Advances in Cytology and Small Biopsies

WEDNESDAY JUNE 14, 2023

Updates to The Bethesda System For Reporting Thyroid Cytopathology

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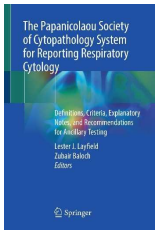
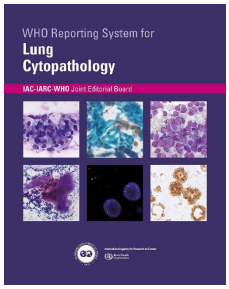
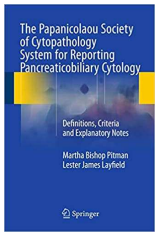
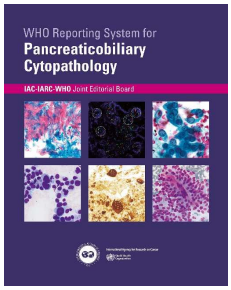
* PVL has no relevant conflicts of interest relating to the content of this presentation to disclose.

Cytology Reporting Systems









WHO books in the works:

- Lymph node, Soft tissue
- Liver, Breast, Kidney/Adrenal

Thyroid FNA Reporting

Reporting system must be succinct, unambiguous, and clinically helpful

✓ **Clarity of communication:**
- Facilitate clear and effective communication among cytopathologists, endocrinologists, surgeons, radiologists, and other health care providers

✓ **Clinically relevant information:**
- Have well-defined ROMs for each diagnostic category, linked to a specific management recommendation

✓ **Universal language:**
- Allow effective and reliable sharing of data between laboratories and translatable results between studies

Pre Bethesda Era

TIMELY REVIEW
Section Editor: Andrea Abati, M.D.

Reporting Thyroid Fine-Needle Aspiration:
Literature Review and a Proposal
Helen H. Wang, M.D., DrPH

Diagn. Cytopathol. 2006;34:67–76.

<u>Literature review: 1966-2003</u>
87 publications:
PPV/NPV/Sen/Spec

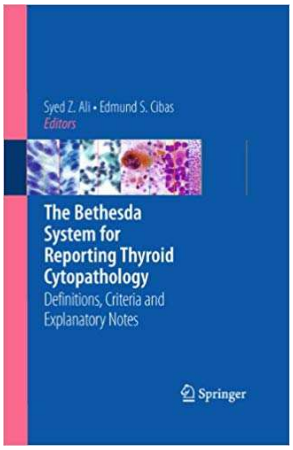
Heterogenous practice:
Two tier reporting: 3
Three tier reporting: 41
Four tier reporting: 17
Five tier reporting: 8
Six + tier reporting: 10
(excluding ND category)

Table IV. Five-Category Schemes

Terminology	*Sensitivity[a] (%)*	*Specificity[b] (%)*	*PPV[c] (%)*	*NPV[d] (%)*
Scheme J[66] • Benign • Indeterminate • Cellular atypia • Suspected malignant tumor • Malignant	Malignant: 34; malignant + suspected malignant: 49; malignant + suspected + cellular atypia: 56; malignant + suspected + cellular atypia + indeterminate: 63	84	Malignant: 99; suspected: 91; cellular atypia: 68; indeterminate: 35	77
Scheme K[67–69] • Benign[e] (normal) • Follicular neoplasm[e] (suggestive of follicular or Hürthle cell neoplasm) • Atypical[e] (indeterminate) • Suspicious • Malignant (positive)	Malignant: 65; malignant + suspicious: 95	26	Malignant: 100; suspicious: 72; indeterminate: 20; follicular neoplasm: 6	100
Scheme L[70,71] • Benign-nodular goiter • Follicular adenoma[e] (possible adenoma-probably benign) • Adenoma-possible carcinoma (atypical) • Suspected carcinoma • Carcinoma (malignant)	Carcinoma + suspected: 92–94; carcinoma + suspected + adenoma-possible carcinoma: 99	34–99	Carcinoma + suspected: 86–97; adenoma-possible carcinoma: 12	98–99
Scheme M[72] • Adenomatoid nodule (AN) • Hashimoto's thyroiditis • Follicular neoplasm (FN) • Indeterminate (accuracy based on only indeterminate cases) • Carcinoma	Suspicious for papillary carcinoma, follicular or thyroid neoplasm: 63	57 (AN versus FN)	Suspicious for papillary carcinoma, follicular or thyroid neoplasm: 50	68 (AN versus FN)
Scheme N[73] • Benign tumor • Thyroiditis • Hürthle cell tumor • Suspicion of malignant tumor • Malignant tumor	Malignant: 67; malignant + suspicion: 86	83 (benign + thyroiditis)	Malignant: 100; suspicion: 25	99 (benign + thyroiditis)

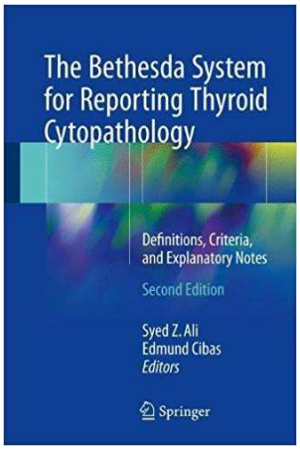
The Bethesda System for Reporting Thyroid Cytopathology

2010



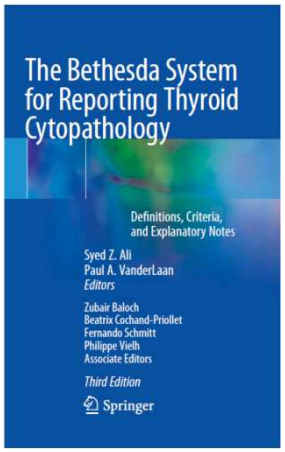
- 2007 NCI Thyroid State of the Science

2018



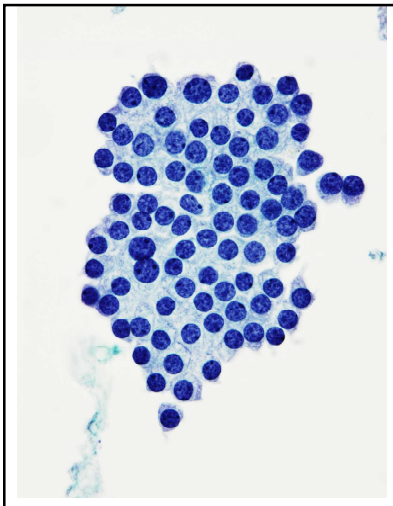
- 2015 ATA guidelines
- Molecular testing
- NIFTP

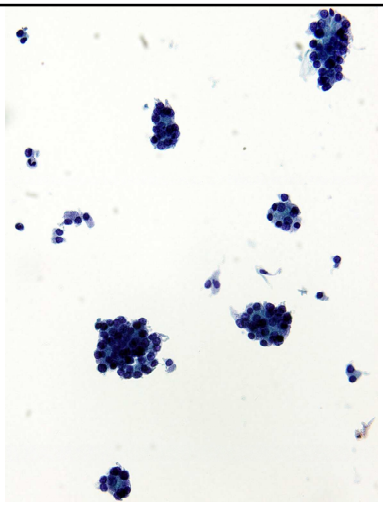
2023

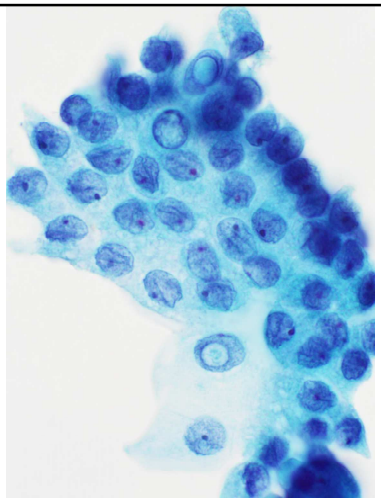


- What's new?

→ All royalties donated to the American Society of Cytopathology (ASC)







Benign → AUS → Follicular Neoplasm → Suspicious for Malignancy → Malignant

TBS 3rd edition

Associate Editors

- Zubair Baloch MD, PhD
  - Hospital of the University of Pennsylvania, Philadelphia
- Beatrix Cochand-Priollet MD, PhD
  - Cochin Hospital, AP-HP Centre, University Paris-Cité-France
- Fernando Schmitt MD, PhD
  - University of Porto, Portugal
- Philippe Vielh MD, PhD
  - American Hospital of Paris, France

TBSRTC 3rd edition: an International effort

2nd ed: 44 authors

3rd ed: 67 authors

- 55 Institutions
- 18 Countries
- 4 Continents
- More clinicians and radiologists

Diagnostic Category Names

One name per category

→ Simplification

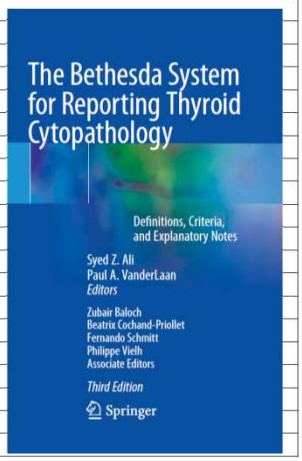
→ Clarity

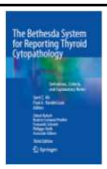
→ Avoid confusion

→ Align with other reporting systems

TABLE 1.1. The Bethesda System for Reporting Thyroid Cytopathology; diagnostic categories.

I. Nondiagnostic
Cyst fluid only
Virtually acellular specimen
Other (obscuring blood, clotting artifact, drying artifact, etc.)
II. Benign
Consistent with follicular nodular disease (includes adenomatoid nodule, colloid nodule, etc.)
Consistent with chronic lymphocytic (Hashimoto) thyroiditis in the proper clinical context
Consistent with granulomatous (subacute) thyroiditis
Other
III. Atypia of Undetermined Significance
Specify if AUS-nuclear atypia or AUS-other
IV. Follicular Neoplasm
Specify if oncocytic (Hürthle cell) type
V. Suspicious for Malignancy
Suspicious for papillary thyroid carcinoma
Suspicious for medullary thyroid carcinoma
Suspicious for metastatic carcinoma
Suspicious for lymphoma
Other
VI. Malignant
Papillary thyroid carcinoma
High-grade follicular-derived carcinoma
Medullary thyroid carcinoma
Undifferentiated (anaplastic) carcinoma
Squamous cell carcinoma
Carcinoma with mixed features (specify)
Metastatic malignancy
Non-Hodgkin lymphoma
Other





Chapter 1

Overview of Diagnostic Terminology and Reporting

Zubair Baloch[a*], David Cooper[b], Martin Schlumberger[c], and Erik Alexander[d]

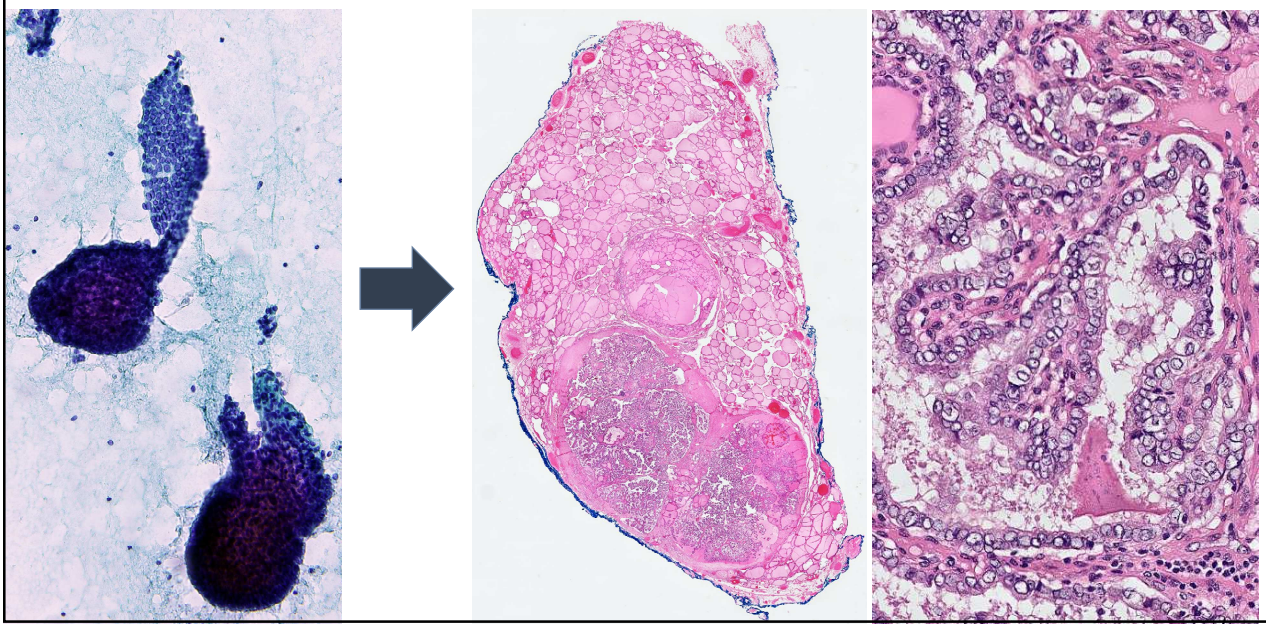
Refined ROM

→ New Data (Prospective Studies)

TABLE 1.2. The Bethesda System for Reporting Thyroid Cytopathology: implied risk of malignancy (ROM) with expected ranges based on follow-up of surgically resected nodules with recommended clinical management.[23-51]

Diagnostic category	ROM[a] Ave% (range)	Usual management[b]
Nondiagnostic	**13** (5-20)[c]	Repeat FNA[d] with ultrasound guidance
Benign	**4** (2-7)[e]	Clinical and sonographic follow-up
Atypia of Undetermined Significance[f]	**22** (13-30)	Repeat FNA[d], molecular testing, diagnostic lobectomy, or surveillance
Follicular Neoplasm[g]	**30** (23-34)	Molecular testing[h], diagnostic lobectomy
Suspicious for Malignancy	**74** (67-83)	Molecular testing[h], lobectomy or near-total thyroidectomy[i]
Malignant	**97** (97-100)	Lobectomy or near-total thyroidectomy[i]

Surgical resection outcome data



Issues with Surgical Endpoints

- Not all nodules are resected (especially AUS)
  - ✓ Verification bias
- Lower risk nodules (B9, AUS) that are resected likely have other worrisome features
  - ✓ Inflated ROM for the category
- Additional layer of diagnostic subjectivity by the surgical pathologist
  - ✓ Multiple degrees of freedom to account for
- Temporal gap between FNA and resection
  - ✓ Lagging outcome indicator, difficulty in compiling data

Review Article *Cancer Cytopathol* 2020;128:238-249.

Differences in Surgical Resection Rate and Risk of Malignancy in Thyroid Cytopathology Practice Between Western and Asian Countries: A Systematic Review and Meta-Analysis

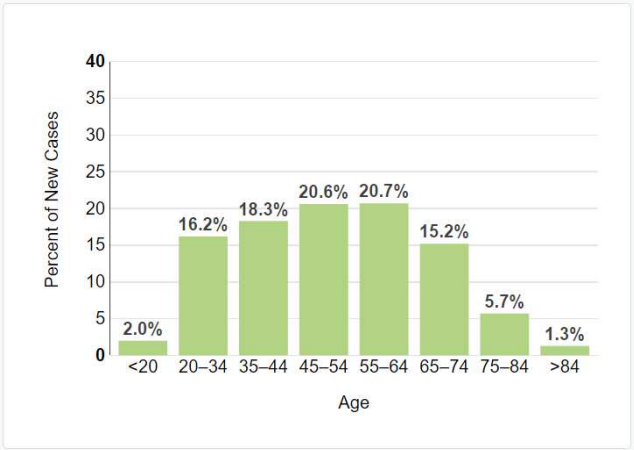
Huy Gia Vuong, MD, PhD[1], Hanh Thi Tuyet Ngo, MD, PhD[2], Andrey Bychkov, MD, PhD[3,4], Chan Kwon Jung, MD, PhD[5], Trang Huyen Vu, MD[6], Kim Bach Le, MD[6], Kennichi Kakudo, MD, PhD[7], and Tetsuo Kondo, MD, PhD[1]

TABLE 3. Resection Rate and Risk of Malignancy for 6 Categories of The Bethesda System for Reporting Thyroid Cytopathology in Western and Asian Series

FNA Category	Pooled Proportion (95% CI), % Western Series (n = 22)	Asian Series (n = 16)	P[a]
Nondiagnostic			
Frequency	11.9 (9.1-14.7)	12.6 (6.7-18.5)	.827
RR	14.9 (11.4-18.5)	11.5 (7.8-15.2)	.896
ROM	13.2 (9.6-16.7)	26.5 (16.4-36.6)	.151
Benign			
Frequency	64.2 (60.0-68.4)	59.8 (51.6-67.9)	.353
RR	11.0 (8.4-13.5)	16.0 (8.3-23.6)	.235
ROM	4.1 (2.8-5.4)	13.8 (9.0-18.6)	**.001**
AUS/FLUS			
Frequency	7.7 (5.1-10.2)	8.4 (5.5-11.4)	.647
RR	40.5 (32.2-48.8)	29.5 (21.0-38.0)	.354
ROM	21.5 (17.0-26.0)	45.0 (33.4-56.5)	**.001**
FN/SFN			
Frequency	7.9 (5.7-10.1)	3.5 (1.9-5.1)	**.008**
RR	63.4 (55.6-71.1)	55.5 (46.2-64.8)	.078
ROM	27.3 (24.4-30.2)	32.8 (27.5-38.1)	.335
Suspicious for malignancy			
Frequency	3.3 (2.6-4.1)	4.3 (2.6-6.1)	.291
RR	72.6 (65.4-79.9)	65.4 (56.4-74.4)	.310
ROM	75.1 (69.8-80.4)	88.1 (82.8-93.4)	**.033**
Malignant			
Frequency	4.9 (3.8-6.0)	10.9 (7.1-14.7)	**.007**
RR	74.8 (68.2-81.5)	68.6 (58.3-78.9)	.314
ROM	99.2 (98.8-99.5)	98.6 (97.6-99.5)	.633

NIH NATIONAL CANCER INSTITUTE
Surveillance, Epidemiology, and End Results Program

Percent of New Cases by Age Group: Thyroid Cancer



Thyroid cancer is most frequently diagnosed among people aged 55–64.

Median Age At Diagnosis

51

SEER 22 2016–2020, All Races, Both Sexes

Original Article

Cancer Cytopathol. 2012;120:342-350.

Cytomorphological and Molecular Genetic Findings in Pediatric Thyroid Fine-Needle Aspiration

Sara E. Monaco, MD[1]; Liron Pantanowitz, MD[1]; Walid E. Khalbuss, MD, PhD[1]; Vanessa A. Benkovich, BS[1]; John Ozolek, MD[1]; Marina N. Nikiforova, MD[1]; Jeffrey P. Simons, MD[2]; and Yuri E. Nikiforov, MD, PhD[1]

Research

JAMA Oncol. 2022;8(9):1323-1327.

JAMA Oncology | Brief Report

Evaluation of the Molecular Landscape of Pediatric Thyroid Nodules and Use of a Multigene Genomic Classifier in Children

Jean-Nicolas Gallant, MD, PhD; Sheau-Chiann Chen, PhD; Carlos A. Ortega, BS; Sarah L. Rohde, MD; Ryan H. Belcher, MD; James L. Netterville, MD; Naira Baregamian, MD; Huiying Wang, MD; Jiancong Liang, MD, PhD; Fei Ye, PhD; Yuri E. Nikiforov, MD, PhD; Marina N. Nikiforova, MD; Vivian L. Weiss, MD, PhD

AJCP / Original Article

Am J Clin Pathol. 2021;155(5):680-689.

Application of the Bethesda System for Reporting Thyroid Cytopathology in the Pediatric Population

A Multicenter Study in Asian Countries

Huy Gia Vuong, MD, PhD,[1,2] Ayana Suzuki,[3] Hee Young Na, MD,[4] Pham Van Tuyen, MD,[5] Doan Minh Khuy, MD,[5] Hiep Canh Nguyen, MD, PhD,[5] Tikamporn Jitpasutham, MD,[6] Agustina Abelardo, MD,[7,8] Takashi Amano,[3] So Yeon Park, MD,[4] Chan Kwon Jung, MD, PhD,[10] Mitsuyoshi Hirokawa, MD, PhD,[3] Ryohei Katoh, MD, PhD,[9] Kennichi Kakudo, MD, PhD,[11] and Andrey Bychkov, MD, PhD[12,13,a]

Original Article

Cancer Cytopathol. 2022;130(5):330-335.

Subtype of atypia on cytology and risk of malignancy in pediatric thyroid nodules

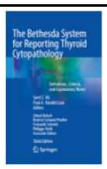
Christine E. Cherella, MD[1]; Monica L. Hollowell, MD[2]; Jessica R. Smith, MD[3]; Benjamin Zendejas, MD, MSc[3]; Biren P. Modi, MD, MPH[4]; Edmund S. Cibas, MD[4]; and Ari J. Wassner, MD[1]

Bethesda System for Reporting Thyroid Cytopathology in Pediatric Thyroid Nodules

Experience of a Tertiary Care Referral Center

Amer Heider, MD; Stacy Arnold, MD; Xin Jing, MD

Arch Pathol Lab Med. 2020;144(4):473-477.



Chapter 1

Overview of Diagnostic Terminology and Reporting

Zubair Baloch[a*], David Cooper[b], Martin Schlumberger[c], and Erik Alexander[d]

Refined ROM

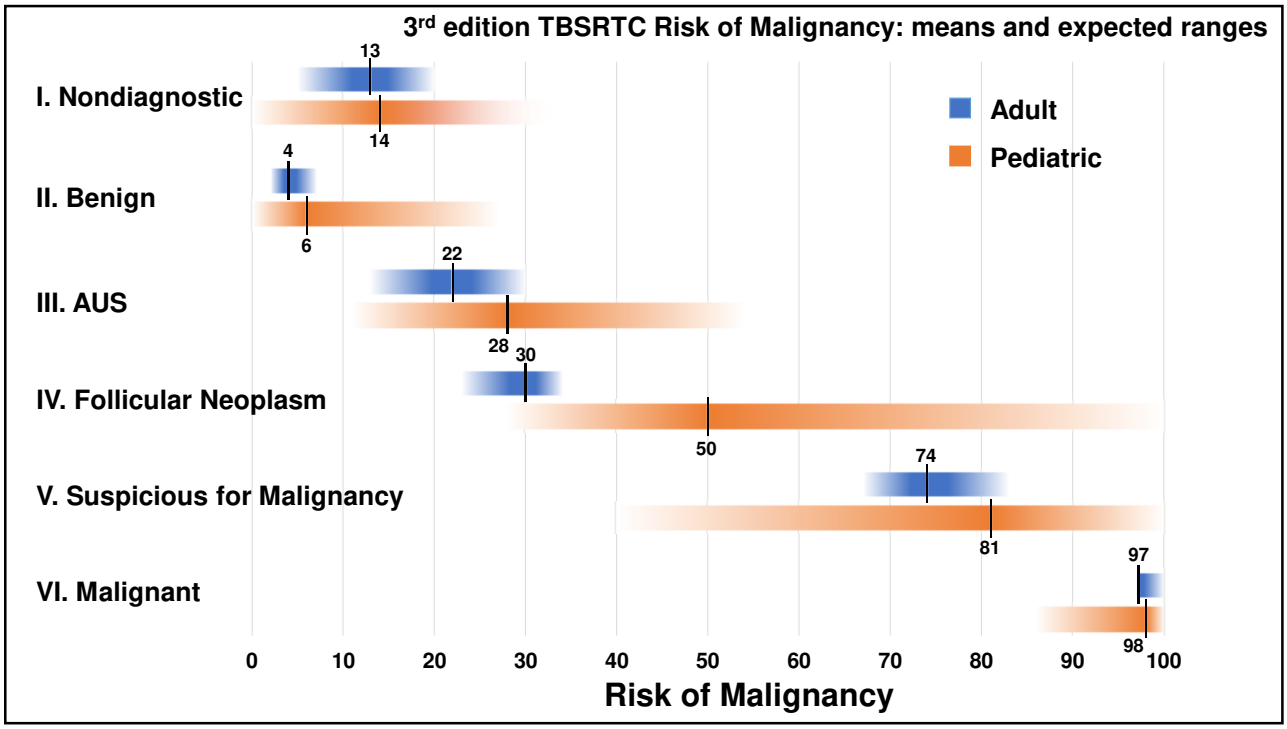
→ New Data
(pediatric population)

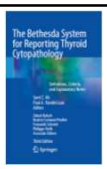
TABLE 1.3. The Bethesda System for Reporting Thyroid Cytopathology in Pediatric Patients with implied risk of malignancy (ROM) and possible management recommendations.[10, 12-18, 64-69]

Diagnostic category	ROM Ave% (range)	Possible Management Recommendations
Nondiagnostic	**14** (0-33)	Repeat FNA with ultrasound guidance
Benign[a]	**6** (0-27)	Clinical and sonographic follow-up
Atypia of Undetermined Significance	**28** (11–54)	Repeat FNA or surgical resection
Follicular Neoplasm[b]	**50** (28-100)	Surgical resection
Suspicious for Malignancy	**81** (40–100)	Surgical resection
Malignant	**98** (86–100)	Surgical resection

[a] ROM is skewed by selection bias since a majority of thyroid nodules classified as benign do not undergo surgical excision.

[b] Includes cases of follicular neoplasm with oncocytic features (Hürthle cell neoplasm).





Chapter 1

Overview of Diagnostic Terminology and Reporting

Zubair Baloch[a*], David Cooper[b], Martin Schlumberger[c], and Erik Alexander[d]

Refined ROM

→ Additional experience with NIFTP

Table 1.4. Reported decreases in the risk of malignancy (ROM) of TBSRTC diagnostic categories if excluding nodules diagnosed on surgical pathology to be "Noninvasive Follicular Thyroid Neoplasm with Papillary Like Nuclear Features (NIFTP)".[21, 23, 70-78]

Diagnostic category	% Decrease in ROM if excluding NIFTP[a] Ave% (range)	Estimated Final ROM if excluding NIFTP[b] Ave%
Nondiagnostic	**1.3** (0-2)	**12**
Benign	**2.4** (0-4)	**2**
Atypia of Undetermined Significance	**6.4** (6-20)	**16**
Follicular Neoplasm	**7.1** (0.2-30)	**23**
Suspicious for Malignancy	**9.1** (0-40)	**65**
Malignant	**2.6** (0-13)	**94**

[a] Based on weighted average (mean) reduction in malignancy with expected ranges calculated from refs [21, 23, 70-78]

[b] Based on estimated average ROM values from Table 1.2 minus values presented in this table

Terminology harmonized

with latest 5th edition / 2022
WHO classification of Thyroid Neoplasms

Benign (Chapter 2)

- Follicular Nodular Disease

FN-OFN (Chapter 6)

- Follicular neoplasm (Oncocytic follicular neoplasm)

High-Grade Follicular-Derived Thyroid Carcinoma (Chapter 10)

- Poorly differentiated thyroid carcinoma (PDTC) & differentiated high-grade thyroid carcinoma (DHGTC)

Malignant-PTC (Chapter 8)

- Cribriform morular thyroid carcinoma (CMTC) classified as malignant thyroid tumor of uncertain histogenesis
- NIFTP and HTT both classified as low-risk follicular cell derived neoplasms

International Agency for Research on Cancer
World Health Organization

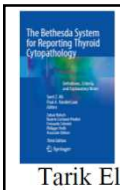
WHO Classification of Tumours online

Home Account Notes Favourites About Contact Logout

Endocrine and Neuroendocrine Tumours (5th ed.)

1. Forewords and introductions
2. Pituitary gland
3. Thyroid gland

- Introduction
- **Developmental abnormalities**
  - Thyroglossal duct cyst
  - Other congenital thyroid abnormalities
- **Follicular cell-derived neoplasms**
  - *Benign tumours*
    - Thyroid follicular nodular disease
    - Follicular thyroid adenoma
    - Follicular thyroid adenoma with papillary architecture
    - Oncocytic adenoma of the thyroid
  - *Low risk neoplasms*
    - Non-invasive follicular thyroid neoplasm with papillary-like nuclear features
    - Thyroid tumours of uncertain malignant potential
    - Hyalinizing trabecular tumour of thyroid
  - *Malignant neoplasms*
    - Follicular thyroid carcinoma
    - Invasive encapsulated follicular variant papillary carcinoma
    - Papillary thyroid carcinoma
    - Oncocytic carcinoma of the thyroid
    - Follicular-derived carcinomas, high-grade
    - Anaplastic follicular cell derived thyroid carcinoma
- **Thyroid C-cell derived carcinoma**
  - Medullary thyroid carcinoma
- **Mixed medullary and follicular-cell derived carcinomas**
  - Mixed medullary and follicular cell-derived thyroid carcinoma
- **Salivary gland-type carcinomas of the thyroid**



Chapter 3

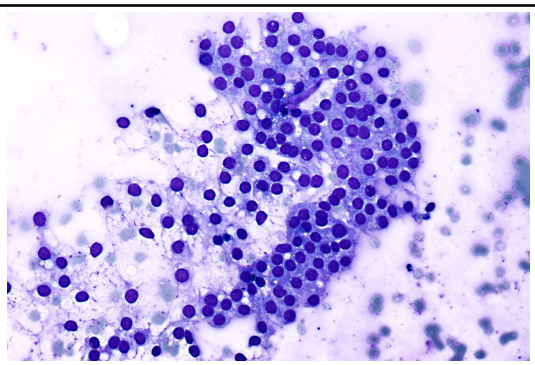
Benign

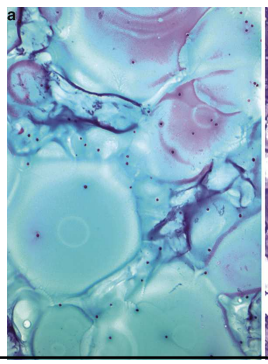
Tarik Elsheikh[a], SoonWon Hong[b], Christian Nasr[c], and Elena Vigliar[d]

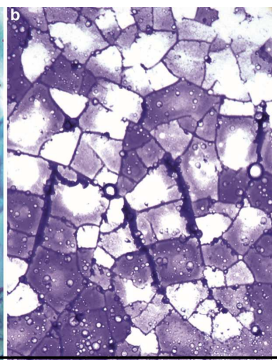
Follicular Nodular Disease (FND)

- recommended by the 2022 WHO classification of thyroid neoplasms
- refers to the spectrum of changes previously designated as colloid nodule, hyperplastic nodule, adenomatous nodule, or benign follicular nodule.
- several studies have shown that these nodules may or may not be clonal
  - ➢ represent mixture of hyperplastic nodules and adenomas

∴ FND avoids designating these lesions as *hyperplastic* or *neoplastic* in nature.







Original Article

Cancer Cytopathol. 2020;128(3):171-176

Defining Thyroid Spherules: A Benign Cytomorphologic Feature That Mimics Microfollicles

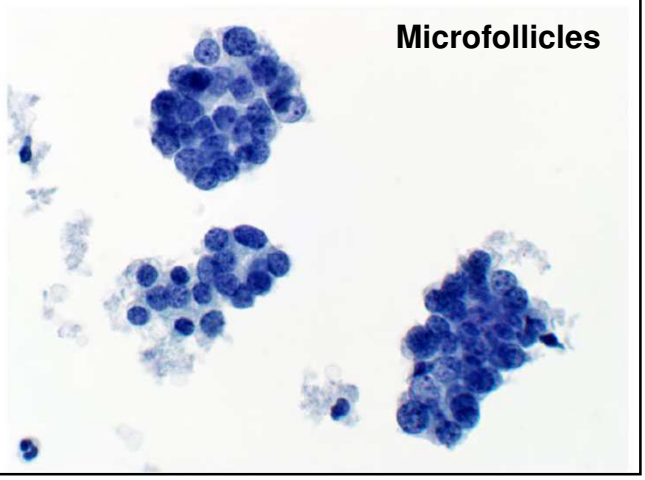
Danielle C. Costigan, MD [1]; Mohanad Shaar, MD[1]; Mary C. Frates, MD[2]; Erik K. Alexander, MD[3]; Justine A. Barletta, MD[1]; and Edmund S. Cibas, MD [1]

Thyroid Spherules

- Follicle formation but **not** microfollicles
- Maintenance of polarity
- Nuclei are evenly spaced without nuclear overlapping and crowding
- Sharply defined/smooth outer contours

Thyroid Spherule

Microfollicles



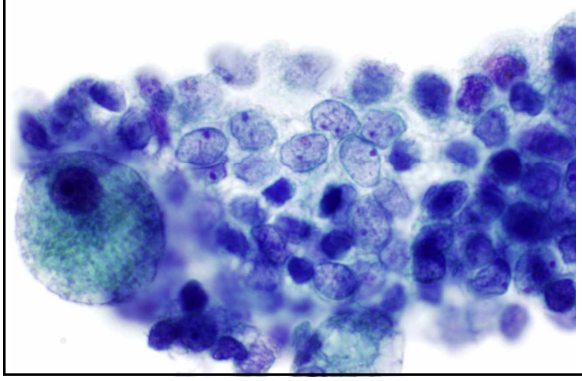
Chapter 4

Atypia of Undetermined Significance

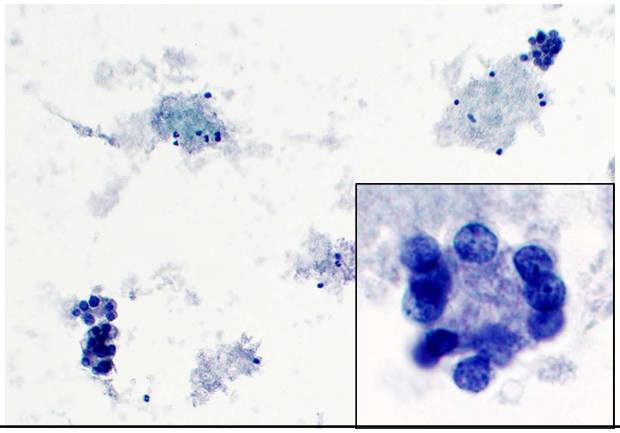
Jeffrey Krane[a], Lan Chen[b], Ronald Ghossein[c], Dong Song[d], Vivian Weiss[e], and Ritu Nayar[f]

~~FLUS~~

AUS with nuclear atypia



AUS – other



Original Article

Cancer Cytopathol 2014;122:368-76.

The Prediction of Malignant Risk in the Category "Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance" of the Bethesda System for Reporting Thyroid Cytopathology Using Subcategorization and *BRAF* Mutation Results

Jiyeon Hyeon, MD[1]; Soomin Ahn, MD[1]; Jung Hee Shin, MD, PhD[2]; and Young Lyun Oh, MD, PhD[1]

Risk of malignancy according to sub-classification of the atypia of undetermined significance or follicular lesion of undetermined significance (AUS/FLUS) category in the Bethesda system for reporting thyroid cytopathology

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Cytopathology. 2017;28(1):65-73.

ORIGINAL ARTICLE

WILEY

Differential outcomes of patients with thyroid FNA diagnoses of AUS/FLUS with and without nuclear atypia: The potential need for separation in the Bethesda System

Georgios Deftereos MD[1,2] | Stephen C. Schmechel MD, PhD[1,3] | Emily E. Waner MD, MPH[4,5] | Malak Itani MD[6,7] | Manjiri K. Dighe MD[6] | Tracy S. Tylee MD[8]

Diagn Cytopathol. 2020;48(7):610-617.

Available online at www.sciencedirect.com
ScienceDirect
journal homepage: www.jascyto.org/

ORIGINAL ARTICLE

Utility of subcategorization of atypia of undetermined significance/follicular lesion of undetermined significance category in ultrasound-guided thyroid fine-needle aspiration in a large referral cancer center

Qiong Gan, MD*, Beth S. Edeiken, MD*, Melissa M. Chen, MD*, Elizabeth G. Grubbs, MD†, Naifa L. Busaidy, MD‡, Mark Zafereo, MD*, Nancy D. Perrier, MD*, Maria D. Gule-Monroe, MD*, Savitri Krishnamurthy, MD*,*

ACTA CYTOLOGICA

Acta Cytologica 2011;55:518–525
DOI: 10.1159/000333232

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Accepted: September 5, 2011
Published online: December 9, 2011

Spectrum of Risk of Malignancy in Subcategories of 'Atypia of Undetermined Significance'

Matthew T. Olson[a] Douglas P. Clark[a] Yener S. Erozan[a] Syed Z. Ali[a, b]

Departments of [a]Pathology, and [b]Radiology, The Johns Hopkins Hospital, Baltimore, Md., USA

Original Article

Cancer Cytopathol. 2022;130(5):330-335.

Subtype of atypia on cytology and risk of malignancy in pediatric thyroid nodules

Christine E. Cherella, MD[1]; Monica L. Hollowell, MD[2]; Jessica R. Smith, MD[1]; Benjamin Zendejas, MD, MSc[3]; Biren P. Modi, MD, MPH[3]; Edmund S. Cibas, MD[4]; and Ari J. Wassner, MD[1]

Am J Clin Pathol. 2011;136:572

Usefulness of Diagnostic Qualifiers for Thyroid Fine-Needle Aspirations With Atypia of Undetermined Significance

Paul A. VanderLaan, MD, PhD,[1] Ellen Marqusee, MD,[2] and Jeffrey F. Krane, MD, PhD[1]

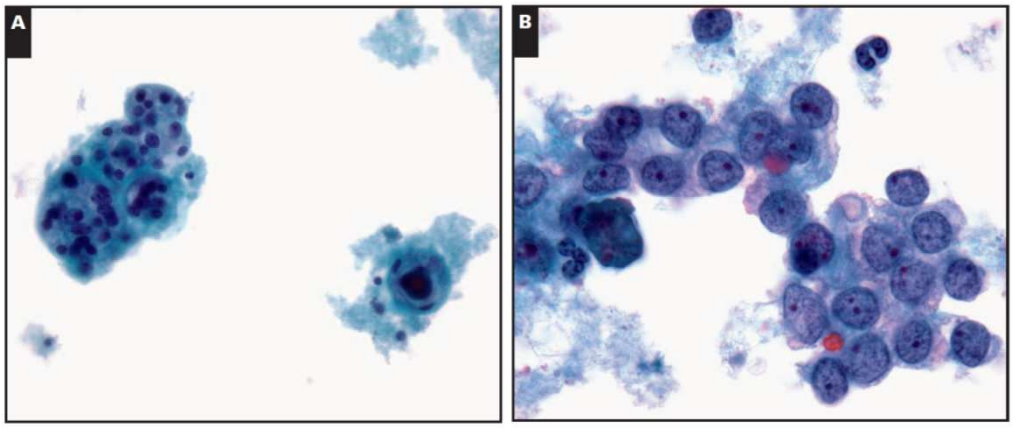
Key Words: Thyroid; Fine-needle aspiration; Cytology; Atypia of undetermined significance

Nuclear (cytologic atypia)

- ROM 20-40%

Architectural atypia

- ROM 10-15%



Original Article

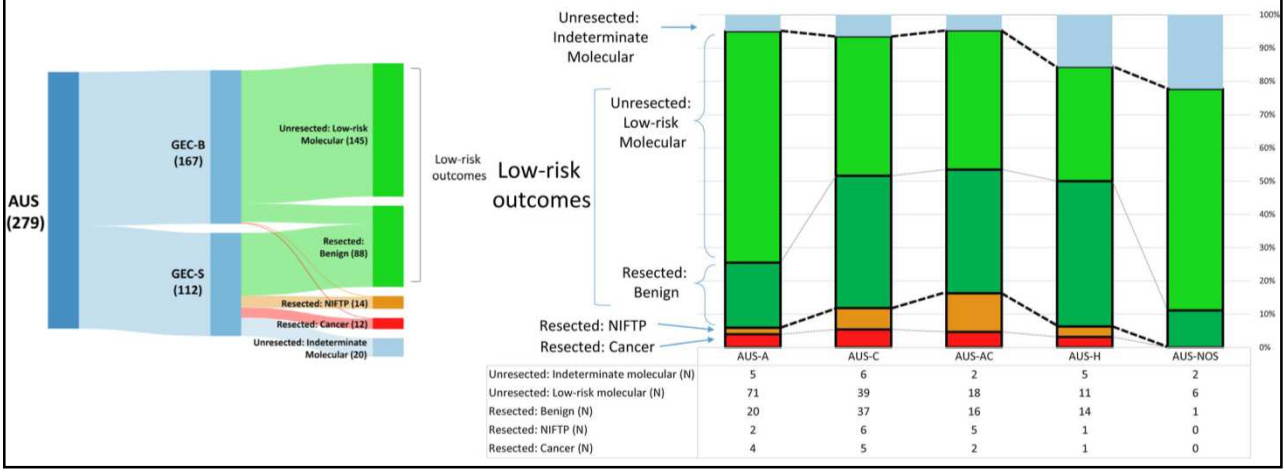
Cancer Cytopathol 2021;129:947-955.

Combined Molecular and Histologic End Points Inform Cancer Risk Estimates for Thyroid Nodules Classified as Atypia of Undetermined Significance

Allison M. Onken, MD [1]; Paul A. VanderLaan, MD, PhD [1]; James V. Hennessey, MD[2]; Pamela Hartzband, MD[2]; and Michiya Nishino, MD, PhD [1]

ROM/NIFTP:

AUS cytologic (nuclear) > AUS Architectural, AUS Oncocytic, AUS-NOS



	AUS-A	AUS-C	AUS-AC	AUS-H	AUS-NOS
Unresected: Indeterminate molecular (N)	5	6	2	5	2
Unresected: Low-risk molecular (N)	71	39	18	11	6
Resected: Benign (N)	20	37	16	14	1
Resected: NIFTP (N)	2	6	5	1	0
Resected: Cancer (N)	4	5	2	1	0

Chapter 4

Atypia of Undetermined Significance

Jeffrey Krane[a], Lan Chen[b], Ronald Ghossein[c], Dong Song[d], Vivian Weiss[e], and Ritu Nayar[f]

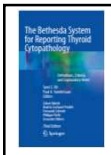
~~FLUS~~

AUS with nuclear atypia

- Focal nuclear atypia
- Extensive but mild nuclear atypia
- Atypical cyst lining cells
- "Histiocytoid" cells
- Nuclear and architectural atypia

AUS – Other

- Architectural atypia
- Oncocytic/Oncocyte atypia
- Atypia – NOS
- Nuclear changes not suggestive of PTC
- Psammoma bodies
- Atypical lymphoid cells, r/o lymphoma



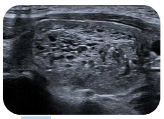
Chapter 13
Clinical Perspectives and Imaging Studies

Christopher VandenBussche[a], Syed Ali[a], Hossein Gharib[b], Hervé Monpeyssen[c], and Gilles Russ[d]

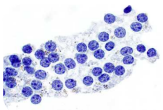
Multi-modal approach to the patient with a thyroid nodule

• Clinical

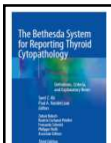
• Biologic serologic



• Ultrasound



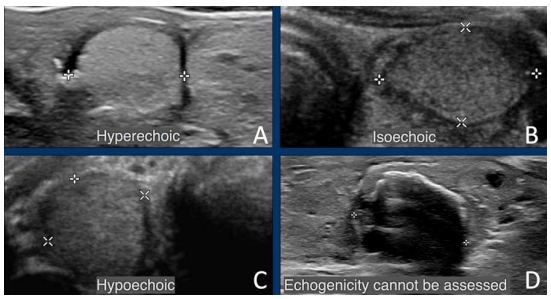
• Cytology



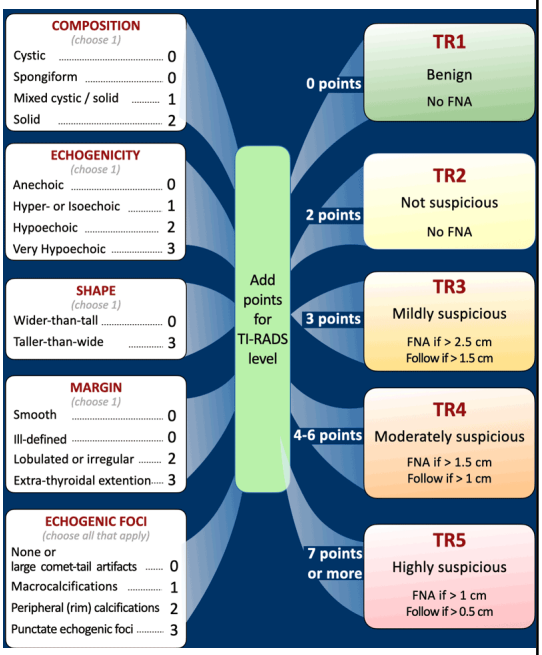
Chapter 13
Clinical Perspectives and Imaging Studies

Christopher VandenBussche[a], Syed Ali[a], Hossein Gharib[b], Hervé Monpeyssen[c], and Gilles Russ[d]

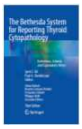
Risk Stratification via Ultrasound



~ROM:
TR1: 0.3%
TR2: 1.5%
TR3: 4.8%
TR4: 9.1%
TR5: 35%



https://radiologyassistant.nl/head-neck/ti-rads/ti-rads



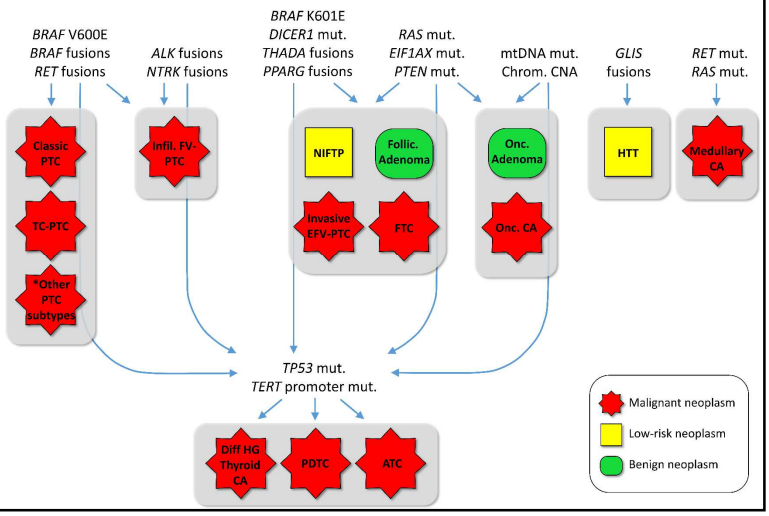
Chapter 14

Molecular and Other Ancillary Tests

Michiya Nishino[a], Paul VanderLaan[a], Giancarlo Troncone[b], Claudio Bellevicine[b], Paul Ohori[c], Tetsuo Kondo[d] and Camille Buffet[e]

Objectives for Ch 14

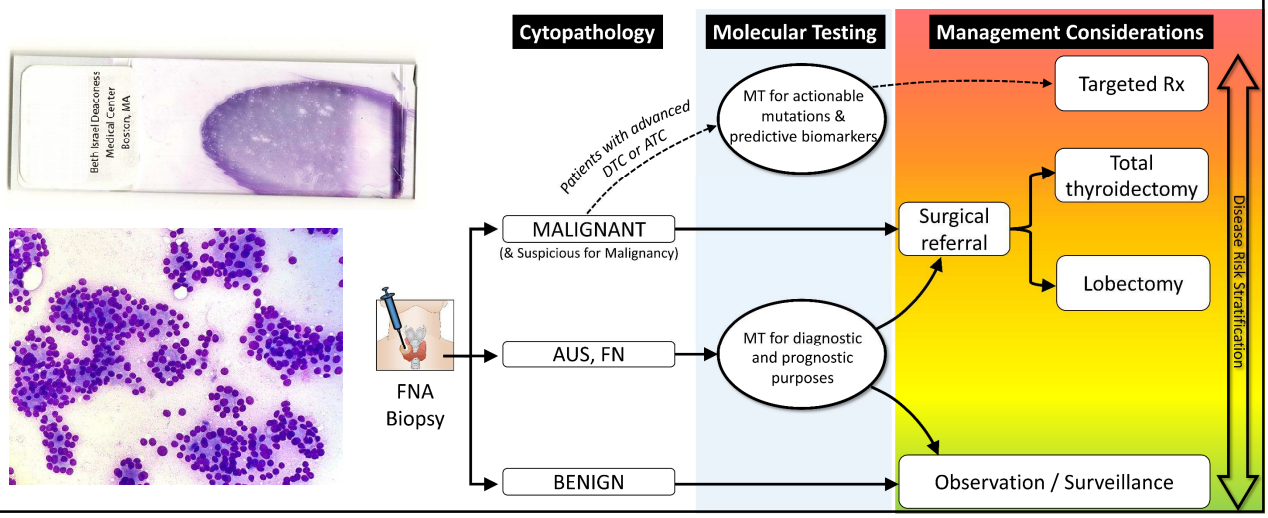
- ✓ Key molecular changes
- ✓ Purpose of molecular testing
- ✓ Testing platforms



Chapter 14

Molecular and Other Ancillary Tests

Michiya Nishino[a], Paul VanderLaan[a], Giancarlo Troncone[b], Claudio Bellevicine[b], Paul Ohori[c], Tetsuo Kondo[d] and Camille Buffet[e]



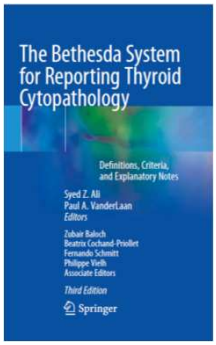
Summary

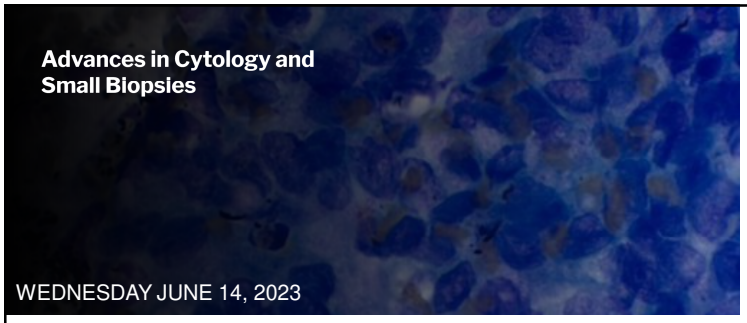
TBS 3rd ed: *evolution* and *maturation* of the most widely used thyroid FNA reporting system

- ✓ Single name for each category
- ✓ Refined ROM
- ✓ Changes in terminology (5th ed WHO)
- ✓ ~40% new/replaced images
- ✓ Literature update/refresh
- ✓ New chapters on Clin/Imaging and Molecular testing

Represents ~2 years of hard work by countless individuals from across the globe

→ Thank you!





Updates to The Bethesda System For Reporting Thyroid Cytopathology

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