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Branched amphiphilic cationic oligo-peptides for delivery of HPV-16 DNA vaccines

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Recently, peptides have shown potential as a new family for gene carriers. Peptides are easy to synthesize, quite stable and expected to produce minimally immunogenic and inflammatory responses. We recently reported on a new class of branched amphiphilic peptides that self-assemble into extremely stable nano-spheres. The Branched Amphiphilic Peptides Capsules (BAPCs) display a uniform size of 20-30 nm and are resistant to detergents, proteases and chaotropes. Comparable to how histones compact DNA to form nucleosomes, the 20-30 nm BAPCs interact with plasmid DNA acting as a cationic nucleation centers with the negatively charged DNA coating the outer surface, generating peptide-DNA nanoparticles with sizes ranging between 50-250 nm. The BAPCs-DNA nanoparticles are capable of delivering plasmid DNA of different size into cells in culture, yielding high transfection rates and minimal cytotoxicity. Furthermore, BAPCs were tested for *in vivo* delivery of a DNA vaccine previously designed to activate immune responses and capable of controlling tumors induced by type 16 *human papillomavirus* (HPV-16). The BAPCs-DNA nanoparticles enhanced the vaccine-induced antitumor protection and promoted efficient activation of murine dendritic cells without significant toxic effects. Together these results demonstrate that the interaction of double stranded DNA to branched amphiphilic oligo-peptides nanoparticles represents a promising new *in vitro* and *in vivo* non-viral gene delivery system.

Biography

L A Avila has completed her PhD in Biochemistry and Molecular Biophysics at Kansas State University in 4 years. Her thesis work focused on developing a method to deliver genes into cells using peptide nano-spheres. Currently, she is a Research Associate at Auburn University working in the field of drug delivery and microfluidics. She has helped to establish a biotechnology company, Genetadi Biotech SL, in Bilbao, Spain from 2008 to 2010 and she had been a founding partner since then. She has published 5 research papers and 1 review article. Presently, she is serving as a co-chair for the Gordon Research Seminar in Cancer Nanotechnology.

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