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THYROID CANCER

Intensity of uptake on PET-CT scan in metastatic thyroid cancer fails to predict growth in individual metastatic lesions

BACKGROUND

Thyroid cancer usually has an excellent prognosis. In fact, risk in thyroid cancer usually refers to risk of recurrence of cancer and not risk of death from cancer, which is quite low. In most patients with spread of the cancer outside of the thyroid (metastatic cancer), the metastatic cancer is limited to the neck. The most common place for metastatic cancer outside of the neck is in the lungs.

First-line therapy for metastatic thyroid cancer is radioactive iodine therapy after initial total thyroidectomy. When the cancer does not respond to radioactive iodine treatment, and surgery or external radiation therapy are not an option, a wait-and-see approach is recommended with close monitoring with imaging studies. Previous studies have shown that uptake of radioactive 18F-labeled fluorodeoxy-glucose (a PET-CT scan) is a predictor of survival in these patients. This study examines the relationship between the intensity of the PET-CT scan with cancer growth.

THE FULL ARTICLE TITLES:

Terroir M et al. The intensity of 18FDG uptake does not predict tumor growth in patients with metastatic differentiated thyroid cancer. Eur J Nucl Med Mol Imaging 2017;44:638–46. Epub October 29, 2016.

SUMMARY OF THE STUDY

Between July 2012 and May 2014, 55 patients who met the following criteria were analyzed: measurable metastasic cancer foci larger than 1 cm on the CT component of the PET-CT, follow-up CT within 3 to 12 months after the initial PET-CT, and no local or systemic treatment in the interval between the two imaging procedures.

In each patient, up to 10 individual metastatic cancer foci were evaluated by measuring maximum standard uptake value on the initial PET-CT scan, metabolic tumor volume, and physical tumor volume calculated based on the largest transverse lesion diameter on the CT scan. Outcome parameters were cancer growth rate in each lesion and patient survival.

The thyroid cancer was papillary in 60%, follicular in 14%, and poorly differentiated in 25% of patients. Average cancer size was 37 mm. A total of 53% of patients had lymph node metastatic cancer foci. Spread of the cancer outside of the neck was present at diagnosis in 47% and otherwise was diagnosed during follow-up after an average of 3 years. Patients were considered resistant to radioactive iodine treatment because of lack of uptake in distant metastases, persistent metastases after high dose radioactive iodine treatment, or because of disease got worse despite persistent radioactive iodine uptake.

The average number of metastatic cancer foci per patient was 2, with an average maximum standard uptake value on PET-CT scan of 8.7, an average metabolic total volume of 3.7 cm3 and an average diameter of 16 mm. The average cancer growth rate was 41% per year. After an average follow-up of 77 weeks, 55% of patients died from thyroid cancer.

The metastatic cancer foci total growth rate did not correlate with maximum standard uptake value, metabolic total volume, or physical total volume. Among the four patients with five or more metastases, the cancers with the highest maximum standard uptake value or highest metabolic total volume did not have the highest tumor growth rate.

Overall 1- and 2-year-survival was 100% in patients with maximum standard uptake value <5. Survival was strongly correlated to patient cancer load as expressed as metabolic total volume or physical total volume.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

PET-CT scanning is a highly useful diagnostic tool for identifying metastatic disease. In patients with thyroid cancer that has spread and is resistant to radioactive iodine, uptake on a PET-CT scan was not predictive of the subsequent growth rate of the metastases as measured by CT scan 3 to 12 months after the initial PET-CT scan.

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The present study confirms the correlation of total metabolic total volume with poor survival. The surprising finding was that the metastatic cancer foci with the highest uptake on PET-CT were not the metastatic cancer foci that grew the fastest. The apparent predictive power of metabolic total volume regarding survival may be due to the amount of cancer present rather than to the intensity of uptake on PET-CT scan.

— Ronald B. Kuppersmith, MD, FACS

ATA THYROID BROCHURE LINKS

Radioactive Iodine: https://www.thyroid.org/radioactive-iodine/

Thyroid Cancer (Papillary and Follicular): https://www.thyroid.org/thyroid-cancer/

ABBREVIATIONS & DEFINITIONS

Metastasis: The spread of cancer cells from the place where they first formed to another part of the body. In metastasis, cancer cells break away from the original (primary) tumor, travel through the blood or lymph system, and form a new tumor in other organs or tissues of the body. The new, metastatic tumor is the same type of cancer as the primary tumor. (Metastases is the plural form of metastasis, meaning multiple areas of spread).

Radioactive iodine (RAI): this plays a valuable role in diagnosing and treating thyroid problems since it is taken up only by the thyroid gland. I-131 is the destructive form used to destroy thyroid tissue in the treatment of thyroid cancer and with an overactive thyroid. I-123 is the non-destructive form that does not damage the thyroid and is used in scans to take pictures of the thyroid (Thyroid Scan) or to take pictures of the whole body to look for thyroid cancer (Whole Body Scan).

Positron-Emission-Tomography (PET) scans: a nuclear medicine imaging test that uses a small amount of radiolabeled glucose to identify cancer. Since cancer cells are more active than normal cells, the cancer cells take up more of the radiolabeled glucose and show up on the PET scan. PET scans are frequently combined with CT scans to accurately identify where the cancer is located.