

Scientists identify new role for lung epithelial cells in sensing allergens in the air

March 30 2009

Researchers at the National Institute of Allergy and Infectious Diseases (NIAID), part of the National Institutes of Health, and at Ghent University in Ghent, Belgium, have identified a new role for certain lung cells in the immune response to airborne allergens. Many foreign substances, called antigens, are inhaled daily, but the lungs have mechanisms that usually prevent people from making unwanted immune responses to these materials.

Sometimes, however, immune responses are generated to these substances, resulting in allergic responses and asthma. Scientists have been working to understand what triggers these undesirable airway responses.

In this new study, conducted in mice, scientists discovered that special sensors called Toll-like receptors (TLRs), which dot the surface of [epithelial cells](#) that line the lungs, detect the presence of antigens and produce signals that activate [immune cells](#). The researchers observed that a particular TLR, TLR4, promoted allergic airway responses to antigen mixtures containing bacterial material or a very common allergen from house dust mites.

Previously, it was unclear whether TLRs on non-immune epithelial cells at mucosal surfaces such as those in the lungs were involved in antigen sensing, or if it was TLRs found on immune cells in these areas that were critical to these allergic responses. The research team observed that TLR4 on airway epithelial cells, not on immune cells, helped induce the

initial [immune response](#) to antigens in the lungs. Eliminating TLR4 or blocking TLR4 function on the airway epithelial cells reduced the recruitment of immune cells to the lungs and the development of allergic disease.

This study demonstrates that TLR4 found on non-immune cells in the lungs contributes to the immune response to airborne antigens. The new results suggest that targeting TLRs may be a research avenue for developing novel treatments for allergic diseases such as asthma.

More information: H Hammad et al. House dust mite allergen induces asthma via Toll-like receptor 4 triggering of airway structural cells. *Nature Medicine*. DOI:10.1038/nm.1946 (2009).

Source: NIH/National Institute of Allergy and [Infectious Diseases](#) ([news](#) : [web](#))

Citation: Scientists identify new role for lung epithelial cells in sensing allergens in the air (2009, March 30) retrieved 2 May 2024 from <https://medicalxpress.com/news/2009-03-scientists-role-lung-epithelial-cells.html>

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