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Editor-in Chief

lerome M. Hershman, MD

VA Greater Los Angeles Healthcare System and UCLA School of Medicine Endocrinology 111D 11301 Wilshire Blvd Los Angeles, CA 90073 Telephone: 310-268-3852 Fax: 310-268-4879 Email: clinicalthyroidology@thyroid.org

Associate Editors:

Albert G. Burger, MD

Professor, University of Geneva Geneva, Switzerland Email: clinicalthyroidology@thyroid.org

Stephanie L. Lee, MD, PhD

Director of the Thyroid Health Center Boston University Medical Center Boston, MA Telephone: 617-638-8530 Fax: 617-638-7221 Email: clinicalthyroidology@thyroid.org

Jorge H. Mestman, MD

Professor of Clinical Medicine and OB/GYN University of Southern California Keck School of Medicine Los Angeles, CA Telephone: 323-442-6179 Email: clinicalthyroidology@thyroid.org

Stephen W. Spaulding, MD

Department of Medicine, University of Buffalo Buffalo NY Telephone: 716-862-6530 Fax: 716-862-6526 Email: clinicalthyroidology@thyroid.org

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Designed By

Karen Durland (kdurland@gmail.com)

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A NEGATIVE PET SCAN EXCLUDES THE DIAGNOSIS OF CANCER IN THYROID NODULES > 15 MM DIAMETER

Vriens D, de Wilt JH, van der Wilt GJ, Netea-Maier RT, Oyen WJ, de Geus-Oei LF. The role of [(18) F]-2-fluoro-2-deoxy-d-glucose-positron emission tomography in thyroid nodules with indeterminate fine-needle aspiration biopsy: Systematic review and meta-analysis of the literature. Cancer. March 22, 2011. [Epub ahead of print]. doi: 10.1002/cncr.26085.

BACKGROUND

18F-2-fluoro-2-deoxy-d-glucose-positron emission tomography (FDG-PET) has been used mainly for evaluating patients with metastatic cancer. In addition, there are many papers concerning its use in preoperative evaluation of thyroid nodules. The purpose of this meta-analysis was to determine the diagnostic value of FDG-PET for patients with results on fine-needle aspiration (FNA) biopsy that is indeterminate or inconclusive.

METHODS

Five search engines used in November 2010 uncovered 239 publications; only 6 of these papers met the criteria for inclusion. These studies comprised 225 patients. The study used a complex statistical analysis to determine the diagnostic value of FDG-PET for prediction of malignancy based on the data for these subjects.

RESULTS

The FDG-PET was positive in 142 of 225 patients (63%), but the prevalence of malignancy was 26%. The specificity was 48%, indicating that a majority of those with positive FDG-PET did not have cancer. The sensitivity was 95%. The negative predictive value was 96%, and the positive predictive value was 39%. The overall diagnostic value of FDG-PET for determination of thyroid malignancy was 60%. Evaluation of the 164 nodules that were >15 mm led to a sensitivity for detection of thyroid cancer of 100%, but the specificity remained similar, at 47%.

CONCLUSIONS

A negative FDG-PET scan in patients with thyroid nodules >15 mm with indeterminate FNA biopsy results is a useful test to exclude the diagnosis of thyroid cancer. Conversely, a positive FDG-PET result did not identify cancer because approximately 50% of patients with positive scans had benign nodules.

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COMMENTARY • • • • •

We now see many patients with positive FDG-PET thyroid nodules that are incidentally discovered in the workup of various conditions. These nodules deserve FNA biopsy. It is comforting to know that a high proportion are not carcinomas. In evaluation of the FNA biopsy, most nodules classified as indeterminate would be a basis for recommending surgery when the FDG-PET is positive. This meta-analysis shows that only a minority of those with this FNA cytology are malignant. The authors avoided using the standard uptake value (SUV) in their evaluations because of too much heterogeneity in the studies. When PET was first used, it was thought that a higher SUV was a much stronger indication of malignancy, and various threshold SUVs were set, such as 5.0. However, Kim et al. (1), in one of the papers included in the metaanalysis, found that there was no difference in the

mean SUV of benign and malignant nodules; instead, the SUV tended to correlate with size—larger lesions had more intense uptake. However, Traugott et al., in another paper included in the meta-analysis, reported that the mean (±SD) SUV for malignant nodules was 12.7±5.7 and for benign nodules 1.9±2.6 (2). In addition, there is the caveat that the smaller the carcinoma or benign lesion, the less likely the FDG-PET is to be positive.

Although a negative FDG-PET result in a lesion >15 mm can reliably exclude malignancy, many benign lesions will be positive, especially larger lesions. Nevertheless, as the cost of FDG-PET declines, it may find a place for evaluation of nodules in the indeterminate FNA category as a basis for avoiding surgery when the FDG-PET is negative in a nodule >15 mm.

Jerome M. Hershman, MD

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