

# Microbes help children to breathe easily

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The incidence of asthma among children in Europe continues to rise. But not all children are equally at risk. Several studies published over the past few years have shown that children living on farms are significantly less likely to develop asthma than others.

An international team of researchers including Dr. Markus Ege and Professor Erika von Mutius of Children's Surgical Clinic in the Dr. von Hauner Children's Hospital (Medical Center of the University of Munich, Germany) has just published an epidemiological study that confirms this finding. It shows that the lower susceptibility of farm children to asthma can largely be accounted for by the fact that they are exposed to a greater variety of microorganisms than other children living in the same regions. The physiological mechanisms underlying the effect remain to be elucidated, but the investigators have identified several species that might be responsible for the reduction in asthma risk. The results have broad implications for the prevention of asthma in other sectors of the population. "We have a long way to go before we can present new preventive measures, but at least we now have candidates for the development of a vaccine," says Ege. ([New England Journal of Medicine](#) online, 24 February 2011)

Asthma is among the most prevalent [chronic illnesses](#) among children in Europe, and in many cases the condition will remain with them all their lives. This is why asthma presents such a challenge for health-care systems. The disease results from a combination of genetic and [environmental factors](#), and various studies have shown that farm children have a significantly lower risk of developing the condition than other

children. In order to identify the reasons for this difference, LMU researchers selected a group of Bavarian schoolchildren for detailed study. In the context of two large-scale, pan-European, epidemiological projects, named GABRIEL and PARSIFAL, Ege and his colleagues compared children living on farms with others from the same rural districts who had little direct contact with farms.

In the new work, the investigators focused on the microbes present in domestic interiors. They collected household dust from children's bedrooms, and analyzed the bacterial and fungal DNAs in the samples. The results showed that farm children must cope with a much greater range of microorganisms than are children who live in other types of environment. The bacteria and fungi seem to act as guardians of health, for it turned out that the more diverse the microbial population, the lower the risk of asthma. Exactly how the cells and spores perform this trick is still unclear, but the researchers suggest a couple of possible explanations. "One possibility is that a particular combination of microbial species stimulates the innate immune system and so prevents it from entering a state that promotes the development of asthma," says Ege. Another model proposes that continuous exposure to many different microorganisms makes it more difficult for the species that potentially induce asthma to become the dominant forms in the lower respiratory tract - similarly to the gastrointestinal tract, where a balanced population of microbes is necessary for optimal organ function.

Microbial diversity alone, however, is not enough to prevent asthma. More probably, it takes a particular consortium of species to exert a protective effect. "Within the large spectrum of organisms that we examined, there are some that may be of special interest," reports Ege. "Among these are certain species of bacilli and staphylococci - *Staphylococcus sciuri*, for instance - as well as fungi of the genus *Eurotium*." The next challenge facing the team is to elucidate, at the level of single species, the nature of the link between the

microorganisms in household dust and the protective effect, with the long-term goal of identifying candidates that might serve as the basis of a live vaccine against [asthma](#).

**More information:** "Exposure to Environmental Microorganisms and Childhood Asthma", Markus J. Ege et.al. *New England Journal of Medicine* online, 24 February 2011

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