TBE NEWS

GEOGRAPHICALLY DISTINCT TICK POPULATIONS SHOW DIFFERENTIAL SUSCEPTIBILITY TO TBE AND LOUPING ILL VIRUS

Background

In the Netherlands, three genetically divergent TBE virus strains have been identified. There are two "classical" European subtype strains, of which one was found in the Utrecht Heuvelrug region (strain NL/UH) and which is closely related to a Swedish strain. Another strain was found near Dronten (strain NL-RMB2), which is closely related to a German strain. A third strain forms an outgroup of the known European subtypes and has found in the Sallandse Heuvelrug region, and this strain (strain NL) is closely related to a strain found in the United Kingdom.

In the UK and in Ireland, louping ill virus (belonging to the TBE serocomplex) circulates, but this flavivirus is predominantly found in ticks on the British islands, where the LIV transmission cycle is dominated by sheep, red grouse and mountain hares as reservoir hosts and *Ixodes ricinus* ticks as vectors.

The focal distribution of TBE virus remains poorly understood. It has been analyzed whether the limited spread of certain flaviviruses could be differences in vector competence in (local) tick populations for specific viral strains.

Results and Discussion

Growth kinetics of different flaviviruses/TBE virus strains were analyzed in the human lung carcinoma cell line A549 and in *I. ricinus* IRE/CTVM19 cells. The growth kinetics of LIV, TBE virus strains NL and Neudörfl (isolated in eastern Austria) were rather similar. Then, the susceptibility of ticks from various regions were tested for various viruses/virus strains. When ticks collected in the region of Wageningen (so far assessed TBE-free) were infected with strain NL, Neudörfl or LIV, the infection rate was equal for the two TBE virus strains, but lower for LIV, and the virus titer reached in the ticks was lower for LIV.

Next, ticks collected in a TBE endemic area near Harle, were infected with the three above mentioned viral strains. Again, infection rates were similar for the two TBE strains, but were lower for LIV. The median viral mean titers were significantly lower for LIV compared to the two TBE virus strains, and infection rate were higher for strain NL compared to Neudörfl. However, ticks collected from a TBE-free region had lower infection rates for strain NL compared to Neudörfl.

Thus, tick populations from a region with active TBE virus circulation and from a non-TBE region were susceptible to two different TBE virus strains of different origin and to LIV. However, the infection rates and virus titers reached were significant lower for LIV, indicating that Dutch ticks are less competent in transmitting LIV (is that the reason why LIV is not present in the Netherlands?) compared to TBE virus. The findings resembled the results found by Liebig et al. (Newsletter March 2021) that ticks infected with a locally circulating TBE virus strain had higher infection rates compared to infection with a geographically different TBE virus strain.

It has been shown that ticks from Great Britain are genetically different from the European continent. However, it remains unclear if these genetic differences within *I. ricinus* underlie the observed differences in vector competence of ticks for different TBE virus strains and other flaviviruses.

Another cause for the different infection rates could be the presence or absence of other specific microorganisms in the ticks.

Literature

Bakker JW, et al.
Differential susceptibility of geographically distinct *Ixodes ricinus* populations to tick-borne encephalitis virus and louping ill virus. *Emerg Microbes Infect*. 2024;13(1):2321992. doi:10.1080/22221751.2024.2321992.

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