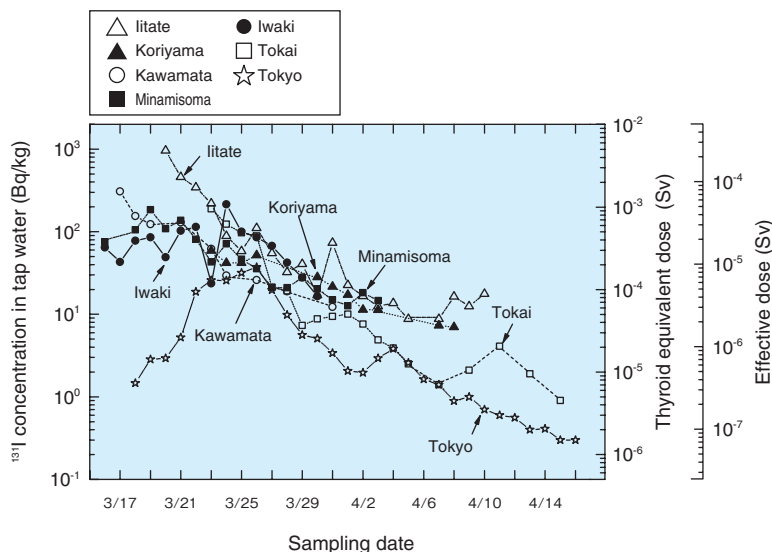


# 1-16 Verification of the Exposure Reduction Effect of Tap Water Restrictions – Evaluation of Averted Doses to Infants in the Implementation after the Accidents at the TEPCO's Fukushima Daiichi NPS –

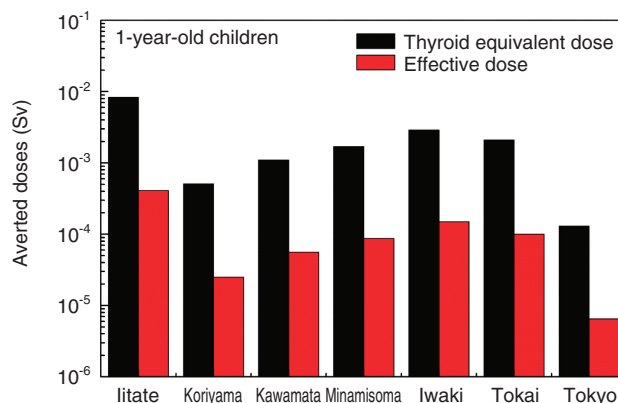


**Fig.1-33 Concentration of <sup>131</sup>I in tap water and projected doses**

The concentration of <sup>131</sup>I in tap water at selected areas in Fukushima, Tokai and Tokyo depended on the sampling points and decreased with an apparent half-life of <sup>131</sup>I of  $2.8 \pm 1.2$  days. Equivalent doses to the thyroids and projected effective doses for 1-year-old children also decreased.

**Fig.1-34 Averted doses by implementing tap water restrictions**

In an emergency situation with the potential for internal exposure due to intake of radionuclides, the averted equivalent doses to the thyroids and the effective doses were a maximum value of 8.3 mSv and  $4.1 \times 10^{-1}$  mSv, respectively, in Iitate. Tap water restrictions were an effective protective action for reducing the internal doses due to ingestion of <sup>131</sup>I.



The accidents at the TEPCO's Fukushima Daiichi NPS resulted in considerable land contamination, and thus tap water restrictions were implemented to reduce the internal doses due to ingestion of radionuclides such as iodine 131 (<sup>131</sup>I). After the concentration of <sup>131</sup>I in tap water decreased, local governments were required to make a decision concerning the termination of tap water restrictions. However, because there was no clear provision for the termination of tap water restrictions, social confusion was induced. When considering appropriate protective action for avoiding unnecessary exposure, it is important to review the effectiveness of the tap water restrictions by examining the temporal change in the concentration of <sup>131</sup>I in tap water and evaluating the dose prevented by the implementation of the tap water restrictions -, i.e., the averted dose. To contribute to the development of criteria for the termination of tap water restrictions, the concentration of <sup>131</sup>I in tap water was examined using monitoring data published by several authorities in Fukushima, Ibaraki and Tokyo, and this data was applied to the subsequent evaluation of the averted doses for members of the public -1-year-old children- due to the intake of <sup>131</sup>I through tap water restrictions.

Fig.1-33 shows the concentration of <sup>131</sup>I in tap water in Iitate, Koriyama, Kawamata, Minamisoma, Iwaki (Fukushima), Tokai (Ibaraki), and Tokyo using data from March 16 to April

16, 2011. The concentration of <sup>131</sup>I varied with the sampling point, but showed an overall tendency to decrease with time. It was found that the apparent half-life of <sup>131</sup>I in tap water was  $2.8 \pm 1.2$  days, which was shorter than the physical half-life of <sup>131</sup>I (8.0 days).

Fig.1-34 shows the averted doses for 1-year-old children by implementing tap water restrictions in Fukushima, Ibaraki and Tokyo. The doses were evaluated by multiplying the daily <sup>131</sup>I intake amount from tap water for 1-year-old children with the dose coefficient of the International Commission of Radiation Protection (ICRP). In Iitate, the maximum averted equivalent dose to the thyroids and the effective dose were found to be 8.3 mSv and  $4.1 \times 10^{-1}$  mSv, respectively. This result indicated that the tap water restrictions were an effective protective action for reducing the internal doses due to ingestion of <sup>131</sup>I. In Tokai, the dose due to ingestion of <sup>131</sup>I was averted fortuitously because it took substantial time to restore the water supply owing to repeated earthquakes and continuous blackouts. In Tokyo, the concentration of <sup>131</sup>I in tap water was relatively low and tap water restrictions were implemented only for one day. Nevertheless, the averted equivalent dose to thyroids was found to be  $1.3 \times 10^{-1}$  mSv, confirming that the tap water restrictions were implemented effectively.

**Reference**

Kinase, S., Kimura, M. et al., Evaluation of Averted Doses to Infants by Tap Water Restrictions after the Fukushima Daiichi Nuclear Power Plant Accident, Nippon Genshiryoku Gakkai Wabun Ronbunshi, vol.10, no.3, 2011, p.149-151 (in Japanese).