

# The Regulatory Challenge of Food Allergens

Steven M. Gendel\*

Food Allergen Coordinator, Center for Food Safety and Applied Nutrition, Food and Drug Administration, 5100 Paint Branch Parkway, College Park, Maryland 20740, United States

**ABSTRACT:** Food allergy is an important public health issue worldwide. Allergic consumers must avoid eating foods that could provoke potentially life-threatening reactions, and successful avoidance depends on having complete and accurate information on food labels. Regulatory agencies support allergic consumers by working with industry to ensure that all food allergens that are intended to be present in a food are declared on the label and that effective controls are used to prevent the presence of unintended allergens. These regulatory activities take place in a complex legal and policy environment both domestically and internationally. Protecting allergic consumers in this complex environment requires effective use of public health data and risk assessments.

**KEYWORDS:** *food allergy, food labeling, allergen labeling*

## ■ INTRODUCTION

Food allergy is an important public health issue that is receiving increasing attention worldwide.<sup>1</sup> Because there is not yet a cure for food allergy, allergic consumers must avoid eating foods that might trigger potentially life-threatening reactions. Successful avoidance depends on being able to find complete information on the allergen ingredients in a food and knowing that no unintended allergens are present. Regulatory agencies support allergic consumers and their families by working with industry to ensure that food labels provide the needed information in a clear and consistent manner and that manufacturers use appropriate controls to prevent the presence of unlabeled allergens. These activities take place in a complex legal and scientific environment.

Risk management for food allergens is more difficult than for toxic chemicals or microbial pathogens. For food allergens, the hazard is a food, not an added substance or contaminant, and is something that is nutritious and desirable for most of the population. This means that it is not appropriate to use the common risk management approaches that aim to reduce overall exposure to a hazard for all consumers. Risk management for chemical contaminants and pathogens is generally based on the assumption that the contaminant or pathogen is a hazard for the entire population (which might include a highly sensitive subpopulation). This assumption does not apply to food allergens. Furthermore, there are no control measures that can be used to remove or reduce the amount of an allergen once it is in a food without negatively affecting the food itself. For example, there is no equivalent of the lethality treatments or growth inhibitors used to control microbial pathogens.

Therefore, the primary risk management option available to government and industry is to provide information to allergic consumers by ensuring that food labels are complete, clear, and accurate. This means that, in the absence of regulatory thresholds, all food allergens that are intended to be present in a food (as ingredients or as components of ingredients) must be identified on the label and preventive controls must be used to avoid the presence of unintended (and undeclared)

allergens. Food allergen risk management occurs in a complex regulatory environment, should accommodate evolving food production technology, and must be aware of the needs of allergic consumers.

## ■ ALLERGEN LABELING – THE U.S. REGULATORY CONTEXT

In the United States, concern with food allergens is the responsibility of several different agencies, each with a different statutory authority. The U.S. Food and Drug Administration (FDA) is responsible for the regulating the production and labeling most packaged foods under the Food, Drugs and Cosmetics Act (FD&C Act). The Food Safety and Inspection Service (FSIS) of the U.S. Department of Agriculture is responsible for the manufacture and labeling of most meat, poultry, and some egg products under the Federal Meat Inspection Act, the Poultry Products Inspection Act, and the Egg Products Inspection Act. The Alcohol and Tobacco Tax and Trade Bureau (TTB) of the U.S. Department of the Treasury has oversight of the labeling of most alcoholic beverages under the Federal Alcohol Administration Act. In addition, the U.S. Environmental Protection Agency is concerned with the allergenicity of plant-incorporated protectants under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Each of these statutes contains specific language that defines the scope of agency authority and the safety standards that must be applied in exercising that authority. Each agency uses an evolving mix of regulations, guidance documents, and procedures to instantiate the statutory authorities and to adapt to a changing world. In addition, foods that are sold through restaurants, catering

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establishments, and retailers are regulated by state and local authorities under state and local laws and ordinances.

Even for foods regulated by a single agency under a single statute, several different terminologies and standards may apply. For example, amendments to the FD&C Act, such as those contained in the Food and Drug Administration Amendments Act and the Food Safety Modernization Act, contain specific terminology and safety standards. Thus, depending on the context, food allergen safety may be evaluated on a standard of whether a substance “may render” a food injurious to health (the standard in Section 342(a)1 for poisonous or deleterious substances), whether there is a reasonable probability that a food will cause “serious adverse health consequences or death” (the standard in Section 350(f)2 for a reportable food), whether an ingredient may cause “an allergic response that poses a risk to human health” (the standard in Section 403(w)6 for a labeling exemption petition), or on one of several other standards. An additional layer of complexity is added by the fact that food allergen safety may be approached through a different level of detail in different contexts. For example, food additives are evaluated as individual substances, food labeling considers ingredients and whole foods, whereas Good Manufacturing Practices (GMPs) and Preventive Controls (PCs) apply to facilities, equipment, and practices.

In the United States, food allergen risk management for those foods regulated by FDA occurs primarily through the labeling standards defined in the Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA) and through the use of GMPs. FALCPA identified the food allergens of public health concern in the United States as being eight foods or food groups (Table 1), as well as any ingredient that contains

**Table 1. Major U.S. Food Allergens**

food	food group
eggs	crustacean shellfish
milk	fish
peanuts	tree nuts
soybeans	
wheat	

protein derived from one of these foods or food groups, which are called “major food allergens”. FALCPA defined the acceptable label formats for declaring the presence of a major food allergen either within the ingredient list or in a “contains” statement immediately adjacent to the ingredient list. In keeping with the goal of providing clear information to allergic consumers, FALCPA requires that an ingredient derived from a major food allergen be identified using the name of that major food allergen. In other words, FALCPA requires that plain language be used so that allergic consumers can quickly find important information. For example, foods that contain ingredients such as whey or casein must use the term “milk” in one of the permitted formats. For those major food allergens that are food groups, FALCPA requires that the specific type or species be identified. In this way, people with fish, tree nut, or crustacean allergies can determine if a food is safe on the basis of their individual sensitivity. To prevent exposure to hidden allergens, FALCPA extends the requirement to label major food allergens to flavorings, colorings, and incidental additives.

FALCPA contains important exclusions from the definition of a major food allergen. These include exclusions for raw agricultural commodities and highly refined oils derived from

the major food allergens. In addition, ingredients may become exempt from the FALCPA labeling requirement through either a petition or notification process. Both petitions and notifications require submission of scientific information about the ingredient and the method used to derive the ingredient. The standard for obtaining an exemption through a petition is that the ingredient “does not cause an allergic response that poses a risk to human health” and through a notification that the ingredient either “does not contain allergenic protein” or that there has been a determination under a premarket approval process that the ingredient “does not cause an allergic response that poses a risk to human health”.

To date, FDA has received seven notifications and three petitions (Table 2). One petition was withdrawn, one petition

**Table 2. FALCPA Petitions and Notifications<sup>a</sup>**

no.	ingredient	major food allergen
<b>Petitions</b>		
001	growth medium	soy
002	lecithin (withdrawn)	soy
003	lecithin (pending)	soy
<b>Notifications</b>		
001	hydrolyzed casein	milk
002	hydrolyzed casein	milk
003	growth medium	soy
004	vita spelt	wheat
005	lactitol	milk
006	probiotic cultures	milk
007	fish extract	fish

<sup>a</sup>The current inventory of FALCPA petitions is available at <http://www.fda.gov/Food/LabelingNutrition/FoodAllergensLabeling/ExemptionsfromFoodAllergenLabelingPetitionNotificationProcess/ucm076631.htm>, and FALCPA notifications are available at <http://www.fda.gov/Food/LabelingNutrition/FoodAllergensLabeling/ExemptionsfromFoodAllergenLabelingPetitionNotificationProcess/ucm076656.htm>.

is pending, and the other petition and the notifications were denied. There are a number of reasons why petitions and notifications have been denied, including poor descriptions of an ingredient or the method used to derive it, poor or no characterization of the proteins in the ingredient, the use of inappropriate methods to characterize the ingredient, or failure to validate methods for detecting or measuring allergens in the ingredient.<sup>2</sup>

FALCPA does not have a mechanism for adding foods to the definition of “major food allergen”. This may become an issue if improved understanding of food allergy epidemiology finds that some widely used foods are of significant public health concern. For example, sesame is widely recognized as an allergen of concern in most other countries, but it is not a major food allergen in the United States. Also, some ingredients (such as lupine) that are currently not widely used have the potential to become significant allergens if they become more common.

FALCPA also does not address the use of advisory labeling such as “may contain” statements. FDA has stated that such advisory labeling should not be used as a substitute for adherence to GMPs and should be truthful and not misleading.

## ■ ALLERGEN LABELING – THE INTERNATIONAL REGULATORY CONTEXT

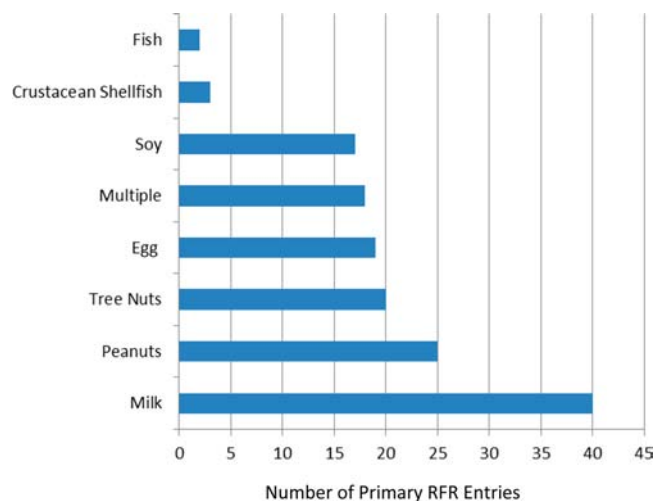
Food allergen labeling has been recognized as a critical risk management tool internationally. This recognition is reflected in the development and implementation of Codex guidelines and regulatory frameworks for food allergen labeling worldwide.<sup>1</sup> However, an analysis of these regulatory frameworks has shown there are significant differences among them.<sup>1</sup> The most important differences are in the allergens of concern that are identified in each. For example, sesame is an allergen of concern in the European Union and Canada but not in the United States. This appears to reflect both variation in patterns of exposure and sensitivity and the lack of a consensus on the criteria used to identify those food allergens that are of public health concern. Other important differences occur in whether it is possible to add additional foods to the list of allergens of concern and whether specific ingredients can be exempted from the allergen labeling requirement. Those frameworks that do have a mechanism for obtaining exemptions differ in the standards that are used for determining whether to grant an exemption.

## ■ MANUFACTURING AND FOOD RECALLS

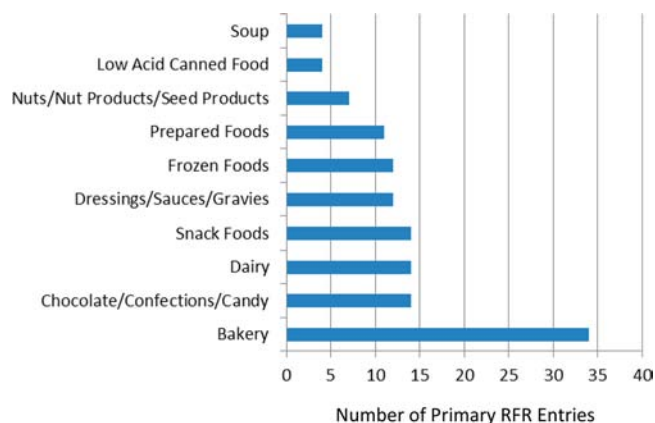
FALCPA labeling regulations apply only to major food allergens that are intended to be components of foods. Undeclared allergens may also be present in a food as unintended components through cross-contact or packaging errors. Cross-contact and packaging errors can both be controlled through the use of GMPs and preventive controls. These practices and controls are used to ensure separation, either in time or space, between foods that contain major food allergens and those that do not and to ensure a match between the label on a food package and the food in that package. Separation can be achieved using controls such as dedicated equipment, appropriate cleaning and sanitation, and physical barriers. Accurate label declarations can be achieved by using controls such as formulation reviews, supplier verification, color-coded packaging materials, and rework controls.

One of the most important tools used by FDA to identify recurring problems with GMPs and labeling controls is the Reportable Food Registry (RFR).<sup>3</sup> Companies that become aware of a problem with a food that could cause serious adverse health consequences or death are required to report that food to FDA through the RFR. This safety standard is equivalent to the standard used by FDA to define a Class 1 recall. The RFR has been active since September 2009. Undeclared allergens are responsible for 32% of the primary reports to the RFR (FDA, 2012). This is only slightly less than the 38% of reports for *Salmonella* contamination. This suggests that there are significant ongoing problems with food allergen control.

Detailed analysis of the RFR reports and the FDA recall database shows that undeclared milk is the most commonly reported major food allergen and that bakery products are the commonly mislabeled commodity<sup>3,4</sup> (Figures 1 and 2). Root cause analysis of these reports and associated recalls suggests that a lack of label and package checks during manufacture, unrecognized ingredient or formula changes by suppliers, and poor training or knowledge at all levels in an organization are frequently associated with GMP or labeling problems.



**Figure 1.** Total RFR reports for undeclared allergens, September 2009–September 2011.



**Figure 2.** Total RFR reports for undeclared major food allergens by commodity, September 2009–September 2011.

## ■ OTHER CHALLENGES

Public health agencies use regulatory thresholds such as defect action levels or tolerances to identify high-risk foods, to evaluate hazard control systems, and to prioritize resource utilization. Regulatory thresholds for food allergens could help in risk and resource prioritization within the FDA and in developing and validating allergen control programs in industry. As the first step in the process of establishing such thresholds, the FDA Threshold Working Group (TWG) identified four approaches that could be used to establish regulatory thresholds for the major food allergens (methods-based, safety assessment-based, risk assessment-based, statutorily derived).<sup>5</sup> The TWG suggested that the risk assessment-based approach should be used when sufficient data are available because it is scientifically the strongest approach and is the most transparent of the four approaches.

Regulatory risk assessments are used to evaluate the public health impact of risk management options. These risk assessments need to be carried out in conformance with a number of legal, policy, and technical constraints that are intended to ensure that the process is rigorous and fully transparent and that all stakeholders have an opportunity to provide input and to review and comment on the results. Generally, agency risk managers identify the options to be

evaluated, thus determining (and limiting) the scope of a risk assessment. The focus on risk management means that a food allergen threshold risk assessment must consider issues related to practicability, enforceability, consistency, and communications as well as the clinical data on allergic consumers.

FDA is currently in the process of defining the scope of a threshold risk assessment for food allergens. This process involves identifying the risk management options that will be evaluated, gathering data from published and unpublished sources, and conducting a data quality analysis. It is important that the results of a threshold risk analysis be useful. Among other things, this means that the agency and industry must be able to reliably determine both the presence and amount of any undeclared major food allergen present in a food. Accurate allergen determinations will require the development of sampling plans that reflect the nonhomogeneous distribution of allergenic protein that often occurs from cross-contact as well as approaches for validating specific methods for use with different foods, ingredients, and environmental conditions. The risk managers, not the risk assessors, will use the result of the risk assessment to determine whether to establish one or more thresholds and how any thresholds will be used.

Coordination between different U.S. government agencies will also be important. Coordination is important both to avoid confusing consumers and because common allergen-containing ingredients may be used in foods regulated by different agencies. Coordination will help to ensure that labeling formats, the contents of label declarations, and GMPs and preventive controls are consistent among different foods.

## ■ CONCLUSIONS

Regulatory agencies work to protect the health of food allergic consumers in a complex legal and scientific environment. Effective risk management requires an integrated approach that recognizes the many ways that food allergens must be considered within the regulatory and policy systems. In view of the increasing volume of international trade in foods and food ingredients, international harmonization based on transparent risk assessment and risk ranking processes will also be important.

However complex the process, it is important to remember that the goal is to prevent potentially life-threatening reactions by providing allergic consumers with clear, complete, and accurate information about what is in the foods they eat.

## ■ AUTHOR INFORMATION

### Corresponding Author

\*Phone: 1-(240) 402-1056. Fax: 1-(301) 436-2973. E-mail: [steven.gendel@fda.hhs.gov](mailto:steven.gendel@fda.hhs.gov).

### Notes

The authors declare no competing financial interest.

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