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Potential impact of dengue vaccination: insights from the first efficacy trial

Laurent Coudeville[1]

[1]*Dengue Company, Sanofi Pasteur, SiĂ¨ge Mondial - 2, Avenue Pont Pasteur - 69367 Lyon cedex 07 - France*
Laurent.Coudeville@sanofipasteur.com

ABSTRACT

Background: With about 100 million apparent infections occurring each year, dengue is a major international public health concern. To date, no specific treatment is available for this disease but vaccines candidates are currently in development. The efficacy against 3 of the 4 dengue serotypes for the Sanofi Pasteur (SP) vaccine candidate was shown during a Phase 2B efficacy trial performed in Thailand. Ongoing large-scale phase 3 studies in various epidemiological settings will complete the information on the efficacy of this vaccine.
Methods and Findings: Data observed during the first efficacy trial performed for the SP vaccine candidate were used to fit an age-structured, host-vector and serotype-specific compartmental model previously developed (Coudeville et al. [2012]). The estimation was performed using Approximate Bayesian Computation (ABC) method based on Sequential Monte Carlo similar to one proposed by Toni et al. [2009]. This estimation allowed first to capture the force of infection of infection during and prior to the study period in the Ratchaburi Province where the trial was performed. We considered several scenarios of cross-interactions between serotypes and estimated the duration of cross-protection and level of enhancement in case of secondary infection corresponding to them. We also tested several scenarios of vaccine efficacy based on 1) difference in efficacy between serotypes 2) increase in efficacy after subsequent doses 3) Protection conferred to naĂŻve and primed populations. Results obtained allowed to identify a subset of scenarios providing a good fit to the data. Interestingly, all these scenarios lead to vaccine profiles able to significantly impact disease burden.
Conclusion: The analysis performed on the basis of the result of the first

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efficacy trial suggests that the SP dengue vaccine has the potential to significantly impact dengue burden. The finding from this analysis will be completed when the result of phase 3 studies will become available.

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