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Poster #53: DNA loaded outer membrane vesicles after bacteriophage treatment

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Bacteria employ diverse defence mechanisms against bacteriophage infection, including the release of bacterial extracellular vesicles (BEVs). Gram-negative bacteria produce outer membrane vesicles (OMVs) composed of outer membrane lipids and proteins, including surface receptors such as the O-antigen of lipopolysaccharide (LPS). This study focuses on the interaction between *Salmonella* Typhimurium OMVs and the podovirus P22, a model phage that uses the O-antigen as its receptor. While OMVs can bind and neutralize phages, the fate of phage DNA and surface changes in OMVs is not well studied so far.

OMVs were isolated from *Salmonella* via explosive lysis and characterized using LPS and protein assays. Vesicle size was determined by dynamic light scattering. We analyzed DNA transfer using fluorescent ejection kinetics and electron microscopy.

In addition to DNA loaded OMVs, we observe phage particles that remain attached to the OMV surface. P22 binds to OMVs and injects its DNA into their lumen, generating DNA loaded vesicles. These OMVs exhibit distinct surface modifications after phage exposure, including alterations in O-antigen composition, and phage particles show divergent fates within the OMV batches.

Vesiculation occurs in response to stress caused by antimicrobial agents, toxic compounds or bacteriophage infection, and it contributes to intermicrobial communication. P22 uses the O-antigen of lipopolysaccharide as its receptor for DNA ejection. OMV phage interactions are particularly interesting: OMVs not only bind and inactivate phages, but they can also take up phage DNA. These findings highlight the important role of OMVs in influencing phage bacteria interactions.

Reference #1

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Reference #2

Reference #3

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