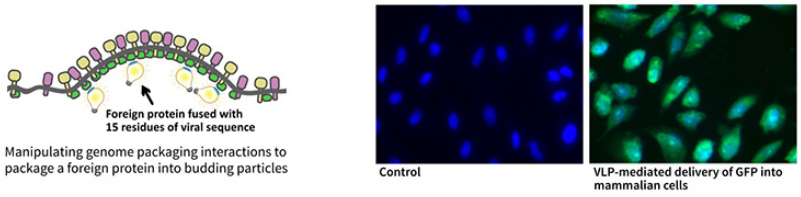
Intracellular Protein Delivery using Virus-Like Particles

ID# 2015-4396



Paramyxovirus Packages Foreign Proteins

Technology Summary

Paramyxoviruses naturally bud particles that enclose the viral RNA genomes and transmit infections to new cells. In study of this process, Penn State Inventors defined regions near the C-terminal ends of paramyxovirus nucleocapsid proteins that are sufficient to direct foreign proteins into budding particles. In application of this finding, foreign proteins of interest can now be appended with 15-20 amino acid residue long targeting sequences, resulting in their efficient incorporation into noninfectious virus-like particles (VLPs). The VLPs are natural delivery vehicles, capable of attaching to target mammalian cells and delivering the protein-of-interest directly to the cytoplasm.
In proof-of-concept studies, Penn State inventors have demonstrated loading of luciferase, GFP, superoxide dismutase, and Cas9 nuclease into VLPs.

Application & Market Utility

Protein cargos are delivered directly to target cell cytoplasms. Proteins, not nucleic acids, are delivered thereby avoiding genetic manipulation of target cells. The short targeting sequences minimally perturb cargo protein function. NLS-bearing cargos can be delivered to the nuclei of target cells. VLPs accommodate a wide range of cargo sizes ranging from peptides to large proteins such as Cas9 (>1500 aa). Nearly any cell type can be targeted for delivery, as VLPs bind generically to sialic acid cell surface receptors.

Next Steps

Seeking research collaboration and licensing opportunities.

TECHNOLOGY READINESS LEVEL 1-3

Seeking

Investment | Licensing | Research

Keywords

- Non-infectious Virus-Like Particles
- VLP-Mediated Protein Delivery
- Delivery to Cytoplasm or Nucleus

Researchers
Anthony Schmitt, Ph.D.
Lead Researcher

Originating College
College of Agricultural Sciences

Office of Technology Management Contact
Long, Melissa
mkl137@psu.edu
814-865-5730