TBE ANTIBODIES IN ROE DEER AND WILD BOAR ACROSS FRANCE

Background

In Western Europe, an increase in the number of West Nile virus (WNV) cases in horses, Usutu virus (USUV) infection in birds, and TBE cases in humans have been reported. USUV and WNV are maintained in an enzootic cycle involving ornithophilic mosquitos, while other flaviviruses like TBE virus (TBEV) and Bagaza virus (BAGV) are transmitted by ticks. To define risk areas of virus circulation, a better understanding of the spatiotemporal distribution of flaviviruses is warranted. Three of the above-mentioned viruses are present in France, while Bagaza virus is known to be present in the neighboring country Spain.

Compared to the neighboring countries Germany and Switzerland, the number of reported TBE cases is low and have mainly be reported from the eastern region in France, i.e., Alsace-Lorraine, Haute Savoie and recently from Loire and Haute-Loire. A seroepidemiological study has been carried out to improve the knowledge about the distribution of various flaviviruses in France.

Results

From 2009 to 2014, a seroepidemiological study was carried out across France, including 51 departments from which 18 departments, representing different bioregions, were selected in which local hunter associations participated in this program to collect serum from wild ungulates during the hunting season from September to February. Antibodies against flaviviruses were detected by a commercial competitive ELISA and which was directed against epitopes of the envelope glycoprotein E common to all flaviviruses. Specification was done using two methods: xMAP microsphere immunoassay (MIAs) and virus micro-neutralization assays (MNTs).

In total, 758 roe deer serum samples and 1014 wild boar samples across France (8 to 304 samples per department) were collected from September 2009 to November 2014. Pan-flavivirus antibodies were detected in 16/758 (2.1%) roe deer serum samples and in 57/1014 (5.6%) wild boar samples. None of the samples tested positive to WNV or BAGV. Specific antibodies against USUV and TBEV were detected in 32 and 4 serum samples by MNTs, and in 30 and 7 samples by MIAs, respectively.

Overall, specific antibodies against USUV were detected by either method in 2 roe deer and 34 wild boar samples, and those against TBE virus were detected in 1 roe deer and 9 wild boar samples. NT titers for TBE virus ranged from 1/10-1/20 up to 1/320.

USUV antibodies were detected in departments located in the southwestern and southeastern France. TBE virus antibodies were found in three departments in eastern France (Savoie, Marne, Jura), but also in northern France (Yvelines). In Savoie, no human TBE cases have so far been reported. In Marne and Jura, forest workers were previously found TBE antibody positive. Overall, TBE virus seroprevalence was 2.9% in wild boar and 0.6% in roe deer from eastern France. None of juvenile animals tested positive.

Discussion

The detection of TBE positive serum samples in two eastern departments where no TBE cases have been reported so far, is a finding that confirms the wider distribution of TBE virus in the east of France. TBE positive antibodies found in southwestern and northern France warrant further exploration to determine possible TBE virus circulation in these areas. This study demonstrates the usefulness of serum banking by hunters for seroepidemiological studies of zoonotic pathogens.

Literature

Bournez et al.

Exposure of wild ungulates to the Usutu and tick-borne encephalitis viruses in France in 2009-2014: Evidence of undetected flavivirus circulation a decade ago.

Viruses. 2021; 12(1):10. doi:10.3390/v12010010

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