Summary

Lyme disease is a multisystem infectious disease caused by spirochetes belonging to the *Borrelia burgdorferi* sensu lato complex, with ticks serving as their vectors. The disease occurs in humans and in various animal species, including dogs. Studies conducted in Bernese Mountain Dogs (BMDs) have shown that dogs of this breed frequently test positive in rapid serological assays for *Borrelia burgdorferi* despite exhibiting no clinical signs of the disease. This suggests that Lyme disease may be overdiagnosed and misdiagnosed in Bernese Mountain Dogs. The doctoral research included studies aimed at: evaluating the clinical course and prevalence of Lyme disease in Bernese Mountain Dogs in Poland, assessing the diagnostic utility of rapid serological tests for the diagnosis of Lyme disease in this breed and performing a proteomic analysis of serum from Bernese Mountain Dogs that tested positive in rapid serological assays for Lyme disease. The results demonstrated that Bernese Mountain Dogs are susceptible to clinically manifest Lyme disease and that *Borrelia afzelii* is the predominant etiological agent responsible for canine Lyme disease in Poland. Among the hematological and serum biochemical parameters investigated, C-reactive protein (CRP) was shown to be a useful marker for monitoring the effectiveness of Lyme disease treatment as well as for differentiating asymptomatic Bernese Mountain Dogs with positive rapid serological test results from dogs of the same breed with clinically confirmed Lyme disease.

A major diagnostic challenge in Bernese Mountain Dogs is that a substantial proportion of clinically healthy individuals produce positive results in rapid serological tests for *Borrelia*, despite the absence of *Borrelia*-specific antibodies in their serum when examined by Western blot analysis. This phenomenon may be associated with the presence of two serum protein fractions with molecular masses of 7,630 Da and 15,260 Da, identified using MALDI-TOF mass spectrometry. These protein fractions may serve as biomarkers for distinguishing dogs that are seropositive from those that are seronegative for *B. burgdorferi* in rapid serological assays.

The findings of this study indicate that diagnosing Lyme disease in Bernese Mountain Dogs based solely on rapid serological tests is associated with a high risk of diagnostic error. Owing to the broad spectrum of clinical manifestations of Lyme disease and their potential long-term health consequences, serological diagnosis should always be confirmed by Western blot, which detects IgG and IgM antibodies directed against *Borrelia burgdorferi* antigens before a definitive diagnosis is established.

Keywords: serological testing, Bernese Mountain Dogs, *Borrelia burgdorferi*, proteomics, Western blot.