



Provision of efficient and verified biomonitoring methods by the MAK Commission

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DFG Deutsche Forschungsgemeinschaft

FAU Friedrich-Alexander-Universität Medizinische Fakultät

KIT Karlsruher Institut für Technologie

Introduction

- **Biomonitoring** represents the most powerful approach to **assess individual exposure and health risk** of workers from chemical compounds.
- **Challenges of biomonitoring analysis** are **availability and implementation of high-quality biomonitoring methods**.
- **Regular published biomonitoring methods** are often
 - lacking sufficient data on reliability criteria
 - difficult to reproduce due to missing detailed information
- **MAK Commission** (Permanent Senate Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area)
 - founded in 1955 by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation)
 - responsible for the **assessment of toxicological data and analytical capacity for exposure monitoring**
 - includes a working group “**Analyses of Hazardous Substances in Biological Materials**” (**AibM**), which develops, verifies, and publishes high-quality human **biomonitoring methods**

Methodology

- **Submitted/requested biomonitoring methods** are assessed in a specified multi-stage process including
 - practical **replication** and verification in at least one **independent lab**
 - checking of **practical reproducibility** and
 - **reliability criteria** (precision, recovery, LOD, LOQ, matrix effects)

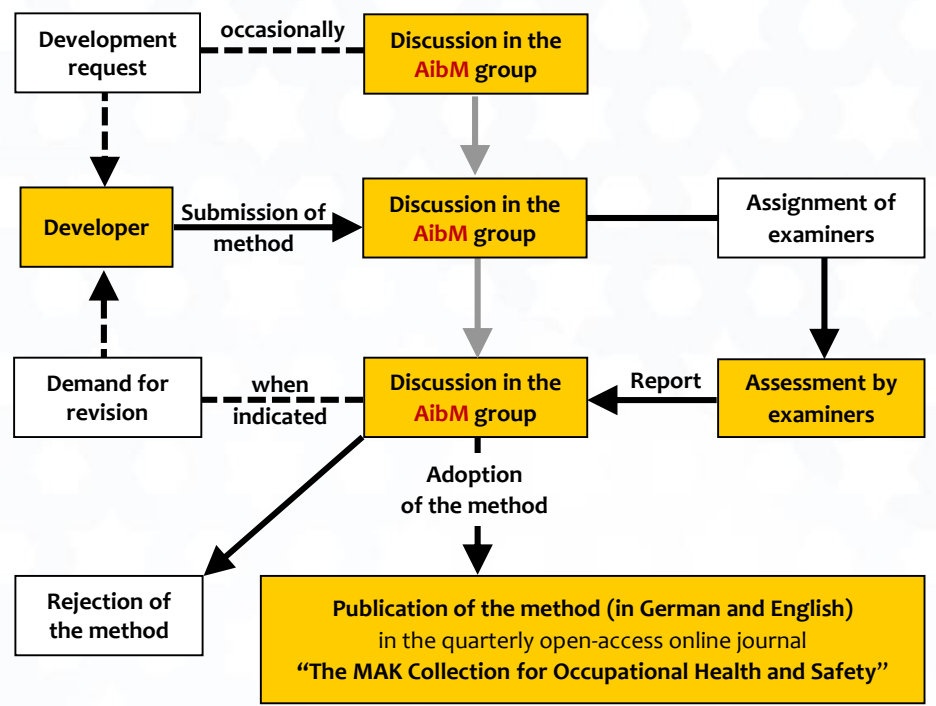


Figure: Process of development, examination, and publication by the AibM group

Results

- The **AibM group** has developed, verified and published nearly **200 biomonitoring methods** in English since 1985
- **AibM methods** include
 - **Inorganic** parameters (Cr, Hg, Pb, Sb, ...)
 - **Organic** parameters (solvents, plasticisers, pesticides, ...)
 - **Element species** (As, Sb, Se, ...)
 - **Multimethods** (e.g. chlorophenols, alkylating substances, ...)
- **AibM methods** are comprehensively validated, and **reliability data** are confirmed by replication and verification of the procedure in independent laboratories (by examiners).
- **Outdated AibM methods** are continuously replaced by new methods with more up-to-date equipment.
- **AibM cooperates** closely with the MAK working group on **assessment values in biological material (BAT group)**, which develops concepts and assessment values for the use of biomonitoring in occupational settings.
- “**The MAK Collection for Occupational Health and Safety**” has been submitted for recording in PubMed Central®.

Take-home messages

- The **quality of AibM methods** is ensured by applying a **multi-stage process** with fixed specifications from development to publication.
- **Detailed, ready-to-use** protocols are published and enable
 - the **monitoring of occupational exposure**
 - but often of the **background exposure** in the general population as well.
- All documents of the MAK Commission are **available by open access**.

References

AibM methods until 2019: Onlinelibrary Wiley

AibM methods from 2020: PUBLISSO ZB MED

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