Ticks are ectoparasites of vertebrates and vectors of numerous pathogens. The interactions between ticks, pathogens and hosts are extremely complex. Despite the important role that ticks play as disease vectors, their immune system is still poorly understood. Arthropods rely on innate immune mechanisms in which immune signaling pathways and the synthesis of antimicrobial peptides (AMPs) play a crucial role.

The aim of this study was to determine the correlation between the expression levels of selected innate immunity genes in the ticks *Ixodes ricinus* and *Dermacentor reticulatus* and the presence of pathogens. The research focused on comparing changes in the expression of two defensin genes in *I. ricinus* (*def1* and *def2*) and the only known defensin gene in *D. reticulatus* (*defDr*) in response to infection with *Borrelia* spp., *Anaplasma phagocytophilum*, *Babesia* spp., *Rickettsia* spp. and *Neoehrlichia mikurensis*. Due to the important role of *I. ricinus* as a vector of *Borrelia burgdorferi* sensu lato, the changes in the expression profile of genes involved in the JAK/STAT pathway and genes encoding AMPs — defensin 1, defensin 2, ricinusin and lysozyme — were also analyzed in response to the presence of spirochetes.

The results showed that the expression of defensin genes in ticks can be modulated by both blood feeding and the presence of pathogens. Differences were found in the expression of the investigated genes between the two tick species. It was also found that in *I. ricinus* individuals infected with *B. burgdorferi* s. l., only a subset of genes related to the JAK/STAT signaling pathway and AMPs were overexpressed. The results suggest that innate immune mechanisms may be involved in modulating the immune response of ticks, which could influence their vector competence.