

Our genes dictate who develops an allergy

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Credit: Medical University of Vienna

Whether or not you develop an allergy is largely dependent upon genetic factors. This is the main finding of a study recently published in *EBioMedicine*, just in time for World Allergy Week. The study was supervised by Winfried F. Pickl from MedUni Vienna's Institute of Immunology. The Vienna researchers were able to show that the gene

HLA-DR1 and allergen-specific, reactive T-cells play a major role in the development of an allergy to mugwort, for example – assuming, of course, that one is exposed to the source of the allergen.

It has long been suspected that HLA molecules are generally very significant in autoimmune diseases, chronic infections and allergies. In the recent study, the MedUni Vienna researchers demonstrated for the first time that, in four mouse models, only mice with the HLA-DR1 gene were capable of developing an [allergy](#) to mugwort. If, at the same time, allergen-specific, reactive T-cells outnumbered regulatory T-cells, "the result was an explosive attack of asthma and formation of pathogenic, allergen-specific immunoglobulin E," explains Pickl. The mugwort allergens were administered via the airways, as would normally occur in humans.

Such accurate proof could only be provided, because the MedUni Vienna research group used so-called humanised mice. Pickl explains: "These are animals that carry a human T-cell receptor specific to the allergen and that also have human HLA molecules (note: in this case HLA-DR1) on their antigen-presenting cells. Our new [model](#) is therefore the first model to reflect the human situation."

The MedUni Vienna immunologists were further able to show that giving the T-cell growth factor interleukin-2 helps to stimulate regulatory T-cells, preventing the development of allergic asthma.

Vaccination against allergies is the vision

"We therefore now know how the allergy develops in the system at a molecular level, so that we will be in a better position to intervene both preventively and therapeutically in future," says Pickl. That would open up huge opportunities in the future for vaccinating people against allergies, even on a preventive basis in risk groups, just like regular

vaccinations. By identifying HLA together with an Allergy Chip test, it would therefore be possible to test infants to determine their future risk of developing allergies and, if necessary, take therapeutic measures at an early stage. "The model described in the recent study is specific to the main allergens from mugwort but we are working on developing similar model systems for all allergies."

More information: Alina Neunkirchner et al. Genetic restriction of antigen-presentation dictates allergic sensitization and disease in humanized mice, *EBioMedicine* (2018). [DOI: 10.1016/j.ebiom.2018.04.001](https://doi.org/10.1016/j.ebiom.2018.04.001)

Provided by Medical University of Vienna

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