

COMPARISON OF BRONCHIAL DEPOSITION AND CLEARANCE BURDENS OF INHALED RADON PROGENIES

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Larger fraction of lung cancers in case of former uranium miners developed in the large bronchial airways where the deposition densities of inhaled radon progenies are the highest. Published dosimetric models compute only with primarily deposition and neglect the concomitant effect of clearance. In the literature, we could not find comparisons of radiation burdens of radon progenies deposited in the central airways with the radiation burden of radon daughter elements cleared up into the central airways from the more distal bronchial regions. In this study, these comparisons have been performed.

In this work, the deposition distributions of inhaled radon progenies were computed by the newest version of the Stochastic Lung Model in each bronchial airway generation. A clearance model was worked out to compute the up-cleared fraction of deposited radon progenies. In addition, a dosimetric model was created to determine the radiation burdens of the primarily deposited and the up-cleared radon progenies in each bronchial airway generation.

Based on our results, the burden of the up-cleared radon progenies in the first few airway generations is even higher than that of the primarily deposited particles. Thus, the concomitant effect of clearance in the bronchial airways should not be neglected in the dosimetric and health effect estimations of inhaled radon progenies.