CUMULATED INTERNAL DOSE OF NATURAL URANIUM IN WORKERS OF AN INDUSTRIAL AREA NEAR A FERTILIZER PRODUCTION PLANT

Rocío Capelo, Universidad de Huelva, Spain
Miguel Ángel García, Universidad de Huelva, Spain
Rosa Galisteo, Universidad de Huelva, Spain
Rocío Jara, Universidad de Huelva, Spain
Eva Buller, Hospital Punta Europa, Spain
Francisco Javier Caballero, Hospital Infanta Elena, Spain
Antonio Pereira, Hospital Juan Ramón Jiménez, Spain
Jesús de la Rosa, Universidad de Huelva, Spain
Jose Luis Gómez-Ariza, Universidad de Huelva, Spain
Juan Alguacil, Universidad de Huelva, Spain

Background: Natural uranium is a low radioactive element that decays slowly by emitting an alpha particle. If absorbed, uranium can damage human health. Working nearby and at a fertilizer production plant might be an important source of exposure to natural uranium. We compared cumulative dose of uranium between workers from a fertilizer plant, chemical/metal workers from the same industrial park, chemical/metal workers from industrial parks of other regions, and workers unexposed to metals.

Methods: Cross-sectional epidemiological study design. We obtained satisfactory results of uranium-238 levels in toenails of 5 workers of a fertilizer production plant, 44 workers of the chemical/metal industry at the same industrial park, 24 workers of the chemical/metal industry from industrial parks of other regions, and of 43 workers unexposed to metals from the service sector. Internal dose of uranium-238 was measured by emission spectroscopy by ICP-MS with collision cells.

Results: The median of the cumulated dose of uranium-238 among the group including all 63 chemical/metal industry workers was 4.9 ppb; and 3.5 ppb in the group of the 43 unexposed workers (p<0.001; U Mann-Whitney test). The median of uranium-238 in the group of fertilizer plant workers was 6.5 ppb; 4.9 ppb among chemical/metal industry workers from the same industrial park, and 4.5 ppb among chemical/metal industry workers from industrial parks without fertilizer plants from other regions (p=0.056; Median test).

Conclusions: Our results suggest that occupational activity on the chemical/metal industry is related to accumulation of natural uranium, mostly among workers from fertilizing plants.