Protein nanoparticles for molecular therapy: Molecular construction of SIVp17/HIV1p6 nanoparticles and assembly in animal cell cultures

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Protein nanoparticles, such as Virus-like particles (VLPs), are becoming promising agents to delivery molecular therapy agents. A nanoparticle was constructed by fusion of the SIV (Simian Immunodeficiency Virus) p17 matrix protein with the HIV-1 (Human Immunodeficiency Virus Type 1) p6 protein with the goal transport of therapeutically agents to specifically targeted cells [1]. We have previously shown that the chimeric p17/p6 protein assembles from 293T cells as fully membrane encapsulated particle with 80 nm and an average of 7700 protein subunits. The intent of this construction is to enable particle engineering based on molecular assembly strategies in order to incorporate selected targeting motifs and particular therapeutic agents. The particles are assembled in animal cell culture upon transiently transfecting the cells with three different vectors one of which encodes the main structural protein of the nanoparticles - the fusion protein p17/p6. The affinity recognition of p6 protein with specific motives included in HIV-1 Vpr protein is then explored to enable the incorporation into the assembling nanoparticles of specific biomolecules linked to such motives. This is demonstrated by construction a fusion protein containing Vpr and EGFP. Co-transfecting animal cells with this vector and the vector encoding p17/p6 results in the assembly of nanoparticles associated with EGFP which is inside the assembled nanoparticles.
This communication addresses the steps involved in the molecular construction, assembly and characterization of such nanoparticles as well as the attempts to their optimization in animal cell cultures.

References:

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