Panel Discussion

Some Problems on the Safe Handling of Radiation in Hospitals and Clinics

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According to our inspectoral results, it was often found that the procedures in handling, storing and disposing of radioactive materials were inadequate in hospitals and clinics, when compared with other organizations.

Especially radiation control systems should be established, in order to ensure that its responsibility is definitel, between a person in charge of radiation handling and other staff concerned. Furthermore, it is necessary that effective instruction and training should be given to all members of radiation works for safe handling of the radiation.

Regulation and Safe Handling of Radiopharmaceuticals from the Standpoint of Users

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It is very important to have an adequate national regulation for safe handling of radioactive isotopes in hospitals. However, if this regulation is not suitable for the present status, it brings us a tremendous amount of trouble, and otherwise nothing. Indeed, currently enforced regulation does not seem to be feasible from the practical standpoint in some aspects. I, even as one of the users, can understand the necessity of ventilation system for the laboratory air and of reservoir for the radioactive liquid waste.

According to Administrative Instruction, however, 1/100 of the amount of radioactive materials used is said to be the factor of evaporation.

In case of in vivo test, radiopharmaceuticals are usually withdrawn from air-tight vials by the syrringes, resulting in a minimum expoure time. Patients are usually out of the controlled room while they are waiting for the test. My experiment shows that 15 % of the dose injected is left in the syringes at most. Furthermore, evaportaion test for the solutions of ^{131}I-hippuran and ^{67}Ga-citrate in test tubes and also for the syringe used for injection showed the factor to be less than 4/1000. Assuming that 10 % of the injected dose is left in the syringe, now evaporation factor as a total becomes 4/10000 (= 4/1,000 x 1/10) of the dose used.

According to the current regulation, the value of concentration for ^{131}I permissible to be drained to the public sewer seems to be rather strict. Based on the data answered from each hospital to the questionaire sent by us (Dr. Machida and I), the total dose of ^{131}I used for a period of one month was divided by the total volume of the water used in each hospital. Subsequently, it was found that the concentration of ^{131}I after dilution with the total volume of the water became one figure less in comparison with the value of the above-mentioned regulation in 27 out of 29 hospitals. In view of the fact that ^{99m}Tc is the nuclide being used most frequently in many hospitals, it is easily imagined that even small-scale reservoir system (including dilution system) will be satisfactory for the sake of safe handling of radiopharamaceuticals in most of the hospitals.

In Japan, there are tremendous confusions for

thyroid cancer treatment with ^{131}I. It is understandable that we are requested to pay special attention to patients' excreta. However, too strict regulation on the ventilation makes us practically impossible to do the treatment.

Assuming that 200 mCi of ^{131}I is given to a patient in the isolated room having 45.2 m^3 air volume, it is now calculated that the ventilation of 750 times every an hour is necessary if the concentration value of 2.5 times is applied, which is larger than that of the table of Notification. On the other hand, if whole air in the controlled area for radioiodine treatment is used to meet the regulation for exhasution, ventilation of 310 times every hour is necessary even with the help of a filter having the filtration efficiency of 90 %. These facts apparently make us difficult to do radioiodine treatment to the patients with thyroid cancer in Japan.

Finally, I must stress that repeated discussions between the officials in charge of radioisotope regulation, and us the users, are necessary to solve the above-mentioned many problems.

Short-life Radioisotopes and Ther Safety in Clinical Use

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With their remarkable advantages, the amount of shortlife radioisotopes, especially ^{99m}Tc or its labelled compounds has been increasing day by day in clinical medicine. It is estimated about 600,000 mCi of ^{99m}Tc was used clinically in 1975, meanwhile 104,400 mCi of ^{99m}Tc was used in 1971. Although clinically useful and indispensable data are available through it, the doctor and other medical employees have to be careful in order not to receive unnecessary radiation when they are using ^{99m}Tc. For example, a syringe should be covered with a protector, because radiation dose is reduced to one two hundredth with a 2 mm thick lead-syringe cover.

Recently in Japan cyclotron has begun to produce medical radioisotopes routinely and new radioisotopes become available. But in spite of these new and better radioisotopes, they have not been approved to use clinically by the Japanese Health Insurance. In view of the point that we have to offer the better medicine to the people, this situation must be changed as soon as possible.

Finally it should be pointed out that ^{99m}Tc is a very safe radioisotope as far as it is used correctly and properly and there is possibility of reducing the disposal contaminated with ^{99m}Tc by changing the law.