BACTERIAL PATHOGENESIS

Disruptive influence

Helicobacter pylori disrupts the polarity of epithelial cells to use the apical cell surface as a replicative niche, according to a recent paper in *PLoS Pathogens*.

H. pylori is found within 25 μm of the epithelial cell surface in the mucus layer that coats the epithelial lining of the stomach. In this highly specialized niche, *H. pylori* is found directly adhered to epithelial cells as well as in a motile planktonic population. Shumin Tan and colleagues were interested in how *H. pylori* interacts with the epithelial cell surface. Using time-course microscopy, they found that *H. pylori* microcolonies form at intercellular junctions and, using a live cell imaging system, they went on to show that these microcolonies are formed as *H. pylori* replicates directly on the epithelial cell surface.

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Polarized epithelial cells maintain distinct apical and basolateral environments. Using a cell-culture model that recreates these conditions, Tan *et al*. found that *H. pylori* can grow on the apical surface of polarized epithelial cells without disrupting epithelial cell integrity even when insufficient nutrients are supplied in the culture medium. Free swimming *H. pylori* cannot survive under these conditions, indicating that close contact with the host cell is required. As the *H. pylori* virulence factor CagA is injected into epithelial cells in a contact-dependent manner, the authors proposed that CagA might allow *H. pylori* to obtain nutrients directly from the epithelium. Many of the cellular effects of CagA — including loss of apical–basolateral polarity — are known, but how these effects benefit the bacterium has been largely unexplored.

By comparing the apical growth of wild type and CagA-deficient mutants in the absence of external nutrients, Tan *et al*. proved that CagA does indeed allow the bacterium to acquire nutrients directly from epithelial cells. The effect of CagA was found to be highly localized, as the addition of wild-type *H. pylori* did not rescue the growth of a CagA-deficient mutant in a mixed infection. Finally, Tan *et al*. found that the effect of CagA on host cell polarity is distinct from its effect on the integrity of the epithelial barrier and is a key factor in the ability of this mucosal pathogen to establish a replicative niche on the apical surface of polarized epithelial cells.

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ORIGINAL RESEARCH PAPER Tan, S., Tompkins, L. S. & Amieva, M. R. *Helicobacter pylori* usurps cell polarity to turn the cell surface into a replicative niche. *PLoS Pathog.* **5**, e1000407 (2009)