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Skin allergies: New database helps develop non-animal test methods

Before they are marketed, chemical substances must be tested for possible adverse health effects. Ideally, the test methods used should not involve animal experiments. This also applies to the question of whether a substance can cause skin allergies. A team of researchers from the Federal Institute for Risk Assessment (BfR) and the US NICEATM (National Toxicology Program Interagency Center for the Evaluation of Alternative Toxicological Methods), together with other US colleagues, has now published a comprehensive database on allergic skin reactions. It contains results of corresponding tests on human test subjects. With this information as a benchmark, it is possible to check and improve the accuracy of new non-animal methods. The researchers report this in the scientific journal "Archives of Toxicology" (<https://link.springer.com/article/10.1007/s00204-023-03530-3>).

For the database, the scientists evaluated a total of 1555 publications and reports on skin tests. It was also necessary to check the scientific quality of the studies, some of which were decades old, and to classify them. Now 1366 chemical substances are listed, of which, depending on the test method, every third to fourth caused allergic reactions in the test. Also listed is information on substance identity and chemical structure. The database is freely accessible: (<https://ntp.niehs.nih.gov/whatwestudy/niceatm/test-method-evaluations/skin-sens/hppt>)

The hallmark of an allergic skin reaction caused by a chemical (allergic contact dermatitis) is an itching, sometimes painful inflammation. This is always preceded by previous contact with the substance that has sensitised the affected person and is the trigger of the allergy. In order to recognise such substances in time, tests are traditionally carried out on mice and guinea pigs. In the corresponding tests on humans, a small section of skin is first repeatedly exposed to a chemical compound. After a longer period of time, the substance is applied again to check whether an allergy can be triggered.

Scientific as well as ethical concerns are leading to an increasing move away from such experiments on mice and humans ("in vivo"). Alternatives are, for example, experiments on cell and tissue cultures ("in vitro") and computer calculations ("in silico"). Combinations of these methods are also possible ("defined approaches"). To prove their reliability, they must

be compared with information from in vivo studies that have already been carried out. The goal is that non-animal tests can predict possible adverse effects of chemicals with comparable accuracy. Extensive and independently reviewed and maintained reference databases such as the one presented here play a key role in this.

Further information:

<https://factor.niehs.nih.gov/2023/10/science-highlights/chemical-safety-testing-database>

About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the Federal States on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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