IN-DEPTH REVIEWS

Ionizing radiation: overview

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Few hazards are able to match ionizing radiation in their capacity to attract media interest or generate public and worker concern. The inclusion of a radiological dimension in consideration of a terrorist threat has raised this profile and provides an important backdrop to this review. The last 10 years have seen new developments in radiation science, some of which are already affecting practice in the areas such as treatment of radiation injury. The importance of others and their future effects on systems of radiation protection have yet to be fully evaluated.

The role of the occupational physician is to provide advice to employers, in areas such as radiation health, health aspects of contingency planning as well as radiation health advice to the worker, both for routine and accidental exposures. These roles require awareness of radiation science and developments in the field. In addition, it is clear that the public will seek advice and information from occupational physicians acknowledged as health professionals with expert knowledge in this area.

Radiobiology is a young science, but ionizing radiations represent some of the most studied human hazards. The complex information produced is kept under review by international groups such as the International Commission on Radiological Protection (ICRP), whose recommendations establish the systems of radiation protection for both workers and the public. ICRP recommendations are incorporated into European directives and subsequently into UK statutory instruments [1–3].

A brief summary of current systems, and some relevant ionizing radiation background information, is available as Supplementary data at Occupational Medicine Online, to assist readers in their use of the expert sections.

This review presents the following expert sections.

1. New advances in radiation biology: K. Prise of the Gray Laboratory.
4. Intervention in the event of radiation emergency: M. Morrey at the Health Protection Agency, UK.

New ICRP thinking

There are a number of discussions ongoing in relation to the next set of ICRP recommendations. For the occupational physician, some of the most important proposals are as follows:

(i) Retention of the linear proportionate dose relationship for stochastic effects.
(ii) Knowledge of roles of genetic instability, bystander cell signaling and adaptive response in the genesis of radiation-induced health effects is insufficiently well developed for radiation protection purposes.
(iii) Genetic susceptibility to radiation-induced cancer involving strongly expressed genes is rare.
(iv) Optimization determines the need for work- or practice-specific dose constraints, with work-specific maximum levels of doses for particular activities being established by stakeholder consensus rather than regulation.

Conflicts of interest

None declared.

References