



A decrease in CD57+ NK cells is demonstrated in patients positive for tick-borne infections



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BACKGROUND

Tick-borne infections (TBIs) can lead to a chronic and debilitating illness. CD57, or cluster designation 57, refers to glycoprotein molecules found on the surface of T cells and natural killer cells (NK). NK cells are involved in the innate immune system and possess the ability to eliminate many different foreign invaders as they lack antigen-specific cell surface receptors. The acquisition of CD57 by NK cells is believed to increase their cytotoxic ability, increase their sensitivity to signalling through CD16 and natural cytotoxicity receptors (NCRs), as well as reduced their sensitivity to cytokines¹.

The diagnosis of TBIs can be challenging due to the limited sensitivity of screening assays for the causative agents and discrepancies among different laboratories. Improved and more reliable testing methods are needed and CD57+ NK cell levels could be a potential marker to assess chronic disease in patients with TBIs. It has been proposed that patients with chronic Lyme disease may exhibit reduced levels of CD57+ NK cells, possibly due to an immunosuppressive ability of *Borrelia*².

OBJECTIVES

This study aimed to determine if there was a decrease in CD57+ NK cells in a subgroup of patients with confirmed TBIs.

METHODS

This retrospective study examined a cohort of 301 patients that presented to an infectious disease clinic with 'Lyme-like' illness. A subgroup was created of patients with enzyme immunoassay confirmed TBIs and this was categorised based on infection type. The CD57+ NK cell levels of this subgroup was analyzed by a decrease in CD57+ NK cell levels specifically below 100 cells/ μ l.

Table 1. Types of infections that were tested.

Types of Infections
• Borrelia species – IgG, IgM, Round body IgG, Round body IgM
• Babesia – IgG and IgM
• Bartonella – IgG and IgM
• Ehrlichia – IgG and IgM
• Rickettsia – IgG and IgM

Citations

- Nielsen CM, White MJ, Goodier MR, Riley EM. Functional significance of CD57 expression on human NK cells and relevance to disease. *Frontiers in Immunology*. 2013;4. doi:10.3389/fimmu.2013.00422
- Stricker RB, Winger EE. Decreased CD57 lymphocyte subset in patients with chronic lyme disease. *Immunology Letters*. 2001;76(1):43–8. doi:10.1016/s0165-2478(00)00316-3

RESULTS

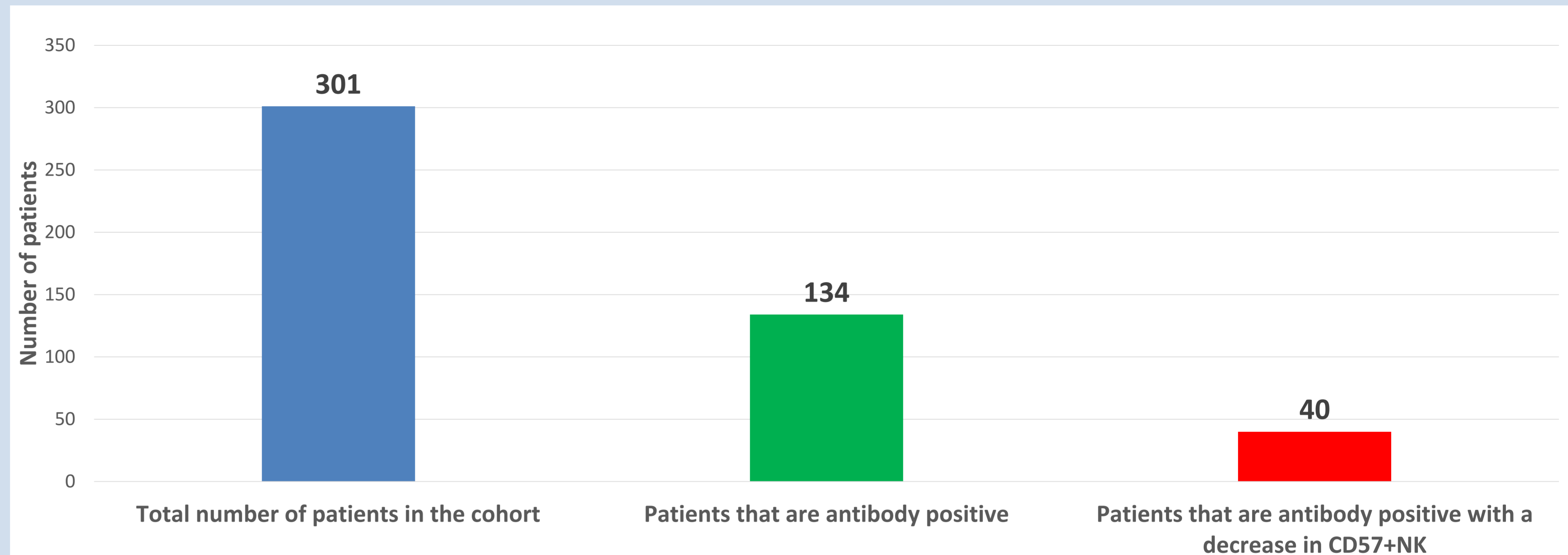


Figure 1. Description of the cohort. Total number of patients (blue) versus the number of patients that are antibody-positive for TBIs (green). The number of patients that are antibody-positive for TBIs with a decrease in CD57+ NK cells (red).

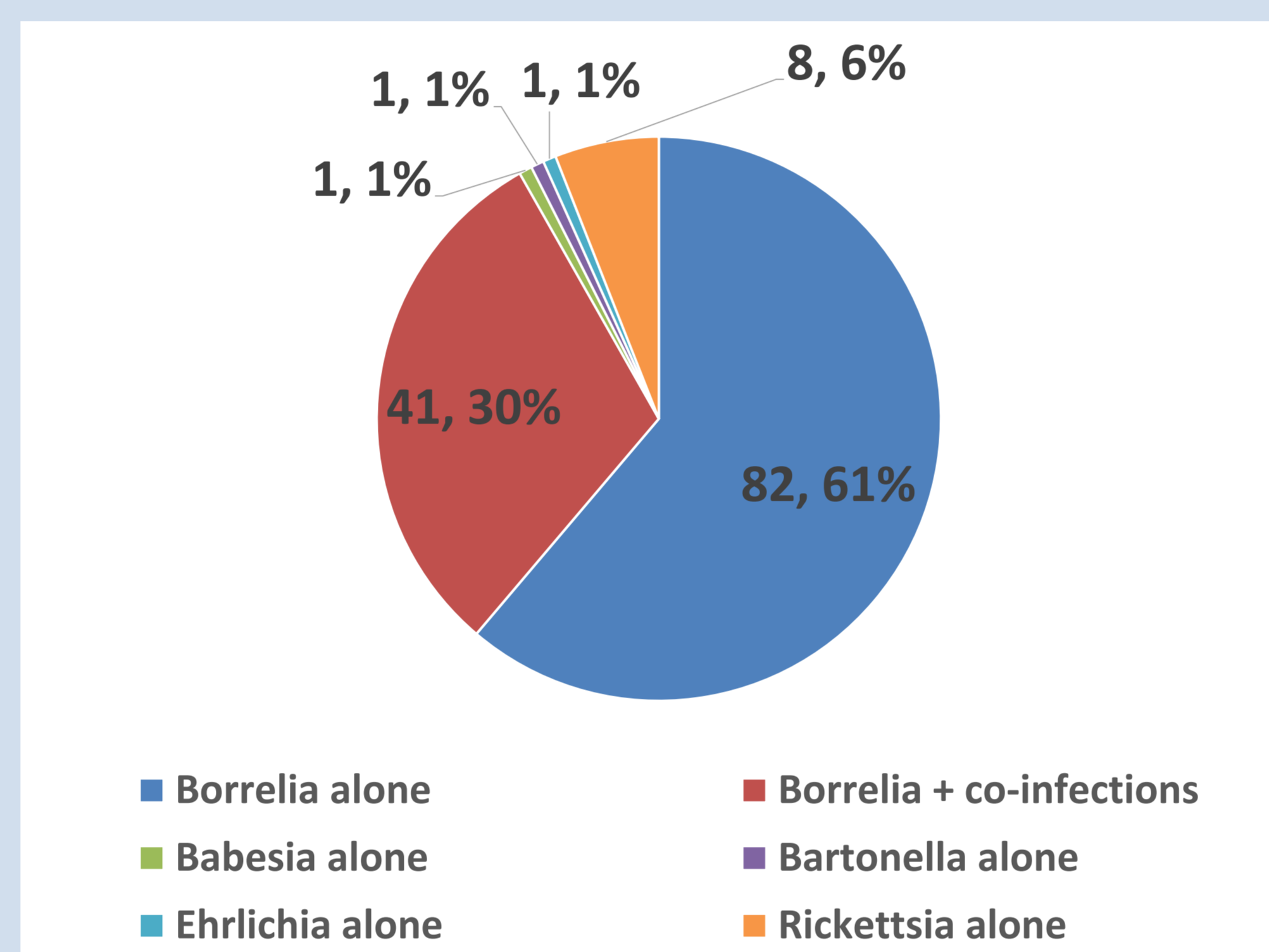


Figure 2. Serologic responses for antibody-positive patients for individual TBIs.

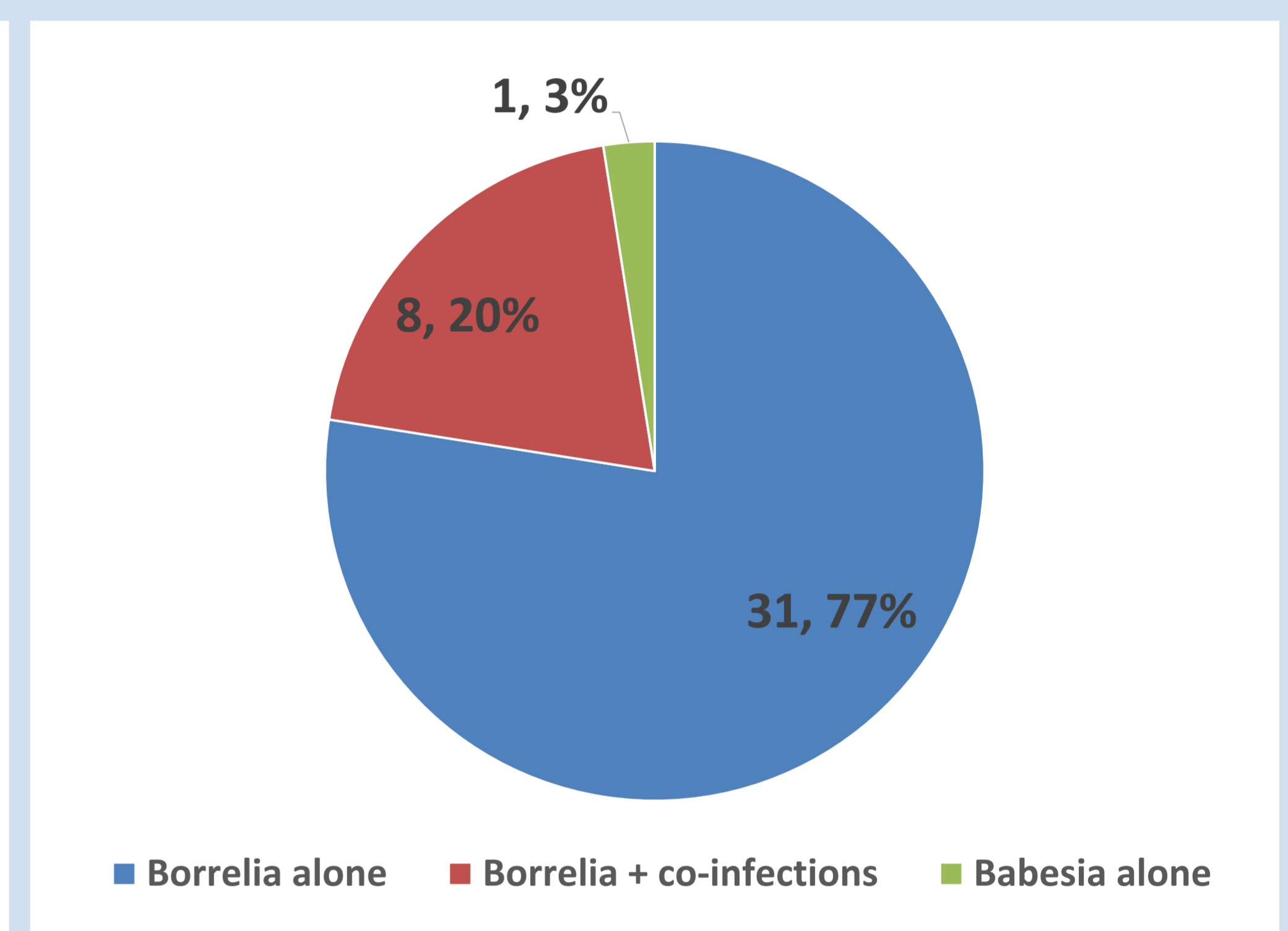


Figure 3. Patients that are positive for TBIs with a decrease in CD57+ NK cells.

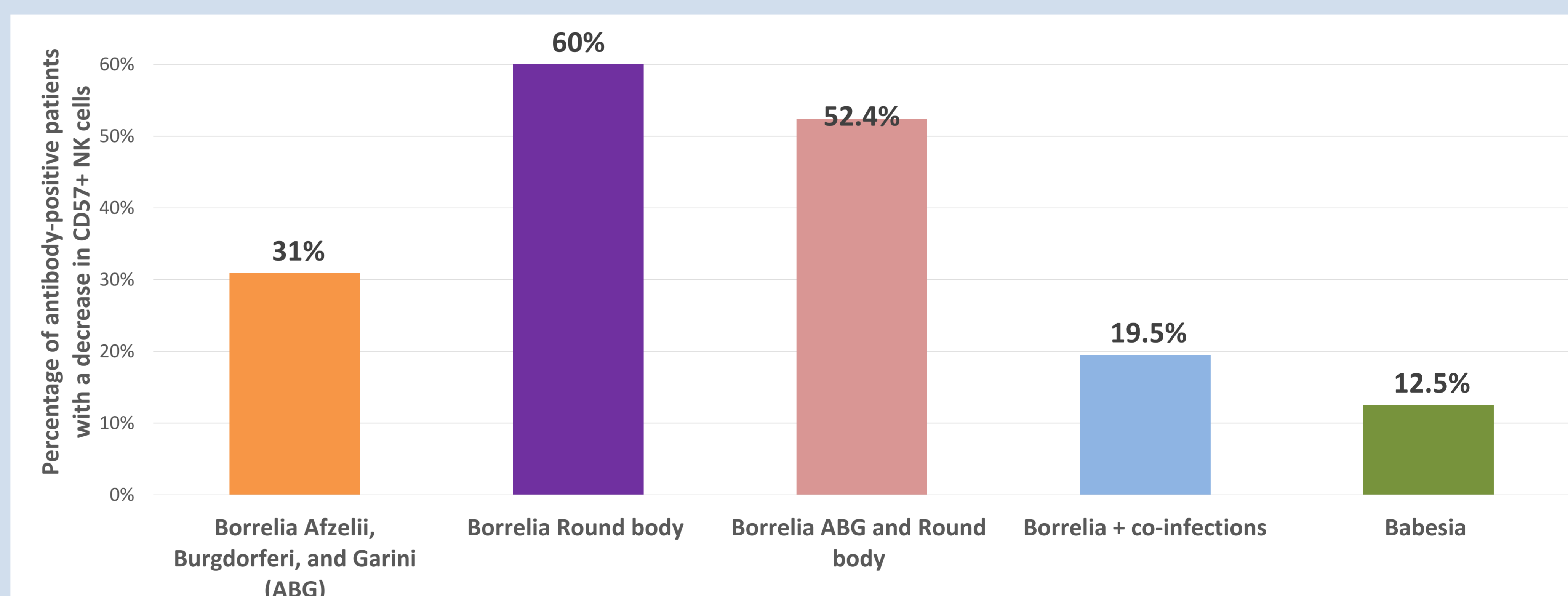


Figure 4. Percentage of antibody-positive patients with a decrease in CD57+ NK cells for their respective antibody-positive TBI groups. The number of antibody-positive patients with a decrease in CD57+ NK cells for *Borrelia afzelii*, *B burgdorferi* and *B garinii* was 17/55 patients, for *Borrelia round body* 3/5, for *Borrelia species* and *round body* 11/21, for *Borrelia* and *co-infections* was 8/41 and for *babesia* 1/8 patients.

CONCLUSION

This study confirmed that a decrease in CD57+ natural killer (NK) cell levels can be observed in patients who tested positive for TBI antibodies, with a decrease being observed in about one-third of antibody-positive patients. Several potential causes may account for this decrease, including chronic immune activation leading to the depletion or dysfunction of CD57+ NK cells, immune suppression, or sequestration of these cells in tissues.

Interestingly, nearly two-thirds of patients infected solely with *Borrelia burgdorferi* round bodies demonstrated a decrease in CD57+ NK cell levels. This finding could be linked to the increased resilience of round bodies to treatment and may contribute to the chronic symptoms experienced by some patients. It has been suggested that a decreased CD57+ NK cell count is associated with chronic symptoms and that proper treatment could potentially improve this count and the symptoms².

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