# The Radiation Dose around a Radionuclide Drain Tank in a Nuclear Medicine Facility Calculated by Monte Carlo Method.

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## 1. Introduction□

The Monte Carlo simulations presented in this paper calculate the maximum dose around the reservoir tanks in hospitals with nuclear medicine facilities.□

### 2. Methods and Materials□

The drain tank was considered to be a rectangular parallelepiped and assumed to fill with water to its limit. In addition, it was assumed that the radioactive substance was uniformly distributed in the tank. The thickness of the drain tank was set at 0.3 cm of iron and the length of one side of the tank was from 1 to 3m. Radiation scatter from the floor was disregarded. The 1-cm dose equivalent was taken as the average water absorbed dose with a depth of 0.5 cm to 1.5 cm from the surface of the slab phantom. With this assumption, the effective dose per decay for $^{131}$I and $^{18}$F, which is commonly used for PET, was calculated.□

### 3. Results

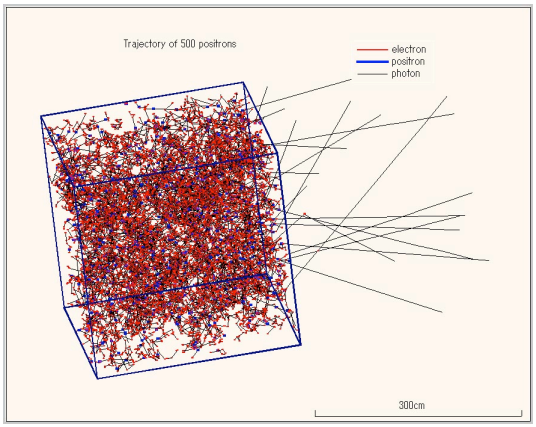


Fig. 1 The trajectory for 500 decays of $^{18}$F in the 27-m$^3$ tank.

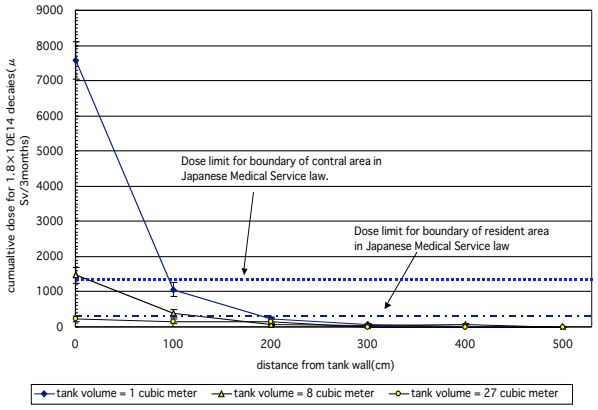


Fig. 2 Dose around the tanks for $^{131}$I with 3 mm iron wall in 3 months.

### 4. Discussion

The calculated dose around the drain tank was sufficiently low compared with the dose limits of the Medical Service Law. The method of appraisal of the radiation shield using the Monte Carlo method is already established, and by using this method, more practical prior safe assessment for nuclear medical facilities can be performed. Based on these observations, verifying the necessity for drain tanks in nuclear medicine facilities is required.