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Demystifying the Official Discourse on Childhood Thyroid Cancer in Fukushima 小児甲状腺ガンについての公式見解を読み解く

Piers Williamson

On 9 October 2011, Fukushima Medical University (FMU) started a two-stage programme of thyroid cancer tests for 368,000 residents in Fukushima Prefecture who were aged 18 or under on 11 March 2011. The first stage was the 'Preliminary Baseline Survey' and began on residents in 'high exposure areas' and eventually covered all municipalities. The original plan had been to commence three years after the incident, but the testing was brought forward due to parental concerns.[1] In April 2014, FMU started the second stage 'Full Scale Survey' of 380,000 residents, now including those who were in utero on 11 March 2011. Participants are to be tested once every two years until they are 20 years old, and then every 5 years for the rest of their lives. The programme uses advanced ultrasound equipment and is unprecedented in scale. It is part of a wider Health Management Survey aimed at estimating the exposure levels and assessing the health status of all Fukushima residents, approximately 2 million people. The first case of thyroid cancer was reported on 12 September 2012 after 80,000 children had been tested.[2] Since then, the numbers have risen steadily. As of writing, 56 have been diagnosed with thyroid cancer, 1 with a benign tumour, and a further 47 are suspected of having the cancer. This brings the probable total to 103 out of 296,026 eligible residents examined.[3] Thus far, nearly all initially 'suspected' cancers have later been confirmed as malignant.

A thyroid test

The 'normal' cancer incidence rate amongst minors is one to two in a million.[4] However, that figure only accounts for children with symptoms who consult a doctor. Thyroid cancer usually progresses slowly, and so the tests conducted in Fukushima may be finding cancers that might have remained dormant without causing any problems until much later in life, although FMU has not released data on the number of symptomatic cases involved. A debate is therefore raging as to whether the cancers being found are caused by exposure to radiation from the Daiichi nuclear plant, or whether they are only being found because doctors are using high-tech equipment to look for them. The position of FMU, as voiced by its two most prominent representatives, Professors Yamashita Shunichi and Suzuki Shinichi, is that connection to radiation exposure is highly unlikely.

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Yamashita Shunichi

Yamashita Shunichi is a second-generation *hibakusha* and 'authority' on thyroid cancer. He is immediate past president of the Japan Thyroid Association, and worked on thyroid cancer in Chernobyl in the early nineties. Yamashita took a leave of absence in July 2011 from Nagasaki University to become the Deputy Director of FMU and the Director of the Radiation Medical Science Center that oversees the Health Management Survey, having been a radiation health risk management advisor for Fukushima Prefecture as well as an advisor to FMU during the disaster in March of that year. He is also Director of the WHO Collaborating Center for the Research on Radiation Emergency Medical Preparedness and Response Network. Yamashita has been a controversial figure since moving to Fukushima due to public comments that animal experiments show that if you smile then you will be safe from radiation, and that radiation levels under 100 μSv (microsieverts) per hour are safe.[5] In June 2013, Yamashita resigned from his position at FMU, with three others, following revelations about 'secret meetings' to stage-manage public hearings of the Oversight Committee Meeting for the Health Management Survey (see below). The following month, Yamashita admitted that he had given incorrect information shortly after the disaster when he advised FMU not to dispense potassium iodide tablets to children.[6] The other key figure, Suzuki Shinichi, is a thyroid surgeon and a professor at FMU who has been in charge of implementing the screenings and has participated in public demonstrations of the testing procedure and held public briefing sessions for Fukushima residents.[7] He was also involved in the 'secret meetings' until the revelations surfaced.

Suzuki Shinichi

Between them, Yamashita and Suzuki give four 'facts' to support their denials of a link with radiation exposure. First, they hold that the unprecedented scale of the testing explains the cancers being found. This is the so-called 'screening effect'.[8] Second, Suzuki and Yamashita state that it is too early to judge because thyroid cancer did not appear until at least four years after Chernobyl.[9] This is actually the reason why Fukushima Prefecture did not originally plan to start tests until three years later.[10] Third, they claim that the radiation levels in Fukushima are lower than those in Chernobyl. Fourth, the main cause of thyroid cancer after Chernobyl was ingestion of contaminated food products, especially milk. By contrast, Japan had prompt and effective food restrictions.[11]

Furthermore, both have commented that the main aim of the Health Survey is to reassure people,[12] apparently advocating an *a priori*

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conclusion that there is no problem. For Yamashita and Suzuki, therefore, the real risk from radiation is psychological. This attitude provoked criticism from Fukushima residents that the survey was being run on the presupposition that there was no problem.[13] It was openly challenged by Professor Shimizu Shuji, an economist at Fukushima University, at the Prefectural Oversight Committee Meeting for Health Management Survey on 19 May 2014. He noted that because the Health Survey was proceeding on the assumption that there would be no health effects if exposed to under 100 mSv [the result of immediate radiation release], and that no one in Fukushima was exposed to 100 mSv or more, then logically that meant that the conclusion had already been reached and so there was no need to run the Health Survey in the first place.[14]

The question is thus: are the 'facts' that Yamashita and Suzuki assert strong enough to support their outright denial of a link between radiation exposure and the thyroid cancers being found in Fukushima? I argue that they are not, and attempt to show that each of the four 'facts' should be viewed skeptically. I point to other 'facts' from 'alternative discourses', and hold that greater circumspection amongst experts is necessary.

Indeed, while experts such as Suzuki and Yamashita may invoke scientific neutrality, their arguments are unscientific and far from neutral. Scientific procedure would dictate that one reserve judgment in an environment of inadequate information, not confidently proffer conclusions that mask an underlying lack of knowledge. Additionally, the premature conclusions promoted are anything but apolitical. The Japanese state has an avowed policy of restarting nuclear plants. This policy has been in place since 2012 when the Noda administration fired up reactors at the Oi plant in Fukui prefecture (although it was never really abandoned anywhere outside the Kan cabinet). The Abe administration has redoubled efforts to return to uranium use. Obviously, should links between sick children and nuclear power be publicly recognized as a possibility, let alone established, it would make it harder for the government's policy to win the support of a Japanese public largely opposed to resurrecting a technology that has caused a national disaster.

Segment 1

Due to the sensitive and controversial nature of the subject, and to avoid misunderstanding, it also bears stating what I am *not* claiming. I am precisely *not* proposing that the cases of thyroid cancer discovered to date are a result of the explosions in the nuclear reactor buildings at Daiichi. I do not know, and neither does anyone else at this time, but I think it is entirely possible and so a link should not be rejected out of hand.

To make my case, I first confirm that the four-year 'fact' has been roundly reported in the Japanese press and so communicated to the public as a certainty. I then discuss the four points that Yamashita and Suzuki have raised. To start, I look at the 'screening effect'. I show that this argument was falsely made after Chernobyl, and presents FMU with a dilemma in the form of unnecessary operations. For if the thyroid cancers being found would not otherwise have caused symptoms and so been found until the children were adults, possibly decades later, or maybe never if the individual had died for other reasons, then standard medical practice dictates that the operations are premature. I also consider challenges to the 'screening effect' and criticism of the frequent and inherently optimistic notion of 'statistical significance'. Next, I look at the related argument that increased thyroid cancer did not appear in Chernobyl until four years after the accident and show that this is a spurious assertion. I then examine other evidence that

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counters the claim that the radiation levels in Fukushima were 'low' in absolute terms and so lower than Chernobyl and therefore cannot have caused thyroid cancer. Finally, I consider inhalation and question the presumption that children in that area were not at risk because they did not consume contaminated milk. I finish my discussion by briefly noting the political priorities of the international and domestic bodies involved in examining the health risks from radiation exposure in Fukushima.

Prevalence of the Four Year 'Fact'

Because the media are key to public opinion formation, and because I had also thought that it took four years for evidence of increased thyroid cancers to appear in children after Chernobyl, I was interested to see how much coverage was given in the 'Big Three' Japanese newspapers, namely the *Asahi*, the *Yomiuri* and the *Mainichi*, to this 'fact'. I chose these publications because they have the largest readership. National sales for the morning editions are 9,868,516 for the *Yomiuri*, 7,543,181 for the *Asahi*, and 3,350,366 for the *Mainichi*.[15] By comparison, the Sunday New York Times has an average print circulation of 1,257,958.[16] I am of course aware that there are other major publications, such as the *Nikkei*, the *Sankei*, and *Tokyo Shimbun*, as well as a host of smaller magazines and journals, and online editions. Thus my findings cannot be said to apply definitively to the Japanese media in general, but they nevertheless account for a significant news outlet to millions of people and can be viewed as an approximate barometer of the major media.

I used the online databases provided by the respective newspapers to run a keyword search for the terms 'thyroid AND Chernobyl' (in Japanese) between 11 March 2011 and 30 June 2014. There were 206 hits for the *Asahi*, 105 hits for the *Yomiuri*, and 85 hits for the *Mainichi*. I found 189 'substantial articles' (i.e. an article that conveys facts about the issue) for the *Asahi*, 96 for the *Yomiuri*, and 78 for the *Mainichi*.

The 'fact' of how long it takes for thyroid cancer to develop in children after exposure to radiation was reported 19 times in total in the *Asahi*, 35 times in the *Yomiuri*, and 25 times in the *Mainichi*. The most common time interval used in the *Asahi* and the *Mainichi* was '4-5 years'. This accounted for 58% of references in the *Asahi*, and for 48% in the *Mainichi*. The most common time interval in the *Yomiuri* was '5 years', accounting for 37%. The shortest time given in the *Asahi* was '3-5 years', cited once, '1 year' in the *Yomiuri*, cited once, and 'immediate' in the *Mainichi*, cited once. All remaining intervals were over 4-5 years, with a handful being vague but intimating a similar delay (i.e. 'several years').

Sources connected to Fukushima Prefecture and Fukushima Medical University were cited most often in the *Asahi* and the *Mainichi*. For both papers, such sources accounted for 57% of sources. The sources in the *Yomiuri* were more varied, but sources connected to Fukushima Prefecture and FMU accounted for 32%, the largest single source. Overall, therefore, all three publications consistently conveyed the 'fact' of a time interval for thyroid cancer in children after Chernobyl of between 4 and 5 years at the earliest.

Despite the wide coverage given to the 'fact' that it took at least four years for thyroid cancer to develop in children after Chernobyl, there are two barely reported elements that undermine the basis of this four-year assumption. They were revealed on 11 March 2014, the third anniversary of the disaster, on *TV Asahi*'s nightly news show, *Hodo Station*. Key segments from this show are presented below. I have added English subtitles.

Segment 2

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The following discussion draws from the *TV Asahi* broadcast to analyze the four facts relayed by Yamashita and Suzuki.

FACT 1: THE SCREENING EFFECT

A Regurgitation

TV Asahi interviewed Dr. Mykola Tronko, head of the Endocrinology and Metabolism Research Centre in Kiev, Ukraine. The broadcast did not mention it, but Tronko provided an analysis of the problem of thyroid cancer in an article he published in the prestigious journal *Nature* in 1995.[17] Received medical wisdom at that time, based on data from the Hiroshima and Nagasaki atomic bomb victims, held that thyroid cancers did not appear until eight years after exposure. Cancers found earlier than eight years were thus written off as the results of the 'screening effect', i.e. the fact that large-scale testing produces higher rates of discovery of the disease. Tronko recalled that he too thought that cases earlier than eight years would be impossible. He now recognizes that he was wrong. Therefore, as Imanaka Tetsuji, Professor of Nuclear Engineering at Kyoto University, pointed out in the broadcast, the first element to bear in mind is that the 'screening effect' argument was made after Chernobyl and was later found to be false.

Mykola Tronko

This can be confirmed by looking at contemporary reports. For example, articles were published in *Nature* in 1992 arguing that the thyroid cancers were probably examples of the 'screening effect'.[18] Furthermore, on 20 April 1991, the *Mainichi* quoted Shigematsu Itsuzō from the IAEA as stating that '[Data from Hiroshima and Nagasaki shows that] cancer in the thyroid, which is in the throat, started to increase after 10 years. Because Chernobyl was not a one time high level exposure, the effects should appear later. The increase in patients in the region is also related to the fact that more people are going to the hospital [my translation].'[19] The following year, on 21 April, The Herald Sun stated the common wisdom at that time when it reported that there was 'a big concern' about the increase in thyroid cancers in children, and that '[f]rom experiences at Hiroshima and Nagasaki it could take seven to 10 years for these [thyroid] cancers to appear.'[20]

Five months later, The New York Times

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reported on 3 September 1992 findings of increased thyroid cancers in children made by a team led by Dr. Vasily Kazakov. The newspaper noted that, '[a]n increase in thyroid cancer had been reported earlier, but some Western health officials had expressed concern about the reliability of the data. As recently as May 1991, Dr. Goldman took part in an International Atomic Energy Agency study that concluded that there were "no health disorders that could be attributed directly to radiation".' The paper also reported that Dr. Keith Baverstock of the WHO was 'particularly surprised that the cancers were showing up so soon'. It quoted him as saying 'We normally expect solid tumors about 10 or more years after exposure [to radiation].'[21] On the same day, The Independent also quoted Dr. Baverstock as commenting, 'It is unexpected that it is so early. It may indicate the start of a much bigger thing, or it may be that there is a particularly sensitive sub-group within the population.'[22] Both The New York Times and The Independent noted that researchers were also surprised by how 'aggressive' the tumours were. Six years later, Baverstock reflected:

> *In 1992, when the first effects of the Chernobyl accident on the prevalence of thyroid cancer in children were reported, they were met with scepticism by the radiological community. Some of this scepticism was undoubtedly scientific ("iodine-131 has a low carcinogenic potential"), though some was not…It is a cautionary tale of how scientific instinct can mislead: help could have been provided more quickly had it not been for this debate.*[23]

But knowledge has progressed since twenty-eight years ago even if the rhetoric hasn't. That thyroid cancers may develop in people sooner than four years after exposure to 'low level ionizing radiation' has, for example, been recognized by the World Trade Center Health Program at the United States Centers for Disease Control and Prevention established to help people affected by the 9.11 attacks. In the revised report issued on 1 May 2013, John Howard M.D., records a 'minimum latency' for thyroid cancer as two and a half years. This result is based on statistical models, including those from the US Nuclear Regulatory Commission. For 'childhood cancers' defined as 'all types of cancer occurring in a person less than 20 years of age', and which includes thyroid cancer, the 'minimum latency' is listed as one year based on literature from the US National Academy of Sciences.[24]

Additionally, as some chapters of the Nobel Prize-winning International Physicians for the Prevention of Nuclear War (IPPNW) – which did not include any Japanese physicians[25] - noted in its June 2014 critical assessment of the 2013 (confusingly published in April 2014) United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) report, '[s]everal international studies also found that thyroid nodules in children have a much higher malignancy rate than in adults, between 2 and 50% [if resultant from ionizing radiation]'.[26] Indeed, a more recent 2014 study (published in October in the peer reviewed journal *Cancer*) of 12,000 people in Belarus who were exposed to iodine-131 from Chernobyl as minors has confirmed the aggressive nature of radiation induced thyroid cancer. Lead author of the study, Lydia Zablotska, physician and Associate Professor at the Department of Epidemiology and Biostatistics (University of California, San Francisco), supported the idea of testing minors in Fukushima, commenting, 'Those exposed as children or adolescents to the fallout are at highest risk and should probably be screened for thyroid cancer regularly, because these cancers are aggressive, and they can spread really fast…Clinicians should be aware of the aggressiveness of radiation-associated tumors and closely monitor those at

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high risk.' The study also showed that exposure to iodine-131 can cause benign tumours.[27]

One should further remember that while children are more vulnerable to radiation exposure than adults, females are more vulnerable than males. According to the risk model formulated in the National Academy of Sciences BEIR VII Phase 2 report, '[t]he risk [of cancer] depends on both sex and age at [external] exposure [to radiation], with higher risks for females and for those exposed at younger ages.'[28] In other words, all other factors being held constant, female infants are the most vulnerable group, followed by male infants, then female adults, and finally male adults. However, these discrepancies are often omitted from officially supported risk models. As Steven Starr, Director of the Clinical Laboratory Science Program at the University of Missouri, writes, '…a female infant has a seven times greater risk, and a five year-old girl has a five times greater risk, of getting radiation-induced cancer than does a thirty-year-old man. Currently accepted radiation safety standards actually use a "reference man", who is twenty to thirty years of age, as the basis for the standards, which underestimates the dose for infants and children.'[29]

This gender imbalance of risk apparently also applies at conception with exposure to so-called 'low level' radiation from bomb tests, fallout from Chernobyl, and from living near nuclear plant operations causing a shift in the human 'sex odds' at birth, meaning that there is a significant increase in the ratio of boys born compared to girls.[30] Having said this, thyroid cancer may be an exception to the fact that females are always more vulnerable than males. According to Shimizu Kazuo, former Chairman of the Japanese Society of Thyroid Surgery, and Chairman of the Third Expert Subcommittee on Thyroid Examination under the Oversight Committee, whereas thyroid cancer normally affects women more than men at a ratio of 1 man to 8 women, thus far in Fukushima males account for 36%. A higher than normal ratio of thyroid cancer amongst males compared to females was also found after Chernobyl.[31]

Treatment under the 'Screening Effect'

If for the sake of argument it is accepted that the thyroid cancers being found are a result of the 'screening effect', as Suzuki Shinichi asserts, this raises the spectre of unnecessary operations. Professor Shibuya Kenji of Tokyo University's Graduate School of Medicine, who participated in the Third Expert Subcommittee on Thyroid Examination under the Oversight Committee on 10 June 2014, argues that many experts hold that because the thyroid cancers being found are a result of the 'screening effect', operations should not be performed before symptoms appear. The procedure leaves mental and physical scars and the children have to take hormone replacement drugs for the rest of their lives. FMU insists that its decision to operate is based on surgical indications such as the size of the tumour, the presence of lymph node or distant metastasis, or proximity to the recurrent laryngeal nerve or trachea. However, when Shibuya asked what percentage of children could not speak because the cancer had spread to the recurrent laryngeal nerve, Suzuki replied that this was personal information that could not be released for reasons of 'privacy'.[32] In other words, conclusions are aired publicly, but the data on which those conclusions are supposedly based is not.

More recently, on 28 August 2014, Suzuki addressed the 52nd Annual Meeting of the Japan Society of Oncology. He revealed that out of 54 operations performed, 45 either had a tumour over 10 millimeters in diameter or metastases to the lymph node or other organs, with 2 metastases to the lungs. Of the remaining 9 cases, 7 were close to the trachea whereas 2

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were performed at the request of patients and/or family. However, Suzuki still refused to reveal the number of lymph node metastases and symptomatic patients.[33]

It would seem that Suzuki faces a Catch-22. Either unnecessary operations are being performed on children with no symptoms whose cancers have only been detected due to the 'screening effect' as Suzuki insists, or those children have symptoms and so the 'screening effect' explanation is demonstrably false as they would soon have presented themselves for treatment without the screening. Or to put it simply, if it is the 'screening effect' he should not be operating. If he should be operating, it is not the 'screening effect'. In discussing the pros and cons of operating on thyroid cancers in the *Asahi* on 13 March 2012, Suzuki had previously displayed caution. While early diagnosis followed by early treatment is the standard approach to cancer, it was noted that thyroid cancer is different. This is because there is a risk that the patient will lose their voice if the surrounding nerves are damaged in the operation,[34] so operations should not be performed until symptoms appear, which may be very late in life, if at all, because the cancer progresses slowly. Moreover, on 12 October 2011, Yamashita Shunichi was quoted in the *Mainichi* as saying that 'at the present time, the probability of finding abnormalities [in the screening programme] is low, we want to lessen anxiety'.[35] This clearly does not square with expectations of a 'screening effect'.

Challenging 'Statistical Significance' and the 'Screening Effect'

While the 'screening effect' is central to the official discourse upheld by Fukushima Prefecture and FMU, Professor Tsuda Toshihide, a medical doctor and epidemiologist at Okayama University directly challenged this during the Environment Ministry's Eighth Expert Meeting On Health Support After The Fukushima Accident (16 July 2014).[36] Tsuda observed that the 2007 ICRP report and the 2008 UNSCEAR report only state that there was no *statistically significant* increase in cancers among the Hiroshima and Nagasaki *hibakusha* cohort under 100 mSv. He pointed out that contrary to popular belief, this does *not* mean that there were no cancers caused, or that there will be none resultant from exposure to under 100 mSv in Japan. The problem lies with the oft-used concept of 'statistical significance'. This can discount actual increases that occur as not being 'statistically significant', and so to all intents and purposes not a problem, because the total is not large enough to meet statistical requirements for causality. The method would also average out the effects, underrating possible specific effects such as regional differences of radiation, different sensitivity to radiation in people (sex, age, overall state of health, etc), and other such factors.

Likewise, IPPNW raised the problem inherent in UNSCEAR's use of the phrase 'no discernible changes in future cancer rates and hereditary diseases' in Fukushima. It pointed out that '…this statement is not saying that there will be no health effects, only that commonly used epidemiological methods will not be able to find them.' It went on to note that UNSCEAR acknowledged this when UNSCEAR stated that 'the Committee has used the phrase "no discernible increase" to express the idea that currently available methods would most likely not be able to demonstrate an increased incidence in disease statistics due to radiation exposure. This does not rule out the possibility of future excess cases or disregard the suffering associated with any such cases should they occur.'[37] Indeed, IPPNW notes that IPPNW's own estimate of excess cancer cases in Japan of between 4,300 and 16,800 (with mortality between 2,400 and 9,100) '…may not be noticed in national epidemiological statistics'.[38] In other words, even if there is an increase in cancer in Fukushima this may not be 'statistically significant' on a national scale

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because it falls within 'Japan's relatively high baseline incidence of cancer' (around 630,000 new cancers every year) and can therefore be dismissed as not having been caused by radiation exposure from Daiichi, even though it was.

Tsuda Toshihide

Drawing attention to the role of misleading headlines at his 20 November 2014 address to the Foreign Correspondents' Club of Japan, Keith Baverstock noted that while the UNSCEAR press release was titled 'Increase in Cancer Unlikely Following Fukushima Exposure', if one applied 'standard risk factors' to the dose estimates given in the report, then one finds 50 excess cancers for workers exposed to over 10 mSv in just the first year and a half after the explosions, and 2500 to 3000 excess cancers for the Japanese population as a whole, just based on the first year of exposure. These cancers are 'not unlikely', they 'are to be expected', but will not be identifiable as Fukushima Daiichi caused cancers.[39]

Such is the nature of 'discernible effects' that official studies highlight and are consequently picked up in media coverage. The concept of 'discernible effects' and their probability also draws attention away from the problem of accelerated disease. According to the epidemiologist Professor Sander Greenland (U.C.L.A.), focusing on 'years of life lost', although imperfect, is less likely to 'seriously underestimate the number of people harmed' than a focus on 'causation probabilities' (e.g. there is a 1 in a 10,000 chance of cancer from exposure) which give the 'lower probability bounds', but are frequently communicated as 'the actual probability', and which tacitly assumes that 'there is no acceleration of disease from exposure'.[40] For example, if you were due to die from cancer at age 70, but die at age 65 because of radiation exposure, the fact that you were killed five years earlier than you would otherwise have died does not appear as an increased risk under an approach using 'causation probabilities', or for that matter, as an 'excess death' if looking at total cases and thus 'discernible effects'.

Tsuda also argued that emphasis in the Environment Ministry's Expert Meeting is being placed on the cause (i.e. the radiation exposure level) to determine the effect. This is a laboratory approach, but does not work in the field where there is a paucity of information relating to the cause. Consequently, the effect is being denied due to the lack of a clear cause. Instead, standard international practice in outbreak epidemiology is to focus on the effect (i.e. disease rates) and so avoid premature denials and delayed medical responses. In Fukushima, Tsuda asserted, the available data already shows regional clusters that cannot be explained away by the 'screening effect'. The authorities should therefore prepare for larger outbreaks as time passes and do more to minimize exposure than is presently being done by running immediate health check-ups for

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people both inside and outside Fukushima; investing in radiation protection measures for vulnerable groups such as pregnant women and minors; considering evacuation within Fukushima for these groups to areas with lower radiation levels; and regularly communicating radiation levels and cooperating with residents to build trust. Tsuda further pointed out that data from Chernobyl indicates that thyroid cancer is a serious problem amongst adults not just children, and that there is plenty of data showing statistically significant increases in cancer cases due to exposure to radiation levels below 100 mSv (e.g. pediatric CT scans, background radiation, flight crews). Pregnant women are particularly vulnerable but are continuing to be exposed to elevated radiation levels in Fukushima.

Tsuda's input invited a lot of criticism from other panel members, particularly Suzuki Gen (UNSCEAR member) and the Chairman, Nagataki Shigenobu, Yamashita's senior colleague at Nagasaki University, who invited responses to Tsuda, commenting that 'it would be terrible if this meeting concluded that cancer was increasing!' Nagataki also later dismissed Tsuda's input, stubbornly insisting that the aim of the committee was to focus on exposure levels.

One of Suzuki Gen's challenges centred on the screening done to establish a control group in three prefectures outside Fukushima Prefecture, namely Aomori, Yamanashi, and Nagasaki. Those studies, conducted under the auspices of the Environment Ministry, in which Suzuki Shinichi and Yamashita Shunichi also participated, concluded that the prevalence of nodules and cysts was not lower than in Fukushima.[41] In total, out of 4,365 children aged 3-18, they found cysts in 56.88% of participants, and nodules in 1.65%. Tsuda responded that the studies were not really comparable due to the age differences (i.e. the age of the control groups was 3-18 years old, but the FMU screenings are for 1-18 years old). But if you tried to adjust for age, then the prevalence in Fukushima was significantly higher. In other words, 1 cancer was found out of 4,365 children in the control studies, whereas the highest rate found in one area of Fukushima was 1 out of 1,633.

In its critical appraisal of UNSCEAR 2013, the IPPNW made similar observations, writing that '…the cohorts [in Aomori, Yamanashi and Nagasaki] were not matched for age, sex or other demographic characteristics' and were 'not representative of the general population', being mainly students at institutions connected to national universities. It further commented that the examinations were said to be longer than those conducted at FMU. Additionally, IPPNW noted that in asserting that results from FMU were within normal bounds, UNSCEAR had not used the latest available results from FMU, and had quoted a Finnish study as showing a prevalence of clinically occult [i.e. asymptomatic] small papillary thyroid cancers of 35%. In fact, the study result was 27%, and it specifically found no thyroid cancers in minors under 18 years old. IPPNW concluded '[t]his fact is not mentioned by UNSCEAR, as it contradicts the screening effect hypothesis.'[42] Overall, while IPPNW held that the 33 cancers found by FMU at the time of its report can only show prevalence (total number) not incidence (rise in number year to year), the figure was 'worrying…with the numbers of detected thyroid cancers higher than expected.'[43]

FACT 2: FOUR YEARS

No Equipment and Not Looking

TV Asahi also spoke to the Deputy Director of a health clinic 10km west of Chernobyl who pointed out that they did not have ultrasound equipment until 1990. Thus, for the first four years, they were checking by hand. He agreed that it was possible that the cancers actually appeared earlier but were undetected. Tronko concurred, stating that the USSR did not have ultrasound equipment until around 1989-1990

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when doctors first received it from some wealthy American donors. This is critical because, as Sugenoya Akira (Mayor of Matsumoto in Nagano Prefecture who worked as a doctor in Belarus from 1996 to 2001) noted in the context of the Fukushima screening programme, 'lumps in children are hard to find by hand'.[44] It is therefore possible, as Tronko himself admitted in the broadcast, that the cancers appeared sooner than four years after the explosion but went undetected due to the lack of equipment. That is the second element to bear in mind.

Because *Hodo Station*'s revelation that the USSR had no ultrasound equipment until four years after Chernobyl casts great doubt on the validity of the four-year 'fact', one might reasonably expect to see it reported widely when time intervals are covered in the *Asahi*, the *Mainichi*, and the *Yomiuri*. Yet despite being the same corporation as *TV Asahi*, the *Asahi* newspaper only made mention, in one sentence, of the lack of equipment in the USSR in an article on 8 March 2014, three days before the *Hodo Station* broadcast. As if on cue, however, Suzuki Shinichi also popped up on the same page with his own short article. He denied that the thyroid cancers found in Fukushima were caused by radiation exposure because thyroid cancer progresses too slowly, and because the screening is unprecedented. He did not mention his four-year 'fact'. Curiously, the *Asahi* did not go on to cover the questions raised three days later in the show. But this was more than the *Yomiuri*, which made no mention whatsoever of the lack of equipment.

Ultimately, it was not the *Asahi*, but the *Mainichi* that reported the contents of the broadcast, albeit two months later on 12 May 2014, when Hino Kosuke published an article in which he discussed the show. He had appeared in it, arguing that Fukushima Prefecture was monopolizing information in an attempt to regenerate the population and revitalize industry. Additionally, the *Mainichi* had previously reported twice on the lack of ultrasound equipment in the USSR after Chernobyl. An article written on 13 August 2013 by Kamata Minoru, the head of Suwa Central Hospital in Nagano Prefecture, described Suzuki Shinichi's denial of a link based on the four-year 'fact' as an 'odd theory'. Kamata recalled that when he visited contaminated areas in Belarus four and a half years after Chernobyl, neither the state nor the doctors were focusing on thyroid cancer, let alone testing for it. But Kamata noticed an outbreak of thyroid cancer in a small village. He and others donated ultrasound equipment to a hospital and started examinations. About two years later, the WHO and IAEA finally recognized a link. Kamata concluded that '…it is possible that there were only a few thyroid cancers in children until four years after Chernobyl because they simply could not have been discovered [earlier] [my translation].'[45] Kamata had also published an article making the same argument in the *Mainichi* on 23 February 2013.[46] Therefore, not only was there no ultrasound equipment in the USSR until around 1990, many doctors were not even looking for thyroid cancers. Readers who were aware of the four-year 'fact' can ask themselves if they were also aware of the lack of both equipment and medical concern with thyroid cancer in the USSR after Chernobyl. It would not be surprising if many, like me, were not, because these crucial points are excluded from the official discourse.

Secret Knowledge on Thyroid Latency

Given Yamashita's work in Chernobyl one would be forgiven for wondering whether the assertion of the four-year 'fact' by Yamashita and Suzuki reflected the true extent of their knowledge. There is evidence to suggest that it does not. FMU's rebuttal of the *TV Asahi* broadcast (see below) argues that the average age of children diagnosed with thyroid cancer thus far (the end of December 2013) was 16.9

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years old, which is in keeping with normal patterns, whereas most cases after Chernobyl were in the 0-5 years old age range, and there was also no regional difference in detection rates within Fukushima. However, as an astute blogger argues,[47] thyroid cancers in children above 5 years old were found after Chernobyl within 4 years in the Gomel region of Belarus. Moreover, the findings were recorded by Yamashita Shunichi.

According to Yamashita's report, which includes data on thyroid cancers confirmed after operations based on age at the time of the accident, as available on the website of the Japan Atomic Energy Commission, there was one case in 1986 (13 years old), four cases in 1987 (11, 12, 14, 16 years old), three cases in 1988 (6, 8, 17 years old), and five cases in 1989 (1, 5, 14, 15, 16 years old). In 1990, when as we now know scanners finally arrived, the total jumps to 15 cases, concentrated in children below 5 years old, although 5 cases are for children above (6yrs (2), 8yrs (2), 13 years old). After that, total cases remain above 34 a year, peaking at 66 in 1997, with increased rates being found in children over five years old at the time of the accident in addition to the greater increase found in under fives.[48]

Thus, Yamashita was aware of eleven cases within four years in children over 5 years old compared to two cases in children aged 5 or under, and due to their close working relationship, it is likely that Suzuki was too. Yet neither have mentioned this. Furthermore, as Japan Focus contributor Ochiai Eiichiro notes, information of an almost immediate increase in thyroid cancers amongst children was reported by the Ukrainian government in 2011.[49] Ochiai writes that '[t]his continuous rise suggests that radiation sources other than the short-lived I-131, such as I-129 and Cs-137, may also be involved.' In other words, radioactive iodine may not be the only cause of thyroid cancers that started almost immediately, radioactive cesium may also be a cause.

Despite this, the FMU site has a pamphlet offering information about thyroid scans, published on 30 November 2012. In the greeting, Suzuki Shinichi states that an increase in thyroid cancer was witnessed in those who were infants at the time of the Chernobyl accident after four years.[50] The wording is subtle. It does not say that thyroid cancers started after four years, but that an increase started. The impression given, however, is that problem cases (for an 'increase' must be an increase above 'normal' levels) only appeared four years later. Therefore, any thyroid cancers found earlier in Fukushima cannot be radiation-related.

FACT 3: LOW EXPOSURE LEVELS

Outdated Data

Regarding Fukushima, Tronko commented that the probability that the thyroid cancers are connected to the accident is low because, as far as he knew, the radiation levels were too low. But he did not rule it out, and said it should be investigated. This raises the question of exposure levels. Tronko did not give a source for his assertion that the radiation levels in Fukushima were 'low', and this can be challenged. For example, Kyoto University nuclear physicist, Koide Hiroaki, writes that:

> *[c]esium-137 was one of the most dangerous radioactive materials to be dispersed by the atomic bomb dropped on Hiroshima. The amount of cesium-137 that was released into the atmosphere by Fukushima Daiichi's Units 1, 2 and 3 was 168 times that of the Hiroshima bomb, according to the Japanese government report to the International Atomic Energy Agency. This is an underestimate. Around 400 to 500 times the amount of cesium-137 dispersed by the Hiroshima atomic bomb has*

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> *since been dispersed into the atmosphere due to the accident at Fukushima Daiichi.*[51]

Consequently, Koide observes that around ten million people in the Kanto and Tohoku regions continue to live in areas that should, according to Japanese law, have been evacuated but were not. He adds that 'almost the same amount of radioactive material' has entered the ocean.

A more recent study conducted by a citizen's group (Yamada and Watanabe (2014)) argues that the amounts of radioactive materials released from the Fukushima incident were about the same or even higher than those from the Chernobyl incident.[52] However, Pavel P. Povinec, et al. (2013) re-evaluated the Fukushima data taking account of atmospheric release, contaminated stagnant water and the amount discharged into the ocean. They concluded that the total release of iodine-131 was 50% to 60% that of Chernobyl, and cesium-137 20% to 40%.[53] Yamada and Watanabe (2014) also suggest that the number of cancer cases in Fukushima would be greater than Chernobyl because the population density of Fukushima is about three times larger than that of the area affected by Chernobyl.[54]

Predicting the health effects of exposure to nuclear fallout is controversial, and one can find various figures, based on different assumptions, with independent scientists opposed to nuclear power often more pessimistic than official organizations. Whereas the WHO has restricted itself to ambiguous calculations of risk increases (see below), UNSCEAR's dose estimates if applied to standard risk models produce cancer estimates of between 2500-3000 excess cancers due to the first year of exposure, and 50 excess cancers for workers due to the first year and a half of exposure. Radiation biologist, Dr. Ian Fairlie, estimates 3000 excess *deaths* from cancer solely due to cesium on the ground ('ground-shine') in the next 70 years.[55] At the other end of the scale, and very controversially, Dr. Chris Busby of the European Committee of Radiation Risk (ECRR) used two different methods to estimate excess cancers. The first method was based on observations made by Swedish physician and scientist Martin Tondel after Chernobyl and predicted 224,223 excess cancers in the first 10 years. The second method used the ECRR model and estimated 416,619 excess cancers within 50 years, with 208,310 appearing in the first 10 years. Both methods were for people within 200km of the Daiichi plant and assumed permanent residence and no evacuation.[56]

Rather than general estimates, however, precise readings of individual exposure are preferable. *TV Asahi* showed that such readings were possible but that they were stopped by the prefecture. It interviewed Sakiyama Hisako, former senior researcher at the National Institute of Radiological Sciences, who was a member of the National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission (NAIIC) set up by the Japanese parliament to look into the disaster at Fukushima Daiichi. She observed that power was deployed to stop measurements of thyroid exposure being taken, citing a document sent from the Fukushima Emergency Response Headquarters to the Nuclear Safety Commission (NSC). It argued that monitors are too heavy to move, and that their use might cause anxiety amongst and discrimination against people involved. In other words, the authorities insisted that the real risk was psychological, not exposure to radioactive fallout. This argument continues to be the position of FMU.

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Sakiyama Hisako

TV Asahi also interviewed Professor Tokonami Shinji of Hirosaki University who tried to measure exposure levels immediately after the explosions. Early readings are important because radioactive iodine-131 only has a half-life of 8 days. He started taking measurements in Namie-machi but was halted by Fukushima Prefecture, which accused him of stirring up trouble. Tokonami recalled that there was a strange atmosphere in the research community at the time of the disaster. Although it was well known that thyroid tests should be taken, no one spoke up, let alone took action. The broadcast offered a representative from Fukushima Prefecture a chance to explain their position, but he only issued a vague denial that Tokonami had been stopped. There was no mention of the Diet Investigation Commission's findings that the NSC had faxed the Fukushima Nuclear Emergency Response Headquarters advising the dispensation of potassium iodide tablets, but the fax had mysteriously disappeared and did not reach local mayors. Consequently, only 10,000 Fukushima residents took iodide tablets.[57] In contrast, thousands of tablets were given to anxious staff at FMU, located 60 kilometers from Daiichi, and their children. FMU Vice President, pediatrician Hosoya Mitsuaki, had also wanted to distribute iodide to residents but was overruled by the prefecture, which handed the decision to Yamashita Shunichi who thought distribution unnecessary (see below).[58] The worries of the FMU staff were later found to have been justifiable. On 15 March, 1.9 million Bq per kilogram of iodine-131 were detected in weeds at the junction in front of FMU on highway 114.[59]

Not to be deterred, however, Tokonami went on to test 65 Fukushima residents one month after the explosions.[60] Although neither the Hirosaki University tests nor the FMU tests can account for iodine-132 which has a half-life of two hours, Hosoi Yoshio of the Research Institute for Radiation Biology and Medicine at Hiroshima University views Tokonomi's tests as more accurate than those conducted at FMU.[61] In all, Tokonami found radioactive iodine in the thyroids of 50 out of the 65 (77%). He then calculated the probable exposure levels assuming inhalation on 12 March 2011. He estimated the equivalent dose to the thyroid and concluded that 34 were under 20 mSv exposure, but 5 had been exposed to more than 50 mSv. The highest reading was 87 mSv, the second highest was 77 mSv. The highest reading for a child was 47 mSv. Tokonami commented that infants who remained in areas with high iodine levels may have been exposed to over 100 mSv.

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Tokonami Shinji

Although lower than the average thyroid exposure at Chernobyl, which according to UNSCEAR was 490 mSv, the level of 50 mSv is significant. In June 2011, the IAEA reduced the exposure level at which it advises potassium iodide tablets be distributed from 100 mSv to 50 mSv in equivalent dose to the thyroid. This was because the latest data from Chernobyl showed that the risk of thyroid cancer increased over 50 mSv.[62] In contrast, the WHO has, since 1999, set the limit at 10 mGy (for laypeople: 10 milligrays is equivalent to 10mSv)[63] for infants, children up to the age of 18, pregnant women, and women who are breastfeeding.[64] Consequently, the Japanese government lowered its guidelines from 100 mSv to 50 mSv in December 2011. Furthermore, whilst it had been a 'fact' that thyroid cancers were occurring only in children after Chernobyl, and so potassium iodide tablets were only advised for those under 40,[65] Hosoi noted that the latest epidemiological data shows that people over 40 years old were also affected.[66] Consequently, the Japanese government changed its guidelines in December 2012 to allow distribution of tablets to people over 40. Having said this, the government remains opposed to pre-distribution, namely assuring that residents in the vicinity of nuclear plants are able to maintain a stock at home, in violation of WHO guidelines, and is embroiled in a conflict with the governor of Niigata prefecture, Izumida Hirohiko, over this issue (amongst many others related to the Nuclear Regulatory Authority (NRA), the new safety standards, laws and emergency measures set up (or not) for restarts). Niigata hosts the world's largest nuclear plant, Kashiwazaki-Kariwa, where Unit 3 caught fire when pipes broke in 2007 due to an earthquake whose epicenter was 20km away.[67] The plant is currently closed but TEPCO is pushing for a restart in line with state policy.

In short, two 'facts' strongly asserted by 'experts' for the last 20 years or so have recently been found to be false, and so are suddenly 'facts' no more. People over 40 are vulnerable to radioactive iodine, and at a level half that previously considered acceptable by the IAEA.

FACT 4: MILK NOT INHALATION

Inhalation and Ingestion

In the Q&A section on its website, FMU declares that the radiation released at Fukushima Daiichi was roughly one seventh of that released at Chernobyl; that thyroid cancers after Chernobyl were not found to have been caused by external exposure and so it is highly unlikely that they will be caused by external exposure in Fukushima; and that thyroid cancers after Chernobyl were in 'many' cases caused by internal exposure.[68] It defines internal exposure as ingestion of contaminated products and concludes that because

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circulation of products after Daiichi was halted promptly it is highly unlikely that there will be any health effects. The final sentence is adamant: 'Therefore, at the present time, it is not thought that there are any adverse health effects on thyroids due to radiation.' There is no consideration of inhalation.

Despite dismissal of inhalation, Yamashita is aware that inhalation can cause thyroid cancer and was concerned about it. Yamashita initially advised FMU not to issue potassium iodide tables on 18 March 2011, stating, 'Many believe that potassium iodide pills will prevent thyroid cancer, but it is nothing but "iodine religion". For the Japanese, the intake of radioactive iodine would be 15 to 25%, unlike 40 to 50% for people in Belarus.'[69] In an article in the *Asahi* published on 21 March 2011, Yamashita argued that ingesting contaminated milk and food caused thyroid cancers at Chernobyl. In the previous paragraph, however, he considered the amount of radioactive iodine in the air in Fukushima and its effect on thyroids. While he held that levels of 100 μSv per hour were low, he stated that it was not advisable to allow infants to remain in those areas.[70] Furthermore, on 24 March 2011, Yamashita was quoted in the *Asahi* as advising the evacuation of infants and pregnant women from areas further than 30km from Daiichi if the radiation readings were high due to concern about effects on the thyroid from radioactive iodine.[71]

It now appears that Yamashita's increased concern was prompted on 23 March 2011 when he saw the SPEEDI estimates of contamination levels. SPEEDI is a computer system that predicts radiation releases based on radiation monitors and weather patterns. An 8 November 2013 article in the *Asahi* reports:

> *What surprised Yamashita was the SPEEDI simulation maps that the national government disclosed on March 23, 2011. At that time, the standard for taking potassium iodide pills was when the equivalent dose at thyroid was expected to reach 100 mSv. In the simulation maps, the areas where the equivalent dose would exceed 100 mSv extended far outside the 30-kilometer radius from the plant.*[72]

The paper quotes Yamashita as commenting, 'I thought 'oops!'.... I had thought a nuclear power plant in Japan was properly equipped with a filter or something to remove iodine and other nuclides. I never imagined such wide areas were contaminated.'[73] Nevertheless, as the blog that provides the above translation notes, ultimate responsibility lies with the central government and Fukushima Prefecture for not issuing tablets before the explosions and venting.

FMU's use of the milk argument to deny any possibility of thyroid cancers in Fukushima as having been caused by radiation thus appears to be sophistry. Furthermore, the 2012 WHO report includes inhalation as a 'pathway'. For example, it estimates that in the first year following the disaster, for Namie and Iitate, inhalation accounted for 60% and 50% of exposure in 10 year olds, 50% and 40% in 1 year olds, and 50% and 40% in adults.[74]

The FMU case seems to rest on the assumption of 'low levels' of radiation after the Daiichi explosions. But as indicated above, that assumption is questionable, not least because the initial measurements taken were far from reliable. For example, on 12 March 2011, the evening edition of the *Asahi* reported that all 8 onsite radiation monitors at Daiichi were broken and that TEPCO was relying on hand-held monitors.[75] Moreover, as *TV Asahi* showed, attempts to measure the more important individual exposure levels were stopped. And as noted above, Yamashita himself later admitted

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that iodide tablets should have been administered in certain areas but were not because he mistakenly advised against it.

What is more, the IPPNW recorded in its critical appraisal that the 2013 UNSCEAR report stated, 'there were insufficient measurements of gamma dose rate and of radionuclides in air during the passage of the radioactive plumes for an assessment to be made of external exposure based on environmental measurements.' Neither is it the case, contrary to FMU, that Japanese food regulations prevented exposure through ingestion. UNSCEAR also noted, 'relatively few measurements of foodstuff were made in the first months', adding that '[there was] insufficient information on the transfer of radionuclides to food as a function of time for foods produced in Japan.'[76] In fact, IPPNW observed that according to UNSCEAR's own estimates, children's thyroids in Fukushima were exposed to between 15 mGy (milligray) and 83 mGy in the first year following the disaster, 'as much as one half of which [arose] from the ingestion of radioactivity in food.'[77] Indeed, Professor Kodama Tatsuhiko, head of Tokyo University's Radioisotope Center, became a household name in Japan in August 2011 when he took Diet members to task for the government's half-hearted response on decontamination and food testing.[78]

IPPNW further noted that a normal annual exposure of the thyroid to background radiation is 1 mGy and referenced paragraph 213 of the UNSCEAR 2013 report. This means in the first year alone, thyroids of infants in Fukushima Prefecture were exposed to harmful radiation 15 to 83 times higher than natural background radiation. Using UNSCEAR's 2013 figures, which it holds as 'conservative', IPPNW calculated a total of 1016 thyroid cancers, mostly in children, in Fukushima Prefecture as a result of radiation exposure. In addition to the trauma and risks involved in invasive treatment and lifelong care, IPPNW reported that the US National Council on Radiation Protection and Measurements puts the fatality rate of thyroid cancer at 7%. This would mean around 70 deaths.[79] Yet this may well be a considerable underestimation, as the IPPNW suggested.

THE POLITICS OF SCIENCE

Underestimation and the Politics of International Organizations

In addition to domestic representatives like Yamashita and Suzuki, international bodies such as UNSCEAR and the WHO are authoritative and widely quoted participants in the debate over the possible health consequences of the TEPCO disaster. However, their involvement also appears to be heavily politicized. Keith Baverstock (University of Eastern Finland, and formerly the Regional Advisor for Radiation and Public Health at the WHO's Regional Office for Europe, see above) cautions that estimates of exposure levels made by UNSCEAR and the WHO are 'highly unreliable' and 'even fictional', with UNSCEAR being more a political body than a scientific one; it being comprised mainly of pro-nuclear 'experts', appointed by nuclear states, whose qualifications and potential conflicts of interest are not disclosed.[80]

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The neutrality of the WHO is also questionable given that it is contractually obligated to work with the IAEA on radiation issues under an agreement it signed in 1959 (WHA12-40). In his 20 November 2014 address to the Foreign Correspondents' Club of Japan, Baverstock reflected on his thirteen years experience at the WHO. He said he does not view the agreement itself as anything out of the ordinary, it being standard practice among UN bodies, but nevertheless holds the relationship between the WHO and the IAEA at the managerial level as a 'big distorting factor'. In short, the IAEA has a lot more money to spend and, according to Baverstock, WHO managers are more inclined to follow IAEA policy than the advice of their own specialists. Baverstock went on to comment:

> *...there was an international symposium at Fukushima city a few months ago...and the WHO spokesman there more or less said that the WHO had to take account of the economic aspects of nuclear power when deciding what was reasonable in terms of public health protection. That statement horrified and amazed me. It's not her job to look after the economic health of the nuclear power industry. It's her job to look after the public health of the population. So there is confusion there, and it seems to persist. The IAEA impeded the publication of the guidelines on iodine prophylaxis to prevent children on exposure to iodine-131 developing thyroid cancer based on what we learned from the Chernobyl accident. And the IAEA, after cooperating to produce those guidelines, withdrew their support and then tried to stop the WHO from publishing them* [he later noted they were eventually published around 2003].[81]

Perhaps as a reflection of this problem, the WHO was roundly criticized for a delay in investigating the heath affects of the 2003 Iraq invasion (genetic damage and cancer rates in Fallujah are higher than in atomic bomb survivors), and then for not considering depleted uranium (DU), lead and mercury as causes in an eventual 2013 report which denied any adverse effects, contrary to previous press releases (by the Iraqi Health Ministry with the WHO listed as having given assistance[82] even though it was originally touted as 'collaborative' and 'jointly funded').[83] Baverstock described the failure to consider depleted uranium as 'an important omission', stating that '[t]here is no doubt in my mind that the upper management of WHO failed to fulfill their obligations to examine the public health implications of DU.'[84] The WHO had in 2004 blocked release of a study led by Baverstock into the effects of depleted uranium. It remains classified.[85] Professor Susanne Soederberg, Canada research chair at Queen's University, concurred with Baverstock, 'I strongly believe that the WHO, like most international organisations, is not a neutral body, but is influenced by the geopolitical powers of its members...So, yes, there is a reason why a group of very smart scientists are not exploring the 'why' question in their study.'[86]

Regarding Fukushima, the 2013 WHO report calculated a 70% increase in thyroid cancer risk in females exposed as infants in the most contaminated areas. This sounds high, and was the highest increase in risk given, but is in fact a 0.50% increase on a baseline lifetime risk of 0.75%. In other words, the WHO estimates that under normal circumstances females have a three quarters of a percent chance of

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contracting thyroid cancer. The TECPO disaster increased this risk by half a percent for female infants in the most contaminated areas (a seventy percent increase), but their total lifetime risk is still extremely low, now being one and a quarter percent. The headline-grabbing conclusion was thus that '...the predicted risks are low and no observable increases in cancer rates above baseline rates are anticipated.'[87] Note use of the term 'observable' here, meaning 'statistically observable' (see above).

Moving outside the UN, neither is the International Commission on Radiological Protection (ICRP) immune to political pressure. This body produces the exposure levels on which many government policies are based and on which the UN bodies rely. There is controversy over applicability of the models the ICRP produce.[88] Reporting on the findings of the Diet's Independent Investigation Commission, Sakiyama Hisako writes that the Japanese Federation of Electric Power Companies (FEPC) '...lobbied radiation specialists, including International Commission on Radiological Protection (ICRP) members and the NSC, to relax radiation protection standards. Unfortunately, many radiation specialists in Japan are obedient subjects of the organizations to which they belong, and one document noted that all FEPC's lobbying demands were reflected in the ICRP's 2007 recommendations. One of the ways the FEPC achieved this was by covering the travel costs for ICRP members attending international conferences.'[89] Or to put it more directly - good old-fashioned bribery.

Secret Meetings and the Politics of the Oversight Committee

Political behaviour amongst scientific bodies studying the TEPCO disaster is not only present at the international level, but is also present at the domestic level. Hino Kosuke disclosed 'secret meetings' of the Oversight Committee in articles published in the *Mainichi* on 3 October 2012 (a joint article written with a colleague) and 9 February 2013. The first article revealed that the 'secret meetings' were held in the prefectural office. The meetings stage-managed scenarios that might arise in the main public meetings to ensure that everyone agreed that there was no link between thyroid cancers and radiation exposure. After being challenged by the *Mainichi*, Fukushima Prefecture explained that their aim had been to avoid confusion and therefore anxiety amongst residents, but agreed that it was inappropriate and so would stop.[90] The second article revealed that whilst in public the committee had called for checks to be made on evacuees outside Fukushima Prefecture as soon as possible, in the 'secret meetings' it had been agreed to slow them down.

The reason for delay was not clear. Suzuki Shinichi had apparently called for the checks to be slowed down because he said there was a lack of specialists outside Fukushima, stating that the tests should be moved to Fukushima if possible. However, in public, Suzuki had stated in April 2012 that preparations were being made to start in May 2012. In the end, the system was not installed until November, and clinics outside Fukushima reported that they had not been approached by FMU until between the end of March 2012 and the beginning of June 2012. There had also been efforts made to redact references to internal exposure from the minutes of the meetings before public release.[91] This reluctance to extend programmes outside Fukushima Prefecture was later reflected in an expert meeting held by the Environment Ministry on 25 June 2014. According to *Our Planet TV*, specialists who had taken the government's side in a court case aimed at widening official classification of *hibakusha* (from Hiroshima and Nagasaki) led the way in raising concerns about extending health checks outside Fukushima.[92]

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A Political Response to TV Asahi

As shown above, *TV Asahi* raised some tough questions. This included a segment, not shown above, about parents unhappy with the treatment of their children under the screening programme. The criticisms did not go unnoticed and were met with an alarming response. In his article on 12 May 2014, Hino explained how both FMU and the Environment Ministry had published reactions on their homepages to the *Hodo Station* broadcast, although neither organization accused *TV Asahi* of making inaccurate claims.[93] The Environment Ministry had also sent its disagreement directly to *TV Asahi*. Stating that the broadcast 'risks misunderstanding', the substance of their rebuttals was simply a restatement of their positions. They justified their unusual intervention on the basis of having received inquiries from members of the public.

Hino quoted Professor Yamada Kenta from Senshu University, a specialist in speech laws, as commenting, 'It is clear from the Environment Ministry's statement that the [show's] criticism was not intentionally biased in one direction. One gets the strong impression that no criticism of an important government policy like nuclear power will be allowed, and that there will be absolutely no concessions made [my translation].' Hino also reported that in April, the Special Secrets Law Countermeasures Defence Council, a group of lawyers concerned about the new secrecy laws, sent a response to the Environment Ministry, on the basis that the ministry's statement 'risks misunderstanding', and accused it of attempting to limit the activities of the media and of threatening the people's right to know.[94] The ministry's actions, coming as they do before the secrecy laws take effect, do not bode well for the future of open critical discussion in Japan.

CONCLUSION

There is an official discourse that denies any link between the thyroid cancers being found under the FMU screening programme and exposure to radioactive fallout from TEPCO's Daiichi nuclear reactors. Yamashita Shunichi and Suzuki Shinichi have been key proponents of this discourse. They have repeatedly asserted that the thyroid cancers being found in Fukushima are due to the 'screening effect'; that thyroid cancers did not appear in Chernobyl until four years after the accident; that the radiation levels in Fukushima are low both in absolute terms and compared to Chernobyl; and that thyroid cancers after Chernobyl were caused by the ingestion of milk, but Fukushima children did not ingest radiated milk and were therefore protected.

Having also heard that it took four years for thyroid cancers to appear after Chernobyl, I surveyed the top three news publications in Japan, namely the *Asahi*, the *Yomiuri* and the *Mainichi*, to see how widely this 'fact' was reported between 11 March 2011 and 30 June 2014. I found that a time interval of '4-5 years' accounted for 58% of references in the *Asahi*, and for 48% in the *Mainichi*. The most common time interval in the *Yomiuri* was '5 years', accounting for 37%. With one exception in each newspaper, all other references were over 5 years, baring a couple of vague references to 'several years'.

Having established that the four-year 'fact' was being consistently relayed to the public in the corporate press, I went on to discuss information, including that presented in a *TV Asahi* news report, which undermined this 'fact'. I showed that doctors did not receive ultrasound equipment in the USSR until around four years after the Chernobyl accident. Thus for the first four years, examinations were done by hand, a highly unreliable method that misses small growths. Furthermore, because it was thought at that time that thyroid cancers could not appear until eight years after exposure to radiation, based on the Life Span Study of

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Hiroshima and Nagasaki A-bomb survivors, many doctors were not even looking. When increased numbers of thyroid cancers started to be reported after four years, the initial reaction in the official discourse was to dismiss the reports as representing the 'screening effect'. This dismissal was subsequently found to be false.

Regarding Fukushima, I reported the conclusion of epidemiologist Tsuda Toshihide that the data from FMU contains regional clusters that cannot be explained by the 'screening effect'. Although the official discourse maintains that the control groups outside Fukushima demonstrate that the Fukushima results are not unusual, both Tsuda and IPPNW point out that the cohorts are not comparable. Tsuda also argues that if one adjusts for age, then one cancer out of 4,365 children outside Fukushima is significantly lower than the highest rate found in one area of Fukushima, namely one out of 1,633. While the extent to which there is a 'screening effect' is impossible to establish without access to the information on symptomatic cases being held at FMU, the refusal to release it hardly suggests confidence in the integrity of the data purportedly underlying the hypothesis. If the 'screening effect' is accurate, however, then FMU may have been conducting unnecessary operations.

Despite Suzuki and Yamashita's insistence on a four-year incubation period, the latest knowledge on thyroid cancer from the US National Academy of Sciences is that thyroid cancer can appear in minors after one year of exposure to ionizing radiation, and in adults after two and a half years. Thyroid cancers resulting from exposure to ionizing radiation are also particularly aggressive, as discovered after Chernobyl and reconfirmed in a recent study published in the journal *Cancer*. In fact, there is evidence that thirteen thyroid cancers appeared in Belarus under four years after Chernobyl and Yamashita himself recorded these cases. More recently, in 2011, the Ukrainian government also reported almost immediate cases of thyroid cancer after Chernobyl.

It also appears that adults can be affected at half the exposure level previously said by the IAEA to only affect people under forty. Due to the latest data from Chernobyl, in 2011 the IAEA reduced the exposure level for potassium iodide tablets from 100 mSv to 50 mSv and the Japanese government followed suit, allowing people over 40 to receive tablets, although it rejects pre-distribution in violation of WHO guidelines. Furthermore, the WHO has, since 1999, set the limit at 10 mGy for infants, children up to the age of 18 years, pregnant women, and women who are breastfeeding. These exposure levels may or may not be underestimates, but the point is that an important 'fact', on which government policy was based, has recently changed into a falsehood.

Another false argument is that because contaminated milk was the cause of thyroid cancers at Chernobyl, children in Fukushima are safe because Japan had strict food regulations. In reality, UNSCEAR found that Japanese food regulations were inadequate at best, and the WHO recognized inhalation as a 'pathway' for children in Fukushima. The related argument that radiation levels in Fukushima were low is also dubious. Yamashita admitted that he was wrong to advise against the dispensation of potassium iodide tablets. When he saw the SPEEDI data he realized he had made a mistake. In contrast, the staff of FMU received iodide tablets, and high radiation levels were later detected near the university. Furthermore, the Diet's Fukushima Nuclear Accident Independent Investigation Commission found that the NSC had advised issuing iodide tablets but the fax it sent vanished and its advice was not followed in most localities. Recent research indicates that radiation releases from Daiichi may be as high

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or higher than after Chernobyl.

Grave doubts over exposure levels only remain because individual exposure levels were not recorded at the time when they should have been. When Tokonami Shinji attempted to take measurements shortly after the explosions the prefectural authorities stopped him. Data that he did manage to garner about a month later show exposure levels over the 50 mSv threshold currently held by the IAEA. Additionally, UNSCEAR estimates thyroid exposure levels of up to 83 mGy, which is 83 times the normal annual thyroid exposure dose from background radiation of 1 mGy as noted by IPPNW. Using UNSCEAR's 2013 figures, IPPNW calculates 1016 thyroid cancers, mostly in children, with around 70 deaths.

Denialists like Suzuki and Yamashita have not only been promoting false arguments, they have also been taking aggressive political action through involvement in 'secret meetings', in failing to disclose knowledge about Chernobyl, and in failing to disclose data on symptomatic cases in Fukushima that may undermine the 'screening effect' hypothesis. Unfortunately, this kind of political behavior is also present in authoritative international bodies such as the ICRP (taking bribes), the IAEA (an openly pro-nuclear organization), the WHO (delaying an ultimately inadequate investigation of depleted uranium in Iraq; subservience to the IAEA), and UNSCEAR (staffed largely by representatives from pro-nuclear states who are not required to declare qualifications or possible conflicts of interest). Their unfailingly optimistic pronouncements are open to criticism in light of other independent research.

One frequent oversight is that, as the US National Academy of Sciences shows, females are more vulnerable than males, and children more than adults. Steven Starr notes that these differences are often left out of risk models. Thyroid cancer may be an exception, however, with Shimizu Kazuo noting elevated rates amongst male children in Fukushima, as found after Chernobyl. Another frequent oversight, as Tsuda and IPPNW highlight, is to assert that there will be 'no observable increases' (WHO) or 'no discernible changes' (IAEA). These conclusions inevitably dominate the media headlines conveying the impression that there is no problem. In actuality, this does *not* mean there will be no increases, but serves to hide those that do occur under the concept of 'statistical significance'. Neither do these observations take account of accelerated disease, which is a real concern for people affected because they die earlier than they otherwise would have. Indeed, official and independent estimates of general excess cancers vary from a couple of thousand to hundreds of thousands. While the differences are huge, and one can point to a pronuclear/antinuclear divide, the point is that none actually predict an absence of health effects, the UNSCEAR and WHO headlines notwithstanding. This contradicts the official FMU position that is only concerned with an increase in 'anxiety'.

In short, information management to prevent 'anxiety', which is an emotional state that can lead to calls for accountability and challenges to entrenched systems of power, has taken precedence over open and honest investigation that might threaten vested interests. It is highly unlikely that authorities will be forthcoming about the extent and nature of the health effects caused by radiation because unfavourable findings would undermine the state's nuclear energy policy, a policy that stubbornly persists even in the wake of the continuing forced evacuation of around 160,000 people and the continued inability to bring Daiichi under control; the destruction of individual livelihoods and whole communities; the contamination of air, water, soil, sea, crops, marine life, cattle and wildlife, all of these especially devastating in an agricultural area dependent on farms and fisheries; deaths

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during evacuation,[95] and from suicide after evacuation;[96] possible deaths due to the prevention of rescue teams from entering the exclusion zone to find and treat people trapped in rubble after the earthquake and tsunami;[97] and health and family problems due to stress and inactivity amongst evacuees (not just from the power plant), such as obesity among children, child abuse, deaths in isolation, and domestic violence.[98] As if that were not enough, hundreds of thousands of children are now undergoing the trauma of ongoing screenings, with tens of the unluckiest ones facing surgery, elevated health risks and lifetime medicine dependency.

I should, however, end by noting that while thyroid cancer has received the most attention, probably because it is the only post-Chernobyl disease recognized by the main international bodies (who in turn probably focus on it in part because it is relatively nonfatal), there are many local accounts of other apparently Chernobyl-related health issues in children in Belarus and the Ukraine, including leukemia, heart disease, lowered immunity, lowered birth rates, increased mortality rates, strokes, high blood pressure, and chronic fatigue.[99] Whether these problems will materialize, or have already materialized, in Japan is an open question beyond the scope of this article,[100] but one should be on one's guard against those who hide any such developments under a politically motivated veil of 'statistical significance' to support a hubristic discourse of absolute denial.

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Notes

[1] *Asahi Shimbun* (10/10/2011).

[2] *Asahi Shimbun* (12/9/2012); *Yomiuri Shimbun* (12/9/2012); *Mainichi Shimbun* (12/9/2012).

[3] The Third International Expert Symposium in Fukushima: Beyond Radiation and Health Risk ~Toward Resilience and Recovery; Thyroid cancer diagnosed in 104 young people in Fukushima

[4] *Asahi Shimbun* (14/2/2013).

[5] For a recording of some of these comments with English subtitles see: this video. Also see: Dr. Shunichi Yamashita, Radiation Advisor to Fukushima: "Fukusima Will Be World-Famous! It's Just Great!"

[6] *Asahi Shimbun* (7/11/2013); *Asahi Shimbun(* 8/11/2013). For an English translation and discussion, see here.

[7]For example, see: Fukushima residents dissatisfied with children's thyroid cancer screenings and Fukushima disaster panel so far reports three young people have thyroid cancer

[8] For an example from Suzuki, see: *Asahi Shimbun* (6/6/2013). For an example from Yamashita, see here.

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[9] For an example from Suzuki, see: *Asahi Shimbun* (6/6/2013). For an example from Yamashita, see: *Yomiuri Shimbun* (9/3/2013).

[10] *Asahi Shimbun* (10/10/2011).

[11] Regarding the third and fourth points, for an example from Suzuki, see: *Yomiuri Shimbun* (8/7/2012). For an example from Yamashita, see: *Yomiuri Shimbun* (18/12/2011).

[12] For an example from Suzuki, see: *Yomiuri Shimbun* (10/10/2011). For an example from Yamashita, see: *Mainichi Shimbun* (12/10/2011).

[13] *Mainichi Shimbun* (Osaka 7/6/2013).

[14] *Hodo Station*, TV Asahi (19/5/2014)

[15] 日本ABC協会「新聞発行社レポート　半期」2013年7月～12月平均　※朝刊セット版部数は、日本ABC協会「新聞発行社レポート　半期」（2013年7月～12月平均）と社内資料から算出 (last accessed 21 July 2014)

[16] New York Times About Page (last accessed 21 July 2014)

[17] *Yomiuri Shimbun* (Nishibu 28/11/2012); 9th Takashi Nagai Memorial Nagasaki Peace Award Profile of the Recipient

[18] V. Beral and G. Reeves (1992) 'Childhood thyroid cancer in Belarus', *Nature*, 359; I. Shigematsu and J.W. Thiessen (1992) 'Childhood thyroid cancer in Belarus', *Nature*, 359; E. Ron, J. Lubin and A.B. Schneider (1992) 'Thyroid cancer incidence', *Nature*, 360.

[19] *Mainichi Shimbun* (20/4/1991)

[20] The Herald Sun (21/4/1992)

[21] The New York Times (3/9/1992)

[22] The Independent (3/9/1992)

[23] The nuclear industry should fund an international foundation to learn from Chernobyl - PMC

[24] Minimum Latency & Types or Categories of Cancer

[25] Thanks to Norma Field for that observation.

[26] Critical Analysis of the UNSCEAR Report "Levels and effects of radiation exposu - re due to the nuclear accident after the 2011 Great East-Japan Earthquake and tsunami"

[27] International Team Studied Children and Teens Exposed After Chernobyl

[28] National Academy of Sciences (2006), Health Risks From Exposure to Low Level Radiation, BEIR VII Phase 2, (p.7).

[29] Steven Starr (2014) 'The Contamination of Japan with Radioactive Cesium', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

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[31] OurPlanet TV

[32] リンパ節転移が多数～福島県の甲状腺がん; 福島県の甲状腺検査のやり方を見直してほしい、と私が発言した理由

[33] 甲状腺がんの子供「原発影響考えにくい」　福島の検査で学会; Details of Fukushima Thyroid Cancer Cases Revealed at the Japan Society of Clinical Oncology Meeting

[34] *Asahi Shimbun* (13/3/2012)

[35] *Mainichi Shimbun* (12/10/2011)

[36] For a transcript, see: Environment Ministry's

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Eighth Expert Meeting On Health Support After The Fukushima AccidentFor video, see: Our Planet TV. For Tsuda's materials see: here.

[37] Akzente Unscear 2014 (p.13)

[38] Akzente Unscear 2014 (p.15)

[39] Keith Baverstock: "2013 UNSCEAR Report on Fukushima: A Critical Appraisal"

[40] Sander Greenland (2012) 'Underestimating effects: Why causation probabilities need to be replaced in regulation, policy, and the law', *Bulletin of the Atomic Scientists*, 68:76.

[41] Thyroid Ultrasound Findings in Children from Three Japanese Prefectures: Aomori, Yamanashi and Nagasaki

[42] Akzente Unscear 2014 (p.17)

[43] Akzente Unscear 2014 (p.17)

[44] *Yomiuri Shimbun* (15/4/2012).

[45] *Mainichi Shimbun* (13/8/2013)

[46] *Mainichi Shimbun* (23/2/2013)

[47] 【緊急特集】最新の福島県小児甲状腺がん患者数×山下俊一の原罪

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[49] Eiichiro Ochiai, (2014) *Hiroshima to Fukushima: Biohazards of Radiation*, Springer, Heidelberg: 164.

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[51] Hiroaki Koide (2014) 'Living in a Contaminated World', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

[52] Kosaku Yamada and Etsuji Watanabe (2014) 'The amount of radioactive material released from Fukushima accident was more than twice of that from Chernobyl accident'

[53] Pavel P. Povinec, Katsumi Hirose, Michio Aoyama, (2013) *Fukushima Accident – Radioactivity Impact on the Environment*, Elsevier.

[54] Thanks to Eiichiro Ochiai for this information.

[55] Ian Fairlie (2014) 'The Initial Health Effects at Fukushima', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

[56] The Low Level Radiation Campaign

[57] Hisako Sakiyama (2014) 'The Findings of the Diet Independent Investigation Committee', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

[58] For translation and analysis see Yuri Hiranuma's blog.

[59] 「福島第一原子力発電所及び福島第二原子力発電所周辺の緊急時モニタリング調査結果について（3月11日～15日実施分）」の一部訂正について

[60] *Asahi Shimbun* (9/3/2012)

[61] Asahi Shimbun (9/3/2012)

[62] Asahi Shimbun (9/3/2012); Asahi Shimbun (18/8/2011).

[63] Thanks to Eiichiro Ochiai for the conversion.

[64] *Asahi Shimbun* (8/12/2011)

[65] *Asahi Shimbun* (26,12,2012); *Asahi Shimbun*

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(19/7/2013); *Yomiuri Shimbun* (16/3/2011)

[66] *Asahi Shimbun* (1/12/2012)

[67] Foreign Correspondents Club

[68] Thyroid Examination - Fukushima Mimamori

[69] Dr. Shunichi Yamashita: I thought, "Oops..." After Seeing the SPEEDI Simulation Map on March 23, 2011

[70] *Asahi Shimbun* (21/3/2011)

[71] *Asahi Shimbun* (24/3/2011)

[72] Dr. Shunichi Yamashita: I thought, "Oops..." After Seeing the SPEEDI Simulation Map on March 23, 2011

[73] Ibid.

[74] See pages 46-7, Preliminary dose estimation

[75] Asahi Shimbun (12/3/2011)

[76] Akzente Unscear 2014 (p.13)

[77] Akzente Unscear 2014 (p.16)

[78] Scientist Lambastes Lawmakers Becomes youTube Star

[79] Akzente Unscear 2014 (p.16-17)

[80] Kagaku Baverstock 2014 (p.3-5)

[81] Keith Baverstock: "2013 UNSCEAR Report on Fukushima: A Critical Appraisal"

[82] Summary report on congenital birth defects study in Iraq

[83] Congenital birth defect study. For a detailed account see: 'Damning Evidence' Becomes 'No Clear Evidence': Much-Delayed Report On Congenital Birth Defects In Iraq

[84] WHO's Iraq Birth Defect Study Omits Causation

[85] WHO Refuses to Publish Report on Cancers and Birth Defects in Iraq Caused by Depleted Uranium Ammunition

[86] WHO's Iraq Birth Defect Study Omits Causation

[87] Global report on Fukushima nuclear accident details health risks

[88] The gist is that critics argue that ICRP models are inappropriate for exposure to fallout because they do not include internal exposure and are based on the flawed atomic bomb studies.

[89] Hisako Sakiyama (2014) 'The Findings of the Diet Independent Investigation Committee', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

[90] *Mainichi Shimbun* (3/10/2012)

[91] *Mainichi Shimbun* (9/2/2013)

[92] OurPlanet TV

[93] Fukushima Radiation and Health; Ministry of the Environment Report

[94] *Mainichi Shimbun* (12/5/2014).

[95] Hisako Sakiyama (2014) 'The Findings of the Diet Independent Investigation Committee', in Caldicott, H. (ed) Crisis Without End: The Medical And Ecological Consequences Of The Fukushima Nuclear Catastrophe, The New Press: New York.

[96] TV Asahi, *Hodo Station*, (25/8/2014)

[97] Yoshioka, Hitoshi (2011) Genshiryoku no shakaishi – sono nihonteki tenkai, Asahi Shimbun Suppan, Tokyo: 373-4.

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[98] For accounts of suicide, abuse, deaths in isolation, and domestic violence see, *Asahi Shimbun* 01/03/2012; *Asahi Shimbun* 11/09/2013; *Asahi Shimbun* 14/03/2014. For an account of obesity amongst children, see *Keizai Shimbun* 13/12/2013.

[99] See Ochiai (2014) or Caldicott (2014) for detailed accounts.

[100] There is some tentative data on possible negative changes in health trends following the disaster, see Ochiai (2014: 173-80).

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