2011
「Seminar on Radiation and its Effects on Our Health」

Lecture Transcript
(English Translation)

(This transcript is a compilation of materials from all 4 seminars held throughout Fukushima Prefecture)

The Fukushima International Association

【Speaker Profile】

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【Seminar Dates & Venues】

《Koriyama》(Co-Host: Koriyama City, Koriyama City International Association)
December 3rd, 2011 (Sat) 13:00~15:30 Koriyama City General Welfare Center

《Aizu》(Co-Host: Aizu Wakamatsu International Association)
December 4rth, 2011 (Sun) 13:00~15:30 Aizu Keikodo

《Iwaki》(Co-Host: Iwaki City, Iwaki City International Association)
December 17th, 2011 (Sat) 13:00~15:30 Iwaki City Social Welfare Center

《Fukushima》(Co-Host: Fukushima City, Fukushima City International Association)
December 18th, 2011 (Sun) 13:00~15:30 Fukushima Terrsa

【Part One: Lecture】

Hello everyone.

I am a physician from Nagasaki who has worked with atomic bomb survivors in the past. I have also visited Chernobyl more than 40 times, and would like to use that experience today to speak to you about radiation and its effects on our health.

By now, I am sure you have received a copy of the Fukushima Health Management Survey. This survey asks you to fill in details about where you were and what you were doing following the nuclear accidents. I hope you have all submitted your surveys. I am also sure that by now, you are aware that ultrasonography testing for thyroid cancer have begun for children in Fukushima.

The thyroid is a butterfly-shaped gland, located in the throat, that produces hormones. These hormones are essential to the human body for maintaining its overall balance, and for producing its energy. For children, they are essential to the development of the brain.

When too many thyroid hormones are being produced, it can lead to a condition known as Hyperthyroidism. This condition is quite common among younger women, and its symptoms include a quicker pulse, hands shaking, and a loss of appetite. When the opposite happens, and there are not enough thyroid hormones being produced, this leads to a condition known as Hypothyroidism. This condition is more common with women who are middle-aged or older, and its symptoms include low blood pressure, a slower pulse, and swelling.

Our bodies produce thyroid hormones from iodine. When iodine is consumed, our body collects it in our thyroid, and then uses it to create these hormones. Sea vegetables are an example of food that is rich in iodine. The Japanese diet consists of a lot of sea vegetables, namely seaweed, both in its dried form and raw form, and kelp. Since iodine is water soluble, the consumption of foods that are a part of the daily Japanese diet such as miso-soup made using kelp broth, results in the Japanese ingesting iodine on a daily basis.

Although residents of South Korea and some parts of China similarly consume sea vegetables, on a global scale, this is not very common. In fact, Japan is one of very few nations in which its people generally have a surplus of iodine obtained

through their diets. Globally speaking, it is more common for a nation to be lacking in iodine consumption, and in such cases, iodine is added to table salt to compensate for the deficiencies.

On April 26th, 1986 a nuclear power plant accident occurred in Chernobyl. The accident at Fukushima was similar to this accident, as both cases resulted in radioactive substances being released into the atmosphere, carried by wind, and dropped down as nuclear fallout. Although the amount of radioactive substances released was very different for each accident, a breakdown of the substances released indicated that in both cases, 90% consisted of radioactive iodine, while the other 10% was radioactive cesium.

I mentioned earlier that iodine is water-soluble. Radioactive iodine released in the air eventually fell in forms such as rain, which was then absorbed by grass, and later consumed by cattle. Since iodine easily condenses inside milk, the milk produced by the cattle contained radioactive iodine, which was transferred to children when they drank the milk. The radioactive iodine became collected in the thyroid, and from there, gamma and beta rays were emitted. This is what is known as “Internal Radiation Exposure”, and is caused when radioactive substances are introduced into the body, and emit rays internally. Exposure to radiation from the outside such as from x-rays and atomic bombs in the case of Hiroshima and Nagasaki is called “external radiation exposure.” These two forms of radiation exposure are categorized and used separately.

In Chernobyl, the number of thyroid cancer cases rose 5 years after the nuclear accident. I have visited Chernobyl over 40 times in the past 15 years to conduct medical research, and think there are 3 reasons for this increase.

The first reason is that radioactive iodine was released by the accident. The second reason is that areas around Chernobyl had a deficiency in iodine, making it very easy for radioactive iodine to be concentrated in the thyroid. Lastly, there were no restrictions placed on the consumption of foods in the early stages following the accident, which caused people to drink milk containing high dosages of iodine. I personally think the third reason is the biggest factor in the increase of thyroid cancer.

The amount of radioactive substance released from the Fukushima accident is said to be about a tenth of what was released during Chernobyl. However, the

breakdown of substances released is thought to be the same, with radioactive iodine contributing 90% of the release, and radioactive cesium 10%. What happened in Fukushima Prefecture immediately was that provisional standards for placing restrictions on certain types of foods were implemented. This was due to the lesson learned in Chernobyl, and was aimed at minimizing the amount of radioactive iodine being consumed.

The first food product to be detected with radioactive iodine contamination was milk. This was because iodine is easily concentrated in milk as I mentioned before. The next products were green and yellow vegetables, if I recall correctly. This was because these vegetables have open leaves, to which radioactive substances falling from the air would attach. Then came tap water. Because iodine is water-soluble, when it fell into water reservoirs, it dissolved, and reappeared in our tap water. The restrictions on consumption and distribution of these products were aimed at minimizing internal radiation exposure.

A few days after the accident, ambient radiation levels rose to around 20 microsieverts per hour, due to radioactive substances in the air falling down together with rain and snow. Currently, there are hardly any radioactive substances in our air.

Right now, cesium is considered to be a problem. A major factor contributing to the problem is the difference in the half-lives of radioactive substances. While iodine-131 has a half-life of 8 days, cesium-137 has a much longer half-life of 30 years. But before we get into this topic, let us consider why radioactive substances emit radiation in the first place. Radioactive substances are structurally unstable. By emitting rays, they try to stabilize themselves. For example, radioactive iodine will emit gamma and beta rays until it eventually becomes a stabilized substance known as xenon. Once it has become a stable substance, radiation will no longer be emitted. In other words, a “half-life”, is a calculation of the time it takes for a substance to become stabilized.

The amount of energy inside a radioactive substance is called “radioacivity”. The unit used to measure this is the becquerel. If radioactive iodine has 100 becquerels of radioactivity, after one week it will drop by approximately half to 50 becquerels. After two weeks it will drop by another half to 25 becquerels, and after a few months following the accident, it would drop to nearly zero. The half-life of cesium on the other hand is either 2 years or 30 years (depending on the type of cesium), so

even after a few months have passed there aren't any significant changes observed.

When a substance has a short half-life, this means it emits a lot of radiation over a short period of time. When a substance has a longer half-life, on the other hand, it emits a smaller amount of radiation over a long period of time.

Radioactive cesium, like iodine, was transferred by wind before eventually falling to the ground. However, unlike iodine, which is water soluble, radioactive cesium attaches to the surface of soil, roads and walls of buildings. That is why it is possible to decontaminate areas by removing the top layers of soil, or by washing walls using high-pressure water sprayers. Another characteristic of radioactive cesium is that it is easy to filter, so it therefore does not appear in our tap water. For well water, if the well had been lidded, radioactive substances would not have fallen inside. Furthermore, the top layers of soil act as a filter, and prevent radioactive cesium from seeping lower into the ground before entering the water supply. Additionally, there is no radioactive cesium in the air at present.

If radioactive cesium enters our bodies, this does not necessarily mean it will remain there over the course of its 30-year half-life because the human body consumes cesium and does not concentrate it in a specific organ as it does with iodine. Rather, cesium gets spread throughout the body. Since muscle constitutes the largest mass in the body, the amount of radioactive cesium inside our muscles tends to be greater than anywhere else. This is why it was detected in beef produced in Fukushima.

Cesium that has spread to our muscles will eventually leave our bodies in the form of urine thanks to our metabolism. Therefore, if one was to consume cesium-137, its half-life in his or her body would not be 30 years, but 2 months for children and approximately 3 months for adults. The half-lives of substances differ depending on their environment. The half-life of a substance when inside the body is known as the "biological half-life". The 30-year half-life of cesium-137 is its "physical half-life", and is different from its "biological half-life", or the amount of time required for the substance to decrease by half inside the body.

The cases of thyroid cancer among children rose as a result of the Chernobyl accident. A few characteristics of this rise have been identified, which I would like to introduce to you. The first is the incidence of thyroid cancer was higher for children who were between the ages of 0 to 15 at the time of the accident, and particularly so

for children between the ages of 0 to 5. The risk decreases as the age rises, and becomes almost non-existent for males above the age of 20, and females above the age of 30.

It is the same situation for Nagasaki and Hiroshima. Leukemia and other cancers rose among atomic bomb survivors, and cancer risks were known to be higher for survivors who were young at the time of the disaster. This is because radiation has a higher effect on cells or bodies that are active in cell division. The reason why cases of leukemia rose among atomic bomb survivors is because bone marrow cells, which are very active in cell division, were exposed to radiation, and increased the risk of leukemia. You may have heard of people losing their hair when undergoing radiation therapy. This is because active cell division is occurring as our hair grows.

When children who were born before the Chernobyl accident are compared with children who were born 8 months following the accident, 25 to 30 cases of thyroid cancer were observed among 10,000 subjects in the former group, while zero cases of thyroid cancer were found for the same number of subjects in the latter group. A study conducted by the World Health Organization reported that the incidence of thyroid cancer increased among children, but increases in leukemia or cancers that were not thyroid cancer could not be proven.

In the cases of Nagasaki and Hiroshima, people were subjected to high amounts of external radiation all at once, which led to bone marrow being affected by radiation exposure. On the other hand, in the case of Chernobyl, internal radiation, in particular internal radiation due to radioactive iodine, led to the thyroid being affected by radiation exposure. Such differences in the form of radiation exposure is thought to be the reason for the difference in results.

Let us step back a bit to look at why exposure to radiation may cause cancer. When you are exposed to radiation, your body is receiving a form of energy that is passing through your body and damaging your DNA. This damage is what leads to future cancer risks.

For example, let's say that you were exposed to 1 millisievert of radiation, and one DNA molecule inside your cell became detached. This will not necessarily lead to an immediate risk of cancer. DNA has the ability to repair itself, and this is not something unique to the human cell alone. Damages to DNA molecules are repaired within a few hours.

When you undergo a CT scan, you are exposed to 5 to 10 millisieverts of radiation, meaning 5 to 10 DNA molecules are detached. These become repaired. However, it is commonly believed that once the exposure to radiation exceeds 100 millisieverts, the risk of cancer rises. What this means is that of the 100 DNA molecules detached, 99 are repaired, but one molecule may not be properly repaired, which leads to a rise in future cancer risks.

It is commonly said that when a person is exposed to 100 millisieverts of radiation, the risk of cancer rises by 0.5%. Right now in Japan, 300 out of 1000 people are predicted to die of cancer, while 200 die of cardiovascular diseases, and 200 of cerebrovascular diseases. If the same 1000 people are exposed to 100 millisieverts of radiation, the number of people who will die from cancer will rise to 305 from 300. It does not mean that all of them will develop cancer.

For exposure that is lower than 100 millisieverts, current science cannot prove a rise in risks of cancer or other diseases. The reason for this is because the risk is so small due to the effects of the aforementioned repairing mechanisms within our bodies. The same can be said about cancer risks due to cell phone usage. The risk is so small it cannot be proven. Cancer risks for people who smoke, on the other hand, is believed to be equivalent to the rise in cancer risks for people exposed to around 1000 millisieverts of radiation exposure.

I would now like you to look at the graph titled “Concepts behind Dose Standards for Protection Against Radiation” that I provided for today (see end of booklet). This graph is of the international standards for protection against radiation as determined by the ICRP (International Commission on Radiation Protection). The ICRP advises that the levels of radiation be kept below 1 millisieverts per year during ordinary, non-emergency situations, and between 20 – 100 millisieverts per year (with an emphasis on keeping it near the lower end) during an ongoing nuclear accident.

Following the Fukushima nuclear accident, the Japanese government adopted a 20 millisievert per year benchmark as its limit for annual radiation exposure, when deciding on areas to designate as evacuation zones, as well as decontamination work on school yards. This was done in accordance with ICRP recommendations. Once this accident is contained, standards set for limiting the annual levels of radiation exposure will be gradually lowered from 20 millisieverts to 1 millisievert,

and eventually back to below 1 millisieverts per year. What is important to understand is that standards for protection against radiation fluctuate and differ following a nuclear disaster, depending on the progress of the accident.

In regards to food, in the early stages of next year (2012), new standards should be introduced for limiting radiation exposure from food. A different set of values for different age groups should also be introduced. Nine months have now passed since the Great East Japan Earthquake, but the fight against radiation is expected to be a long one. What is most important for us is to continue obtaining information on radiation from a wide range of sources. One can obtain information by contacting or going to websites for local municipalities, prefectures, or international associations, and by sharing information with peers or community if there is something you do not understand. Since the sources of information are sometimes limited in the case of foreign residents living in Japan, it is even more important for them to share their information with peers and communities.

【Part Two: Question and Answer】

Questions Regarding Radiation Levels

Q1 What is the difference between a becquerel and a sievert? What is the difference between units like 1 milli and 1 micro?

A1 The becquerel is a unit used to measure the radioactivity, while a sievert is a unit for measuring the dosage of radiation. When calculating the effects of radiation on the human body, sieverts are used. One milli = 1000 micros.

Q2 Following the nuclear accident, I stayed outside for about an hour per day while waiting in line to receive water due to the stoppages in water services. How much radiation was I exposed to?

A2 If you were exposed to 1 hour of radiation per day for 7 days, and the levels of radiation were about 20 microsieverts per hour, a simple calculation yields that you were exposed to 140 microsieverts (20x1x7). A chest x-ray exposes you to 50 ~ 100 microsieverts, while a CT scan exposes you to 5,000 ~ 10,000 microsieverts of radiation. The level of microsieverts you were exposed to will be about the same as an ordinary chest x-ray, and it is therefore hard to think there will be negative effects on your health.

Q3　The wind directions in Iwaki will soon change and begin blowing from the north, where the nuclear accidents occurred. Will changes in the directions of wind have an effect on the levels of ambient radiation?
A3　If the nuclear reactors have achieved a cold shutdown as has been reported, it is hard to imagine that radioactive cesium will be released into the air again and travel downwind, so I do not think there will be any changes in ambient radiation levels.

Q4　You mentioned that the annual average of radiation exposure in Japan is 1.5 millisieverts. What is it like in other parts of the world?
A4　As long as you live on Earth, you will always be exposed to a certain level of radiation due to radioactive rays from outer space, radioactive substances of which the earth itself consists, and radioactive potassium that exists inside our foods. The average in Japan is 1.5 millisieverts. The Global average is 2.4 millisieverts. There are places with higher levels such as coastal areas in India that have about 10 to 20 millisieverts of annual radiation. These areas have a high level of radiation due to natural radioactive substances that are being washed ashore from the ocean.

Q5　Ambient radiation levels reported on TV, etc., tell me that Aizu generally has a reading of about 0.12 microsieverts. Is this higher or lower when compared to the national average?
A5　Since 0.12 micro Sieverts is a reading per hour, if this is converted to an annual average it will be about 1,051.2 microsieverts (0.12 x 24 hours x 365 days), or about 1.05 millisieverts per year, which is by calculation lower than the national average in Japan. Furthermore, if you are inside a building, especially a concrete building, the amount of radiation exposure will be about a tenth of that reading.

Q6　Is it okay for me to assume that there are no radioactive substances floating in the air right now? And if this is so, why is there ambient radiation being detected?
A6　Right now, radioactive substances are found attached to the soil, etc. and do not exist in the air. What dosimeters are measuring as ambient radiation levels are the levels of radiation being emitted by radioactive substances that are in the soil.

Q7　Where is it safe to be in Japan?
A7　According to current standards, areas with 20 millisieverts of annual radiation are being set as evacuation areas or planned evacuation areas. Areas outside of these have annual radiation levels that are lower than 20 millisieverts, so in that

sense, I think it is safe to consider the area you are living in right now as safe.

Q8　The readings on dosimeters differ greatly depending on the person, even when they are living in the same area. Why is this?

A8　Cumulative amounts of radiation exposure will differ depending on that person's behavioral patterns. If a person has a high reading and if the reason for this can be determined then specific areas with higher radiation levels in their behavioral patterns can be identified and decontaminated.

Q9　Many companies are producing dosimeters right now. Is there some sort of a standard set for dosimeters?

A9　Dosimeters that were available in the early stages following the accident had discrepancies in their data, which became a major problem. The ambient radiation levels in our areas right now are about as low as these dosimeters can measure, and because of this there seems to be fluctuations in the numbers. Dosimeters that are very cheap in price have a high chance of not being adjusted to measure such low radiation, so you need to be careful when purchasing these. Furthermore, dosimeters for measuring ambient radiation levels and cumulative radiation levels (pocket dosimeters, film badges, etc.) do not always match, and will differ depending on that person's living patterns. You should buy dosimeters in accordance to your purpose, whether or not it's for measuring your own cumulative radiation exposure or that of the area you are living in.

Q10　What does a whole body counter measure?

A10　It is a device used for measuring internal radiation exposure. Right now, it can be used to evaluate the amount of internal radiation exposure due to radioactive cesium.

<u>Questions Regarding Daily Life</u>

Q11　Is there anything I should be careful of in my daily routines? Should I be wearing a mask? Is it safe to dry my futons and laundry outside?

A11　There are no radioactive substances floating in the air right now so there is no need to be over-sensitive. Right now, I don't think there is any point in wearing a mask. In regards to drying laundry, unless it's a very windy day with lots of dirt and dust being blown in the wind, I don't think you need to be worried about anything. If your laundry does get dirt on it outside, dusting off your laundry or better yet, wiping the dirt off with a wet cloth will remove radioactive substances. Washing the laundry again will be the most effective method of decontamination in such cases.

Q12　Is it safe to collect fallen leaves with my hands?
A12　If those leaves were from trees that had already foliaged at the time of the March disasters, then there is a possibility that they contain radioactive cesium. If you do not want this cesium on your body, I think it is best if you wear gloves, or use a rake to collect the leaves. Even if you do collect them with your hands, if you wash your hands afterwards there shouldn't be a problem.

Q13　Following the accident, I heard stories of people thinking that radiation can be transmitted from people in Fukushima. Is it safe for me to hold my great grandchild in my arms?
A13　If you touch something that has a lot of radiation on it, radioactive substances may stick to you, but if you wash it off there is no problem. There is no such thing as radiation transmitting from one person to another.

Questions Regarding Drinking Water

Q14　Is it safer for me to purchase and drink bottled water as opposed to tap water?
A14　In the early stages following the accident some iodine was detected in tap water, but now everything is below the detection criteria. In this situation, I don't think there is any need to purchase water. Cesium, unlike iodine, is easy to filter, so it's hard to imagine you will find it in our tap water right now.

Q15　Can I drink well water without treating it?
A15　I am assuming your well has a lid and that you use a pump to extract the water. If your well has a lid, then radioactive substances will not be able to enter it. Radioactive cesium gets attached to the surface layer of the soil, and doesn't seep down lower so I think there isn't a problem with drinking it.

Q16　Does boiling the water lower the amount of radioactive substances inside it?
A16　It depends on the substance, but radioactive iodine for example is volatile, but its boiling temperature is higher than that of water. For this reason, boiling it may actually concentrate it and make it stronger. Cesium also has a boiling temperature that's higher than water, so boiling it will not have an effect.

Questions Regarding Food

Q17　To what extent should I be pretreating vegetables?

A17　If there is Cesium on its surface, then peeling the vegetable or removing its outer layer would be effective. The type of treatment will be case by case, and depends on where and how the vegetable was harvested. There is no one general rule to follow, so the most important thing would be to find out whether or not it is over the standard values set in place for food safety.

Q18　Is it safe to be eating foods from Aizu? I know some people who are purchasing milk online from Kyushu. How careful do I need to be in regards to the foods I consume on a daily basis?

A18　There are certain type of foods in which cesium concentrates easily. The most typical of such foods are mushrooms and other types of fungi. Mushrooms grown in greenhouses are no problem, but mushrooms grown out doors are vulnerable to cesium concentrating inside them. If you plan to go mushroom picking, it would be best to avoid areas with high ambient radiation levels. Fish, like beef, may also has cesium inside its muscles, and as I recall there is a volunteer ban on all fishing off the coast of Fukushima. Currently, there are provisional standard values set in place to limit the amount of radiation exposure due to foods to below 5 millisieverts per year. If you happen to consume a food product with radiation levels higher than these values once or twice or for a week or so, there should be no issues with your health. Furthermore, these are provisional values, and new values will likely be introduced next year. It is predicted that the new values will limit the amount of exposure due to food to 1 millisievert per year, so I suggest everyone continues to collect information on the foods they are eating.

Q19　Are there any food products that reduce the amount of exposure to radiation?

A19　There are some theories that apples are good for this, but there are no foods that have been determined to be effective in reducing radiation exposure. I personally think apples are good for your health, but when it comes to removing the radiation within your body, it becomes a totally different story. What is more important, I feel, is that you continue to choose foods that are below the standard values set in place.

Q20　How can I find out the amount of radioactive substances in each food product?

A20　You can find this information on the prefectural website.

http://wwwcms.pref.fukushima.jp/

Questions Regarding Home Gardening

Q21　Is it okay for me to eat vegetables that I've grown in my own garden? Is it safe to make dry fruit by drying it outside?

A21　It is hard to say as it will differ depending on where you live and on what you are growing. Please check to see if the vegetable or fruit you have in mind from your area is being subjected to restrictions on distribution or if it has gone over the provisional standard values. If you would like to decontaminate your garden from cesium, modifying the soil by removing the top layer or replacing it entirely will be effective.

Q22　I have a compost box which I haven't opened since the earthquake. Is it safe to use any compost created from here?

A22　If you haven't opened the lid, there shouldn't be any problems.

Questions Regarding Pregnancies and Breast Milk

Q23　Please tell me about the effects of radiation on pregnant women.

A23　The ICRP (International Commission on Radiation Protection) advises that radiation exposure under 100 millisieverts is not a reason to consider an abortion. With the current situation in Fukushima, it is hard to imagine that a pregnant person will be exposed to 100 millisieverts of radiation, so it is safe to become pregnant and give birth in Fukushima. The most important thing is to provide an environment where the mother can relax and give birth.

Q24　Please tell me about the effects on breast milk.

A24　In the early stages, there were some reports of radioactive iodine appearing in breast milk. Mammary glands do indeed have very high radiation sensitivity, but data obtained up to today has shown that the levels of radiation are exceptionally low, low enough to a level where they pose no danger to the health of an infant. In addition, currently there are nearly zero amounts of radioactive iodine in Fukushima, and therefore there is no need to place restrictions on breast milk. Breast milk is not only a valuable source of nutrition, but also has many merits that have to do with the baby's immune system, so the merits of continuing to breastfeed must be taken into consideration.

Questions Regarding Health

Q25　I understand how cancer occurred in Chernobyl. Is it the same in Fukushima?

A25　The biggest reason for the rise in cancer patients in Chernobyl was because they didn't restrict the distribution of foods contaminated by radioactive substances, and therefore couldn't prevent internal radiation exposure due to radioactive iodine. In Fukushima, the government placed restrictions on food from the early stages on to prevent such internal radiation exposure. Data obtained up to today on the amount of internal radiation among people living in Fukushima reiterates this, as the levels of internal radiation due to radioactive iodine and cesium are exceptionally low. Therefore, I think the government's response was effective in preventing internal radiation exposure resulting from the early stages of the accident. Since the initial actions taken by the government following the accident are different between Chernobyl and Fukushima, I think the results will turn out to be drastically different as well.

Q26　When I was cutting some grass in my yard in June (2011), I cut my hand but continued to cut the grass for about 2 hours. Afterwards, I simply washed the wound with water and not soap. Will this cause skin cancer?
A26　I think the most appropriate action for you to take here was indeed washing your wound, as you mentioned you did. The fact that 2 hours had passed doesn't make a difference. Radioactive Substances are unlike snake venom, and do not rapidly spread throughout the human body in blood if left unattended to. The same is also true if a child is injured while playing on a school field. If the dirt and dust is washed off with water, there is no problem. It is not a case where skin cancer will develop immediately.

Q27　My child has a swelling that hasn't gone away for a month now. Do you think there is a relation to the radiation?
A27　I get similar questions like these, for example about nose bleeds that won't stop. Exposure to radiation can indeed reduce the number of blood platelets or white blood cells, but such acute symptoms only occur when the levels of exposure are around 500 to 1000 millisieverts. It is hard to imagine someone in Fukushima being exposed to such high radiation, so I think it has nothing to do with the radiation.

Q28　Has there been anything proven scientifically in regards to the effects on health from continued exposure to low levels of radiation?
A28　Studies were conducted in Tottori Prefecture in the Mishio district that has high radiation levels, and no differences in age expectancy or diseases were proven. In India, there are areas where the annual level of radiation is between 10 to 20 millisieverts, and studies have been unable to find any differences when comparing

the life expectancy and prevalence of diseases among those in these areas with other people in other areas. Although 10 millisieverts per year will reach 100 millisieverts per year in 10 years, what these studies suggest is that there is a difference between receiving the same amount of radiation at once (acute) or over a gradual period of time(chronic). The reason why there are less effects on health being observed for chronic exposure in comparison to acute exposure, is likely due to the repair mechanisms of the human body. Some people have asked me if there is a difference in radiation exposure if the source is man-made like radioactive substances produced in a nuclear power plant, or if they are from natural sources. The types of radioactive rays that are emitted are beta rays and gamma rays for both cases, meaning there is no difference in radiation no matter where the source comes from.

Q29　Have there been any scientific findings proving that exposure to low levels of radiation is good for you?
A29　Low radiation, for example in radium hotsprings, and its effects on our health have been the subject of many studies, yet there has been no consensus reached on a specific theory yet.

Q30　If you lack in iodine, does it mean the risk of thyroid cancer is high?
A30　It all depends on your diet, but if you are eating Japanese food then you should have enough iodine in your system and do not need to worry.

Q31　Is it necessary to continue consuming iodine?
A31　Iodine is very important for producing thyroid hormones, so its important to consume appropriate amounts in your diet. However, if you continue to take iodine pills that were handed out to prevent internal radiation exposure to radioactive iodine, it will actually cause side effects so you must be careful.

Q32　Is there an effective way of removing cesium from our bodies?
A32　There is medication that will help remove cesium from the body, but this is only used for people who are working at the nuclear power plants and are exposed to high doses of radiation. The medication is not available to regular citizens.

Q33　I read on the Internet that there are herbal medications that are good for protection against radiation. Is this true?
A33　There are indeed many types of medicines out there right now, but a lot of them have not been proven from a scientific standpoint. The aforementioned iodine

pills have scientifically proven effects, but not all of these medicines do, so you need to be careful.

Others

Q34　When will the health check-ups for children begin?

A34　The Fukushima Health Management Survey is for everyone living in the prefecture of Fukushima. For children below the age of 18, periodic check-ups for thyroid cancer will be conducted by local municipalities. Please keep an eye out for notices from your local municipalities.

Q35　Many experts are claiming different things right now. Can you give us advice on how to tell a good expert apart from one who is not.

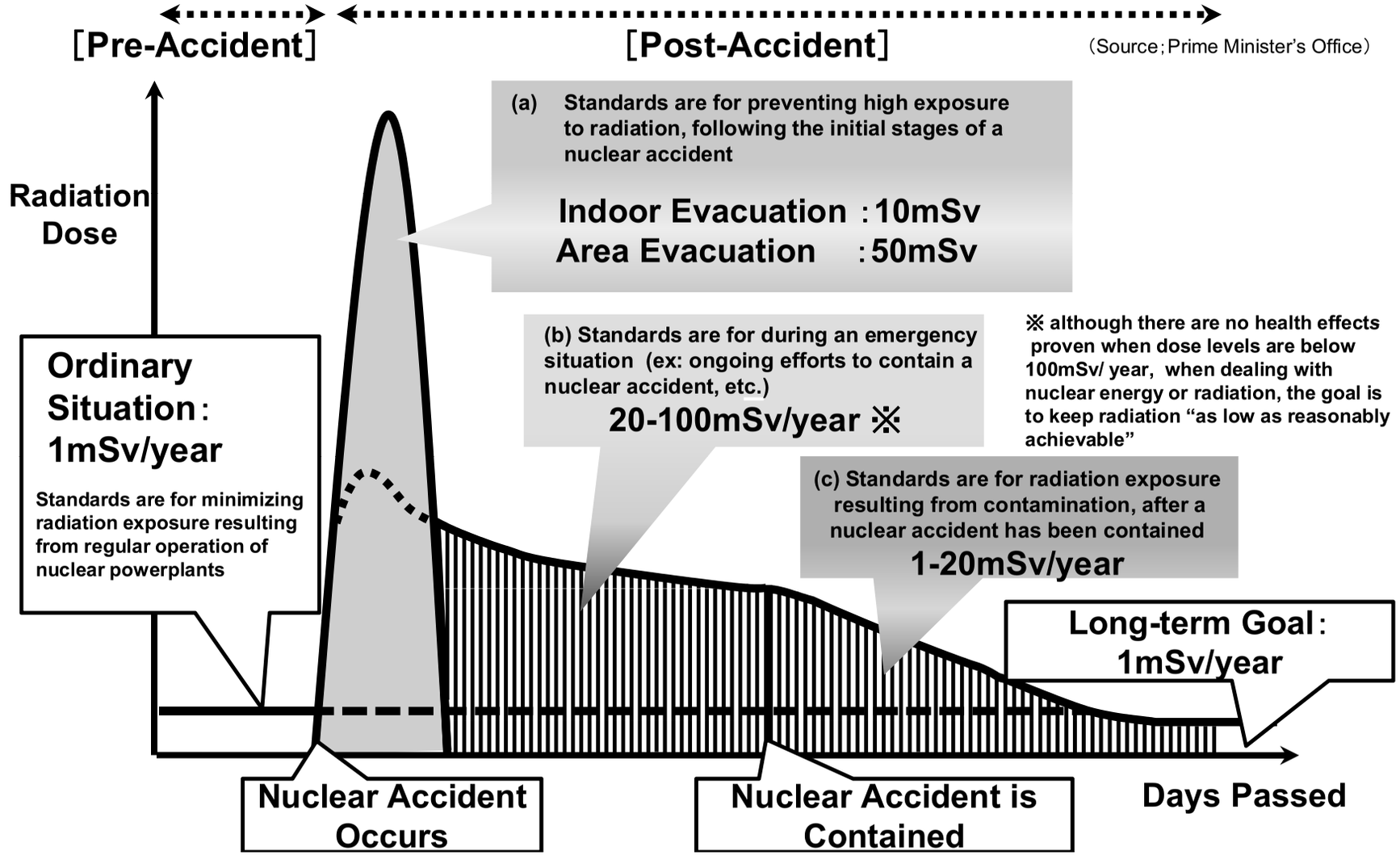
A35　Although scientists are free to research whatever they want, it is important that when dealing with the general public, they only supply information that has been agreed upon by the scientific community on a global scale. If you want to know how to tell a trustworthy expert from one that is not, this may be a very good guideline to keep in mind.

Q36　Can we trust the government's claim that the accident is now under control?

A36　This question is outside of my expertise so its hard for me to answer. One thing I can say for sure is that the data indicates that no new radioactive substances are being released right now.

Supervised By：Prof. Noboru Takamura, Nagasaki University
Fukushima Prefectural Radiation Health Risk Management Advisor
（January 20th, 2012）

Concepts behind Dose Standards for Protection Against Radiation



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