

Soy



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Soy and Allergenicity

Introduction

A relatively small frequency of food allergies or food sensitivities exists in the general population and varies according to area and reporting methodology. Reports range from one to 2.4 percent of the population.¹ Despite the small percentage, it is important to bring into perspective allergic reactions and sensitivities from food and to provide a better understanding of the information surrounding these topics.

Food Allergy

Almost any food can induce an allergic reaction in sensitive individuals. Identification of eight food categories having the most frequent incidence of sensitivities include fruits, legumes (including soy and peanuts), eggs and milk, crustaceae or shell fish, tree nuts, vegetables, wheat and sesame seed.² Estimates show 90 percent of all allergic and sensitivity responses are the result of consumption of these food categories.³ These food categories are the focus of efforts to identify and minimize the consequences of food reactions. Most of these foods appear not only as ingredients in formulated foods but as food individually. Some sensitizing agents may be destroyed or inactivated by heating, storage or the digestive process.

Definitions

The usage of terms is often confusing since food allergy, food sensitivity and food intolerance are often used indiscriminately and interchangeably. A discussion of soy allergy can be better understood if there is a definition of terms.²

- The term “food allergy” defines any adverse reaction to food. In fact, a more accurate definition is an immune reaction or an antigen-antibody response.
- A broader term, “food sensitivity” may be any adverse reaction that renders a food indigestible or unavailable or elicit an unfavorable reaction. Enzyme deficiency is a frequent offender, most frequently lack of a digestive enzyme. Lactase, an enzyme required to digest milk sugar, is the most frequent offender.

Understanding Food Sensitivity and Allergenicity

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- “Food intolerance” generally refers to indigestibility or interference with the digestive process. Another definition suggests food intolerance is a much broader term that refers to any non-psychologically mediated untoward reaction induced by a food, which may include food allergy.

Consequences

Food sensitivity manifestations may range from severe anaphylaxis to facial swelling, respiratory discomfort to cutaneous responses and gastrointestinal reactions.⁴ In virtually all cases the gastrointestinal tract is involved.⁵ Little evidence exists that other organs are involved with food sensitivity. It is rare for severe reactions to occur, and result in the necessity for drastic treatment action. Usually the most effective method to address the problem involves complete elimination of the food.

Age and Allergenicity

It is reasonably well established that infants and young children are most susceptible to food sensitivity due to the immature digestive tract. Infants and young children consume foods with soy as an ingredient in soy formula and infant cereal. At the same time, infants and young children most frequently “outgrow” their allergies; particularly those to milk, eggs and soy.⁶ The estimates of incidence for soy allergy in the general population are therefore inflated by the frequency with the very young.

Soy Allergy

Soy is one of the most important ingredients and basic food sources, used more widely than most others, worldwide.¹ The nutrition contributions of soy are detailed to include the uses and application.⁷ Nutritional quality has been evaluated, and adjustments made where needed. The World Health Organization has recognized that plant proteins are deficient in lysine and beans typically low in sulfur containing amino acids methionine and cysteine. The protein level in soy is, however, high enough to provide all the essential amino acids to meet human requirements when consumed at the recommended level of protein intake.⁸ Some of the early concerns (trypsin inhibitor, phytic acid, lectins and saponins) have been addressed and corrected by processing. According to recent estimates, the incidence of soy protein allergy and sensitivity amounts to less than 0.5 percent of the entire population.⁹ This estimate may be inflated since it includes infants and children who usually have a transitional sensitivity. Estimates for infants and young children have been from 0.9 percent to as high as seven percent. The exact time the transition occurs is indefinite but the incidence is dramatically reduced when ages greater than three years are compared with less than three years. Most food reactions occur within the first year, but most foods can be reintroduced after three years without incident.¹⁰ Soy sensitivity is rare with persons with food intolerance.¹¹

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Two factors assume key importance in evaluation of soy allergy including age of subject and processing of soy. Unfortunately much of the available information is confusing since both have changed dramatically during the past several years and information reporting has not always been separated based on the period it was obtained.

Frequency estimates may, therefore, be misleading. Also, most frequency evaluations conducted the study with persons from a known sensitivity population. The sensitivity may be specifically to soy or a congenital allergy predisposition.⁴ Information collection is preferable using the double blind placebo controlled food challenge methodology. This methodology avoids the false positives that occur with casual observation.^{12,13}

Processing changes have evolved with extensive use of soy as a food source. Earlier concerns with components that interfered with digestibility and absorption; trypsin inhibitor, phytic acid, lectins and saponins are now modified, destroyed or separated during processing.

Soybean Processing

Processing is a necessary part of preparation of soybeans to provide a product suitable for food consumption. The beans must be dehulled and ground, then heated to destroy indigestible materials and components that interfere with digestibility (hulls, endogenous inhibitors and lectins). Oil is extracted to separate soy oil from soy protein components. Meal is concentrated and/or isolated by a separation process to yield soy protein suitable for use as a food or food ingredient. Each of the processes modifies or removes potentially allergenic or sensitizing components. Further processing often includes fermentation (soy sauce, tofu, miso) or texturizing which results in undefined changes in allergenicity.

Controversial Issues

A number of controversial issues arise in discussion of sensitivity to soy, including discussions of MSG, small quantities of protein remaining in soy oil and residual amounts of protein in soy lecithin.

Concerns about MSG arise based on the relatively high concentrations of glutamic acid in soy protein. The concentration of glutamate is significant as a result of hydrolysis to soy sauce. Since soy protein contains a relatively high concentration of glutamic acid the association is frequent. Purified glutamate is more efficiently manufactured from other sources, for example by protein hydrolysis or from sugar beet pulp. The role of MSG in symptoms comparable to sensitivity have not been established by reputable studies, therefore the relationship does not have scientific credibility.¹

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The contents of soy protein contained in soy oil are of questionable significance. As a result of solvent extraction for soy oil, infinitely small quantities of protein can be detected and would only be important for individuals with a unique sensitivity.¹⁴ Challenge trials have indicated that refined soy and peanut oil are safe for even those with a known allergy to the source material. Peanut oil was implicated but testing indicated that soy was not included.

Likewise, soy lecithin is frequently used in food processing and traces of protein may be present in the resulting ingredient. Lecithin is a valuable ingredient since it provides a natural stabilizer and emulsifier in formulated foods. A case report suggested, with a single observation, that soy lecithin may complicate problems with soy sensitive subjects.¹⁵ Due to the extremely small quantities the significance also is questionable.

Reasonable Actions

The importance placed on allergy and sensitivity is magnified because of the discomfort and severity of reactions with sensitive individuals. Most people sensitive to a particular food are aware of the response. Information is necessary for identification and action to ameliorate the consequences. Awareness leading to the identification of sensitivities and actions that may be taken are the most satisfactory approach. Food allergy awareness is a Food and Drug Administration priority, largely to ensure clearer labeling of food allergens.³

Many of the issues that surround soy protein sensitivity or allergy may be addressed by detailed labeling. The assumption is that persons with a sensitivity to soy or any other allergen are aware of the problem either by diagnosis or as a result of discomfort or adverse reaction resulting from consumption of the food or ingredient. Regulatory agencies including FDA and CODEX Alimentarius have addressed this issue.^{3,2} Potential food allergenic components should be declared separately, including those in a color or flavor. Also, it is advantageous to declare any allergenic sources from which ingredients may be derived.

Regulations and guidelines provide adequate “transparency” in label detail to allow for evaluation of contents and assurance of safety. Focus is placed on the eight major sensitizing food categories, which includes soy. Complete ingredient and source labeling requirements ensure that information is available on labels to provide information to concerned parties; consumers, professionals and regulators. The purpose is to provide label detail by ingredient source to detail the components of processed and formulated foods.

Summary

Food allergies represent a major concern, and soy allergy is a reality for a small group of people. Soy’s nutritional advantage makes it an important and beneficial ingredient in food. Soy is readily available and can be utilized for many purposes. The allergenicity of soy is substantially reduced as a result of processing. Awareness of the existence of soy allergy and of the contents of soy as an ingredient is vital. Labeling and published information provide the best basis for knowledge.

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