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JANIC Fukushima Radiation Guideline

“The fundamental principle when considering the effects of radiation is “Decide for yourself how much exposure you can tolerate”. Some experts controversially say that there is no such thing as a safety standard that can apply to all people, instead there is only the standard which can be set for each of us by our own judgement. Once you decide to be involved in the issues of Fukushima, please make your own decision as to whether or not you can accept these guidelines.”



地球 × 未来、あなたと今できること。

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Japan NGO Center for International Cooperation

JANIC Fukushima Radiation Guideline

2012/7/2
JANIC Disaster Task Force
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Director
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Due to the diffusion of radioactive substances into the environment caused by the accidents at Fukushima Daiichi Nuclear Power plant, the wider area, mainly Fukushima prefecture, has been contaminated since March 11, 2011.

Since the relief workers conduct relief/reconstruction activities in contaminated areas, they must be made aware of the dangers of contaminated areas. As with professionals such as firefighters and police officers, they will inevitably be subject to a more permissive standard than that of the general public.

JANIC does not recommend the involvement of young people (under 40 years of age) travelling from outside of the affected areas, including from overseas.

However, JANIC does not prevent you from working if you, with willful commitment and sound judgement, understand and accept the risk of exposure to radiation.

The fundamental principle when considering the effects of radiation is "Decide for yourself how much exposure you can tolerate". Some experts controversially say that there is no such thing as a safety standard that can apply to all people, instead there is only the standard which can be set for each of us by our own judgement. Once you decide to be involved in the issues of Fukushima, please make your own decision as to whether or not you can accept these guidelines. Please do not allow the experts to decide if the risk to your own health and safety is acceptable.

※ NGO / NPO, CSO and civic organizations working in Fukushima or areas where the situation is similar to Fukushima may quote freely and without prior consent from these guidelines, as long as they cite the source and edition.

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We set the following categories for staff working in Fukushima.

(H) High Risk Group: Men from 20 – 30 years old, Women from 20 – 40 years old.

※ According to the 2009 demographic survey by the Ministry of Health, Labor and Welfare, 97.1% of all childbirths are by women under 40 years old.

(L) Low Risk Group: Men from 30 – 50 years old, Women from 40 – 50 years old.

(D) Diehard Group: Men and women over the age of 50.

Dose on duty: (H) does not exceed 10.0 mSv per year cumulative. ※ 1

Dose on duty: (L) does not exceed 20.0 mSv per year cumulative. ※ 2

Dose on duty: (D) does not exceed 30.0 mSv per year cumulative. ※ 3

In addition to relief workers, we set the category of “Non-professional Volunteer” (NPV). Their dose does not exceed 1.0 mSv per year cumulative. ※ 4

Those relief workers and NPVs who are expected to work in Fukushima wear an integrating dosimeter for 10 - 30 days prior to entering Fukushima, and record the measurement of the radiation dose accumulated during normal life at their residence. It will be the reference for calculating the amount of the total annual cumulative exposure in residence areas and working area.

Relief workers carry integrating dosimeters and glass badge, while NPVs wear a glass badge. They report the record of daily and monthly dose to their superiors or administrators.

Relief workers should report immediately to their supervisors if the monthly permissible exposure calculated from the annual allowable dose in each category is exceeded.

The supervisors must analyze the working conditions of relief workers, and take measures to reduce exposure and submit the report to a general secretary.

Those relief workers who exceed the allowable annual dose will be granted paid leave of 14 days in addition to legally designated paid holiday. They must leave the work location rapidly, and take appropriate action to lower the exposure level. Additionally, they will be granted the right to request reassignment or change of work schedule.

- In the above-mentioned dose, the amount of external exposure is counted and the amount of internal exposure is not taken into account. The amount of exposure to external radiation dose is measured by integrated dosimeter and glass badge. The measurement of internal exposure is not included.
- Some experts mention that although the formula for measuring internal exposure has been published as well, it is not sufficiently trustworthy and is difficult to calculate on a daily basis. This is not limited to internal exposure calculations, but we should make every effort to make radiation exposure as small as possible.
- If radioactive substances have been introduced into the body by taking contaminated foods or water, or by inhaling dusts and dirt in the air, they can be the cause of internal exposure.
- Be cautious with the safety of water, milk, seafood, vegetables and meats. Drinking water should be mineral water or uncontaminated tap water.
- Wear masks on windy days, and when strong winds and rain are approaching wear raincoats that can be wiped down later. Winter coats and scarves can easily collect dust, and should be left at the entrance without bringing them inside. Follow precautions used to combat flu and hay fever, such as hand washing and gargling after going out, sweeping out the interior of rooms, etc.
- Pregnant women will be excluded from all categories.
- Women with high probability of pregnancy should wear a mask when going out.
- You should always carry an emergency manual.

Radiation risk

Annual dose calculation based on a 1 – 4 week stay in or around Fukushima followed by return to Tokyo.

Values represent the approximate average exposure on July 27, 2012

Fukushima radiation and lifestyle information provided by:

Fukushima Minpo private (Fukushima city and surrounding areas)

http://www.minpo.jp/pub/jisin_jyohou/info_index.html

Tokyo Metropolitan Institute of Public Health (Tokyo area)

<http://monitoring.tokyo-eiken.go.jp/index.html>

	Unit	Fukushima	Koriyama	Shirakawa	Aizu wakamatsu	Minami Souma	Iwaki	litate	Tokyo (Shinjuku)
One hour	μSv/h	0.68	0.52	0.22	0.10	0.27	0.10	0.83	0.08
One week	μSv/w	114.24	87.36	36.96	16.80	45.36	16.80	139.44	13.44
1 year after return	mSv/y	0.80	0.77	0.72	0.70	0.73	0.70	0.83	0.70
Two weeks	μSv/2 w	228.48	174.72	73.92	33.60	90.72	33.60	278.88	
1 year after return	mSv/y	0.90	0.85	0.75	0.71	0.76	0.71	0.95	
Three weeks	μSv/3 w	342.72	262.08	110.88	50.40	136.08	50.40	418.32	
1 year after return	mSv/y	1.00	0.92	0.77	0.71	0.80	0.71	1.08	
One month	μSv/m	489.60	374.40	158.40	72.00	194.40	72.00	597.60	
1 year after return	mSv/y	1.13	1.02	0.80	0.72	0.84	0.72	1.24	
1 year workin g	mSv/y	5.96	4.56	1.93	0.88	2.37	0.88	7.27	

We observe a decline of exposure values for decontaminated areas, but many locations not yet decontaminated show parallel decreases.

※ You can calculate with the updated figures by changing the data in yellow on the "total estimated annual dose calculation table". The yellow cells contain the highest hourly exposure rate in the Fukushima Prefecture area on July 27, 2012.

The table above is the approximate annual exposure if you live one year in the Shinjuku area of Waseda after working from one to four weeks in Fukushima Prefecture. However, internal exposure is not taken into consideration in this data. For internal exposure, even the ICRP reported that if one takes

water and food whose radiation level is below the provisional standard, the effect becomes much larger when it comes to long term exposure. Please do not underestimate the danger of the low-dose internal exposure. Please estimate the yearly exposure using the latest exposure per hour data.

Based on the above table, a NPV is only able to work around three weeks in Fukushima. This is calculated based on the data of July 27, 2012.

When calculating the amount of hourly exposure to children from the average annual exposure, the ministry of Education derived coefficients by using the average rate of exposure in classrooms, schoolyards and residences. The ministry of Education then simply reduced the number of hours by using those coefficients. However, we do not adopt the idea, because the average value is unsuited as the basis of safety. In the medical statistics, normally, it is common sense to think of the value which fits 95% of the cases (with a 5% outlier rejection rate). When the Ministry of Education publicized the method of calculation, databases used as the basis of numbers or reference lists that have been evaluated scientifically were not shown.

The amount of radiation in Fukushima was at a maximum of 24 $\mu\text{Sv/h}$ immediately after the accident of the Fukushima Daiichi nuclear power plant caused by the Great East Japan Earthquake. It is decreasing, and reached roughly 1.10 $\mu\text{Sv/h}$ by August. However, this figure is comparatively higher than litate village (designated evacuation area), except for the warning zone. The figures will also vary depending on location. There are hot spots where the dose is relatively high, such as drainages and ditches. Please avoid getting close to those places.

※ According to International Commission on Radiological Protection 4 (ICRP), "the cumulative radiation dose and exposure limits for one year (at normal)" is set at 1 mSv (= 1000 micro sievert).

※ 10 mSv annual dose of 1 High Risk Group is based on the fact that occupationally exposed persons (limits apply only to women who have the potential to become pregnant) are legally allowed an exposure of 5mSv in 3 months. However, the limited exposure of the general public is 1 mSv (= 1000 $\mu\text{Sv/h}$) per year according to the International Commission on Radiological Protection (ICRP).

※ 20 mSv annual dose of 2 Low Risk Group is based on the standard conduct for radiation exposure of private workers involved in the decontamination and restoration work ordered by the prefectural government, which was established by the Japanese government after the disaster. This dose is the level which certifies nuclear power plant workers for compensation, should they develop leukemia.

※ 30 mSv annual dose of 3 Diehard Group is based on the report of Dr. Brenners mentioning that "cancer occurs excessively from 34mSv of the cumulative dose " at the National Academy of Sciences (PNAS) in 2003.

※ According to International Commission on Radiological Protection 4 (ICRP), "the cumulative radiation dose and exposure limits for one year (at normal)" is set at 1 mSv (= 1000 μ Sv/h).

Source A: "A Commentary on the Fukushima Nuclear Plant Accident and Measures Against Radiation",
April 11, 2011

By: Yasuyuki Fujimura, Founder of Atelier Non-Electric, Professor of Nihon University

<http://www.hidenka.net/toride/>

Source B: "The How and The Why of Behind Setting the Maximum Dosage of Radiation Exposure for
School Children at 20 mSv"

By: ZIPANG Renaissance Website Article

http://blog.livedoor.jp/zipangu_renaissance/archives/3187342.html#

Source C: "Nuclear Power Deception", Hiroaki Koide

Source D: "Protecting Children from Radiation", Jun Takada

Source E: "Application of the Commission's Recommendations to the Protection of People Living in
Long-term Contaminated Areas After a Nuclear Accident or a Radiation Emergency"

By: ICRP Publication 111

Source A: Excerpts from “A Commentary on the Fukushima Nuclear Plant Accident and Measures Against Radiation”, April 11, 2011 by Yasuyuki Fujimura, Founder of Atelier Non-Electric Company, Professor of Nihon University

• **Types of Exposure: Three modes of Exposure**

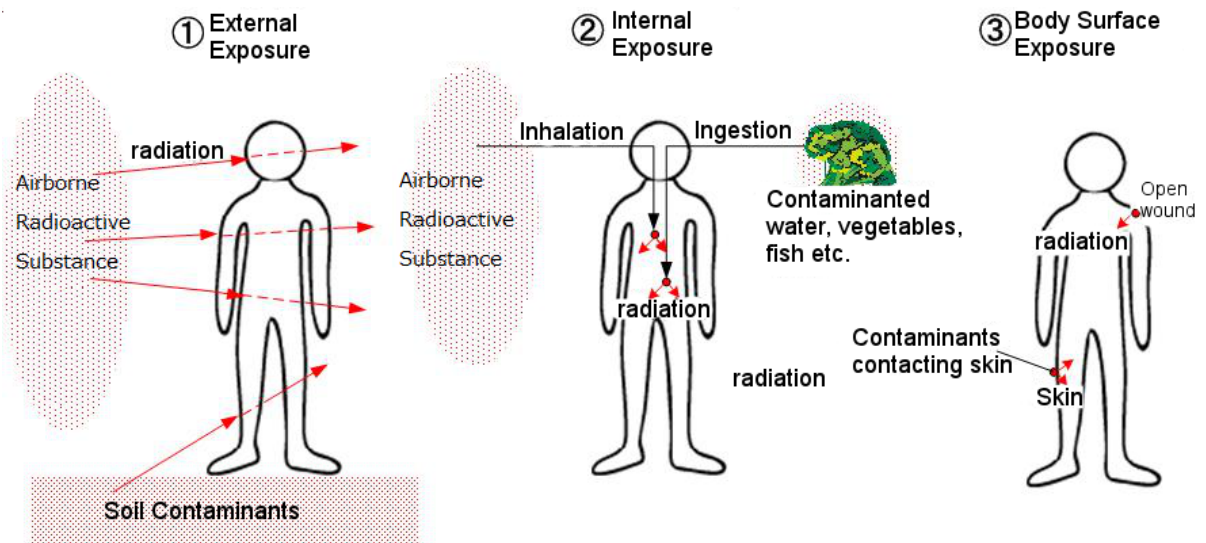
There are three modes of exposures as listed below:

External Exposure • • External irradiation by air-borne or terrestrial radioactive material.

Internal Exposure • • Radioactive elements enter the body via inhaled air or soil, and ingested water, milk, vegetables, meat and fish. They irradiate the organs and tissues directly.

Body Surface Contamination • • Radiation absorbed via direct contact with skin surface or wounds.

Since workers entering a nuclear plant facility or an accident site are required to wear dust masks, it is unlikely for them to be internally exposed by way of inhalation or ingestion - they must concentrate more on their external exposure and body surface contamination. But to those living in areas away from the nuclear power station, the effects from internal exposure through inhaling and ingesting would be greater. The Chernobyl nuclear disaster showed that while those areas located more than 30 km away from the affected plant had only cases of internal exposure, those located closer to the accident site reported both incidents of external and internal exposure.



Source A: Excerpts from “A Commentary on the Fukushima Nuclear Plant Accident and Measures Against Radiation”, April 11, 2011 by Yasuyuki Fujimura, Founder of Atelier Non-Electric Company, Professor of Nihon University

- **Internal Exposure via Contaminated Food**

It was childhood thyroid cancer that saw an increased occurrence among the residents living in contaminated regions near Chernobyl. Rapid increase in cases of thyroid cancer a few years after the nuclear accident is seen among young children who inhaled fallout containing iodine-131. An increase was also seen in the cases of infant cancer and premature birth of children born to parents exposed to radiation. The reported radiation dosage these parents received were in the tens and hundreds of mSv. Internal exposure is still affecting people 25 years after the accident, because they continue inhaling the contaminated air and ingesting contaminated vegetables, milk, meat, and mushrooms. An increase in children’s leukemia and other form of cancers, in addition heart and cerebro-vascular disease and diabetes - diseases that are generally considered adult ailments.

Source A: Excerpts from “A Commentary on the Fukushima Nuclear Plant Accident and Measures Against Radiation”, April 11, 2011 by Yasuyuki Fujimura, Founder of Atelier Non-Electric Company, Professor of Nihon University

- **Unclear Effects of Low Doses**

The ICRP (International Commission on Radiological Protection) 2007 Recommendations, a de facto standard for radiological protection, sets the threshold value of exposure for the general public to 1 mSv per year. The dose excludes exposure from natural radioactivity and medical treatment. However, this threshold value of 1 mSv/year should be taken only as a guide toward protection, and not be interpreted as an indication of immediate danger when exceeded. The threshold value was derived from empirical assumptions that a cumulative exposure of 50 mSv would increase the rate of cancer patients to 0.5% and that adults would in general live 50 more years (70 years for children).

Source C: Excerpts from “Nuclear Power Deception”, Hiroaki Koide

- **Low-dose Exposure’s Effects Being Recognized**

Findings of a scientific research project revealed that low-dose exposure, compared to a high-dose one, posed higher risks at per unit dose. This research conducted by Dr. Morgan concluded that he had reliable evidence demonstrating that in very low-dose exposures, compared to that of high-dose one, per 1 rem occurrence of cancer was higher - called it “a super lineal hypothesis.”

Source C: Excerpts from “Nuclear Power Deception”, Hiroaki Koide

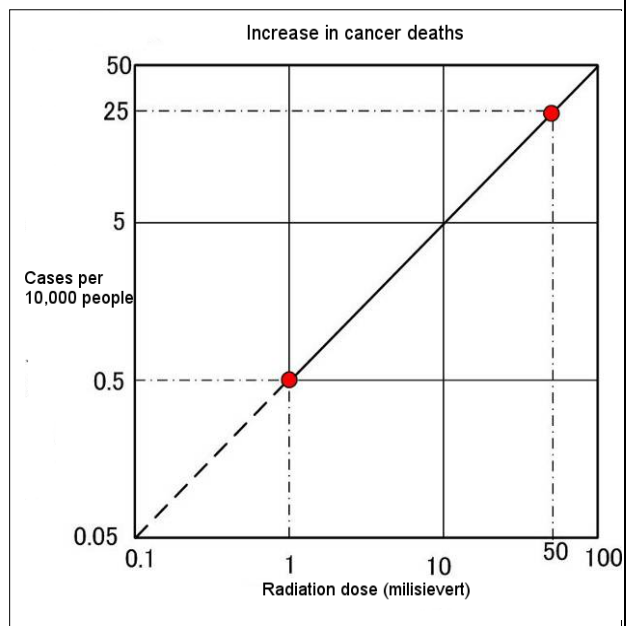
- **The Younger at The Higher Risk of Death**

Children, more than adults, will be disproportionately affected by radiation despite receiving the same doses. While the effects of radiation exposure to young children is four times greater than to adults in their 20s and 30s, the effects lessen with more advanced age. It is accepted that an adult of about 30 years of age can be considered to be at a median radiation susceptibility level, but as one ages the effects of radiation decrease, and by age 50 radiation-induced cancer deaths decrease drastically.

Source A: Excerpts from “A Commentary on the Fukushima Nuclear Plant Accident and Measures Against Radiation”, April 11, 2011 by Yasuyuki Fujimura, Founder of Atelier Non-Electric Company, Professor of Nihon University

- **Why 1 mSv per Year?**

ICRP calculated on the assumption that 0.1 to 3.7 per 10,000 die of radiation-induced cancer if they received 1 mSv of radiation, then it adopted the average death rate of 0.5 per 10,000. This means that the proportion of cancer deaths will increase by 0.005%. If the radiation continues at the rate of 1 mSv per year for the next 50 years the cumulative doses will be 50 mSv, thus radiation-induced cancer deaths will be 25 per 10,000 or an increase of 0.25%. Since Japan’s average cancer related deaths occupy about 30% of the total, after 50 years of exposures the same average will become 30.3%. These figures and averages such as “0.5 deaths per 10,000” or “increase from 30% to 30.3%” should be left to the judgment of each individual's sense of safety and risk. ICRPs recommendations set the yearly maximum exposure to 1 mSv for the general public. For professional exposure, it sets a maximum cumulative dose to 100 mSv over a five year duration and less than 50 mSv for one year.



However, the Japanese government recently raised the general public's yearly maximum exposure dose from 1 to 20 mSv, which triggered an increase in the number of criticisms accusing the government of trying to adopt the professional exposure standard to the general public. If the yearly exposure of 20 mSv continues for the next 50 years, the general public will eventually receive 1 Sv, or in other words 5% will die of cancer. This is too lenient a standard.

ICRP recommendations assume the risk of radiation-induced deaths using results obtained by researching/examining atomic bomb survivors in a linear model. While atomic bomb victims received acute radiation doses, the general public will be exposed to a low dose over a prolonged period of time, otherwise known as chronic radiation dose. Under this circumstance, a significant portion of the cellular damage may be repaired; therefore, the risk rate for the chronic dose is set for half of that of an acute dose.

Source B: "The How and The Why of Behind Setting the Maximum Dosage of Radiation Exposure for School Children at 20 mSv"

By: ZIPANG Renaissance Website Article

During the May 2nd "Save the Fukushima Children" Forum chaired by Ms. Mizuho Fukushima, a member of the House of Councilors, Nuclear Safety Commission member clearly stated that it is not permissible for children be exposed to 20 mSv per year. At the same time, the Ministry of Education, Culture, Sports, Science and Technology stated that the figures for the internal exposure dose did not include the portion for ingestion of food.

Source D: Excerpt from "Protecting Children from Radiation", Jun Takada

● **Know Your Radiation Exposure Dose**

Ascertain the level of radiation dose of your neighboring areas via TV or Radio flash report. If the reported hourly dose rate exceeds 1 mSv, pay particular attention. If you remain in such an area for more than 100 hours, you could accumulate a total dose of 100 mSv.

Source E: Excerpt from ICRP Publication 111

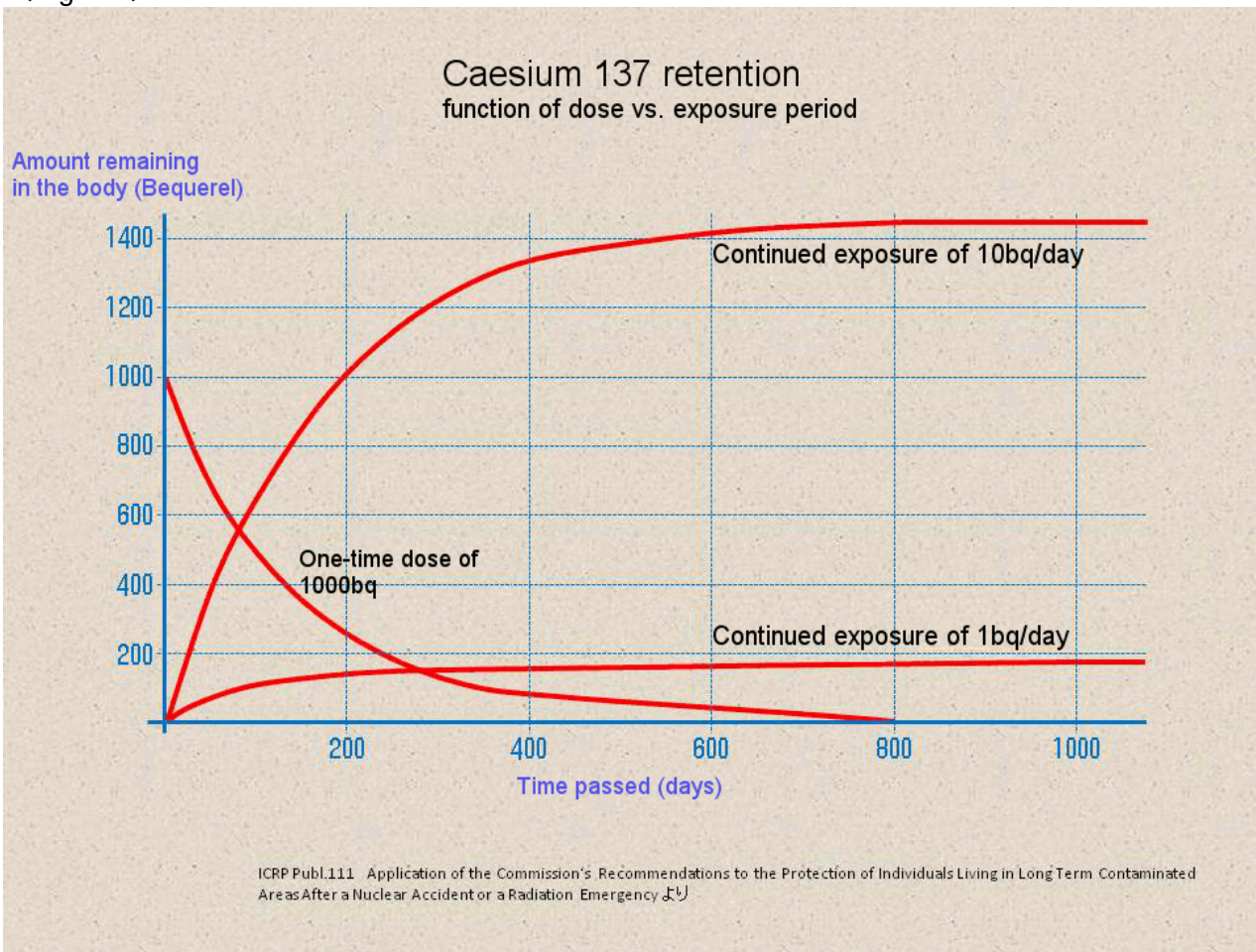
“Application of the Commission’s Recommendations to the Protection of People Living in Long-term Contaminated Areas After a Nuclear Accident or a Radiation Emergency” Approved by the Commission in October 2008.

(17) Exposure from ingestion of contaminated foodstuffs may result from both chronic and episodic intakes according to the relative importance of locally produced foodstuffs in the diet. As an example, Fig. 2.2 presents the evolution of the whole-body activity associated with an episodic intake of 1000 Bq of ^{137}Cs and with a daily intake of respectively 1 and 10 Bq of ^{137}Cs over 1000 days. For the same total intake, the resulting whole-body activity at the end of the period is significantly different. This illustrates the intrinsically different burden between daily ingestion of contaminated foodstuffs and periodic ingestion. In practice, for people living in contaminated areas, the whole-body activity is resulting from a combination of daily and episodic intakes depending on the origin of foodstuffs and dietary habits.

Reference: Independent Nuclear Research Room

<http://nucleus.asablo.jp/blog/2011/10/17/6159844>

<Fig. 2.2>



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