



Al-Mustaqbal University College
Radiological Techniques Department



RADIATION PROTECTION

The principle of Radiation Protection

Third Stage

Second Lecture

By
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The principle of Radiation Protection

The objectives of radiation protection are to minimize the health effects due to radiation and to provide an appropriate standard of protection for mankind without limiting the beneficial practices giving rise to radiation exposure.

Any practice resulting in increased exposure to radiation should be carefully planned in accordance with the three basic radiological protective principles as set out by the International Commission on Radiological Protection (**ICRP**).

Radiation Protection System: It is an integrated and coordinated set of requirements that lead to the protection of workers, the general public and the environment from radiation exposure

The three fundamental principles for radiation protection have been developed by the ICRP for any exposure to ionizing radiation:

- 1- Justification of a practice
- 2- Optimization of protection
- 3- Application of dose limits

These principles are source-related and apply in all exposure situations

- ❖ **The principle of justification:** The first principle is the justification of radiological protection. This is the fundamental principle that an act of using radiation is permitted only when the benefits or merits outweigh the radiation risks.
- ❖ **The principle of optimization of protection:** The second principle is the optimization of radiological protection. When merits of an act of using radiation outweigh radiation risks, it is decided to use radiation by taking measures to reduce exposure doses as low as reasonably achievable. This is called the ALARA principle. The optimization of radiological protection means to strive to reduce exposure doses as low as possible, while taking into consideration social and economic balances, and does not necessarily mean to minimize exposure doses
- ❖ **The principle of application of dose limits:** The third principle of radiological protection is the application of dose limits. It requires setting an upper limit on the radiation dose that can be exposed. It can affect any individual or any worker in cases of exposure.

Exposure to dose limits must be within prescribed dose limits

Justification of a Practice

Justification in radiological protection of patients is different from justification of other radiation applications. Any procedure in which radiation is used must have more benefits than harm for the exposed persons. For example, in diagnosis and medical treatment, radiation exposure is considered a justification.

There are three levels of justification of a radiological practice in medicine.

- **At the first and most general level**, the proper use of radiation in medicine is accepted as doing more good than harm to society.
- **At the second level**, The aim of the second level of justification is to judge whether the radiological procedure will improve the diagnosis or treatment, or will provide necessary information about the exposed individuals.
- **At the third level**, the application of the procedure to an individual patient should be justified. Hence all individual medical exposures should be justified in advance.

Optimization of Protection

Optimization of protection for patients is also unique. In optimization of protection of the patient in diagnostic procedures, again the same person gets the benefit and suffers the risk, and again individual restrictions on patient dose could be counterproductive to the medical purpose of the procedure.

The optimization of radiological protection for patients in medicine is usually applied at two levels:

1. the design, appropriate selection, and construction of equipment and installations;
2. the day-to-day methods of working.

The principle of application of dose limits

in treatment or health checkups, dose limits are not applied. This is because the application of dose limits to medical exposure may hinder patients from receiving necessary inspections or treatment and is sometimes detrimental to them.