

## UCSB Researchers Discover That the Cell's Endosomes Use a Surprising Transportation System

Cells have developed a surprising transportation system for their endosomes, according to research published today in *Physical Review Letters*, "Dynamics and Spatial Organization of Endosomes in Mammalian Cells."

By marking endosomes with fluorescent tags and watching them move in live cells, Samir Mitragotri, a UCSB professor of chemical engineering, and graduate students Chinmay Pangarkar and Anh Tuan Dinh learned that the endosomes travel to the cell's nucleus using back-and-forth symmetrical movement, rather than taking a more direct route. This forward and reverse motion leads to even distribution of the endosomes on microtubules.

An aster-like layout of the microtubules helps the endosomes accumulate at the nucleus. The researchers think this non-direct approach to the nucleus has evolved to allow hundreds of endosomes to bring nutrients and molecular information to the cell's center for processing. Even if the cell moves or if there's increased traffic flow, there's never a traffic jam on the microtubules.

While it has long been known that endosomes travel in a bidirectional way, it has not previously been established that the transport system is symmetrical. The authors believe that because a number of neurological, muscular and cardiac diseases stem from the malfunctioning of one or more proteins that regulate the transport properties of endosomes or lysosomes, it may be possible to perform in silico and/or laboratory experiments to better understand the relationship between transport properties and pathology.

The delivery of many therapeutic agents, especially DNA and siRNA is dependent on endocytic transport. Understanding how endosome distribution evolves is central to such therapeutic approaches.

### Media Contact

Tony Rairden

[trairden@engineering.ucsb.edu](mailto:trairden@engineering.ucsb.edu)

805.893.4301

---