

REDUCTION IN THE NUMBER OF PATIENTS WITH NEUROBORRELIOSIS, FOLLOWING A SIGNIFICANT REDUCTION IN ROE DEER ABUNDANCE ON THE ISLAND OF FUNEN, DENMARK



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Introduction

The Roe deer (*Capreolus capreolus*) population on the island of Funen, Denmark has since the year 2002, been suffering from increased mortality (fig. 1) and there has been a 50% reduction in the annual hunting bag (1, 2).



Figure 1: Dead roe deer. The underlying cause has so far been connected to symptoms of diarrhea and malnutrition of unknown etiology.

It is well established that the abundance of the tick *Ixodes ricinus* – the vector of *Borrelia burgdorferi* s.l in Europe – is correlated with the abundance of roe deer (3). Since tick abundance correlates with human cases of neuroborreliosis, it was hypothesized that the reduction in roe deer densities had led to changes in human neuroborreliosis cases in the region (4).

Materials and Methods

Patients resident on Funen and hospitalized with intratecal antibody response to *Borrelia Burgdorferi* s.l. (A) and/or the diagnosis ICD-10A69.2 Lyme Disease (B), were compared to data from the annual Danish Game Bag Statistic on roe deer (C). Data were analyzed by linear regression modeling using SAS 9.3.

Data from: (A) The Department of Clinical Microbiology, Odense University Hospital, Denmark. (B) The National Patient Registry has data on patients hospitalized in Denmark. (C): Centre for Environment and Energy, Aarhus University, Denmark. *The data on neuroborreliosis from 2001 is not available.

References

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Results

The data collected from 1990/94 to 2013 is shown in figure 2*. Linear regression show significant correlation with the roe deer bag for current year, and bag numbers of the past one to three years (P 's <0.0001). The highest level of explanation $R = 0,62$ was found between roe deer bag two-years-past.

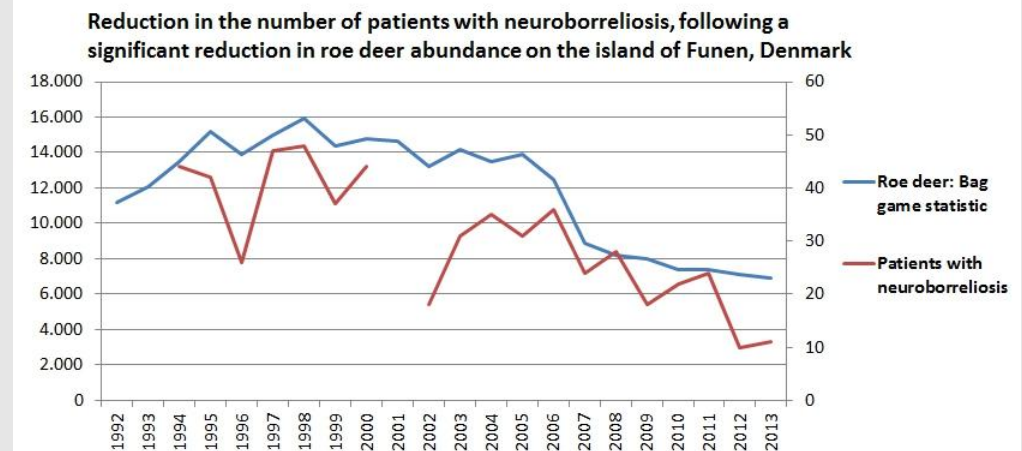


Figure 2: The blue line represents the bag game statistic on roe deer (*Capreolus capreolus*) on the island of Funen, Denmark. The red line represents the number of hospitalized patients with neuroborreliosis on the island of Funen, Denmark, except from the year 2001. The highest correlation was observed by assuming a two year delay from changes in the roe deer population to neuroborreliosis manifestation in the human population, as shown in the figure.

Conclusion

The reduction in roe deer abundance can explain up to 62% of the total variation in patients with neuroborreliosis on the island of Funen in the period 1994 to 2013. The highest correlation was observed by assuming a two year delay from changes in the roe deer population to neuroborreliosis manifestation in the human population. The cause for the delay is defined by the development periods of the local tick population and difference in tick instar host-preferences.