

## **FAO/WHO Acrylamide in Food Infonet Update** **Number 1 – April 2003**

This Infonet Update is a summary of information collected by the Acrylamide Infonet up to February 12, 2003 with the research projects updated through April 9.

### **Research Database**

On April 9, 43 projects had been registered in the research database. They are distributed as follows: Occurrence in Food (18); Analytical Methodology (11); Mechanisms of formation (12); Exposure assessment (6); Genotoxicity (6); Carcinogenesis (6); Neurotoxicity (4); Biomarkers (3); Oncogenic mechanism (1), Reproductive toxicity (1); Other toxicology (3) – endocrinology (1), epidemiology (1), metabolism (1); Asparagine content (1); Mechanism of action (2); Methods for potential reduction of acrylamide in foods (2), Literature search (5).

Most of the studies are just being initiated or are still in progress, however the database includes references for some published studies. There are results listed from studies concerning the occurrence in acrylamide in foods in Japan. Determinations of the acrylamide content of foods are occurring in Australia, Italy, Japan, Norway, Poland and the United States. Studies are underway in Norway and Sweden to determine methods to reduce the acrylamide content of selected foods. Several studies on various aspects of toxicology including carcinogenesis, neurotoxicity, and genotoxicity have been initiated.

### **Remaining Research Gaps**

Gaps in research are identified by comparing the projects registered and their results with the recommendations of the 2002 FAO/WHO Consultation on the Health Implications of Acrylamide in Food.

At this time, it is difficult to assess the extent of research gaps until some of the results and additional projects are registered. It is clear that work is underway in many countries in virtually all of the categories listed; however not all researchers have registered their projects. Efforts will continue to identify projects and assist researchers with entering projects into the database. This will enable a better assessment of what is being done, where it is being done, and what is not being done (the research gaps).

However, on the basis of what is known, there is a decided gap in determination of acrylamide in many food categories, particularly those differing between countries/regions. A distinct and important gap exists in the category of restaurant, food service, and home preparation and the amount of acrylamide found in food prepared in those locations.

Additional research is needed on the mechanism of formation of acrylamide in food with emphasis on whether there are alternative mechanisms occurring that do not involve asparagine. Measurement of the asparagine content of a wider variety of foods is also

needed to assist in determining the importance of this amino acid in acrylamide formation in foods. In addition, no new epidemiological work investigating the issue of dietary intake of acrylamide appears to have been initiated.

The Infonet Updates aim to provide **trend monitoring of acrylamide** in food data, at the level of identifying gaps in data (foods/regions not covered), and consistency or not with the conclusions of the FAO/WHO Consultation. At this stage, insufficient data is currently available to determine any trends. More projects with resulting data are needed before this can be assessed.

### **Studies Published in the Peer Reviewed Literature**

The following list includes studies identified by the Infonet. Researchers are encouraged to advise the Infonet of any additional publications.

1. A. Becalski, B. P.-Y. Lau, D. Lewis and S. W. Seaman. Acrylamide in foods: Occurrence, sources, and modeling. *J. Agric. Food Chem.* 51:802-808 (2003).
2. T. R. Fennell, R. W. Snyder, W. L. Krol, and S. C. J. Sumner. 2003. Comparison of the hemoglobin adducts formed by administration of N-methylolacrylamide and acrylamide to rats. *Toxicol. Sci.* 71:164-175.
3. D. S. Mottram, B. L. Wedzicha, and A. T. Dodson. Acrylamide is formed in the Maillard reaction. *Nature* 419:448-449(2002).
4. L. A. Mucci, P. W. Dickman, G. Steineck, H.-O. Adami and K. Augustsson. Dietary acrylamide and cancer of the large bowel, kidney, and bladder: Absence of an association in a population-based study in Sweden. *British J. Cancer* 88:84-89 (2003).
5. H. Ono, Y. Chuda, M. Ohnishi-Kameyama, H. Yada, M. Ishizaka, H. Kobayashi, and M. Yoshida. 2003. Analysis of acrylamide by LC-MS/MS and GC-MS in processed Japanese foods. *Food Addit. Contam.* 20: in press.
6. B. Paulsson, N. Kotova, J. Grawe, A. Henderson, F. Granath, B. Golding, and M. Tornqvist. 2003. Induction of micronuclei in mouse and rat by glycidamide, genotoxic metabolite of acrylamide. *Mutation Res.* 535:15-24.
7. J. Rosen and K. Hellenas. 2002. Analysis of acrylamide in cooked foods by liquid chromatography tandem mass spectrometry. *Analyst* 127:880-882.
8. R. S. Stadler, I. Blank, N. Varga, F. Robert, J. Hau, P. A. Guy, M.-C. Robert, and S. Riediker. Acrylamide from Maillard reaction products. *Nature* 419: 449 (2002).

9. E. Tareke, P. Rydberg, P. Karlsson, S. Eriksson, and M. Tornqvist. 2002. Analysis of acrylamide, A carcinogen formed in heated foodstuffs. *J. Agric. Food Chem.* 50:4998-5006.
10. E. Tareke, P. Ryberg, P. Karlsson, S. Eriksson, M. Tornqvist. 2002. Acrylamide: A cooking carcinogen? *Chem. Res. Toxicol.* 13:517-522 (2002).
11. F. Tateo and M. Bononi. 2003. Title not available (Will describe a new GC/MS method, simplified in the extraction phase, for detection and quantitation of underivatized acrylamide). *J. Italian Food Sci.* 15(1):in press.
12. V. A. Yaylayan, A. Wnorowski, and C. P. Locas. 2003. Why asparagine needs carbohydrates to generate acrylamide. *J. Agric. Food Chem.* 51: in press. (on web at <http://dx.doi.org/10.1021/jf0261506>)

### **Events and Activities**

An FAO/WHO Informal Workshop on Acrylamide was held in conjunction with the 35<sup>th</sup> Meeting of the Codex Committee for Food Additives and Contaminants (CCFAC), in Arusha, 16 March 2003. This Workshop provided an opportunity for countries to share information, including on research underway to further investigate the health implications of acrylamide in food, and on data gaps that need to be filled. The presentations can be accessed at [http://www.fao.org/es/ESN/jecfa/acrylamide\\_en.stm](http://www.fao.org/es/ESN/jecfa/acrylamide_en.stm)