Peanut allergy vaccine to rewrite the immune system

December 6 2019

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Peanut allergies could become a thing of the past as breakthrough research from the University of South Australia develops a radically novel vaccination that's poised to cure the potentially life threatening

condition.

The vaccine uniquely uses a virus-based platform to rewrite the body's natural response to peanut allergens, causing it to elicit a non-allergic immune response in lieu of an allergic one.

Developed in partnership with Biotechnology company, Sementis and UniSA's Experimental Therapeutics Laboratory, the vaccine has the potential to help millions of people. Now, funding from the Channel 7 Children's Research Foundation will help evaluate the efficacy of the vaccine in humans.

Peanut allergies occur when the immune system mistakenly identifies peanuts as an allergen signalling immune cells to release chemicals resulting in adverse reactions that can range from mild hives, cramps, nausea and vomiting to life threatening anaphylactic reactions that require immediate medical attention. Severe allergic reactions can include impaired breathing, swelling in the throat, a sudden drop in blood pressure, dizziness, and even death.

Globally, the incidence of food allergies and related life-threatening anaphylaxis is increasing, with the World Allergy Organization reporting 220-550 million people are affected.

Peanuts are one of the most common food allergies and the most likely food to cause anaphylaxis or death. In Australia, there is particularly high prevalence of peanut allergies with one in 200 adults, and almost three in every 100 children affected.

Project lead, Dr. Preethi Eldi says the new peanut allergy vaccine has great potential to change lives.

"The impact peanut allergy can have on a family is all-consuming,

especially given the very real risks to a child's heath," Dr. Eldi says.

"Parents are constantly protecting their child from being exposed to peanuts in all forms—from popular breakfast cereals and school snacks, to biscuits, cakes and even health foods—whether at home, school, or in social situations. And, it means being vigilant and imposing very stringent dietary restrictions, not only for the child, but often, also for family members.

"If we can deliver an effective peanut allergy vaccine, we'll remove this stress, concern, and constant monitoring, freeing the child and their family from the constraints and dangers of peanut allergy."

The new peanut allergy vaccine is formulated by packaging bits of peanut proteins into the Sementis Copenhagen-vectored (SCV) virus platform. SCV is a ground-breaking technology developed by Dr. Paul Howley, Chief Scientific Officer, Sementis and UniSA's Professor John Hayball, Head of UniSA's Experimental Therapeutics Laboratory.

Prof Hayball says the peanut allergy vaccine tricks the immune system into seeing peanut allergens in a new light, so that the body responds normally instead of generating an allergic reaction.

"We're effectively reprogramming the body to see peanuts as an entity that can be cured by a vaccine, rather than an allergen that elicits an allergic reaction," Prof Hayball says

"Already, the vaccine is showing signs of success, shifting peanut-specific immune responses in mouse models of peanut allergy, and in preliminary in vitro vaccination-like studies using human blood samples from clinically-confirmed peanut allergic people.

"The next steps are to gain further human samples and confirm the

efficacy of the vaccine. This will demonstrate human translational capacity and will significantly increase the chances of success in future clinical trials."

Dr. William Smith, Head of the Clinical Immunology and Allergy unit at the Royal Adelaide Hospital and lead clinician involved in the study, says that despite global efforts and several other ongoing clinical trials, the development of immunomodulatory therapeutics is proving extremely challenging.

"There are varying degrees of 'clinical' desensitisation of peanut allergy, but to date, none have succeeded in safely and completely eradicating peanut allergy," Dr. Smith says.

"An effective vaccine for use in peanut allergy must be safe to administer with minimal adverse events, have a short immunisation schedule to improve compliance specifically with peanut allergic children and, most importantly, induce life-long protection.

"The preliminary data is encouraging and favours that the vaccine can meet all these criteria. It's very exciting research and we are very positive to take the next step into what we hope will be a cure for peanut allergy."

Provided by University of South Australia

Citation: Peanut allergy vaccine to rewrite the immune system (2019, December 6) retrieved 16 April 2024 from https://medicalxpress.com/news/2019-12-peanut-allergy-vaccine-rewrite-immune.html

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