

## Assessment of the Exposure to and Dose from Radon Decay Products in Normally Occupied Homes

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The exposure to radon decay products has been assessed in seven homes in the northeastern United States and southeastern Canada. In two of the houses, there was a single individual who smoked cigarettes. There were a variety of heating and cooking appliances among these homes. These studies have provided 565 measurements of the activity-weighted size distributions in these houses. The median value for the equilibrium factor was 0.408 as compared with the previously employed value of 0.50. Using the recently adopted ICRP lung deposition and dosimetry model, the hourly equivalent lung dose rate per unit, radon exposure was estimated for each measured size distribution. The mean equivalent dose rate per unit of  $^{222}\text{Rn}$  gas concentration was approximately  $140 \text{ nSv h}^{-1} \text{ Bq}^{-1} \text{ m}^{-3}$ . It was found that the equivalent dose was strongly correlated with the ratio of the decay product concentration to that of radon, termed the equilibrium factor,  $F$ , with a correlation coefficient of 0.785. The correlation coefficient with the  $<2\text{-nm}$  size fraction (the "unattached" fraction) was 0.169, reflecting no significant relationship with the unattached fraction. Differences between houses with smokers present and absent were noted in the exposure condition, but the resulting dose rate per unit of radon gas concentration was essentially the same for the two groups. Expressed in terms of ICRP's unit of effective dose for members of the public, the mean dose rate conversion coefficient with respect to radon gas concentration found in this study was  $3.8 \text{ nSv h}^{-1} \text{ Bq}^{-1} \text{ m}^{-3}$ .

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