Exposure to platinum group elements in young university students from Leicester, England.

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The platinum group elements (PGEs): platinum (Pt), palladium (Pd) and rhodium (Rh), are increasingly emitted into the environment due to their industrial (glass, petroleum, electric and electronic industries), manufacture of jewellery and medical uses, for example as antitumor drugs. Moreover, increased concentrations of these elements have been observed in urban environments following the introduction of automobile catalytic converters in the 1980s, as they are indispensable components of these converters. We assessed dietary exposure to PGEs in young adults (18-23 yrs-old) at De Montfort University (DMU, Leicester, England). 111 (20.45 ± 1.16 yrs-old; 78 female) DMU students completed a validated variant of the EPIC-Norfolk Food Frequency Questionnaire. PGEs were analysed in scalp-hair provided by 73 of these participants (58 female) by ICP-MS after removal of exogenous contamination, as human hair has been described as a reliable tool to monitor environmental exposure to Pd and Pt. Data was processed with the statistical package 'NADA' in R due to high presence of censored results (data presented as censored percentages and LoDs in μg/g for Pd, Pt and Rh, respectively: 100%, 0.0057; 75.34%, 0.00046; 82.19%, 0.0014). Pt was detected in hair from sixteen female [median and IQR, in μg/g: 0.00014 (0.000036, 0.000551)] and two male participants [P95=0.00205, in μg/g]; Rh was detected in seven female [P95=0.0038, in μg/g] and six male participants [median and IQR, in μg/g: 0.00097 (0.00028, 0.00335)]. Only Rh showed sex-dependency (p-value=0.00392) possibly due to the high presence of censored values in female/male participants. Concentrations of Pt were similar to those reported in adolescents' hair from Palermo, which also reported higher levels in females. However, small concentrations of Pd were detected in scalp hair from 22 adolescents living in Palermo (Italy; 1.37 ng/g), which may suggest that DMU students would have shown to have been little exposed to Pd. Pt was positively correlated with fatty fish intake (r=0.292; p-value<0.05) and Rh with the intake of dairy product and fish (r=0.293, 0.286; p-value<0.05) and very positively with the intake of eggs, meat and crisps and snacks (r=0.311, 0.315, 0.335; p-value<0.01). The differences in intake of these foods might explain the sex differences found for Rh in hair. Thus, the intakes of eggs (17.625 vs. 16.998 g/day) and meat (271.55 vs. 193.06 g/day) were higher in male counterparts. Similarly for Pt, as female participants eat more fatty fish (13.41 vs. 10.05 g/day). In conclusion, our results suggest that DMU students would have shown a minimal exposure to PGEs.

Key words: PGEs, human hair, dietary intake, university students.