

TABLE 7. ULTRASOUND FEATURES OF LYMPH NODES PREDICTIVE OF MALIGNANT INVOLVEMENT^a

Sign	Reported sensitivity, %	Reported specificity, %
Microcalcifications	5–69	93–100
Cystic aspect	10–34	91–100
Peripheral vascularity	40–86	57–93
Hyperechogenicity	30–87	43–95
Round shape	37	70

^aAdapted with permission from the European Thyroid Association guidelines for cervical ultrasound (20).

cancer risk. However, given the higher pretest likelihood of thyroid cancer associated with these clinical risk factors, FNA can be considered at lower size cutoffs for all of the sonographic appearances described above.

Ultrasound elastography (USE) has similarly been investigated for its ability to modify thyroid cancer risk assessment among clinically relevant thyroid nodules. Elastography is a measurement of tissue stiffness. Performance requires an US machine, as well as an elastography computational module that most often must be purchased separately. An initial prospective study of 92 selected, nonrandomized patients suggested positive and negative predictive values (NPVs) near 100% (97). However, more recently, larger trials have reported substantially different results. Moon and colleagues retrospectively studied 703 thyroid nodules in comparison to gray-scale US (78). Performance of USE was inferior to that of gray-scale US assessment. The largest prospective study of 706 patients with 912 thyroid nodules was recently published by Azizi *et al.* (98). In this study, the positive predictive value (PPV) of USE was only 36%, comparable to that of microcalcifications. The NPV of USE was 97% in a population with cancer prevalence of 9%. Thus, while USE holds promise as a means by which to noninvasively assess cancer risk, its performance is highly variable and operator dependent. Perhaps most importantly, USE can only be effectively applied to solid nodules, thus excluding its utility for cystic or partially cystic nodules. Furthermore, to be amenable to direct pressure and determination of tissue strain, the index nodule must not

overlap with other nodules in the anteroposterior plane. Obese patients, those with multinodular goiters and coalescent nodules, or patients in whom the nodule is posterior or inferior are not candidates for USE. Thus, at present, USE cannot be widely applied to all thyroid nodules in a similar fashion to gray-scale or Doppler US examination. The committee therefore believes USE (when available) may prove to be a helpful tool for preoperative risk assessment in those patients in whom accurate assessment can be performed. However, the committee cannot presently recommend its universal use or widespread adoption. Importantly, the ability to perform (or not perform) USE should not modify the recommendation for traditional gray-scale sonographic evaluation.

Finally, while most thyroid nodules meeting the preceding sonographic patterns and sizes should undergo FNA, we acknowledge that a conservative approach of active surveillance management may be appropriate as an alternative to FNA in selected patients. These may include patients with very low-risk tumors (e.g., no clinical or radiographic evidence of invasion or metastases), patients at high surgical risk, or those with a relatively short life span expectancy in whom the benefits of intervention may be unrealized.

[A11] What is the role of FNA, cytology interpretation, and molecular testing in patients with thyroid nodules?

■ **RECOMMENDATION 9**

Thyroid nodule FNA cytology should be reported using diagnostic groups outlined in the Bethesda System for Reporting Thyroid Cytopathology.

(Strong recommendation, Moderate-quality evidence)

To address a significant variability in the reporting of cytological findings in thyroid FNA samples, the 2007 National Cancer Institute Thyroid Fine-Needle Aspiration State of the Science Conference provided consensus recommendations known as the Bethesda System for Reporting Thyroid Cytopathology (99,100). The Bethesda system recognizes six diagnostic categories and provides an estimation of cancer risk within each category based upon literature review and expert

TABLE 8. THE BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY: DIAGNOSTIC CATEGORIES AND RISK OF MALIGNANCY^a

Diagnostic category	Estimated/predicted risk of malignancy by the Bethesda system, % ^a	Actual risk of malignancy in nodules surgically excised, % median (range) ^b
Nondiagnostic or unsatisfactory	1–4	20 (9–32)
Benign	0–3	2.5 (1–10)
Atypia of undetermined significance or follicular lesion of undetermined significance	5–15	14 (6–48)
Follicular neoplasm or suspicious for a follicular neoplasm	15–30	25 (14–34)
Suspicious for malignancy	60–75	70 (53–97)
Malignant	97–99	99 (94–100)

^aAs reported in The Bethesda System by Cibas and Ali (1076).

^bBased on the meta-analysis of eight studies reported by Bongiovanni *et al.* (103). The risk was calculated based on the portion of nodules in each diagnostic category that underwent surgical excision and likely is not representative of the entire population, particularly of nondiagnostic and benign diagnostic categories.