**Topic:** ALTERNATIVE TREATMENTS FOR ‘HOT’ NODULES

**Title:** Randomized prospective study comparing a single radioiodine dose and a single laser therapy session in autonomously functioning thyroid nodules.

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**SUMMARY**

**Objective:** To compare the efficacy of interstitial laser photocoagulation (ILP) with radioiodine in hot thyroid nodules.

**Design:** Thirty consecutive outpatients with subclinical or mild hyperthyroidism and a scintigraphically solitary hot nodule with extraglandular suppression were randomized either to either one ILP session or one radioiodine (RAI) dose.

**Methods:** ILP was performed under continuous ultrasound-guidance and with an output power of 2.5-3.5 Watts. RAI was given as a single dose based on thyroid volume and a 24-hour RAI thyroid uptake measurement. Thyroid function and nodule volume were evaluated at inclusion and at 1, 3, and 6 months after treatment.

**Results:** Normalization of serum TSH was achieved in 7 out of 14 patients in the ILP group and in all 15 patients in the RAI group (P = 0.0025). In the ILP group, mean thyroid nodule volume reduction was 44 ± 5% (SEM; P <0.001), and in the RAI group 47 ± 8% (P <0.001), within 6 months, without between-group difference (P = 0.73). The mean reduction of total thyroid volume was 7 ± 5% in the ILP group (P=0.20) and 26 ± 8% (P = 0.006) in the RAI group (P=0.06 between groups). Two patients in the RAI group developed hypothyroidism but no major side effects were seen.

**Conclusions:** This first randomized study, comparing ILP with standard therapy, demonstrates that ILP and RAI therapy approximately halves thyroid nodule volume within 6 months; but in contrast to RAI, extranodular thyroid volume is unaffected by ILP and no patient developed hypothyroidism. Using the present design, ILP seems inferior to RAI therapy in normalization of serum TSH. The potential value of ILP as a non-surgical alternative to RAI needs further investigation.

**COMMENT**

Autonomously functioning thyroid nodules (AFTN) or ‘hot’ nodules are a well known cause of hyperthyroidism, especially in the older population. Even in apparently euthyroid patients with AFTN (who often present with a decreased serum TSH), there is good evidence that there is an increased risk for adverse cardiovascular events. Classical treatments include radioiodine (RAI) ablation or surgery, and both treatments are effective in restoring normal thyroid function. However, all patients cannot (and should not) be operated; similarly, the use of RAI is limited by possible side effects (such as hypothyroidism) or reluctance to use RAI
in some countries (especially in Southern Europe). It is therefore understandable that medical care providers have searched for alternative therapies. The most successful alternative has been PEI (percutaneous ultrasound-guided ethanol injection), a technique proposed originally by Papini et al. almost 15 years ago (JCEM, 76:413, 1993). Results with PEI treatment have been promising, but its use has been limited by several considerations: difficulty in predicting ethanol diffusion outside the nodule, pronounced pain, extraglandular fibrosis, need of repeated injections, etc. Furthermore, the lack of randomized trials to assess the efficacy of PEI versus RAI or surgery has also clearly limited the routine use of PEI in most centers.

Ultrasound-guided percutaneous interstitial laser photocoagulation (ILP) has been introduced for the treatment of thyroid cold nodules since 3-5 years. ILP is minimally invasive, and the procedure induces tissues necrosis by thermic energy that can be delivered in a controlled fashion without damaging surrounding tissue.

Main results of the present (and first) randomized trial comparing ILP with RAI were that the mean nodule volume reduction was equivalent with both techniques (close to 50% after 6 months). ILP induced less destruction of the surrounding perinodular thyroid tissue, as judged from the significantly greater thyroid volume reduction observed after RAI, compared with ILP (26% versus 7%). It is surprising that TSH normalization was achieved in only half the patients treated with ILP, compared with all the patients who received RAI. This difference was confirmed by normalization of thyroid scintigraphy in 8/15 patients in the RAI group, while in only 2/14 patients in the ILP group. The authors provided no explanation for this important difference, but concluded—rightly—that for the present time, RAI therapy of hot thyroid nodules should be considered superior to ILP.

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See Figure below

![Figure 1](image)

**Figure 1** Thyroid nodule volume reduction 1, 3 and 6 months after ILP treatment and $^{131}$I therapy (mean±S.E.M). Laser vs. $^{131}$I at 6 months, $P=0.73.$