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Site-specific dose conversion factors for radon progeny based on actual aerosol size distributions at various environments

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The ICRP recommended a new dose conversion factor for radon, which is two times higher than the value by the UNSCEAR[1,2]. Therefore, an inhalation dose assessment for radon and its short-lived progenies gets more essential recently. The ICRP also mentioned the importance of the aerosol size distribution in the inhalation dose assessment. Many researchers reported that the inhaled aerosol size would determine the sites of deposition in the respiratory tract. In addition, each region of the respiratory tract has different radiosensitivity. Therefore, the inhalation dose strongly depends on the aerosol size distribution. The ICRP also mentioned that site-specific dose conversion factors can be used if sufficient, reliable aerosol information is available and estimated doses warrant more detailed consideration. In this study, aerosol size distributions were measured under various situations and the site-specific dose conversion factors were evaluated and compared with values of other reports.

The aerosol size distributions were measured at a tourist cave by a Portable Aerosol Mobility Sizer (Model3310, Kanomax Inc.), which can measure the aerosol size distribution in the range from approximately 15 to 800 nm. Also, activity size distributions of radon and thoron progeny were measured using Micro-Orifice Uniform Deposit Impactor (Model 110, MSP) and alpha counters (Model 43-10, Ludlum Measurements, Inc.) at the outdoor environment in Hirosaki. In addition, 4-stage impactor was used with Solid-State Nuclear Track Detector (CR-39, BARYOTRAK, Fukuvi Chemical Industry Co., Ltd.). Based on the results obtained, the site-specific dose conversion factors were evaluated using Integrated Modules for Bioassay Analysis (IMBA Professional, Health Protection Agency) under several assumptions.

The results of the measurements and calculations will be presented in the presentation

References

- [1]. ICRP, 2017. Occupational Intakes of Radionuclides: Part 3. ICRP Publication 137. Ann. ICRP 46(3/4).
- [2]. UNSCEAR, 2006, UNSCEAR 2006 Report to the General Assembly with scientific annexes. United Nations, New York.

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