

### HYPERFUNCTIONING THYROID NODULES AND PERCUTANEOUS ETHANOL INJECTION THERAPY

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Ultrasonographic guidance of percutaneous ethanol injection therapy (PEIT) is used either in benign or malignant conditions; it has been proposed in the treatment of autonomous thyroid nodules as alternative to surgery or radioiodine therapy in recent years.

**Aims** To assess the immediate and long-term efficacy and safety of PEIT

**Methods** 50 patients underwent the treatment (44 pts with a single nodule, two pts with two nodules and three patients with three nodules). Three elderly pts were treated with methimazole during PEIT. Color Doppler Ultrasound of the nodules and guidance of needle were performed with a broadband 5-10 MHz probe; needle guidance was free-hand, checking in real time the needle tip position in the nodule. The mean ratio of injected ethanol to nodule volume was  $1.6 \pm 0.1$ ; ethanol was administered in 4 to 10 weekly sessions.

**Results** Complete or partial response (i.e., TSH return to normal range and scintigraphic visualization of surrounding parenchyma) was achieved in 44 patients (89%). After treatment marked nodule shrinkage was observed in responsive patients (55% reduction in volume after one month). Treatment failed in 4 patients who interrupted the therapy at various stages because of side effects (e.g. transient vocal cord paresis, paresthesia). The response was directly related to alcohol dose and inversely related to initial nodule volume. No recurrence was observed after a follow-up of 36 months (range 3-60).

**Conclusions** On the bases of these data we can state that:

- 1) PEIT is effective in obtaining long-term functional ablation of hyperfunctioning thyroid nodules;
- 2) PEIT compares favourably with both surgery and radioiodine treatment and can be a valid alternative to them;
- 3) this treatment has a favourable cost/benefit ratio under skilled ultrasonologists

### PERCUTANEOUS ETHANOL INJECTION (PEI) UNDER POWER DOPPLER GUIDANCE IN THE TREATMENT OF NODULAR THYROID DISEASE.

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In recent years, PEI under sonographic guidance has been successfully utilised for the treatment of autonomously functioning thyroid nodules (pretoxic and toxic adenomas), of cystic and solid nodules. The aim of this study was to evaluate the possibility of improving the results of PEI, injecting the ethanol under power doppler (PD) guidance. In fact, by PD it is possible to detect the presence of flow also in very small vessels, getting angiographic micromaps. Thus, 50 patients (36f, 14m, 37-72 yr age ranged) with different thyroid disease (Table) were subjected to a "single session" PD-guided PEI, when other established treatments were refused or contraindicated. The procedure consisted of injection of 95% sterile ethanol into the nodule by PEIT needles 21G x 80 mm. The amount of the ethanol to be injected was evaluated on the basis of the ethanol intranodular diffusion. Before PEI, all patients were subjected to ultrasound guided fine needle biopsy in order to exclude the presence of malignancy; in addition, all the nodules were studied at PD and their vascular patterns were recorded on videotape. After PEI, no permanent side effects were observed. At 6 month follow-up the PD vascular patterns of the treated lesions were compared with those acquired before PEI and the nodular shrinkage was calculated (Table). In conclusion, we believe that PD, allowing to guide the ethanol intranodular injection into the principal afferent vessels of the lesions, and of evaluating, in real time, its diffusion and its effects on the nodular vascularization, might improve the results of PEI in thyroid disease.

Thyroid disease	N°	PD pattern pre-PEI	PD pattern post-PEI	Nodular shrinkage (mean)
Pretoxic adenoma < 40 ml	21	Peri- and intralesional	Perilesional	69%
Toxic adenoma > 40 ml	7	Peri- and intralesional	Perilesional	52%
Cystic lesions	17	No signal	Perilesional	80%
Solid lesions	5	Peri- and intralesional	Peri- and intralesional	33%

### DOPPLER EVALUATION OF VASCULAR INTRATHYROID RESISTANCES DURING PREOPERATIVE THERAPY WITH LUGOL IN PATIENTS WITH BASEDOW DISEASE.

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**Purpose.** In patients with Basedow disease, preoperative therapy with Lugol is commonly given to reduce bleeding during surgery and glandular friability. Aim of this study has been evaluation of the Doppler changes induced by this kind of therapy within the thyroid arteries to clarify its mechanisms of action.

**Material and Methods:** 19 consecutive patients with Basedow disease with planned near total thyroidectomy underwent Doppler evaluation before and after preoperative Lugol therapy (total dose 60 mg iodine, 120 mg iodide). A thyroid murmur was present in 10 cases. The resistive index (RI) was measured at the intraparenchymal superior and inferior thyroid arteries on both sides. A mean RI was calculated from 12 measurements. 19 normal subjects were evaluated as controls (C).

**Results:** C had mean RI of  $0.55 \pm 0.05$ . Patients had basal mean RI of  $0.51 \pm 0.068$  ( $p = 0.008$ ). The mean RI of patients after therapy was  $0.573 \pm 0.052$ , with a mean  $\Delta$ RI of  $\pm 15\%$  ( $p = 0.0002$ ). Patients with murmur had no statistically significant differences from those who did not have this finding. Furthermore, an intermediate RI evaluation was obtained at disappearance of the murmur in 5 cases, showing RI increase over basal values. However, a further increase in RI was noted at the end of the therapy cycle also in these patients.

**Conclusion:** Duplex Doppler measurements of RI allow demonstration of intrathyroid vasoconstriction during Lugol therapy. This finding provides demonstration of vasoactive effect of iodine-iodide therapy in patients with Basedow disease. Given the present large variability of dosage and administration time of this kind of therapy among surgical centers, RI measurements seem a promising tool for setting a therapeutic standard, while determining the most effective dose and time in a simple and effective way.

### ECHOGRAPHIC THYROID CHANGES IN IODINE DEFICIENCY AND EXCESS

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Low iodine intake is known as a main etiologic factor of endemic goiter development. The aim of this study was to establish the significance of morphological thyroid changes caused by iodine deficiency or excess.

The study was prospective, including 293 patients (pts) from Clinical Dept of Nuclear Medicine (261 women, 32 men, mean age 44). Iodine in casual urine sample provides a reasonably good estimate of iodine intake. Iodine deficiency ( $<100 \mu\text{g/L}$ ) was found in 78% of pts, with mean value of iodine being  $70.2 \mu\text{g/L}$ . Iodine excess was found only in pts treated with amiodarone. Ultrasonography with high frequency probes was used for thyroid measurement and morphology determination. In the group with excess iodine autoimmunity thyroiditis was found in high percentage (68.6%). No significant difference between the proportion of pts with diffuse goiter and those with normal sized thyroid with nodules between all three examined groups was found. However, enlarged thyroid with nodules was found in significantly higher proportion ( $p < 0.05$ ) of pts with deficient iodine (82%) in respect to the group with normal iodine values (36%). We detected no such changes in the group with iodine excess. In 145 pts with thyroid nodules, 34 thyroid tumours were diagnosed by ultrasound guided fine needle aspiration biopsy. The ratio of follicular tumours and papillary carcinomas was 1.86 in the group with iodine deficiency and 1.89 in the group with normal iodine values.

One can conclude that our patients suffer from insufficient iodine supply. Increasing of iodine intake causes the increase of diffuse altered thyroids and decrease of nodular changes. Excess iodine intake has a major influence on thyroid autoimmunity. In mild iodine deficiency area ultrasound is irreplaceable procedure in thyroid size and morphology determination.