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Letter to the Editor

Toshiko Kato (2019) Area Dose Response of Prevalent Childhood Thyroid Cancers after the Fukushima Nuclear Power Plant Accident

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Sir,

In his article, Kato investigated the prevalence of thyroid cancers (TC) in children and young adults from Fukushima Prefecture, reported in the Fukushima Health Management Survey (FHMS) for the first (fiscal years (FY) 2011-2013) and the second screening round (FY 2014-2015). In his so-called F model, Kato adopted the official regional division of Fukushima Prefecture by dose group used in the FHMS reports, i.e. (1) the evacuation zone (highest dose), (2) Nakadori, (3) Iwaki and Soma, and (4) Aizu (lowest dose). For the mean effective doses in the four areas, Kato refers to the UNSCEAR 2013 report "Effective doses in Japan for the first year" (his reference 11). In his (Figure 2D), Kato shows the dose dependency of TC prevalence in the first and second screening rounds. No increase in TC prevalence with dose is seen in the first round (FY 2011-2013) but there is a clear dose-response in the second round (FY 2014-2015). In the result section, Kato does not mention the results of his regression analysis (i.e. parameter estimates with 95% confidence intervals and p-values); but the p-values for the trend parameters are given in his (Figure 2D) as $P=0.86$ for FY 2011-13 and $P=0.09$ for FY 2014-15. Thus, Kato's result for the dose response in FY 2014-15 is not statistically significant on a 5% level of significance.

To check Kato's results, I analysed the data in his (Table 2) using logistic regression (program R, function glm), (family=binomial). While the trend parameter was negative for FY 2011-13 (-0.028 ± 0.087 , $P=0.74$),

it was positive for FY 2014-15 ($+0.319 \pm 0.122$, $P=0.009$) which translates to a 38% (95% CI: 9-76%) relative increase per mSv effective dose (Figure 1). In addition, I conducted a combined logistic regression of both data sets with an interaction term in the regression model that estimates the difference in dose dependency (slope) in FY 2014-15 and FY 2011-13. The result for the interaction term was statistically significant ($P=0.020$). The fact that a dose response is only apparent 3-5 years after Fukushima is compatible with the Chernobyl experience: In Belarus, a first rise in childhood thyroid cancers was only observed in 1990, 4 years after the accident.

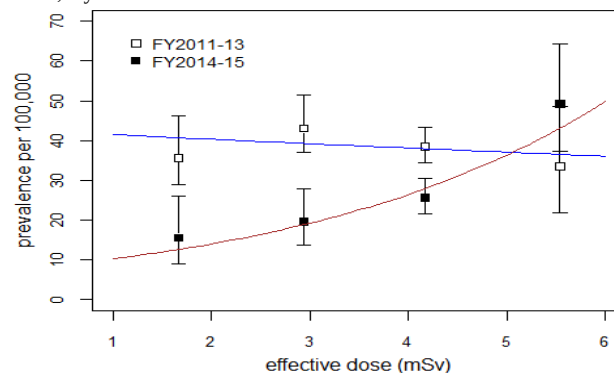


Figure 1: Thyroid cancer prevalence in four areas of Fukushima Prefecture as a function of mean effective dose for two periods: fiscal years (FY) 2011-2013 and 2014-2015. The blue and brown lines show the respective regression results. The error bars are standard deviations.

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