

## In Response

Dear Sir:

Dr. Herman-Giddens contends that our Lyme disease risk map<sup>1</sup> inaccurately depicts actual risk because it does not conform to recent Lyme disease case reports from southern states. The precise purpose of this Centers for Disease Control and Prevention (CDC)-funded project was to determine risk based solely upon entomological data because of the spatial inaccuracy of human case report data. The evidence she provides to support her contention is based primarily upon case report data from Virginia, West Virginia, and North Carolina, states in which counties were recently considered endemic based upon the CDC criteria of having more than one confirmed case report.<sup>2</sup> A strictly case-based definition for endemic disease is inappropriate for vector-borne zoonoses such as Lyme disease because misdiagnosis can result in endemic areas occurring within states where infected vectors have never been found (Arizona, New Mexico, Nevada, and Colorado, for example). Risk maps based upon systematically collected data on infection prevalence in vectors represent disease risk more accurately than do human case reports that are subject to misdiagnosis and travel history (reports reflect location of residence not exposure).

We caution against misinterpreting the usefulness of case report data as a means to determine risk for Lyme disease. A confirmed case of Lyme disease can be reported solely on the basis of a physician-recognized rash (erythema migrans) in a county where a similarly defined case has been previously reported.<sup>2</sup> No laboratory confirmation of infection with *Borrelia burgdorferi* is required, nor is a history of tick bite or exposure to areas known to have infected vector ticks. Thus, any county in the country could become endemic for Lyme disease simply by having two patients with misdiagnosed skin rashes.

The entomological study Dr. Herman-Giddens cites for North Carolina<sup>3</sup> is actually consistent with our findings. In that study, 14 *Ixodes scapularis* nymphs were found in only 6 of 26 sites sampled in one county, and only two of these sites yielded more than a single tick. We found 5 nymphs among 13 sites, each in a different county in North Carolina, and only one site had more than one nymph. The sampling method (drag cloth) was identical and sampling period (April to July versus May to August) was similar in both studies, therefore the implication that the timing of our collections was not suitable for these sites is unfounded.

Dr. Herman-Giddens is also incorrect in stating that we did not sample other southern states. Supplementary materials listed only sites where at least one nymph was collected, but all negative sites are shown in Figures 1 and 2 on this publication and discussed in our previous publication cited by Dr. Herman-Giddens.<sup>4</sup> *Ixodes scapularis* nymphs were rarely collected south of the 39th parallel: only 21 nymphal *I. scapularis* were collected in 223,400 km of drag sampling among 60 sites south of that latitude. Compared with 1,384 nymphs collected in 207,600 km of drag sampling among 36 sites north of this latitude<sup>4</sup> in the same year and using identical collection effort, we responsibly conclude that the risk of Lyme disease is low, but not zero, in these southern states.

We are aware that Lyme disease is spreading because of the expanding populations of *I. scapularis*<sup>5</sup> and we include areas of Virginia, West Virginia, and North Carolina in our transitional zone where we have less confidence in our results (Figure 2). Although the rate of expansion is relatively slow,<sup>6</sup> we anticipate a need for future studies using our standardized surveillance protocol for determining change along the periphery of currently high risk areas.

Over diagnosis of Lyme disease and resulting inappropriate therapy has become an issue of increasing public health concern because of unnecessary costs and adverse outcomes, including death.<sup>7,8</sup> Accurate information on the geographic distribution of Lyme disease risk should help physicians arrive at an appropriate diagnosis for patients living in their area. We believe our risk map currently represents the best evidence that science can provide on the risk of Lyme disease in the eastern United States.

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