

Key difference in immune cells may explain children's increased susceptibility to illness

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Schools are commonly known as breeding grounds for viruses and bacteria, but this may not necessarily be linked to hygiene. New research in mice shows that because their immune systems do not operate at the same efficiency as adults, children may not only be more likely to



contract a viral infection, but they also take to longer clear it. Specifically, the study examined how CD4 T-cells (immune cells that play a key role in fighting viral infections) respond to influenza, and found that children's immune systems may not yet be able to make enough antibody molecules to rid their lungs of the influenza virus as quickly as adults. These findings were reported in the July 2016 issue of the *Journal of Leukocyte Biology*.

"Our hope is that by understanding the key differences in the immune responses of <u>young children</u>, we may be able to develop better ways to bolster their immunity toward the common pathogens that affect their population," said David E. Verhoeven, Ph.D., a researcher involved in the work from the College of Veterinary Medicine at Iowa State University in Ames, Iowa. "More importantly, this knowledge may have us consider new designs of current vaccines, since adult and children's immune systems may respond to them in different ways."

To make this discovery, scientists used two groups of mice to model the effects of influenza infection in young children and adults. The first group was 21 days old, and the other group was 8-10 weeks old. Both groups were infected with influenza virus, strain H1N1. Researchers then compared their immune responses to the infection. They found that CD4 T-cells in young mice secreted a key antiviral cytokine, interferon gamma, at significantly lower levels than adult CD4 T-cells. These lower levels of interferon gamma led to higher rates of CD4 T-cell death during an infection. Because CD4 T-cells are involved in antibody production, the young mice were unable to mount a strong enough immune response to clear the virus from their lungs until very late.

"Anyone with young children knows that they bring home all sorts of germs and infections, and in fact, children can be a major source of epidemiological spread of some infections," said John Wherry, Ph.D., Deputy Editor of the Journal of Leukocyte Biology. "These new data are



important because they start to point at key immune mechanisms that operate differently at young ages that might allow delays in viral clearance which could translate to longer ability to transmit such infections to new hosts."

More information: D. Verhoeven et al, Control of influenza infection is impaired by diminished interferon- secretion by CD4 T cells in the lungs of toddler mice, *Journal of Leukocyte Biology* (2016). DOI: 10.1189/jlb.4A1014-497RR

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