VAC_22 - Evaluation of heat inactivation of yellow fever vaccine residue in the filling bottle

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Introduction: Heat is a powerful tool against most infectious agents. It is widely used for decontamination of medical, laboratory, industrial and personal protective equipment as well as for biological samples. Thermal inactivation of viruses has been an alternative commonly used method in the disinfection of waste and objects, considering that chemical inactivation could cause corrosion of metallic parts and prolonged contact time. In the immunobiological industry, the waste generated in different stages of production is considered biohazard and must be handled with great care before disposal, which includes effective decontamination. In this context, the use of hot water has been shown to be a potentially applicable, low-cost, quick and easy-to-apply decontamination alternative.

Objective: The aim of this study was to evaluate the heat inactivation of the Attenuated Yellow Fever vaccine residue contained in the bottle and accessories (hoses/needles of the filling system) using hot WFI water (90ºC) available at the DEPFI/Bio-Manguinhos/FIOCRUZ filling area.

Methodology: After the filling process, approximately 20 or 45 liters of WFI water ≥80°C were added to the container with the vaccine residue. This volume of hot water was rinsed, including the filling system (hoses and pumps), and 50 ml samples were collected at the end of the line, at each established time: initial t0', t05´, t10', t15´, t20' and t30' and the temperature monitored during these time intervals. Three assays were performed to evaluate the inactivation by plaque assay using Vero cell culture.

Results: The first viral inactivation assay was performed with approximately 20 L of hot water. The filling bottle temperature varied from 67.5 to 63.5ºC during the 20 minutes of the experiment. The results showed a reduction of the viral titer of 97.66% in the first 5 minutes and of 99.88% in 20 minutes. For the following tests, the volume of hot water added to the filling bottle was changed to 45 L, which increased the inactivation temperature in the filling bottle to the range of 66 to 71ºC. Under these conditions, it was possible to observe a 100% reduction in the viral titer after 30 minutes (2nd assay) and confirmation of these results is in progress (3rd assay).

Conclusion: The initial results indicate the possibility that the proposed strategy of heat inactivation for the Attenuated Yellow Fever vaccine residue contained in the flask and accessories of the filling system using hot water could potentially applicable in the DEPFI/Bio-Manguinhos area and could be evaluated for other decontaminations in the unit. Further experiments will be needed to confirm these results.

Keywords: Heat; Inactivation; Yellow fever