Counterplans Against Radioactive Waste from in Vitro Laboratories

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Solid waste disposal is a major problem in the radioisotope utilization in the “in vitro” laboratories. This report discussed counterplans for this subject.

1) To diminish the quantity of the solid waste
The most radical plan for this is to recycle and not to dispose the test tubes and other devices used in the assays. But the cleaning, decontamination and checking of radioactivity are very troublesome. Moreover, the possibility of interactions of residual protein material or soap to the antigen-antibody reaction in the following assay remains. So that, the recycle of the all tubes is not recommended.

The practical plan which we adopt is to crush the plastic tubes etc. into pieces. By doing it, the size of the waste reduced to almost one third.

Then we considered the commercial kits from a viewpoint of the waste disposal. The dose of radioactivity and devices to be disposed differ widely from kit to kit even used in the same purpose. And to design the kits taking into account the waste disposal is expected. Ideas of measuring the radioactivity of “beads” and “discs” in the solid phase assays without using test tubes were proposed.

2) Reduction of the frequency of assays
The one idea of this is the multi-tracer method in which multiple items, necessary in the diagnosis of a disease, are measured in a single assay. For example, Bluett et al. recently reported a simultaneous radioimmunoassay of TSH and T-4 using I-125 and I-131, respectively.

Another idea is to measure multiple samples in a single assay. Our field work of screening of cretinismus by TSH assay is an application of the idea. In this procedure, two blood samples are mixed and assayed in a single medium, and the result does not exceed an level the two samples are judged as normal. If the result is high, individual assays easily determine the abnormal baby. As this field work is against all newborns, samples are very large in number. But this method reduces the assay frequency to almost one half.

Those methods reduced the quantity of the radioactive waste as a whole.

3) Future prospect
Flow systems in the radioimmunoassay, utilizations of short life nuclides were reviewed and discussed.

Finally, non isotopic methods such as enzyme assay were introduced.

Legal Problems in the Radiological Medical Care

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In Japan the radiological care such as X-ray emission at hospitals and clinics is regulated by the Law of Medical Care.

Though the part of the law regulation the radiological medical care was enacted in 1962 based on the level of the radiological medicine at that time, it has not been revised at all since then.

However, the radiological medicine has greatly advanced for the last several years. Especially the application of the nuclear medical science to the medical care has increased markedly. As a result, the present statutory regulation falls much short
of requirement.

Many problems need to be solved such as complicated procedure for the use of the radiation, health control of workers engaged in the radiological medical care, exposure control for patients, radioactive waste disposal and establishment of the organization for radiation control.

Therefore the Academy of the Radiological Medicine and other associations concerned must play an active role in bringing about the necessary modification of the law based on the up-to-date scientific knowledge.

Furthermore, efforts should be made to enlighten the general public as much as possible by disseminating the exact knowledge of radiological medical care.

**Suggestion for the Future Status of the Facility of the in Vitro Test and the Administration on the Radioactivity**

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In carrying out the radioisotope in vitro tests in Japan rationally and safely there are considerable problems to be solved as soon as possible. These problems are related more or less to the laws and regulations in our country. In that case they should be changed, and so sometimes it will take a long time to solve the problems.

First, some practical examples will be mentioned. In spite of using radioactive tracers in the in vitro tests, there are some facilities which the administration of the Science and Technology Agency or Ministry of Health and Welfare does not reach, because of the insufficiency of the regulations. On the other hand, though we handle a very small amount of radioactivity in the in vitro tests, the drainage of the contaminated water, the disposal of the contaminated air, or the waste disposal, etc. are strictly administered owing to the regulations applied to the in vivo tests in the radioisotope facilities. In the United States the in vitro tests are usually carried out in the ordinary laboratories, without having the special facility for radioactive substances. At present, there is no structural standard on the in vitro test facility in our country. So a committee has started to make blue prints on the model plan of the independent in vitro test facility in Japanese Radioisotope Association.

In order to discuss the problems mentioned above, and to find a rational solution of them, a committee on the in vitro test should be set out in the Japanese Society of Nuclear Medicine in the near future.

In that committee the request to solve the problems should be discussed and offered to the Ministry of Health and Welfare or to the Science and Technology Agency, and the laws and regulations should be changed or newly made to meet the demand.