Diagnostics of canine Leishmania infection by ELISA and PCR – a comparative study

D. Breu, J. Guthardt, E. Müller
LABOKLIN GmbH & Co. KG, 97688 Bad Kissingen, Germany

Introduction & Objectives

Leishmaniosis is one of prevalent parasitic canine diseases widely spread in temperate zones. Canine leishmaniosis may manifest as subclinical illness, a self-limiting disease or severe and chronic disease with multiple organ involvement. Our study was aimed to evaluate the relationship between the two current diagnostic methods of canine Leishmania infection, namely anti-Leishmania antibody (Ab) assay by ELISA (Enzyme-Linked Immunosorbent Assay) and Leishmania-DNA assay by CR (Polymerase Chain Reaction). Blood samples and, when available, other materials (tissue, swabs) were obtained from the dogs with suspected Leishmania infections or history of importation and relocation from endemic countries to Germany.

Materials & Methods

In 2016 and 2017, we analyzed a total of 15449 and 17789 blood samples, respectively, for Leishmania Ab assays and a total of 712 and 786 samples, respectively, for Leishmania DNA assays. 129/712 and 145/786 dogs were available for both Abs and DNA tests. For antibodies, we used a commercially available ELISA (negative <0.9; questionable/? > 0.9 ≤ 1.1; positive >1.1 LE), DNA detection was done with real-time PCR.

Results

Specifically concerning the samples subjected to both PCR and Ab assays (129/712 in 2016; 145/786 in 2017), we observed the following Ab profiles (Fig 1). In 2016 and 2017, seropositivities (Leishmania unit or LE > 1.1) were 97.1% (33/34 dogs) and 93.5% (29/31 dogs), respectively, in PCR+ cohorts, respectively, versus 31.6% (30/95 dogs) and 32.5% (37/114 dogs), in PCR- cohorts, respectively. Notably, the PCR+/Ab+ cohorts showed Ab titres (mean) ~2 times higher than those of the PCR–/Ab+ cohorts (3.1 LE versus 1.7 LE).

Summary

- PCR-positive samples were almost 100% Ab-positive,
- PCR-negative samples were ~32% Ab-positive, and
- in Ab-positive cases, PCR-positive samples had approximately twice higher Ab titres than PCR- negative samples.

Conclusions & Discussion

Our data suggested that PCR-positivity may be considered as the diagnostics generally confirming active Leishmaniosis. It is corroborated by approximately 2-fold higher levels of antibodies in PCR–positive samples. The high level of antibodies in these cases may suggest a predominant Th2-type immune response in the infected dogs which is largely characterized by high antibody production but failure to eliminate the intracellular Leishmania pathogen. Other ~32% of the PCR-negative/sero-positive samples might be the cases where persistent/residual antibodies were present due to exposition to the parasite or past Leishmania infection, regardless of the clinical status of dogs.