Fukushima Thyroid Examination Fact Sheet:

February 2016 by Yuri Hiranuma, D.O.

On October 9, 2011, Fukushima Prefecture began the Thyroid Ultrasound Examination (TUE), part of the Fukushima Health Management Survey (FHMS)[1,2], on about 360,000 residents age 18 or younger at the time of the triple disaster of the earthquake, tsunami, and nuclear accident on March 11, 2011. As the exposure to radioactive iodine dramatically increased the incidence of childhood thyroid cancer cases after the 1986 Chernobyl nuclear accident, TUE was implemented to monitor the exposed children in Fukushima Prefecture. The majority of Fukushima residents did not receive iodine tablets to protect their thyroid glands against radioactive iodine.

TUE consists of a thyroid ultrasound screening and, if necessary, an examination including more detailed ultrasound examinations and urine/blood testing and possible fine needle aspiration cytology (FNAC) when warranted. When FNAC results are suspicious for cancer, surgical excision and pathological examination of the thyroid gland are necessary to confirm the definitive diagnosis of thyroid cancer. The first round of TUE was scheduled to be conducted from October 9, 2011 through March 31, 2014, with each fiscal year from April to the following March covering residents from a set of municipalities grouped according to the air dose level of radiation. The second round was scheduled to begin in April 2014, immediately after the first round was completed, including children who were in utero as well as not conceived at the time of the accident.

What has drawn the most attention so far is the number of cancer cases. Table 1 below shows the most recent results[3] (data as of December 31, 2015) released on February 15, 2016.

Screening round	Number of suspicious FNAC cases	Number of surgical cases	Number of confirmed cancer cases	Papillary thyroid cancer	Poorly differentiated thyroid cancer
1st (complete)	*116	*101	100	97	3
2nd (ongoing)	51	16	16	16	0
Total	*167	*117	116	113	3

*One case was post-surgically confirmed to be benign nodule.

Although it is not appropriate to compare prevalence obtained by a general population screening and incidence based on clinical diagnosis, as a reference the 2010 national incidence[4] estimated in Japan for thyroid cancer in age 0-19 was 3.3 per million[5]. Assuming all the suspicious FNAC cases are to be confirmed as cancer, excluding the single case surgically confirmed to be a benign lesion, the first round screening data yields a prevalence of 333 per million (100 cancer cases per 300,478 participants) for both sexes for thyroid cancer in those 0-18 years old at the time of the accident,. (However, the estimated incidence significantly increases with age, as shown in Table 2 below, from 1.2 per million for age 10-14 to 11.2 per million for age 15-19, or even 31.1 per million for age 20-24, and about half of the Fukushima cases are over age 18 at diagnosis).

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Table 2: Thyroid cancer incidence rate in Japan by age and sex in 2010 (per million): calculated from 2010 cancer statistics and population by age and sex in Japan[6].

Age / Sex	0-4	5-9	10-14	15-19	20-24	Average for 0-19
Male	0	0	0	3.9	12.2	1.0
Female	0	0	2.4	19.0	50.6	5.6
Both	0	0	1.2	11.2	31.1	3.3

The official explanation for the surprisingly high number of thyroid cancer cases is the screening activity by highly sophisticated ultrasound equipment[7]. Radiation effect is considered unlikely given the Chernobyl precedence, such as the latency (it took four years for Chernobyl childhood thyroid cancers to appear), the low exposure dose and the lack of cases in young children (many of the Chernobyl cases were younger than five at exposure). However, comparing the outcome to Chernobyl may be questionable since no widespread screening was conducted immediately after the Chernobyl accident, and cases in children younger than five did accelerate four years after the accident when symptomatic cases began occurring. Furthermore, actual exposure doses are unclear due to the large uncertainties and the limited number of direct measurements taken under the condition of high background levels of radiation.

The first epidemiological analysis[8] of the publicly available data by a group of Japanese researchers was published in October 2015, reporting excess occurrence of thyroid cancer in Fukushima unlikely to be due to screening, therefore more likely to be due to radioactive iodine exposure though another source cannot be absolutely ruled out. This study was very controversial and received multiple counterarguments in the form of letters to the editor[9]. Interestingly, another group of Japanese researchers also admit excess occurrence but attribute it to overdiagnosis[10].

<u>The focus on the claim of screening effect and overdiagnosis by officials overlooks some important concerns</u>:

1) There are unofficial reports of increased childhood thyroid cancer cases in neighboring prefectures[11];

2) Clinico-pathological features of the operated cases[12] indicate aggressive features of some of the cases, suggesting it is not chance detection of tumors that might have stayed dormant if it were not for the screening activity;

3) Majority of the suspicious FNAC cases in the second round had no ultrasound findings with malignant potential in the first round[13], suggesting a new onset of cancer.

Regrettably, no comprehensive expert analysis has been conducted to date, encompassing different disciplines such as radiation biology, radiation protection and clinical medicine, and incorporating the evolving knowledge and latest scientific evidence regarding the low dose radiation effect.

The problem of radiation-induced thyroid cancer in childhood might be one of the most contentious and politically polarizing issues of the TUE and radiation health effects. It is important to maintain a balanced view on existing and emerging data, while making sure the suffering of children and their families is not magnified by the deficiency in public health measures.

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1 http://fmu-global.jp/fukushima-health-management-survey/
2 http://www.clinicaloncologyonline.net/article/S0936-6555%2816%2900004-2/fulltext
3 http://fukushimavoice-eng2.blogspot.com/2016/02/fukushima-thyroid-examination-february.html
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