

# Thyroid Cancer: We Need a Carcinogen-specific Genome Study

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Thyroid cancer is the most common cancer among Koreans with 22.3% annual percentage change in incidence rates between the years of 1999 and 2012 (1). An age-period-cohort analysis showed a strong period effect (2), which supports the hypothesis that the dramatic increase in the incidence rates of thyroid cancer in Koreans is ascribable to over diagnosis due to the spread of diagnostic ultrasound (3,4). The results of a cohort study with residents living near nuclear power plants (NPPs) conducted by Ahn et al. (5), according to which only female thyroid cancer showed significantly higher incidence, can also be explained to be attributable to such over-diagnosis.

Nevertheless, some (6-8) demand an extended cohort study, putting forward a claim that this result should be interpreted in relation to the radiation exposure of NPP residents (9). However, it is doubtful that we need to extend the follow-up duration and reanalyze the collected data because of the following reasons. First, radiation levels near NPPs are not higher than other regions, as demonstrated by radiation monitoring (5). At such a low radiation level, additional follow-ups are completely meaningless. Second, adults exposed to acute radiation are not affected in relation to thyroid cancer, as demonstrated by the Chernobyl disaster (10,11). Given this fact, there is no persuasive evidence to conduct follow-ups with adults living near NPPs that have no history of nuclear accidents. Third, previous cohort studies with residents near NPPs reported that low-dose radiation is not associated with the occurrence of thyroid cancer (12,13).

On the other hand, a genuine research necessity lies in finding out whether the incidences of thyroid cancer among NPP residents are attributable to their radiation exposure or not. To put it another way, a radiation-specific genome study should be conducted. If the pathogenic mechanism of thyroid cancer in relation to radiation-induced problems at the genome level can be known, the findings can be efficiently applied to the determination of the radiation-related conditions specific to the thyroid cancer cases among NPP residents.

Through the results of previous studies conducted with Hiroshima atomic bombing victims and Chernobyl NPP accident victims, it is now known that while the thyroid cancer among highly sensitive pediatric patients is induced by RET/PTC rear-

rangements, BRAFV600E point mutation is responsible for the thyroid cancer developed in adulthood (14-16). Given these facts, a more urgent research task would be to determine the incidence rates of thyroid cancer in the age group of  $\leq 18$  yr and perform a genome study on thyroid tumors in order to verify the influence of the radiation exposure of NPP residents.

Additionally, the Phenopedia of HuGE Navigator (17) lists a total of 359 genes associated with thyroid cancer as of July 2015. It would be useful to investigate the difference in genome distribution in the incidences of thyroid cancer between adult residents near NPPs and regions unaffected by the presence of NPPs in a case-control study.

## DISCLOSURE

The author have no potential conflicts of interest to disclose.

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