

# Interpretation of commercial food ingredient labels by parents of food-allergic children

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**Background:** To avoid allergic reactions, food-allergic consumers depend on the ingredient labels of commercial products. Complex ingredient terminology (eg, *casein* and *whey* for milk) and label ambiguities (eg, *natural flavor* and *may contain peanut*) might compromise the ability of patients/parents to determine the safety of particular products.

**Objective:** The purpose of this investigation was to determine the accuracy of label reading among parents of food-allergic children.

**Methods:** Parents of children on restricted diets attending our referral center were asked to review a group of 23 food labels taken from widely available commercial products. For each label, each parent/parent pair was asked to indicate whether the product was safe for the allergic child and, if it was not, which foods restricted from the child's diet were in the product.

**Results:** There were 91 participants. Peanut was the most commonly restricted food (82 children), followed by milk, egg, soy, and wheat (60, 45, 27 and 16 children, respectively). Identification of milk and soy was the most problematic: only 4 (7%) of 60 parents correctly identified all 14 labels that indicated milk, and only 6 (22%) of 27 parents correctly identified soy protein in 7 products. Peanut was correctly identified in 5 products by 44 (54%) of the 82 parents restricting peanut. Wheat (10 labels) and egg (7 labels) were correctly identified by most parents (14/16 and 42/45, respectively). Correct label identification was associated with prior instruction by a dietitian.

**Conclusions:** With current labeling practices, most parents are unable to identify common allergenic food ingredients. These results strongly support the need for improved labeling with plain-English terminology and allergen warnings as well as the need for diligent education of patients about reading labels. (*J Allergy Clin Immunol* 2002;109:1019-21.)

**Key words:** Food allergy, labels, commercial foods

It has been estimated that up to 8% of children less than 3 years of age and approximately 2% of adults experience food-induced allergic disorders.<sup>1,2</sup> To determine the safety of their food, affected individuals and their families depend on ingredient labels on commercial food products. Mistakes in this process are potentially deadly<sup>3-5</sup>; they can arise from the mistaken inclusion in the food of unlabeled ingredients<sup>6,7</sup> as well as from errors on the part of consumers in reading the labels.

Current US labeling practices unfortunately allow for a number of potential obstacles to accurate food ingredient label reading and interpretation. For example, complex terms for the proteins of common allergens such as milk (eg, *casein* and *whey*) and egg (eg, *ovalbumin*) might not be generally recognized by consumers. In addition, ambiguous terms such as *natural flavor*, *may contain nuts*, and *spices* might be used. In some cases, the possible presence of a protein might be signaled only by a symbol, such as *D* for *dairy*. Even label enticements are potentially misleading, such as the use of the term *egg substitute* for products that contain egg. To our knowledge, the impact of this lack of clarity in labeling has not been studied and there is no information about how accurately parents are able to understand labels on commonly available food. Such information has obvious importance not only for patient care but also for industry and public policy. This study sought to ascertain the accuracy with which parents who are restricting their children's diets because of food allergy were able to identify the restricted foods on labels of commonly available commercial food products.

## METHODS

Each patient attending the pediatric allergy clinic at Mt Sinai Hospital is sent a preclinic form before the initial visit. If the child was identified on the form as following a restricted diet, consent was sought to proceed with this study. One hundred eligible patients were asked to participate. The study consisted of a brief, self-administered questionnaire completed by the parent or parent pair during the visit. Demographic information and allergy information were requested, including the names of food(s) being restricted, the length of the dietary restriction, and details of prior dietary advice from various sources. The parents reviewed 23 food labels and were requested to indicate whether they would restrict the product from the child. If they indicated that they would avoid the food, they were

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Supported in part by NIH PO1 AI44236 (S.M.), K23 AI 01709-01 (S.H.S.), the Royal Australian College of Physicians and The University of Sydney (P.J.), and the Food Allergy Initiative.

Received for publication December 31, 2001; revised January 22, 2002; accepted for publication January 24, 2002.

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0091-6749/2002 \$35.00 + 0 1/87/123305

doi:10.1067/mai.2002.123305

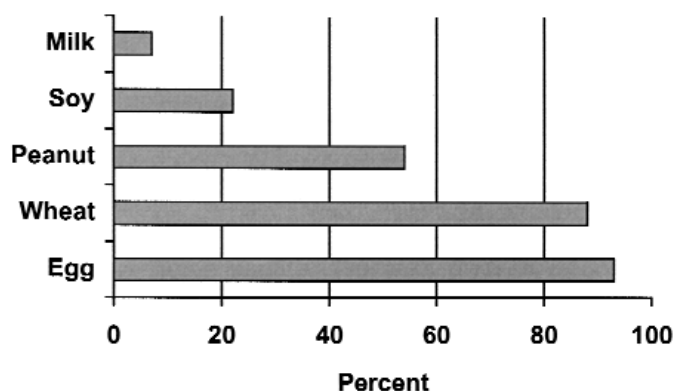


FIG 1. Percent of subjects with perfect label identification by food.

TABLE I. Label designations on 23 test labels

| Allergen | No. of labels on which common name is used | Other designations                                                                      |
|----------|--------------------------------------------|-----------------------------------------------------------------------------------------|
| Milk     | 5                                          | Whey (4)<br>Casein (2)<br>D* (natural flavor)<br>D* (butter flavor)<br>DE†              |
| Egg      | 7                                          | —                                                                                       |
| Wheat    | 8                                          | Semolina<br>Spelt flour                                                                 |
| Soy      | 7                                          | —                                                                                       |
| Peanut   | 2                                          | May contain traces of peanut (2)<br>Manufactured on equipment that processes peanut (1) |

\*D symbol denoted dairy.

†DE symbol denoted dairy equipment.

asked to name the food allergens to which the child was allergic that were present in the particular product. Scores were based on correct identification of the products containing ingredients that were being avoided for the child with appropriate identification of the ingredient being avoided.

Labels were selected to reflect the range of ways in which manufacturers label for allergenic ingredients, and 12 labels included more than 1 potential allergenic ingredient. The specific terms used on the 23 labels are shown in Table I. In all, there were 14 labels indicating milk, 7 indicating soy, 5 indicating peanut, 10 indicating wheat, and 7 indicating egg.

Data analysis was performed through use of SPSS software (SPSS, Inc, Chicago, Ill).  $\chi^2$  tests were used to compare values, and a *P* value of less than .05 was considered significant. This study was approved by the Institutional Review Board of the Mt Sinai Medical Center.

## RESULTS

### Subjects

Ninety-one parents/parent pairs returned the survey, representing 91 children ranging in age from 6 months to 14 years (median, 2 years). The period of dietary restriction ranged from 1 month to 14 years (median, 3 years). Thirty-eight parents (42%) indicated that their child had experienced anaphylaxis. Forty-two children (46%) had

prior evaluations in the clinical practice, 64 (70%) had received dietary advice through materials provided by the Food Allergy and Anaphylaxis Network (a lay educational organization for persons with food allergy), and 46 (51%) had previously received instruction from a dietitian. Forty-four parents (48%) indicated that they found it necessary to contact manufacturers to assist with the interpretation of food ingredient labels. Peanut was the most commonly restricted food (82 children), followed by milk, egg, soy, and wheat (60, 45, 27, and 16 children, respectively). Eight children had peanuts and tree nuts as their only restricted foods. The remainder had 2 or more food allergens restricted.

### Label interpretation

Of the 60 parents of milk-allergic children, 4 (7%) were able to correctly identify all 14 labels indicating milk. Most of the errors occurred when the *DE* symbol was the only indication of dairy and when the *D* symbol and the term *natural flavor* were used on the packaging.

Six (22%) of the 27 parents of soy-allergic children correctly identified soy protein in all 7 products. Errors centered primarily on 2 products in which there were multiple ingredients and for which the word *soy* was buried within the ingredient list. Another potential error in regard to soy is indicated by the fact that 13 of the 27 parents considered foods containing soybean oil or soy lecithin to be allergenic and restricted these. Although there are no large, definitive studies, soy oil in particular has generally been found to be safe and tolerated by soy-allergic individuals.<sup>8,9</sup>

Peanut was identified correctly in all 5 products by 44 (54%) of the 82 parents restricting peanut. A small label reading "Trace peanuts" that was not within or adjacent to the main ingredient list on a chocolate product resulted in the greatest number of errors.

Wheat (10 labels) and egg (7 labels) were correctly identified by most parents (14/16 and 42/45, respectively).

The rate of perfect product recognition for each allergen is shown in Fig 1. Ninety percent of the families with perfect label identification for milk and soy had previously attended our clinic and had met with the dietitian. This fraction was significantly greater than the 43% who had met with the dietitian among those with at least 1

incorrect response ( $P < .05$ ). Nine of the 10 parents with perfect label identification for milk or soy had received advice from the Food Allergy and Anaphylaxis Network; this fraction was significantly greater than the 39 (51%) of 77 parents with at least 1 incorrect response ( $P < .05$ ).

## DISCUSSION

For the more than 6 million Americans with food allergy, a variety of obstacles are in place that can impede their ability to identify commercial food products containing the allergens that they must avoid. In January 2001, the US Food and Drug Administration, reporting the results of an investigation of food companies, found that 25% of products contained undeclared allergenic ingredients, often from cross-contamination.<sup>7</sup> Our group<sup>6</sup> previously reported on a number of additional problems, such as differences in ingredients among different package sizes, differences between ingredient labels on inner packaging and ingredient labels on outer packaging, ingredients visible in the product that were not listed on the label, and reactions due to contaminations of products with allergens not disclosed on the label.

In this study, we addressed the accuracy with which parents of food-allergic children were able to determine the safety of commercial products for their children on the basis of their reading of product labels. Unfortunately, but not unexpectedly, the vast majority of parents made mistakes.

Milk was the ingredient most difficult to identify, all but 4 of the 60 parents of milk-allergic children failing to correctly identify all of the milk-containing foods. Using symbols to indicate the presence of dairy with no other written information provided on the package was associated with most of the errors, as were terms such as *natural flavors*. The parents' inability to identify milk is of concern but was not unexpected, given the large number of terms and symbols used to indicate the presence of this ingredient. Soy was the next most frequently incorrectly identified ingredient. Interestingly, some parents indicated that they would restrict a food containing soy oil or lecithin—ingredients that are generally tolerated by those with soy allergy<sup>8,9</sup> and that are found in many foods. Apparently, it is important to specifically address whether an individual needs to restrict soy oil so that families are not imposing unnecessary restrictions. Peanut was correctly identified by most parents; however, given the high rate of severe reactions to this food,<sup>5,10</sup> the margin of error is small. Not including terms such as *trace peanuts* in or near the main ingredient list resulted in the greatest number of errors.

There are potential biases in this investigation that could have resulted in better-than-expected label-reading accuracy. Our study was performed in a clinic specializing in the treatment of food allergy, and 46% of participants had a prior consultation. Moreover, the relatively controlled surroundings of the clinic, in contrast to the realities of shopping for and selecting appropriate products in the food market setting, might have facilitated more thorough reading of the labels. Indeed, parents who previously attended the clinic and met with the dietitian

were more likely to interpret the labels accurately. Similarly, contact with the Food Allergy and Anaphylaxis Network was associated with more correct responses. Evidently, additional education about label reading is helpful and necessary, though it does not lead to foolproof results.

In conclusion, parents make numerous mistakes when reading product labels, a problem that seems to be particularly prominent with regard to products containing milk and products containing soy. Mistakes such as these can result in allergic reactions and have the potential to be deadly. The magnitude of the confusion related to label reading is demonstrated by the fact that 48% of the participants indicated that they need to contact manufacturers to determine whether the food that they are avoiding is contained in products. For the sake of improving the ability of allergic individuals to properly identify allergens, we make the following suggestions:

- Simple terms, such as *milk*, should be used in place of less familiar terms, such as *casein*.
- Allergens should be declared when they are present in spices or natural flavors.
- Precautionary terms, such as *may contain*, should not be used unless it is clear that there are no other viable alternatives by which to prevent contamination despite good manufacturing practices.
- Given the results of this and previous studies,<sup>6,7</sup> it might be suggested that implementation of allergen prevention plans is needed for industry to reduce the introduction of unintended allergens and to ensure accurate labeling. Future considerations for alterations in labeling should include market analysis to determine the best way for information to be presented on food labels (eg, allergen warning sections and the use of boldface lettering). Finally, continued patient education on careful label reading is paramount.

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