INSECT IMMUNITY

The *psidin* adventure

DOI:
10.1038/nri2030

A newly identified gene in *Drosophila melanogaster* acts in phagocytic blood cells where it has dual roles in the larval immune response, report Brennan and colleagues in *Current Biology*. The authors show that the gene *psidin* is required for the phagocytic degradation of internalized bacteria and for the induction of the antimicrobial-peptide gene *Defensin* in the fat body.

Similar to vertebrates, *D. melanogaster* has bactericidal phagocytes. These cells and the humoral immune response both contribute to the killing of invading bacteria. But do these systems work together? Brennan *et al*. focused on Defensin, which is expressed predominantly in the fat body following immune challenge. The fat body is the fly equivalent of the mammalian liver and white adipose tissue. It is distributed throughout the body of the fly and synthesizes most of the circulating proteins, including an array of antimicrobial peptides. The fly fat body is responsible for activating the humoral immune response. Defensin is expressed in the fat body of *D. melanogaster* at lower levels than other antimicrobial peptides, and seems to be more sensitive to perturbations of immune signalling.

The authors examined flies with mutations in the gene they identified and called *psidin*, and found that the induction of Defensin production was severely affected in these mutants. The induction of *Defensin* expression during infection required *psidin* expression in the phagocytic blood cells but not in the fat body itself. Further investigation led the authors to conclude that the activation of systemic antimicrobial responses in the fat body, in response to disseminated infection, requires phagocytic blood cells, as well as the function of *psidin*.

Brennan and colleagues next asked how mutations in *psidin* might affect the phagocytic function of the blood cells. Testing the ability of *psidin* mutant cells to engulf and degrade fluorescein-conjugated, heat-killed bacteria showed that although the mutant cells could readily engulf the particles, they failed to digest them. Further analysis showed that both internalization and degradation (two stages of phagocytosis) are required for the blood cells to stimulate the induction of *Defensin* expression in the fat body. Therefore, phagocytosis has a central role in activating immune responses in *D. melanogaster*.

So, phagocytic blood cells have a role in detecting infection and activating the immune response in *D. melanogaster*. The authors suggest that additional genetic studies into the induction of *Defensin* expression in *D. melanogaster* might be useful for analysing phagocytosis *in vivo* and how it links with immunostimulatory mechanisms.

Sharon Ahmad

ORIGINAL RESEARCH PAPER Brennan, C. A. *et al.* Psidin is required in *Drosophila* blood cells for both phagocytic degradation and immune activation of the fat body. *Curr. Biol.* **17**, 67–72 (2007)
FURTHER READING Hultmark, D. & Borge-Renberg, K. *Drosophila* immunity: is antigen processing the first step? *Curr. Biol.* **17**, R22–R24 (2007)