Chronic ingestion of 137-caesium does not induce significant modifications of the immune system

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Twenty years after the Chernobyl accident, 137-Caesium (137-Cs) is the main residual radionuclide found in contaminated areas. 137-Cs progressively integrated food chains until man, inducing a chronic contamination of large populations through daily ingestion of small quantities of 137-Cs. Some studies indicated an accumulation of 137-Cs in the thyroid, the heart and muscles. It was then suggested that 137-Cs contamination could lead to some pathologies observed within populations living onto contaminated areas. In order to determine the possible influence of Cs137 onto the immune system, we developed a mouse model of chronic contamination through drinking water with a concentration of 20 KBq.l-1 of 137-Cs. This corresponds to a daily ingestion of 6 KBq.day-1.kg of body weight, ten times higher than the highest measurements made after the Chernobyl accident. Parent animals were contaminated before mating and during gestation. After weaning, contamination of offspring was continued through drinking water. Gamma counts indicated that 137-Cs was found in all tissue tested at a concentration between 2 and 20 Bq/g of tissue. However, a progressive accumulation of 137-Cs was observed in muscles and kidney, and to a lesser extend in the heart and in femurs, mainly until 9 weeks of age. The immune system was evaluated by several means, including phenotypic and functional analyses. Phenotypic analysis of blood cells did not showed significant changes in both CD4+ and CD8+ T lymphocytes, in CD4+CD25+ Tregs, or in B220+ B lymphocytes between control and 137-Cs contaminated animals. Intrathymic differentiation was evaluated by phenotypic analysis of thymocyte subpopulation and by T cell excision circle (Trec) detection. However, no significant changes in intra-thymic differentiation were observed whatever the age of animals. Three functional tests were also used to evaluate the immune system, response of splenocytes to a mitogenic stimulation, response of splenocytes in a mixed lymphocyte reaction test, and specific response to a vaccination against tetanus toxoid. However, no significant changes were observed in 137-Cs contaminated animals as compared to control animals, even in 35 weeks-old animals. Overall, these results suggest that 137-Cs may accumulate over time in some organs such as the heart, the kidney, the femurs and muscles. However, our results also demonstrate that 137-Cs ingestion does not induce a significant modification of the immune system. This suggests that the pathologies associated with the immune system observed within populations living onto contaminated territories might not be attributed solely to the 137-Cs internal contamination.

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