Study findings

Both body mass index (BMI) and muscle mass index tended to decrease with increased radiation dose in both male and female A-bomb survivors. Abdominal obesity index tended to increase among females who were younger than 15 years of age at the time of bombing (ATB).

Explanation

Dr. Yoshimi Tatsukawa, Associate Senior Scientist at the Hiroshima Department of Clinical Studies, RERF, and other researchers examined the relationship of radiation exposure to BMI and to body composition measured by systemic dual-energy X-ray absorptiometry (DXA) among subjects of the Adult Health Study (AHS), a long-term follow up of the health of A-bomb survivors based on biennial health examinations. The study results were published in the International Journal of Obesity.

1. Study purpose

   No study has been conducted on whether A-bomb radiation affected obesity or body composition such as muscle and fat. This paper resulted from a study on whether radiation exposure is related to alterations of BMI and of body composition measured by DXA, taking age ATB into consideration.

2. Study methods

   Relationship between radiation exposure and BMI was examined for 2,686 A-bomb survivors (834 males and 1,852 females) aged 48–89 (0–40 years ATB) who had participated in the AHS during the period 1994–1996. Further, the relationship between radiation exposure and body composition was examined for 1,729 of those survivors (550 males and 1,179 females) for whom body composition had been assessed by DXA.

   In reviewing body composition, we used 1) fat-free mass of extremities (both arms and both legs; weight minus weight of bone and fat)/height squared, as an index of muscle mass, and 2) ratio of trunk fat to extremity fat, as an index of abdominal obesity. In statistical analysis, age at examination, age ATB (ages <15, ≥15), serum creatinine level, smoking history, drinking history, diabetes, ischemic heart disease, presence or absence of malignant tumor, and menopausal status, for females, were taken into consideration.

3. Study results

1) Effects of radiation on BMI

   BMI tended to decrease with increased radiation dose in both males and females. Analysis by age ATB showed a significant relationship between increased radiation dose and decreased BMI among males who were younger than age 15 ATB.

2) Effects of radiation on body composition
Muscle mass index decreased with increased radiation dose. As in the case of BMI, examination by age ATB showed that the muscle mass index tended to decrease with increased radiation dose among males who were younger than age 15 ATB. Among females who were younger than age 15 ATB, the abdominal obesity index tended to increase with radiation dose.

In this investigation of A-bomb survivors around 50 years after A-bomb radiation exposure, decreased BMI and altered body composition with increased radiation dose were suggested. Further investigation is underway on how such body composition alterations are involved in the health status of A-bomb survivors.

The Radiation Effects Research Foundation has studied A-bomb survivors in Hiroshima and Nagasaki for more than 60 years. RERF’s research achievements are considered the principal scientific basis for radiation risk assessment by the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and for recommendations regarding radiation protection standards by the International Commission on Radiological Protection (ICRP).

$\textit{International Journal of Obesity}$, which is an international scientific journal published by the Nature Publishing Group, carries papers in a wide range of research fields concerning obesity research and therapy. (Impact factor in 2011: 4.691)