

Allergic Hypersensitivity to Food as a Critical Bystander of the Atopy and the Encountering Requirements

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Received: December 18, 2014; Published: February 19, 2015

Abstract

Needless to say, food is necessary to supply energy and nutrients for sustaining life. In a word, we eat that we may live. Food also, provides pleasure when it is tasted and ingested. On the other hand, the variety of various, easily-attainable natural and processing-derived food products, in particular, in developed countries has never been as spread as it is nowadays.

In the parallel manner, the public-predilection in preparing/cooking and thereafter taking delight in different delicious diets has well-revealed itself, firstly, due to a shower of magniloquent propagandistic programs canvassing vehemently as for the scrumptious viands of all kinds in all around the world, over a number of recent years.

With this in mind, despite a plenty of benefits accruing from the improvement of general awareness regarding the direct relationship existing between diet and body-health status, regretfully, the excessive/unprecedented augmentation in prevalence-rates of allergic hypersensitivities to foods, specially as to genetically-modified crops and thereby, relative risks of subsequent consequences have exceeded the hazardous boundaries.

Neatly talking, while some substances present in food may be nutritional and/or gratifying, they may not necessarily be safe for everybody. Namely, under a given condition, an exposure to a food or food additive or even, a food component which is formed *in situ* -at the time of preparing/cooking-, is followed clinically by an adverse immune response -referred to as food allergy- that according to its acuity, has alternatively threatened a large number of human lives worldwide since long.

Fortunately, specifically over recent years, in the field of allergology and in accordance with other expedient attempts are lending themselves to ease the way for health-care policies/determinations -with a view to intervening, preventing and even, curing of several human diseases- main concentrations are being placed on the recruitment of medicinal plants.

Considering the allergies, a compound of paramount interest to investigators is the flavonoid Quercetin which occurs in daily-consumed, natural food ingredients in great levels. Due to its anti-inflammatory and anti-allergic temperaments, the flavonol Quercetin has been suggested for the prevention or treatment of humankind allergic disorders and might be effectual for the remedy of food Allergies.

Keywords: Immunological Hypersensitivities; Preventative & Remedial Requirements; Quercetin

Introduction

Hypersensitivity to Food

Principally, the adaptive immune response is a critical component of host-defense against infection and therefore is essential for normal health maintenance. However, in an opposite manner, adaptive immune responses are occasionally, elicited by antigens not associated

Citation: Lotfollah Behroo. "Allergic Hypersensitivity to Food as a Critical Bystander of the Atopy and the Encountering Requirements". *EC Nutrition* 1.2 (2015): 52-56.

with infectious agents and the yielded condition can cause unexpected serious impairments. One circumstance in which this occurs is when harmful immune reactions -known generally as hypersensitivity reactions- are made in response to inherently, harmless environmental antigens called “allergens” such as foods, pollens, drugs, etc.

Initially, hypersensitivity reactions were classified into four types by *Gell* and *Coombs* in 1963 [1]. Hypersensitivities to foods are prevalent immune-system pathologies, in most cases, with an acute onset of symptoms following ingestion. These reactions are mainly mediated by IgE-antibodies-Type I/Allergic Hypersensitivities [2]. Even though other *Coombs* and *Gell* types II-IV reactions can also be involved in this pathway, however, their engagement is of limited significance in a true/Atopic-origin allergy. In the light of almost a decade of continuous remedy-seeking endeavors/enterprises, the author of the present paper re-designates the novel (or reviews the newly-proposed) opinions/comprehensions regarding the basic immunological concepts and pathomechanisms involved in an “IgE-mediated Food Allergy”, as well as the ensuing complications.

At the end, the author’s own experience of an appropriate and effectual therapeutic achievement is also, introduced in this mini-review article.

Atopy

Etymologically, the term “Atopy” has been derivatized from the Grecian word “*Atopia*” that is equivalent to “Out of Place” denoting ectopic/strange/unusual. At the first blush, it was described by *Coca* and *Cooke* in 1923 [3]. An “atopy phenotype” is a genetic/hereditary predisposition for a predominance of T helper 2-[(Th2); IgE producing T lymphocyte lineage]-type immune responses [4]. This entity/temperament is thought to be coded on chromosome 5 (interleukin 4- and 5-induced IgE synthesis) and chromosome 11 (IgE-FcR production).

In addition to genetic (familial or personal) affinity/tendency, different environmental parameters seem to play a significant role in the development of atopy. Amongst them the “Hygiene Hypothesis” is one of the outstanding paradigms available to date, that may express the rising trends in the incidence of allergic maladies [5-7]. The hypothesis proposes that excess “cleanliness” in an infant or child’s environment can lead to a decline in the number of infectious stimuli that are necessary for appropriate evolution/maturation of the immune system [8].

With an eye to history, patients with atopy develop potentially, what that is referred to as the “Allergic Triad” of symptoms, in other words; Eczema/Atopic Dermatitis, Hay Fever/Allergic Rhinitis, and Allergy-induced Asthma/Allergic Asthma. Notably, they tend to have Food Allergies, as well. All the same and despite the overall improvement of our understanding as for the immuno-pathologies, unfortunately, the detailed pathomechanisms of atopy have remained unclear, yet.

Allergy

From immunological point of view, the meticulous definition of allergy has for several years been a contentious issue. In terms of lexicology, the word “ALLERGY” has originally been derivatized from two Grecian words; “*ALOS*” meaning “Other” and “*ERGON*” meaning “Reaction”. Allergy was described primarily, by “*Clemens von Pirquet*” in 1906. He perceived that patients who had previously received injections of Horse-serum or Smallpox Vaccine had quicker and severe responses to a second injection. With the passage of time and subsequent to discovery of IgE antibodies in 1968 by *Johansson* and *Ishizaka*, the allergy became synonymous with IgE-mediated/type I hypersensitivity reactions.

Just the same and irrespective of what explained earlier, the author of the current interest declares/weens frankly that the word “ALLERGY” is radically, an acronym that stands for an Atopic, Long-Lasting, “Environment»»Reciprocity««Gene”-Yielded condition. Clinically, an allergic reaction is characterized by an abnormal, reproducible immune-system response with an acute/immediate outbreak of symptoms/signs which would be manifested upon subsequent exposure of the previously sensitized individual to a given allergen, as well as, cross-reactive protein(s), in such a tiny quantity that can easily be tolerated by a non-sensitized one.

Taking it all-round and neglecting the intricate/complicated nature of the patho-mechanisms involved in an allergic reaction, the eminent issue is the immune system mistake. In brief, due to some causative reasons -not all of them have fully/decisively been confirmed till date, from the etiologic point of view- the immune system goes primarily awry concerning its "Cognitive" function/specificity. As a result, it is committed/incurred an illusion in specific recognizing the physical structure of the suspected protein(s). Whereby, the B-cell isotype is erroneously, switched-over/skewed towards the production of IgE antibodies by way of anaphylactic mode -{in reply to the allergenic stimulant in dispute and, in return for interferon-gamma (IFN- γ) which is a typical response of the T helper 1 (Th1); allergy-protective pathway in a non-atopic individual} [4].

IgE-mediated Food Allergy

In tune with other types of allergic disorder, a Food Allergy by definition is an acquired condition that characterized by an exaggerated, overwhelming and reproducible, adverse immunological reaction against a certain food protein (s).

Mechanistically, following production, food-specific IgE antibodies bind to/arm the effector cells -Tissue Mast Cells and Blood Basophils, a state named "Sensitization". Next exposure to the same allergenic food (s) leads to an acute release/discharge of a whole host of chemical mediators through the effector-cells degranulation (A Volcanic Phenomenon). Amongst the others, Histamine is assumed as a chief/potent mediator that solely, can cause/induce/trigger all of the pathological aspects/features of an allergic hypersensitivity response to an immunogenic food. Anyway, the ensuing manifestations might differ/range in severity, from a merely mild irritation to life-threatening anaphylaxis or even, death [4,9-11].

Epidemiology and Etiology

Not to mention the paucity of epidemiologically, confirmed/documentated information as for the overall dissemination/dispersion of allergic disorders in diverse districts of the world; it cannot be questioned except that, the intractable prevalence-rate of aforementioned ailments is ceaselessly/dramatically on the rise. This fact already generates a heavy burden on health systems, owing to the absence/lack of deserved readiness to envisage the new challenges.

At a glance, the first allergens recognized by the immune system in terms of IgE production are food allergens. Although all foods can trigger an allergic response however, frequent/potent allergenic foods inducing IgE-mediated hypersensitivity reactions, include Hen's Egg, Cow's Milk and Peanut allergens [4,9]. Of course, sensitization to inhalant allergens such as Cat-Dander, House Dust-Mite and Pollen allergens can also, be present already during the first 3 years of life in most of the children, even though the clinical relevance is often observed later, at school ages. Regretfully, notwithstanding that the allergic hypersensitivities to food proteins having been known for several years, there is etiologically, little information on whether food antigens are increased in such conditions and how much antigen is absorbed, as well as, the biological activity of the absorbed allergen [4].

In the gross, -as explained before- a food allergy is a consequence of the complex interaction of one's genetic being with immunologic and environmental influences. Furthermore, other supposed environmental risk factors that together with atopy may induce the food allergies include Vitamin-D insufficiency, reduced consumption of Healthful, Dietary Fats/Antioxidants, and Obesity. So, taking everything into account, urgent attempts/enterprises for inspecting/developing of practically, efficient preventative/therapeutic strategies become a necessity and cannot be disputed, certainly.

Preventative/Therapeutic Instructions in Use

Current knowledge has different appropriate bases to identify the allergy-protective agents/factors also, to provoke/employ the primary and secondary preventative/therapeutic protocols to revert the epidemic trends of the allergies.

Possibly, as a response to previous studies suggesting that the infants exposed to whole cow's milk proteins were at higher risk of milk allergy -compared to those receiving breast milk or hypoallergenic formula-, several expert panels and professional organizations

along with other observations, proposed the 'avoidance' of allergens for vulnerable infants. Moreover, some guidelines included allergen-avoidance during Gestation and lactation, as well [12].

On the other hand, allergy-prevention based on the administration of Probiotics to pregnant mothers and to infants [6] has provided unfortunately conflicting and still, debated results. Other strategies under investigation include the safer prescription of oral or intranasal bacteria extracts and in particular, earlier introduction of foods to infants.

Especially during recent years, promising compounds of paramount interest to immunologists are the *Phenolic Phytochemicals* -Flavonoids- which present in everyday-eaten natural food components in fairly, high levels. Amongst them, the Flavonol Quercetin due to its anti-inflammatory and anti-allergic temperaments has been suggested for the prevention and/or treatment of humankind allergic disorders and circumstantially, has been effectual for the remedy of food Allergies [9].

Discussion & Conclusions

Talking of allergies, the environmental and genetic determinants likewise their interactions, are assumed to be responsible for the skyrocketed increment of atopic disorders -with an IgE-mediated food allergy referred to as a serious and complicated consequence/ bystander of atopy. Of course, considering/comparing the identical twins, environmental factors appear to be more likely, account for the extant obvious rise, rather than genetic predispositions. On this concern, an overarching effect may be the immune-dysregulation attributable to the hygiene hypothesis. According to this theory, a decline of microbial diversity has been proposed since the late nineties, as a major cause of the allergy epidemic trend. Notably, this area of the hygiene hypothesis, nowadays defined as "Biodiversity Hypothesis" has found specific support in several epidemiological studies, even though, counter-examples remain and, more studies are warranted [13,14]. Other theories for justifying the said increment include vitamin D insufficiency attributable to a greater applying of sunscreens and less time outdoors, reduced consumption of healthful omega-3-polyunsaturated fatty acids & antioxidants, and doubtlessly, the increased obesity which can represent an inflammatory state.

Collectively, owing to the paucity of applicable/acceptable curative and immunotherapy approaches, the large figures of populations suffering from potentially deadly IgE-mediated food allergies and the possibility of unavoidable occurrences of unexpected exposures, the necessity of any challenges/researches for more effectual and at the same time, secure/safer preventative and/or remedial strategies is apparent/ undisputable.

Fortunately, over recent two decades, in the field of clinical immunology and in accordance with other expedient attempts/enterprises are lending themselves to pave the way for health care policies/purposes -in terms of intervening/preventing and even, treating of several human being diseases-, major concentrations have been adverted to the recruitment of medicinal plants.

Concerning the allergies, the compounds of distinguished interest to researchers are the flavonoids in general, and quercetin in particular, which occur in daily often-consumed, plant origin, nutraceutical ingredients in fairly great levels. Due to its anti-inflammatory and anti-allergic characteristics, the flavonol quercetin by distinct, has been propounded for the prevention and/or therapy of human-kind allergic maladies and might be helpful for the treatment of food allergies [9,15,16].

In conclusion, seeing that the increasing prevalence rate of the IgE-mediated food allergies is evidently, associated with life-threatening anaphylaxis in children and adolescents, luckily various valuable efforts have been implemented in the last few years to identify and characterize individual food-allergen molecules in prevalent allergenic foods as well as the respective encountering requirements which likely will warrant the improving/recruiting of the requisite preventative and/or therapeutic strategies in this field. However, the need for a definitive hospitalization is apparent, infinitely.

Bibliography

1. Gell PGH and Coombs RRA. "The classification of allergic reactions underlying disease". In Clinical Aspects of Immunology. Blackwell Science (1963).
2. Taylor SL and Hefle SL. "Will genetically modified foods be allergenic"? *Journal of Allergy and Clinical Immunology* 107.5 (2001): 765-771.
3. Coca AF Cooke RA. "On the classification of the phenomenon of hypersensitiveness". *Journal of Immunology* 8.3 (1923): 163-182.
4. Behroo Lotfollah. "IgE-Mediated Food Allergy; Complications & Implications" *Journal of Pharmacy and Nutrition Sciences* 3.4 (2013): 238-240.
5. American College of Allergy Asthma & Immunology. "Food allergy: A practice parameter". *Annals of Allergy, Asthma & Immunology* 96.3 Suppl 2 (2006): S1-68.
6. Furrie E. "Probiotics and allergy". *Proceedings of the Nutrition Society* 64.4 (2005): 465-469.
7. Weiss ST. "Eat dirt-the hygiene hypothesis and allergic diseases". *New England Journal of Medicine* 347.12 (2002): 930-931.
8. Rook GA and Stanford JL. "Give us this day our daily germs". *Immunology Today* 19.3 (1998): 113-116.
9. Shishehbor F, et al. "Quercetin effectively quells peanut-induced anaphylactic reactions in the peanut sensitized rats". *Iranian Journal of Allergy, Asthma and Immunology* 9.1 (2010): 27-34.
10. Koppelman SJ, et al. "Relevance of Ara h1, Ara h2 and Ara h3 in peanut-allergic patients, as determined by immunoglobulin E Western blotting, basophil-histamine release and intracutaneous testing: Ara h2 is the most important peanut allergen". *Clinical Experimental Allergy* 34.4 (2004): 583-590.
11. Jutel M, et al. "Histamine in allergic inflammation and immune modulation". *International Archives of Allergy and Immunology* 137.1 (2005): 82-92.
12. Ferreira CT and Seidman E. "Food allergy: A practical update from the gastroenterological viewpoint". *Jornal de Pediatria* 83.1 (2007): 7-20.
13. Yazdanbakhsh M, et al. "Allergy, parasites, and the hygiene hypothesis". *Science* 296.5567 (2002): 490-494.
14. Martinez FD Holt PG. "Role of microbial burden in aetiology of allergy and asthma". *Lancet* 354.Suppl.2 (1999): SII12-SII15.
15. Behroo L, et al. "Quercetin-therapy of Peanut Allergy; a nutraceutical-means to an end". *Iranian Journal of Immunology* 11.Suppl.1 (2014): 81-82.
16. Behroo L, et al. "Everything about a well known nutritional compound; the panacea named Quercetin". *Iranian Journal of Immunology* 11.Suppl.1 (2014): 81.

Volume 1 Issue 2 February 2015

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