ENVIRONMENTAL ASSESSMENT OF Pb, As AND Cr CONCENTRATIONS IN TOPSOIL, GROUND-LEVEL DUST AND MOSS FROM URBAN PLAYGROUNDS, PUBLIC GARDENS AND PARKS FROM LISBON, PORTUGAL

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This study presents results from a project untitled "Geochemical survey of Lisbon urban soils: a baseline for future human health studies". Fifty one topsoil and 50 ground-level dust samples were collected in playgrounds, schoolyards, urban parks and public gardens. At each site, 1 uncontaminated moss transplant was fixed to a horizontal tree limb, which remained in situ for a period of 6 months. Soil were sieved to the <2 mm (usually used in environmental studies) and <250 μm (usually used in bioaccessibility testing) soil fractions. Dust samples were sieved to the <500 μm fraction. Total concentrations of potentially harmful elements (PHE) were determined by ICP-MS. Concentrations of PHE in the soil, one of the important pathways of exposure, where compared with those in dust and in moss. Oral bioaccessibility testing for As, Cr and Pb was carried out using the Unified Bioaccessibility Method, validated by the Barge group. For Cr, the spatial distribution of total concentrations is similar in both soil fractions; higher Cr concentrations occur in the soils of the Volcanic Complex of Lisbon; previous studies indicate that these are residual, in situ soils, and the source of Cr is mostly geogenic; Cr in dusts indicate that Lisbon airport is a source of Cr but the biomonitors show that the major atmospheric inputs of Cr in the urban environment occur downtown; bioaccessibility estimates have the same range in the gastric(G) and gastric-intestinal (GI) phases, but samples with higher bioaccessible Cr are not the same in both phases, indicating that the soil properties control Cr dissolution in both compartments. Lead also shows a similar distribution of total concentrations in both soil fractions and shows that higher Pb levels occur downtown; dust and in biomonitors have considerably higher Pb concentrations than soil but the spatial distribution is similar, indicating an atmospheric contribution for Pb in the soil; bioaccessibility estimates are significantly higher in the G phase and the higher estimates occur in a small garden near a petrol station, and in a playground. In the urban environment of Lisbon As occurs in low concentrations; the spatial distribution of As total concentrations is slightly different between soil fractions and markedly different for dusts and biomonitors; bioaccessibility estimates have the same range of values in the G and GI phases and, unlike Cr, higher bioaccessibility estimates occur in the same samples in both phases.

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