CLINICAL THYROIDOLOGY **FOR PATIENTS**

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## THYROID NODULES

# Analysis of molecular markers on indeterminate thyroid biopsies may reduce the need for thyroid surgery

### BACKGROUND

Thyroid nodules are very common, occurring in up to 50% of the population as determined by neck imaging. Thyroid nodules are concerning due to their risk for thyroid cancer, which occurs in 5-8% of nodules. The evaluation of thyroid nodules frequently involves a fine need aspiration biopsy of the nodule. While a diagnosis is usually made after a biopsy, the results are indeterminate in up to 30 % of cases. This means that it cannot be determined if the patient has a thyroid cancer that requires surgery or a benign nodule that can be simply watched. The risk for thyroid cancer in these situations is 20-40%, meaning that the majority of patients with indeterminate biopsies have what may be termed "unnecessary" thyroid surgery which is often associated with lifelong need for thyroid hormone replacement. It is clear that thyroid cancers express some unique genes that serve as molecular markers for cancer and which can be analyzed on cells removed during a biopsy. The company Veracyte unveiled this year the Affirma Gene Expression Classifier (AGEC) to test for these molecular markers. Veracyte claims that the AGEC test can predict a benign nodule in 95% of the cases when the test is read as negative for cancer. The goal of this study was to determine whether the use of the AGEC test with thyroid nodule biopsy is able to prevent unnecessary thyroid surgeries when compared to thyroid biopsy alone.

### THE FULL ARTICLE TITLE

Duick DS et al. The impact of benign gene expression classifier test results on the endocrinologist-patient decision to operate on patients with thyroid nodules with indeterminate fine-needle aspiration cytopathology. Thyroid 2012;22:996-1001. Epub August 8, 2012; doi: 10.1089/thy.2012.0180.

### SUMMARY OF THE STUDY

The study included patients of 51 endocrinologists with thyroid biopsy results read as indeterminate and AGEC test negative for cancer. Only 28 (7.6 %) such patients were referred to surgery for either 1) a large nodule, 2) a rapidly growing nodule, 3) having symptoms related to their nodules or 4) based on suspicious appearance of the nodules by ultrasound. However, the final pathology for the patients that had surgery was not stated, so it is unknown of any cancers were actually in this group.

### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study suggests that the use of the AGCE test resulted in a marked decrease in the number of unnecessary surgeries. However, there are several limitations to this study so the results still need to be validated with other studies. The Veracyte AGEC test does hold promise to aid in making a diagnosis and avoiding unnecessary surgery in patients with indeterminate biopsies.

— Mona Sabra, MD

### ATA THYROID BROCHURE LINKS

Thyroid Nodules: http://www.thyroid.org/what-are-thyroid-nodules

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

### ABBREVIATIONS & DEFINITIONS

Thyroid nodule: an abnormal growth of thyroid cells that forms a lump within the thyroid. While most thyroid nodules are non-cancerous (Benign), ~5% are cancerous.

Thyroid fine needle aspiration biopsy: a simple procedure that is done in the doctor's office to determine if a thyroid nodule is benign (non-cancerous) or cancer. The doctor uses a very thin needle to withdraw cells from the thyroid nodule. Patients usually return home or to work after the biopsy without any ill effects.

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## **THYROID NODULES,** continued

Indeterminate thyroid biopsy: this happens usually when the diagnosis is a follicular or hurthle cell lesion. Follicular and hurthle cells are normal cells found in the thyroid. Current analysis of thyroid biopsy results cannot differentiate between follicular or hurthle cell cancer from noncancerous adenomas. This occurs in 15-20% of biopsies and often results in the need for surgery to remove the nodule.

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.