Review: Risk of Infection From Tick Bite vs. Duration of Attachment of Ixodes Nymphs

by

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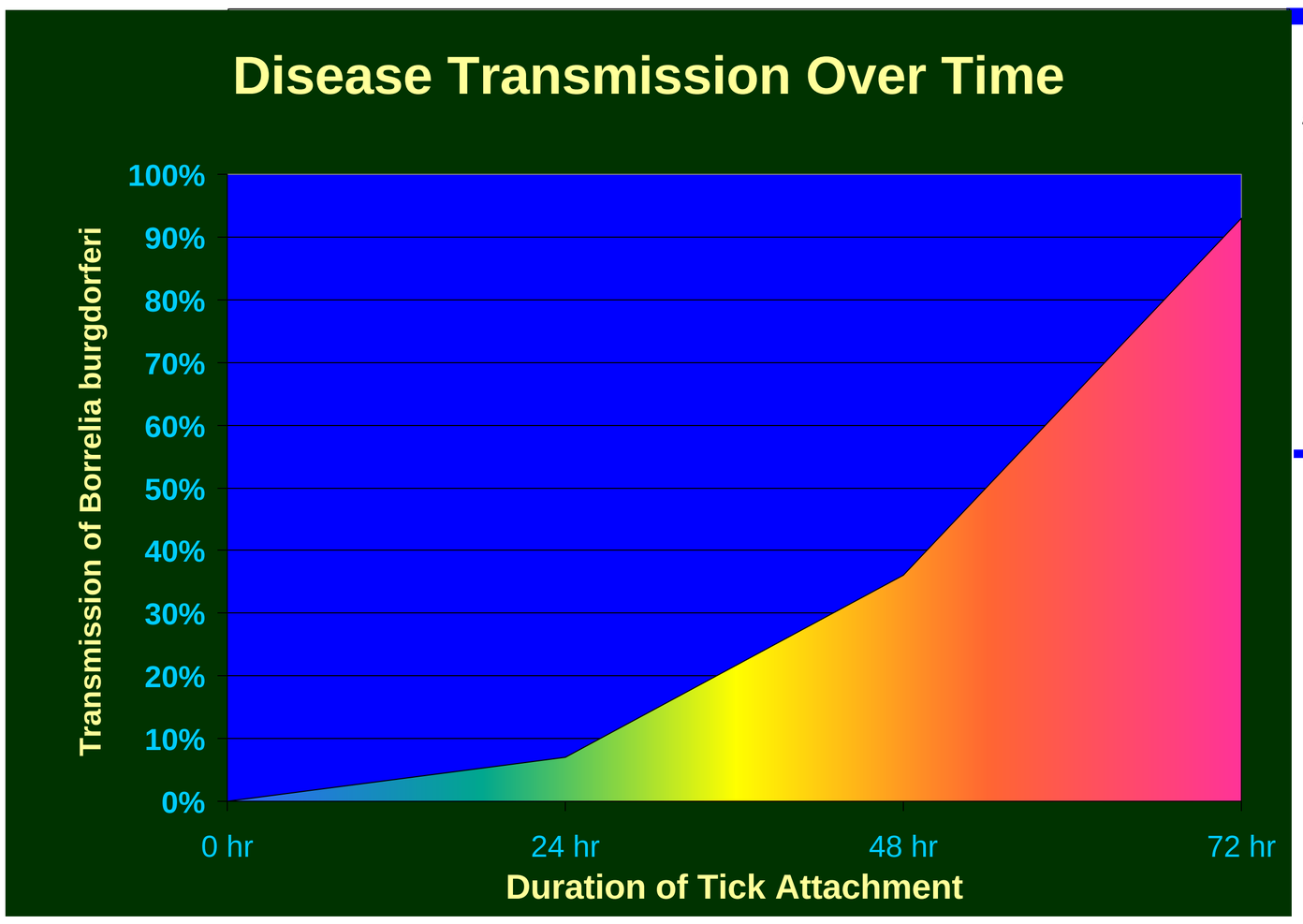
Nymphal ticks are implicated in most human cases of Lyme disease.[1] Promptly and properly removing embedded ticks is key to preventing transmission of disease agents. In one study, experimentally infected *Ixodes pacificus* nymphs do not EFFICIENTLY [*emphasis added*] transmit Bb to mice until ticks have been attached for 3-4 days, HOWEVER 11% of mice became infected after only 2 days of tick attachment (<=48hrs.) [2]

Matuschka and Spielman reported that about 5% of infected *Ixodes dammini* (i.e. *scapularis*) nymphs transmit Bb in the first day (24hr), about 50% after 2 days.[3] J. Piesman et al. reported that Ixodes ticks transmitted Lyme disease to 1 of 14 rodents exposed for 24 hours, 5 of 14 rodents exposed for 48 hours, and 13 of 14 rodents exposed for 72 or more hours. The authors concluded that prompt removal of ticks is important.[4] Patmas and Remora reported on a case of Lyme disease that was transmitted after only 6 hours of attachment by a deer tick. The authors concluded that, "The current recommendation against treatment of short-duration tick bites may need reconsideration."[5]



At 24 hours the risk is low, but it is not zero.

Chart data per J. Piesman et al.

It is impossible to remove a tick promptly if one does not even know it is there. According to some experts, only 14-32 % of patients who have Lyme disease recall a tick bite.[6] Durland Fish, associate professor in the department of epidemiology and public health at Yale University, wrote this letter to the New York Times (6-14-01):

> You report on a new study showing that Lyme disease is very difficult to catch, even from a deer tick in a Lyme-infested area (front page, June 13). But the 3 percent chance of getting Lyme disease from a tick bite cited in the New England Journal of Medicine article that I co- authored pertains only to people who have found and removed a tick, which greatly decreases the chance of infection. Most people never notice the tick that gave them Lyme disease [*emphasis added*]. About 25 to 30 percent of nymph-stage deer ticks in the Northeast are naturally infected with the Lyme disease bacterium. Nearly all of these infected ticks will cause Lyme disease if they are not removed [*emphasis added*]. Ticks in this stage are about the size of a poppy seed, making them very difficult to find. People who live in Lyme disease areas should take the risk of tick bites seriously and do all they can to prevent them, keeping in mind the 25 percent chance of infection if they miss a tick, instead of the 3 percent chance if they find one.

UC Berkeley entomologist Robert Lane reports that one of his team of researchers was fed upon by infected nymphal ticks for at least 1-2 days after exposure to tick-infested habitat, despite "extreme personal preventive measures." He advises people who work or recreate in endemic areas to check themselves frequently and carefully for several days following exposure, since unfed nymphs are very difficult to spot and may be easier to detect when partially replete.[7]

References

[1] Clover JR, Lane RS. Evidence implicating nymphal *Ixodes pacificus* (Acari: Ixodidae) in the Epidemiology of Lyme Disease in California. Am J Trop Med Hyg. 53(3):237-240, 1995.

[2] Peavey CR, Lane RS. Transmission of *Borrelia burgdorferi* by *Ixodes pacificus* nymphs and reservoir competence of deer mice (*Peromyscus maniculatus*) infected by tick-bite. J Parisitol 1995;81:175-178

[3] Matuschka FR, Spielman A. Risk if infection from and treatment of tick bites. Lancet 1993;342;8870:529-30

[4] Piesman, J, et al. Duration of Tick Attachment and *Borrelia Burgdorferi* Transmission. J Clin Microbiol. 1987 Mar;25(3):557-8.

[5] Patmas, MA, Remora, C. Disseminated Lyme Disease After Short-Duration Tick Bite. JSTD 1994; 1:77-78

[6] Nadelman RB, Wormser GP. Recognition and treatment of erythema migrans: are we off target?
Ann Intern Med. 2002 Mar 19;136(6):477-9.

[7] Lane, RS, et al. Human Behaviors Elevating Exposure to *Ixodes pacificus* (Acari: Ixodidae) Nymphs and Their Associated Bacterial Zoonotic Agents in a Hardwood Forest. J.Med.Entomol.41(2):239Ð248 (2004)