REVIEW OF THE RADIOBIOLOGICAL PRINCIPLES OF RADIATION PROTECTION

The radiobiological principles underlying radiation protection guidelines will be reviewed, analyzing the published results of the effects of ionizing radiation at the cellular level, in animal experiments and, especially,in epidemiological studies. Human data on radiation induced cancer and genetic effects published by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the Biological Effects of Ionizing Radiation (BEIR) Committee,with their latest estimates of risk per unit dose, will be presented. The dose response of normal tissues will be discussed, including effects on the developing embryo and fetus. The recent draft of the International Commission on Radiological Protection (ICRP) on *Early and late effects of radiation in normal tissues and organs: threshold doses for tissue reactions and other non-cancer effects of radiation in a radiation protectioncontext,*which includes follow up times much longer than those common in radiotherapy (up to 20 to 40 versus 5 to 10 years) for some tissues, will be introduced. In particular, the current information on acute and chronic radiation syndromes, as well as the newly proposed threshold doseof 0.5 Gy for cataract induction and cardiovascular effects, will be examined.The impact of these newly proposed threshold values on the development of radiation protection guidelines and standards, especially in the forthcoming *International Basic Safety Standards on Protection against Ionizing Radiation and for the Safety of Radiation Sources*(BSS),will be evaluated. The units and their values used in radiation protection, and the operational units used for measurements, will be presented. The concepts of equivalent dose vs dose equivalent as well as the term effective dose, the Sv unit, and the radiation and tissue weighting factors will be explained and illustrated.

Learning Objectives

1. To understand the radiobiological basis of radiation protection standards.
2. To distinguish between stochastic and deterministic effects.
3. To define the radiation protection magnitudes and units, their valuesand their practical measurement.