

## Clinical and Functional Outcomes in Lyme Disease

Shadick NA, Phillips CB, Sangha O, Logigan EL, Kaplan RF, Wright EA, et al. Musculoskeletal and neurologic outcomes in patients with previously treated Lyme disease. *Ann Intern Med* 1999;131:919–26.

### Study Overview

**Objective.** To determine clinical and functional outcomes in persons treated for Lyme disease in the late 1980s with oral or intravenous antibiotic therapy.

**Design.** Population-based, retrospective cohort study.

**Setting and participants.** 186 persons with a history of Lyme disease (case-patients) and 167 persons with no history (controls); all participants resided on Nantucket Island, Massachusetts. Case-patients were classified according to a modified version of the Centers for Disease Control and Prevention criteria for Lyme disease: (1) history of erythema migrans, (2) late manifestation of Lyme disease confirmed by positive results on serologic analysis, or (3) both [1].

**Main outcome measures.** Standardized medical history, physical examination, functional status measure (Medical Outcomes Study 36-Item Short Form Health Survey [SF-36]), mood assessment (Profile of Mood States), neurocognitive tests, and serologic examination.

**Main results.** The prevalence of Lyme disease among adults on Nantucket Island was estimated to be 14.3% (95% confidence interval [CI], 9.3% to 19.1%). Mean time from infection to study evaluation for case-patients was 6 years. These participants reported poorer functional status than controls. Multivariate analyses confirmed that case-patients had more joint pain (odds ratio [OR] for pain in any joint, 2.1; 95% CI, 1.2 to 3.5;  $P = 0.007$ ), more symptoms of memory impairment (OR for any memory problem, 1.9; 95% CI, 1.1 to 3.5;  $P = 0.003$ ), and poorer functional status due to pain (OR for 1 point on the SF-36 scale, 1.02; 95% CI, 1.01 to 1.03;  $P < 0.001$ ) compared with controls. On physical examination, however, case-patients and controls did not differ in musculoskeletal or neurologic abnormalities or in neurocognitive performance. On all neurocognitive tests, age- and sex-adjusted mean scores for case-patients and controls were within normal ranges.

Case-patients who had persistent symptoms after receiving treatment for Lyme disease ( $n = 67$ ) were more likely to

have suffered fever, headache, photosensitivity, or neck stiffness during their acute illness than those who had completely recovered (87% compared with 13%; OR, 2.4; 95% CI, 1.0 to 5.5;  $P = 0.045$ ). On neurocognitive tests, however, the performance of these 2 groups did not significantly differ.

### Conclusion

Musculoskeletal and neurocognitive outcomes in persons with previous Lyme disease seem to be favorable. However, long-term impairment of functional status can occur.

### Commentary

Caused by tick-borne infection with *Borrelia burgdorferi*, Lyme disease can affect the skin, nervous system, heart, and joints. Clinicians are aware that the disease attacks multiple systems and can cause severe symptoms at onset, but data on long-term outcomes following treatment with antibiotics are lacking. This study is an important step in documenting the impact of Lyme disease on patients long after their initial bout with the illness.

It should be noted that this study was limited to a small geographic area among a largely well-educated, white population (99% of case-patients and 95% of controls). Given the study's limited scope, it would be valuable to compare the authors' findings with similar data on former Lyme disease patients living in other areas or belonging to other racial/ethnic groups (who may not have received optimal treatment).

### Applications for Clinical Practice

It is important for clinicians to recognize that the ill effects of Lyme disease can continue years after the original diagnosis and treatment. Educating patients about this possibility may help them make more effective decisions about their care, particularly when they consider treatment alternatives for symptoms related to their original illness.

### References

1. Wharton M, Chorba TL, Vogt RL, Morse DL, Buehler JW. Case definitions for public health surveillance. *MMWR Morb Mortal Wkly Rep* 1990;39(RR-13):1–43.