**Virus-like particles: Targeted diagnostic imaging and directed immune responses**

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Viral capsids are naturally designed to target hosts/cells where their nucleic acids are released for replication. From a materials point of view, these are perfect examples of cell targeted delivery systems. Inspired by viral capsids, we have utilized cage-like proteins as vehicles for targeted delivery of imaging agents and the presentation of antigenic peptides to specific tissues and cells. We have developed virus-like particles platforms as imaging agents to monitor clinically important diseases including atherosclerosis and utilized their natural antigenicity for the development of controlled immune responses to conserved epitopes of influenza.

Virus capsids present two unique interfaces that can be chemically and genetically manipulated – the exterior (exposed) and interior (buried) surfaces. This allows us to independently manipulate the exterior surface to display a surface that may assist with either the cell specific targeting or modulate the immune response to the particle in vivo. The interior can then be used to encapsulate a cargo that could comprise a high density of imaging agent or a buried immunogenic peptide. Our results suggest the promise for using a wide variety of protein cage architectures as vehicles for imaging agent delivery and also as platforms for vaccine development.