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**Abstract
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Dietary and environmental exposure to gadolinium in young adults from Leicester, England

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BACKGROUND AND AIM:To assess environmental and dietary exposure to gadolinium (Gd) in young adults at De Montfort University (DMU, Leicester, England).

METHOD:Nutrient intake was collected from 111 (18-23 years-old; 78 female) DMU students using a validated food frequency questionnaire. Gd was analysed in scalp-hair provided by 73 of these participants (58 female) by ICP-MS after appropriate removal of exogenous contamination. 450 topsoil samples were collected per urban park across Leicester city and prepared as composite samples to measure Gd (LoD=0.0017 µg/g) to estimate environmental exposure. Data was processed with 'NADA' in R, due to a high presence of censored results in hair (60.3%; LoD=0.0006 µg/g).

RESULTS:Higher levels of Gd were detected in hair from female participants although without significance, possibly due to the low number of samples from male participants in which Gd was detected (n=4 vs. 25); data is provided as median and IQR (in µg/g): 0.00051 (0.00021, 0.00123) vs. 0.00033 (0.00017, 0.00065). It has been reported that young females would be more sensitive to even small quantities of rare earths, which could explain our results. Thus, the levels of Gd found in the urban topsoils (median=3.094 µg/g) were lower than the reported in topsoils from Beijing urban parks (4.48 µg/g) and the Upper Continental Crust (6.1 µg/g), suggesting that Leicester would be less contaminated than other more industrialised cities. Gd was positively correlated with alcohol (r=0.339; p-value<0.01) and tea consumption (r=0.295; p-value<0.01). Although non-significantly different, the higher intake of alcohol (2.28 vs. 1.79 g/day) and tea (161.29 vs. 106.97 g/day) in female counterparts might explain the sex differences found for Gd in hair.

CONCLUSIONS:The presence of Gd in the hair samples monitored was much lower than those reported in environmentally exposed groups living in smelting/mining areas, suggesting that DMU students would have had a low exposure to Gd.

Keywords: Gd, human hair, dietary intake, environmental exposure, university students.