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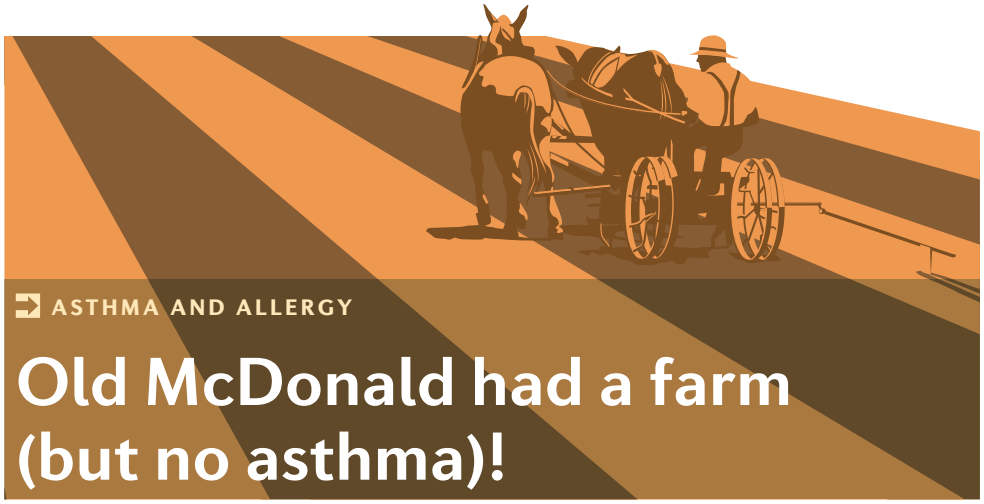

S. Bradbrook/NPG

ASTHMA AND ALLERGY

Old McDonald had a farm (but no asthma)!

> exposure to an environment rich in microorganisms protects against asthma

In addition to genetic factors, environmental exposures can influence the development of asthma and allergic disease, as exemplified by epidemiological data showing protection from these diseases in children raised on traditional dairy farms in Central Europe. However, little is known about the effect of traditional farming environments on the immune system. In a study published in *The New England Journal of Medicine*, new data shows that a protective farm environment affects asthma susceptibility by modulating the innate immune response.

The study examined environmental exposures and immune profiles in 60 Amish and Hutterite schoolchildren. These farming populations were chosen as they are of similar ancestry, remain reproductively isolated and have similar lifestyles but have different farming practices and prevalence of asthma: the Amish follow traditional farming practices and have an asthma prevalence of 5.2%, whereas the Hutterites use industrialized farming practices and have an asthma prevalence of 21.3%.

Endotoxin levels in airborne dust were 6.8 times higher in the Amish homes compared with Hutterite homes. Similar differences in the composition of bacteria in mattress dust were observed, suggesting that Amish children are exposed to higher levels microbial products in their home.

Further analysis showed that Amish children have significantly higher levels of circulating neutrophils and significantly lower levels of circulating eosinophils than Hutterite children. Surface receptor expression analysis indicated that the neutrophils in Amish children were immature and may have recently emigrated from the bone marrow due to repeated microbial stimulation. Furthermore, monocytes from Amish children, but not Hutterite children, expressed markers of a suppressive phenotype. Finally, a comparison of gene expression profiles in peripheral blood leukocytes revealed that crucial innate immune pathways were activated in Amish children at baseline.

Using a mouse model of airway sensitization, the authors showed that house dust from Amish homes, but not Hutterite homes, provided robust protection against the development of experimental asthma. This protective effect was reduced in mice lacking the innate immune adaptor molecule MYD88 and was completely abrogated in mice lacking both MYD88 and TRIF.

These data from human and mice support the concept that exposure to an environment rich in microorganisms protects against asthma through effects on the innate immune system.

Olive Leavy

ORIGINAL ARTICLE Stein, M. M. *et al.* Innate immunity and asthma risk in Amish and Hutterite farm children. *New Eng. J. Med.* **375**, 411–421 (2016)