



EFFECTIVENESS OF TBE VACCINATION

Background

During the last 30 years, the number of reported TBE cases in Europe has increased by more than 193%, despite two effective TBE vaccines (FSME Immune and Encepur) being available. The reason for this increase is manifold: e.g., emergence of new endemic areas, increased awareness and testing, besides changes in working and leisure time activities that have increased exposure to the TBE virus. Lisensure of TBE vaccines are based on clinical studies demonstrating seroconversion, geometric mean antibody titers and seropersistence, while population-based vaccine effectiveness (VE) has so far only been performed in Austria. This country has an extremely high TBE vaccine coverage (at least one injection) and VE was calculated $\geq 90\%$ for all age groups. A study has been conducted to investigate the VE of TBE vaccination in Germany and Latvia for the 12-year period from 2007 to 2018.

Results

Data were analyzed for southern Germany (Bavaria and Baden-Wuerttemberg). These two federal German states had a population of 24.1 million inhabitants in 2018 with 9.7 million TBE-unvaccinated individuals and an incidence of 2.57 per 100,000 population. Latvia had a population of 1.9 million inhabitants in 2018 with 0.8 million TBE-unvaccinated individuals and an incidence of 31.69 per 100,000 population. It should be noted that three TBE virus subtypes are circulating in Latvia (European, Siberian, Far Eastern). Data used for calculation of VE were the annual numbers of reported and lab confirmed TBE cases, vaccination history of the cases, estimated TBE vaccine uptake and schedule adherence data and population estimates. „Within schedule“–vaccination was classified when vaccination was done according to the recommended intervals of injections, otherwise it was termed „outside vaccination“. VE was calculated for individuals having received ≥ 2 vaccine doses, because for

FSME Immun, two doses can provide sufficient level of protection (see SmPC) preceding a tick season.

A total of 4040 TBE cases had been reported for southern Germany, of which 3277 cases had a complete vaccination history. Among these cases, 3010 (91.9%) occurred among non-vaccinated patients, while 267 (8.1%) had received one or more doses. Of these 267 cases, 77 (28.8%) had received only one dose, leaving 190 vaccine breakthrough cases for analysis. Overall, TBE VE for vaccinated (≥ 2) persons in southern Germany was 93.9%. For persons with „outside schedule“, VE was lower in southern Germany for those with only two injections: 90.6% compared to 97.2% for those with „within schedule“. Similar differences were seen for those with a complete primary immunization (3 doses) – 89.9% vs. 95.0% for those with „within schedule“.

In Latvia, a total of 3106 TBE cases had been reported for the 12-year period of which 3044 (98.3%) occurred among patients with not a single TBE vaccination, while 54 (1.7%) had received at least one injection at any time. Finally, 47 breakthrough cases were analyzed. The overall TBE VE for vaccinated persons (≥ 2 doses) was 98.6%.

For those individuals, whose last dose was a booster (≥ 4 doses) there was no longer significant differences associated with delayed timing for any age groups in either country, indicating that „outside schedule“ is not a predisposing factor for higher vaccine failure rates, and it is discussed that even after prolonged vaccination intervals, a rapid anamnestic immune response can be expected.

Discussion

TBE vaccines are highly immunogenic, and these analyses have shown that VE is high (typically more than 90%) regardless of age groups, number of prior TBE vaccine doses (2, 3 or ≥ 4), or



adherence to recommended dosing intervals. No enhancement of vaccine failures could be seen among elderly individuals who had completed the 3-dose primary series. When vaccinees followed the recommended injection interval, even two doses gave high VE supporting the 2-dose concept for travelers for seasonal protection.

The complexity of the currently recommended vaccination schedules may be a barrier to uptake of TBE vaccination (e.g., see Germany, Snapshots of [week 1/2022](#), [week 51/2021](#), [week 3/2021](#)).

The evidence presented here, and recently shown for Switzerland (see Snapshots [week 3/2022](#), [week 32/2021](#), [week 23/2021](#)), suggests that a less complex TBE vaccination schedule may be considered effective to provide sustainable protection.

Literature

Erber et al.

Effectiveness of TBE vaccination in southern Germany and Latvia

Vaccine 2021, in press, doi.org/10.1016/j.vaccine.2021.12.028

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