

LETTER TO THE EDITOR

Iran J Allergy Asthma Immunol
June 2011; 10(2): 139-140.

**Quercetin as a Potential
Anti-Allergic Drug: Which
Perspectives?**

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Received: 16 January 2011; Accepted: 17 February 2011

ABSTRACT

Flavonoids polyphenolic compounds that exert many anti-inflammatory and anti-microbial effects, and exhibit an anti-allergic action. Quercetin is a flavonoids that recently has raised many issues and shown evidence about its action as a potential drug to allergy. A Chinese herbal formula, known as Food Allergy Herbal Formula (FAHF) has been related with blocking of anaphylaxis to peanuts (PNA) in mouse models. Quercetin appears to possess the same potential of FAHF as a safe anti-allergic substance but it opens only a wide perspective, at the moment, due to several complex issues that hamper the possibility to use natural medicine and phytochemicals as true drugs.

Key words: Flavonoids; Natural Medicine; Peanut Allergy; Polyphenols; Quercetin

LETTER

The recent article by Farideh Shishehbor and colleagues on one of the latest issues of this journal contributes to expand the debate about the anti-allergic and anti-inflammatory properties of plant-derived flavonoids by reporting the effect of quercetin on peanut sensitized rats.¹ Flavonoids are well known natural polyphenolic compounds which exert many anti-inflammatory and anti-microbial effects.²

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Peanut allergy (PNA) is considered one of the major leading cause of anaphylaxis due to food allergy; actually, food-induced anaphylactic reaction is the most common reason for a person to present to an emergency department for treatment of this life-threatening hypersensitive reaction. Avoiding the allergenic food is the only currently available method for sensitized patients to prevent further reactions but strict avoidance of specific foods, however, though is an accepted treatment of food-induced allergic reactions, is often an unrealistic therapeutic strategy for the treatment and prevention of food-induced vaccination with immuno-stimulatory DNA sequences, and anti-immunoglobulin E-therapy.³ There has been recent advances in the understanding of the immunological mechanisms underlying allergic disease and better characterization hypersensitivity reactions. Desirable therapeutic strategies for the treatment and prevention of the food allergies must be safe, relatively inexpensive, and easily administered. Several different forms of immuno-modulatory therapies are currently under investigation: peptide immunotherapy, mutated protein immunotherapy, allergen DNA immunization, food allergens and natural compounds have greatly expanded the potential therapeutic option for future use.⁴ A Chinese herbal medicine, known as Food Allergy Herbal Formula (FAHF),⁴ has been related with blocking of anaphylactic reaction to peanuts in CH3/J mouse models and *in vitro* cell lines.^{4,5}

The inhibitory effects of polyphenolic compounds, such as flavonoids, in basophils and mast cells have been extensively reported.^{2,6} FAHF-2 effectively contains a group of polyphenolic compounds, such as palmatine (or proto-berberine), berberine and jatrorrhizine, which are well known plant alkaloids and proved to inhibit mast cell degranulation.⁵ FAHF-2 silencing potential against peanut-induced anaphylaxis might involve an IFN- γ -producing CD8⁺ lymphocyte population: a single course of FAHF-2 treatment completely protect peanut-allergic mice from anaphylactic reactions for more than 6 months post-treatment.⁷

In this context it looks like as an anti-peanut allergy vaccine. In male Wistar rats quercetin proved able to abrogate completely peanut-induced anaphylactic reactions, after challenges, and to reduce significantly plasma histamine levels.¹ This evidence raises the question whether also FAHF contains quercetin. As the herbal formula, also quercetin is able to regulate

Th1/Th2 balance, as shown in a murine model of asthma.⁸ Basophils, more than tissue mast cells, play the pivotal role in this balance and hence these poorly studied leukocytes should represent the main target of natural compounds for allergy treatment.⁹ So, what's new about natural compounds as anti-allergic substances? Mouse and rat models represent good reliable models to achieve a prediction of human PNA responses to plant-derived polyphenols: many bioavailability studies have been pointed out on these experimental models in order to reach some comprehension about the pharmacokinetics of quercetin in humans.

This topic is still under spotlight and represents a real stumbling block for the building up of a true anti-allergic drug, rather than a nutraceutical supplement to diet. Further investigation should highlight the role of this compound in preventing and silencing anaphylactic or hypersensitivity reactions to food allergen whether in dietary assumption or in pharmaceutical vehicles.¹⁰ It is arguable that different mechanisms of immune response might be elicited by the two diverse approaches and in this context new insights about the role of basophils in immunity are needed. However, the increasing amount of evidence about the effectiveness of herbal medicine in treating allergic ailments, suggests that pharmacology has to face a new landscape of therapeutical tools for physicians.

There are strengths and limitations to the use of complementary or herbal medicine in allergy and inflammation, due moreover to the great probability of negatively interacting with standard medications or to the toxic (or genotoxic) potential of many natural compounds as phytoestrogens; anyway, even pharmacology needs for new drugs and certainly the investigations made by using natural compounds are welcome in this field. Quercetin appears to possess the potential of a safe anti-allergic substance but it opens only a wide perspective, at the moment.

DISCLOSURE

The Author declares that he has no conflict of interest.

REFERENCES

1. Shishehbor F, Behroo L, Ghafouriyan Broujerdnia M, Namjoyan F, Latifi SM. Quercetin effectively quells peanut-induced anaphylactic reactions in the peanut sensitized rats. *Iran J Allergy Asthma Immunol* 2010; 9(1):27-34.
2. Chirumbolo S. The role of quercetin, flavonols and flavones in modulating inflammatory cell function. *Inflamm Allergy Drug Targets* 2010; 9(4):263-85.
3. Burks W, Kulis M, Pons L. Food allergies and hypersensitivity: a review of pharmacotherapy and therapeutic strategies. *Expert Opin Pharmacother* 2008; 9(7):1145-52.
4. Li XM. Beyond allergen avoidance: update on developing therapies for peanut allergy. *Curr Opin Allergy Clin Immunol* 2005; 5(3):287-92.
5. Song Y, Qu C, Srivastava K, Yang N, Busse P, Zhao W, et al. Food allergy herbal formula 2 protection against peanut anaphylactic reaction is via inhibition of mast cells and basophils. *J Allergy Clin Immunol* 2010; 126(6):1208-17.
6. Chirumbolo S, Marzotto M, Conforti A, Vella A, Ortolani R, Bellavite P. Bimodal action of the flavonoid quercetin on basophil function: an investigation of the putative biochemical targets. *Clin Mol Allergy* 2010; 8:13-24.
7. Srivastava KD, Qu C, Zhang T, Goldfarb J, Sampson HA, Li XM. Food Allergy Herbal Formula-2 silences peanut-induced anaphylaxis for a prolonged posttreatment period via IFN-gamma-producing CD8+ T cells. *J Allergy Clin Immunol* 2009; 123(2):443-51.
8. Park HJ, Lee CM, Jung ID, Lee JS, Jeong YI, Chang JH, et al. Quercetin regulates Th1/Th2 balance in a murine model of asthma. *Int Immunopharmacol* 2009; 9(3):261-7.
9. Ozdemir C, Akdis M, Akdis CA. T-cell response to allergens. *Chem Immunol Allergy* 2010; 95:22-44.
10. Rogerio AP, Dora CL, Andrade EL, Chaves JS, Silva LF, Lemos-Senna E, et al. Anti-inflammatory effect of quercetin-loaded microemulsion in the airways allergic inflammatory model in mice. *Pharmacol Res* 2010; 61(4):288-97.