BACTERIAL PHYSIOLOGY

Release the vesicles

Gram-negative bacteria release membrane vesicles from sites of cell envelope remodelling during growth and division, according to a new paper that is available online in *Molecular Microbiology*.

The release of vesicles from the outer membrane (OM) is conserved in Gram-negative bacteria, yet little is known about the release process. Deatherage and colleagues were interested in determining the factors that control the biogenesis and release of membrane vesicles. They began by taking an inventory of the main protein constituents of the membrane vesicles that are released by *Salmonella* cells. Three main groups of proteins were identified: integral OM proteins, proteins connecting the OM to peptidoglycan (referred to as OM-PG proteins) and proteins that form membrane-spanning protein complexes linking the OM and peptidoglycan to the inner membrane (referred to as OM-PG-IM proteins).

In-frame deletions in each of the coding regions for these proteins were generated and the effects on vesicle release were quantified. Compared with the vesicles that are released from wild-type *Salmonella* cells, mutations targeting the integral membrane proteins had no effect on the size of the vesicles released or their localization. By contrast, mutation of the OM-PG and OM-PG-IM proteins altered both the size of the vesicles and the locations they were released from. So the size of membrane vesicles and their release locations is influenced by the abundance of specific proteins that have connective roles in the cell envelope. The importance of this connectivity was confirmed by further work which showed that complementation with truncated proteins lacking key domains involved in binding peptidoglycan or the inner membrane failed to restore the wild-type vesicle phenotype. Finally, by analysing the distribution of the vesicles released from septate and non-septate filamentous cells, Deatherage *et al*. found that in addition to the quantity and quality of envelope connections, the distribution of these connections also influences membrane vesicle protein content and site of nascent release.

Taken together, the authors propose a model in which membrane vesicles are not released as a result of random membrane instability but instead are released from areas of the cell envelope where cell growth and division lead to a temporary, localized decrease in the density of specific and highly conserved OM-PG and OM-PG-IM interconnections.

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