

Non-malignant thyroid disease after exposure to radioactive elements during nuclear explosion: a neglected issue

Nükleer patlama sırasında radyoaktif element maruziyetinden sonra malign olmayan tiroid hastalığı: Göz ardı edilen bir konu

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Recent nuclear explosion in Japan led to a great concern regarding its detrimental effects on health. As obtained data imply the increased risk of thyroid cancer, the prevention is widely suggested. Also the adverse effect of leaked radioactive elements can lead to non-malignant thyroid disease, which is neglected. In this article, non-malignant thyroid disease after exposure to radioactive elements during nuclear explosion was reviewed and discussed.

Key Words: Non malignant; nuclear; radioactive; thyroid.

Yakın zamanda Japonya'daki nükleer patlama, sağlık üzerinde zararlı etkilerine ilişkin büyük bir endişeye neden oldu. Elde edilen veriler, tiroid kanseri riskinin artmış olduğunu işaret ettiği için, büyük ölçüde korunma önerisi yapılmaktadır. Bununla birlikte, sızan radyoaktif elementlerin olumsuz etkileri, göz ardı edilen malign olmayan tiroid hastalığına da yol açabilir. Bu makalede, nükleer patlama sırasında radyoaktif element maruziyetinden sonra malign olmayan tiroid hastalığı incelenmiş ve irdelenmiştir.

Anahtar Sözcükler: Malign olmayan; nükleer; radyoaktif; tiroid.

The present explosion at Fukushima nuclear plant raises great concerns about its serious effects on the health of the exposed population. The radioactive elements can cause several problems in every organ system of people living in contaminated areas. One important concern among these is carcinogenesis. Previous similar nuclear crises have confirmed that exposure to leaked radioactive elements can result in cancer development, especially thyroid cancer. The problematic radioactive element of concern is iodine 131 (I^{131}) that can easily uptake into normal thyroid tissue similar to nonradioactive iodine.

Because accumulated evidence implies increased risk of thyroid cancer, prevention is widely suggested.^[1-3] The use of potassium iodine prophylaxis is recommended by the World Health Organization (WHO) for areas with high exposure.^[4] However, the adverse effects of leaked radioactive elements can also lead to non-malignant thyroid disorders. This is a forgotten issue. Here, the author reviews and discusses non-malignant thyroid disorders after exposure to radioactive elements from nuclear explosion.

AUTOIMMUNE THYROID DISORDER

As already noted, I^{131} can be absorbed into the thyroid gland and can be the pathophysiologic factor of several thyroid disorders. In general, the genetic alteration is detectable and this can be a cause of thyroid cancer and other thyroid disorders.^[5]

Alteration of the normal T-lymphocyte function is reported and this is believed to be the origin of autoimmune thyroid disorders.^[6,7] Tronko et al.^[8] noted that "no radiation-related increase in prevalence of autoimmune thyroiditis was found in a large cohort study" but they observed that "a dose-response relationship with antibodies to thyroid peroxidase prevalence raises the possibility that clinically important changes may occur over time." Not only antiperoxidase but also antimicrosomal antibodies are reported to increase in frequency in exposed subjects.^[9,10] Vermiglio et al.^[11] gave an interesting hypothesis that the increased frequency of automimmune antibodies might be a result of combined factor, radioactive elements and nutritional status of the exposed subjects. Finally, it should be noted for some relationship of appearance of autoimmunity and other disorders. Poverennyi et al.^[12] concluded that "the presence of autoimmune thyroiditis rises 75 times the risk of malignant lympho-proliferated diseases appearance."

PRE-MALIGNANT THYROID TUMOR

As already noted, the exposure to I^{131} can induce genetic content changes in normal thyroid cells. This can lead to tumorogenesis and carcinogenesis. The increased incidence of the pre-malignant thyroid tumor is also mentioned. Zablotska et al.^[13] concluded that "persons exposed to radioactive iodines as children and adolescents have an increased risk of follicular adenoma, though it is smaller than the risk of thyroid cancer in the same cohort."

HYPOTHYROIDISM

The radioactive elements exposure can also lead to hypothyroidism. The juvenile hypothyroidism emerged in the exposed population after the Chernobyl crisis.^[14] It is evidenced that body burdens of radioactive Cesium 137 is related to the hypothyroidism prevalence rates.^[14] Ostroumova et al.^[15] concluded that "The radiation increase in hypothyroidism was small (10% per Gy) and limited largely to subclinical hypothyroidism."

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