



Non-Confidential Description

PSU Invention Disclosure No. 4396 "Paramyxovirus Virus-like Particles as Protein Delivery Vehicles"

Field of Invention/Keywords:

Paramyxovirus virus like particles (VLP), protein delivery system, protein terminal modification, therapeutic protein delivery system

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Background

The subject invention was conceived after the revelatory results of a previous investigation performed by the inventors, on understanding a virus' natural packaging mechanism of its contents during an infection. Virus like particles have previously been proposed as delivery vehicles for proteins because, similar to viruses, VLPs excel at delivering their contents to target cells. But prior to this invention, there was no simple and effective way of directing a foreign protein of interest to be incorporated into VLPs. Although strategies for incorporating proteins into human papillomavirus like particle have been implemented by researchers in the past, there are significant shortcomings to this approach, as the foreign protein must be substantially modified to gain compatibility with papillomavirus proteins to enable VLP packaging. Ideally, VLP incorporation should require only minimal perturbation to the foreign protein so that the chance of impairing its biological activity is minimized.

Invention Description

The subject invention comprises a method for delivering proteins or peptides into cells using virus-like particles (VLPs) composed of paramyxovirus components. Foreign proteins are appropriately modified to enable their efficient incorporation into budding VLPs. The modified foreign proteins are produced in cells together with other important proteins of the virus. The resulting VLPs contain the foreign protein of interest and are capable of attaching to target cells and delivering the contents to the target cell interior. VLP based delivery vehicles could potentially provide a highly flexible and safe platform for therapeutic delivery of functional proteins or toxins to cells. A key benefit of this strategy is that the modifications required to direct packaging into VLPs are small – as little as 15 amino acid residues appended to the end of the protein, compared to other such attempted technologies where attachment of a large number of amino acid residues is required, thereby potentially compromising the biological activity of the protein of interest.

Status of the Invention

A provisional patent application is in the process of being filed for this invention. Potential applications for this invention include the delivery of proteins to the cells of patients (gene therapy for genetic disorders) or laboratory applications (e.g. delivery of proteins directly to primary cells or cell lines that are un-transfectable). The inventors have demonstrated this technique successfully in two different paramyxoviruses and with multiple target proteins.

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