

Reviewer's report

Title: A review on the applicability of non-invasively collected matrices for human biomonitoring

Version: 1 **Date:** 23 September 2008

Reviewer: Antonio Mutti

Reviewer's report:

The manuscript entitled: "A review on the applicability of non-invasively collected matrices for human biomonitoring" by Smolders et al. reviews the literature on biomarkers of exposure/effect in several non-invasively collected matrices, focusing on the relationship among them.

Some aspects (e.g., lines 58 and 66) are certainly true, but also of little interest to the reader. One might even question that people with a perceived "overall lack of knowledge on the general methodology" should write a review paper on a complex subject such as human biomonitoring, implying so many scientific, technical, ethical and practical issues.

Even if most of the considerations reported by the authors have been already reported in literature even in a more detailed way (e.g., by Angerer et al, 2007; Paustenbach and Galbraith, 2006; Mutti and Corradi, 2006; Apostoli, 2002), the general approach of the present review could be of interest, as the focus is on non-invasive collection of samples, which is certainly important (and somehow obvious) in Environmental Toxicology and Health. Moreover, the manuscript suffers from an excess of vagueness, and therefore it should be extensively revised prior to acceptance for publication. As far as I can appreciate as a non-mother tongue reader, extensive editing seems also necessary.

General comment: toxic substances with different chemical and physical properties are considered together. As a result, some general conclusions are not valid for some of them, some mistakes being also apparent (e.g., in table 1). Different classes of toxic compounds/species should be clearly distinguished throughout the manuscript.

Below are some examples:

- Metals (please use "metallic elements") are discussed only generically, without taking into account that they (e.g., Cr, Ni) can be dispersed in the environment under different oxidation states and in compounds with different solubility, and hence with different mechanism of action and toxicity. Their characterization – possibly in biological matrices, if relevant/ meaningful – is an important issue. The lack of adequate consideration of this aspect, leads the authors to report erroneous data: in table 1, urinary Cr should not read Cr(VI) but [Cr(III)]. Cr(VI), the most toxic form of Cr, is absorbed as Cr(VI), mainly by inhalation, but it is excreted in urine after reduction to Cr(III). In urine, Cr is excreted as Cr(III) but it is a biomarker of exposure to either soluble forms of Cr(VI), which have a

relatively fast kinetics, or to slowly absorbed insoluble forms of Cr(VI) and Cr(III). However, Cr can be speciated in EBC (see Goldoni et al, 2006) as a biomarker of exposure (contact between Cr dispersed in inhaled air and the lining fluid of the respiratory tract) prior to absorption or reduction to the trivalent state. In the same way, urinary Ni should reflect only the soluble fraction of Ni compounds, not necessary in the Ni(II) form or the slowly absorbed fraction of less soluble Ni(II) compounds.

- Line 196-198: this statement is not true for several toxic metals and other compounds also volatile, for which the correlation between urinary and airborne concentration is well known (Apostoli, 2002; Jakubowski and Trzcinka-Ochocka, 2005).

- The part about exhaled breath should be revised:

Line 410-412: the statement should be supported by literature and examples.

Line 418-419: there are not two distinct fractions of exhaled breath. Exhaled breath could be cooled to obtain condensate for measuring non-volatile or low-volatile compounds. The vapor phase can also be sampled for measuring highly volatile compounds. Therefore, the matrix is the same but it can be collected in different ways depending on the type of compounds of interest and the analytical techniques to be used (see for example Goldoni et al, 2005; Corradi et al, 2007; Buszewki et al, 2007).

Line 420-426: it is not exact. Some VOCs could be considered as possible biomarkers of effects (e.g. isoprene, and certain iso-paraffin such as methyl-pentane). See for example Phillips et al, 2000 and many other papers.

Line 442: Cr is missing (Caglieri et al, 2006; Goldoni et al, 2006; Goldoni et al, 2008).

Level of interest: An article of limited interest

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests.