

“Take Science Seriously and Value Ethics Greatly”: Health Effects of Fukushima Nuclear Disaster

Interview with Hisako Sakiyama, M.D. & Ph.D.

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Hisako Sakiyama, M.D. & Ph.D.

Introduction

Hisako Sakiyama has a PhD in Medicine and is

a Member of the Takagi School of Alternative Scientists, a Japanese NGO established in 1998 to study the environment, nuclear issues, human rights, and other issues in modern society from the perspective of citizens. The School seeks to create ways that scientists and prospective scientists can link their specialized expertise and capabilities with citizen movements. She has been a Research Associate at MIT and worked on cancer cell biology as Former Senior Researcher at the National Institute of Radiological Sciences (NIRS) in Japan. Sakiyama served as a member of the Fukushima Nuclear Accident Independent Investigation Commission (NAIIC), a commission established by the Japanese Diet in 2011. She subsequently co-established the [3.11 Fund for Children with Thyroid Cancer](#) with Ruiko Muto in 2016. As a former member of the Fukushima Nuclear Accident Independent Investigative Commission, Dr Sakiyama continues to be active in sharing her findings, which often contradict those of the Japanese government and its associated scientists' in terms of their evaluation of the health effects of the nuclear disaster, with media and citizens around the world (K.H.).

The interview was held on June 3rd, 2018 and updated on August 13, 2020.

Health Effects of Fukushima Nuclear Disaster

Hirano: Seven years have passed since the Fukushima nuclear power plant accident. Do you think that the effects of radiation on the human body have decreased since then?

Sakiyama: Although radiation has gone down significantly, there are still many radiation hotspots, such as forests, rivers and riverbeds, and *satoyama*¹, where decontamination is not possible.

The health impact of radiation adds up over time, so long-term exposure certainly becomes a health concern. The risk is determined by how long you live in a contaminated area. The risk in a given locality may diminish, but the effects of cumulative radiation exposure will gradually increase over time. Sensitivity to radiation differs among individuals, but the risks for children are generally greater than for adults.

You inherit two sets of genes, one from each parent. Cells have DNA repair enzymes that correct any physical damage of DNA -- including that caused by exposure to radiation. If you inherit a mutated gene of a repair enzyme, however, the repair mechanism becomes less effective. With even a little radiation, there is a likelihood that cancerous tumors can grow. As time goes by, we will see more cancer cases among the people exposed to radiation in Fukushima, since it may take years for cancer to develop. In fact, childhood thyroid cancer cases have already increased.

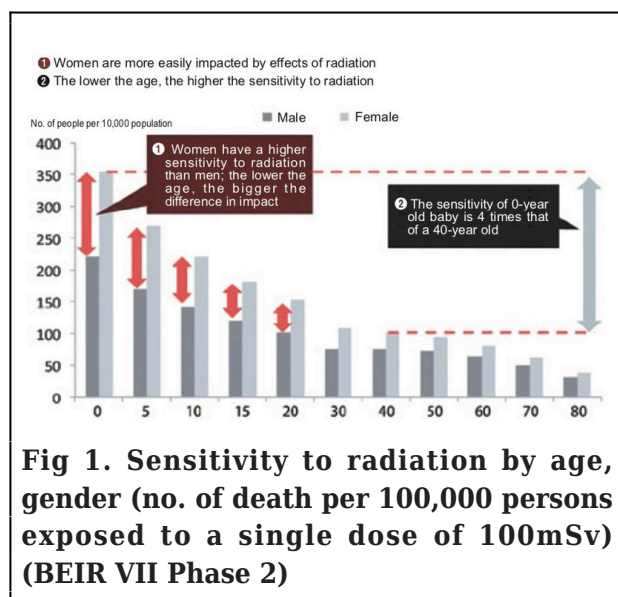
Hirano: Despite such scientific data, the Japanese government continues to maintain a safety standard of up to 20 mSv/yr - which is twenty times the usual limit. This applies only in Fukushima. as part of a policy to encourage residents to return home. Using this standard, the government has been telling people to go back home, and compensation payments for evacuees were cut off in March 2017.

Sakiyama: Exactly. Just think about it. The government used the threshold of a 20 mSv radiation dose as the basis for evacuation orders soon after the accident, so residents in the applicable areas were forced to leave everything and flee their hometown in order to evacuate to areas where the radiation level was below 1 mSv/yr.

Now, the government is trying to bring people back to hometowns which are still contaminated with radiation levels of up to 20 mSv/yr, claiming that decontamination efforts have made it safe to return. It just does not make any sense at all.

Another problem related to the decontamination effort is that there are now about 10 million bags of decontamination waste from all over Fukushima prefecture. Without knowing what to do with all that contaminated soil and materials, the government decided to open up the bulk bags, sift through them, and reuse the contaminated soil below 8000 Bq/kg in public construction projects. How can they proceed with such a ridiculous plan? It's unthinkable.²

Going back to the subject of age-dependent radiation risks, there is a report from the American Academy of Sciences called BEIR-VII (Committee on the Biological Effects of Ionizing Radiation). I made a graph using the data and submitted it when the NAIIC (National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission) met (see Figure 1). This data was included in NAIIC's report. It's easy to see that children are particularly vulnerable. Under the government return policy, children, including infants, are encouraged to return to places with 20mSv. You can see how terrible the government policy is. The recommended dose limit for adults employed in radiation work is 20 mSv/yr. Minors under the age 18 are usually prohibited from entering places like that.



Hirano: I've heard a lot of concerns regarding the 20mSv standard itself, but I understand that it's also dangerous to apply the standard in a uniform way regardless of differences in age and gender -- particularly to children and those who are pregnant.

Sakiyama: That's true. I believe the standard should be lowered from 20 to at most 1 mSv for women, anyone who may become pregnant. Of course, the lower the better.

Hirano: In Japan, is the limit of radiation exposure differentiated by age or sex?

Sakiyama: In general, yes. Those under 18 years old are not allowed to enter radiation-controlled areas.

Hirano: I see. But when it comes to the return policy, I take it there is no differentiation, is there?

Sakiyama: Exactly. None at all. It's what we call 'Fukushima discrimination'. Considering the radiation level, I believe some parts of Fukushima prefecture should really be treated as a radiation-controlled areas. Such areas are usually identified and fenced off. As Dr. Koide

Hiroaki has also stated, simply staying overnight, let alone living a regular lifestyle is impossible in such a dangerous environment.³

Hirano: Obviously, the central government does not acknowledge the risks associated with its return policy, does it? So far 199 children and young adults have been diagnosed with thyroid cancer or suspected malignancy, haven't they?

Sakiyama: That's right. Among them, 162 have been already confirmed as malignant, and one of these was diagnosed as benign after operation. (As of June 15th 2020, 195 people received definitive diagnosis of thyroid cancers after undergoing surgery. See the Table below).

	Round 1 (Oct.2011~ 2014Apr)	Round 2 (Jun. 2014~2017)	Round 3 (Jun. 2016~ 2017)	Round 4 (2018~2019)	For age 25 (2017 ~)	Total
Malignant or suspected	116	71 (Round 1 results: A1:33, A2:32, B:5 Not examined : 1)	31 (Round 2 results: A1 : 7, A2 : 14, B : 7 Not examined : 3)	16 (Round 3 results: A1:2, A2:8, B:3)	7	241
M:F Age as of the accident	39 : 77 6~18	32 : 39 5~18	13 : 18 5~16	8:8 4~12	2:5 16~18	
Confirmed Histologic Type	102 PTC : 100 Poorly differentiated TC : 1 Benign nodule : 1	52 PTC : 51 Other type of TC : 1	27 PTC : 27	11 PTC:11	1 PTC:3 FTC:1	196 Confirmed as TC : 195
Participants	300,472 (81.7%)	270,540 (71.0%)	217,921 (64.7%)	163,453 (55.6%)	5,578 (8.4%)	

PTC: Papillary Thyroid Cancer
FTC: Follicular Thyroid Cancer

Fukushima Medical University examined thyroids of children in Fukushima who were 18 years old and younger at the time of accident. Examinations will be carried out every two years until they are 20 years old, and every 5 years after that. The screening flow chart is shown in Fig.2.

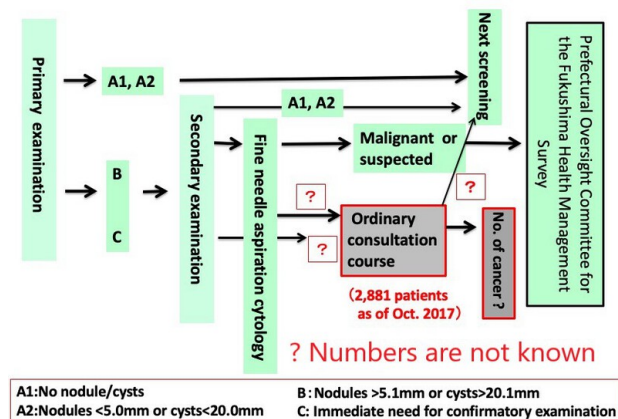


Fig 2. Thyroid screening flow chart. The ordinary consultation course (the surveillance course) was not made public until March 2017 when the 3.11 Fund for Children with Thyroid Cancer announced that a boy who was 4 years old at the time of the accident had been operated on at Fukushima Medical University. His case had not been reported to the oversight committee. As of October 2017, there were 2,881 patients who underwent this ordinary consultation course, but they were neither covered by the Fukushima Health Management Survey, nor reported to the oversight committee even after being diagnosed as malignant as a result of surgery.

Hirano: Early on there were some scholars who disputed those findings. They claimed that more cases are cropping up simply because of more aggressive screening with ultrasonic examinations, so that the high numbers are driven by new screening technology, and are unrelated to radiation exposure from the nuclear disaster. Please tell me your thoughts on this.

Sakiyama: In the first round of screening, a total of 116 children, out of roughly 300,000 children tested, were suspected of having thyroid cancer. That is a thyroid cancer rate dozens of times higher than usual over a 2-year period. Yet, these scholars still dismiss the link

between this unusually high occurrence of childhood thyroid cancer and radiation exposure, and insist that it was the result of “mass screening.”

In fact, by that time just 10% of the first round of screening had been completed, Dr. Yamashita Shunichi had already noticed that cancer rates had spiked, with 3 confirmed and 10 suspected cases. So he had to come up with some explanation for the findings. He announced that it was due to the “effect of mass screening” and not an epidemic. I believe the announcement was actually made right on March 11th, 2013, at an annual meeting of the NRC (U.S. Nuclear Regulatory Commission) in the US.

Hirano: Which means that Dr. Yamashita and his colleagues were working from the beginning to establish a discourse, even in international spaces, that the Fukushima disaster had done nothing harmful to the human body.

Sakiyama: Exactly. It was a discussion with a foregone conclusion. The decision had already been made before the screenings had even begun. Even after it became clear that thyroid cancer incidence rates in the affected areas were several tens of times greater than the national average, they insisted that it was due to the effects of mass screening.

However, during the second round of screening, they began seeing some results that were not normal, and could not be explained by the mass screening effect. At this point some of these medical experts started voicing concerns about the possibility of “over-diagnosis.” By “over-diagnosis” they mean that they examine cases that would not otherwise cause symptoms or death during a patient’s ordinarily expected lifetime. But, these concerns weren’t coming from clinicians – they were from epidemiologists such as Dr. Tsugane Shoichiro, the director of Research Center for Cancer Prevention and Screening, National Cancer

Center Japan, and Dr. Shibuya Kenji, the Visiting Professor of the Department of Global Health Policy, Graduate School of Medicine, the University of Tokyo.

Dr. Tsugane said that in general, thyroid cancer has an appropriate prognosis, but by over-diagnosing children, they might be subjected to unnecessary surgeries. This would eventually give them not only scars on their necks, but also the stigma that they had developed cancer due to radiation exposure. He warned that it would probably affect their eligibility for cancer insurance, and they might face discrimination in marriage or other contexts for having been exposed to radiation. He argued that there is little merit in examining children, and suggested reducing the thyroid cancer screenings in Fukushima. Actually, it is official policy that is now moving in this direction with scaling down thyroid screening all together.

On the other hand, Dr. Suzuki Shinichi, professor of thyroid surgery at Fukushima Medical University, who has operated on most thyroid cancer patients at the university, refuted the charge of over-diagnosis. He presented evidence at the Japanese Society of Thyroid Surgery that among 145 patients who were operated on, about 78% had lymph node metastasis, and about 45% showed invasive growth. Based on these facts, he said that over-diagnosis is unlikely.

Hirano: It sounds like they are appropriating a discourse about discrimination and prejudice in order to confuse the issue of radiation and cancer, and sweep everything under the rug.

Sakiyama: Exactly. As you know, Dr. Yamashita is unfortunately an influential figure in the Thyroid Association. At first, he used to say that it was necessary to conduct thyroid cancer screenings, but now he has become one of the loudest voices advocating scaling down the program.

There was an International Experts Meeting last year in Fukushima, and after the meeting Dr. Yamashita and Dr. Niwa, the Chairman of the Radiation Effects Research Foundation, made a recommendation to the governor of Fukushima Prefecture. In their interim report Dr. Yamashita and Dr. Niwa stated that it was difficult to find a link between the cancers found through the screenings, and radiation exposure. They suggested curtailing the screenings, not stopping them altogether but making participation “voluntary.”

One justification for this was the so-called theory of fetal thyroid cell carcinogenesis that was introduced by Dr. Takano Tōru of Osaka University. According to him, young children develop a higher risk of thyroid cancer because thyroid tumor cells are derived directly from thyroid fetal cells, which exist only in fetuses and young children, and the fetal cells possess cancerous characteristics; however, the tumors from these immature fetal cells in the young diminish during infancy and stop growing altogether after middle age. Therefore the prognosis is excellent and the process does not progress to cause cancer deaths.

On the contrary, he continued, if you develop thyroid cancer in the middle or old age, the tumor cells undergo sudden proliferation, which can lead to cancer death. Therefore, he concludes that thyroid cancer in young children should be left undiagnosed.

I did not know much about thyroid cancer, but since Dr. Takano talked about his new theory so confidently, I studied it quite a bit. What I learned was that Dr. Takano is the only person who actually advocates this fetal thyroid cell carcinogenesis theory. Yet he has not published any paper on the isolation and characterization of the fetal thyroid cells.

Kasai: You mean he is the only one in the entire world?

Sakiyama: Yes, but he is so self-confident in

his theory that he claims that the problem is that everyone has fallen behind his new scientific findings. If you propose this theory, however, you should first find a fetal cell, and then characterize it. That is the path a researcher should take, but he does not seem to be doing this. I have been checking his papers, and they seem to all be hypothetical. If we imagine that there is such-and-such, one can then imagine that there is so-and-so, and therefore fetal thyroid cell carcinogenesis exists. There is no experimental evidence.

Hirano: Do you mean that without any experimental evidence, he has been arguing thyroid exams, which have a crucial role in monitoring children's health, should be scaled down?

Sakiyama: Exactly. And a person like him was appointed as a member of the Prefectural Oversight Committee for the Fukushima Health Management Survey.

I am sure you heard about Dr. Yamashita telling Fukushima residents to smile and relax at a public meeting right after the nuclear accident. He said to his audience, "Radiation does not affect people who are happy and smiling. The effects of radiation come to you if you worry about it. This theory has been proven by experiments on animals."⁴

Hirano: Yes, I know he was criticized in the media for being flippant. Such a dismissive remark was beyond acceptable, they said.

Sakiyama: That is right. Unfortunately, it did not end there. Just recently Dr. Takano gave a lecture in Osaka, and it was uploaded to YouTube, so I watched it. You wouldn't believe what I heard in the video. At the beginning of the lecture, Dr. Takano mentioned Dr. Yamashita's remark and praised him for it. "Professor Yamashita really knows what to say."⁵ When I heard this, I was at a loss for words.

I heard that knowledge of Dr. Yamashita's remark spread all over Japan but also overseas. Someone actually made it into a cartoon.⁶

Kasai: A satirical cartoon.

Sakiyama: Yes! How can Dr. Takano possibly say, "Dr. Yamashita really knows what to say?" It is beyond my comprehension.

Hirano: What has always seemed strange to me is that Dr. Yamashita visited Chernobyl more than 100 times and has been deeply involved in medical aid projects there, well before the Fukushima nuclear disaster. As you mentioned, he is considered Japan's number one authority on radiation health. It is hard to comprehend that a person like him, who has seen the health effects of the Chernobyl incident first-hand, has been so active in trying to cover up the health risks associated with radiation exposure.

Even in Chernobyl, early on there was a cover up of the effects on human health, and some used the idea of over-diagnosis to downplay the risks. He would have witnessed it all.

Sakiyama: Exactly.

Hirano: He must have seen that there was a large increase in the cases of thyroid cancer after the disaster, and that the governments of the Ukraine and nearby countries were forced to admit the various health problems stemming from the accident. When it comes to Fukushima, however, Dr. Yamashita is using the same methods used by the Soviet Union to continue to hide those problems. What do you think of this from a scientist's perspective?

Sakiyama: I don't think he is taking a stance as a scientist. I feel that he has abandoned science. So many people ask me why Dr. Yamashita acts the way he does and what his intentions are, but I tell them that people who take science seriously and value ethics have no answer for that question.

I remember, however, that he said once that he has a hard time saying 'No' to whatever the central government wants.

Hirano: Oh, I also remember that. He said something like, "As a Japanese, I cannot say *no* (to the government)."

Sakiyama: That's probably a reason why he sticks with the central government. He has told his audiences that absolute truth lies with the government. He is now serving as vice president of Fukushima Prefectural Medical University, so it seems likely that he will keep covering up one thing after another and just go along with what the government says.

Kasai: So I believe you are saying that some kind of hypothesis, or a pseudo-hypothesis, about how thyroid cancer develops has appeared that deviates from the fundamental methods of science and medicine, and is being disseminated to society in a way that deviates from the normal rules? Furthermore, you're also saying that this discussion seems to have taken on a political dimension.

Sakiyama: Right. It has been exploited for political gain.

Kasai: Yet, when they give explanations to the general public, they make use of their statures as an expert in medical science.

Sakiyama: That's right.

Kasai: So, ordinary citizens like us, are told through the media that experts in this field are saying this or that and come to think 'oh, radiation has been scientifically proven to be safe, or not dangerous' and '20 mSv/yr is not something to worry about.' That's how we have been producing a social consensus about radiation risk.

Sakiyama: Absolutely. I just don't understand why they are doing it and what their motivations are. Dr. Yamashita already had

plenty of social status as vice president at Nagasaki University. But it was obvious that he lied about a 4-year-old boy who had developed thyroid cancer. He at first decided not to make the case public, but when we announced it, he finally came clean.

In fact, one journalist interviewed him and asked why he wanted to hide the case,. Dr. Yamashita answered, "I am not able to say anything unless it is announced officially." But even as he said that, he had officially announced that there were no cancer cases among children 5 years and under.

Hirano: He obviously contradicted himself.

Sakiyama: It is ridiculous, isn't it? By the time the interim report was being compiled, it had become clear that there was an incident of thyroid cancer in a 5-year-old child immediately following the accident. He ignored that case, however, and decided to announce that there were no cancer cases in children ages 5 or younger. He used that claim as the basis on which to dismiss the link between thyroid cancer and radiation to other experts. .

Hirano: I see. You mentioned earlier that 162 children (as of June 15th, 2020, 195 children) have been confirmed to have contracted thyroid cancer, but how well known is this in Japan?

Sakiyama: Well, this might sound strange, but not many people even in Fukushima are aware of this.

Hirano: People in Fukushima do not know?

Sakiyama: No, they don't. I visited a recuperation center last year, and met about 10 mothers there. You may assume that these families, who sent their children to a place like this, are likely to be particularly concerned about radiation, but surprisingly, none of the mothers knew about the high prevalence of childhood thyroid cancer. I was just shocked.

I was trying to understand why, and I realized that people in Fukushima get their information mainly from local news sources, such as Fukushima Minpō (福島民報) and Fukushima Minyū (福島民友) newspapers, and Fukushima TV or other local television channels. These do not take up this news as major stories.

Hirano: The local media don't report such facts?

Sakiyama: Right. These mothers also shared with me that they kept it secret from neighbors and even relatives that they were sending their children to a recuperation facility. They were afraid that they might be criticized or labeled as oversensitive about radiation exposure, so they just told people that they were going on vacation, not mentioning recuperation at all.

I was also surprised when we went to Koriyama City Hall to see if our organization, 3.11 Fund for Children with Thyroid Cancer,⁷ could leave some application forms at the front desk. As a matter of fact, the city of Koriyama has the highest incidents of childhood thyroid cancer, along with places like Iwaki. But the Koriyama city officials had no idea. When we told them about the rising number of cancer cases, they were shocked, and even panicked.⁸

Kasai: In other words, even in this region where the cases of childhood thyroid cancer are actually occurring, the people in charge of the local government are not aware of the facts.

Sakiyama: Exactly. This is happening in Fukushima, so in other prefectures they know even less.

Hirano: Were the children who developed thyroid cancer living in the so-called evacuation areas at the time of the nuclear accident? Were they exposed to the meltdown for some period of time before they were able to evacuate?

Sakiyama: There is geographic variation in

cancer rates. Professor Tsuda Toshihide of Okayama University divided the prefecture into 9 areas, and that division reflects the external radiation dose to some extent. Based on his findings, radiation exposure as a factor behind the rise in thyroid cancer.

On the other hand, there is a paper written by Dr. Suzuki Shinichi and Dr. Ohira Tetsuya, who compared childhood thyroid cancer prevalence in three regions, and argued that those regions did not reflect a correlation between radiation dosage and thyroid cancer. However, their method didn't pay attention to a variation that existed between high and low dose areas. It won't tell you anything about geographic variation in radiation dosage. Therefore, the thyroid cancer prevalence appeared random, and they then concluded that there was no significant correlation between location and thyroid cancer.

Kasai: Do you think Dr. Suzuki and Ohira's research was intentionally designed to draw that conclusion?

Sakiyama: I am not positive, but I feel that this was the case. In the second round of screening results you can see an extremely clear differences across 4 geographical regions in the prefecture: Hamadori, Nakadori, Aizu, and the evacuation zone. This was also discussed at the review committee meeting, and the regional differences became even clearer as more data analysis was done by age and sex. So I don't think we can deny the effects of radiation exposure.

Hirano: There are also radiation hotspots outside of Fukushima prefecture, including in Chiba, Ibaraki, Tochigi, Gunma, Iwate, and Miyagi. Do you think people, especially parents of small children, should be concerned about the risk of radiation exposure? The government did not take any measurements to protect them, did they?

Sakiyama: No, they didn't. They focused

exclusively on Fukushima and left all the other prefectures on their own.

Within a year of the accident, prefectures such as Gunma, Ibaraki, Iwate, and Tochigi convened an advisory council. Each prefecture summoned experts and let them discuss whether they also should administer thyroid cancer screenings. But these experts came to the conclusion that testing was not necessary, and their decision was reported to the Ministry of the Environment. The final decision was made at the so-called ‘Expert Conference’ held under the aegis of the Ministry of Environment, chaired by Dr. Nagataki Shigenobu, Professor Emeritus of Nagasaki University.⁹

There were many worried mothers in small communities in those prefectures, however, so some municipal governments have given support for screening sessions. That there are only a handful of such places. Most screenings are conducted by volunteers from NPOs and NGOs with help from concerned doctors, but what they’re doing is just a small-scale thyroid examination program.

They have found one person with thyroid cancer in Ibaraki prefecture.

Hirano: It was in the northern part of Ibaraki near Fukushima, wasn’t it?

Sakiyama: Yes, it was in the north. I believe it was a young child.

As of October 2017 there were 2881 individual screenings conducted which were being observed closely, but it has not been confirmed whether they are thyroid cancer (see Figure 2). We don’t know how many cases have been confirmed as malignant among them. In fact, Fukushima Prefectural Medical University is supposed to be investigating this, but they only count the cases that have been operated at their hospital. Anyone who was operated on elsewhere won’t be counted. Therefore, nobody knows the actual number of thyroid cancer

cases in Fukushima.

Even then, they said it would take 2 years to calculate the final number of cancer cases. I don’t understand that because Fukushima Prefectural Medical University has a comprehensive database, and they should know the number right away. But they said they would spend 2 years finding out. The thing is that none of the oversight committee members have complained about this at all.

When the case of thyroid cancer in the 4-year-old was confirmed, the oversight committee must have realized that the data they received from Fukushima Prefectural Medical University did not reflect reality. They found out about the 4-year-old’s cancer case at the oversight committee’s 28th meeting. They met once every three or four months, but they obviously were not notified about this. If I were one of the committee members, I would be furious that such things were being kept secret, and I would start to feel suspicious. I would wonder what the purpose of all 27 meetings had even been. But none of them got angry.

When I heard the news about the case of the 4-year-old, I thought at least some committee members would yell at the government and call the whole thing a sham, or even storm out of the meeting room and quit altogether, but no one seemed to be upset, and they continued to meet as if nothing had happened. I was in total despair.

3.11 Fund for Children with Thyroid Cancer

Hirano: So you witnessed the repeated cover-ups and realized the incompetence of the government in terms of helping the victims. Did you launch the ‘3.11 Fund for Children with Thyroid Cancer,’ out of a sense of urgency about the crisis?

Sakiyama: Yes.

Hirano: Another thing you mentioned earlier that sticks out in my mind was how radiation exposure has become a target of stigma in the public mind, which forces people in Fukushima to be silent about their health concerns. This kind of social pressure is creating a situation where they have to keep going to recuperation centers secret, and they even hesitate to have cancer screenings.

My understanding is that you wanted to relieve some of that pressure for people who are worried about their health and cancer treatment, by providing financial support through the '3.11 Fund for Children,' which is an independent, not-for-profit organization, for people to actually get access to screening. Is that right?

Sakiyama: That's right. We have held many meetings and lectures, but we noticed that we tended to get the same audience at these kinds of events. Then we started to look for a way to reach out to those in need of help, and we realized that children with thyroid cancer and their families have often been isolated by not knowing where to go and how to get help. They are also burdened by the medical expense of repeated examinations and hospital visits, and some patients will require a lifetime of medical care. We all agreed that these are the people we really want to help and we were looking for a way to reach them.

We felt that meetings and lectures weren't getting us anywhere, so we talked with several people and came up with the idea of giving money. At first, we felt uneasy about giving support in the form of money, but it is the only option to help those who tend to be isolated.

Hirano: You have said that there are actually eight more cases of pediatric thyroid cancer apart from the 199 children and young adults who have officially been diagnosed with thyroid cancer or suspected malignancy. Did those

people contact the organization by themselves to ask for support after hearing about the '3.11 Fund for Children'?

Sakiyama: I believe so. We posted a full-page advertisement about '3.11 Fund for Children with Thyroid Cancer' in the Fukushima Minpō (福島民報) newspaper, which cost nearly one million yen. People contacted us then, and since that time NHK has been following our activities. Every time we hold a news conference, they broadcast it nationwide, so we have received a lot of inquiries and applications as a result of media coverage. For example, a grandmother was watching NHK news and applied to the fund for her grandchild who had developed thyroid cancer.

By the way, people who have come to mistrust Fukushima Medical University don't want to get their screening there, so of course they won't be counted in official statistics. So even if Fukushima Medical University publishes the number of cancer cases they see, we still do not have the real count.

Hirano: Could you explain to readers what internal radiation exposure is and how it occurs, since it is understood to be the cause of cancer?

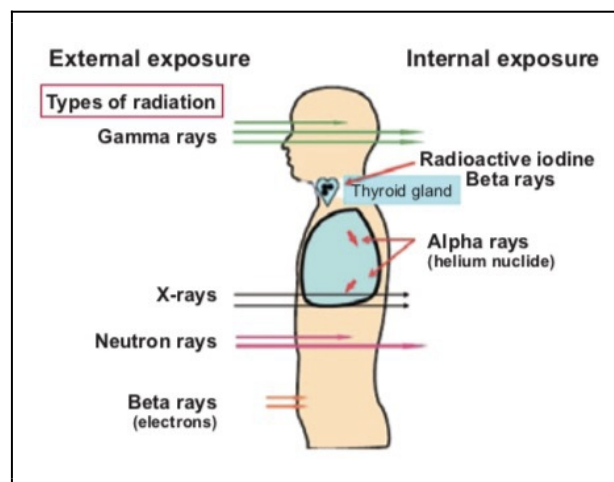


Fig.3. External and internal exposure.

Sakiyama: Internal radiation exposure occurs when radioactive material gets inside your body and irradiates you from the inside. This may happen through the air while there was a plume of radioactive material, or by consuming contaminated food and water. External radiation exposure takes place when radioactive substances are outside of the body (see Fig. 3).

In general, external radiation exposure does not occur with alpha and beta rays because their tracks of radiation are very short (alpha ray: about 4 μ m, beta ray: several mm) and are not likely to pass through the skin. For example, even if there were plutonium emitting alpha radiation in front of me right now, I wouldn't be exposed to radiation.

Once radioactive materials emitting alpha or beta rays get inside the body, however, they stay there for a long period of time, which increases the chance of DNA damages and cell death, because inside the body cells and tissues are next to the radiation and are exposed directly to alpha or beta rays.

As far as the relative biological effectiveness (RBE), the ratio between the dose and the ultimate biological effects, alpha radiation is about 20 times more damaging than beta, gamma, and X-rays. Furthermore, the half-life of plutonium is 24,000 years, and it's insoluble in water. Therefore, if plutonium gets inside your body, you will be irradiated for the rest of your life.

In order to assess health hazards to the human body caused by both internal and external radiation exposure, we measure in mSv (millisieverts). We assumed that radioactive materials are spread inside the body fairly uniformly when we try to calculate the damage. That's why it is very difficult to figure out the

actual health effects.

For example, tritium emits very weak beta rays, which do not have enough energy to travel very far in the air and to penetrate the skin, so it is believed not to be dangerous externally. But tritium is a radioactive form of hydrogen and can become incorporated into DNA. When that tritium decays into helium, it causes the DNA strand to break.

Tritium exposure used to be considered a low, or level 1 risk, due to its weak beta radiation energy, but now some scientists argue that the risk could be 6 times higher than was originally thought.

So, the issues remain contested. But some reputable researchers claim that internal exposure poses a significant health risk.

According to Dr. John William Gofman, a renowned physician and nuclear/physical chemist, there is not much difference in terms of health effects on humans between internal and external exposure, given the same radiation doses. I agree. But the problem is that we don't know exactly whether the dose coefficient of radioactive substances that we use to convert a unit of pure radioactivity (becquerel: Bq) to a medically effective dose (sievert: Sv) is right or not. For instance, the dose coefficient used to calculate Sv equivalent to 1Bq of Cesium 137 is based on the assumption that Cesium 137 is distributed evenly in the human body as in the case of water. However, when Cesium 137 becomes particulates, this assumption breaks down because they are insoluble. Then dose coefficient itself may not be accurate.

Hirano: What about the campaign to get people to buy and eat food from Fukushima? It's been going on for a long time as an expression of moral and economic support, with slogans like "Let's Help Fukushima" and "Hang in There Fukushima!" (*ganbare Fukushima!*). The discussions have been

carried on in the context of the possibility of internal radiation exposure, and also involve the issue of economic damage caused by harmful rumors (風評被害) about the dangers of Fukushima food.

As a medical scientist, what position do you take on Fukushima produce? Do you think people should avoid eating it as much as possible? Do you think it is okay to consume as long as each item is inspected?

Sakiyama: This is a major question. Fukushima prefecture does conduct repeated inspections and testing on all their foods more thoroughly than surrounding prefectures such as Ibaraki, Tochigi, and Gunma. So, I hope that most of the Fukushima products sold on the market do not exceed the standard limit of 100 Bq/kg. But that still means foods with dozens of becquerel have been going into the market. Recently a group held a conference on the level of food contamination. They concluded that there are essentially no items from the prefecture that exceed 100 Bq/kg, and the highest is around 50 to 60 Bq/kg. Despite the fact that they are inspecting their foods, that fact makes me feel very uneasy. For example, it takes about 120 days for Cesium-137 inhaled or ingested by an adult to reduce the biological half-life. If someone takes 10 Bq/kg into the body everyday, it amounts to about 1400 Bq in a year. If 40 Bq/kg, it will be 5600 Bq. This is a very high number that might cause a serious health issue like cancer. That's why I have suggested to officials in Fukushima that they lower the cesium contamination limit to 20 Bq/kg from 100 Bq/kg. However, they are unwilling to do so.

Hirano: Is it because in reality, a great deal of Fukushima produce exceeds 20 Bq/kg, so they might not be able to sell anything if they set 20 as the new standard?

Sakiyama: It could be, but I don't think they would have nothing to sell if the limit were 20Bq/kg. Because Fukushima prefecture has

been saying that their food is safe, I said that if the government standard is 100 Bq/kg, surely they can do even better with 20. But they did not go for it.

Once I really upset officials with that suggestion. There was a conference where a Fukushima official was coming to give a talk. I wanted to get some information from him, so I attended the lecture and asked about the possibility of lowering the standard. Of course, I had no intention to offend him, but he got so upset with my suggestion that he told the organizer that the prefecture would no longer send anyone to lecture to that group. (laughs)

Kasai: What do you think is the reason those people from the government found your suggestion so offensive?

Sakiyama: The group that invited the official from Fukushima prefecture is called "Skilled Veteran Corps for Fukushima." They are older volunteers, age 60 and up, who are retired workers from Fukushima, including engineers and technicians who formerly worked in the nuclear power industry. They have signed up to help clean up the contaminated Fukushima plant in order to protect and replace younger workers, since they are not as concerned about exposure to radiation.

I think that the officials had trust in that group and were willing to come to talk to them. Maybe they did not expect to be questioned about their policy, particularly by an outsider like me. But anyway, they became upset and told the group that the prefecture would not send anyone anymore. I feel bad for that volunteer group!

Hirano: But I think it is true that we, consumers, have concerns about the safety of Fukushima produce. Any food under 100 Bq/kg are considered to be safe, and sold in stores, right?

Sakiyama: Exactly.

Hirano: Whenever I go to a supermarket in my hometown, Ibaraki, there is a special section with fresh produce from Fukushima. Every single package of fruits and vegetables has a sticker on it, which says 'inspected.' These products actually look very good, but often are left unsold. I think that consumers are not quite convinced of their safety and they hesitate to buy them.

I believe that a sense of distrust towards the government is still there in the consumers' minds, and that it has something to do with the safety standard for radiation in food. There is a big difference between 20Bq/kg and 100Bq/kg.

Sakiyama: I agree. There are many independent, citizen-run food testing labs, such as COOP's 'pal system' and 'seikatsu club.'¹⁰ I heard that certain food items, particularly *shiitake* mushrooms, continue to contain at least 4 or 5 Bq/kg, so the 'pal system' decided to stop carrying wild *shiitake* mushrooms altogether.

Also, some farmers treat their contaminated soil with fertilizers based on potassium chloride in order to prevent their crops from absorbing cesium, but that does not prevent farmers from being exposed to radioactive material while working in the field. You would expect farmers to carry a dosimeter, but they don't have dosimeters at all.

In fact, I feel the risk to farmers and decontamination workers is likely greater than for those working at the site of the nuclear power plants. They inhale dust with radioactive materials, and that puts them at risk for both internal and external radiation exposure. But they don't even measure radiation doses.

When I think about the impact of radiation on human health, I feel that Fukushima is going to face a very tough future.

Cover-up Culture and Social Pressure

Hirano: I see. There are two things to note here; one is the systematic cover-up practices of the government, and the other is the so-called social pressure that makes victims unwilling to talk about radiation concerns in public. When you think of Fukushima's current situation and the possible health consequences of the incident, which of those do you think poses a more serious problem to society?

In other words, is it more important to build a society where people can say well, I may be seen as strange for this, but I am worried about my child's health, so they can be open about discussing ways to protect children's health? Or is it more crucial to try to change the cover-up practices of the government -- which, honestly, I don't really know is possible? Of course, both of these things should change.

Which change should come first in your opinion?

Sakiyama: Well, it is citizens who can change the government. For example, the Education Ministry initially did not even acknowledge the recuperation program for children in Fukushima, but as more private individuals got involved through NGOs and other means, and people in Fukushima petitioned for financial assistance, the government finally had no choice but to agree to fund the program.

There is no way that the Education Ministry would have changed right away without pressure from citizens. And there is no way that the Ministry of the Environment will change without pressure from citizens. We need to make it happen. We are the ones who elect public officials.

So, I think that citizens will have to change and initiate movement in politics and government. I agree with you that change will not start with the government; it will not abandon the cover-up by itself. For example, can you even imagine

the possibility of the International Nuclear Power Village (changing its course?) Maybe if they were broken there may be a change, but I don't think it's possible considering how powerful the organization is.¹¹ The only possibility left is that we, citizens, change politics through our own actions.

The Japanese public now favors phasing out nuclear power. And Japan's renewable energy industry has been growing rapidly.

Have you heard about an organization called *Genjiren* (原自連)? It's an antinuclear, pro-natural energy confederation. The 'ji' 自 actually refers to natural energy (自然エネルギー).

Kasai: It must be named to contrast with *Denjiren* (電事連), the Federation of Electric Power Companies of Japan.

Sakiyama: Exactly. *Genjiren* is headed by Mr. Kawai Hiroyuki, a lawyer; former Prime Minister Koizumi Junichiro; and Mr. Yoshiwara Tsuyoshi, a former president of Jonan Shinkin Bank. Indeed, the renewable energy market in Japan has been growing very vigorously over the past decade.

There are various sites throughout Japan that generate electricity on a small scale. I heard that altogether there are more than 500 of these nationwide. If we continue to promote and invest in renewable energy, there is a chance to create a largely non-nuclear and fossil fuel-free future.

Running nuclear energy is almost too expensive considering capital costs for building nuclear plants, the challenges of disposal of nuclear waste, and the risk of meltdown. So we have to keep spending money in order to sustain nuclear power, not to mention the cost of decontamination after the accident. It would be a disaster to discontinue the decontamination work due to lack of money. It's time to just end the whole nuclear business - you know, like they say, "when poverty knocks at the door,

love flies out of the window." (laughs)

Right now the government seems to have money and keeps throwing it at general contractors. The thing is, though, these construction companies have made so much profit building the nuclear power plants, and after the accident they have made huge profit through decontamination work. How terrible is that?

Hirano: I agree. In English, it is called Disaster Capitalism.

Kasai: It is 災害便乗資本主義 (*saigai binjō shihonshugi*) in Japanese.

Sakiyama: That's right. Exactly.

Hirano: They can fail and still make a profit.

Sakiyama: Actually, I believe that it is badly poisoning Fukushima. The decontamination work keeps some tiny share of money flowing into the prefecture, and it also provides employment opportunities for those who are over 18 years old. Considering how scarce jobs are in that area, the decontamination work has been giving them plenty of steady job opportunities.

A friend who is a physician told me once that young people, after graduating from high school, come to her clinic seeking health screening. They want documentation to prove they are healthy enough to work at the decontamination sites. My friend tells them that it's a bad idea, but they say there's no work, so they end up working there anyway.

Scientists and Civic Engagement

Hirano: I would like to move on to the next question. What kind of role do you think a scientist with specialized knowledge should play in civil society? This has to do with what

you have been doing through the Takagi School.¹²

Mr. Kasai and I were talking about this before this interview – until recently neither of us have read through scientific journals. At first, they seemed to be rather difficult for people like us, with so little science background. But after the nuclear disaster, it seems that some scientists who have strong social and civic consciousness started to publish very accessible papers in science-related journals. As we moved forward with this Fukushima interview project, we came to realize how important the role of these scientists has been in providing their knowledge to the general public in order to build a democratic civil society going forward. What kind of social role do you think those who have expertise in medicine and science should play in the future?

Sakiyama: The most important thing for us, in my opinion, is education. Education is the top priority. However, the Education Ministry is in charge of education, and they promote myths about nuclear power safety right from elementary school. We really need to figure out how to deal with that.

The anti-nuclear movement has simply have not been involved in doing something about education. There are a few teachers who are interested in nuclear energy education, but they are an absolute minority. Still, we decided to team up with some educators and formed an organization called the Committee for Nuclear Power Education 原子力教育を考える会, and in around 2005 we created a website “[Understanding Nuclear Power](#)” 「よくわかる原子力」.

The Takagi School hosted some public lectures about nuclear energy and environmental education, and teachers from all over the country made presentations. We decided to form a group, the Committee for Nuclear Power Education.

We wanted to counter the Ministry of Education, for example by writing our own textbook, but then we realized that we didn’t have enough financial resources to do so successfully. It can get very expensive when we consider the expenses associated with publishing textbooks, such as printing costs and so on.

Then we agreed that the best way would be to create our own webpage, and, actually, my daughter helped get it started.

We also needed to figure out a way to make our information available for lessons at school, so I gave some suggestions to teachers as to what information we’d like them to introduce in classrooms. But they said that they couldn’t use it, since what they can teach during lessons is pretty restricted due to educational guidelines, and they know those restrictions very well.

They are required to write lesson plans, and they said their principals would not approve the plans if the teachers put it in the plans, so the only way to get our information or messages across for them is to walk that fine line somehow.

Then we decided to produce a set of educational DVDs called “What’s REAL about Radiation” (放射線のホントのこと) for classroom use for junior high and high school students. The first volume, ‘What is Radiation?’ covers the scientific aspects, including what exactly happened in Fukushima, how radioactive materials spread in the air, what kinds of effects radiation can cause to living things, and what we should do to protect ourselves from radiation exposure.

The second volume, ‘What is going on in Fukushima now?’ focuses more on social consequences of the disaster in local communities and social issues faced in Fukushima. In order to introduce ‘real voices’ from Fukushima, we visited various places throughout the prefecture, conducted

interviews, and compiled them, along with some photos of the current situation in the evacuation areas, as well as of the millions of bulk bags full of radioactive soil stacked in huge piles.

As you know, even seven years after the Fukushima disaster, people are still being exposed to radiation from radioactive fallout. The victims are still suffering, but these struggles have been largely neglected. We have less and less media coverage on Fukushima. So, it is our hope that the DVDs will give children a chance to learn about not only what has happened and what is happening in Fukushima, but also what radiation really is and what they should and can do to protect themselves.

Children don't know about these things. In order for teachers to use these DVDs in the classroom, we managed to make each of them about 20 minutes long. They come with supplemental worksheets that help teachers give more detailed explanations and encourage classroom discussions. But the reality is that very few teachers use them in the classroom.

The video created by the Education Ministry is up online, so anyone can watch it. Have you seen it? It's awful. I have to question if it is even okay to teach the things it claims.

One member of the Committee for Nuclear Power Education had an opportunity to visit Belarus and learn about how children learn about radiation after Chernobyl. I believe the school he visited was one of the more liberal institutions, but according to him, preschoolers were taught through a kind of a fairy tale.

The story goes like this. There was a castle. One day the fireplace at the castle was broken and a radiation queen popped up and ran outside of the castle. Her henchmen also got out and are hiding inside food. So do not eat such food. Or wash the food before eating it, or cook the food before eating it.

That's how they teach small children to protect themselves from radiation. They seem to focus on training children from a young age to be able to protect themselves without parental help and give them the knowledge they need to keep healthy.

When I went to Ukraine as a member of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission, I noticed that they don't really treat radiation as something special. Instead, they talk about radiation along with other dangers in daily life. What do you do if there is a burglar, or what do you do if there is a car accident, and, right along with that, what do you do about radiation. They teach it as a normal part of protecting your body.

From that perspective Japanese children are totally vulnerable when it comes to protecting themselves. All they have heard about radiation is that no one can avoid it since radiation is everywhere, and is useful in various fields including industries and medicine. They are also taught that the risk of radiation less than 100mSv is equivalent to lack of vegetables or exercise -- without showing any evidence for such claims. The message is that a low dose is okay and there is no need to worry about radiation anymore.

Have you heard about a new information and learning facility, called "*Comyutan Fukushima*" コミュタン福島? The Fukushima prefectural government opened it in Miharu town as a part of the Center for Environmental Creation in 2016.

They claim that the facility teaches visitors about radiation and Fukushima's environmental restoration activities through interactive fun activities, such as games, crafts, and a simple science experimenta.

In my opinion, however, what they are trying to do is to instill inaccurate knowledge about radiation. Their main message is that we are all

surrounded by naturally occurring radioactive materials on a daily basis, and we are also exposed to man-made radiation such as X-rays; therefore, there is no need to worry about what happened in Fukushima. This is nothing but brainwashing, which is making people, especially children and young people, defenseless against radiation. It is very dangerous. The young will not know how to protect themselves from radiation, and in the end, they will suffer health effects if something happens.

Hirano: It sounds as if safety is being abandoned to a myth of safety. This has to be the most serious adverse effect of the safety myth on individuals.

Sakiyama: Absolutely.

Hirano: So, contrary to *Comyutan Fukushima*, Belarus has successfully created an educational program that teaches children the risks of radiation very clearly, so they will learn how to protect their own safety.

Sakiyama: Yes.

Hirano: Where do you think such differences are coming from?

I don't want to draw a conclusion just on the basis of cultural comparison. But as you mentioned earlier, in Japan, in particular among mothers with young children, it has become almost taboo to talk about concerns about the effect of radiation on their children's health.¹³ I have to wonder why this kind of social phenomenon is happening.

Do you think it has something to do with a low level of awareness of rights to wellbeing in Japan? In other words, do you think the problem comes from a lack of public awareness that we have right in order to protect our livelihood or ourselves?

Sakiyama: I think so. In general, Japanese

people have a low awareness of human rights.

Kasai: I agree. It's indicated just in the word itself, *Okami* お上,¹⁴ we are not used to critically examining what the authorities say and then making our own judgments. That is one thing that is lacking in our education system. This has been a problem in Japan even before the nuclear power accident. I feel that more people ought to be angry with the current political situation in Japan. You know, if a burglar broke into your house and stole things, you'd be upset, wouldn't you? But even though it's widely discussed that the taxes you paid have been misused, a lot of people are not upset about it. In some sense, I feel that people's engagement with public affairs is weak. So it seems to me, as you pointed out earlier, that this is the result of something that has been perpetuated in society through our education over the years, rather than coming from some essentialist notion about Japanese culture.

When we asked earlier what kind of role scientists should play in civil society, you answered that it should be in education. As an educator myself, I totally agree. I feel that the problem is serious and there is a need for change.

Sakiyama: By and large the people who have been diagnosed with thyroid cancer do not seem to be angry with the central government or TEPCO, who are responsible for the nuclear disaster. Instead, they have been trying to hide from the public.

The other day some members of FOE (Friends of the Earth International) from Germany came to visit us, so I asked what they thought of this. They said if it were in Germany, the thyroid cancer patients would be very angry for sure, and file a suit to get compensation.

I would really like to tell them that they are the victims, and that they should not feel ashamed at all for having gotten thyroid cancer. It is the

central government and TEPCO that should be ashamed and held accountable. Unfortunately, it's the opposite of that, since most victims are still living in the shadow of the nuclear disaster.

Hirano: That is what I have been very concerned about. Really, society should be supporting these socially vulnerable people, but that is not the society we have in Japan. Instead, they have to face the stigma attached to radiation exposure, and the victims fear becoming the targets of social opprobrium if they speak out. This is causing them to suffer from fear and psychological trauma. All these factors have led to a situation where the victims are pushed into a corner and forced into hiding. That's what most worries me.

These massive cover-ups from the government are not new or uncommon, especially as relates to nuclear power, even outside Japan. But the fact that citizens are creating social pressure against the victims means that citizens are taking the side of the government without even realizing it, and is building a structure of discrimination and oppression.

Kasai: As you mentioned earlier about Ukraine

and Belarus, we should have a more active debate regarding both social issues and scientific subjects such as radiation. We only have one interpretation that is widely circulated and shared. What we need, at a minimum, is to introduce other views on the same footing, and then listen to and discuss them thoroughly before making a judgment.

If we don't exercise a process like that, we won't be able to break our patterns of uncritically accepting whatever teachers say, or whatever the government or other authorities say, and we'll have no other recourse even if we think something is troubling. I think this is a very important issue we Japanese face.

Sakiyama: I agree with you. In that sense, it is imperative that scientists work very hard not to just get on the good side of the government and authorities, but to convey scientific facts and disseminate truth to citizens.

Hirano & Kasai: Thank you very much for speaking with us today.

Katsuya Hirano is Associate Professor of History, UCLA. He is the author of [The Politics of Dialogic Imagination: Power and Popular Culture in Early Modern Japan](#) (U of Chicago Press). The Japanese translation of the book is forthcoming from Iwanami Shoten in early 2021. He has published numerous articles and book chapters on early modern and modern Japan, the colonization of Hokkaidō, settler colonialism, cultural studies, and critical theory, including [“The Politics of Colonial Translation: On the Narrative of the Ainu as a ‘Vanishing Ethnicity’”](#). You can also find the series of interviews related to the Fukushima nuclear disaster in the Asia-Pacific Journal, a project which Hirano started in 2013. He can be reached at his [email](#).

Hiroataka Kasai is Professor of Department of International and Cultural Studies at Tsuda University in Tokyo, Japan. He has published articles and book chapters on political thought in modern and contemporary Japan, including “Maruyama Masao's ‘Japan,’”

in *Deconstruction of Nationality*, edited by Naoki Sakai, Brett de Bary, and Toshio Iyotani (Cornell University East Asian Series, 2005). He is the translator of *Sengo Nihon no Minshushugi Kakumei to Shutaisei (Revolution and Subjectivity in Postwar Japan)* by J. Victor Koschmann (Heibonsha, 2011).

Notes

¹ In *Satoyama* (里山), mountain woodlands surrounding people's homes, radiation levels have remained high since the current decontamination process has been mainly limited to residential and farm areas people use on a daily basis. *Satoyama* is considered a place where nature and people exist in harmony and has been a key part of Japanese village life for centuries.

² Dr. Sakiyama told us on August 13, 2020 that she had discovered an ongoing experiment to grow crops in one of the most contaminated regions, Warabidaira in Iitate village.

³ See Koide Hiroaki's point in [our interview with him](#). Koide makes it clear that there is no absolute standard that guarantees "safe" exposure to radiation. Any radioactive exposure, especially internal exposure, poses some risk. It is best to minimize exposure. It is also clear that infants, young people, and pregnant women are particularly vulnerable to radioactive exposure. The Japanese government's evacuation plans never took this factor into consideration. It is worth noting that in the vicinity of Chernobyl, 20mSv would still be enough to declare a "no-go zone." The Japanese government has never rescinded the Declaration of a Nuclear Emergency Situation [原子力緊急事態宣言] clause of a law enacted in 1999. This law reflected ICRP (International Commission on Radiological Protection) "post-accident" period standards and took the upper end of that and seemingly made it applicable indefinitely. I thank Norma Field for providing this important perspective on ICRP.

⁴ Dr. Yamashita made this remark in a lecture held on March 21st, 2011 in Fukushima City. On January 28, 2019, however, *Tokyo Shimbun* (東京新聞) published an article which revealed that Dr. Yamashita expressed concern to Dr. Yasuda Hiroshi, a researcher at the National Institute of Radiological Science stationed at the off-site emergency response center, stating on the day of the lecture that "there is a possibility that the risk of pediatric thyroid cancer due to the radiation exposure could reach a serious level". This was recorded by Dr. Yasuda and kept at the National Institute of Radiological Sciences in Chiba City. *Tokyo Shimbun* obtained the documentation per a request for disclosure of information. Responding to *Tokyo Shimbun* in writing, Dr. Yamashita admitted the meeting with Dr. Yasuda on that day and said, "I simply expressed my view that radiation exposure within the exclusion zones immediately after the nuclear accident was very worrisome, and the influence caused by radioactive iodine on children should be most considered." As for the comment telling Fukushima residents to smile and be happy, Dr. Yamashita explained that it was "a comment made for residents in Fukushima City. No explosion occurred there and no serious situation was anticipated in that city located far away from the nuclear power plant." He explained that his views regarding the exclusion zones and Fukushima City, outside of the zones, differed. (Reported by *Tokyo Shimbun*'s morning edition on January 28, 2019)

⁵ The lecture titled “Ethical problems of thyroid screening test in Fukushima prefectural health survey” was given on April 14th, 2018 in Osaka

⁶ Witch Doctor Yamashita Shunichi to Head Fukushima Health Study;



onlyinamericablogging.blogspot.com

⁷ The 3.11 Fund for Children with Thyroid Cancer has provided medical expenses to a total of 120 from December of 2016 to March of 2018 with the amount of 100,000 yen for each case and additional 100,000 yen for relatively serious patients who underwent reoperative surgery. It also offers an additional 100,000 yen to the people who received RI treatment. The Fund can be used for any purposes that concern children with thyroid cancer.

⁸ The city of Koriyama, located at the center of Fukushima prefecture and 43 miles (70km) west of the nuclear power plant, is well outside the area where tens of thousands of people were ordered to evacuate.

⁹ The Ministry of Environment’s Experts’ Meeting regarding the Issues of Health Management of Residents Due to the Fukushima Daiichi Nuclear Power Plant Accident, chaired by Dr. Nagataki Shigenobu, published its Interim Report on December 2014, and it stated that the higher risks of cancer due to the Fukushima Daiichi Nuclear Accident “cannot be statistically proven.” It also denied the need for thyroid screenings outside of Fukushima by stating that “it is quite unlikely that people who reside in the prefectures surrounding Fukushima have been exposed to more radiation dose than the people who lived in the evacuation areas and such in Fukushima prefecture.” In acknowledging the mounting concern and anxiety regarding thyroid cancer from residents outside of Fukushima, the report concluded that “we first need to take a wait and see stance and see how the Fukushima Health Management Survey ‘Thyroid Ultrasound Examination’ makes progress. Careful explanation of the information gained through individual health consultation, and risk communication, etc. for residents with anxiety about thyroid cancer, are also important.” See the complete Interim Report [here](#).

¹⁰ ‘Pal System’ and ‘Seikatsu Club’ are both food delivery co-ops that established their own stricter guidelines around food, as well as stricter testing procedures than supermarkets following government standards. These food supplies are well supported by those individuals who feel skeptical about the government doing enough to minimize the risk of radiation to children’s health and distrust in the government’s ability to deal with radiation risk.

¹¹ “International nuclear village” is the term commonly used in Japan to refer to the international network of pro-nuclear advocates who comprise International Atomic Energy Agency, governments, banks, investors, media and academia.

¹² Takagi School (高木学校) was founded by a Japanese scientist, Takagi Jinzaburo (高木仁三郎), an internationally renowned critic of the nuclear industry. After graduating in 1961 from the University of Tokyo, he worked for a private nuclear firm and the nuclear institute at

University of Tokyo. In his next post, as associate professor of nuclear chemistry at Tokyo Metropolitan University, he started a career of nuclear activism. Leaving the post in 1975, he joined with a group of colleagues to create the Citizen's Nuclear Information Center (CNIC), a network of antinuclear groups across the nation, and became its head. Takagi conducted numerous research projects and published many books and articles on nuclear issues. His extensive scientific analytical work has contributed greatly to educating the public, media and officials on the threat of nuclear waste, and on environmental protection. In 1997, he received the prestigious Right Livelihood Award, jointly with his colleague Mycle Schneider, for contributions to resolving issues facing mankind, for his work informing the world of the risks and the environment implications of plutonium. In 1998, with the prize money, Dr. Takagi started Takagi School to educate people who aim to be “citizen/alternative scientists” who share concerns held by citizens about the environment, nuclear weapons, human rights and other issues facing the contemporary world. Dr. Takagi passed away in 2000.

¹³ Concerned mothers, who left contaminated areas, have often been labeled as “radiophobic” or “neurotic” and have suffered ridicule and derision from their relatives as well as their communities for leaving. This phenomenon has led these women to feel isolated and depressed. Moreover, with the layers of stress associated with the nuclear crisis, and disagreements over radiation safety among married couples, a lot of women separated from their husbands, which has led to a trend called “atomic divorce” (*Genpatsu rikon*) in not only Fukushima but also outside the region. The reality is that, with the loss of essential financial support from the government for evacuees, these mothers and their children have faced severe economic disadvantage.

¹⁴ The meaning for *O* お (御) is honorable, and *kami* 上 means above. *Okami* generally refers to the Emperor, authorities and government.