Results:
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Full text: https://jnm.snmjournals.org/content/50/5/732.long

Title:
Optimizing 131I Uptake After rhTSH Stimulation in Patients with Nontoxic Multinodular Goiter: Evidence from a Prospective, Randomized, Double-Blind Study

Authors:
Søren Fast, Viveque Egsgaard Nielsen, Peter Grupe, Steen Joop Bonnema and Laszlo Hegedüs

Abstract:

Prestimulation with recombinant human thyroid-stimulating hormone (rhTSH) augments radioiodine (131)I therapy for benign nontoxic multinodular goiter. The purpose of this study was to determine the optimal time interval between rhTSH and (131)I administration to enhance thyroid radioactive iodine uptake (RAIU).

Methods: Patients were randomized, in a 2-factorial design, to receive either a 0.1-mg dose of rhTSH (n = 60) or placebo (n = 30) and to a time interval of 24, 48, or 72 h before (131)I administration. The rhTSH- or placebo-stimulated RAIU study was performed at 4 wk after a baseline RAIU assessment in a tertiary referral center at a university hospital. A total of 90 patients (78 women; median age, 52 y; range, 22-83 y) referred to (131)I therapy for symptomatic nontoxic goiter (median goiter volume, 63 mL; range, 25-464 mL) were included in the study. Change in thyroid RAIU was determined at 24 and 96 h after (131)I tracer administration.

Results: In the placebo subgroups, RAIU did not change significantly from baseline. The mean (+/- SE) 24-h RAIU increased from 33.8% +/- 2.3% to 66.0% +/- 1.8% (111.2% increase) with a 24-h interval, from 36.8% +/- 2.1% to 64.6% +/- 2.7% (83.3% increase) with a 48-h interval, and from 33.0% +/- 2.7% to 49.6% +/- 2.5% (62.4% increase) with a 72-h interval. All within-group changes were highly significant ($P < 0.001$). The effect was negatively correlated with initial RAIU ($r = -0.703$, $P < 0.001$). The increase in 24- and 96-h RAIU was significantly higher in the rhTSH/24-h group than it was in the rhTSH/72-h group ($P = 0.023$ and 0.012, respectively) and insignificantly higher than in the rhTSH/48-h group ($P = 0.37$ and 0.26, respectively).

Conclusion: The effect of rhTSH on thyroid RAIU is most pronounced when administered 24 h before (131)I administration and declines with longer time intervals. Whether there is a similar time dependency for goiter reduction after rhTSH-stimulated (131)I-therapy remains to be clarified.

Results:
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Title:
Recombinant Human Thyrotropin-Stimulated Radioiodine Therapy of Nodular Goiter Allows Major Reduction of the Radiation Burden with Retained Efficacy

Authors:
Søren Fast, Laszlo Hegedüs, Peter Grupe, Viveque Egsgaard Nielsen, Christa Bluhme, Lars Bastholt, Steen Joop Bonnema

Abstract:

Context and objective: Stimulation with recombinant human TSH (rhTSH) before radioiodine (131I) therapy augments goiter volume reduction (GVR). Observations indicate that rhTSH has a preconditioning effect beyond increasing thyroid (131)I uptake. We test the hypothesis that an equivalent GVR might be obtained by an absorbed thyroid dose well below what has been used previously.

Patients and design: In a double-blinded setup, 90 patients (78 women; median age, 52 yr; range, 22-83) with a nontoxic nodular goiter (median size, 63 ml; range, 25-379 ml) were randomized to either 0.1 mg rhTSH (n=60) followed by a thyroid dose of 50 Gy or placebo followed by 100 Gy (n=30).

Results: At 12 months, the mean relative GVR in the placebo and the rhTSH group was identical (35+/-3%; P=0.81). The median administered 131I-activity was 170 MBq (45-1269) in the rhTSH group and 559 MBq (245-3530) in the placebo group (70% reduction, P<0.0001). According to the official radiation regulation, hospitalization was required in 14 patients in the placebo group vs. one patient in the rhTSH group (P<0.0001). In both groups, goiter-related symptoms were effectively relieved in the majority of patients. The prevalence of myxedema (10%) did not differ among groups.

Conclusions: This is the first study to demonstrate that rhTSH not only increases the thyroid 131I uptake, but per se potentiates the effect of 131I-therapy, allowing a major reduction of the 131I-activity without compromising efficacy. This approach is attractive in terms of minimizing posttherapeutic restrictions and in reducing the potential risk of radiation-induced malignancy.