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THEORETICAL CONSIDERATIONS OF THE EFFECT OF RADIOACTIVITY DECAY AND THE FLUCTUATION OF THE DISPOSAL RATE ON THE ACCUMULATION OF RADIOACTIVE WASTE. N.Fukuda, N.Yago*. National Institute of Radiological Sciences, *St. Marianna Univ., School of Medicine.

Usually, evaluation of cumulative radioactivity required for the radiation-shield calculation is performed without considering the effect of radioactivity decay as well as of fluctuation of disposal rate.

At first, theoretical expressions for the kinetics of accumulation of radioactivity in the case of discrete as well as continuous disposal process were derived without considering the random fluctuation of disposal rate.

Expressions obtained for the cumulative radioactivity $C(w)$ of radioactive isotope with decay constant λ in the case of discrete disposal rate. $C = \sum_{i=1}^w C_i$ per week, is given by

$$C(w) = C \cdot \frac{1 - e^{-\lambda w}}{1 - e^{-\lambda}} \cdot \mu C_i$$

When $e^{-\lambda} - 1 \approx -\lambda$, this formula reduces to that of the continuous disposal process. The following expression for the variance ($\text{VAR}(\tilde{C}(w))$) of cumulative radioactivity in the case of continuous disposal process with variance σ^2 of disposal rate was derived by solving a stochastic differential equation.

$$\text{VAR}(\tilde{C}(w)) = \frac{\sigma^2}{2\lambda} (1 - e^{-2\lambda w})$$

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WASTE DISPOSAL OF RADIOPHARMCEUTICALS AND CONTAMINATED MATERIALS. STUDIES ON THE EFFECT OF CRASHING, WASHING, BURNING AND SOLIDIFICATION OF WASTE BEFORE ITS DISPOSAL. Tadashi Tamiya* and Hiroshi Saito**

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Considering the recent trends: the shift to the use of fast decaying nuclides, steady increase of low level waste of in vitro tests, and the outdated regulation for waste disposal in our country, which needs to be revised, and the fact that Japan Radioisotope Association hesitates to handle the excreta and blood fearing the risk of viral infection, the study for pre-processing the nuclear medical waste seems important. The results were as follows. The volume of solid waste was reduced to 1/3 to 1/6 by crashing, more than 60% of the radioactivity of the waste was removed by ultrasonic washing, and the evaporation of Fe-59 and Cr-51 was negligible by burning. However, the evaporation of I-131, Hg-203, and Se-75 was high, especially when they were burnt with plastics. The efficiency of capturing such evaporated nuclides was as low as 20%. The investigation to heighten the efficiency of capturing evaporated radionuclides is being carried out.