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CORRESPONDENCE

Reply to Correspondence

Pediatric Research (2024) 95:3–4; https://doi.org/10.1038/s41390-023-02790-0

We thank Dr. Greenberg for her comments on our study.[1] As physicians and psychologists caring for pediatric patients with Lyme disease and their families, we are grateful for the opportunity to respond and highlight several points raised, which were not possible within the scope of the initial publication.

We agree that larger studies with prospectively collected data, specifically in children, are necessary to further refine our study findings. The low number of participants with prolonged symptoms for the outcomes in our study precluded the use of multivariable modeling. We recognize that our study design may have introduced differential response bias. However, it is not clear that our study underestimated the true rate of persistent symptoms in children. While it is possible that non-respondents had more persistent symptoms than respondents, it is also possible that those with persistent symptoms were more likely to participate in the study, leading to an overestimate of the true rate. Also, respondents differed from non-respondents in terms of age and race, and not symptoms or stage of Lyme disease.

Overall, our study results are similar to other pediatric studies which have shown that most children who are appropriately treated for Lyme disease will have excellent long-term outcomes.[2–9] It is important to make the distinction between definite sequelae and post-treatment Lyme disease symptoms, as it was performed in the study by Skogman et al.[10] For example, irreversible nerve damage can lead to persistent sequelae, as it is the case of incomplete resolution of facial palsy. These sequelae should be differentiated from subjective nonspecific symptoms. Importantly, the study by Skogman et al.[10] showed that children treated for neuroborreliosis had similar rates of reported nonspecific symptoms, and their effect on daily activities and school performance, to matched controls. Regarding the study by Fallon at al.,[11] it is important to note that the 28% increase in the rate of mental disorder diagnoses is relative, and, as stated by the study, the absolute population risk is low. Interestingly, Lyme neuroborreliosis was not associated with an increased risk of psychiatric illness, similarly to another population-based matched cohort study.[12] Studies examining neuropsychiatric symptomatology in children treated for Lyme disease have shown similar outcomes when compared to matched siblings controls[13] and matched controls.[14]

Foremost, our findings provide an important starting point for health care professionals and families to be made aware that most children do make full recovery, often within one or two months of diagnosis. It has been our experience in clinical practice that many children and families who receive a diagnosis of early localized, early disseminated or late Lyme disease are fearful, due to the impression that there is not effective treatment available and that this will be a lifelong illness. The lack of pediatric-specific information about outcomes, easily accessible to health care professionals and the general public, contributes to this belief. We have found that publication of our study has provided many of our referred patients and families peace of mind on the knowledge that the odds are very much in favor for a full recovery with appropriate treatment. Our study serves as a source of systematically collected and validated data documenting the spectrum of response to therapy in most children and is useful to not only patients and their families but also those who are caring for them and addressing expectations for course of recovery.

While most patients will recover, our study showed that full recovery may take 6 months or longer in a significant subset of pediatric patients (22%). Our intention was never to dismiss this group of patients. In fact, one of the goals of our study was to identify and operationalize a pediatric-specific description of post-treatment symptoms, potentially unique to children and their developmental stages. The finding that the majority recover more quickly in no way diminishes the importance that children who are suffering from prolonged symptoms need our attention and care. Only by recognizing this entity and sharing this information with health care professionals will these individuals be appropriately diagnosed and treated. Our collective clinical mission is not only to ensure that children receive the correct diagnosis and treatment to optimize their outcome, but to also ensure that children with prolonged symptoms are appropriately identified and have access to effective treatments.

We agree that well-designed prospective studies looking at long term follow-up in youth with Lyme disease are needed to determine the persistence of and risk factors for different types of symptomatology. The pathogenesis of these prolonged symptoms is not clear and is likely multifactorial. This is an active area of research by many different groups, thinking broadly in scope. These studies must be scientifically rigorous and adequately powered to detect meaningful impact, or lack thereof, on patient outcomes. Furthermore, the broader concept of infection-associated chronic illnesses, encompassing overlapping symptoms of unclear etiology occurring after different conditions, is a powerful paradigm for progress moving forward. To this end, multicenter collaborative partnerships that leverage cross-disciplinary expertise, as well as geographic and demographic diversity, are the ideal platform to design and carry out these studies, with crosstalk between clinicians, patients and scientists.

We are committed to continued collaborative work toward the goal of identifying effective, safe, accessible and affordable treatments for patients suffering from prolonged symptoms following *Borrelia burgdorferi* infection.

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Received: 23 July 2023 Accepted: 29 July 2023
Published online: 18 September 2023

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AUTHOR CONTRIBUTIONS

All authors drafted the response, revised it critically for important intellectual content, and provided final approval of the submitted manuscript.

FUNDING

This work was supported by the Clinical and Translational Science Institute at Children's National (CTSI-CN) [Grant numbers UL1TR001876-05 and UL1TR001876-02S1] and the Intramural Research Program of the National Institute of Allergy and Infectious Diseases, National Institutes of Health (to A.M.).

COMPETING INTERESTS

M.M. is currently employed by the National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health. All data for this manuscript were collected prior to her employment at the National Institutes of Health. A.M. is employed by the National Institute of Allergy and Infectious Diseases, National Institutes of Health; A.M. has a patent (US 8,926,989) and serves as an unpaid scientific advisor to the Global Lyme Alliance and the American Lyme Disease Foundation. The other authors declare no competing interests.

ADDITIONAL INFORMATION

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