Tick-borne encephalitis (TBE) is a potentially severe central nervous system infection endemic in many European and Asian countries. The causative agent of the disease is a tick-transmitted flavivirus, tick-borne encephalitis virus (TBEV). There are three subtypes of the virus: European (TBEV-Eur), Siberian (TBEV-Sib) and Far Eastern (TBEV-FE). The vectors for TBEV are *Ixodes ricinus* (sheep tick) and *I. persulcatus* (taiga tick).

We developed an IgM enzyme immunoassay based on secreted recombinant prM and E antigen produced in insect cells for diagnosis of acute TBE. The test proved sensitive and specific and is now in use at the diagnostic laboratory of Hospital District of Helsinki and Uusimaa, Finland. We also studied the prevalence and molecular epidemiology of TBEV in Finland and Russia, and old as well as emerging TBE foci in Finland. The epidemiology of TBE depends on (micro)climatic and ecological factors, and based on predicted climate change it is likely that TBE will become more prevalent in northern Europe, including Finland.

In Finland the disease has been endemic in the Åland Islands, archipelagos of Turku, Helsinki, and Kokkola, and in Lappeenranta region. New endemic foci have appeared recently, including the world’s northernmost TBE-endemic focus in Simo in northern Finland. We isolated seven TBEV-Eur strains from *I. ricinus* ticks and human sera from the southern regions of the country. The Finnish TBEV-Eur strains showed small-scale geographical clustering which supports the hypothesis that the endemic foci are maintained independently without the need of introducing new viral strains each summer. Unexpectedly, we found the western coast being inhabited by *I. persulcatus* ticks, which carry TBEV-Sib in Kokkola archipelago but unorthodoxly, TBEV-Eur in Simo. We isolated 11 TBEV-Sib strains from *I. persulcatus* from Kokkola archipelago. From Simo we isolated six TBEV-Eur strains, two from *I. persulcatus* and four from bank voles. *I. persulcatus* has distributed to Simo within the last 50 years, and the establishment of a new focus by unusual combination of virus subtype and vector species indicates different dispersal routes of the virus and its vector.

We also studied ticks from two republics in the Russian Federation, Karelia in the north-west and Buryatia in eastern Siberia, and isolated two TBEV-Sib strains and one TBEV-FE strain, respectively, from *I. persulcatus*. The TBEV-Sib strains isolated from Finland and Russian Karelia belonged to the “Baltic” lineage of the Siberian subtype.

The prevalence of TBEV in ticks was about 1% in most of the studied endemic foci within a large geographical area. We characterized the Finnish TBE foci and found a new tick species for Finland, *I. persulcatus*, distributed in western Finland, carrying both TBEV-Eur and TBEV-Sib subtypes.