

Radon Exposure and Public Health: Therapeutic and Cancer Risk; A Case Study of Groundwater of the Federal Capital Territory Abuja.

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Abstract

Radon is one of the naturally occurring radionuclide materials (NORM) that emanate from the radioactive decay of its parent radium. It occurs naturally in the environment and is the main source of exposure to ionizing radiation for many people. It is the most significant cause of lung cancer after smoking. However, radon is also applied for the therapy of inflammatory and degenerative diseases in galleries and spas to many thousands of patients a year. In either case, chronic environmental exposure or therapy, its effect on the organism exposed need to be investigation. This study was set to review the therapeutic effects and investigate exposure to internal organs from groundwater ingestion in the Federal Capital Abuja. Rad7 alpha spectroscopy radon detector was used to measure groundwater radon concentration. Radon therapies are medicinal application of radon which include radon galleries, radon baths, radon air baths, radon steam baths and radon waters. All these can increase the patient's exposure, the prescribing doctor must weigh up the benefits i.e. pain alleviation and the risk i.e. cancer risk for patients when prescribing the therapies. Radon applications are not advised as spa treatments. Radon activity concentration ranges from 609.00 ± 3.04 to $92,500.00 \pm 63.4$ Bqm⁻³ with mean of $16,628.19 \pm 60.0$ Bqm⁻³. Annual effective dose due to ingestion and inhalation was found to be in the range from 0.13 to 19.43 mSv year⁻¹ and 0.002 to 0.23 mSv year⁻¹ with mean of 3.49 and 0.04 mSv year⁻¹ respectively. Total annual effective dose ranges from 0.13 to 19.66 mSv year⁻¹ with mean of 3.53 mSv year⁻¹. About 48.15% of the samples had radon greater than 11.1 BqL⁻¹ maximum contaminant limit recommended (MCL) by the United State Environmental Protection Agency. Compared to Nigeria standard, all samples had radon greater than MCL of 0.1 BqL⁻¹. All the samples had total annual effective dose greater than 0.1 mSv year⁻¹ recommended by World Health Organization and European Commission.