



## KEYNOTE TALK

Population dynamics of endemic mosquitoes species and epidemiological implications in Northern Italy

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The rapid invasion and spread of *Aedes albopictus* within new continents and climatic ranges has created favorable conditions for the emergence of tropical arboviral diseases in the invaded areas. We used mosquito abundance data from 2014 and 2015 collected across ten sites in northern Italy to calibrate a population model for *Ae. albopictus* and to estimate the transmission potential of chikungunya, dengue and ZIKV. The model predicts a significant risk of chikungunya outbreaks in most sites if a case is imported between the beginning of summer and up to mid-November, with an average outbreak probability between 4.9% and 25%. Peak values of  $R_0$  range from 0.5 to 3 depending on the site. A lower risk is predicted for dengue, with an average probability between 4.2% and 10.8% for cases imported between mid-July and mid-September and peak values of  $R_0$  from 0.5 to 2. Importantly,  $R_0$  of dengue remains above the epidemic threshold for a much shorter period of time. We estimated the basic reproductive number  $R_0$  for ZIKV to be systematically below the epidemic threshold in most scenarios. The main determinants of transmissibility are i) local abundance of *Ae. albopictus*, which in turn depends on local temperature patterns, precipitation – a robust negative correlation was found with late spring precipitations – and habitat suitability, and ii) natural history of the diseases. In particular, the lower estimated risk for dengue is mainly determined by the length of the extrinsic incubation period in *Ae. albopictus*, while the lower risk of ZIKV is mainly ascribable to the low transmission efficiency of *Ae. albopictus*, compared for instance to that of *Ae. aegypti*.

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