

Abstract

Magnitude and Variability of Exposures to Natural Background Radiation in the UK

Gerry M Kendall¹, Jon CH Miles², Martyn BMR Green²

1) Childhood Cancer Research Group, University of Oxford, 57 Woodstock road, OX2 6HJ, UK.
Tel: 44(0)1865 310030
Fax: 44(0)1865 315940
Gerald.Kendall@ccrg.ox.ac.uk

2) Radiation Protection Division, Health Protection Agency, Chilton, Didcot, Oxon, OX11 0RQ, UK
Tel: 44(0)1235 831600
Fax: 44(0)1235 833891
Jon.Miles@HPA.org.uk

Objectives

An association between radon exposures and lung cancer can be demonstrated in epidemiological studies. The linear no-threshold hypothesis implies that other components of background radiation would also induce some cancers. However, for such effects to be detectable the exposures must both cause a significant proportion of disease and the variation between individual exposures must be large enough.

Methods

The components of natural radiation exposure which it is usually practicable to measure on an individual basis are radon and terrestrial gamma rays together with the directly ionising component of cosmic rays. An investigation of such exposures was undertaken in a random sample of about 2000 UK houses. The magnitude and variability of these results between individuals and the variability of mean values in administrative districts (as might be used in an ecological study) have been investigated in more detail in recent analyses.

Results

The distributions of dose-rates from terrestrial γ -rays and from cosmic rays are approximately normal. However, for radon the distribution has a marked high dose tail and is closer to log-normal. Quantitative results will be presented.

Conclusions

The respiratory tract receives large and variable distributions of doses, largely from radon. Doses to other organs and tissues are generally lower. Radon delivers doses which differ greatly across organs and tissues while gamma ray doses vary much less. Doses to individuals are more variable than means in administrative districts. Results will be presented and the implications will be discussed.