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TITLE: DEVELOPMENT OF VIRUS-LIKE PARTICLE PLATFORM FOR THE CONTROL OF CELL BEHAVIOR

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ABSTRACT:

Virus-Like Particles (VLPs) are self-assembled protein-based nanoparticles that provide versatile delivery platforms for a variety of biomedical applications thanks to their biocompatibility and their ability to encapsulate therapeutic molecules[1,2]. However, the field of biomaterials still makes little use of these tools. Here we show that VLPs can be used to develop cell-signaling nanoscaffolds that can control cell behavior. Using cloning techniques, we fused short bioactive peptides to the C-terminus of the CP3 coat protein. We produced recombinant particles expressing adhesion (RGD) and osteogenic (BMP2) peptides at their surface and purified them by affinity and size exclusion chromatography techniques. We show that VLP-RGD particles stimulate adhesion and cell spreading with the same efficacy as native fibronectin whereas VLP-BMP2 particles do not. With similar methods, we were able to produce heteromeric particles co-expressing RGD and BMP2 peptides. We showed that the presence of RGD and BMP2 peptides on our multifunctional particles can promote cell adhesion similarly to VLP-RGD. These results show that our particles can be used as a platform to control cell adhesion for biomaterials applications.

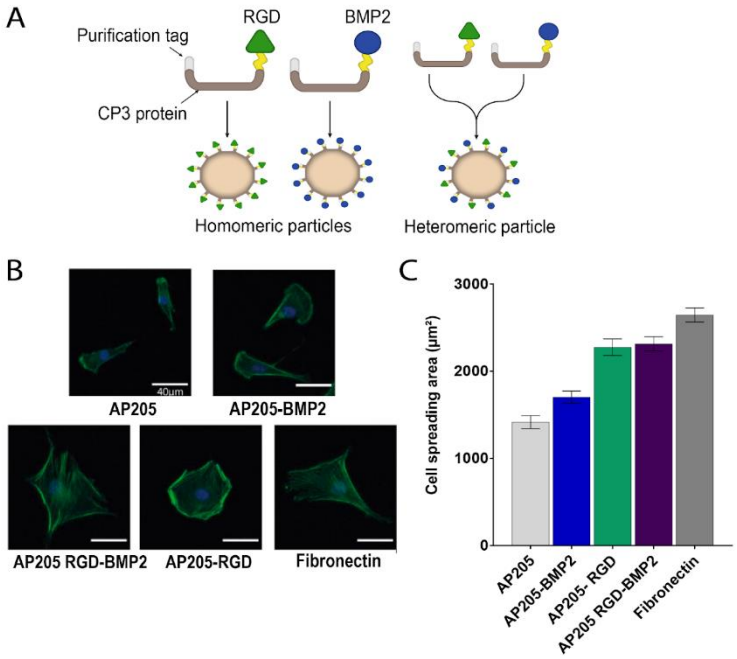

Figure 1: A Virus-Like Particle platform for the control of cell behavior. Schematic representation of AP205 VLPs constructions made (A). Immunostaining of C2C12 cells after 6h of incubation on PDMS surfaces treated with AP205 particles and fibronectin at concentrations of 200 µg/mL. Scale bar: 40 µm (B). Quantification of cell spreading area in µm² measured on each condition (C).

References

1- Shirbaghaee, Z. and Bolhassani, A. (2016), *Biopolymers*, 105(3), pp. 113–132.
2- Pushko, P., Pumpens, P. and Grens, E. (2013), *Intervirology*, 56(3), pp. 141–165.