Title: Employing Flock House Virus like particles (VLP s) as versatile drug delivery agents.

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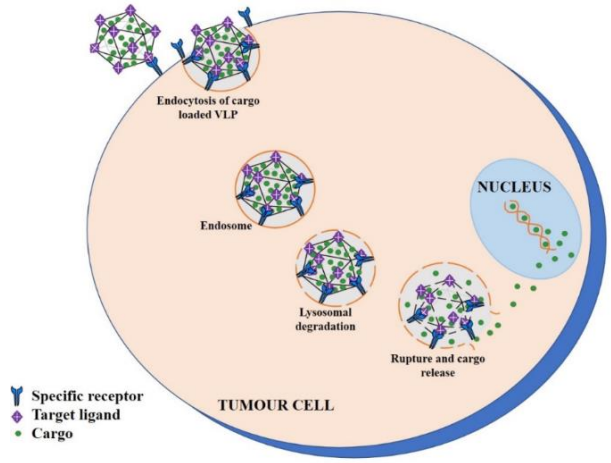
Abstract

Chemotherapy against cancer comes with a lot of complications including lack of selectivity for tumor cells, poor effectiveness and biodistribution and short circulation time. Several nanotechnology-based platforms such as liposomes, synthetic polymers and protein based nanocarriers have been developed to circumvent these issues. The structural proteins of many viruses can self-assemble spontaneously into virus like particles (VLPs) under appropriate conditions, which makes them potentially effective nanocarriers for drug encapsulation and delivery. We have exploited the inherent advantages of an insect nodavirus, Flock House Virus (FHV), to engineer a targeted nano-vehicle. Since FHV lacks mammalian cell tropism, making use of click chemistry we have devised a quick chemical conjugation method to attach targeting peptides to FHV virus-like particles (VLPs). Further, the natural affinity of FHV for hydrophobic molecules has been utilized for encapsulating hydrophobic chemotherapeutic drugs, like doxorubicin and camptothecin, by transient destabilization and re-stabilization of the capsid via modulation of Ca^{2+} concentration. These modified drug encapsulated VLPs have demonstrated high anticancer efficacy in murine colorectal and melanoma models. Their effectiveness as targeted drug delivery vehicles is being investigated in murine lung cancer model as well. The cellular internalization and trafficking of these VLPs will be tested in addition to their apoptotic efficiency in the respective cancer cell lines. Effective targeted delivery of chemotherapeutic drugs via VLP-based nano-vehicles is expected to address some of the primary challenges associated with cancer therapy.

Biography



Ms. Maryam Khursheed is currently a PhD candidate at Indian Institute of Technology Delhi, India. Her current research focuses on exploiting small non-enveloped viruses for use as bionanoparticles for therapeutic delivery to cancer cells. She has a keen interest in structural virology.



Relevant Publications

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- Odegard, A., Banerjee, M., & Johnson, J. E. (2010). Flock house virus: a model system for understanding non-enveloped virus entry and membrane penetration. *Cell Entry by Non-Enveloped Viruses*, 1-22.
- Bajaj, S., & Banerjee, M. (2016). In vitro assembly of polymorphic virus-like particles from the capsid protein of a nodavirus. *Virology*, *496*, 106-115.
- Manayani, D. J., Thomas, D., Dryden, K. A., Reddy, V., Siladi, M. E., Marlett, J. M., ... & Schneemann, A. (2007). A viral nanoparticle with dual function as an anthrax antitoxin and vaccine. *PLoS pathogens*, *3*(10), e142.
- Venter, P. A., Dirksen, A., Thomas, D., Manchester, M., Dawson, P. E., & Schneemann, A. (2011). Multivalent display of proteins on viral nanoparticles using molecular recognition and chemical ligation strategies. *Biomacromolecules*, *12*(6), 2293-2301.