



GOITER

Recombinant Human Thyrotropin (rhTSH) use in the treatment of nontoxic multinodular goiter

WHAT IS THE STUDY ABOUT?

A multinodular goiter is an enlarged thyroid that contains more than one thyroid nodule. Multinodular goiters are very common as we get older. They are also common in areas that have low amounts of iodine in their diet, such as parts of Europe and Asia. In the United States, anywhere from one-third to one-half of people over the age of 50 will have one or more nodules in their thyroid. While multinodular goiters can be overactive or contain a thyroid cancer, most function normally and do not include a cancer. Occasionally, multinodular goiters can enlarge and put pressure on structures in the neck, causing choking and difficulty swallowing. When this occurs, the usual treatment is surgery. Recently, some studies have suggested that large multinodular goiters can shrink if treated with radioactive iodine. Further, some studies have shown that the radioactive iodine can be more effective if the thyroid is turned on first by treatment with recombinant human TSH (rhTSH). However, this therapy can have some side effects and has been shown to increase thyroid size and potentially cause hyperthyroidism. At present, rhTSH is mainly used for treating patients with thyroid cancer and has not yet been approved by the Food and Drug Administration for this reason. The aim of this study was to determine which dose of rhTSH is the most effective with the least side effects.

THE FULL ARTICLE TITLE:

Fast et al. Dose-dependent acute effects of recombinant human TSH (rhTSH) on thyroid size and function: comparison of 0.1, 0.3 and 0.9 mg of rhTSH. *Clin Endocrinol (Oxf)* 2010;72:411-6.

WHAT WAS THE AIM OF THE STUDY?

The aim of this study was to determine which dose of rhTSH is the most effective with the least side effects.

WHO WAS STUDIED?

Nine men with an average age of 33 years were studied. All of them had normal thyroid size and normal thyroid function tests.

HOW WAS THE STUDY DONE?

The study participants were injected with increasing doses of rhTSH (0, 0.1, 0.3, and 0.9 mg) over four study rounds. They evaluated thyroid volume by ultrasound and thyroid hormone levels in the blood 1, 2, 3, 7 and 28 days after injection of each dose.

WHAT WERE THE RESULTS OF THE STUDY?

This study showed that rhTSH did cause enlargement of the thyroid gland on a dose dependent basis. The thyroid enlarged to 35-45% with the 0.3 mg and the 0.9 mg dose, but not with the 0.1 mg dose of rhTSH. Thyroid hormone levels also increased in a dose-dependent fashion, with peak levels observed 24-48 h after the injection. Most of the study participants developed mild hyperthyroid symptoms for a few days following the injections, more often at the higher doses. Only one participant reported hyperthyroid symptoms after the 0.1 mg dose. No permanent abnormalities in thyroid function were seen in the patients for up to 2 years after the study.

HOW DOES THIS COMPARE WITH OTHER STUDIES?

Several studies have looked at the use of rhTSH to increase that amount of radioactive iodine taken up by goiters. The initial concerns were that rhTSH stimulation would increase the release of T₄ and T₃ from the thyroid and possibly cause some problems. The early studies showed this was not a problem. Older studies found that with higher doses of rhTSH (0.3, 0.9) there was thyroid enlargement with multinodular goiter. However, this study differs from other studies in that the same subjects were given repeat rhTSH doses to determine the effects. The dose of rhTSH used was also examined and the most safe and effective dose was found to be 0.1 mg, as it was in this study. This dose is 1/3 of the dose used in thyroid cancer.

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WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Doses of rhTSH of 0.1 mg or less are likely to cause fewer adverse effects in patients. If side effects occur, they usually go away quickly.

— Heather Hofflich, MD

ATA THYROID BROCHURE LINKS

Thyroid Nodules: http://thyroid.org/patients/patient_brochures/nodules.html

ABBREVIATIONS & DEFINITIONS

Goiter: a thyroid gland that is enlarged for any reason is called a goiter. A goiter can be seen when the thyroid is overactive, underactive or functioning normally. If there are nodules in the goiter it is called a nodular goiter; if there is more than one nodule it is called a multinodular goiter.

TSH: Thyroid stimulating hormone – produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.

Recombinant human TSH (rhTSH) - human TSH that is produced in the laboratory and used to produce high levels of TSH in patients after an intramuscular injection. This is mainly used in thyroid cancer patients before treating with radioactive iodine or performing a whole body scan. The brand name for rhTSH is Thyrogen™.

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).

Thyroid Ultrasound: a common imaging test used to evaluate the structure of the thyroid gland. Ultrasound uses soundwaves to create a picture of the structure of the thyroid gland and accurately identify and characterize nodules within the thyroid. Ultrasound is also frequently used to guide the needle into a nodule during a thyroid nodule biopsy.