



10-YEAR TBE BOOSTER INTERVAL: SUMMARIZED DATA SHOW ITS FEASIBILITY

Background

During the last two decades, TBE cases have been gradually increasing within the European Union with a total of 3,734 confirmed cases reported in 2020. Further, the number of new TBE endemic areas is increasing (see e.g. Snapshot weeks 2/2024, 4/2024, 9/2024). Nevertheless, vaccine coverage (with at least one vaccine dose) in Europe remains low, with an average of 36% in endemic countries and 5% in non-endemic countries.

In Europe, two TBE vaccines are licensed for use: Encepur (derived from strain K23, Bavarian Nordic) and FSME-IMMUN (derived from strain Neudörfl, Pfizer). The primary vaccination schedule consists of three injections, and classical vaccination schemes as well as accelerated/rapid vaccination programs are available for pediatrics as well as adults. Following the completion of the primary vaccination, the first booster dose should be administered three years later, followed by booster doses every five years or every three years for individuals over the age of 65.

In recent years, there has been discussion about extending the booster interval to ten years. Recent review articles have summarized valuable data for extending the TBE booster interval, with a focus on Encepur, but also including data for FSME-IMMUN.

Results

A measure of antibody persistence is typically determined through the use of an ELISA test, a hemagglutination test, or neutralizing antibodies (NT), and an NT that is greater than 10 is generally considered to be a surrogate marker of protection. After the first booster vaccination, the

antibody persistence was studied in a prospective long-term immunogenicity study in healthy adolescents and adults. According to these studies, 94%, 97%, and 95.8% of all participants achieved $NT \geq 10$ at 5, 10 and 15 years after the first Encepur booster, respectively. Individuals older than 60 years of age also showed these results. According to several power-law models, stable levels of TBE NT antibodies will persist up to 20 years after booster stimulation. According to long-term immunogenicity data, antibody persistence of at least 15 years applies even to vaccination schedules that are different from what the manufacturer recommends.

Several studies conducted in Switzerland, Germany, and Latvia showed high vaccine effectiveness even for individuals who had exceeded the five (3) year booster interval and had received their last booster dose within or over 10 years. This demonstrated that the prolonged booster interval of 10 years did not affect the effectiveness of the vaccine. It was found that the effectiveness of vaccines Encepur and FSME-IMMUN, as well as a combination of both vaccines (heterologous vaccination), was similar. Long-term results of the FSME-IMMUN study indicated that antibody levels were lower in older age groups. However, these results suggest that humoral immunity mediated by NT antibodies may not be the only immune response that protects against TBE. (Relatively) low antibody titers (≤ 10) may not necessarily indicate loss of protection.

In Switzerland, no increase in the rate of vaccine breakthrough infection has been observed after the implementation of the 10-year booster interval. There was no increased risk of breakthrough infection in the older population if they were not boosted every three years.



Discussion

The extension of the booster interval may increase compliance in the population. TBE has a profound impact on society not only clinically, but also economically. Aside from hospitalization costs associated with TBE treatment, long-term permanent neurologic sequelae can also contribute to high healthcare costs.

It is anticipated that extending the booster interval will result in lower vaccine costs per person and lower associated costs related to vaccine service delivery. Extending the booster interval may also reduce patient fears of being vaccinated against TBE, and can foster trust in the vaccine, which may further increase vaccine uptake. Increasing evidence supports the longevity of protection conferred by TBE vaccines. Combining a 10-year booster interval with improved surveillance and increased disease awareness can reduce the burden of TBE in Europe.

Literature

Schelling et al.

Evidence for a 10-year TBE vaccine booster interval: an evaluation of current data. *Expert Rev Vaccines*.2024;23(1):226-236.
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