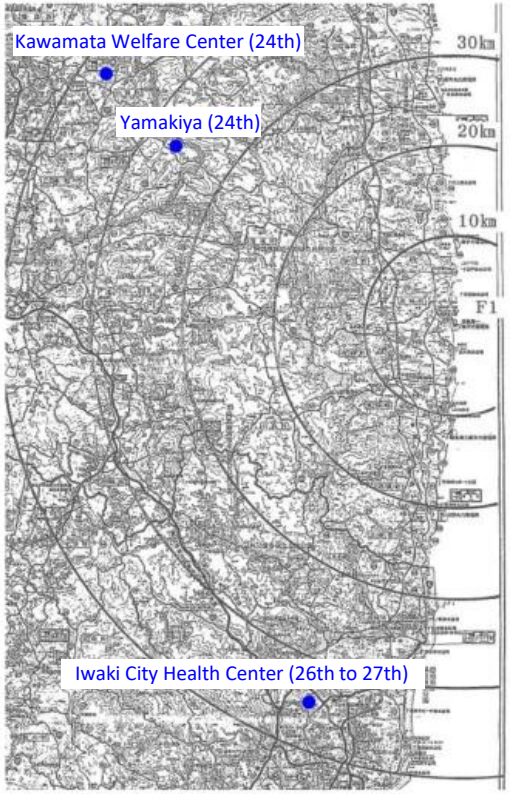
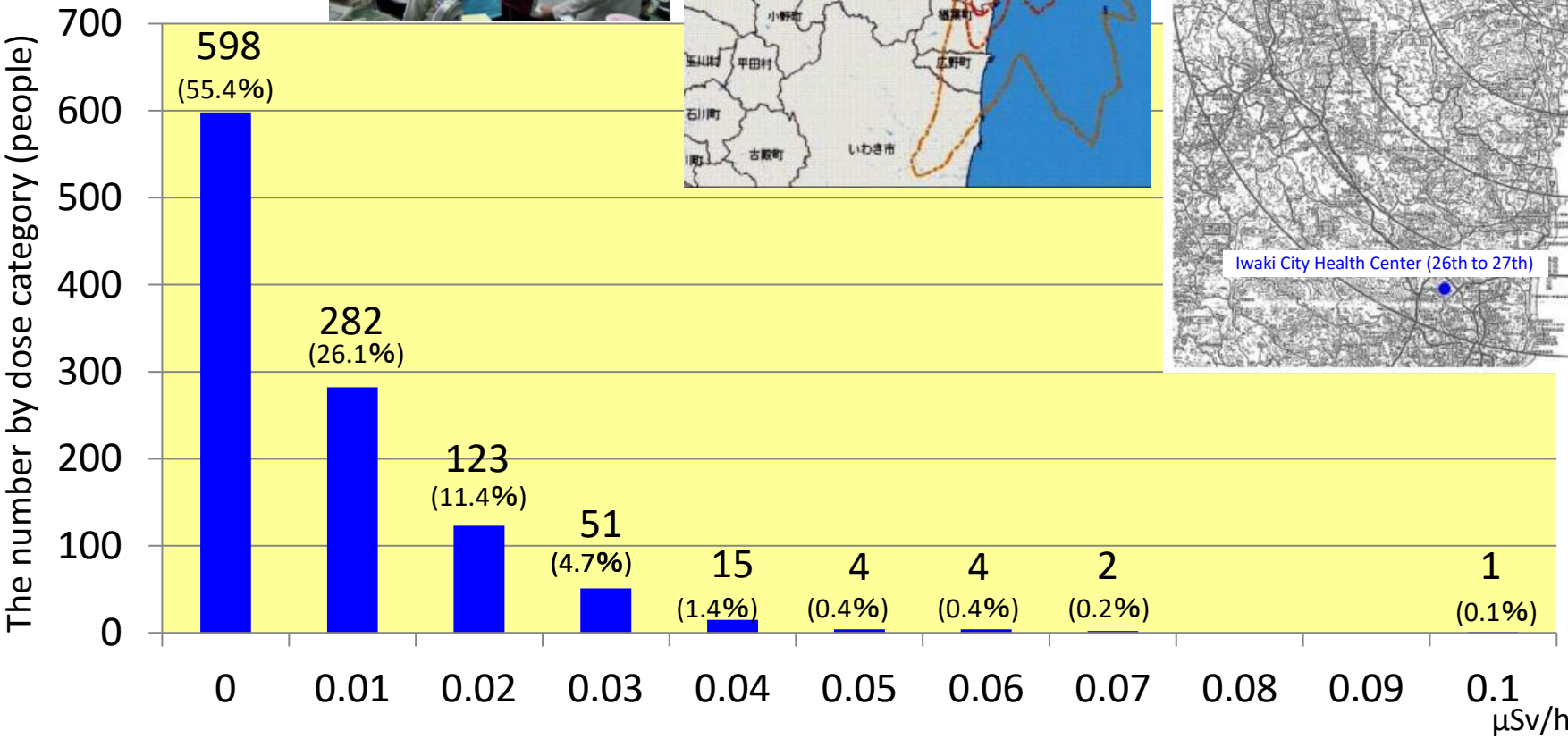
Survey on Internal Exposure by Direct Measurements

Simplified Thyroid Exposure Dose Measurement for Children





Nuclear Safety Commission, "Evaluation of the Results of the Childhood Thyroid Examination," September 9, 2011

Survey on Internal Exposure by Direct Measurements

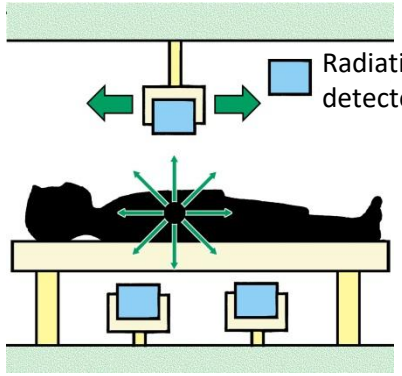
Internal Exposure Measurement Using a Whole-body Counter

Whole-body counter (WBC): A device to measure radiation from radioactive materials within the body
It can measure radionuclides emitting γ-rays, such as Cs-134 and Cs-137.

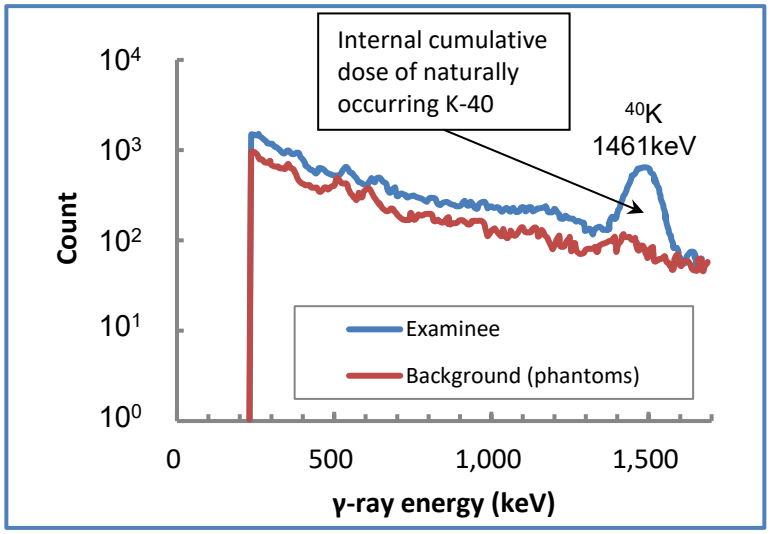
Whole-body counter (WBC)

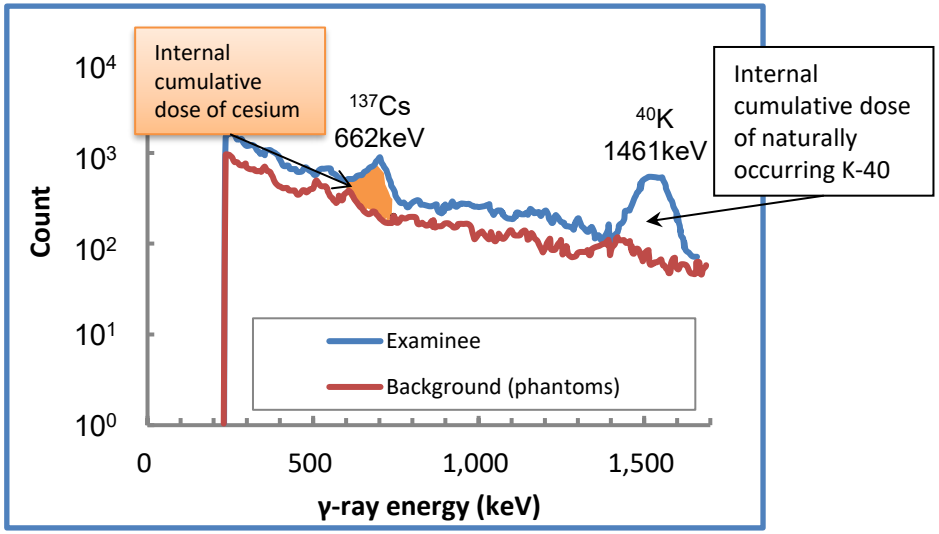
When radioactive materials have entered the body

When radioactive materials have not entered the body



When radioactive materials have entered the body





keV: kilo-electron volts

Survey on Internal Exposure by Direct Measurements

Results of the Internal Exposure Measurement Using a Whole-body Counter

Targeting the residents of the Evacuation Areas and the areas where internal and external exposure doses are likely to be higher than in other areas based on the results of the environmental monitoring survey, etc. (Yamakiya District in Kawamata Town, Iitate Village and Namie Town), the internal exposure measurement using a whole-body counter commenced on June 27, 2011. The targeted areas were expanded sequentially, and measurements were conducted for a total of 347,226 people by November 30, 2024. For over 99.9% of them, committed effective doses due to Cs-134 and Cs-137 were below 1 mSv and even the maximum measured value was 3 mSv. Measured values were all unlikely to cause any health effects.

(i) Targeted local governments: All 59 municipalities in Fukushima Prefecture

(ii) Organizations that conducted the measurement

Fukushima Prefecture; Hirosaki University Hospital; Minamisoma City General Hospital; Japan Atomic Energy Agency; Niigata Prefecture Radiation Examination Office; Hiroshima University Hospital; Nagasaki University Hospital; Japanese Red Cross Otsu Hospital; Mori no Miyako Industrial Health Association; National Hospital Organization Kanazawa Medical Center; Ehime University Hospital; and the National Institute of Radiological Sciences

(iii) 'Mobile measurement' using whole-body counter vehicles outside Fukushima Prefecture

Fukushima Prefecture ran whole-body counter vehicles for mobile measurement so as to enable evacuees outside the prefecture to also receive measurement. By March 2016, mobile measurement was conducted in 38 prefectures including the Tokyo Metropolis (other than Aomori, Ibaraki, Niigata, Ishikawa, Shiga, Hiroshima, Aichi and Nagasaki Prefectures), where there was no permanent organization to which Fukushima Prefecture commissioned the measurement.

(iv) Measurement results (committed effective doses) (Results up to November 2024 were released on December 19, 2024.)

	Jun. 27, 2011 – Jan. 31, 2012	Feb. 1, 2012 – Nov. 30, 2024	Total
Less than 1 mSv	15,384 people	332,110 people	347,494 people
1 mSv	13 people	1 person	14 people
2 mSv	10 people	Zero	10 people
3 mSv	2 people	Zero	2 people
Total	15,409 people	332,111 people	347,520 people

* Committed effective dose: Assuming that until the end of January 2012, a person ingested radiation once on March 12, 2011, and, from February 2012 onward, a person orally ingested the equal amount of radiation every day from March 12, 2011, to the day preceding the measurement date, the person's lifetime internal doses are calculated by summing up the doses for fifty years in the case of an adult and for the years elapsed until becoming 70 years old in the case of a child.

Prepared based on the website of Fukushima Prefecture, "Results of the Internal Exposure Measurement Using a Whole-body Counter"

Survey on Internal Exposure by Direct Measurements

Internal Exposure due to Foods

- Radioactive cesium is eliminated from the body over time.
- The internal exposure measurement using a whole-body counter being conducted at present examines the effects of radiation that is ingested orally on a daily basis.
- Measured values exceeding 1 mSv are considered to be mostly caused by radiation **derived from wild plants or animals**. Since March 2012, values exceeding 1 mSv have not been detected.

* Reference: p.84 of Vol. 2, "Mushrooms, Wild Plants and Wild Bird and Animal Meat"

Q. What if the measurement using a whole-body counter detected any value exceeding the detection limit?

A. The relevant person may have eaten a lot of foods – not allowed in commercial markets – that contain radioactive cesium at high concentrations, e.g., wild mushrooms, wild plants, wild bird and animal meat (wild boars, bears, etc.).

Prepared based on the following:

Masaharu Tsubokura, et.al. "Reduction of High Levels of Internal Radio-Contamination by Dietary Intervention in Residents of Areas Affected by the Fukushima Daiichi Nuclear Plant Disaster: A Case Series," PLoS One. 2014; 9(6): e100302., US National Library of Medicine, National Institutes of Health, Published online 2014 Jun 16

Survey on Internal Exposure by Direct Measurements

Self-Protection against Internal Exposure

- General protection against radioactive cesium
  It is very effective to
  → Have knowledge on foods that contain a high level of radioactive cesium
  → Avoid eating the same food continuously
  →Try to eat a variety of foods produced in diverse areas.

- State of Fukushima after the accident at Tokyo Electric Power Company (TEPCO)'s Fukushima Daiichi NPS
  → There is no significant difference whether one selects foods and water produced locally or selects those produced in other areas.
- Obtaining accurate information is extremely important.

Prepared based on the material released by the 9th Opinion Exchanges, Foodservice Industry Research Institute (September 3, 2012)