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Risk factors for thyroid cancer

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Abstract :

Thyroid cancer is the most common endocrine cancer, of which the incidence has dramatically increased worldwide in the past few decades. The most common types of thyroid cancer are papillary and follicular. These types are often curable, especially when found early. Other types include medullary, anaplastic, and Hurthle cell cancer. Most tumors of the thyroid are not cancerous. A risk factor is anything that increases a person's chance of developing cancer. Although risk factors often influence the development of cancer, most do not directly cause cancer. Some people with several risk factors never develop cancer, while others with no known risk factors do. This report tries to give a balanced view of debated factors leading to the thyroid cancer epidemic, and to suggest potential directions in the search of modifiable risk factors to help reduce thyroid cancer.

Introduction :

The thyroid is a gland located in the front of the neck just below the larynx, called the voice box. A healthy thyroid gland has 2 lobes, 1 on each side of the windpipe, joined by a narrow strip of tissue called the isthmus. The thyroid is part of the endocrine system, which regulates hormones in the body. The gland absorbs iodine from the bloodstream to produce thyroid hormone. This hormone controls a person's metabolism and is necessary for life. Thyroid cancer begins when healthy cells in the thyroid gland change, grow out of control, forming a mass called a tumor. Thyroid carcinoma occurs at all ages, most of the cases diagnosed between the 5th and 6th decade of life. Cancer of thyroid is found frequently in females than males. The male to female ratio of thyroid cancer incidence is 1:3 **.** Women are 3 times more likely to have thyroid cancer than men, but death rates among women and men are similar. This suggests that men have a worse prognosis than women when there is a diagnosis of thyroid cancer. Prognosis is the chance of recovery [1]. In an effort to control and combat the increasing trend of thyroid cancer, much effort has been devoted to the search for modifiable risk factors of this malignancy. Among the wide range of studied factors hypothetically affecting thyroid cancer risk, early childhood exposure to iodine radiation is the only well-established risk factor. The analyses of other potential risk factors have not presented with conclusive evidence, and studies of the disease mechanisms often indicate multiple pathways/agents that may or may not play a significant role in a given population. For example, in addition to age of exposure, epidemiologic evidence also points to gender and geographic differences in risk estimates. The incidence of large tumors and cancer-related mortality also slightly increased , suggesting other factors leading to the growth of thyroid cancer incidence. Therefore, environmental/lifestyle factors (e.g., radiation, iodine intake, and nitrates), as well as comorbidities (e.g., chronic lymphocytic thyroiditis), and perhaps a complex multiplication of these factors are considered possible causes for a true increase in thyroid cancer incidence. [2]

Discussion :

There are many risk factors for thyroid cancer, in this report I will discuss three risk factors which are as the following :

1- Familial predisposition to thyroid disease.
2- Obesity and diabetes.
3- Iodine intake.

Other risk factors include: radiation exposure, estrogen and reproductive factors. Familial thyroid disease may be a risk factor for differentiated thyroid carcinoma . A positive family history of thyroid disease is associated to a larger extent with the development of papillary thyroid carcinoma than with that of follicular thyroid carcinoma, so the aim of the study was to assess the occurrence of thyroid disease in the families of patients with DTC. A questionnaire-based case-control study was conducted at the Department of Endocrinology, Jagiellonian University Medical College in Kraków, Poland, based on the local register of TC, which covered the data of patients from the former provinces of Kraków and Nowy Sącz since 2012. A case-control study was conducted in a group of 232 patients with DTC and in 342 age- and sex-matched healthy subjects. Eighty patients were diagnosed with follicular thyroid carcinoma, 127 with papillary thyroid carcinoma, and 25 with oxyphilic thyroid carcinoma. The questionnaire included questions on the presence of thyroid diseases in first-degree relatives. RESULTS: Thyroid disease was more common in the families of DTC patients than in the control group: 18.5% of the patients and 9.6% of the control group had a parent with thyroid disease . 16.8% of the patients and 7.7% of the control group had a sibling with thyroid disease . [3]

Recently, it has been proposed that the rising thyroid cancer incidence in the world might be related to insulin resistance . This hypothesis has been supported by epidemiological evidence that a higher body mass index (BMI) is associated with an increased risk of thyroid cancer. Studies have also observed that patients with insulin resistance have larger thyroid volumes and higher risk for formation of thyroid nodules[4]. Another small cross-sectional study noted that increased prevalence of insulin resistance is present in patients with differentiated thyroid carcinoma . These findings suggest that the higher circulating levels of insulin may cause increased thyroid proliferation and thyroid nodules. Studies have also observed that type 2 diabetes patients had a higher incidence of thyroid dysfunction , or higher prevalence of abnormal serum thyroid stimulating hormone concentration , which in some studies have been linked to an increase in thyroid cancer . Briefly, at 40 clinical centers throughout the United States between September 1, 2012 and December 31, 2015, including both multicenter clinical trials (CTs) and an observational study (OS), a total of 161 808 women ages 50–79 were recruited. The following participants were excluded from the original cohort of 161 808 for this analysis: 12 655 women who had a history of cancer (except non melanoma skin cancer) at baseline; 636 women who had no follow-up information; 221 women who were diagnosed with diabetes before age 20 and/or who were “ever hospitalized for diabetic coma” (these were deemed to have a probable type 1 diabetes diagnosis); and 362 women who had missing values of the main exposures (including diagnosis of diabetes, age at diagnosis, and diabetes treatment). After these exclusions, 147 934 women remained for final analysis.[5]

Iodine is an essential element for the synthesis of thyroid hormones. Both chronic iodine deficiency and iodine excess have been associated with hypertrophy and hyperplasia of follicular cells, attributed to excessive secretion of TSH. This may be associated to

thyroid cancer risk. In a large three-year prospective study between 2012 and 2015, Teng and his team found that the region with excessive iodine intake had 13 new cases of thyroid cancer, while none were diagnosed in regions with mildly deficient iodine intake [6]. In 2016, another cross-sectional study was performed in cities with adequate iodine intake or more than adequate intake. The prevalence of thyroid nodules was much higher (12.8% versus 2.78%) compared with the prospective study of 2012–2015. Also, some studies suggested that iodine intake may influence the distribution of thyroid cancer subtype, rather than the overall incidence. There may be more follicular and fewer papillary carcinomas in iodine-deficient areas and more papillary subtype in iodine-rich areas[7]. Level of iodine intake affects thyroid functions, but mechanisms linking with thyroid cancer are not clear. Chronic stimulation of the thyroid-stimulating hormone (TSH) and BRAF mutations in PTC are possible pathways [8].

Conclusion:

By collecting of these knowledge, and as a conclusion a Positive family history of thyroid disease discussed as a risk factor for differentiated thyroid carcinoma. And Insulin resistance is a key feature of type 2 diabetes mellitus. It is therefore possible that patients with type 2 diabetes have increased thyroid cancer risk. It is clear that variation in population iodine intake are a determinant of benign thyroid disorders, in contrast the role of iodine intake in thyroid cancer remains uncertain. More well- controlled studies are needed to clarify the potential links between iodine intake and molecular alternation in thyroid cancer.

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