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**Abstract
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Presence of platinum, palladium and rhodium in children living in Alcalá de Henares (Spain) and the environment

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BACKGROUND AND AIM:The use of automobile catalytic converters has led to concerning concentrations of platinum (Pt), palladium (Pd) and rhodium (Rh), in urban environments. A human and environmental monitoring programme was performed to determine the environmental presence and exposure to these pollutants in Alcalá de Henares (Spain).

METHOD:Scalp-hair was collected from 120 children (6 to 9-years-old; 70 girls) born and residing in Alcalá. Elements were monitored in scalp hair by ICP-MS; limits of detection (LoD) were 0.0051, 0.0007 and 0.0018 µg/g, respectively. Additionally, Pt and Rh were monitored in 97 topsoil samples randomly sampled from different urban parks across the city after appropriate mineral digestion; LoDs were 0.38 and 0.22 mg/kg, respectively. Data was processed in the 'NADA' statistical package.

RESULTS:Pd and Rh were detected in only a few of the scalp samples collected, specifically in 9.24% and 5%, respectively, which might be attributed to the higher mobility and biological uptake rates of Pd and Rh compared with Pt. Concentrations in µg/g were as follows (values provided as 95 percentiles and ranges), being slightly higher in boys' hair: Pd [(0.0010, 0.00091-0.00112) vs. (0.00076, 0.00072-0.00137)] and Rh [(0.0024, 0.00187-0.00372) vs. (<0.0018, 0.00227-0.00984)]. In contrast to hair, Pt was detected (median and IQR, in mg/kg) in 41.24% [0.27 (0.26-0.81)] and Rh in 15.46% [0.15 (0.15-0.16)] of the topsoil samples monitored, which may suggest that the Alcalá child population monitored has not been significantly exposed to Pd, Pt and Rh, as hair has been suggested as an appropriate tool to measure their exposure.

CONCLUSIONS:In general, the presence of Pt and Rh Alcalá's soils would not represent a significant risk for the population. Human hair would be a safe and non-invasive tool to follow-up exposure to metals related with automobile catalytic converters in urban environments and identify future risks from these contaminants.

Keywords: Platinum group elements, human hair, monitoring, Spanish children, soils.