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Infant infections: Development of the immune system in the gut of children

Immune cells equipped to eliminate cells infected with viruses are present in the guts of children already at birth

Hamburg. A team of scientists from the Department "Virus Immunology" at the Heinrich Pette Institute, Leibniz Institute for Experimental Virology (HPI) has investigated the maturation of the immune system in the gut of children during the first year of life. The results have now been published in the renowned journal "Nature Communications".

Children are more at risk of infections with viruses than adults. Viruses predominantly enter the body at mucosal sites such as the gut or lung. Immune cells are required to defend the body against viruses. In contrast to adults, little is known regarding the immune cells present in the gut of young children. Researchers of the HPI Department "Virus Immunology" under the leadership of Dr. Madeleine Bunders have now investigated this question.

The study published in the renowned journal "Nature Communications" shows that rapid changes take place in immune cell populations in the gut of children during the first year of life. At birth, natural killer (NK) cells, which are innate immune cells, are present in the guts of children. After birth, T cells, which are part of the adaptive immune system, replace NK cells, resulting in a mature gut immune system as observed in adults.

"Our results demonstrate that the main population of innate lymphocytes in the intestine of infants are NK cells", explains Adrian Sagebiel, first author of the publication and MD student at the HPI.

"We can now explore how to exploit these NK cells to improve control of viral infections in children", adds Dr. Dr. Madeleine Bunders, head of the study.

This study, led by the Heinrich Pette Institute, was conducted in close cooperation with the University Hospital Hamburg-Eppendorf (UKE) and the Amsterdam University Medical Center of the University of Amsterdam. The research work was supported by the German Research Foundation (DFG) with funds from the SFB841 and by the Daisy Huët Röell Foundation.

The results were published in the journal "Nature Communications":

Adrian F. Sagebiel, Fenja Steinert, Sebastian Lunemann, Christian Körner, Renée R.C.E. Schreurs, Marcus Altfeld, Daniel Perez, Konrad Reinshagen & Madeleine J. Bunders (2019). ***Tissue-resident Eomes⁺ NK cells are the major innate lymphoid cell population in human infant intestine.*** Nature Communications, 2019 Feb 28.

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Heinrich Pette Institute, Leibniz Institute for Experimental Virology

The Heinrich Pette Institute, Leibniz Institute for Experimental Virology (HPI) investigates the biology of human pathogenic viruses with the aim of unraveling the molecular mechanisms that control viral life cycles and virus induced pathogenesis. The institute applies basic experimental research to develop new approaches for contemporary treatments of viral infections such as AIDS, influenza and hepatitis but also of emerging viral diseases.

The HPI was established by the philanthropist Philipp F. Reemtsma and the neurologist Heinrich Pette in 1948. The institute is a non-profit, independent research foundation that is part of the Leibniz Association.

Further information: www.hpi-hamburg.de