

## TICK-BORNE ENCEPHALITIS (TBE) IN THE BALTIC STATES:

### IDENTIFYING PREDICTORS OF SPATIAL VARIATION AND TEMPORAL CHANGE

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One of the most dramatic changes in tick-borne disease epidemiology in Europe over the past two decades is the sudden increase in incidence of TBE in the Baltic States. While the annual numbers of cases increased gradually in some Western European countries, in Lithuania, for example, registered TBE incidence increased 38 times from 1985-90 to 1993-98. When analysed at the level of administrative units – ‘counties’ (of which there are c.85 in Estonia, Latvia and Lithuania together) the increase was very heterogeneous, in some ‘counties’ TBE incidence increased by as much as several orders of magnitude while in others the incidence only doubled.

This paper presents some findings in our investigations of the biological (abiotic and biotic) and non-biological causes of the spatial heterogeneity and temporal change of TBE, both within and between Latvia, Estonia and Lithuania.

At first, correlations between the spatially variable incidence of TBE and abiotic variables (climate, topography and land cover) were sought, focussing on the period 1993-98, immediately after incidence had increased to its highest level. Analysis revealed that the land cover and precise seasonal patterns of climatic indices (temperature and NDVI) play a significant role in spatial distribution of TBE. Across all the Baltic States, abiotic variables alone can explain 55% of the observed variance in TBE incidence. However, there is a lot of variation between the three countries and unexplained variance, which suggests that non-environmental (biotic and/or socio-economic) factors are also important.

Then the predictors of spatial variation were examined to see if they changed at the right time and place and in the right direction to explain the upsurge in TBE incidence. Preliminary results indicate a very specific change in spring temperature conditions from 1993 onwards that could enhance the transmission of TBE virus. However this changing temperature pattern does not explain the spatial heterogeneity in increased TBE incidence, because the pattern was similar irrespective of the observed epidemiological changes.

Further time series analysis of climate, together with analysis of biotic factors, socio-economic conditions and human behaviour is undertaken to explain the epidemiological patterns more fully.

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