JIFSAN / NCFST Acrylamide in Food Workshop
White Paper for Working Group 5:
Risk Communication

I. PURPOSE AND OBJECTIVES

This white paper was designed to facilitate the discussions of Working Group 5 (Risk Communication) at the Joint Institute for Food Safety and Applied Nutrition (JIFSAN)-National Center for Food Safety and Toxicology (NCFST) Workshop, "Acrylamide in Food: Scientific Issues, Uncertainties, and Research Strategies," ("The JIFSAN Workshop"), held in Chicago, IL, October 28-30, 2002. The main objective was to stimulate thought by 1) posing several overarching questions for consideration by Working Group members, and (2) framing plausible sample scenarios that would require communicating with various stakeholders about risks from acrylamide in the diet.

It is anticipated that a major international research effort on acrylamide in food will be taking place over the next several years. At the JIFSAN Workshop, invited experts in five subject areas (working groups) identified data gaps in the scientific knowledge. The Workshop's conclusions include high-priority needs that will be included in a research agenda. Some research recommendations have already been articulated in the report of a Joint WHO /FAO Consultation on Health Implications of Acrylamide in Food, held 25-27 June 2002 in Geneva ("WHO 2002"). Although it cannot be predicted with real certainty what specific research will be undertaken, the subject areas of the five working groups at the JIFSAN Workshop and the WHO/FAO recommendations provide focus and were used as the basis for the development of the scenarios presented in this paper.

II. PRIMER ON RISK COMMUNICATION

Communication about the risks of acrylamide in foods warrants special attention because the highly technical nature of the subject and the evolving science make it more difficult than communication about other controversial issues. In context of this white paper, the broader definition of risk communication by the National Academy of Sciences in 1989 is utilized.[1] The NAS defined risk communication as "an interactive process of exchange of information and opinion among individuals, groups, and institutions. It involves multiple messages about the nature of risk and other messages, not strictly about risk, that express concerns, opinions, or reactions to risk messages or to legal and institutional arrangements for risk management."

Thus, risk communication includes not only announcements, warnings, and instructions from expert sources to non-expert audiences, but also other kinds of messages – about risk information and information sources, about personal beliefs and feelings concerning

[1] National Research Council, National Academy of Sciences (NRC-NAS). Improving Risk Communication. National Academy Press, Washington DC 1989.

risk and hazards, and about reactions to risk management actions and institutions. Risk messages can come from a variety of sources: physicians, journalists, regulatory agencies, manufacturers, environmental groups, health officials, and various self-appointed experts. However, because they flow in only one direction, they are only part of the interactive risk communication process. Given this broader context, following are several considerations for a successful risk communication program. These considerations were also articulated by the NRC-NAS in its 1989 report on Improving Risk Communication:

- Risk communication is successful only to the extent that it raises the level of understanding of relevant issues or actions and satisfies those involved that they are adequately informed within the limits of available knowledge.
- Risk communication is a component of risk management. Successful risk communication does not guarantee that risk management decisions will maximize general welfare; it only ensures that decision makers will understand what is known about the implications for welfare and the available options.
- A risk communication process that disseminates accurate information is not successful unless the potential recipients achieve a sufficient understanding. The recipient of the information must be able to achieve a complete understanding of the information he/she desires.
- Risk communication is more than one-way transmission of expert knowledge to the uninformed. Messages about expert knowledge are necessary to the risk communication process; they are not sufficient, however, for the process to be successful.
- Although consensus on controversial issues is often the criterion of success for producers of risk messages, it may not be appropriate for risk communication process in a democracy. Successful risk communication need not result in consensus about controversial issues.

A clear understanding of public "hot button" issues can help focus communication strategies. Within this broader context of risk communication, the public's perception of the acrylamide in food risk should also be considered and addressed. A presentation by the Harvard Center for Risk Analysis (available on the JIFSAN website) examines relevant factors. As the JIFSAN Workshop was held to proactively identify data gaps and a research agenda to better understand acrylamide risks, it should serve well as a starting point to gain public trust in the near and long term.

III. QUESTIONS FOR PANEL CONSIDERATION

Although it cannot be predicted with real certainty what specific research will be undertaken, the subject areas of the five working groups at the JIFSAN Workshop and the WHO/FAO recommendations suggest that there will be a number of scenarios for which risk communication strategy will be needed. While these scenarios will vary depending on future scientific, regulatory and political developments, there are a number of questions that would be applicable to all scenarios. These overarching questions are outlined below.

1) What is the best overall approach to manage the flow of communications concerning acrylamide risks from food, and ongoing research, considering that, over the next few years: a) research activities may not be precisely coordinated; b) pieces of the health risk puzzle may be emerging slowly, and, at any point in time, quality of available data may range from preliminary findings to published, peer-reviewed conclusions; c)the release of research outcomes may be leaked prematurely to the media.

2) Is there a need to develop a network (of government, industry and academic researchers) to coordinate research information as it is being generated?

3) "Weight of evidence" will develop over time – do we need a process to systematically track the information and provide context for the public?

4) Meanwhile, are there contextual messages that might serve as an anchor/focus of food safety communication while science is being developed? For example, the complexities of understanding the effects of carcinogens and anti-carcinogens in foods?

5) The public does not appear excited about acrylamide in foods at this point. What could change this sentiment? Could/should anything be done in advance to try to make the issue less prone to going "critical"?

6) Is there a need for attitudinal research to better understand how best to communicate with various audiences?

IV. HYPOTHETICAL SCENARIOS FOR COMMUNICATION ABOUT RISKS OF ACRYLAMIDE IN FOODS

The assessment of cancer risk from exposure to any substance involves a "weight-of-the-evidence" approach that considers all the different kinds of relevant available data. The acrylamide research program will consist of many different studies over a period of several years; at any point in time during this period, a weight of the available evidence may lead to different conclusions about the risk. Two sets of hypothetical scenarios are presented below: the first set deals with scientific developments specific to acrylamide; the second set comprises more generic developments that may occur during any multi-year research effort aimed at understanding a health risk.

A. Scenarios Driven By Scientific Developments On Acrylamide

Starting with the WHO/FAO's recommendations and the nature and charge of the JIFSAN Workshop Working Groups, the following types of studies and possible outcomes can be postulated:

1. Studies on mechanisms of formation of acrylamide in foods

These studies could result in more detailed understanding of acrylamide formation, including better characterization of ingredients and processing conditions under which acrylamide formation is avoidable and unavoidable. These results could lead to the following scenarios:

- Bench-scale processing conditions are defined that significantly reduce acrylamide formation in foods, but industry implementation would entail major changes in product formulas or costly retooling of processing operations.
- Efforts to reduce acrylamide levels may produce unintended side effects such as safety concerns from undercooking food.
- Expert(s) recommend that consumers simply avoid, or reduce consumption of, certain type(s) of processed/cooked foods.

2. Methods of Analysis

The WHO/FAO Consultation recommended that low-cost, simple methods for routine monitoring of acrylamide in foods be developed. Research effort in this area could lead to the following scenarios:

- Low-cost methods for detection of acrylamide at very low levels become available and food monitoring programs are implemented by government agencies worldwide. Results could lead to the conclusion that the incidence of acrylamide in foods is much more widespread than originally anticipated. (See Table 1 for summary of concentrations in foods reported thus far.)
- While the detection capability is enhanced, rigorous scientific information on health effects associated with acrylamide levels in foods is much slower in coming.
- Analytical problems are too complex – adequate, cost-effective methods are not validated in the next few years; thus, the existence and/or extent of the problem cannot be fully characterized.

3. Studies on Exposure and Biomarkers

- Preliminary data on acrylamide levels detected in certain foods from the Center for Science in the Public Interest (CSPI) and the governments of Norway, Netherlands, Sweden, Switzerland and UK are summarized in Table 1. Additional data on consumption of specific foods in the US, and acrylamide concentrations in those foods, would lead to more accurate estimates of acrylamide intake and dietary contribution to risk for subgroups, such as children.
- Studies on environmental exposures to acrylamide in food service settings are also possible. Potential occupational exposure coupling with dietary exposure

could lead to the identification of vulnerable sub-groups with high exposure to acrylamide.

- The WHO/FAO concluded "given the state of knowledge on methods of formation and levels of acrylamide in foods, biomarkers of exposure are likely to provide the most direct means of evaluating exposures to acrylamide from food and other sources." Studies to calibrate these biomarkers and to evaluate their correlation with dietary intakes were recommended. Biomarkers reflect the sum total of exposure from all sources. There are known environmental and occupational sources of acrylamide. Questions of source apportionment and the utility of biomarkers in assessing dietary risks are extremely complex and will take considerable time and effort to resolve. However, measurements of acrylamide biomarkers in blood and tissues can be carried out today at a number of academic or non-academic institutions. A possible scenario is that a small study on children is conducted and shows correlations between the biomarkers and dietary intakes of certain foods. While the study may have many scientific limitations, the media focus on the results could garner much public attention and create serious concerns.

4. Studies on toxicity and metabolic consequences.

A number of possible outcomes/scenarios could be envisioned from this kind of research, including:

- Evidence is consistent with increased cancer risk associated with specific foods.
- Evidence is inconsistent with increased cancer risk from specific foods, but may support association with certain dietary patterns.
- Non-cancer effects such as neurotoxicity (and possibly developmental neurotoxicity) are found to occur at lower doses than previously expected, in the range of dietary exposures.
- Scientists continue to debate the merit of relying on animal data at high doses to characterize risk at low dose through dietary exposure in humans, while detection and monitoring efforts are advancing at a much more rapid pace. (see scenario described under analytical method section)

B. Generic Scenarios Relating To Risk Research Programs.

These scenarios could occur at any point during the acrylamide research program:

1. Multiple Risk Assessment

    - As scientific information periodically emerges during the concerted research effort, different groups with diverging agendas would be tempted to use incomplete and limited information to conduct risk assessment to promote their points of view. In these assessments, different assumptions

based on different interpretation of the incomplete science would be used. Consequently, the public would be confronted with conflicting interpretation of science.

2. Legal/regulatory developments.

   - At any point during the research program, a US or international health or regulatory agency, or private party, may decide to act, for example:

     a) Issuance of consumer warning/advisory
     b) "Safe" levels/regulatory action levels for specific foods
     c) Recommended caution, limitations on consumption of certain foods
     d) Prop 65: complaints or lawsuits are filed, with corresponding publicity

V. CONCLUSIONS

There is an extraordinary opportunity to help frame public understanding of the emerging science of acrylamide in food in an open and transparent fashion. This may help influence how the public and regulators view this issue. This JIFSAN meeting and the process of bringing together diverse disciplines and discussing the scientific issues in an environment of sharing is a unique and progressive approach to develop an effective and efficient research agenda.

Short-term communication strategies

While the research agenda is pursued, there will be incremental releases of information that should be put in context of evolving science. It is important that as new information is made widely available in an open manner, messages are put in perspective. The short-term perspectives include:

- Acrylamide is present in foods and there is exposure, but there is not yet any evidence of harm from human consumption.
- There is great uncertainty in acrylamide toxicity information.
- Consumers should continue eating a balanced diet.
- Web links to expert organizations and credible acrylamide information are now available; i.e. International Food Information Council (IFIC) Q & A, Food and Drug Administration Statement, JIFSAN Acrylamide page.
- A network of experts is available to journalists from IFIC, the Council for Agricultural Science and Technology and Institute of Food Technologists.

Longer term communication strategies (up to 2 years)

1. Attitudinal research will provide the following information that is critical for risk communication purposes:

- Baseline information on consumer awareness and knowledge will be generated. It is very important to understand what consumers know about acrylamide in food in order to help them understand emerging information.
- Triggers for behavioral change may be identified.
- Consumer sources for food safety information will be examined. There has been a changing trend from where consumers obtain information on food and health during the last decade.
- Keys to helping consumers navigate conflicting information and messages will be highlighted.
- Messengers who are most trusted by the public will be highlighted.

2. Establish an information clearinghouse and evidence review process

- A clearinghouse where most up-to-date research findings, calendar of events, anticipated timeline for new research and information will be accessible.
- The existing JIFSAN/WHO established network of information provides the starting foundation for this clearinghouse.
- Integration of an evidence review process into the clearinghouse would provide context to the evolving scientific information. Model systems to conduct evidence review should be evaluated to select a transparent system amenable to this dynamic information clearinghouse.
- Full participation by a broad group of stakeholders is critical in demonstrating a willingness to be transparent.

3. Communication Programs

   a. Establish an "Expert Network"
      - Develop a network of experts who are trusted by the public who can help decipher the complex and evolving scientific information.
      - Include current experts who attended the JIFSAN workshop, and include other experts from various organizations (IFIC, CAST, IFT, American Dietetic Association, etc), federal agencies (FDA, Environmental Protection Agency, Centers for Disease Control and Prevention), international experts (WHO-FAO), and other scientists who are also working on acrylamide related research/activities.
      - Include a process to update experts with current and emerging information.

   b. Media tracking/outreach
      - Track media trends on acrylamide in food over time.
      - Regularly update thought leaders.

c. Backgrounder
   - Produce a short document that provides the state-of-the-art on the science of acrylamide in partnership with credible government, academic or professional organizations.
   - Rapidly update as new science emerges.
   - Provide to journalists and thought leaders.

d. Glossary
   - Provide a definition of terms and acronyms commonly used in acrylamide communication instruments.

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Table 1. **ACRYLAMIDE LEVELS AND DATA SOURCES IN TESTED FOODS**
ug/kg (ppb)

	Arithmetic Mean	Geometric Mean	Median	Data sources					
				CSPI	Norway	Netherlands	Sweden	Switzerland	UK
Bread	36	35	30		X	X	X	X	
French Fries	887	293	320	X	X	X	X	X	X
Potato Chips	1241	967	1115	X	X	X	X	X	X
Biscuit/Cookie	399	132	100		X	X	X	X	
Crisp Bread	1082	233	176			X	X		X
Cereal	216	163	189	X	X		X	X	X
Corn Chips	742	116	162	X			X		
Pop Corn	416	416	416				X		
Battered Fried Products	37	41	39				X		
Fried Potato	170	145	183		X			X	
Coffee (ground roast)	250	249	255					X	