

Allergy is the price we pay for our immunity to parasites

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New findings, published in *PLOS Computational Biology*, help demonstrate the evolutionary basis for allergy. Molecular similarities in food and environmental proteins that cause allergy (such as pollen), and multicellular parasites (such as parasitic worms), have been identified systematically for the first time.

A study led by Dr Nicholas Furnham (London School of Hygiene & Tropical Medicine), supports the hypothesis that allergic reactions are a flawed antibody response towards harmless environmental allergens.

It is thought that part of our immune system has evolved to combat and provide immunity against infection by parasitic worms. However, in the absence of parasitic infection, this same arm of the immune system can become hyper-responsive and mistakenly target allergenic proteins in food or the environment. This results in an unregulated allergic response, which can sometimes be lethal.

The researchers used computational techniques to predict which proteins in <u>parasitic worms</u> would cause an immune response similar to an allergic reaction in humans. Their experimental studies supported these predictions and, for the first time, they identified a protein in a parasitic worm that is similar to a protein that was previously thought to be encoded only in the genomes of plants. This protein is one of the most common proteins in <u>pollen</u> that causes allergy in humans.

The study provides tools that will make it easier for scientists to predict



proteins in food and the environment that are likely to cause allergy, and to design protein molecules for treating allergy.

Dr Furnham said: "Our findings address an outstanding question: what makes an allergen an allergen? We've shown that the off-target effects of the immune system in allergy are due to the significant molecular similarities we have identified between environmental allergens and parasitic worm proteins. The findings demonstrate that <u>allergy</u> is the price we pay for having immunity to parasites."

More information: Tyagi N, Farnell EJ, Fitzsimmons CM, Ryan S, Tukahebwa E, Maizels RM, et al. (2015) Comparisons of Allergenic and Metazoan Parasite Proteins: Allergy the Price of Immunity. *PLoS Comput Biol* 11(10): e1004546. DOI: 10.1371/journal.pcbi.1004546

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