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# Environmental exposure of children to erbium in Alcalá de Henares (Spain)

Antonio Peña Fernández<sup>1</sup>, Manuel Higuera<sup>2</sup>, Mark D. Evans<sup>1</sup>, María Carmen Lobo Bedmar<sup>3</sup>

<sup>1</sup>Leicester School of Allied Health Sciences, De Montfort University, Leicester, LE1 9BH, UK

<sup>2</sup>Departamento de Matemáticas y Computación, Universidad de La Rioja, Logroño, Spain

<sup>3</sup>Departamento de Investigación Agroambiental. IMIDRA. Finca el Encín, Crta. Madrid-Barcelona Km, 38.2, 28800 Alcalá de Henares, Madrid, Spain

**BACKGROUND AND AIM:**High-technology rare earth elements (REEs) are contaminants of emerging concern. To determine the environmental presence and exposure to Er, a minimally studied REE in topsoils, in children born and residing in Alcalá de Henares (Spain)

**METHOD:**Scalp-hair was collected from 120 children (6 to 9-years-old; 70 girls). Erbium (Er) was analysed by ICP-MS after appropriate removal of exogenous contamination using Triton X-100/bath sonication. Er was also monitored in 70/167 topsoil samples randomly sampled from different urban parks across Alcalá.

**RESULTS:**The limits of detection of Er in hair and topsoils were (in  $\mu\text{g/g}$ ): 0.00025; 0.0005). Data was processed using 'NADA' statistical package, due to the censored data found in hair (32.5%). Levels of Er in scalp hair was slightly higher in male participants (95th percentile and range, in  $\mu\text{g/g}$ ): 0.00143 (0.00026-0.00157) vs. 0.00103 (0.00026-0.00117). In contrast, Er was detected in all topsoil samples monitored (median and range, in  $\text{mg/kg}$ ): Er 0.93 (0.1287-1.3833), which would suggest little anthropic input as they were within the background value range reported for soils in Spain (FOREGS; 0.3-13  $\text{mg/kg}$ ). Moreover, levels of Er in hair showed statistical significance according to zones of residency ( $p\text{-value}=1.04\text{E}-10$ ); the mean concentration of Er was higher in children's hair living in areas with a higher density of green areas than in those with higher number of buildings and industrial activities, respectively (0.00073 vs. 0.00038 and 0.00043  $\mu\text{g/g}$ )

**CONCLUSIONS:**Our results suggest that monitored child population in Alcalá de Henares have not been significantly exposed to Er, as the concentration was much lower than that reported in exposed children (0.0281  $\mu\text{g/g}$ , 0-3 years-old) and adolescents hair (0.0159  $\mu\text{g/g}$ ; 11-15 years-old) living in mining areas in China. However, further efforts should be carried out to determine the (eco)toxicological values of Er, to be able to characterise the risks to human health due to this element.

**Keywords:** Exposure assessment, Children's environmental health, Erbium