Use of Cellular Damage to Determine the Relationship Between Exposure and Dose from Inhaled Radon

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Dose distribution in the respiratory tract following inhalation can influence risk. We have evaluated the frequency of radon induced micronuclei as a marker of the distribution of damage and dose. Experimental animals were exposed by inhalation to radon and its progeny. Physical and biological variables were evaluated to determine the usefulness of cellular damage to predict dose distribution. Physical parameters included: the influence of total dose, dose rate, LET and aerosol carrier on damage in respiratory tract cells. Damage increased as a function of dose and LET. Aerosol size and concentration also changed the frequency of micronuclei observed in deep lung fibroblasts. Biological parameters included; the influence of strain and species, the role cell cycle, and the role of cell type on damage and dose distribution. The major research reported in this paper is the influence of cell location and type on radon induced micronuclei. The slope of the exposure response in respiratory tract cells was ranked from lowest to the highest as follows; nose, (0.012), deep lung fibroblasts (0.018), tracheal epithelium (0.034), deep lung epithelial cells (0.066) % micronuclei/WLM. The importance of this research in relating exposure to dose and dose to risk will be discussed.

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