



## NO ACCORDANCE IN THE INCIDENCE OF TBE AND LYME BORRELIOSIS CASES, AUSTRIA, 2005–2018

### Background

TBE and Lyme borreliosis both occur in Eurasia and are mostly transmitted by the same vector, primarily by *Ixodes ricinus* in Europe and by *I. persulcatus* in Asia. Both, TBE virus and *Borrelia* species have the same reservoir hosts, namely small mammals (especially rodents). Humans are incidental and dead-end hosts and do not play a role in the maintenance of these pathogens in nature. There are five subtypes of TBE virus circulating in various geographic regions. In Austria, TBE is caused by the European subtype. The most frequently detected *Borrelia* species in ticks in Austria are *B. afzelii* (app. 56%), *B. burgdorferi* sensu stricto (app. 27%), *B. valaisiana* (app. 25%) and *B. garinii* (app. 20%). The most prominent pathogenic *Borrelia* genospecies in humans is *B. afzelii* in skin manifestations (app. 90%), and *B. garinii* predominates in Lyme neuroborreliosis (app. 67%) in Austria.

Since *Borrelia* and TBE virus are transmitted by the same vector and are maintained in the same animal reservoir, one would expect that changes in the incidence in TBE are in accordance with that of borreliosis. Changes in the incidence of TBE and borreliosis have been analyzed for different regions in Austria from 2005 to 2018.

### Results

TBE is a notifiable disease in Austria since 2012 and only hospitalized patients with a serologically diagnosed infection are counted as cases. From 2005 to 2018, 97.5% of the residence of hospitalized patients matched with the corresponding federal province. Information of hospitalized cases of borreliosis was based on hospital discharge records from 2005 to 2018,

and the incidences in the federal provinces were derived from the postal code of the patient's home address. The overall incidence rate for borreliosis patients and non-vaccinated TBE patients were calculated nationally and for each individual federal province.

A clear trend can be seen for TBE virus infections over time: an almost complete disappearance in the east (Burgenland), which had been heavily affected until the end of the 1980s and the establishment of new TBE foci in the alpine region in the west (Tyrol).

The mean incidence of hospitalized borreliosis cases was about twice as high compared to TBE (11.3 vs. 6.0) for Austria as a whole. However, this ratio strongly differed in individual provinces. The lowest incidence is in Tyrol (0.8) and the highest in Burgenland including Vienna (4.9). Independent from geographic differences, the incidences of both TBE and borreliosis strongly vary from year to year. However, these variations do not occur in parallel for these two diseases in the same area, e.g., there was a low incidence for borreliosis in all provinces of Austria, but a peak for TBE in Carinthia and Tyrol in 2008/09. In 2017/18, there were no TBE cases reported in Burgenland, but a high number of borreliosis cases have been reported in this region. Interestingly, in Tyrol, and only in this province, the TBE incidence is higher since 2013 compared to the incidence of borreliosis. In total, a discordance for the two infectious diseases could be seen on a relatively small geographic scale, and a variation from season to season was observed.



## Discussion

The authors suggest that the analyzed discordance in TBE and borreliosis incidences in various provinces in Austria may be a result of other factors than those directly influencing propagation and abundance of ticks in their habitats or changes in human behaviors leading to tick exposure. The reduced TBE incidence in the east (Burgenland, but also in Hungary) may be due to the establishment of less virulent TBE virus strains. Another issue, but rarely investigated so far, is the microbiome of the ticks. The decline of TBE cases in eastern Austria despite a high borreliosis prevalence indicates other factors beyond the prevalence of ticks and human exposure are responsible for the observed phenomenon and have yet not been decoded.

## Literature

Stiasny et al.

The regional decline and rise of tick-borne encephalitis incidence do not correlate with Lyme borreliosis, Austria, 2005 to 2018

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