CLINICAL THYROIDOLOGY **FOR PATIENTS**

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AMERICAN THYROID ASSOCIATION
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HYPOTHYROIDISM

Should patients with no functional thyroid gland be treated with both thyroxine (T_4) and triiodothyronine (T_3)?

BACKGROUND

Thyroxine (T_4) is the main hormone secreted by the thyroid gland. It is converted to the active hormone T_3 in other cells in the body, most commonly in the liver, kidney and in the cells where thyroid hormone works. Both T_4 and T_3 are important in maintaining normal metabolic function. In individuals with normal thyroid function, ~10-15% of the daily T_3 production comes from the thyroid gland. In patients who have no functioning thyroid (ie are hypothyroid), the absence of T_3 production by the thyroid can be overcome by maintaining higher circulating T_4 levels, resulting in normal circulating levels of T_3. This is why T_4 in the form of levothyroxine is the main treatment for hypothyroid patients. However, a longstanding question by both physicians and patients remains whether some hypothyroid patients could benefit from a mixture of T_4 and T_3 rather than replacing T_4 alone. Recent studies have generally found that there is no clinical advantage in adding T_3 to the usual T_4 replacement regimen. One condition that the studies suggest may have some benefit to replacing both hormones are those who had their thyroid removed surgically (surgical hypothyroidism). The present study examines whether T_4 alone is sufficient to maintain normal levels both T_4 and T_3 in patients with surgical hypothyroidism.

THE FULL ARTICLE TITLE

Gullo D et al. Levothyroxine monotherapy cannot guarantee euthyroidism in all athyreotic patients. PLoS One 2011:6:e22552. Epub August 1, 2011.

SUMMARY OF THE STUDY

This was a study of 1811 patients (1530 women and 281 men) who became hypothyroid following a total thyroidectomy for thyroid cancer and were receiving hormone replacement with T_4 alone. Subjects were free of thyroid cancer and had no evidence of any residual thyroid function. These patients were compared to a group of 3875 patients with normal thyroid function despite benign thyroid nodules less than 2 cm in size. Free T_4 (FT_4) and free T_3 (FT_3) levels were examined in both groups.

In these T_4-treated patients, FT_4 levels were 7.2% lower and FT_3 levels 15.2% lower than in the nodule patients with normal thyroid function. Moreover, there was a wide range of variability in the T_3/T_4 ratios in T_4-treated patients suggesting a wide range in peripheral T_3 levels in different individuals. In fact, more than 20% of the T_4-treated patients did not maintain FT_3 and FT_4 levels in normal range despite normal TSH levels.

WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Hypothyroid patients are typically treated with T_4 alone. A number of studies have demonstrated that T_4 alone is sufficient for the majority of hypothyroid patients. The present study identifies a subgroup of hypothyroid patients, namely those whose thyroid was surgically removed who do not have normal FT_4 and FT_3 levels despite normal TSH levels on T_4 alone. What is not shown by this study is whether or not combination therapy (T_4 plus T_3) is beneficial in these patients. Further studies are needed to sort this out.

— Frank Crantz, MD

ATA THYROID BROCHURE LINKS

Hypothyroidism: http://thyroid.org/patients/patient_brochures/hypothyroidism.html

Thyroid Hormone Treatment: http://thyroid.org/patients/patient_brochures/hormonetreatment.html

Thyroid cancer: http://thyroid.org/patients/patient_brochures/cancer_of_thyroid.html

continued on next page

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HYPOTHYROIDISM, continued

ABBREVIATIONS & DEFINITIONS

Hypothyroidism: a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

Thyroidectomy: surgery to remove the entire thyroid gland. When the entire thyroid is removed it is termed a total thyroidectomy. When less is removed, such as in removal of a lobe, it is termed a partial thyroidectomy.

Thyroid hormone therapy: patients with hypothyroidism are most often treated with Levothyroxine in order to return their thyroid hormone levels to normal. Replacement therapy means the goal is a TSH in the normal range and is the usual therapy. Suppressive therapy means that the goal is a TSH below the normal range and is used in thyroid cancer patients to prevent growth of any remaining cancer cells.

Thyroxine (T_4): the major hormone secreted by the thyroid gland. Thyroxine is broken down to produce Triiodothyronine which causes most of the effects of the thyroid hormones.

Triiodothyronine (T_3): the active thyroid hormone, usually produced from thyroxine, available in pill form as Cytomel™ or liothyronine.