Message

From: Zambrana, Jose [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=88E570833823499C9BD33B7E782845AC-ZAMBRANA, JOSE]
Sent: 5/31/2018 6:57:58 PM
To: Guiseppi-Elie, Annette [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=63d3e2eaeb9c4acba2609baa90b0f735-Guiseppi-El]
Subject: RE: Bioavailability in soils

Footnote right?

From: Guiseppi-Elie, Annette
Sent: Thursday, May 31, 2018 11:57 AM
To: Zambrana, Jose <Zambrana.Jose@epa.gov>
Subject: Fwd: Bioavailability in soils

Link to reference- time permitting to include. No problem if not

Annette Guiseppi-Elie, PhD, FAIMBE
Associate Director, Exposure Science
NERL/ORD/EPA
Mobile: Ex. 6 Personal Privacy (PP)

Begin forwarded message:

> **From:** "Guiseppi-Elie, Annette" <Guiseppi-Elie.Annette@epa.gov>
> **Date:** May 30, 2018 at 5:22:34 PM EDT
> **To:** "Thomas, Kent (thomas.kent@epa.gov)" <thomas.kent@epa.gov>
> **Subject: Bioavailability in soils**

https://semspub.epa.gov/work/03/2218794.pdf

6. Medium-Specific Default Values for Bioavailability of Metals

As noted above, Agency guidance (U.S. EPA, 1989) recommends that, in the absence of data to the contrary, the bioavailability of a chemical should be assumed to be equal in soil, diet, and water (i.e., RBA = 1.0). However, the Agency recognizes that some cases may exist where sufficient data are available for a chemical to support development of medium-specific default absorption factors for that chemical. The purpose of these medium-specific and chemical-specific default values is to increase the accuracy of exposure and risk calculations even when site-specific studies are not available. These default absorption factors are determined by EPA based on national data.

Lead is an example of a chemical for which the Agency has established recommended medium-specific default absorption factors for both children and adult populations. The Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK model) predicts geometric mean blood lead (PbB) concentrations for a hypothetical child or population of children (birth to 84 months of age) resulting from exposure to environmental sources of lead, including soil, dust, air, drinking water, and diet (U.S. EPA, 1994a,b; White *et al.*, 1998). An assumption in the model is that the absolute bioavailability of lead in soil and dust for children, at low intake rates, is 0.3 (30%) and the absolute bioavailability of soluble lead in water and food for children is 0.5 (50%). This corresponds to a relative bioavailability of 0.6 (60%) for lead in soil (or dust) compared to

soluble lead in water or food for children. The model also allows for the input of site-specific values.

The Agency has developed the Adult Lead Methodology (ALM) for assessing lead risks in adult populations (U.S. EPA, 1996). An assumption in the ALM is that the absolute bioavailability of lead in soil for adults is 0.12 (12%)[1]. This value is based on assumptions that the absolute bioavailability of soluble lead in water for adults is 0.2 (20%) and that the relative bioavailability of lead in soil, compared to soluble lead, for adults is 0.6 (60%).

The Agency has also derived RfDs that are specific for an exposure medium based on consideration of bioavailability or other factors that might suggest unique dose-response relationships in that medium. For example, separate RfDs for cadmium in food and drinking water have been derived based on the rationale that the bioavailability of cadmium in water is greater than that of cadmium in food by a factor of 2 (i.e., 5% vs. 2.5%, respectively [U.S. EPA, 2003a]). Similarly, the Agency recommends that a modifying factor of three be applied to the chronic oral RfD for manganese when the RfD is used to assess risks from drinking water or soil to account, in part, for potential differences in bioavailability of manganese in water and soil compared to food (U.S. EPA, 2003b).

However, even in cases where sufficient data exist to support default medium-specific absorption factors for a chemical, site-specific data collection may also be important. Important factors that can affect the bioavailability of metals in soil can be expected to vary from site to site, or within a given site. These include the physical and chemical forms of the metal, as well as the physical and chemical characteristics of the association between the metal and soil particles. Default values for bioavailability may not reflect these factors (*e.g.*, chemistry, particle size, matrix effects) at any given site. Therefore, use of default values should not substitute for site-specific assessments of bioavailability, where such assessments are deemed feasible and valuable for improving the characterization of risk at the site (see *Recommended Decision Framework*, below).