06 June 2005

JIFSAN
Joint Institute for Food Safety and Applied Nutrition

University of Maryland

Food and Drug Administration

0220 Symons Hall
University of Maryland
College Park,
Maryland 20742

Tel: 301.405.8382
Fax: 301.405.8390

Cynthia Oshita
Office of Environmental Health Hazard Assessment ("OEHHA")
Proposition 65 Implementation
P.O. Box 4010
1001 I Street, 19th Floor
Sacramento, California 95812-4010

Re: April 8, 2005 Notice to Interested Parties Re: Workshop on Potential Regulatory Action Exempting from the Proposition 65 Warning Requirements, Exposures from Chemicals that Form from Natural Constituents in Food During Cooking or Heat Processing.

Dear Ms. Oshita:

I am the director of the Joint Institute for Food Safety and Applied Nutrition ("JIFSAN"), a multidisciplinary research, education and outreach program, established as a partnership between the United States Food and Drug Administration ("FDA") and the University of Maryland in April 1996. In that capacity, I have the opportunity to work closely with government and university researchers who are on the forefront of developing critical science-based foundations for sound food safety policy.

JIFSAN is therefore uniquely positioned to take on emergent food-related issues of interest to government regulators and industry and academic researchers. For example, we held two separate international workshops on acrylamide in October 2002 and April 2004. These events were attended by 170 and 140 scientists, respectively, and generated five JIFSAN-administered research projects. In addition, JIFSAN has established the Acrylamide Infonet on behalf of the U.N. Food and Agriculture Organization (FAO) and the World Health Organization (WHO) to facilitate efforts to evaluate the issues of acrylamide in foods.[i]

I have therefore been following with great interest the scientific and regulatory developments concerning trace amounts of acrylamide and other Proposition 65 chemicals that are created when the natural constituents in food are subjected to heat. I am a carbohydrate scientist by training, and like other scientists studying these issues, I have serious concerns about the potential unintended adverse consequences of blanketing grocery stores and restaurants with warnings to consumers about acrylamide or other chemicals that are present in a wide variety of foods at very low levels as the result of heating and cooking.

For the reasons explained in more detail below, it is my view that OEHHA must take action now to adopt a regulation that will exclude the byproducts of heating the natural constituents of foods from the scope of Proposition 65's warning requirement.

1. There Is No Sound Scientific or Policy Basis for Distinguishing Between Chemicals Formed by Growing Foods and Those Formed by Heating Foods.

The process of cultivating seeds into plants, plants into fruits, vegetables, and grain products, and fruits, vegetables and grain products into useable energy is one that depends on human activity. Soil must be prepared. Seeds must also be prepared and sown. Seedlings must be watered, exposed to sunlight, and protected. Proposition 65 chemicals form as the plant grows from these activities and produces fruits, vegetables, or grains. It is my understanding that Proposition 65 recognizes that these human activities do not make a food product subject to regulation under Proposition 65. It is simply not accurate to assume that such activities have no significant impact on the chemical composition of foods. For example, soil conditions such as pH or iron oxide content can significantly influence the uptake of metals or nutrients into plants.[2] These environmental conditions and human intervention to enable plants to grow (including decisions about where to plant), impact the composition of cereal grains and potato tubers.

The precursors known to form acrylamide during heating (e.g., glucose, fructose, and asparagine) are natural components of plants that are formed during growth and maturation of the plant. Thus, it would be virtually impossible to make many foods acceptable and edible to humans without the formation of acrylamide.

The fact is that there is no toxicological, health, regulatory, or policy difference between a chemical formed as a byproduct of cooking and the chemical as a product of human activities associated with cultivation. From a policy perspective, it makes no sense to identify harvest as a "bright line" along the spectrum of human activity associated with converting seeds into human energy. Each chemical is created within the food as the unintended result of human intervention.

From a toxicological point of view, the differences between these groups of chemicals are also irrelevant. Each has cancer or reproductive toxicity as an endpoint. The route of exposure is identical. Moreover, while different chemicals may have different mechanisms for carcinogenicity or reproductive toxicity, the mechanism of *how a chemical is created* in food (through exposure of a seed to minerals in soil, to irrigation, and to sunlight or through heating plant material to make it attractive and digestible) is irrelevant to the analytical process required to determine dose-response and to assess risk.

2. Massive Warnings Will Confuse or Disillusion Consumers.

Recent information indicates that plant-based foods containing acrylamide account *for approximately 40% of the caloric energy consumed in the typical diet*, and the list of such foods will continue to grow.[3] As our understanding of the mechanism of acrylamide formation grows, it is likely that this list will expand.

Nor will the list be limited to products containing acrylamide. Benzo(a)pyrene has also been detected in dark roasted coffee. Furans are also formed during cooking from some of the same types of precursors as acrylamide.[4] Already, approximately 1,200 compounds have been identified as products of the Maillard reactions involved in browning foods.[5] No less than 40 other chemicals currently listed under Proposition 65 may be created by heating other substances found in food, many of which are formed by smoking or cooking meats, fish, and poultry.[6] When these foods are taken into account, the scope of affected products may expand to cover the entire scope of the human diet.

I understand that Proposition 65 is a right-to-know statute, and no one disputes the value of informed consumer choices.[7] However, when *virtually every product* in the grocery store is the subject of a Proposition 65 warning, choice is illusory. Faced with this dilemma, consumers will likely tune out.

Among the research projects recently administered by JIFSAN as the result of its acrylamide workshops was a focus group study of consumer attitudes about acrylamide.[8] While limited in its scope, the results were illuminating, and confirm what many commentators have already told OEHHA on the record concerning consumer dismay in the face of omnipresent and conflicting information:

> There was some backlash against the ever-constant stream of new food/health threats, with some participants indicating there is always something new to be concerned about, and *if they cut out all of the foods that contained potential health risks, there would be nothing left to eat.*[9]

If they do not ignore warnings altogether, consumers may react in unpredictable (and, potentially, unhealthy) ways. In the past two years, OEHHA has heard from many experts in the field of food science and nutrition on the subject of consumer warnings. FDA and others have cautioned against indiscriminate warnings for products that carry very low risks to consumers.[10] Each has expressed concerns about confusion and potential adverse effects that a barrage of food warnings could have on consumers.[11]

These concerns are also confirmed by several focus group studies and other research.[12] In a study conducted by FDA with respect to advisories concerning methylmercury in tuna, for example, some participants displayed a tendency to "globalize" the information beyond the scope of the intended message to conclude that they should eat less fish overall. While the message was aimed at women who are or may soon be pregnant, participants also tended to interpret the message to mean that *all* people should reduce fish consumption.[13]

Another study concerning nutrient labeling confirms testimony that OEHHA has heard from Dr. Barbara Schneeman and others that consumers often react to nutritional information about health risks by making choices that do not reduce those risks.[14] The study indicated that people who were provided nutritional information that attempted to draw distinctions between "healthy" and "unhealthy" foods often did not make more healthy choices as a result. Where there were wide differences in qualities such as taste

between the two foods, consumers tended to substitute better-tasting "unhealthy" foods.[15] If this substitution effect is large, nutrient labeling may not change the overall consumption of "unhealthy" nutrients and thus may not lead to significant changes in health risk.

The lesson in all of this is that human response to dietary information is complex, and pronouncements influencing food choices must be carefully crafted to avoid unintended adverse consequences.[16] Food scientists acquainted with these issues routinely conduct consumer research and analyze the results prior to making recommendations about a particular label or warning.[17] As should be clear from the record before OEHHA, regulators whose job it is to assure the safety and healthfulness of the foods we eat routinely struggle with these issues in an attempt to strike the right balance.[18]

Conclusion

Based on all of the above, I share FDA's reluctance to advise consumers to make changes to their diets or cooking practices based on the current state of information regarding acrylamide or other chemicals formed by cooking.[19] If the world's experts cannot conclude from the information that these foods are unsafe for people, the public would be little helped to see warnings or disclosures about the presence of acrylamide on their foods. After all, there is reason to believe that these chemicals have been in the human diet for thousands of years without evident effect.

I therefore urge OEHHA to act now to adopt a regulation creating an exemption to Proposition 65 for the unintended chemical byproducts of heating the natural constituents of food.

Very truly yours,

David R. Lineback

cc: Joan Denton
Director, Office of Environmental Health Hazard Assessment
P.O. Box 4010
1001 I Street, 19th Floor
Sacramento, California 95812-4010

---

[1] Available at http://www.acrylamide-food.org.

[2] *See generally*, Brady and Weil, The Nature of and Properties of Soils, 13th ed. (discussing the effect of pH of soil on the uptake of various metals); *see also*, El-Kherbawy, M., J.S. Angle, A.E. Heggo, and R.L. Chaney (1989), Soil pH, rhizobia, and vesicular-arbuscular mycorrhizae inoculation effects on growth and heavy metal uptake of alfalfa (*Medicago sativa* L.), Biol. Fert. Soils 8:61-65.

[3] FDA Food Advisory Committee Meeting on Acrylamide, Feb. 24-25, 2003; http://www.cfsan.fda.gov/~lrd/pestadd.html#acrylamide.

[4] May 2005 Tr. at 100:11-13.

[5] Approximate Number of Chemicals Found in Browning Reaction (slide presented in support of testimony by Dr. Takayki Shibamato at the May 12, 2003 acrylamide workshop), available at http://www.oehha.ca.gov/prop65/public_meetings/pdf/Shibamoto_Modulation.pdf.

[6] Introduction to Food Toxicology, Takayuki Shibamoto and Leonard F. Bjeldanes, Academic Press (1993), p. 183; Turesky, R. J., et. al, *Quantitation of Carcinogenic Heterocyclic Aromatic Amines and Detection of Novel Heterocyclic Aromatic Amines in Cooked Meats and Grill Scrapings*, J. Agric. Food Chem. 53, 3248-3258 (2005). These listed compounds include polycyclic aromatic hydrocarbons (PAHs), amino acid or protein pyrolysates (also known as heterocyclic amines, or HCAs), and *N*-nitrosamines, all of which are formed when foods are heated. *Id.*

[7] Cal. Health & Safety Code § 25249.5, Historical Note § 1; Final Statement of Reasons for Section 12501 at 5; *see also, e.g.*, Transcript of May 2003 acrylamide workshop at 104, 116; Transcript of May 2005 cooking exemption workshop at 35:10-15, 61:5-6, 121:7-13.

[8] Consumer Behavioral Shifts: Understanding Consumer Response To Acrylamide and Other Food/Health Issues (April 2003).

[9] *Id.*, Executive summary, at 5-6 (emphasis added).

[10] May 2003 Tr. at 72:10-16 (remarks of FDA scientist Dr. Terry Troxell); OEHHA Background Materials for the CIC Consultation on OEHHA Proposed Acrylamide Workplan, Sept. 9, 2003, available at http://www.oehha.ca.gov/prop65/docs_state/acrylback.html ("Background Materials"), at Tab 5;. *see also* May 2003 Tr. at 71:25-72:9; 31:5-9, 68:8-11, 13-18, 70:25-71:14, 71:18-24, 72:20-23, 113:21-25, 116:1-5 (comments by Drs. Barbara Schneeman, Dr. Barbara Petersen, Dr. Henry Chin); May 2005 Tr. at 40:18-22 (comments of Dr. A. Larry Branen, Associate Vice President, Research and Outreach and Professor of Food Science and Toxicology, University of Idaho) ("Caution must also be taken in the potential labeling. Again, as I said, unwarranted consumer fears could lead to avoidance of foods that contribute significantly to the nutritional and satiety value of the American diet.").

[11] May 2003 Tr. at 31:16-18, 70:25-71:14, 71:18-24, 118, 122-123. May 2005 Transcript at 58:6-17.

[12] Consumer Behavioral Shifts: Understanding Consumer Response To Acrylamide and Other Food/Health Issues (April 2003).

[13] United States Food and Drug Administration, *Methylmercury in Fish - Summary of Key Findings from Focus Groups about the Methylmercury Advisory* (March 2005), available at http://www.cfsan.fda.gov/~dms/admehg3g.html.

[14] Mario F. Teisl and Alan S. Levy, *Does Nutrition Labeling Lead to Healthier Eating?* Journal of Food Distribution Research 3(28):19-26 (1997).

[15] *Id.*

[16] May 2003 Tr. at 146:25-147:4 (comments of Dr. Richard Forshee, Director, Center for Food and Nutrition Policy) ("[F]inally, we need to relate all of this complex information about how the pieces of the diet are interrelated with questions on what the overall impact on nutrition and health is going to be from making this particular change.") .

[17] *See, e.g.*, Cogent Research, *Impact of Trans Fat Label Information on Consumer Food Choices* (2003), available at http://www.ific.org/research/upload/Impact-of-Trans-Fat-Label-Information-on-Consumer-Food.pdf (studying the effectiveness of a label explanation of trans fat in the context of the diet reading,

"Intake of trans fat should be as low as possible."); Alan S. Levy, Sara B. Fein, and Raymond E. Schucker, *Performance Characteristics of Seven Nutrition Label Formats*, Journal of Public Policy and Marketing 15(1):1-15 (1996) (evaluating seven nutrition label formats to determine consumer comprehension and acceptance of displayed information); Alan S. Levy, Sara B. Fein, Raymond E. Schucker, *More Effective Nutrition Label Formats Are Not Necessarily Preferred*, Journal of American Dietetic Association 92(10):1230-1234 (1992) (experimental design used to compare performance and preference for five nutrition label formats) (1982); James T. Heimbach and Raymond C. Stokes, *Nutrition Labeling and Public Health: Survey of American Institute of Nutrition Members, Food Industry, and Consumers*, American Journal of Clinical Nutrition 36:700-708 (1982) (survey of industry and consumers concerning nutrition labeling of foods); Christine J. Lewis and Elizabeth A. Yetley, *Focus Group Sessions on Formats on Nutrition Labels*, Journal of the American Dietetic Association 92(1):62-66 (1992) (consumer focus study on the on the utility and appropriateness of selected components of nutrition label formats; results were used by FDA); Alan S. Levy and Sara B Fein, *Consumers' Ability to Perform Tasks Using Nutrition Labels*, Journal of Nutrition Education 30(4):210-217 (1998) (study analyzing consumers' ability to perform common nutritional label use task components, which revealed the effect of prior knowledge for relationships with demographic characteristics, label reading, and health status).

[18] For example, Dr. Barbara Schneeman (now of FDA) has provided testimony to OEHHA about her experiences with consumer overreactions to FDA dietary guidelines about fat. *See*, May 2003 Tr. at 139:23-140:5 ("I will add that I was on the '90 [FDA] committee, which was the first time we put in something about fat and tried to construct a message. And, indeed, the typical consumer response to previous messages, which was to avoid too much fat, was, oh, fat's bad, avoid fat, which is why then we came in '90 and said, oh, when we say avoid too much fat, we mean it's okay to have about 30 percent energy from fat.").

[19] May 2003 Tr. at 30:6-21 (comments of Dr. Terry Troxell of FDA).("Finally, we have been working on risk communication. We have released a dietary message on acrylamide. The current message is to eat a balanced diet, choosing a variety of foods that are low in trans fat and saturated fat and rich in high-fiber grains, fruits and vegetables. By the way, the WHO's message was to eat a balanced diet rich in fruits and vegetables. . . . . Some people have asked us to provide more specific advice; for example, by cooking practices at home. We believe that FDA does not have the science to provide target advice to consumers on reducing acrylamide levels in home-cooked foods.")