HHS Public Access

Author manuscript

Lancet Diabetes Endocrinol. Author manuscript; available in PMC 2021 April 01.

Published in final edited form as:

Lancet Diabetes Endocrinol. 2020 April ; 8(4): 269–270. doi:10.1016/S2213-8587(20)30070-X.

BPA and risk assessment

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Endorsees[†]

A recent correspondence in The Lancet Diabetes & Endocrinology asserts that indirect measurement of bisphenol-A (BPA) metabolites in urine underestimates exposure to BPA in human biomonitoring studies [1]. The indirect method quantifies levels of total BPA in a 2-step procedure (enzymatic deconjugation and extraction), whereas the direct method eliminates the enzymatic deconjugation, but requires concurrent determination of three species: BPA-glucuronide, BPA-sulfate, and free BPA. Both human pharmacokinetic and laboratory studies have demonstrated the validity of the indirect method, the approach used by most laboratories routinely measuring BPA. Human pharmacokinetic and laboratory studies have excellent agreement regarding levels of BPA and its conjugates, including studies in humans that compared levels using direct and indirect methods [2]. Pharmacokinetic studies from several laboratories using controlled dosing with isotopically labeled BPA doses concur, showing that BPA in the body is conjugated and eliminated quantitatively (84–109% of total administered dose) in urine, mainly as BPA-glucuronide [2–4]. Laboratory experiments also show distribution of BPA metabolite concentrations comparable to those of human pharmacokinetic studies (BPA-glucuronide>BPA-sulfate>free BPA) [2, 5–8].

Scientific advances allow confirmation of complete enzymatic deconjugation by including a deconjugation tracer (e.g., 4-methylumbelliferone [9, 10]). Further, two international external quality assessment schemes evaluate five times per year interlaboratory proficiency in measuring total BPA using urine control materials fortified with known amounts of free BPA and BPA-glucuronide. In the most recent rounds of G-EQUAS (http://www.g-equas.de/default.htm) and OSEQAS (https://www.inspq.qc.ca/en/ctq/eqas/oqesas/description), only 5 results among 70 from 30 international participants for 5 control materials were outside the tolerance range, and all above the assigned value. Moreover, based on results reported by participating laboratories in G-EQUAS in the past 5 years (BPA has been part of the

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program since 2009), the average recovery of spiked BPA-glucuronide was 105%, calculated from the known spiked amount and the difference between amounts in spiked and non-spiked samples. These findings, also supported by interlaboratory comparison results from the European Union's large-scale human biomonitoring initiative HBM4EU (https://www.hbm4eu.eu/), confirm that current population levels of BPA in urine are accurately and precisely measurable by laboratories around the world. These data do not support the view that the indirect method underestimates urinary BPA concentrations and thus BPA exposure.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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