

§ 14. Environmental Behavior of Tritium and Biological Effects and Assessment of Tritium

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Effect of Low Dose Tritium on Mouse Lymphocyte Estimated by Comet Assay

Low dose effect of HTO on mouse lymphocytes DNA were estimated by the comet assay using ICR male mouse. Lymphocytes were isolated by centrifugation of whole blood sample on Ficoll-Paque solution and embedded in agarose gel just after mixed with 17-50 mGy of HTO. The individual comets on stained slides after electrophoresis were analyzed using imaging software. No significant DNA damages were observed. (Y.Ichimasa and K.Otsuka,et.al.)

Heavy Water Release Experiments in a Greenhouse : Translocation of Deuterium into Unhulled Rice and Its Loss during Growth Process of Rice

Heavy water (D₂O as a substitute for HTO) vapor release experiments were carried out in a greenhouse and uptake and loss kinetics of D₂O in leaves and formation, translocation and retention of organically bound deuterium (OBD) in rice were investigated using different growth process of rice. After the release, OBD concentration in unhulled rice increased until 4 days after the exposure and then decreased with time due to metabolic consumption in rice grain. (M.Ichimasa, et al.)

Detection of sunlight UV-induced DNA damage in mouse cells with the comet assay

This study intended to estimate biological effects of UVA, UVB and UVC irradiation on cell DNA with single cell electrophoresis assay (comet assay) in comparison with DNA damage induced by tritium. Hepatic cells isolated from ICR mouse were applied to

microscope slides for comet assay and electrophoresis was performed after UV irradiation in sunlight. The relations between intensity of individual UV irradiation and DNA damage were investigated.(Y.Ichimasa et. al.)

Characteristics of tritium gas oxidizing bacteria, isolated from cultivated soils, which were classified to belong to the genus Kitasatospora

The tritium gas (HT) oxidizing bacteria were isolated from cultivated soils in Ibaraki Prefecture.

Various chemical analyses and 16S rRNA sequence analyses were conducted for some isolated strains. The several strains with gray color, smooth-surface spores, meso-DAP, galactose and mannose as whole-cell sugars, and phospholipid type of II were classified to the genus Kitasatospora. (M.Komuro and M.Ichimasa et.al)

Analysis of Mutation Induction By Low Dose Rate Tritium Radiation Using Hyper Sensitive Detection System

To examine the low dose rate effect of tritium, we established a hypersensitive mutation detection system using hamster cells carrying a human X-chromosome. We have tested mutation induction by tritiated water at dose rate between 0.18 and 4.4 cGy/h. Our results suggest that mutation frequency seems to be slightly increased at lower dose rate. Further analysis is in progress. (H.Tauchi and K.Komastu et.al.)

Development of a Generic Model for the Biokinetics of Tritium and Carbon in Mammals

We have reanalysed available data to test the hypothesis that both ³H and ¹⁴C transfer in mammals can be accounted for by an understanding and application of metabolism. Data obtained from various ¹⁴C and ³H experiments with rats and sheep have been analysed to assess the multi-component retention function of various organs and identify any relationship between half times and component contribution. The results obtained could be used in the development of a human biokinetic model.

Mass dependent relationships for OBT and carbon loss rates can be defined across species. Intake fractions for OBT are lower than for organic carbon, and on the basis of a comparison between rats and sheep those for OBT may be lower for ruminants.

(H. Takeda and K.Miyamoto)