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Letter to Editor

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Environmental Radon, Thoron and their Decay Products may cause Lung Cancer: Need for Effective Measurements

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Abstract
Study of radon (222Rn), thoron (220Rn) and their daughter products is an important aspect as they are the main contributors to the total radiation dose inhaled by human beings from natural radioactive sources. The contribution of radiation dose from daughter elements of 222Rn and 220Rn are more harmful and they cannot be neglected. The alpha-emitting, short-lived decay products are present everywhere in the environment in attached or unattached fractions of air particles. During inhalation, these daughter products stay in the lungs, which may lead to lung cancer.

Keywords: Radon; Thoron; Radiation dose; Lung Cancer

The main sources of indoor radioactive gases are the soil-gas, minerals and rocks in the earth's crust, building material and groundwater. Radon, thoron and their daughter products are the major contributors to the annual effective radiation dose (more than 50%) received by the general population (UNSCEAR, 2000). Smoking radon is the second main reason behind lung cancer in the human population. The short half-life of 222Rn (3.82 days) limits its diffusion in the soil so that radon measured at the level of the surface of the ground cannot have an origin from the deep. The increase of 222Rn concentration from the soil surface is predominantly a pressure-driven flow, with little role of diffusion in it. In the past research contribution of radiation dose from thoron was neglected as compared to radon because of its short half-life (55.6 sec), but now some studies show that inhalation dose calculated due to thoron is comparable with radon and also their decay products are more harmful from their parent elements, so they cannot be neglected (Singh et al., 2016). The short-lived progenies of radon (214Pb, 214Bi and 218Po) and thoron (212Pb and 212Bi) are present everywhere in the environment in attached and unattached fractions. The charged short-lived radioactive progenies when entering the air, tend to attach with water vapours, dust particles or oxygen in the air to form groups or clusters of activity median diameter below 10 nm in a short period of time, so-called unattached progeny and if they are deposited on the surfaces of surrounding objects within a period of few seconds to few minutes, or attach to aerosols with an AMD in the range 10-1000 nm, then they are called attached progeny (Dankelmann et al., 2001). During inhalation, progeny concentrations of 222Rn and 220Rn stay in the lungs and irradiate the bronchial target cells by emission of alpha particles, which results in bronchial carcinomas and consequences may lead to lung cancer (UNSCEAR, 2000). So, more research is required for the measurement of 222Rn, 220Rn and their progeny elements in the proper investigation of effective inhalation doses for the betterment of mankind. The state-of-the-art equipment and techniques are also necessary for this field to provide a safeguard for human beings from naturally occurring radioactive sources.

References

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Author Contributions

PS conceived the concept, wrote and approved the manuscript.

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Competing interest

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Ethics approval

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