

## **S013** Real-time Intracellular Confocal Particle Tracking of Particulate Drug Carriers

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An improved understanding of the intracellular transport of particulate drug and gene carriers is needed to guide the rational development of improved delivery systems. Cellular properties and processes often adversely affect the efficacy of particulate drug and gene delivery vehicles. Our laboratory uses high resolution video confocal microscopy to study the real time movements of drug and gene carriers in live cells, and to quantitatively correlate particle location with various cellular structures and/or pathways. We seek to understand in a quantitative manner the bottleneck(s) to efficient drug/gene delivery in a variety of relevant cell types, including primary neurons, stem cells, endothelial cells, muscle cells, and cancer cells. We also seek to understand how effective systems, such as viruses for gene delivery, are trafficked as compared to currently-available synthetic systems in an attempt to learn potentially desirable properties that can/should be mimicked. Confocal particle tracking provides information on the trafficking patterns of hundreds of individual particles/vesicles, and in some cases individual macromolecules, allowing excellent insight into transport phenomena that has largely been studied using bulk-average techniques in the past. This talk will discuss results from our laboratory that demonstrate the utility of the technique and provide insight that is guiding the rational improvement of synthetic drug and gene delivery systems aimed at effective intracellular delivery.