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Response to Gottesfeld and Jacobs 2016

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Dear Editor,

We are grateful for the evaluation and insights into our recently published article on lead in public playground paints (Turner et al., 2016) by Gottesfeld and Jacobs (2016), and are pleased that the authors are in broad agreement with the findings and their implications. Gottesfeld and Jacobs (2016), however, raise an important issue that was addressed by Turner et al. (2016) as an area of contention; namely, the consideration and evaluation of oral bioaccessibility of Pb (and chromium) in paints. We used a simple, operational means of evaluating bioaccessibility to children by exposing ground paint samples to a mixture of pepsin in dilute HCl at 37^{o}C, a common component of many physiologically-based extraction techniques (Hamel et al., 1999; Ibanez et al., 2010). The results are informative in demonstrating that bioaccessibility in the digestive tract, and as a percentage of total Pb, ranged from less than 0.1 to about 17, and that Pb in coloured paints and that contain chromate is less accessible than lead in white paints that do not contain chromate. Such information is also useful in providing comparisons of Pb bioaccessibility in exterior playground paints with similar measures of accessibility in a variety of other environmental solids, including house dusts (Turner and Simmonds, 2006), soils (Hamel et al., 1999), boat paints (Turner and Radford, 2010) and road dusts (Elom et al., 2014).

Although Gottesfeld and Jacobs (2016) give the impression that we overstate the importance of our bioaccessibility results, we would like to clarify that this measure was just one component of the study and that we do not imply that accessibility should form the basis of any regulatory standards or mechanisms. Thus, in our discussion, results are generally compared with total lead standards and guidelines, with reference to migratable (bioaccessible or soluble) concentrations at one juncture and in respect of the European Standard for safety of toys (EN 71-3; 1994). Critically, in Section 3.7 of Turner et al. (2016), a daily intake threshold is compared with a mass of paint of 60 μg, a figure computed from total Pb content, while later discussion relating to leaded paint comparisons and to a Health Canada disease report also refers to total Pb and not soluble Pb.

We agree with Gottesfeld and Jacobs (2016) that solubility of Pb in paint does not necessarily correlate with absorbed or blood Pb in children and that particle size, dust loading and nutrition have important roles in this regard. Moreover, oral bioaccessibility does not address the exposure and health risks associated with airborne paint particles, both to children and to contractors engaged in the removal and repair of painted surfaces. In this respect, low solubility coupled with a lengthy residence time in the lungs may in fact serve to promote chronic exposure of both Pb and chromate.

We are also in agreement with Gottesfeld and Jacobs (2016) in that the findings of our research, and those reported in a related paper on the occurrence of leaded paint in the urban environment more generally (Turner and Solman, 2016), highlight the inadequacies of regulatory and voluntary phase-out mechanisms in the European Union. The pending EU REACH authorisation for a Canadian company to employ lead chromates in specific applications, despite manufacturers in member states having to use safer alternatives, exemplifies these shortfalls.

In conclusion, we do not recommend bioaccessibility being incorporated into regulation; rather, like Gottesfeld and Jacobs (2016), we would prefer an outright on all uses of leaded paint, both residential and commercial.

Faithfully,

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