

Disease Control and Prevention” therein. This source is for policy making, not for scientific research. The author states “However, the National Academy of Sciences has reported that childhood cancers have a period of 1 to 10 years. Therefore, based on the best available scientific evidence and the following methodology presented in this revised *White Paper on Minimum Latency and Types or Categories of Cancer*, the administrator selected a minimum latency of 1 year for use in the evaluation of cases of childhood cancer for certification in the WTC Health Program....”

I would be happy if the present letter might help readers correctly understand the results presented in the last column of Table 2.

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To the Editor:

Tsuda et al.¹ reported the current findings of a large-scale thyroid disease screening program in Fukushima Prefecture, Japan, following the release of radionuclides, in particular iodine-131, from the accident at Fukushima Dai-ichi nuclear power station in March 2011. They suggest that these findings indicate an increase in cases of thyroid cancer that is attributable to the accident. We

were members of an International Expert Working Group established by the World Health Organization to perform an initial assessment of the health consequences of the Fukushima Dai-ichi accident,² and we have serious concerns over this interpretation of Tsuda et al.¹

Thyroid disease screening with ultrasound can have a dramatic effect on the detection of thyroid nodules. A 15-fold increase in the incidence of thyroid cancer occurred in South Korea after the introduction of a national cancer screening program in 1999, with the incidence rate in regions increasing in direct proportion to the percentage of screened people.³ Consequently, it is inappropriate to compare the data from the Fukushima screening program with cancer registry data from the rest of Japan where there is, in general, no such large-scale screening. The proper comparison is between different screened areas within Fukushima Prefecture, since significant radioactive contamination from the accident was confined to a relatively small part of the prefecture.

There is no statistically discernible difference in thyroid cancer prevalence between the low, intermediate, and high contamination areas of Fukushima Prefecture. The prevalence ratio for the highest to lowest contamination areas was 1.08 (95% confidence interval [CI]: 0.60, 1.96), and the highest prevalence was seen in the area with an intermediate level of contamination (prevalence ratio = 1.21 [95% CI: 0.80, 1.82]). Furthermore, the measured levels of radioactivity in thyroids in Fukushima Prefecture were far lower⁴ than would be needed to

elevate cancer rates as much as Tsuda et al.¹ claim.

The situation in areas of the former USSR heavily contaminated following the Chernobyl accident in 1986 is of relevance here: in these areas, many children received high thyroid doses (much higher than those following the Fukushima accident) and there is a clear and large excess of thyroid cancer in this group. The thyroids of 13,127 Ukrainians, 17 years old or younger at the time of the accident, were screened between 1998 and 2000.⁵ Based on this study, 105 (95% CI: 30, 258) background cases of thyroid cancer would be expected from the first screening in Fukushima prefecture.⁶ The good agreement between this point estimate and the number of 112 cases that has been detected up to the end of March 2015 in Fukushima Prefecture¹ does not permit the inference that an effect of radiation exposure has been demonstrated. A more plausible conclusion is that the screening program is finding an anticipated increase in thyroid cancer detection across the prefecture.

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Drs. Wakeford and Kesminiene have received research funding from the European Commission. Dr. Wakeford has received a grant from Children with Cancer UK (current) and is a Member of Technical Working Party of UK Compensation Scheme for Radiation-linked Diseases (current). He has served as consultant to US Electric Power Research Institute (past), Horizon Nuclear Power Ltd (past), and the UK Treasury Solicitor (past).

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OPEN**To the Editor:**

Dr. Tsuda and colleagues¹ analyzed statistical reports of the Fukushima Health Management Survey published by the Fukushima prefectural government, and obtained markedly higher incidence rates of thyroid cancer in Fukushima Prefecture compared with the rate for all of Japan. Regrettably, their analysis has a serious methodological error regarding the prevalence pool with the 4-year duration.¹

They assumed a steady prevalence pool² of thyroid cancer cases detected by screening in Fukushima with using the definition of the "latent duration," which

is the time period from the date when a case of thyroid cancer became detectable by screening and cytology ("detectable by screening" hereafter) to the date when the thyroid cancer could be diagnosed in a clinical setting without screening or the date of operation ("detectable clinically"), using the duration of 4 years as the maximum length between the nuclear accident and the cancer detection.

This assumption implies that the cancer in all cases became detectable by screening at or after the nuclear accident, and that all of these cancers progressed enough to be detected clinically within 4 years. However, both of them are unreasonable. They ignored two important possibilities: (1) the date at which a patient's cancer becomes detectable by screening (which is usually unknown) might have preceded the nuclear accident, and (2) the slow growing nature of thyroid cancer³ might cause many slowly progressing cases to remain in the pool. That is, the equilibrium of the pool within 4 years does not hold anymore. Thus, their incidence rate of the clinically detected cancer in Fukushima as the numerator of the paper's incidence rate ratio—which is the essential index in the paper—is severely overestimated.

The Fukushima Health Management Survey was commissioned by Fukushima Prefecture and has been conducted by the Radiation Medical Science Center for the Fukushima Health

Management Survey at Fukushima Medical University since June 2011. With the efforts of over one hundred of the Center's personnel, the results of the survey have become freely available on our website (<http://fmu-global.jp>) to ensure attention and transparency and to enable further examination of these findings.

As Professor Scott Davis noted regarding the screening for thyroid cancer after the Fukushima accident,⁴ "it should be of no surprise that a number of study designs and approaches have been tried, largely driven by the data available." For the analyses, special attention should always be placed on the inherent limitations of the study.

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The Authors Respond:

We read with great interest the Davis commentary¹ and the seven letters^{2–8} in response to our article.⁹ We thank the editors for the opportunity to respond to them. Due to the space limitation, we herein discuss four points raised, using data from the non-Fukushima exposed populations^{10–14} as well as the unexposed.^{15–19}

The authors report no conflicts of interest.

Co-author Kenneth E. Nollet has, in the past 36 months, received travel support from the American Red Cross, the Radiation Injury Treatment Network, the International Atomic Energy Agency, the OECD Nuclear Energy Agency, and the Mayo Clinic Alumni Association for the purpose of reporting personal experience and data from the Fukushima Health Management Survey to groups in Washington, DC; Vienna, Austria; Singapore; Tokyo, Japan; and Phoenix, Arizona.

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