



Absorption, accumulation and biological effects of depleted uranium in Peyer's patches of rats

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Abstract

The digestive tract is the entry route for radionuclides following the ingestion of contaminated food and/or water wells. It was recently characterized that the small intestine was the main area of uranium absorption throughout the gastrointestinal tract. This study was designed to determine the role played by the Peyer's patches in the intestinal absorption of uranium, as well as the possible accumulation of this radionuclide in lymphoid follicles and the toxicological or pathological consequences on the Peyer's patch function subsequent to the passage and/or accumulation of uranium.

Results of experiments performed in Ussing chambers indicate that the apparent permeability to uranium in the intestine was higher (10-fold) in the mucosa than in Peyer's patches ($(6.21 \pm 1.21$ to $0.55 \pm 0.35) \times 10^{-6}$ cm/s, respectively), demonstrating that the small intestinal epithelium was the preferential pathway for the transmucosal

passage of uranium. A quantitative analysis of uranium by ICP-MS following chronic contamination with depleted uranium during 3 or 9 months showed a preferential accumulation of uranium in Peyer's patches (1355% and 1266%, respectively, at 3 and 9 months) as compared with epithelium (890% and 747%, respectively, at 3 and 9 months). Uranium was also detected in the mesenteric lymph nodes (5-fold after contamination with DU). The biological effects of this accumulation of depleted uranium after chronic contamination were investigated in Peyer's patches. There was no induction of the apoptosis pathway after chronic DU contamination in Peyer's patches. The results indicate no change in the cytokine expression (IL-10, TGF- β , IFN- γ , TNF- α , MCP-1) in Peyer's patches and in mesenteric lymph nodes, and no modification in the uptake of yeast cells by Peyer's patches.

In conclusion, this study shows that the Peyer's patches were a site of retention for uranium following the chronic ingestion of this radionuclide, without any biological consequences of such accumulation on Peyer's patch functions.

Keywords: Depleted uranium nitrate; Yeast cell uptake; SIMS; ICP-MS; Intestine; Cytokines



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