

Arbovirus control: what is the (real) stone in the way?

Dear Editor

Infections by arboviruses are a historic public health problem in tropical and subtropical countries and territories¹. More recently, several factors, such as climate changes and globalization, have contributed to the increase of the distribution of arboviruses and (re-)emergence of some viral species in many areas, including temperate regions^{2,3}. As a result, many universities, research centers and institutes around the world have the mosquito-borne viral diseases as major research object. Interestingly, the attention, investment and scientific rigor given to the subject sometimes have secondary importance and factors of non-scientific order contribute to widening the gap between research and population.

Regarding the reduction of mosquito vectors, various alternative measures, such as biocontrol strategies, have been strongly suggested to overcome the toxicity to non-target organisms and resistance mechanisms triggered by chemical insecticides. For example, larvicidal fish, such as *Gambusia affinis* and *Poecilia reticulata*, and copepods, such as *Mesocyclops thermocyclopoides* and *M. longisetus*, have been successfully used to control *Aedes aegypti* populations and decrease the number of *Dengue virus* (DENV) infections⁴.

Despite the optimistic results of these and others related-interventions, it is necessary to evaluate their sustainability in different environments, long-term effects, influence on the ecological balance and on the interaction between target and non-target species. The time and infrastructure required for the analysis, in addition to possibility of unsatisfactory results, require more cautious conclusions about the real contribution of vector control measures. Indeed, in this perspective, the relative distance between research and society is scientifically justified.

About the mass immunization, the development of some vaccine strategies is also hindered by scientific obstacles associated to molecular characteristics and pathogenesis of the target viral species. Multiple DENV serotypes and the possibility of antibody-dependent enhancement of infection have been an old problems for the development of a safe DENV vaccine. The fine balance between immunogenicity-safety and the development of a safe vaccine for the fetus are the most important concerns for the chikungunya and Zika vaccines, respectively¹. Historically, however, the gap between vaccine development and immunization action has been supported by other criteria, notably less scientific.

The yellow fever vaccine, for instance, although developed between 1930 and 1940, has not yet been used as an effective disease prevention measure in many regions of South America and Africa. In recent literature, vaccine coverage for countries at risk for yellow fever ranged from 0% in parts of Central and Eastern Africa to 100% in part of the Amazonas State (Brazil)⁵. In Africa, risk areas for disease with lack of vaccination coverage included large part of Central and Eastern Africa and parts of Nigeria, Niger, Sierra Leone, Liberia and Guinea-Bissau⁵. In Brazil, only in 2018 an immunization plan for the whole country⁶ was established. In the same trend, the anti-dengue vaccine (CYD-DTV vaccine, ChimeriVax-Dengue/Dengvaxia[®]), licensed since 2015 and currently approved in 20 countries, is not yet part of the immunization schedule of many countries where dengue fever is endemic⁷.

In this context, in addition to investing in integrated vector management and/or vaccination strategies for arboviruses, it is also necessary to focus and discuss others factors, probably of economic and political origin, that hamper the implementation

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of satisfactory scientifically measures. Otherwise, why investing funds and knowledge in laboratory practices if, ultimately, criteria that do not meet the scientific requirements seem to be the most important? In the broadest sense, following the verses of the Brazilian poet Carlos Drummond de Andrade (1928): “In the middle of the way had (has) a stone/Had (Has) a stone in the middle of the way” from the Portuguese “No meio do caminho tinha (tem) uma pedra/ Tinha (Tem) uma pedra no meio do caminho”; it is imperative to ask: what is the (real) stone between laboratory and social outcome?!

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