Differentiation of Reinfection from Relapse in Lyme Disease Patients with Recurrent Erythema Migrans Using Molecular Microbiologic Tools

Abstract:

Background
Erythema migrans is the most common manifestation of Lyme disease. Recurrences are not uncommon, and although they are usually attributed to reinfection rather than relapse of the original infection, this remains somewhat controversial. We used molecular typing of Borrelia burgdorferi isolates obtained from patients with culture-confirmed episodes of erythema migrans to distinguish between relapse and reinfection.
Methods
We determined the genotype of the gene encoding outer-surface protein C (ospC) of B. burgdorferi strains detected in cultures of skin or blood specimens obtained from patients with consecutive episodes of erythema migrans. After polymerase-chain- reaction amplification, ospC genotyping was performed by means of reverse line- blot analysis or DNA sequencing of the nearly full-length gene. Most strains were further analyzed by determining the genotype according to the 16S–23S ribosomal RNA intergenic spacer type, multilocus sequence typing, or both. Patients received standard courses of antibiotics for erythema migrans.
Results
B. burgdorferi isolates obtained from 17 patients who received a diagnosis of ery- thema migrans between 1991 and 2011 and who had 22 paired episodes of this lesion (initial and second episodes) were available for testing. The ospC genotype was found to be different at each initial and second episode. Apparently identical genotypes were identified on more than one occasion in only one patient, at the first and third episodes, 5 years apart, but different genotypes were identified at the second and fourth episodes.
Conclusions
None of the 22 paired consecutive episodes of erythema migrans were associated with the same strain of B. burgdorferi on culture. Our data show that repeat episodes of erythema migrans in appropriately treated patients were due to reinfection and not relapse. (Funded by the National Institutes of Health and the William and Sylvia Silberstein Foundation.)