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THYROID NODULES

Molecular analysis of thyroid nodule biopsies may be helpful to determine whether an indeterminate nodule is benign

BACKGROUND

Once a significant thyroid nodule is identified, the next step often is a fine-needle aspiration biopsy to determine if the nodule is cancerous. However, a definitive diagnosis of cancer vs benign can only be made in 70-85% of nodules as 15-30% fall into the "indeterminate" category. In this category are 3 subgroups: 1) atypical, 2) follicular neoplasm and 3) suspicious for cancer. At present, these indeterminate nodules usually end up being removed by surgery and only 10-30% of those in the atypical or follicular neoplasm category will actually be cancerous. Certainly any way to separate cancers from benign nodules in this group without depending upon surgery would be very beneficial for patients. Various molecular diagnostic procedures have been reported to clarify the diagnosis of malignant or benign in the indeterminate category in order to determine whether a thyroidectomy is appropriate therapy. Molecular procedures take advantage of the fact that cancers express different profiles of certain genes than do benign nodules. The authors report a multicenter study that evaluates a commercial method (gene-expression classifier (GEC)) that classifies indeterminate biopsy cytology into a category of either benign nodule or suspicious for cancer category.

THE FULL ARTICLE TITLE

Alexander EK et al. Preoperative diagnosis of benign thyroid nodules with indeterminate cytology. N Engl J Med. June 25, 2012 [Epub ahead of print].

SUMMARY OF THE STUDY

The Veracyte company collected 4812 nodule aspirates from 3789 patients at 49 clinical sites in the United States and 577 were classified as indeterminate (12%). For 413 of the 577 samples, surgical resection of the nodule was performed. A total of 265 samples subsequently were available for primary analysis: 129 in the atypical category, 81 in the follicular neoplasm category and 55 in the suspicious for cancer category. In addition to the indeterminate samples, 47 benign and 55 cancerous surgical samples were evaluated

In the atypical category, 31 of 129 samples (24%) were cancerous by pathology and 28 of 31 were classified as suspicious by the GEC. The remaining 98 were benign, but the GEC result was suspicious in 46 of them and benign in 52.

In the follicular neoplasm category, 20 of 81 samples (25%) were cancerous by pathology and the GEC was suspicious in 18 of 20 but benign in two. The remaining 6 were benign, but 31 of them were classified as suspicious by GEC.

In the suspicious category, 34 of 55 samples (62%) were cancerous by pathology and the GEC classified 32 of them as suspicious. Of the 21 that were benign, the GEC classified only 11 as benign and the other 10 as suspicious.

All of the additional 55 pathologically cancerous samples were categorized as suspicious by the GEC. Of the 47 additional samples considered benign cytologically, 3 were cancerous and 44 were benign by pathology and of these 44, the GEC considered 13 as suspicious.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Many molecular diagnostic procedures are currently being tested. This study shows that one such method, the gene-expression classifier, may be used to identify a subpopulation of patients with a low likelihood of thyroid cancer who might otherwise have been treated by thyroidectomy.

— Alan P. Farwell, MD

ATA THYROID BROCHURE LINKS

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

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

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A publication of the American Thyroid Association

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THYROID NODULES, continued

ABBREVIATIONS & DEFINITIONS

Thyroid fine needle aspiration biopsy (FNAB): 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.

Indeterminate thyroid biopsy: this happens usually when the diagnosis of a benign nodule or cancer cannot be made with certainty. There are 3 categories:

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.

Atypical thyroid biopsy: this happens when there are some abnormal/atypical cells in the biopsy sample but not enough to diagnose a cancer. However, because there are abnormal cells in the biopsy sample, the specimen cannot be called benign. Sometimes a repeat biopsy may be helpful but often surgery is recommended to remove the nodule.

Suspicious thyroid biopsy: this happens when there are atypical cytological features suggestive of, but not diagnostic for cancer. Surgical removal of the nodule is required for a definitive diagnosis.

Genes: a molecular unit of heredity of a living organism. Living beings depend upon 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.