



## V 42 Impact of climate change on the incidence of tick-borne encephalitis in Arkhangelsk Oblast of the Russian Federation

N.K. Tokarevich<sup>a</sup>, A.A. Tronin<sup>b</sup>, O.V. Blinova<sup>a</sup>, R.V. Buzinov<sup>c</sup>, V.P. Boltenev<sup>d</sup>

<sup>a</sup> St. Petersburg Pasteur Institute, St. Petersburg, Russian Federation

<sup>b</sup> Institute of Environment Safety RAS, Russian Federation

<sup>c</sup> Rospotrebnadzor Regional Directorate for Arkhangelsk Oblast, Russian Federation

<sup>d</sup> Center for Hygiene and Epidemiology for Arkhangelsk Oblast, Russian Federation

The study objective was to estimate the impact of climatic factors on the growth of tick-borne encephalitis (TBE) incidence in Arkhangelsk Oblast (AO) in the north of the European sub-Arctic zone of the Russian Federation.

The report analyzed TBE incidence in AO and its administrative districts in 1980–2009 and local climatic changes within the same period. In 2000–2009, there was nearly a 60-fold rise in TBE incidence as to compare with 1980–2009, and TBE cases were identified not only in the south of AO, but also in its central districts much further to the north.

*Ixodes persulcatus* is the prepotent TBE vector in AO. Within the studied period, its TBE virus prevalence remained unchanged, but its distribution expanded significantly: In the 1980s, those ticks were found only in the southern AO districts, but starting in 2002, they penetrated much further northward. Flagging of vegetation in a number of central districts proved monotonous growth of local *I. persulcatus* populations.

The most important climatic factors that may influence tick expansion are humidity and temperature. In AO, within the period under review, humidity was stable; however, both average annual temperatures and temperatures during the tick activity season grew significantly and favored the expansion of *I. persulcatus* into central and even northern AO districts.

The mathematical analysis of available data revealed a distinct correlation between TBE incidence and the growth of the average annual air temperatures in 1990–2009 in the southern, central, and northern AO districts and in AO as a whole.

The climate warming may thus be substantially responsible for the rise of TBE incidence. Other factors, e.g. social, also contribute to it, but their role in AO proved to be relatively small.