

RELIABLE METHODS FOR BIOMONITORING OF OCCUPATIONAL EXPOSURE PUBLISHED BY THE DFG-SENATE-COMMISSION FOR THE INVESTIGATION OF HEALTH HAZARDS OF CHEMICAL COMPOUNDS IN THE WORK AREA

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Preface

The Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area was founded by the Deutsche Forschungsgemeinschaft (DFG) in 1955. The Commission advises the German government and its agencies concerning the estimation of health risks by chemical exposure and their prevention. Within the commission the working group "Analyses of Hazardous Substances in Biological Materials" (AibM) develops and verifies procedures for the determination of chemical substances in biological materials. Most of these detailed, ready-to-use human biomonitoring (HBM) methods do not only enable the monitoring of occupational exposures but also the determination of the chemical exposure in the general population.

Submission and examination process

Figure 1 shows the scheme of the submission and examination process in the AibM working group. Generally, a member of the working group or an external expert ('author') submits a human biomonitoring method to the group. Moreover, in some cases a member of the group is asked to develop a method for a HBM parameter which is missing in the method collection of the working group (Stage 0). After a first discussion on the submitted method the AibM group selects at least one examiner (Stage 1), who tries to reproduce the method in her/his laboratory and to verify the reliability criteria. The report given by the examiner is discussed within the group (Stage 2). The method may be adopted for publication or may be given back to the author with demand for revision. Again, the results of the revision are reviewed and reported by the examiner. In case of fundamental drawbacks the method is rejected. At least the following reliability criteria have to be tested and documented by authors and examiners:

- Sensitivity: demonstrated by the limit of detection (LOD) and the limit of quantification (LOQ)
- Repeatability: contains data for within-day precision and precision from day to day.
- Accuracy: information on relative and absolute recovery; if available: results for certified reference materials (CRM) or intercomparison studies

Moreover, information on working range, linearity, robustness and interferences are documented.

The adopted methods are published at regular intervals in German and English (see References). The publications contain all details of the procedures and the reliability data of the methods.

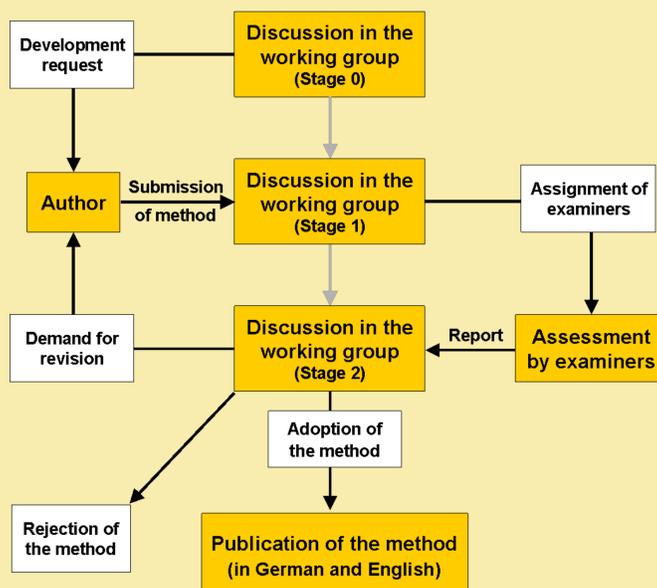


Fig. 1: Process of development, examination and decision making in the AibM group.

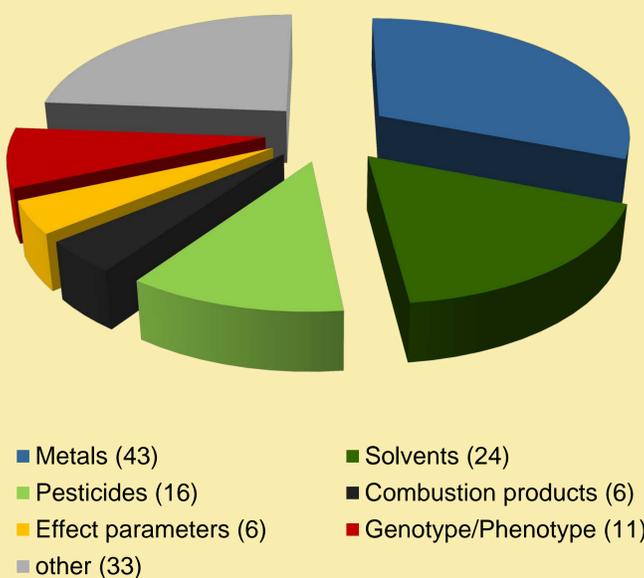


Fig. 2: Groups of parameters determined by the biomonitoring methods of the MAK-Collection (number in brackets).

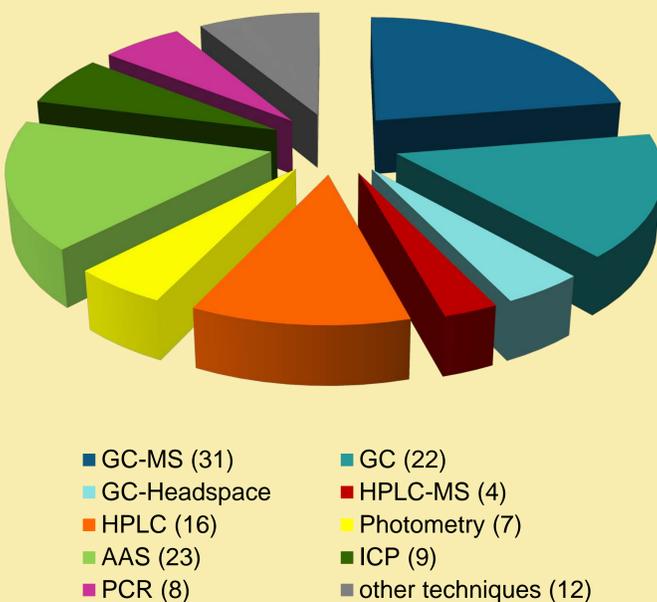


Fig. 3: Analytical techniques used in the biomonitoring methods of the MAK-Collection (number in brackets).

Publications of the AibM working group

Since 1985 the working group has published 139 analytical methods and 12 general chapters on biomonitoring techniques in 12 issues of the English edition. These procedures refer to the analyses of different agents or effects in human biological materials: metals, solvents, pesticides, markers of susceptibility, biomarker of combustion products and tobacco smoke, biological effect markers and further occupationally used chemicals (Fig. 2). The analytical techniques used for these methods are mainly GC and HPLC procedures for organic compounds and AAS and ICP for inorganic parameters (Fig. 3). A lot of the methods enable the determination of the environmental exposure, too.

Conclusions

The AibM working group promotes the development and publication of biomonitoring methods for the determination of occupational and environmental chemical exposure.

The crucial benefit of this work is the supply of unambiguous composed procedures with proven reliability.

Acknowledgment

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References

Henschler D, Greim H, Angerer J, Schaller KH (eds): Analyses of Hazardous Substances in Biological Materials. Vol. 1-9, WILEY-VCH, Weinheim (1985-2004) [ISSN 0179-7247].

Greim H, Hartwig A, Angerer J (eds): The MAK-Collection for Occupational Health and Safety. Part IV. Biomonitoring Methods. Vol. 10-12, WILEY-VCH, Weinheim (2005-2010) [ISSN 1860-4994].



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Since January 2012 all publications of the DFG-Senate-Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area (The MAK-Collection for Occupational Health and Safety) are available in open access via

<http://onlinelibrary.wiley.com/book/10.1002/3527600418/topics>