Emerging Infectious Diseases – right on our doorstep?

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Introduction

Due to the influence of Global Warming an increase in arthropods (insects, ticks, mites)-transmitted infections must be anticipated. However, the mere introduction of a disease into Germany, for example by tourists, is not of epidemiological importance, because the infections cannot be distributed until compatible vectors are imported too. A much bigger problem poses zoonotic infections, especially when reservoir hosts are established, because control measures are difficult to develop if possible at all.

Results

In Germany, arthropod-transmitted infections were considered for a long time to be a problem of warmer regions. Due to Global Warming the risk increases that thermophilic vectors migrate from the Mediterranean countries into the central European countries. The (Asian) tiger mosquito (Aedes albopictus) (Fig.1) was translocated to Germany with the trade of used tires and can be found there since 2008. At the same time the Japanese bush mosquito (Aedes japonicus) (Fig. 2) was detected in Northern Switzerland. Both species continuously propagate since then and recently the first established population of the tiger mosquito has been detected close to Freiburg, Germany. Given their vector-competence for different infectious diseases (Tab.1) control measures are necessary.

In Central Europe, tick-borne diseases like Rickettsiosis are known only since the 1970’s. Different Rickettsia species have been detected in ticks of the genera Dermacentor and Ixodes although their pathogenicity for humans is comparatively low (Tab. 2). Nevertheless Rickettsia conorii was also identified, which is the causative agent of the Mediterranean Spotted Fever. This pathogen is consistently introduced to Germany with imported dogs along with its host, the brown dog tick (Rhipicephalus sanguineus) (Fig. 3). Up to know the brown dog tick is not able to establish populations in natural habitats, but this may change due to changing climatic conditions. Red Foxes (Vulpes vulpes) could act as suitable reservoir hosts, because seroprevalences of up to 20% for Rickettsia species have been detected (Tab. 3).

Sandflies (Phlebotominae) (Fig. 4) are distributed throughout the whole Mediterranean area. They are vectors for several Leishmania-species, predominantly Leishmania infantum. Canids are known as reservoir hosts, especially the dog. A seroprevalence of 50 to 70 % has been detected in stray dogs in Spain. Together with numerous dog-transportations from these regions, Leishmania-species may be transported to Germany as well. A potential vector, Phlebotomus mascittii, have already been detected several times in Germany. The well-known vector for Leishmania species, Phlebotomus perfiliewi, was collected at several spots in Germany as well. Several autochthonous Leishmania infections of humans and animals were already described in Germany and a seroprevalence in red foxes (Canidae) of 4 % illustrates a possible establishment of this infection (Tab. 3).

Conclusion

Arthropod-transmitted infections are already or will be of increasing importance for public health services. They are responsible for:

The documentation of cases,

The clarification of epidemiological correlations in particular cases,

The surveillance of the distribution of vectors and the pathogens, and

The information of the human population.

These activities are essential for the individual prophylaxis. Additionally they can be used for epidemiological studies and control measures of vectors and reservoir hosts.

Literature


Tab. 1: Expected arthropod-borne infections in Germany, originating in the Mediterranean region.

Vector Pathogen Disease

Aedes albopictus (tiger mosquito) Dengue virus (A. albopictus) Dengue fever

Aedes japonicus (Asian bush mosquito) West Nile virus (A. japonicus) West Nile fever

Rhipicephalus sanguineus (Brown dog tick) Dracunculosis Mediterranean spotted fever

Phlebotomus sp. (Sand fly) Phlebotomus sp. (Phlebotomus sp.) Leishmania sp. (Leishmania sp.) Leishmania species

Tab. 2: Prevalences of Rickettsia species in ticks.

Vector Pathogen Prevalence

Ixodes ricinus (canor bean tick) Rickettsia helvetica 8,9%

Dermacentor ornatus cow tick R. raoultii 33%

Blatticophagus sanguineus R. conori 10%

Tab. 3. Survey on Rickettsia and Leishmania species in red foxes (Canidae).

Pathogen serological survey PCR

Leishmania spec. 4% 5/130 0/10 serologically positive samples

Rickettsia spec. 20% Not done

Mean air temperature of the pentad 2001 - 2005