Panel Discussion II

Nuclear Medicine in Japan

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During recent 5 years after the Japanese Society of Nuclear Medicine had been held, the researches and clinical applications in this field becomes popular, but the definition is not yet completely confirmed. Because the field of Nuclear Medicine is systematized as to use radioisotopes in medicine, it occupies also some part of many other fields of medicine and it is important to avoid the meritless divergence. Technological part of nuclear medicine is of cource one of the important parts of this field, but the main part of nuclear medicine must be contributed to medicine and the doctors who work in this field must have enough knowledge about radiation. Education program of nuclear medicine is also an important problem.

Such problems are discussed by the authorities in nuclear medicine in Japan.

Former workes of Dr. Miyakawa mainly depend on radiation biology and radiation therapy, Dr. Nakao hematology, Dr. Kakehi nuclear medicine and Dr. Hiramatsu radiation biology and X-ray diagnosis.

My Opinion on "Nuclear Medicine"

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In all sciences as well as in medicine a new establishment of an novel idea or of dexterous methodology has usually brought on rapid progresses.

Regarding methodology, many real examples can be given, for instance the invention of microscope and electronmicroscope. It is a well known fact that the introduction of microscope into biology and medicine has led a philosophy of microcircumstances at cell-level, and furthermore that of electron-microscope has clearly demonstrated a intimate relationship between the ultrastructures of cell or tissue and its functional activities at molecular level. No body doubts that nowadays a microscope has became an indispensable tool in practical medicine.

The application of radioactive isotopes in the field of medicine prospectively is expected to become so popular even in routine practical

medicine in future analogously to a microscope. Contributions of utilization of radioisotopes to developments of biological and medical researches are surprisingly great. New knowledges, which would seem impossible if radioisotopes had been unable to use, have became not only our common knowledge in practical medicine, but also a basis of further developing of medical sciences.

Such phenomena are prevailing in every field of medicine and never previleged to any branches of medicine already specialized. This means that a concept of "nuclear medicine" involves all fields of medicine in which energy of radioisotopes are applied. The application of radioisotopes in medicine can be mainly classified into three major fields. 1) tracer experiments, 2) diagnostic procedures and 3) treatments.

Recently, an utilization of radioisotopes in medicine has so rapidly expanded that some one says it seems to be convenient to use the word "nuclear medicine" restrictedly to a methodology of medicine, in which radioactivity of radioisotopes are put to use regardless their metabolic natures. It is my feeling that an utility value of radioisotopes in medicine is splendidly emphasized in the concept of "nuclear medicine" and that a possibility of hazardous effects of radioisotopes on human body is apt to be left disregarded. However, it must be seriously taken into consideration to avoid conceivable injuries, be use at present time it is difficult to say definitely safe even when a minimal dose of radioisotope is given. Further developments of nuclear medicine need completely secured facilities and highly trained techniques in order to minimize the radiation injuries.

It is noteworthy that "nuclear medicine" particularly needs intimate cooperation with other fields of sciences, such as physics, engineering, electronics et al.

Nuclear Medicine as Considered from the Viewpoint of Internal Medicine

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Radioisotopes are now widely used in clinical medicine. In the field of internal medicine, the fundamental principles in the use of radioactive tracers may be divided into three categories: isotope dilution studies, diffusion and flow studies and metabolic studies. Some of these studies are performed mainly for the purpose of clinical investigations, but a large number of tracer studies have already been introduced into clinical medicine as routine procedure, and are now being used not only for the diagnosis of various diseases but also for the function test of various organs.

Furthermore, the advancement of radioisotope scanning technique has made it possible to determine the localization, shape, size and function of various organs such as the thyroid gland, brain, lung, heart, liver, spleen, pancreas, kidney and placenta and to detect space occupying lesions in these organs. Radioisotopes are also used for irradiation therapy, as external and implanted radioactive sources, or as sources of internal irradiation.

As mentioned above, recent advances in nuclear medicine are rapid and striking, and we can forsee enormous progress in the near future. The application of radioisotopes to the field of internal medicine may be further enhanced, if the following requirements are fulfilled.

1) Preparation of suitable radioisotopes for clinical use.

The introduction of radioisotopes with short half lives, little β and weak γ rays is desirable to reduce the radiation effect to the minimum and to increase the efficiency of radioactivity measurement. In this respect, the ineroduction of ^{99m}Tc seems to be useful for scanning of various organs because of its physical properties which satisfy the above-montioned requirements. The preparations of various radiopharmaceuticals labeled with suitable radioisotopes is important for the progress of diagnostic procedures and metabolic studies.