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POSTER

MODELLING WEST NILE VIRUS TRANSMISSION AND HUMAN INFECTION RISK IN VENETO (ITALY)

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ABSTRACT

West Nile virus (WNV) is a flavivirus of emerging public health relevance in Europe, which is maintained in enzootic cycles between avian reservoir hosts and mosquitoes. Humans are dead-end hosts in which infection can induce symptoms from mild flu-like fever to severe neurological syndromes such as meningitis, encephalitis, and acute flaccid paralysis. An intensified and continuous WNV spread across Northern Italy has been observed since 2008, which caused more than a hundred reported human infections up until 2016. Veneto is one of the Italian regions where WNV is considered endemic, and the greatest circulation was observed during 2013 and 2016.

By using entomological data collected across the region in those years, we calibrated a mathematical model through a Bayesian approach that simulates the WNV infection in an avian population with seasonal demography, taking also into account the effect of temperature on the virus dynamics. We considered two alternative routes of introduction of the virus at the beginning of each vector breeding season: in one the virus is introduced by infected birds, migrating to the study area, in the other by diapausing mosquitoes which were infected in the previous year. We estimated biting rate and host-vector ratio by fitting model prediction to the observed WNV infection in the vector. Afterwards, we computed seasonal risk curves, indicating the likelihood for a human to be infected during the year, also allowing for a shift in vector feeding preference according to actual observation.

According to our results, WNV is likely to be introduced each year via already infected mosquitoes, thus it seems probable that the virus survives through winter in the area and it is not reintroduced every season from other regions. The highest probability of human infection is expected to occur in August, consistently with observations.

Our findings might provide new insights on the ecology of WNV in Southern Europe, in particular regarding its endemism and seasonality. Estimated human infection risk during the season can be of particular interest for public health authorities, helping them to design efficient surveillance and prevention strategies.