

Population dynamics of bank voles and human Puumala virus infections in Germany

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The rodent-associated Puumala virus (PUUV), a hantavirus species, is widely spread in Europe. It is part of a series of zoonotic human pathogens and is transmitted by forest-living bank voles (*Myodes glareolus*). Infections with PUUV can cause *Nephropathia epidemica* (NE), a mild form of the hemorrhagic fever with renal syndrome (HFRS). Its reservoir species, the bank vole, shows seasonal variations and multi-annual fluctuations in population size, which is partially related to climatic conditions. The number of human PUUV infections also fluctuates. Hence, years with high bank vole abundances might be related to a large number of notified PUUV infections in humans.

The aim of our study is to closely investigate the potential correlations between climate, bank vole population dynamics and PUUV infections in humans and to use these correlations for predictive models.

Since 2010, changes in population dynamics of forest rodents, especially bank voles, are monitored in several regions of Germany using Ugglan live traps. Each trapping site is sampled three times a year. Blood samples of

each trapped individual are taken to serologically detect PUUV infections and to estimate the rate of PUUV seroprevalence in bank vole populations. We were able to show a positive correlation between high numbers of human PUUV infections and high population densities of PUUV infected bank voles. Furthermore, we are analysing data on climate and bank vole abundance from several states of Germany by performing CART (classification and regression tree)-analyses to identify climate parameters that are clearly linked to changes in the population density of bank voles. On the basis of predicted climate data (Climate Service Center - Hamburg) we aim to make predictions about the population development of bank voles and finally about the risk of infection for humans with PUUV.

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