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History and Organizations for Radiological Protection

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International Commission on Radiological Protection (ICRP), an independent international organization established in 1925, develops, maintains, and elaborates radiological protection standards, legislation, and guidelines. United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) provides scientific evidence. World Health Organization (WHO) and International Atomic Energy Agency (IAEA) utilise the ICRP recommendations to implement radiation protection in practice. Finally, radiation protection agencies in each country adopt the policies, and adapt them to each situation. In Korea, Nuclear Safety and Security Commission is the governmental body for nuclear safety regulation and Korea Institute of Nuclear Safety is a public organization for technical support and R&D in nuclear safety and radiation protection.

Keywords: Radiological Protection; ICRP; UNSCEAR; IAEA; KINS

Radiation injury began to occur soon after the human race discovered the radiation. The first case appeared as skin burn in the United States just after several months from November 1895 when Roentgen W.C. discovered X-rays. After this event, radiation damages to the hands and fingers have been reported from several countries such as the UK and Germany. Workers were informed for recommendations on radiation protection. However, due to the characteristics that damage does not appear immediately, some practitioners have ignored the recommendations and was found that radiation causes cancers in 1905.

In 1896, American engineer Wolfram Fuchs gave a recommendation for radiation protection for the first time (1). This was 1) to make the exposure as short as possible; 2) do not stand within 12 inches (30 cm) of the X-ray tube; and 3) coat the skin with Vaseline (a petroleum jelly) and leave an extra layer on the most exposed area. In only one year after discovery of X-ray, 3 basic principles of radiation protection time, distance, and shield were set up.

The X-ray and Radium Protection Committee was formed within the British Roentgen, and next year similar committee were organized in the United States and France. The motivation for the need of the international standards for radiation led the 1st International Congress of Radiology (ICR) which was held in London 1925. International X-ray and Radium Protection Committee (IXRPC) was organized at the 2nd ICR in 1928, held in Stockholm. George Kay from the British National Physics Laboratory led the committee, and only two medical doctors were committed. In 1950 after the World War II, ICR was held again in London. Two surviving members of IXPRC, Lauriston Taylor and Rolf Sievert revived the committee and changed the name of committee into International Commission on Radiological Protection (ICRP) which is still used. ICRP is now an independent international organization for developing, maintaining, and elaborating radiological protection standards, legislation, guidelines, programmes, and practice. ICRP is comprised of a Main Commission, five standing Committees, Task Groups and Working Parties. Until now, ICRP has published 129 publications on all aspects of radiological protection including fundamental recommendations, each describe the overall system of radiological protection. The basic principles of justification, optimisation and dose limitation are introduced by ICRP Publication 26 at 1977 (2).

ICRP is an independent international NGO and members are voluntary participants who are experts in radiological protection from various international organizations and countries. Since 1934, in order to protect the independence and scientific soundness from the influence of interest groups, members are selected internally even if they are recommended from outside. Members are invited to serve with ICRP based on the skills and knowledge, and as such do not represent their countries or employers when working with ICRP. ICRP has six sub-committee in order to improve productivity. Committee 1 deals with radiation effects, Committee 2 dose from radiation exposure, Committee 3 protection in medicine, Committee 4 application of the Commission's recommendations, and Committee 5 takes care of protection of the environment.

Various organizations have different roles to make and implement of radiation protection policy (Fig. 1). United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) is the United Nations system established to assess and report levels and effects of exposure to ionizing radiation (3). Specialists from 27 member countries collate and analyse data,

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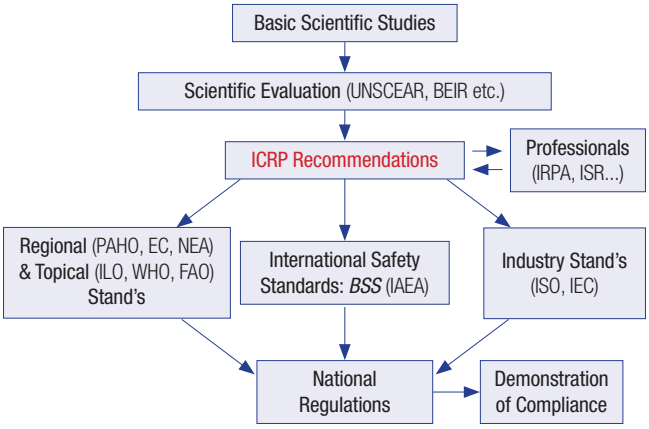

Fig. 1. The process how ICRP recommendations on radiological protection policy are produced and applied (from ICRP Publication 109).

study relevant scientific literature and produce scientific evaluations. Committee on the Biological Effects of Ionizing Radiation (BEIR), a committee of the National Research Council of the USA publishes a series of reports informing the US Government on the effects of ionizing radiation. ICRP proposes protection policies and principles aimed at both legislators and regulators, operators and licensees, and members of the public as a form of recommendation. World Health Organization (WHO) and International Atomic Energy Agency (IAEA) utilise the recommendations of ICRP to implement radiation protection in practice (4). They hold meetings and training programs, create and distribute documents to apply the principles specifically. Finally, radiation protection agencies in each country adopt the policies, and adapt them to each situation.

The Republic of Korea installed Atomic Energy Research Institute in 1959. The first research reactor began its operation in 1962, and radiation licensing system was enacted to manage the radiation risks associated with the use of nuclear energy. In 1981, the Nuclear Safety Center was founded in Korea Atomic Energy Research Institute. Korea Institute of Nuclear Safety (KINS) was established under the Ministry of Science and Technology in 1990 and is responsible for the regulation of nuclear and radiation safety. After the accident of Fukushima nuclear power plant KINS was repositioned into a newly established Nuclear Safety and Security Commission (NSSC) in order to strengthen the independence of the nuclear safety regulation in 2011. Safety regulation system for medical radiation in Korean has been divided into two separate systems. NSSC based on Nuclear Safety Act control radioisotopes and the radiation generators or equipment for therapeutic purposes and its related workers. On the other hand, Ministry of Health and Welfare is responsible for safety management of workers and equipment for diagnostic radiation generator, such as X-ray and CT on the basis of the Medical Service Act.

As a private organization, the Korea Radioisotope Association (KRIA) founded in 1985 has performed training and exposure management for radiation workers. After the launch of NSSC, the business for radiation safety was transferred from KRIA to the Korea Foundation of Nuclear Safety. In 2015 KRIA was renamed as the Korean Association for Radiation Application and is mainly doing business promoting radiation related industry. Korea Radiation Safety Foundation also change its name into Korea Nuclear Safety Foundation to broaden its role. The Korean Association for Radiation Protection (KRAP) founded in 1975 is a major academic society holding annual meetings, symposia, and workshops to promote, exchange information and networking people in the field of radiation protection. KARP publishes regularly an official peer reviewed journal, *Journal of Radiation Protection and Research*. For the preparedness of medical emergency in nuclear or radiological disaster, the National Radiation Emergency Medical Center was constituted in Korea Institute of Radiological Medical Sciences (KIRAMS) in 2003. This center provides continuous education and train programs for personnel who will involve medical countermeasure in a nuclear or radiological incident. It also dispatches emergency response team to disaster site and receives victims for medical services.

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DISCLOSURE

There is no conflict of interest.

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