

DOSE COEFFICIENTS FOR YOUNG WORKERS

T J Silk and A W Phipps

National Radiological Protection Board, Chilton, Didcot, Oxon OX11 0RQ

ABSTRACT

It is well known that there are many areas of biological variability among any group of workers. One such area is skeletal development where people younger than their mid-twenties will probably not have reached full skeletal maturity. For this reason, people in their late teens tend to have a higher gut and skeletal uptake of calcium and other alkaline earths such as strontium and radium. Thus, there is scope for higher doses to young people from radioisotopes of these elements.

This paper gives committed effective doses for 16 and 18-year-old workers and compares these results with the recommended ICRP dose coefficients for a reference worker. It is found that for some important radionuclides the dose coefficient for a 16-year-old is more than a factor of four greater than that for a reference worker. Even though ICRP does not recommend dose coefficients for young workers, it would appear prudent to consider tighter controls on the levels of activity of particular nuclides to which young workers could be exposed if there is a prospect of the dose limit being approached.

INTRODUCTION

People younger than their mid-twenties will probably not have reached full skeletal maturity. This is taken into account in the new ICRP models^(1,2) for bone-seeking elements by recommending that the 'adult' model applies at age 25 years rather than the 20 years used in the models for non-bone-seeking elements. Therefore, for an intake by a young worker, aged say 18 years, the appropriate model parameters lie somewhere between the recommended models for the 15-year-old and the adult. In some cases this means that there are substantial differences in the model for the 18-year-old and a reference worker, as gut and skeletal uptake can be significantly higher in the former.

For a given type of intake ICRP currently recommend one dose coefficient to be used for all workers (the use of dose coefficient in this paper should be taken to mean committed effective dose per unit intake, Sv Bq⁻¹). These will often overestimate the actual doses received by a working population because they are committed doses evaluated over a 50 year period; a worker of average age would be unlikely to receive the full 50 year dose. However, the use of the reference worker dose coefficient may not adequately protect either trainees or young classified persons in cases where doses arise largely from intakes of certain nuclides. This paper aims to raise awareness of these cases and gives some examples.

LIMITS AND DOSE COEFFICIENTS

The current annual dose limit for a classified person is 50 mSv under the Ionising Radiations Regulations (1985)⁽³⁾. Trainees, who could be as young as 16 years, are

