

The dog as an epidemiological marker of *Rickettsia conorii* infection

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INTRODUCTION

Dogs are considered to be the sentinels of *Rickettsia conorii* infection, which is the causative agent of Mediterranean spotted fever, one of the most prevalent tick-transmitted disease in our area. It is transmitted by the dog tick, *Rhipicephalus sanguineus*. This tick is relatively host-specific, and rarely feeds on people unless its preferred host—the dog—is not available [1]. This tick is active from spring to autumn, but climatic changes influence its activity and, consequently, Mediterranean spotted fever epidemiology [2].

As canine serology constitutes a useful epidemiological marker [3], the objective of this study was to evaluate the presence of *R. conorii* in dog populations subjected to different exposure to *R. sanguineus*. For this purpose, three seroepidemiological studies were designed: serosurvey in dogs with close contact with ticks, seasonal differences in antibodies to *R. conorii* in dogs subjected to natural tick infestation, and a comparison of canine seroprevalence rates obtained in 1997 and in 2007 in dogs regularly treated for ectoparasites.

MATERIALS AND METHODS

Blood samples collected by cephalic venipuncture were allowed to clot. Serum was stored at -80°C until being analysed. A questionnaire was completed at the time of sampling, providing information about *modus vivendi* (shelter, flat, kept in yard, garden, farm), purpose (pet, hunting, breeding, shepherd, guard), and ectoparasite treatment. Dog sera were tested for IgG antibodies to *R. conorii* by an indirect immunofluorescence antibody test (bioMérieux, *R. conorii*

spot-IF, Marcy l'Etoile, France). All sera were screened at 1 : 40 dilution. Positive sera were then titrated in a two-fold dilution. The Epi Info v.3.3.2 software package was used for statistical analysis.

STUDY I: One hundred and thirty canine sera were collected from dogs living in the countryside around Barcelona (Delta del Llobregat). Serum samples were collected during the summer.

Most of the dogs lived outdoors ($n = 103$). Ninety-eight of 130 were guard dogs, 12 were hunting dogs, eight were pets, eight were kenneled, and four were sheep dogs. None of them received ectoparasite treatment.

STUDY II: Nine dogs exposed to natural tick infestation were investigated for 17 months for detection of IgG to *R. conorii*. Dogs were clinically explored, and sera were collected monthly. Sera were diluted 1 : 20 in a two-fold dilution until titration.

STUDY III: In 1997, 74 canine sera were collected from spring to autumn in different veterinary clinics in Barcelona province. All of them systematically received an acaricide treatment. Dogs lived in flats (48.5%), gardens (40.9%), farms (7.6%) and breeding kennels (3%). In 2007, 70 canine sera were collected in the same area during the same period of time. Dogs were living in shelters and were treated for ectoparasites monthly.

RESULTS

STUDY I: The seroprevalence to *R. conorii* was 53% (70/130). Titres ranged from 1/40 to 1/1280. Thirteen dogs showed titres $>1/160$: 1/320 ($n = 10$), 1/640 ($n = 2$) and 1/1280 ($n = 1$). STUDY II: Antibody titres decreased from November onwards. During January and February, all dogs became seronegative. Dogs seroconverted from March onwards (Fig. 1). STUDY III: The seroprevalence obtained in 1997 was 31% (23/74), whereas in 2007 the prevalence was 41.4% (29/70). No statistical differences were observed when comparing both prevalences. Titres ranged from 1/40 to 1/640. Two dogs showed titres $>1/160$ (1/320 and 1/640).

Statistical differences were observed when these prevalences were compared to that obtained in study I.

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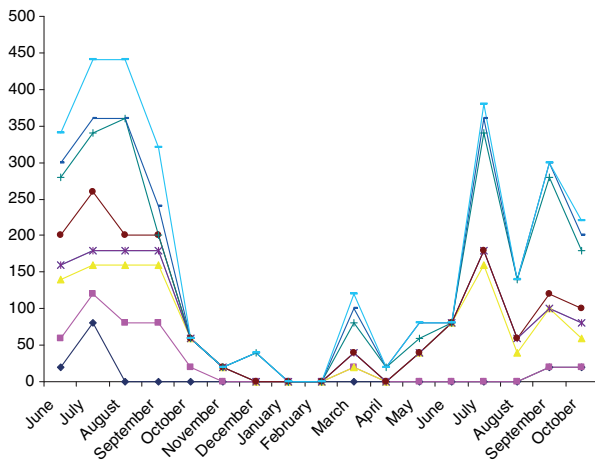


Fig. 1. Seasonal variation of antibodies to *Rickettsia conorii* over a period of 17 months.

DISCUSSION

The antibody response to *R. conorii* in dogs correlates with the active period of *R. sanguineus* in the dog habitat. Seroprevalence was higher in dogs that were highly exposed to *R. sanguineus* than in those either living as pets or kenneled, but subjected to tick-control programmes. Dogs may act as tick-infected carriers, so tick-control programmes may constitute an important factor in preventing *Rickettsia* circulation in the human habitat. Nevertheless, this is controversial, as it has been suggested that *R. sanguineus* ticks bite human beings when dogs are protected by repellents [4].

All seropositive dogs were healthy, as has been previously observed in other canine seroepidemiological studies [5].

Finally, no differences were observed when current seroprevalence was compared to that obtained 10 years ago, although an influence of climate change on canine seroprevalence was expected.

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