



## THYROID CANCER

### What can we learn from gene markers in cancer tissue from patients with papillary thyroid cancer?

#### BACKGROUND

Thyroid cancer, especially papillary cancer, has been diagnosed more frequently during the past 20 years. It is not known if this is due to a true increase in cancer or easier and earlier diagnosis of small cancers which have been discovered due to the increased use of diagnostic imaging tests, such as CT scans and ultrasounds. The trend has been to discover smaller cancers especially in older populations. Cancer-associated genes found in papillary cancers may provide information about thyroid cancer. Many researchers have been studying these markers with the hope of making the diagnosis of papillary cancer easier, improving the ability to predict the prognosis of papillary cancer and discovering the causes of papillary cancer. This study was done to measure the incidence of 2 gene markers over a 15 year time frame. The markers are RET/PTC which is commonly caused by chromosome breaks from ionizing radiation and BRAF which is a single “point” change in a chromosome which could be spontaneous or due to unknown environmental pollutants. The aim of the study was to measure the RET/PTC and BRAF gene markers in papillary cancer tissue samples and to determine if they are increasing or decreasing over time. This information may provide clues as to the causes of papillary cancer, especially if there has been a true increase in the occurrence of this cancer.

#### THE FULL ARTICLE TITLE

Romei C et al Modifications in the papillary thyroid cancer gene profile over the last 15 years J Clin Endocrinol Metab September, 2012 97(9):E1758-E1765.

#### SUMMARY OF THE STUDY

Saved tissue samples from patients with papillary cancer treated at several Italian thyroid cancer centers were tested for the gene markers RET/PTC and BRAF V600e. Samples from 3 time intervals (1996-2000, 2000-2005 and 2005-2010) were compared. During each 5 year time interval the incidence of the RET/PTC marker progressively decreased and the BRAF marker increased from the first to the last interval. The cancer size decreased and the age of the patients increased during the same intervals.

#### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

The conclusion is that the BRAF gene marker is increasing in all patients with papillary cancer during the 15 year time frame, not only in older patients but in all age groups, possibly due to exposure to newer environmental pollutants. Secondly, older patients may be more sensitive to these cancer-causing factors (such as: environmental pollutants). Finally, the smaller size of newly discovered papillary cancers in older patients may also be due to early discovery from increased use of imaging studies in this population.

— Jerrold M. Stock, MD

#### ATA THYROID BROCHURE LINKS

Thyroid cancer: <http://www.thyroid.org/cancer-of-the-thyroid-gland>

#### ABBREVIATIONS & DEFINITIONS

**Genes:** a molecular unit of heredity of a living organism. Living beings depend on genes, as they code for all proteins and RNA chains that have functions in a cell. Genes hold the information to build and maintain an organism’s cells and pass genetic traits to offspring.

**Molecular markers:** genes and microRNAs that are expressed in benign or cancerous cells. Molecular markers can be used in thyroid biopsy specimens to

either to diagnose cancer or to determine that the nodule is benign.

**Cancer-associated genes:** these are genes that are normally expressed in cells. Cancer cells frequently have mutations in these genes. It is unclear whether mutations in these genes cause the cancer or are just associated with the cancer cells. The cancer-associated genes important in thyroid cancer are BRAF, RET/PTC and RAS.

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## **THYROID CANCER**, continued

**BRAF gene:** this is gene that codes for a protein that is involved in a signaling pathway and is important for cell growth. Mutations in the BRAF gene in adults appear to cause cancer.

**Papillary thyroid cancer:** the most common type of thyroid cancer.

**Ionizing radiation:** radiation that can damage cells, causing cell death or mutation. It can originate from radioactive materials, x-ray tubes or specialized machines. It is invisible and not directly detectable by human senses.