Improved screening is insufficient to explain the rising incidence of advanced stage thyroid cancers: a population-based analysis

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Introduction

Thyroid cancer is a highly preventable, usually curable disease. Most cases are due to sporadic mutations in thyroid hormone receptors. The rising incidence of thyroid cancer can either be attributed to a true increase in incidence or to increased detection of small, otherwise occult, subclinical tumors. The rising incidence has been documented without a concomitant increase in mortality, which would be expected if there were truly increasing cancer incidence. An alternative explanation would be that there is an increasing incidence of thyroid cancer, due to unknown hormonal, dietary, genetic or environmental risk factors. Further investigation in these areas seems prudent.

Methods

The National Cancer Institute's Surveillance Epidemiology and End Results (SEER) program records data from 18 population-based cancer registries in the United States. SEER*Stat software, release 6.5.2 (2009; NCI Cancer Statistics Branch, Bethesda, MD) was used for the data analysis. We identified cases originating within the thyroid gland, and used the corresponding ICD-O-3 (International Classification of Diseases for Oncology, 3rd edition) topography codes for "papillary carcinomas of thyroid" and variants (codes 8535, 8531, 8120, 8130-8140, 8143-8145, and 8153-8159). Between 1973 and 2006, incidence in Hawaii increased 50.2% (APC 0.7%, p<0.0001), but more than quintupled in Connecticut, with an increase of 433.4% (APC 5.4%, p<0.0001, data not shown). The detection of large tumors does not require aggressive use of screening and pathologic criteria.

Results

The rising incidence of thyroid cancer may in part be attributed to increased detection of occult thyroid cancer. Screening may be the main contributor, as rising incidence has been documented without a concomitant increase in mortality, which would be expected if there were truly increasing cancer incidence. However, the screening hypothesis remains speculative. In fact, Verheugen et al. suggested that the rise in incidence of thyroid cancer may be explained by early diagnosis, due to increased use of systematic needle aspiration biopsy of small nodules, as well as more frequent "incidences" due to incidental thyroidectomy. Several large population-based analyses have demonstrated that the majority of the increase in thyroid cancer incidence is due to increased detection of small thyroid cancers (PTC), and that there has not been a concomitant rise in thyroid cancer mortality. These findings are consistent with the argument that advancing technology leads to increased diagnosis of otherwise occult, subclinical tumors. The incidence in non-Hispanic blacks more than tripled since 1973, and is currently increasing with APC of 6.6% (p=0.014). By comparison, incidence has increased only slightly in black Americans (4.4% (p=0.013) and Asians, (2.1% (p=0.009). Incidence has not changed in the Hispanic population (1.1% (p=0.013) (Figure 1b). Incidence has increased linearly in each SEER geographic registry, with a wide range between regions. Between 1973 and 2006, incidence in Hawaii increased 50.2% (APC 0.7%, p<0.0001), but more than quintupled in Connecticut, with an increase of 433.4% (APC 5.4%, p<0.0001, data not shown). The detection of large tumors does not require aggressive use of screening and pathologic criteria.

Conclusion

The rising incidence of thyroid cancer can either be attributed to a true increase in incidence or to increased detection of small, otherwise occult, subclinical tumors. The rising incidence has been documented without a concomitant increase in mortality, which would be expected if there were truly increasing cancer incidence. An alternative explanation would be that there is an increasing incidence of thyroid cancer, due to unknown hormonal, dietary, genetic or environmental risk factors. Further investigation in these areas seems prudent.