



# DEPARTMENT OF PATHOLOGY

## Pathology e-gazette

Volume 1 Issue 2

June 2022



### Recent changes in Classification of Thyroid Neoplasms (WHO 2022)

The World Health Organization (WHO) has released the 5th edition of the WHO Classification of Endocrine and Neuroendocrine Tumors, with updates relating to the thyroid gland.

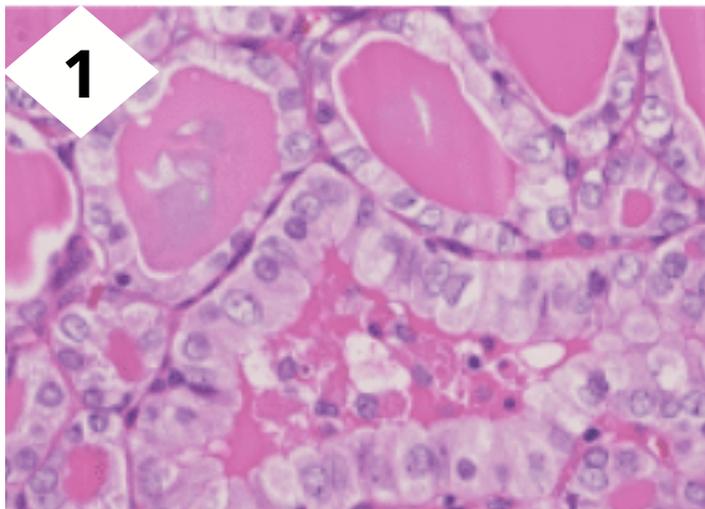
The 5th edition divides thyroid tumors into new categories to provide a clearer understanding of their cell of origin, pathologic features, molecular classification, and biological behavior.

Benign tumors include follicular adenoma and its variants, such as those with papillary architecture.

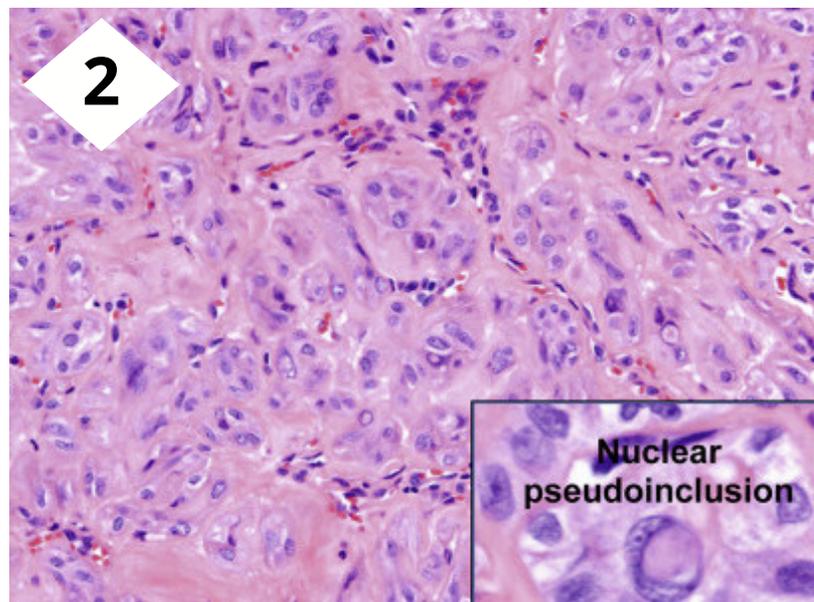
For papillary microcarcinomas, the new classification requires detailed subtyping like that required for tumors greater than 1 cm. This edition also recommends not designating these carcinomas or cribriform-morular thyroid carcinoma as a PTC subtype. In addition, using the term “Hürthle cell” is discouraged.

The most common thyroid tumors, follicular-cell–derived tumors, are now divided into 3 categories : benign, low-risk, and malignant neoplasms.

### QUIZ TIME



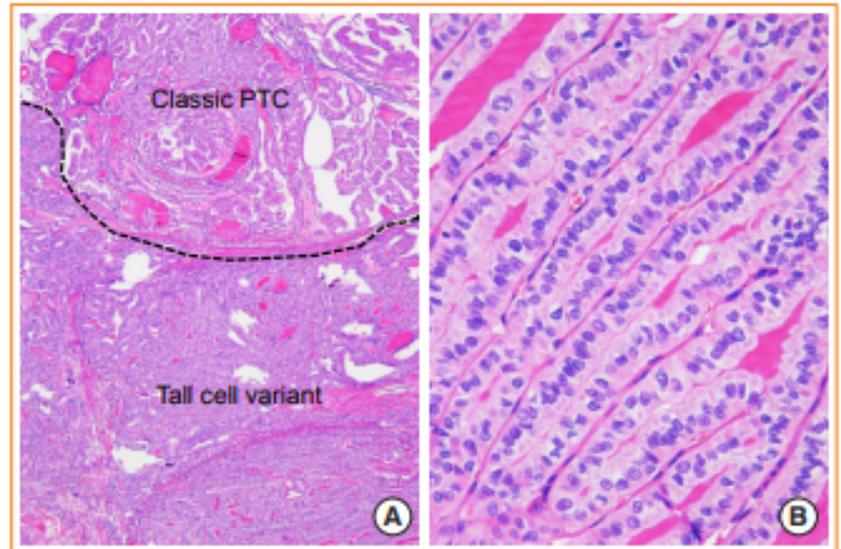
Identify the type of neoplasm.  
Hint : FNAC can not diagnose this neoplasm



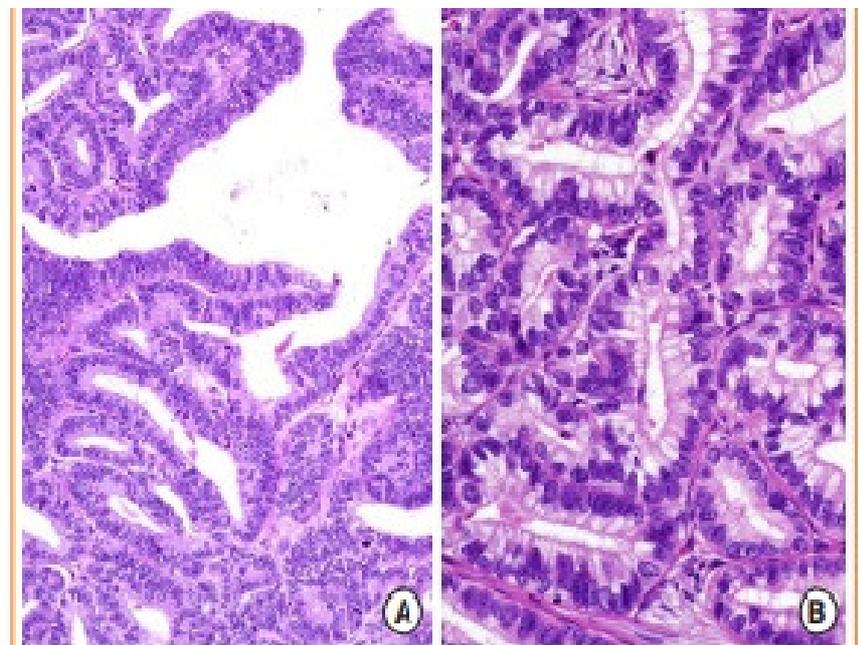


Non-invasive follicular thyroid neoplasm with papillary-like nuclear features, thyroid tumors of uncertain malignant potential, and hyalinizing trabecular tumor are among the low-risk follicular-cell-derived neoplasms included.

Malignant follicular-cell-derived neoplasms are now stratified on the basis of their molecular profile and aggressiveness. PTCs have many morphological subtypes and are classified as BRAF-like malignancies. In contrast, invasive encapsulated follicular variant PTC and follicular thyroid carcinoma are classified as RAS-like malignancies.



Tall cell variant of papillary thyroid carcinoma (PTC) mixed with classic papillary PTC



Columnar cell variant of papillary thyroid carcinoma (PTC)





### HIGHLIGHTS

Furthermore, the 2022 edition does not refer to oncocytic carcinoma as a distinct entity; in the new classification, this term refers to oncocytic follicular-cell-derived neoplasms that lack characteristic nuclear features of PTC and high-grade features. In the new edition, high-grade follicular-cell-derived cancers encompass both poorly differentiated carcinoma and high-grade differentiated thyroid carcinomas.

- Squamous cell carcinoma of the thyroid is now classified as a subtype of anaplastic thyroid carcinoma, the most undifferentiated form. The new classification also introduces a grading system for medullary thyroid carcinomas based on mitotic count, tumor necrosis, and Ki67 labeling index.

- Finally, several unusual neoplasms have been categorized into new sections on the basis of their cytogenesis.
- “The current classification also emphasized the value of biomarkers that may aid diagnosis and provide prognostic information,” authors noted.

Malignant follicular cell-derived neoplasms are stratified based on molecular profiles and aggressiveness.

Mutation	FA	PTC	FTC	Anaplastic
BRAF	0%	44%	<1%	24%
RET/PTC	Controversial	35%	0%	0%
RAS	13%	10%	40%	22%
PAX8/PPARδ	11%	0%	36%	0%
P53	0%	1%	1%	55%
NTRK1	Unknown	12%	Unknown	Unknown

PTC : Papillary thyroid cancer, FTC : follicular thyroid cancer



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Pathological and Molecular correlates of NIFTP and tumors of uncertain malignant potential, compared to other encapsulated follicular - patterned tumors.

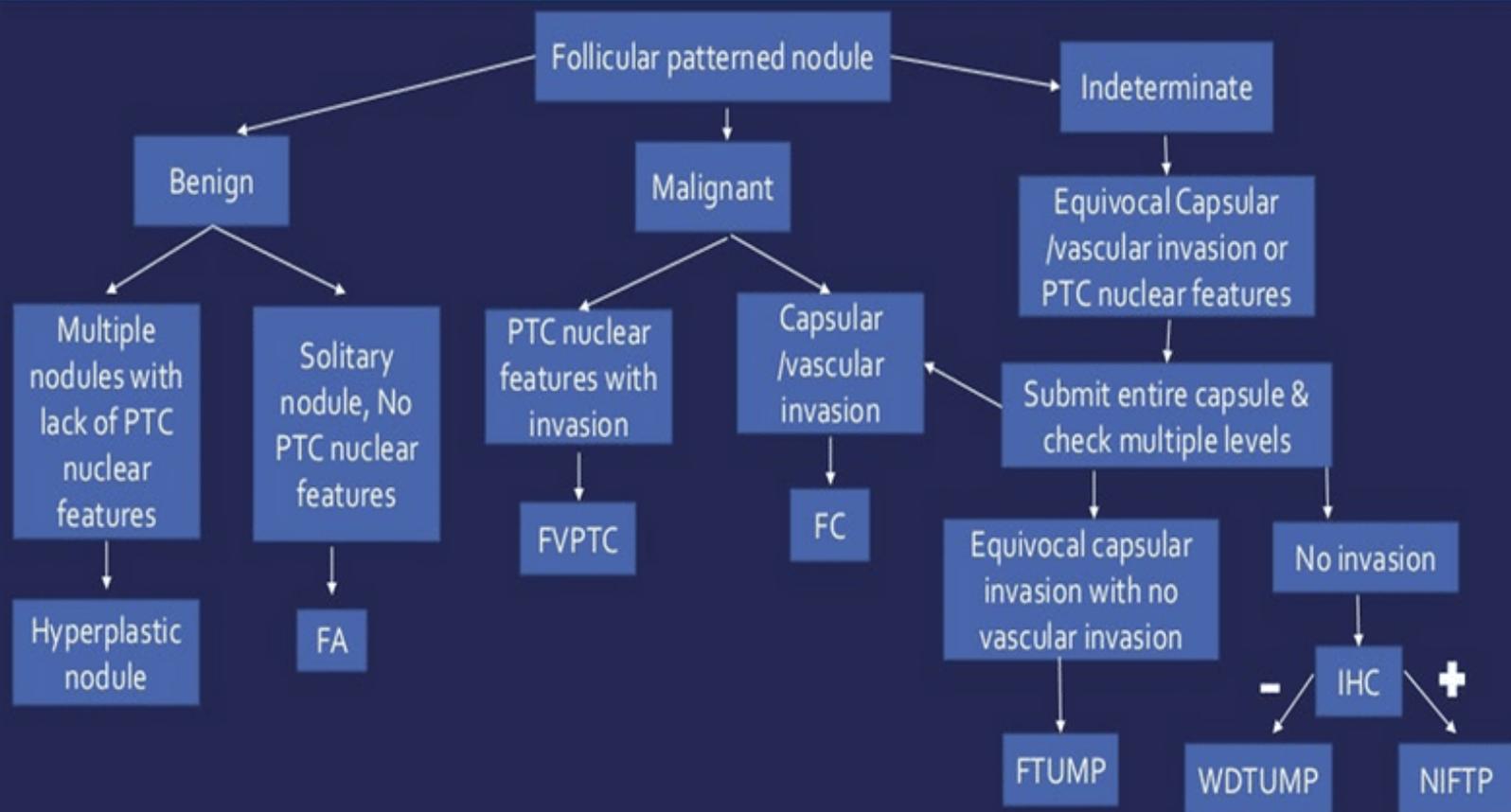
	FA	FT-UMP	WDT-UMP	NIFTP	IEFVPTC
Category	Benign	Low - risk	Low - risk	Low - risk	Malignant
PTC nuclear score	0-1	0-1	2-3	2-3	2-3
Invasion	Absent	Questionable	Questionable	Absent	Present
High - grade morphology	Absent	Absent	Absent	Absent	Absent
RAS mutations	up to 20%	up to 20%	up to 20%	up to 60%	up to 70%
BRAF K601E, EIF1AX, EZHI, DICER1, PTEN or TSHR mutations	<10%	<10%	<10%	<10%	<10%
PAX8::PPARG	<10%	<10%	Rare	up to 30%	up to 40%
THADA fusions	<10%	Not Determined	Not Determined	up to 30%	<5%
BRAF, RET, NTRK, or ALK fusions	Not found	Not found	Not found	Not found	Rare
BRAF V600E	Absent	Absent	Absent	Absent	Infrequent

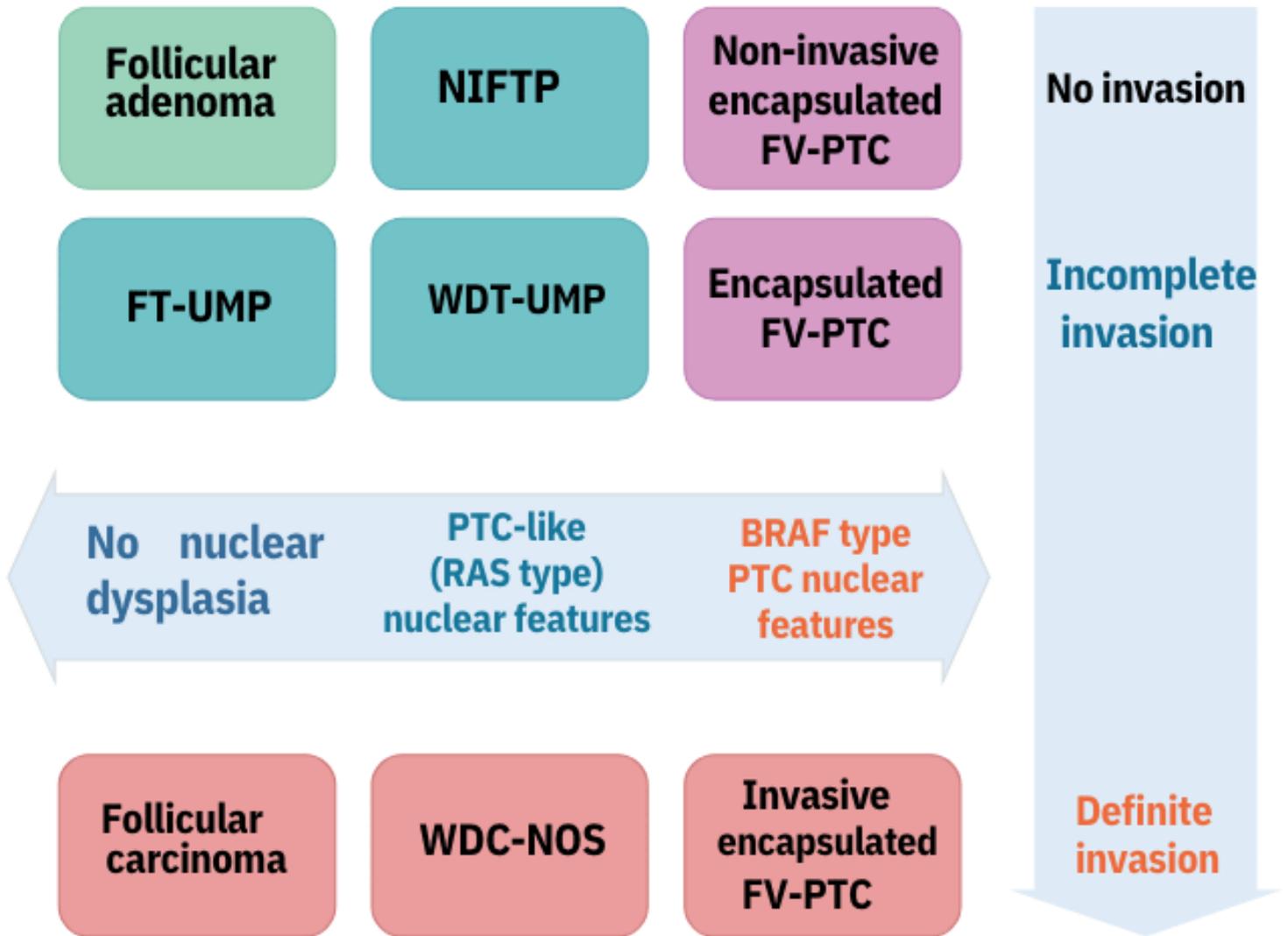
FA follicular adenoma; FT-UMP follicular tumor of uncertain malignant potential; WDT-UMP well - differentiated tumor of uncertain malignant potential; NIFTP non - invasive follicular thyroid neoplasm with papillary - like nuclear features; IEFVPTC invasive encapsulated follicular variant papillary carcinoma.

- PTC nuclear scoring system is composed of three categories:
  1. Nuclear Size and shape (enlarged, elongated, overlapped, and crowded)
  2. Nuclear membrane irregularities (irregular nuclear membranous contours, nuclear grooves, or pseudoinclusions)
  3. Chromatin characteristics (Clearing, margination, or glassy nuclei).
- The nuclear score is calculated as the sum of these categories, with one point scored if each category is identified.
- If **BRAF V600E** and high - risk mutations such as **TP53**, **PIK3CA**, or **TERT** promoter mutations are detected in benign or low - risk thyroid neoplasms, the entire tumors should be meticulously examined to exclude malignancy



### ALGORITHMIC APPROACH TO FOLLICULAR PATTERNED NODULE





### Encapsulated follicular patterned thyroid tumors

Schematic explanation of encapsulated follicular patterned thyroid tumors. NIFTP, noninvasive follicular thyroid neoplasm with papillary-like nuclear features; FV-PTC, follicular variant papillary thyroid carcinoma; FT-UMP, follicular tumor of uncertain malignant potential; WDT-UMP, well-differentiated tumor of uncertain malignant potential; WDC-NOS, well-differentiated carcinoma not otherwise specified





### PATHOLOGY PEARLS

# NEOPLASMS WITH NUCLEAR GROOVES (☕ BEAN NUCLEI)

## PAPILLARY TUMOURS

Papillary Thyroid carcinoma

Solid pseudopapillary tumour of pancreas

Papillary transitional cell carcinoma of the bladder

Papillary renal cell carcinoma

Papillary tumour of pineal region.

Other papillary tumours.

## OVARIAN TUMOURS

Granulosa cell tumor

Sex cord tumor with annular tubules

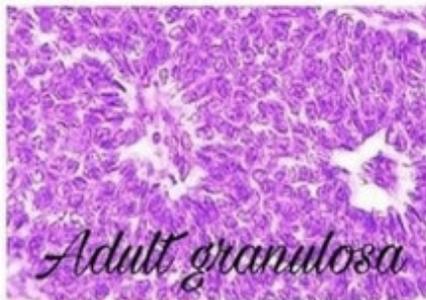
Brenner tumour

## BONE AND SOFT TISSUE

Adamantinoma

Chondroblastoma

Desmoplastic small round cell tumor.



## OTHERS

Langerhans cell histiocytosis

Melanocytoma of CNS

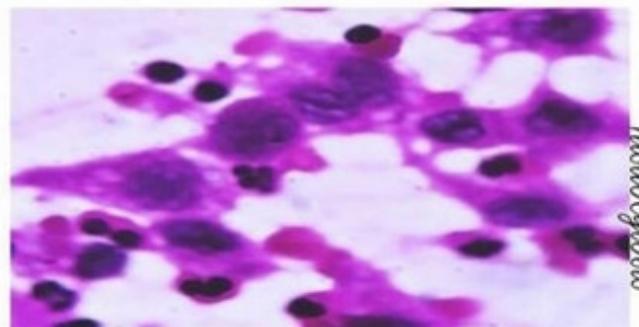
Hyalinizing trabecular tumour of thyroid.

Thymic carcinoma.

Clear cell sarcoma of kidney

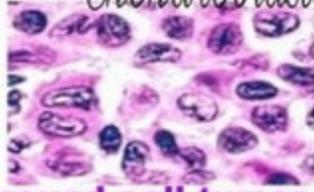
Epithelioid GI stromal tumor

Nodular hidradenoma



Cytology of Langerhans cell histiocytosis

Chondroblastoma



Answer to the QUIZ

1

Noninvasive follicular thyroid neoplasm with papillary-like nuclear features.

2

Hyalinizing Trabecular Tumor



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### NEWS TIME

**World Brain Tumor Day is observed on 8th June, every year. The day spread awareness and educates people about brain tumor.**

**2022 theme is Together We Are Stronger – Promoting the Value of Teams, Partnerships, and Collaborations in Neurological Care and Research.**

### *Take home message*

- Biomarkers & molecular profiles have a very important role in diagnosis & prognosis of thyroid cancer.
- Management of thyroid cancer depends on tumor type & its stage at the time of diagnosis

- 14 June is the World Blood Donor Day & the theme for this year is “Donating blood is an act of solidarity. Join the effort and save lives” to draw attention to the roles that voluntary blood donations play in saving lives and enhancing solidarity within communities.

**"Shine the Light on Sickle Cell" is an initiative to bring attention to this disease and to celebrate World Sickle Cell Awareness Day on June 19, 2022**

**A little progress each day, adds up to big results**

*Dr. Garima Anandani  
Dr. Tarang Patel  
Dr. Gyanendra Singh*

ASSISTANT PROFESSORS



*Message from the*  
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