Peptide Display on Bacteriophages PP7 and MS2: Characterization of Virus-like Particles as Potential Vaccine Platforms

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INTRODUCTION: Virus-like particles (VLPs) are obtained by self-assembly of structural proteins of viral capsids. VLPs are excellent scaffolds for surface display of molecules. The stability of a VLP is an important consideration for its use in nanobiotechnology. Here, we describe a platform for vaccine development based on the VLPs of bacteriophages MS2 and PP7. Peptides representing the V3 loop of HIV gp120 and the ECL2 loop of the HIV coreceptor, CCR5, were inserted into a surface loop of MS2 coat protein. PP7 VLPs display L2 peptides from the capsid protein of three different HPV types. **OBJECTIVE:** Here we aim to evaluate the stability and profile of disassembly of these virus-like particles, investigating which components are important for the structural stability of these genetically modified VLPs. **MATERIAL AND MEHODS**: The effects of the insertion of these peptides on the VLPs structure were assessed by dynamic light scattering , transmission electron microscopy and small-angle x-ray scattering (SAXS). Bacteriophage VLPs also encapsidate ssRNA. To analyze if the presence of RNA in VLPs would contribute to particle stability, we removed the genetic material and evaluated possible structural changes. **RESULTS AND DISCUSSION**: The VLPs displaying peptides on their surfaces showed a similar structure and slightly lower stability than VLPs formed by the native coat protein. SAXS data show that the effect of 3 hours of pressurization was not able to promote the VLPs disassembly, but different concentrations of urea were able to disrupt some VLPs. The removal of RNA from VLP PP7 did not compromise the stability of the particle. **CONCLUSIONS**: The genetically modified VLPs promoted little changes in the stability of the particles without a significative size change. The insertion of peptides seems to make VLPs slightly more vulnerable to disassembly. Our work aims to contribute for the characterization of these potential vaccine platforms.

Keywords: Virus-like particle, structural stability, vaccine platform

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