

Parasites clue to why allergies are more common in developed countries

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Credit: University of Nottingham

A molecular mechanism which could explain why allergies are more common in developed countries has been discovered by researchers at The University of Nottingham.

The experts in parasitology from the School of Life Sciences report in the journal *Immunology* that this finding could lead to new immunotherapies to prevent allergies.

Allergies are known to be much more prevalent in Western populations but up to now why this is the case has been a mystery. One popular theory is the hygiene hypothesis, which suggests that our immune systems need to come into contact with a range of micro-organisms at a young age to produce appropriate immune responses later in life.

"Allergies are a type of inappropriate immune [response](#), where our

bodies misidentify a harmless substance as a threat," said study author Dr Joseph Igetei who carried out the research at Nottingham.

"We know that parasitic worm infections occur more frequently in less developed countries, in places where allergies are rare. Although it's been suggested that worm infections could prevent allergy, there has been little concrete evidence of the potential molecular mechanisms that might mediate any such relationship."

The research team led by Professor Mike Doenhoff from The University of Nottingham, and including Dr Marwa El-Faham from Alexandria University and Dr Susan Liddell set out to discover if the antigens produced by a common species of parasitic worm that infects humans (called *Schistosoma mansoni*) were cross-reactive to antigens from peanuts, i.e. do the proteins from the worm and from the peanuts trigger the same immune response?

Antibodies are a type of immune protein made by the body to provide a tailored response to any substance deemed to be a threat so the team used antibodies from rabbits that had been exposed to various life stages of the worm. The researchers tested if these antibodies (which had been produced specifically against the [parasitic worm](#)) also reacted to various proteins found in peanuts.

They found that the antibodies responded to several proteins in the peanut, in particular one called Ara h 1, which is known to be a key player in inducing the negative response in people who are allergic to peanuts.

Co-author Professor Michael Doenhoff said: "It may sound strange that peanuts and worms have anything in common that could cause the [immune system](#) to generate the same response. However, our work indicates that proteins from these two seemingly very different

organisms actually have identical markers on them, meaning the immune system views them in the same way and targets them with the same antibody."

The findings are important in two ways. Firstly, this work goes some way to explaining the [molecular mechanisms](#) behind the observation that countries with a high incidence of [worm infections](#) have a low incidence of [allergy](#). Although more work is needed to confirm the exact relationship, the team think that antibodies produced in response to a worm infection could stop the immune system from producing an allergic reaction when faced with a novel substance such as peanut protein. Secondly, this work opens up new therapeutic avenues to explore to treat allergies using immunotherapy. The team's next step is to see if antibodies produced by humans in response to a worm infection also cross-react with peanut proteins.

Provided by University of Nottingham

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