

Gene therapy could 'turn off' severe allergies

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Associate Professor Ray Steptoe. Credit: The University of Queensland

A single treatment giving life-long protection from severe allergies such as asthma could be made possible by immunology research at The University of Queensland.

A team led by Associate Professor Ray Steptoe at the UQ Diamantina Institute has been able to 'turn-off' the immune response which causes allergic reaction in animals.

"When someone has an allergy or asthma flare-up, the symptoms they experience results from [immune cells](#) reacting to protein in the allergen," Professor Steptoe said.

"The challenge in asthma and allergies is that these immune cells, known as T-cells, develop a form of immune 'memory' and become very resistant to treatments.

"We have now been able 'wipe' the memory of these T-cells in animals with gene therapy, de-sensitising the immune system so that it tolerates the protein.

"Our work used an experimental asthma allergen, but this research could be applied to treat those who have [severe allergies](#) to peanuts, bee venom, shell fish and other substances."

Dr Steptoe said the findings would be subject to further pre-clinical investigation, with the next step being to replicate results using human cells in the laboratory."

"We take [blood stem cells](#), insert a gene which regulates the allergen protein and we put that into the recipient.

"Those engineered cells produce new blood cells that express the protein and target specific immune [cells](#), 'turning off' the allergic response."

Dr Steptoe said the eventual goal would be a single injected [gene therapy](#) , replacing short-term treatments that target [allergy](#) symptoms with varying degrees of effectiveness.

"We haven't quite got it to the point where it's as simple as getting a flu jab, so we are working on making it simpler and safer so it could be used across a wide cross-section of affected individuals," Dr Steptoe said.

"At the moment, the target population might be those individuals who have [severe asthma](#) or potentially lethal food allergies."

Dr Steptoe's research has been funded by the Asthma Foundation and the National Health and Medical Research Council.

Asthma Foundation of Queensland and New South Wales Chief Executive Officer Dr Peter Anderson said more than two million Australians have asthma, and current statistics show that more than half of those are regularly burdened with symptoms of the disease.

"Even though there are effective treatments available for the vast majority, patients face a number of obstacles and challenges in their self-management practices," Dr Anderson said.

"The Foundation welcomes the findings of this research and looks forward to a day in the future when a safe one-off treatment may be available that has the potential to eliminate any experience of [asthma](#) in vulnerable patients."

The research is published in *JCI Insight*.

More information: Jane AL-Kouba et al, Allergen-encoding bone marrow transfer inactivates allergic T cell responses, alleviating airway inflammation, *JCI Insight* (2017). [DOI: 10.1172/jci.insight.85742](https://doi.org/10.1172/jci.insight.85742)

Provided by University of Queensland

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