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Equipment matters

Max Planck Scientists Can Predict which Immune Cells Identify Invaders

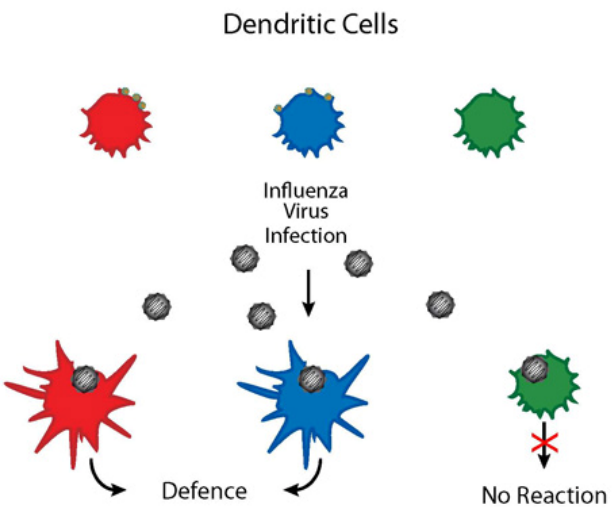
In order to defend ourselves from viruses, germs and parasites, the immune cells of our body are equipped with different defense systems. For the first time, scientists of the Max Planck Institute (MPI) of Biochemistry and the biotech company Bavarian Nordic GmbH in Martinsried near Munich, Germany, have now investigated the proteins of a highly specialized family of immune cells. "To our surprise, we discovered that not all the members of the dendritic cell family are able to detect pathogens such as viruses", explains Christian A. Luber, scientist at the MPI of Biochemistry. "We could predict this behavior only on the basis of their protein equipment." The work has now been published in *Immunity*.

The immune system is a complex system consisting of many different cell types. In order to fight invaders successfully, it is necessary to coordinate all these cells carefully. The decision about which cell type is used for which infection and in which way, is made by a highly specialized family of immune cells: the dendritic cells.

Like cellular police officers, dendritic cells sit in tissues such as the skin, waiting for invaders. When they encounter one of these, they absorb all the information about the invader. Afterwards, they move towards the lymph nodes, where they present the information like a mug shot to other defense cells. Then, the directed immune response can begin. "Dendritic cells are so to speak cells of a general's rank that indicate to other troops the direction for combating an infection", illustrates Christian A. Luber. "It is because of this leading role, they are so interesting for us."

Until now, scientists have supposed that each dendritic cell is able to detect viruses. But the results of the Research Department Proteomics and Signal Transduction, headed by Matthias Mann, show that only specific members of the dendritic cell family possess the essential protein equipment for viral sensing.

In collaboration with the Bavarian Nordic GmbH, this result could be confirmed. The scientists infected dendritic cells with various viruses, including influenza viruses, and observed that one specific member of the dendritic cell family did not show any reaction. It does not have the proteins which are necessary to identify the virus. "It has already been known for some time that dendritic cells are aware of such a thing as division of labor. We were very surprised that this also applies to something as fundamental as the detection of influenza viruses", says Christian A. Luber. "Our results could help to understand the complex mechanisms of the immune system even better."



Original Publication:

C. A. Luber, J. Cox, H. Lauterbach, B. Fancke, M. Selbach, J.Tschopp, S. Akira, M. Wiegand, H. Hochrein, M. O'Keeffe, M. Mann: Quantitative proteomics reveals subset-specific viral recognition in dendritic cells. *Immunity*, February 18, 2010.

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