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### The Reproducibility of the VOCAL Program for Evaluating 3D Power Doppler Ultrasonography of Thyroid Nodules

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**Aim:** The aim of this study was to evaluate the inter-examination, intra-observer and inter-observer reproducibility of three dimensional (3D) power Doppler ultrasonography (US) with the virtual organ computer-aided analysis (VOCAL) program for measuring thyroid volume, mean gray value (MG) and vascular indices in patients with thyroid nodules.

**Patients and Methods:** Patients had thyroid nodules with diameters range from 0.5 to 3 cm, clear margin and scanty cystic part, without history of thyroidectomy, were examined by 3DUS (V730, GE) from March 2008 to June 2008. The thyroid volume, MG and vascular indices: vascularization index (VI), flow index (FI), vascularization-flow index (VFI) were obtained from the VOCAL program. Inter-examination reproducibility intra-observer and inter-observer reproducibility were presented as inter-examination-class correlation coefficient (inter-examin-CC), intra-class correlation coefficient (intra-CC) and inter-class correlation coefficient (inter-CC). Values greater than 0.70 were considered as acceptable.

**Results:** Totally 38 patients with 44 nodules were included. Twenty nodules were examined with two times' 3DUS examination. The values of inter-examin-CC of volume, MG, VI, VFI were larger than 0.9323; otherwise, FI was 0.8162 with wide 95% CI 0.5984-0.9224. For evaluating total 44 thyroid nodules, thyroid volume showed excellent intra-observer and inter-observer reproducibility (intra-CC > 0.9677 and inter-CC: 0.8533). MG, VI and VFI also showed excellent reproducibility (intra-CC > 0.9921 and inter-CC > 0.9592). The values of intra-CC of FI were larger than 0.8983 but small inter-CC value (0.5112).

**Conclusion:** Base on this study, 3DUS with the VOCAL program is a reproducible tool, except FI, for evaluating thyroid nodules.

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### Clinical Evaluation of Elastography for the Differential Diagnosis of Thyroid Follicular Tumors

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**Purpose:** The diagnosis and management of follicular cancer of the thyroid gland remains a controversial topic. The aim of this study was to evaluate the clinical usefulness of Elastography imaging for the differential diagnosis of thyroid follicular lesions.

**Methods and Materials:** 133 follicular tumors were examined by Elastography. Papillary cancers, other types thyroid malignancies or hot nodules were excluded from this study. The images of thyroid follicular lesions were recognized as four typical patterns as follows: Pattern 1(P1): nodule is relatively homogenous and colored with light green. Pattern 2(P2): the center of nodule is colored with green and its periphery is colored with blue. Pattern 3(P3): nodule is mixed-colored with light green and red. Pattern 4(P4): the whole tumor is displayed in blue.

**Results:** All the follicular tumors were surgically and histopathologically diagnosed finally. In this series, 58 hyperplastic nodules, 33 follicular adenomas and 42 follicular cancers (28 Minimally invasive, 14 Widely invasive) were found. Of the 42 follicular cancers, 31 cases were P2, which was occupied 73.8%. Assuming Pattern 2 to be malignant and others to be benign, 87 of 91 benign tumors and 31 of 42 follicular cancers were accurately diagnosed, yielding a sensitivity of 78.8%, a specificity of 95.6%, and an accuracy of 90.2%.

**Conclusion:** Elastography can provide new useful information for the differential diagnosis of thyroid follicular tumors and has a capability to improve the diagnostic specificity and accuracy than that of our former studies of color-Doppler examination.

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### Clinical Application of 3D Color Energy Mapping in Thyroid Nodules

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**Objective:** To explore the clinical application of 3-D color energy(3CDE)mapping in the diagnosis of the thyroid nodules.

**Methods:** A total of 62 thyroid nodules in 56 patients were detected on 3 CDE mapping. The ultrasonic data were compared with results of surgery and pathology.

**Results:** The mapping of thyroid nodules had high reproducibility. Benign and malignant thyroid nodules has their own characteristics. About 73.3%(11/15) of malignant thyroid nodules displayed dilatated, distorted and irregular distributed vessels. In benign nodules the cyst or cystic solid nodules showed that the vessels distributed surrounding the mass, and the substantial nodules showed thin, regular vessels arranged from outside toward the inner. All the two types counted to 87.2%(41/47). Therefore, significant difference was present as benign nodules VS malignant (P<0.05).

**Conclusions:** 3CDE provided direct viewing and thyroid nodular morphology, and 3CDE nodular mapping can display the vessel structure. The relationship with adjacent tissue and distribution of vessels may also help confirm new vessels of thyroid nodules. 3CDE mapping is a new method for analysing tumor characteristics.

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### Application of 2D and 3D Ultrasonography in the Diagnosis of Thyroid Nodules

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**Objective:** To apply two-dimensional and 3D ultrasonography were performed in 56 patients with 62 thyroid nodules. The results were compared with those of operation and pathology.