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EDITORIAL

Highlight report: critical evaluation of key evidence on health hazards of the general European population by exposure to arsenic

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In this issue, Ursula Gundert-Remy and colleagues contribute a review article about the need for risk reduction due to high exposure to inorganic arsenic in the general European population (Gundert-Remy et al. 2015; this issue). It is known since long that one of the largest man-made catastrophes was caused by drinking water contaminated with arsenic (Gundert-Remy et al. 2015; Golka et al. 2010; Ahmad 2001; Bae et al. 2002). In the 1970s, a WHO-initiated campaign in Bangladesh installed more than 4 million wells to reduce diseases due to microbiologically contaminated water (Gundert-Remy et al. 2015). However, contamination of this water with geogenic arsenic led to a situation, where more than 50 million people in Bangladesh were put at risk of arsenic-induced diseases (Golka et al. 2010; Gundert-Remy et al. 2015). However, the current review of Gundert-Remy and colleagues demonstrates that the exposure to arsenic is critical not only in countries of the third world but also in Europe. Arsenic is a carcinogen that induces tumors of the lung, urinary bladder, skin and kidney (IARC 1973, 1980, 2004, 2012; Francesconi 2010; Tokar et al. 2010; Wang et al. 2014; WHO 2011a, b, c; Zhou et al. 2014; Masoudi and Saadat 2008; Selinski 2012; Stewart and Marchan 2012). A recently published study of the EFSA on dietary exposure to inorganic arsenic demonstrates that mean dietary exposure of infants ranges between 0.2 and 1.37 µg/kg body weight per day (EFSA Journal 2014). On the other hand, benchmark doses resulting in a 1 % increased risk of lung cancer were calculated to range between 0.3 and 8 µg/kg body weight/day (EFSA CONTAM Panel 2009; WHO 2011a; review: Gundert-Remy et al. 2015). This scenario illustrates that the margin of exposure is small or even absent—a situation that calls for urgent regulatory action to reduce arsenic exposure of the general European population (Gundert-Remy et al. 2015). The authors of the review article also explain why one-sided regulatory measures to reduce arsenic only in rice are not sufficient. Priority measures should rather be to reduce arsenic in food categories that contribute most to exposure in Europeans, such as milk and dairy products, drinking water, and food for infants. Toxicity of arsenic represents a cutting-edge topic in our journal (Bolt 2012, 2013; Sinha et al. 2013; Kumasaka et al. 2013). Intensively—but sometimes also controversially—discussed are the carcinogenic effects, mechanisms and dose–response relationships of arsenic (Waalkes et al. 2014a, b; Cohen et al. 2014; Xu et al. 2014; Méndez-Fernández et al. 2015; Bach et al. 2014). A particular research focus is how arsenic influences signaling pathways relevant in cell stress response and carcinogenesis (Chen et al. 2014; Wang et al. 2014; Weng et al. 2014; Liu et al. 2013; Jiang et al. 2013; Pastoret et al. 2013). Recently, also epigenetic alterations (Gribble et al. 2014), developmental toxicity (Zimmer et al. 2014; Stern et al. 2014) and metabolism as well as transport of arsenic (Tokar et al. 2014; Yu et al. 2013; Xu et al. 2013; Watanabe and Hirano 2013) have been intensively studied. The present review of Gundert-Remy and colleagues which comprehensively compares arsenic exposure likely to cause adverse effects in humans to current exposure levels of the general European population demonstrates that research of arsenic is of high practical relevance and should lead to regulatory action to reduce the risk of the general population.

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