

## **GAINING CHEMICAL CONTROL OVER ENDOCYTOSIS**

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Compartments are a fundamental component of cellular machinery. They provide barriers, sequester reagents, accelerate reactions, and control specificity. Yet we still do not understand how cellular compartments assemble and reorganize, how they control the flow of information into and within a cell, or how they can be breached for benefit of biotechnology. Touching on all these topics, this lecture will describe the discovery of a chemical motif that guides peptides and proteins into the cytosol by promoting efficient endosomal escape, a precise single-molecule tool that quantifies this trafficking event in live cells with accuracy and precision, and a genome screen that successfully identified the cellular machinery hijacked for this process. Our work provides new insight into how cells respond to unnatural endocytic cargo and how this knowledge can be exploited to improve the cytosolic delivery of proteins and peptide mimetics of diverse structure.