SHORT COMMUNICATION

Inter-observer reproducibility using ‘The Besthesda System for Reporting Thyroid Cytopathology’ (TBSRTC)

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ABSTRACT
The overall inter-observer reproducibility of thyroid fine-needle aspiration (FNA) has not been comprehensively assessed. A blinded 3-rater inter-observer reproducibility study was conducted on 100 thyroid FNA cases using ‘The Bethesda System for Reporting Thyroid Cytology’. There was substantial inter-observer agreement for the Category 6 (κ = 0.678370) and Category 2 (κ = 0.615656); moderate agreement for Category 1 (κ = 0.527311); fair agreement for Category 4 (κ = 0.339415); and slight agreement for Category 5 (κ = 0.186441) and Category 3 (κ = 0.068966). The overall agreement, however was moderate (κ = 0.513213). The categories used in ‘The Bethesda System for Reporting Thyroid Cytology’ is reproducible and clinically relevant system for thyroid FNA reporting. This study demonstrates that International efforts to harmonize and refine thyroid cytology classification systems can improve consistency in the clinical management of thyroid nodules.

Keywords: Thyroid cytology, Bethesda, inter-observer reproducibility

INTRODUCTION
In India the prevalence of a palpable thyroid nodule in the community is about 12.2%, according to a recent study.1 However, thyroid cancer is quite rare, and the incidence is 8.7 per 100,000 people per year.1 Therefore, it is neither necessary nor feasible to surgically remove every thyroid nodule. Fine-needle aspiration (FNA) has been widely accepted as the diagnostic procedure of choice in the evaluation of patients presenting with nontoxic thyroid nodules. It reduces the rate of unnecessary thyroid surgery for patients with benign nodules and appropriately triages patients with thyroid cancer to appropriate surgery. (95) Depending on the type of lesion, thyroid FNA can be considered as either a diagnostic test or a screening tool.2 As a diagnostic test, the goal is to identify papillary carcinoma and other malignancies. The exceptions are follicular and Hurthle cell carcinomas. Cytology is unable to differentiate follicular and Hurthle cell carcinomas from their benign counterparts because it cannot establish the presence of capsular and/or vascular invasion.2 Thus, thyroid FNA is treated as a screening tool with regard to the detection of follicular and Hurthle cell carcinoma. (88) About 60% of the thyroid nodules are classified cytologically as benign, whereas less than 10% of the nodules are cytologically deemed malignant. The remaining 30% present findings not diagnostic of either benignancy or malignancy.2 Until recently, various diagnostic terminologies, including “atypical,” “indeterminate,” and “suspicious for malignancy,” were used to describe these diagnostically challenging cases. Further, until recently there were no uniform criteria established for the various diagnostic categories and specimen adequacy. As a result, diagnostic inconsistency existed among different laboratories as well as pathologists within the same laboratories. This resulted in difficulty in communicating the clinical implications of thyroid FNA results both to direct caregivers (endocrinologists and surgeons) and indirect caregivers (pathologists and radiologists). A critical need for cytopathologists to communicate thyroid FNA interpretations to referring physicians in terms that are succinct, unambiguous, and clinically helpful was felt. (137) To address terminology and other issues related to thyroid FNA, the National Cancer Institute (NCI) hosted the “NCI Thyroid Fine Needle Aspiration State of the Science Conference.”5 The meeting was organized by Andrea Abati, MD, and took place on October 22 and 23, 2007, in Bethesda.1 MD. Edmund S. Cibas, MD, and Susan J. Mandel, MD, MPH, served as moderators and Zubair W. Baloch, MD, PhD, served as chair of the committee.3 (67) A uniform reporting system for thyroid FNA to facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists, and other health care providers; cytologic-histologic correlation for thyroid diseases; research into the epidemiology, molecular biology, pathology, and diagnosis of thyroid diseases, particularly neoplasia;
and allow easy and reliable sharing of data from different laboratories for national and international collaborative studies was developed. The terms used in the reporting system also have an implied (or explicit) risk of malignancy on which recommendations for patient management (e.g., annual follow-up, repeat FNA, surgical lobectomy, near total thyroidectomy) can be based. The conclusions from the NCI meeting led to the development of ‘Bethesda Thyroid Atlas Project’ and the basis for ‘The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC)’. For clarity of communication, TBSRTC recommends that each report begin with 1 of 6 general diagnostic categories. Some categories have 2 alternative names; a consensus was not reached at the NCI conference on a single name for these categories. For some of the general categories, some degree of sub-categorization can be informative (Table 1). Additional descriptive comments (beyond such sub-categorization) are optional and left to the discretion of the cytopathologist. Each of the categories has an implied cancer risk that links it to a rational clinical management guideline (Table 2).

**MATERIALS AND METHODS**

All cases of Thyroid FNAs registered between January 2009 and September 2010 in Cytology Department of Shree Krishna Hospital, Karamsad, were studied retrospectively. Pathologist performed majority of the FNAs while few FNAs were done under ultrasound guidance. Direct smears were prepared from each pass. Smears were either air dried and stained with the Diff-Quikstain (DadeBehring, Deerfield, IL) or fixed in alcohol and stained by the Papanicolaou method. On average, two to three passes were performed for each nodule. On-site assessment of adequacy was performed in all of the patients. Prior to the reproducibility study’s commencing, all the 3 participants had discussed at length the cytologic details of the TBSRTC. The 3 observers were given all relevant clinical information such as patient’s age, the site of the nodule(s), if available, and any other clinical information that was supplied, but they were blinded as to the initial cytologic diagnosis. Each observer reported the cases according to the TBSRTC and categorized them into any of the following 6 general diagnostic categories of the system. (90)

**Category 1: Nondiagnostic (ND) or Unsatisfactory (UNS)**

A good criterion of adequacy, when appropriately applied, ensures a low false-negative rate. The adequacy of a thyroid FNA is defined by both the quantity and quality of the cellular and colloid components. Specimens could be rendered unsatisfactory owing to obscuring blood, overly thick smears, air-drying of alcohol-fixed smears, or an inadequate number of follicular cells. (63) For a thyroid FNA specimen to be satisfactory for evaluation, it should contain at least 6 groups of well-visualized (i.e., well-stained, undistorted, and unobstructed) follicular cells, with at least ten cells per group, preferably on a single slide. 

There are several exceptions to this numeric rule:

1. **Colloid nodules**: Any specimen that contains abundant colloid is considered adequate. A minimum number of follicular cells are not required.

2. **Cyst-fluid-only (CFO) (macrophages only)**: The significance and clinical value of a CFO result depend in large part on sonographic correlation. If the nodule is almost entirely cystic, with no worrisome sonographic features, the CFO is considered as benign. On the other hand, it might be clinically equivalent to an ND result if the sonographic features are worrisome. The risk of malignancy for a CFO sample was 4%.

3. **Solid nodules with inflammation**: Nodules in patients with lymphocytic (Hashimoto) thyroiditis, thyroid abscess, or granulomatous thyroiditis may contain only numerous inflammatory cells. Such cases are interpreted as Benign and not as ND/UNS. A minimum number of follicular cells are not required.

4. **Solid nodule with cytological atypia**: Whenever there is any atypia, the specimen is, by definition, adequate for evaluation.

**Category 2: Benign**

A “benign” result is obtained in 60% to 70% of thyroid FNAs. Excision should be considered for persistently ND/UNS nodules because about 10% (5% to 10%) prove to be malignant. (86) ND/UNS results occur in 2% to 20% of cases but ideally should be limited to no more than 10% of thyroid FNAs, excluding samples composed exclusively of macrophages. (29)

**Category 3: Suspicious**

A suspicious result is obtained in 5% to 10% of thyroid FNAs. The significance and clinical value of a suspicious result depend in large part on sonographic correlation. If the nodule is almost entirely cystic, with no worrisome sonographic features, the CFO is considered as benign. On the other hand, it might be clinically equivalent to an ND result if the sonographic features are worrisome. The risk of malignancy for a CFO sample was 4%.

**Category 4: Benign Follicular Nodules (BFN)**

Benign Follicular Nodules encompass multinodular goiter and follicular adenoma. A distinction between the two cannot be made by FNA and is of no consequence to the patient because they are benign and, therefore, can be managed in a similar,
conservative manner. (72) Category 3: Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance (AUS/FLUS) This category includes lesions that are not easily classified into benign, suspicious or malignant categories. An AUS result has been reported in 3–18% of thyroid FNAs. AUS is a category of last resort and should not be used indiscriminately. (52) Category 4: Follicular Neoplasm or Suspicious for a Follicular Neoplasm (FN/SFN) The purpose of this diagnostic category is to identify a nodule that might be a follicular carcinoma (FC) and triage it for surgical lobectomy. (35) The term suspicious for a follicular neoplasm is preferred by some laboratories over follicular neoplasm for this category because a significant proportion of cases (up to 35%) prove not to be neoplasms but rather hyperplastic proliferations of follicular cells, most commonly those of multinodular goiter. (3,4) About 15% to 30% of cases called FN/SFN prove to be malignant, out of which many are follicular carcinoma, but a significant proportion are follicular variants of papillary carcinoma. (3,74) Category 5: Suspicious for Malignancy (SFM) The aim of segregating a “suspicious” category apart from a “malignant” category is to preserve the very high positive predictive value (PPV) of the malignant category without compromising the overall sensitivity of the procedure. (40) Many thyroid cancers, most especially papillary thyroid carcinoma (PTC), can be diagnosed with certainty by FNA. But the nuclear and architectural changes of some PTCs are subtle and focal, particularly true of the follicular variant of PTC. If only 1 or 2 characteristic features of PTC are present, if they are only focal and not widespread throughout the follicular cell population, or if the sample is sparsely cellular, a malignant diagnosis cannot be made with certainty. Such cases occur with some regularity, and they are best classified as “suspicious for malignancy,” qualified as “suspicious for papillary carcinoma.” Most (60–75%) prove to be papillary carcinomas and the rest are usually follicular adenomas. (3,113) The same general principle applies to other thyroid malignancies like medullary carcinoma and lymphoma, but these are encountered less frequently than PTC. (21) Category 6: Malignant The general category malignant is used whenever the cytomorphologic features are conclusive for malignancy. A 3–7% of thyroid FNAs have conclusive features of malignancy, and most are papillary carcinomas. (3,32) The anonymized results of the present study were collated with the data being analyzed by a professional statistician. The κ statistic was used to assess the agreement between all 3 observers simultaneously. In this method of κ analysis, an agreement score is given for each component (whether observers agreed a case was in that category vs any other category) and an overall assessment of agreement is made. Values of the Cohen κ were interpreted as follows: 0 to 0.2, slight agreement; 0.21 to 0.40, fair agreement; 0.41 to 0.60, moderate agreement; 0.61 to 0.80, substantial agreement, and 0.8 to 1.00, almost perfect agreement. (7,94)

RESULTS
A total of 100 thyroid FNAs were evaluated at our institution during the 21-month study period between January 2009 and September 2010. Table 3 summarizes the distributions of cytologic diagnoses by 3 observers. (34)

Table 1: The Bethesda System for Reporting Thyroid Cytopathology; recommended diagnostic categories

<table>
<thead>
<tr>
<th>Diagnostic category</th>
<th>Risk of malignancy (%)</th>
<th>Usual management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-diagnostic or Unsatisfactory (Not including CFO)</td>
<td>1-4</td>
<td>Repeat FNA with ultrasound guidance</td>
</tr>
<tr>
<td>Benign</td>
<td>0-3</td>
<td>Clinical follow-up</td>
</tr>
<tr>
<td>Atypia of Undetermined Significance</td>
<td>-5–15</td>
<td>Repeat FNA</td>
</tr>
<tr>
<td>Follicular Neoplasm or Suspicious for a Follicular Neoplasm</td>
<td>15–30</td>
<td>Surgical lobectomy</td>
</tr>
<tr>
<td>Suspicious for Malignancy</td>
<td>60–75</td>
<td>Near-total thyroidectomy or surgical lobectomy</td>
</tr>
<tr>
<td>Malignant</td>
<td>97–99</td>
<td>Near-total thyroidectomy</td>
</tr>
</tbody>
</table>

Table 2: The Bethesda System of Reporting Thyroid Cytopathology; Implied risk of malignancy and recommended clinical management

I. Non-diagnostic or Unsatisfactory

1. Cyst fluid only
2. Virtually acellular specimen
3. Other (obscuring blood, clotting artifact, etc.)

II. Benign

1. Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc.)
2. Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context
3. Consistent with granulomatous (subacute) thyroiditis
4. Other

III. Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance

IV. Follicular Neoplasm or Suspicious for a Follicular Neoplasm

1. Specify if Hürthle cell (oncocytic) type

V. Suspicious for Malignancy

1. Suspicious for papillary carcinoma
2. Suspicious for medullary carcinoma
3. Suspicious for metastatic carcinoma
4. Suspicious for lymphoma
5. Other

VI. Malignant

1. Papillary thyroid carcinoma
2. Poorly differentiated carcinoma
3. Medullary thyroid carcinoma
4. Undifferentiated (anaplastic) carcinoma
5. Squamous cell carcinoma
6. Carcinoma with mixed features (specify)
7. Metastatic carcinoma
8. Non-Hodgkin lymphoma
9. Other

Table 3: The Bethesda System of Reporting Thyroid Cytopathology and its variants of papillary carcinoma.

<table>
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<tr>
<th>Diagnostic category</th>
<th>Risk of malignancy (%)</th>
<th>Usual management</th>
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<td>0-3</td>
<td>Clinical follow-up</td>
</tr>
<tr>
<td>Atypia of Undetermined Significance</td>
<td>-5–15</td>
<td>Repeat FNA</td>
</tr>
<tr>
<td>Follicular Neoplasm or Suspicious for a Follicular Neoplasm</td>
<td>15–30</td>
<td>Surgical lobectomy</td>
</tr>
<tr>
<td>Suspicious for Malignancy</td>
<td>60–75</td>
<td>Near-total thyroidectomy or surgical lobectomy</td>
</tr>
<tr>
<td>Malignant</td>
<td>97–99</td>
<td>Near-total thyroidectomy</td>
</tr>
</tbody>
</table>
Table 3: Distribution of cytologic diagnoses by 3 observers

<table>
<thead>
<tr>
<th>Cytologic category</th>
<th>Observer 1</th>
<th>Observer 2</th>
<th>Observer 3</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unsatisfactory</td>
<td>13</td>
<td>06</td>
<td>09</td>
<td>9.3</td>
</tr>
<tr>
<td>2. Benign</td>
<td>75</td>
<td>81</td>
<td>78</td>
<td>78</td>
</tr>
<tr>
<td>3. Atypia of undetermined significance</td>
<td>02</td>
<td>04</td>
<td>03</td>
<td>3.0</td>
</tr>
<tr>
<td>4. Follicular neoplasm or Suspicion of a follicular neoplasm</td>
<td>04</td>
<td>03</td>
<td>04</td>
<td>3.7</td>
</tr>
<tr>
<td>5. Suspicious for malignancy</td>
<td>03</td>
<td>02</td>
<td>00</td>
<td>1.7</td>
</tr>
<tr>
<td>6. Malignant</td>
<td>03</td>
<td>04</td>
<td>06</td>
<td>4.3</td>
</tr>
</tbody>
</table>

Table 4: Distribution of cytologic diagnoses in three studies

<table>
<thead>
<tr>
<th>Cytologic category</th>
<th>Study by Yang J, Schadag V et al</th>
<th>Study by Constantine G.A. et al</th>
<th>Our study</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Unsatisfactory</td>
<td>10.4</td>
<td>11.1</td>
<td>9.3</td>
</tr>
<tr>
<td>2. Benign</td>
<td>64.6</td>
<td>73.8</td>
<td>78</td>
</tr>
<tr>
<td>3. Atypia of undetermined significance</td>
<td>3.2</td>
<td>3.0</td>
<td>3.0</td>
</tr>
<tr>
<td>4. Follicular neoplasm or Suspicion of a follicular neoplasm</td>
<td>11.6</td>
<td>5.5</td>
<td>3.7</td>
</tr>
<tr>
<td>5. Suspicious for malignancy</td>
<td>2.6</td>
<td>1.3</td>
<td>1.7</td>
</tr>
<tr>
<td>6. Malignant</td>
<td>7.6</td>
<td>5.2</td>
<td>4.3</td>
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**DISCUSSION**

The thyroid gland is the organ most commonly sampled by FNA. Thyroid fine-needle aspiration (FNA) has been in use for many years and is now the mainstay of preoperative diagnosis of thyroid lesions. Although thyroid cytology is widely used as a first-line investigation to guide clinical management, until recently, there was no standardized terminology for FNA reporting. The Bethesda System for Reporting of Thyroid Cytology (TBSRTC), published in 2008 is an international effort to standardize diagnostic terminology in thyroid FNA. The present study is an inter-observer reproducibility study on six-tier diagnostic classification system of TBSRTC in reporting thyroid FNA results, undertaken by 3 experienced cytopathologists (D.N., J.M. and P.K.). Of the 100 thyroid FNAS studied, 9.3% of thyroid nodules were classified as unsatisfactory, 78% benign, 3% atypia of undetermined significance, 3.7% suspicious of follicular neoplasm, 1.7% suspicious for malignancy, and 4.3% positive for malignancy. There was no statistically significant difference among the distribution of the diagnostic categories between the three observers in our study (paired t-test, p>0.005). In a similar study by Yang J, Schnadig V et al that also utilized a similar six-tier cytologic diagnostic approach reported that 10.4% were unsatisfactory, 64.6% benign, 3.2% atypical cellular lesions, 11.6% FN, 2.6% suspicious, and 7.6% as malignant based on a cohort of 4073 thyroid FNA samples from two academic institutions. Constantine G.A. Theoharis et al reported distribution of these categories from 3207 evaluated nodules as follows 11.1% unsatisfactory, 73.8% benign, 3.0% indeterminate, 5.5% FN, 1.3% suspicious, and 5.2% malignant. The distribution of cytologic diagnoses in the three studies are given in Table 3. One of the major limitations of thyroid FNA is the relatively high rate of "unsatisfactory/non-diagnostic" specimens. The majority of the reported unsatisfactory rates ranged between 10% and 20%. However, unsatisfactory rates as high as 30% have been reported. The rate of nondiagnostic specimens may be influenced by the nature of the thyroid nodules, the experience of the aspirators, whether on site adequacy assessment is performed, and the criteria used to define specimen adequacy. In our institution, we used the number of follicular cells as a general rule but not the absolute criterion. In many instances, we took into consideration the sono graphic findings. For nodules that appeared entirely cystic or colloid rich on ultrasound with the aspirate demonstrating predominantly histiocytes and/or colloid, the specimen was classified as adequate even if there were an insufficient number of follicular cells; a qualifier indicating paucity or lack of follicular cells was added. Also, in our institute, we follow on site cytologic specimen adequacy evaluation, which reduced our unsatisfactory smears to less than 10%. This also provides great cost savings as it reduces the cost associated with second hospital visits and additional procedures. Also the optimal number of fine needle passes during thyroid FNA has not been well documented. Weijian Z. et al through their study on 883 cases recommend that 4 passes/lesion should be the minimum number to reach a reasonable diagnostic rate. It is clear that smear cellularity depends on several factors including the aspirator’s skill and the intrinsic nature of the thyroid nodule. Since solitary nodules that are repeatedly “non-diagnostic” on FNA have an unknown risk of malignancy, ranging between 5 and 10%, the American Thyroid Association recommends that solid nodules associated with a “non-diagnostic” smear should be re-aspirated with ultrasound guidance, and if repeat aspirates remain “non-diagnostic,” surgery should be strongly considered. It is not surprising that aspirates classified as “benign” accounted for the majority of the thyroid FNAS. This category consisted of a heterogeneous group of lesions such as nodular goiter, colloid nodule, and lymphocytic thyroiditis. Cytologically “benign” thyroid nodules require careful clinical follow-up because of associated up to 5% false-negative rate. The false-negative rate may be higher with FNAs directed by palpation rather than by ultrasound examination. Ultrasonographic characteristics that indicate a higher likelihood of malignancy include...
microcalcifications, irregular borders, hypoechochogenicity in a solid nodule and intranodular hypervascularity. Cytologically “benign” nodules can be followed clinically with repeat ultrasound examination at 6 to 18 month intervals. These nodules may be reaspirated or surgically removed when significant change in size occurs. Ultrasonography appears to be the best technique for detection of change in nodule size. The American Thyroid Association (ATA) has suggested that a 20% increase in nodule diameter with a minimum increase in two or more dimensions of at least 2 mm is a reasonable definition for a significant change in nodule size. The diagnostic category “atypia of undetermined significance” in the NCI classification included cases that could not be classified as benign or FN. The guidelines provided by the NCI encouraged minimizing the use of this category. According to the NCI recommendation, patients with an indeterminate thyroid FNA could benefit from repeat FNA because the risk of malignancy was 5-10%, with the remaining 90-95% being adenomas or dominant nodules of a multinodular goiter. In our study, this category accounted for only 3% of all thyroid FNAs, the second lowest in frequency among all diagnostic categories, only preceded by the suspicious for malignancy category. However, in various studies, 10-40% of nodules are diagnosed as indeterminate by cytology, making it difficult to optimally manage these patients. Given that this diagnostic category is associated with low specificity and a low positive predictive value, repeat FNAs, repeat ultrasound scans or radionucleotide uptake studies are recommended. Radiological correlation may also be helpful in improving the overall positive predictive value of this category. In cases cytologically designated as “atypical/borderline”, and when the serum TSH level is low or below normal the referring clinician may consider an iodine-123 scan. If the scan is “hot,” clinical follow-up with a repeat FNA in 3-6 months is appropriate. If the scan is “cold,” the patient may be referred for surgery. Yuri E. N., David L. S. et al in their study on 328 patients with thyroid nodules, observed that molecular testing of thyroid nodules for a panel of mutations (BRAF, RAS, RET/PTC, and PAX8/PPARγ) enhances the accuracy of FNA cytology and is of particular value for thyroid nodules with indeterminate cytology. The diagnostic category “Follicular Neoplasm” was applied to cellular aspirates that demonstrated a predominant microfollicular pattern with little or no colloid. Because of the inability of FNA to distinguish follicular and Hurthle cell adenomas from their malignant counterparts, the role of thyroid FNA shifts from being a diagnostic test to a screening test, implying that specificity will take a back seat with regard to sensitivity in detecting follicular and Hurthle cell carcinoma. This category is associated with a 20-30% incidence of malignancy. Because of the high incidence of associated malignancy, operative intervention has been recommended. The choice between lobectomy and total thyroidectomy depends on a variety of factors. Usually a lobectomy is performed followed by intraoperative or postoperative histologic examination of the lesion for capsular and/or vascular invasion. If capsular or vascular invasion is documented, total thyroidectomy may be performed. Total thyroidectomy should be considered in patients with large tumors (>4 cm), characteristic of index nodule, presence of nodules in the contralateral lobe, marked atypia on FNA, age of the patient, and patient with family history or personal history of radiation exposure. Majority of the cases in the category “Suspicious for malignancy” represent papillary carcinoma. Less commonly, other malignancies such as medullary carcinoma, lymphoma and metastatic carcinoma are included in this category. Approximately 50-75% of the lesions placed in this category are malignant. Intraoperative frozen section may be of significant aid in determining the extent of surgery when a definitive diagnosis of papillary carcinoma is made by frozen section evaluation. “Malignant” category refers to the histologic entities of papillary carcinoma, medullary carcinoma, lymphoma, anaplastic, and metastatic carcinoma. The ATA recommends total or near total thyroidectomy for cases in this category if any of the following features are present: primary carcinoma is more than 1-1.5 cm in size, contralateral thyroid nodules are present, regional or distant metastases is present, patient has history of radiation to head or neck or a first degree relative with thyroid carcinoma. However, if the cytology suggests metastatic cancer, a search to identify the primary site is required so that unnecessary thyroidectomy is avoided. The most common metastatic tumors to thyroid are renal cell carcinoma, lung and breast carcinoma.

CONCLUSION
Interpretation of thyroid FNA is challenging. Before TBSRTC was introduced, reports were largely descriptive, with a multiplicity of category names, descriptive reports (no categories), or the use of surgical pathology terminology. For categories such as atypical, indeterminate, suspicious, and nondiagnostic, 27% of pathologists used 3 categories, 44% used 2 categories, and 27% used just 1 category. In a recent study of 742 inter-institutional referrals, thyroid FNA accounted for 23% of all major diagnostic disagreements. In summary, our
study shows that the six-tier diagnostic approach of reporting thyroid FNA proposed by the NCI Thyroid FNA Scientific Conference is an excellent screening test. By adhering to strict cytologic criteria, we encountered few false positives. Further, each diagnostic category conveys a different level of risk of malignancy to the direct care givers. On the other hand, thyroid surgery is indicated for patients with a cytologic interpretation of FN, suspicious for malignancy, and positive for malignancy because of the substantial risk of malignancy. For patients with an indeterminate thyroid FNA, benefit may be obtained from repeat thyroid FNA in the absence of clinical and/or radiologic concerns of an underlying malignancy. (187)

REFERENCES


