

Summary of Key Points

Nature of the Infectious Agent	<ul style="list-style-type: none"> -Tick-borne Encephalitis is caused by the flavivirus Tick-borne Encephalitis Virus (TBEV) -The European subtype is present in Switzerland
Vector and Prevalence	<ul style="list-style-type: none"> -TBEV is transmitted by Ixodes ricinus ticks -Prevalence is focal and ranges widely, generally less than 1% of questing ticks in Switzerland but has been found to be as high as 14.3% -Alimentary transmission has been reported but not systematically documented in Switzerland
Epidemiologic Trends	<ul style="list-style-type: none"> -Incidence in Switzerland has increased over the last decades (4.4/100,000 in 2018) -In 2018 an incidence of 5.0/100,000 or more (the WHO definition of "highly endemic") was observed in 10 cantons -Disease has spread from the northeast progressively west and southward -Disease is more common in men than in women -Incidence increases with age, in Switzerland adults from 60-74 are most affected
Risk Factors	<ul style="list-style-type: none"> -The majority of people are exposed via leisure activities -Sentinella regions 5, 4 and 2 are associated with an increased risk of disease -Increased age/comorbidities/immunosuppression increase disease risk
Affected Populations	<ul style="list-style-type: none"> -Among adults, disease is more severe with increased age/immunosuppression -Incidence tends to be lower in children although severity diagnoses in children 0-6 in Switzerland are not substantially different from those of the population as a whole -Average frequency of deaths in children 0-6 (Switzerland, 2000-2019) is similar to that of adults -Cases of meningoencephalitis in children 0-6 rose sharply from 2010 to 2018
Clinical Disease	<ul style="list-style-type: none"> -TBEV is neurotropic/neurovirulent and can cause severe Central Nervous System disease -30% of TBEV exposures are thought to result in clinical disease (30/100 exposures); 3-0% of clinical cases are abortive with a single, flu-like phase of illness (9/100); -70% of clinical cases progress to CNS disease (21/100) which includes meningitis 8.4/100), encephalitis (11.6/100), myelitis (1/100) or any combination of these
Fatalities	<ul style="list-style-type: none"> -Approximately 1% (0.2/100 exposures) of CNS disease cases in Switzerland are fatal -We estimate 354 life years have been lost due to TBE infection (3.54 YLL/year) since 2009
Disease Severity and Sequelae	<ul style="list-style-type: none"> -Permanent CNS sequelae occur in 30-50% of CNS disease cases and range from mild (20-30%), to moderate (50-60%), to severe (10%) -Persisting neurological sequelae occur in 30-50% of severe TBE cases -Persistent headaches and cognitive disorders are common -more severe sequelae can be life-altering include ataxia/tremors, persisting limb paresis, severe cognitive disorders and persisting respiratory paresis
Treatment and Prevention	<ul style="list-style-type: none"> - Currently, only supportive treatments available for TBE - Elimination of exposure to ticks is difficult, vaccination is the most effective prevention
Direct Costs of TBE	<ul style="list-style-type: none"> -We estimate the direct cost of hospitalization alone due to acute TBE (not accounting for sequelae) to be over 8,150,000 CHF annually
Indirect Costs of TBE	<ul style="list-style-type: none"> -We estimate indirect costs of acute TBE illness due to lost work by affected individuals alone to be in excess of 3,100,000 CHF annually
TBE Vaccines	<ul style="list-style-type: none"> -Two vaccines (Encepur N and FSME-Immun) are available for adults and children -Seroconversion for both is similar and is approximately 92-100% -Vaccine effectiveness is estimated to be 96-99% (vaccine failure estimated at 3%) -Seroconversion is similar for adults under 50 and children from 1 year of age -Primary and booster responses are lower in adults 50-60+ -Primary vaccination appears to be less effective in immunocompromised individuals - In Austria, 88% of the population has received at least one dose of TBE vaccine; vaccination prevented 2600 illnesses and 20 deaths between 2000 and 2006
Vaccination Coverage	<ul style="list-style-type: none"> -42% of adults in Switzerland have received at least 1 dose of TBE vaccine -33% of adults in Switzerland completed the primary vaccination series of 3 doses
Cost of Vaccination	<ul style="list-style-type: none"> -The primary series of 3 vaccinations costs approximately 200 CHF -We estimate the cost to complete primary vaccination for 100% of adults in Switzerland would be approximately 815,000,000 CHF (571,000,000 CHF for 70% coverage) -The cost to vaccinate all children 1 through 5 at 87,500,000 CHF (61,300,000 CHF for 70% coverage) -The cost to vaccinate children from 3 through 5 is 52,300,000 CHF (36,600,000 CHF for 70% coverage)