Human cells build protein cages to trap invading Shigella

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In research on the never-ending war between pathogen and host, scientists at the Pasteur Institute in Paris have discovered a novel defensive weapon, a cytoskeletal protein called septin, that humans cells deploy to cage the invading Shigella bacteria that cause potentially fatal human diarrhea, according to a presentation on Dec. 5, at the American Society for Cell Biology Annual Meeting in Denver.

Pascale Cossart, Ph.D., and Serge Mostowy, Ph.D., reported that the septin cages not only targeted the pathogens for degradation by autophagy, the cell's internal garbage disposal system, but also prevented the Shigella bacteria from spreading to other cells by impeding the pathogens' access to actin, a different component of the cell skeleton.

Shigella requires actin to rocket around the host cell before punching into an adjacent cell, said the Pasteur researchers, who made their discovery in human cells grown in culture in the laboratory.

First discovered in yeast as rings that pinch off dividing cells, septins are Guanosine-5'-triphosphate (GTP)-binding proteins that are integral to a cell's dynamic skeleton. Cossart, a Howard Hughes Medical Institute (HHMI) investigator, and Mostowy continue to investigate the properties of the individual septins, which total 14 in humans, to understand how they associate with other proteins as parts of complex nano-machines.

Before their studies revealed septin's new role in innate immunity, Cossart and Mostowy said that the cytoskeletal protein already was

implicated in the pathogenesis of many human disorders including leukemia and colon cancer as well as Parkinson's and Alzheimer's diseases.