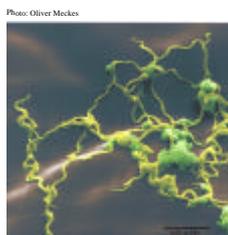


# The value of antibiotic prophylaxis and the risk of *Borrelia burgdorferi* transmission after tick bite

Zappe H.A.<sup>1</sup>, Hassler D.<sup>1</sup>, Stutzke O.<sup>1</sup>, Oehme R.<sup>2</sup>, and Maiwald M.<sup>3,4</sup>



*Borrelia burgdorferi*

<sup>1</sup>Sektion Allgemeinmedizin & Versorgungsforschung, Medizinische Universitätsklinik, Bergheimerstr. 147, D-69115 Heidelberg, Germany;

<sup>2</sup>Landesgesundheitsamt Baden-Württemberg, Wiederholdstr. 15, D-70174 Stuttgart, Germany;

<sup>3</sup>Hygiene-Institut der Universität, INF 324, D-69120 Heidelberg, Germany;

<sup>4</sup>Department of Microbiology and Immunology, Stanford University, Palo Alto, CA 94304, USA



*Erythema migrans*

**Background:** The question of antibiotic prophylaxis after tick bite remains controversial. The main objection is the necessity to treat a great number of persons to prevent one case of Lyme disease.

**Objectives:** The value of antibiotic prophylaxis highly depends on the risk of *Borrelia burgdorferi* transmission after tick bite and on the rate of sequelae following an infection. To define that risk we conducted a trial in southwest Germany which is endemic for Lyme disease.

**Method:** Ticks were removed from patients by general practitioners and examined by polymerase chain reaction (PCR) for *B. burgdorferi* sensu lato. To assess whether transmission of *B. burgdorferi* occurred, the patients were clinically and serologically examined after tick removal and during follow-up examinations for up to one year.

**Results:** A total of 3747 *Ixodes ricinus* ticks were collected from 3708 patients. 592 ticks (16 %) were PCR positive (Table 1).

After the bite of a PCR positive tick, 239 patients were initially seronegative and could be followed up. Transmission occurred in 54 of these patients. Serological results and symptoms are listed in Table 2.

Hence, the transmission rate of all tick bites was 3.5 %, whereas the transmission rate from the bites of PCR positive ticks amounted to 23 % (Figure).

**Conclusions:** The examination of ticks makes it possible to reduce the number of unnecessary treatments substantially. Nearly a quarter of the patients bitten by infected ticks seroconverted and/or developed overt symptoms of Lyme disease. This fact supports the strategy of testing ticks removed from patients in endemic areas and of administering antibiotic prophylaxis when the tick has proved to carry *B. burgdorferi*.

**Relevance:** Since the early 1990s, the awareness of the diseases associated with tick bites has considerably increased. As a consequence, more patients present to general practices for tick removal and ask for prophylaxis. Antibiotic prophylaxis after tick bite is not recommended routinely. We propose a strategy which allows the general practitioner to decide individually on a well grounded basis.

**Table 1.** The prevalence of *Borrelia burgdorferi* infection in *Ixodes ricinus* ticks and the rate of transmission to humans in the Stuttgart and Heidelberg areas (southwest Germany)

No. of ticks collected	No. of patients examined	No. (%) of PCR pos. ticks	No. of susceptible follow-up patients with PCR positive tick	No. (%) of susceptible follow-up patients infected with PCR positive tick
3747	3708	592 (16 %)	239	54 (23 %)

**Table 2.** Serological results and symptoms of infected patients with PCR positive tick

	No. of patients infected
Seroconversion without symptoms	13
Seroconversion with nonspecific symptoms	15
Erythema migrans	21
Lymphocytoma	1
Facial paralysis	4
<b>Total</b>	<b>54</b>

**Figure.** Transmission risk: 3.5 % total transmission rate (100 % = 3747 tick bites); 23 % after bite of a PCR positive tick (100 % = 239 tick bites)

