

Drosophila innate immunity: Another piece to the puzzle

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In the present study wildtypes of different origin were shown to be quite different in their behavior towards odors of different origin. Credit: Rickard Ignell

EPFL scientists have discovered a new receptor in the fruit fly immune system that detects bacterial infections. The finding opens up clues for our own immune responses.

Our immune system has two phases: innate and adaptive. The first phase, innate, refers to the immediate defense mechanisms such as skin, blood chemicals and certain types of [immune cells](#) that constantly fight off foreign organisms to keep them from infecting us. There has been much interest in understanding innate immunity, and much of that research is carried out using *Drosophila* flies, a type of fruit fly widely used in

biological and genetic research. EPFL scientists have now identified a new receptor that *Drosophila* flies use to fight off infections, adding a missing piece to the puzzle. The work is published in Immunity.

The study, led by Igor Iatsenko in the lab of Bruno Lemaitre at EPFL, found that the immune cells of *Drosophila* flies secrete a pattern-recognition receptor to detect foreign pathogens and turn the fly's immune system against them. The receptor belongs to a larger class of [receptors](#) that regulate *Drosophila*'s innate [immune response](#), and are collectively named "peptidoglycan recognition proteins" or PGRPs for short. Along with insects, PGRPs also exist in mammals.

PGRPs specialize in scavenging for a complex sugar-protein molecule called peptidoglycan, which is found abundantly on the so-called bacterial wall. When they detect peptidoglycans, the PGRPs send signals that activate various defenses of the [innate immune](#) system to fight off potentially threatening bacteria. However, some PGRPs act as bactericidals, attacking the bacteria directly.

Using an array of genetic and molecular biology techniques, the EPFL researchers, working with colleagues at the CNRS and Japan's National Institute of Genetics, were able to identify a new PGRP, as an integral part of *Drosophila*'s innate immunity. This particular protein is secreted from the fly's cells to scout their immediate environment for threats.

Once it binds it, the PGRP moves peptidoglycan to the cell surface of immune organs where it interacts with another recognition receptor. Then, the whole complex activates a cascade known as the "immune deficiency" pathway. This is a complex molecular cascade that produces various antimicrobial proteins that attack the invading bacterium. The authors of this study speculate that the existence of this secreted recognition receptor increases the sensibility of the fly immune system to bacterial infection.

The study adds another piece to the puzzle of *Drosophila* innate immunity, and gives further clues about our own. In fact, the authors draw a parallel between the secreted PGRP-SD and the well-known CD14 protein, which is a pattern recognition protein of the mammalian innate [immune system](#), and is implicated in a number of allergic and immune conditions.

More information: Igor Iatsenko, Shu Kondo, Dominique Mengin-Lecreulx, Bruno Lemaitre. PGRP-SD, an extracellular pattern-recognition receptor, enhances peptidoglycan-mediated activation of the *Drosophila* Imd pathway. *Immunity* 15 November 2016. [DOI: 10.1016/j.immuni.2016.10.029](#)

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