

Assessment of Prevalence of and Risk Factors for Internal Radiation Exposure after the
Fukushima Nuclear Accident

福島原発事故後の内部被曝率および危険因子に関する研究

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Objective: The Fukushima Dai-ichi nuclear disaster, the first level-7 nuclear disaster since Chernobyl, raised concerns about the future health consequences of radiation exposure. Risk factors associated with exposure, which are key to understanding and improving current nuclear disaster management, are not well studied. This study aims to investigate both the prevalence and levels of measurable internal radiation exposure in residents of Minamisoma, and also to identify risk factors for high prevalence and levels of exposure.

Methods: A screening program for internal exposure using a whole body counter (WBC) measurement and a questionnaire survey was implemented in Minamisoma, between October 2011 and March 2012.

Results: Approximately 20 % of the city population (8,829 individuals) participated in the WBC measurement for internal exposure, of which 94 % responded to the questionnaire. The proportion of participants with detectable internal exposure was 40 % in adults and 9 % in children. The level of internal exposure ranged from 2.3 to 196.5 Bq/kg (median, 11.3 Bq/kg), and exposure above 50 Bq/kg was very rare. Multiple regression analysis identified two risk factors: more time spent outdoors, and intake of potentially contaminated foods and water.

Conclusions: This study suggests that internal radiation exposure risks can be identified and managed, and that with sensible and reasonable precautions, people can continue to live in radiation-affected areas with limited risk of exposure. To enable this, nuclear disaster response should strictly reinforce food and water controls with dissemination of evidence-based, clear and up-to-date information about avoidable exposure risks.

Key words: Nuclear disaster; Internal radiation exposure; External radiation exposure; Disaster management; Disaster response; Whole body counter machine; Multiple regression analysis.