Medical Xpress

Why some people react to contact allergens more quickly than others

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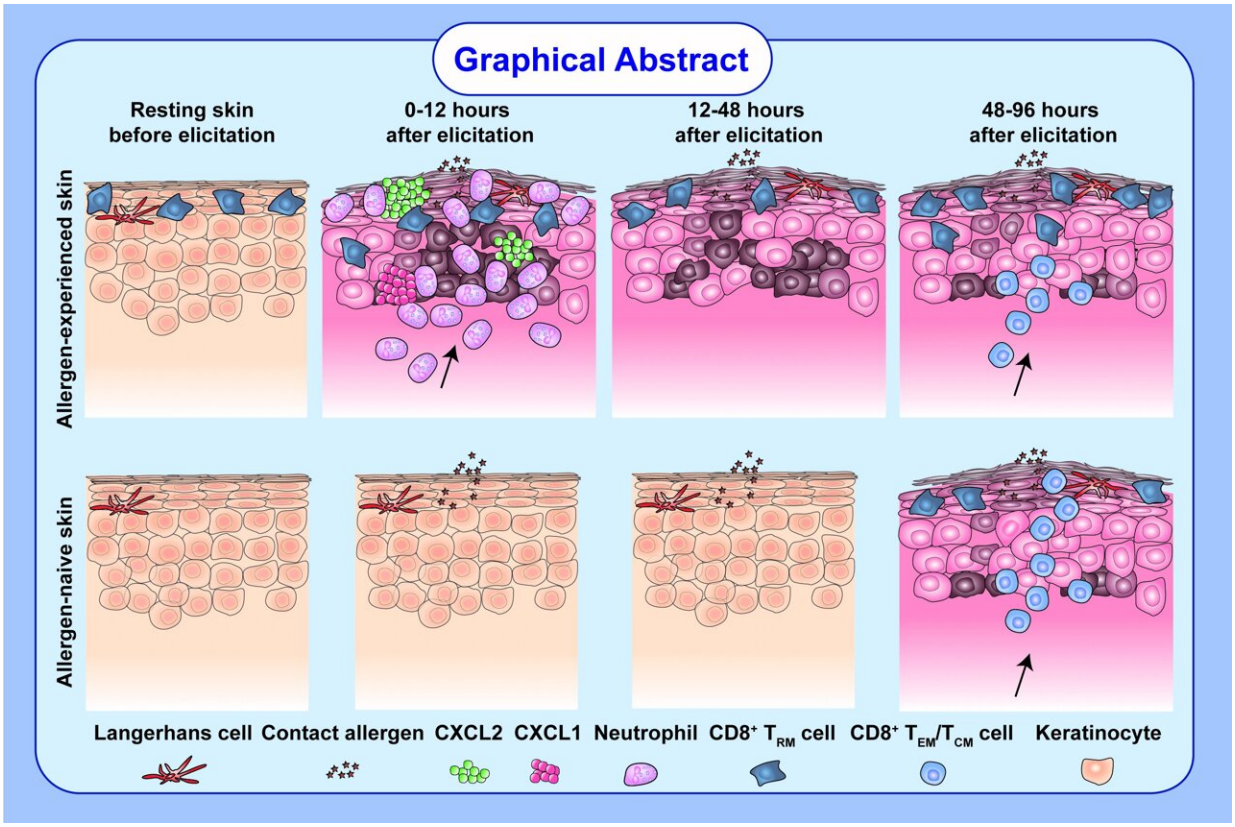

This illustrations shows how the skin early skin reactions happen in the new subcategory. Illustration by Anders B. Funch.

Hair dye, perfume, jewelry. Beautifying to most, but for some they are equivalent to rashes, irritation and reduced quality of life. Together with

hay fever and food allergies, allergic contact dermatitis due to exposure to e.g. nickel and perfume ingredients represents the majority of allergic reactions seen among Danes.

Traditionally, researchers have distinguished between immediate and delayed allergic reactions, depending on which parts of the immune system that is responsible for the reaction; e.g., hay fever and food allergies are immediate forms that cause immediate symptoms, whereas it can take days before the skin reacts to things like nickel and perfume. But now a new study conducted by the LEO Foundation Skin Immunology Research Center at the University of Copenhagen changes this understanding.

"Some patients develop allergic contact dermatitis at a much earlier stage than described by text books. The aim of the study was therefore to try to determine why some react to contact allergens much faster than prescribed. It turns out that when a part of the skin is exposed to the allergen for the first time, the cells within that specific skin area will develop local memory towards the contact allergen. And then when the same area is re-exposed to the allergen at a later point in time, the patient will develop a clear reaction within only 12 hours," explains Ph.D. Student and first author of the study Anders Boutrup Funch.

It is the T cells in the body that are responsible for delayed allergic reactions—also known as type 4 allergic reactions. But in the new study conducted on mice, the researchers have shown that the T cells are capable of building a sophisticated memory that enables them to respond more quickly than previously assumed. This gives us a more complex picture of contact allergy.

"We point to a need for clarification of this disease. Type 4 reactions should be subcategorised, giving us both the classic delayed reaction—that is, where the patient reacts 24-72 hours after

exposure—and an immediate reaction, where the patient develops symptoms much faster. Based on these results, we may have to change the text books on contact allergy. At any case, we will need to add a chapter," says the main author of the study, Professor Charlotte Menné Bonefeld.

The study also reveals that activation of the memory T cells following exposure to an allergen leads to massive recruitment of the most abundant type of white blood cells in the body—the so-called neutrophils—to the affected part of the skin. Normally, neutrophil recruitment is used to fight infections, as these cells are capable of effectively eliminating microorganisms. At the same time, they cause intense infection and local tissue damage, which is what the patients experience as a rash. Neutrophil recruitment is not seen in connection with delayed reactions to contact allergens.

The next step in the research is to test the study results on humans. Once a person has developed contact allergy, they are likely to suffer from it for the rest of their lives. Therefore, the researchers behind the study hope the new knowledge may improve contact allergy patients' chances of getting treatment in the future.

"First and foremost, we need to tell the world that we have new knowledge which should change our understanding of the disease," Anders Boutrup Funch concludes.

More information: Anders B. Funch et al, CD8 + tissue-resident memory T cells recruit neutrophils that are essential for flare-ups in contact dermatitis, *Allergy* (2021). DOI: 10.1111/all.14986

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