

BARGE, Bioavailability Research Group Europe: European Co-ordination on Risk Assessment of Soils

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INTRODUCTION

BARGE (Bioavailability Research Group Europe) is a European network bringing together institutes and research groups to study the human bioavailability of priority contaminants such as lead, cadmium and arsenic in soil via the gastrointestinal tract. The correct estimation of this bioavailability may have a major impact on current risk assessment practice. The first goal of BARGE is to compare and evaluate the many models and systems that have been developed over the years to estimate bioavailability and contaminant exposure. The ultimate goal is a methodology to arrive at more realistic bioavailability factors to be used in site-specific risk assessment and for policy making.

PROJECT DESCRIPTION

The idea that extra attention should be paid to human bioavailability was proposed at a CLARINET meeting in November 1998. More precise knowledge on the bioavailability of ingested soils could have a major impact on risk assessment practice. It could also greatly reduce the costs of dealing with contaminated sites in all CLARINET countries. R&D co-operation between experts working on this topic seems an efficient way to enhance the knowledge in this field within the next few years.

Recently NICOLE (Network for Industrially Contaminated Land in Europe) and CLARINET issued a Joint Statement on Sustainable Management of Contaminated Land, in which they mentioned assessment of bioavailability as a key research need. The EU has also designated bioavailability in its broadest sense as a key topic in its 5th Framework Programme.

In the field of human risk assessments soil ingestion is, in most cases, the dominant exposure route for immobile contaminants in soil. In the absence of more detailed information, the default value used for relative oral bioavailability is commonly 100%. This default value is used in most guideline values (trigger values, intervention values, soil screening levels, etc.). This assumption has an impact on soil remediation targets, soil management and policy on risk assessment in general. However, it is widely believed that most contaminants ingested in a soil matrix are likely to be less bio-accessible (i.e. extractable in the human gut) than in the materials used in the past to derive tolerable daily intakes. A more realistic approach has important economic consequences.

In Europe and elsewhere much valuable research is being done investigating the bioavailability of contaminated soil after ingestion by humans, and in particular by children (the high-risk group). However, researchers focus on many different aspects of the problems related to human bioavailability. Co-ordinating efforts and pooling present and future knowledge and expertise will provide a more complete picture. Such pooling may result in more realistic bioavailability factors, and as a consequence, more realistic exposure calculations. This is particularly important for priority contaminants like lead, arsenic and polycyclic aromatic hydrocarbons.

RESEARCH STATUS QUO

In December 1999 the Dutch Ministry of Housing, Planning and the Environment (VROM) decided to finance an investigation into possible European co-operation in this field. A separate, external body (Schelwald-van der Kley Consulting B.V.) was commissioned to discover and describe the *status quo* in the field of human bioavailability, by means of a questionnaire, interviews and internet searches. In addition, the need for co-operation and/or exchange of data was investigated. The need for co-operation appeared to be strong, and a great enthusiasm to exchange knowledge

between countries was evident. Even before the study made its final report, a workshop had been organised for researchers to meet each other and discuss the way forward. The results of this workshop have been included in the final report of the feasibility study, 'Human bioavailability of contaminants in ingested soil: A. Feasibility study on R&D co-operation; B. Set up and first results of collaborative R&D' (VROM/TCB), June 2000. See the BARGE web pages for further information.

Preliminary results have been discussed and a number of research questions have been defined. The first test results revealed great diversity in bioavailability factors for similar soil samples, strengthening the need for greater understanding of the driving forces behind these differences (www.schelwald.nl/pages/barge).

The participants in this workshop have agreed to compare and validate current test systems using identical soil samples. They also decided to continue with this collaboration and so BARGE was established.

FUNDING

So far, BARGE has been self-funding. However, external financing for further research work and information exchange is urgently needed. Given the collective importance and value of the deliverables for all EU-countries, an appeal has been made to ministries and environmental agencies of the CLARINET countries to sponsor further BARGE activities. Counting on at least eight countries to contribute, a financial contribution of 25,000–40,000 Euro (depending on the involvement) is needed per individual sponsor for a period of two years. This money is mainly intended for collaborative research activities. The EU-COST programme has been asked to become sponsor to provide an additional 65,000 Euro per annum, which is needed for organisation of meetings and the subsistence costs of research participants. Meanwhile a proposal will be made for the EU 5th Framework Programme for longer-term research work.

FUTURE PLANS

A major goal for the next two years is to arrive at a cost-effective assessment method to estimate human bioavailability for the priority contaminants lead, cadmium and arsenic. The focus will be on the correct estimation of bio-accessibility,¹ a major factor in determining overall bioavailability.

To meet this goal a number of activities are foreseen:

1. A brainstorming meeting (early 2001) with all sponsors and research participants with the aim of defining the most important policy issues regarding bioavailability and resulting research questions.
2. In-depth comparison and validation of the different national test methods available. This will include research into the influence of variability between test parameters on test results, resulting in a proposal of which method to use in what circumstances; this may lead to one (or more) commonly accepted method(s).
3. Estimation of bioavailability for a number of selected soils from 'real life' case studies in different EU-countries.
4. Regular meetings with research participants to discuss progress and exchange information.
5. A final workshop in early 2003 with all sponsors to discuss the findings.

Another major project deliverable will be a draft framework providing policy guidelines on how to assess bioavailability in risk assessment practice.

YOUR CONTRIBUTION?

If you are interested in taking part and/or would like to become a sponsor we kindly ask you to contact the BARGE secretariat by mail to barge@schelwald.nl – they will contact you to discuss your interests in more detail.

More information can be found at the BARGE web pages (www.schelwald.nl/pages/barge).

1. Bioaccessibility is defined as the fraction of a substance that is released from the soil matrix in the human gastrointestinal tract and is available for absorption.