

# XXXII

CONGRESSO NAZIONALE  
DELLA SOCIETÀ ITALIANA DI PARASSITOLOGIA  
NAPOLI, 27-30 GIUGNO 2022

## TRANSIZIONI PARASSITOLOGICHE



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## EARLY WARNING SIGNALS OF TICK-BORNE ENCEPHALITIS RISK

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**Keywords:** tick-borne encephalitis, early warning, risk assessment

**INTRODUCTION:** Tick-borne encephalitis is an emerging tick-borne viral infection caused by TBEv, a flavivirus affecting human and animal central nervous systems. Despite the availability of an effective vaccine, an average of 2700 confirmed human cases are reported each year in Europe, with a mean annual notification rate of 0.6 cases per 100,000 inhabitants. The virus circulates enzootically in natural foci among ticks and a number of wildlife hosts which play different eco-epidemiological roles. These include rodents, which play a major role as reservoirs and amplifiers of the infection, and deer which affect tick abundance. TBE distribution is very focal as a consequence of the complex interplay between environmental covariates and the temporal and spatial variation in the abundance of key hosts. The reduction of tick-borne diseases burden strongly depends on the level of awareness of those categories mostly exposed to tick bites including the general public. Therefore, the identification of early warning signals of changing risk can be of utility for the public health authorities for the implementation of prevention and informative campaign.

**MATERIALS AND METHODS:** We focused our studies on the Province of Trento (northern Italy, ~6,000km<sup>2</sup>, ~500,000 inhabitants) where TBEv cases have been recorded since 1992. By combining long term data on host abundance, tick infestation rate on rodents, seroconversion in rodents, a number of environmental variables, and TBE human cases, by the use of mathematical models we identified those predictors with higher potential to forecast changes in TBE risk.

**RESULTS AND CONCLUSIONS:** Between 1992 and 2020, a total of 206 TBEv human cases were recorded in the study area. We found a significant positive association between TBEv cases and the number of co-feeding ticks on rodents (Rosà et al., 2019), autumnal cooling temperature, and airborne pollen with a different time lag. In particular, we recently found a significant positive association between beech, oak, and hop hornbeam pollen abundances and TBEv cases recorded two years later. These predictors could be used by public health officers as an early warning signal for changes in TBE risk and therefore of utility to plan information and prevention actions.