies has been further developed into the fully automated Liaison TK assay (DiaSorin). Sera from healthy dogs (n=30), and dogs with leukemia (LEUK) (n=35), ML (n=84), non-hematological tumors (n=50), and inflammatory disease (n=14) were tested using both methods. Lymphoma and LEUK samples were available before and during chemotherapy. The coefficients of variation for the Liaison TK assay in this study were 6.3 and 3.4% (low/high TK, respectively), and the correlation between TK REA (X) and the Liaison TK assay (Y) was  $y=0.9203x + 1.3854$  ( $R^2=0.9501$ ). The TK1 levels measured during chemotherapy gave very clear differences between dogs in complete remission and dogs out of remission. A Tukey-Kramer analysis showed that all LEUKs and MLs out of remission differed significantly from the other groups. The Liaison TK assay showed high precision, high sensitivity and a good correlation to the TK REA. The Liaison TK assay provides valuable clinical information in the treatment and management of canine LEUK and ML, with a potential to be further validated in human trials.

**OPEN ACCESS ARTICLE**

### Plasma Thymidine Kinase Activity in Dogs with Lymphoma and Leukemia

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(Received 6 May 1997/Accepted 27 June 1997)

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**ABSTRACT.** Plasma thymidine kinase (TK) activity was evaluated as a plasma marker for canine lymphoma and leukemia. A tentative "cut-off" value was set at 6.0 U// as the upper level of plasma TK based on the mean + 2SD of plasma TK activity in 13 clinically healthy dogs. The levels of plasma TK activity in all of the 20 dogs with lymphoma and leukemia were higher than the cut-off value, whereas those in dogs with lymphoma decreased in parallel with the reduction of the tumor mass after chemotherapy. These findings suggested that estimation of plasma TK activity can be used as a plasma marker for lymphoma and leukemia in the dog. — **KEY WORDS:** canine, lymphoma, thymidine kinase (TK).

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*J. Vet. Med. Sci.* 59(10): 957-960, 1997