

(e) *Analysis of environmental carcinogens and analytical quality assurance*

- (i) *International mycotoxin check sample programme* (Dr M. Friesen, Mrs L. Garren and Miss Y. Granjard; supported in part by the Food and Drug Administration, USA, under contract No. NOI CP 55630 with the National Cancer Institute, USA, and, in part, by the Joint FAO/WHO Food and Animal Feed Contamination Monitoring Programme)

As the measurement of human exposure to carcinogens is a matter of general concern and importance, a programme which enables individual laboratories to judge critically and to improve their analytical results is of considerable value. A programme of analytical quality assurance is now available to laboratories involved in the analysis of aflatoxins B₁, B₂, G₁ and G₂⁶, aflatoxin M₁⁷ and ochratoxin A⁸. Any laboratory wishing to compare its analytical results with those of a large group of laboratories using the same or different methodology may participate without charge. Individual results are identified only by laboratory code numbers. Statistical analyses carried out on the ensemble of results assist in the comparison of analytical techniques.

In the current series, 134 laboratories in 41 countries participated in the analysis of samples of finished peanut butter and yellow corn meal for aflatoxins B₁, B₂, G₁ and G₂ and 81 laboratories in 28 countries analysed lyophilized milk for aflatoxin M₁. A subgroup of 32 laboratories also participated as part of the FAO/WHO Food and Animal Feed Contamination Monitoring Programme to help assure the quality of results generated by the programme's collaborating centres around the world.

- (ii) *Carcinogens in environmental samples* (Dr M. Castegnaro and Miss M. C. Bourgade; in collaboration with Dr C. L. Walters, British Food Manufacturing Industries Research Association, Leatherhead, UK; The Association of Official Analytical Chemists (AOAC); The American Society of Brewing Chemists (ASBC); Mr L. Charpenet, Science Faculty, St-Cyr-l'Ecole, France; Professeur R. Truhaut, Faculty of Pharmacy, Paris)

Collaborative studies

- (1) *Total N-nitroso compounds* (in collaboration with Dr C. L. Walters, BFMIRA, Leatherhead, UK; and with the support of IUPAC)

Step I of a multi-stage collaborative study of methods of analysis for total N-nitroso compounds devised by Dr Walters' group⁹⁻¹¹ has been initiated. This study involves determination of various N-nitroso compounds dissolved in ethyl acetate. Eleven laboratories are participating in the study.

⁶ Friesen, M. D. & Garren, L. (1982) *J. Assoc. off. anal. Chem.*, **65**, no. 4 (in press).

⁷ Friesen, M. D. & Garren, L. (1982) *J. Assoc. off. anal. Chem.*, **65**, no. 4 (in press).

⁸ Friesen, M. D. & Garren, L. (1982) *J. Assoc. off. anal. Chem.* (in press).

⁹ Downes, M. J., Edwards, M. W., Eisey, T. S. & Walters, C. L. (1976) *Analyst*, **101**, 742-748.

¹⁰ Walters, C. L., Downes, M. J., Edwards, M. W. & Smith, P. L. R. (1976) *Analyst*, **103**, 1127-1133.

¹¹ Walters, C. L., Hart, R. J. & Perne, S. (1976) *Z. Lebensmittel. Untersuch. Forsch.*, **167**, 315-319.

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- (2) *Volatile nitrosamines in beer* (in collaboration with the AOAC *ad hoc* Committee for Analysis of Volatile Nitrosamines)

The results of the study organized in 1981 have been published and the method adopted by the AOAC as an official first action¹².

- (3) *Volatile nitrosamines in malt* (in collaboration with ASBC and the AOAC *ad hoc* Committee for Analysis of Nitrosamines)

As a member of the AOAC group, IARC was asked to take part in a study involving testing of three methods, i.e., mineral oil vacuum distillation, celite column and wort extraction. The results have now been made available, and the following recommendation was adopted: Vacuum distillation is included as a reference method and celite column extraction as a screening method in the methods of analysis of ASBC.

- (4) *NDMA in non-fat dry milk* (in collaboration with the AOAC *ad hoc* Committee for Analysis of Volatile Nitrosamines)

A study to evaluate the celite column extraction method is in progress.

Volatile nitrosamines in exhaust gas from diesel engines (in collaboration with Mr L. Charpenet, Science Faculty, St-Cyr-l'Ecole, France)

A pilot study has been performed to analyse effluents from diesel exhaust engines. It was found that, using Thermosorb cartridges, NDEA could be detected as an artefact of the sampling system. Using trapping in potash solution, no volatile nitrosamine was detected.

Volatile nitrosamines in tobacco smoke condensates (in collaboration with Professor R. Truhaut, Faculty of Pharmacy, Paris)

The sampling and analytical conditions have been standardized, providing a 20% variation in the level of nitrosamines detected in a batch of samples. Large variations were found between cigarettes from different batches. Seven types of cigarette were investigated. The data are being analysed.

- (iii) *Polycyclic aromatic hydrocarbons in human tissue* (Dr I. K. O'Neill, Dr M. Castegnaro and Mrs L. Garren; in collaboration with Dr P. L. Grover, Chester Beatty Research Institute, London)

Because some polycyclic aromatic hydrocarbons (PAH's) are potent mammary carcinogens in rats and have recently been shown to become activated to DNA-binding metabolites by epithelial cells prepared from human mammary tissue¹³, we examined whether PAH are stored in human fat. Breast tissue samples from seven healthy women undergoing cosmetic size-reduction of over-large breasts, were obtained and extracted. Analysis by HPLC with UV and fluorescence detection showed the presence of benzo[a]pyrene in six of eight samples. Due to the small size of the samples provided and the low levels of PAH, it was not possible to perform a complete profile analysis according to Grimmer's method.

¹² Sen, N. P., Seaman, S. & Bickis, M. (1982) *J. Assoc. off. anal. Chem.*, 65, 720-729.

¹³ Grover, P. L., MacNicol, A. D., Sims, P., Easty, G. C. & Neville, A. M. (1980) *Int. J. Cancer*, 26, 467-475.

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