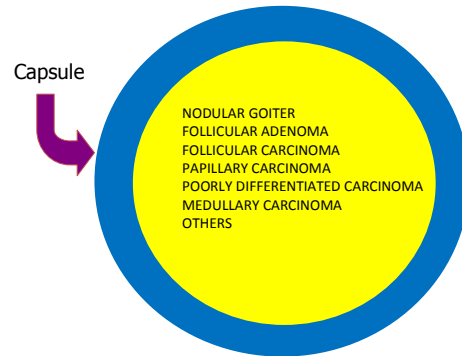


Capsule of Follicular Cell Tumors, its Significance and Morphology

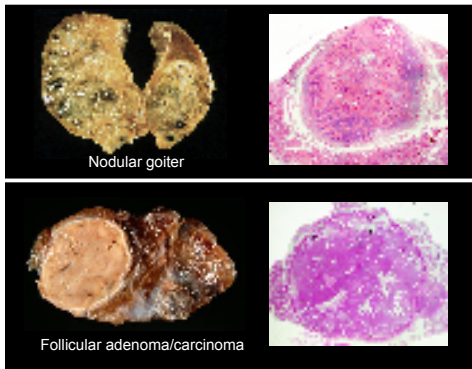
RYOHEI KATOH, TADAO NAKAZAWA, AND TETSUO KONDO

DEPARTMENT OF HUMAN PATHOLOGY
UNIVERSITY OF YAMANASHI, JAPAN

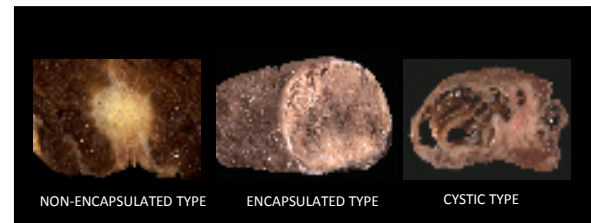
Capsule of thyroid nodule



CAPSULE OF THYROID NODULE



CAPSULE IN PAPILLARY THYROID CARCINOMA

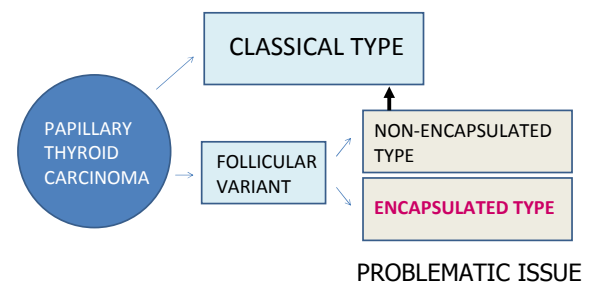


MACROSCOPIC TYPES OF PAPILLARY THYROID CARCINOMAS

	Encapsulated type	6%
	Partly encapsulated type	11%
	Non-encapsulated type	75%
	Cystic type	7%

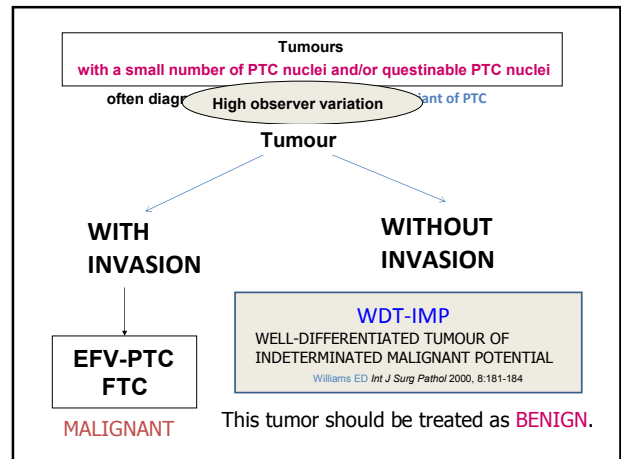
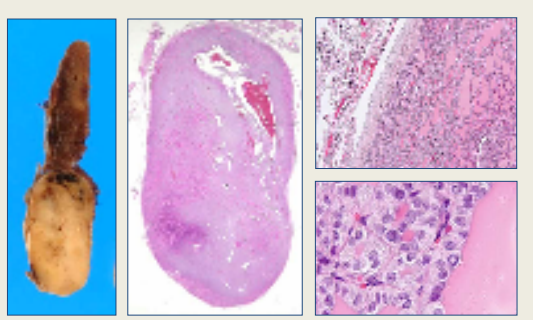
(150 PTCs with classical histology)

DIAGNOSIS OF FOLLICULAR VARIANT OF PAPILLARY THYROID CARCINOMA



Liu J, et al. *Cancer* 2006;107:1255-64

**ENCAPSULATE FOLLICULAR VARIANT
OF PAPILLARY THYROID CARCINOMA**



FOLLICULAR ADENOMA/CARCINOMA

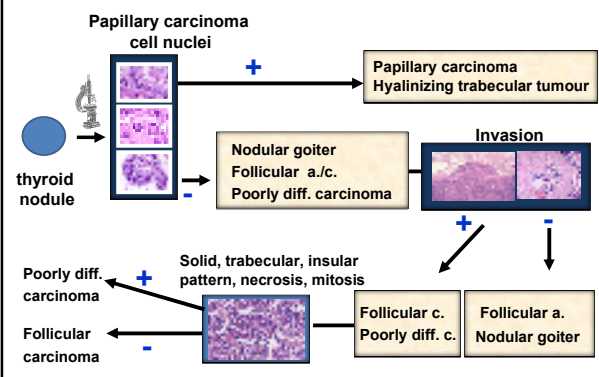
FOLLICULAR ADENOMA/CARCINOMA

- ADENOMA** A BENIGN ENCAPSULATED TUMOUR OF THE THYROID SHOWING EVIDENCE OF FOLLICULAR CELL DIFFERENTIATION
- CARCINOMA** A MALIGNANT EPITHELIAL TUMOUR SHOWING EVIDENCE OF FOLLICULAR CELL DIFFERENTIATION AND LACKING THE DIAGNOSTIC NUCLEAR FEATURE OF PAPILLARY CARCINOMA.

PERHAPS THE MOST DIFFICULT PROBLEM IN THYROID PATHOLOGY IS THE DISTINCTION OF FOLLICULAR CARCINOMA FROM FOLLICULAR ADENOMA AND FROM THE FOLLICULAR VARIANT OF PAPILLARY CARCINOMA.

Evans HL. Cancer 54:535-540, 1984

Diagnostic algorithm of follicle forming thyroid nodule

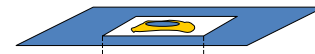


INVASIONS

Capsular invasion

Vascular invasion

My PROCEDURE

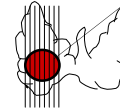


Cover glass 24mm



Most of sections should include the tumour capsule and adjacent thyroid tissue, if present

Longitudinal sections



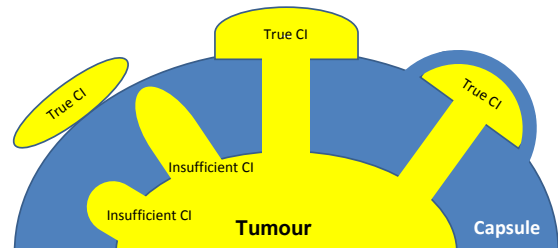
Nodule \leq 2cm	Entire nodule
Nodule $>$ 2cm	10 sections + Additional sections

nodulectomy, lobectomy, subtotal/total thyroidectomy

INVASION

1. CAPSULAR INVASION (CI)

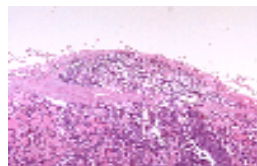
Patterns of Capsular Invasion (CI)



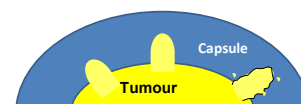
Capsular invasion is defined by **tumour penetration** through the tumour capsule unassociated with the site of a previous fine needle aspiration biopsy. (WHO 2004)

Patterns of Capsular Invasion (CI)

Tumour penetration through the tumour capsule

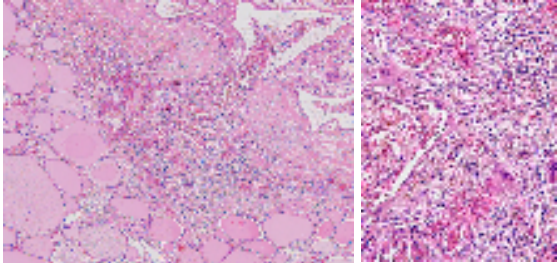


Patterns of Capsular Pseudoinvasion (CPI)



WHAFFT

Worrisome histologic alterations following FNA of the thyroid.
 LiVolsi VA, Merino MJ. Lab Invest 62, 1990

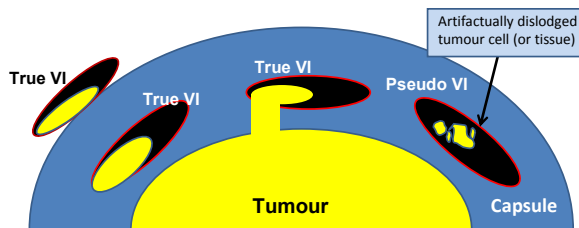


- Hemorrhage and hemosiderin
- Focal and geographic pattern of lesion

INVASION

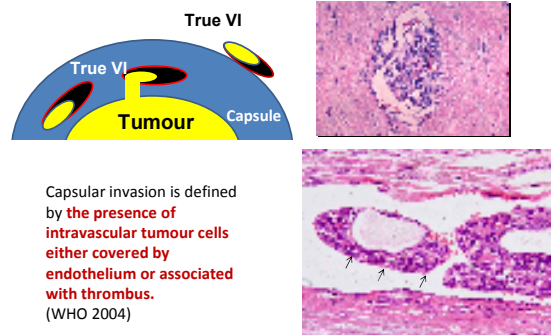
2. VASCULAR INVASION (VI)

Patterns of Vascular Invasion (VI)



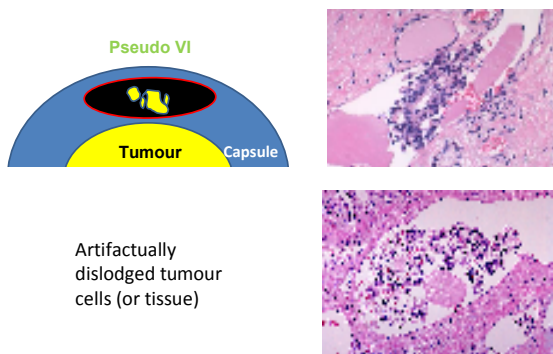
Capsular invasion is defined by **the presence of intravascular tumour cells either covered by endothelium or associated with thrombus.**
 (WHO 2004)

Patterns of Vascular Invasion (VI)



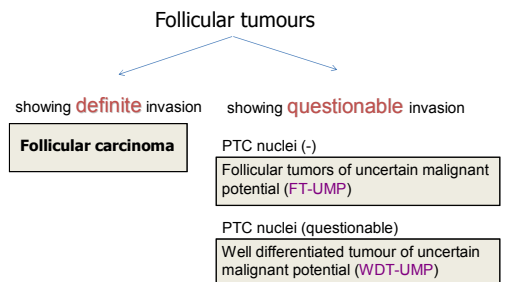
Capsular invasion is defined by **the presence of intravascular tumour cells either covered by endothelium or associated with thrombus.**
 (WHO 2004)

Patterns of Pseudovascular Invasion (VI)



Artificially dislodged tumour cells (or tissue)

DIAGNOSIS OF FOLLICULAR CARCINOMA



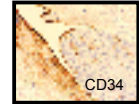
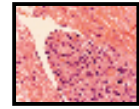
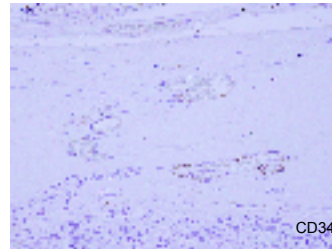
IMMUNOHISTOCHEMICAL DEMONSTRATION OF LYMPHATIC AND BLOOD VESSELS

Elastic tissue stains : only limited use in identifying intracapsular vessels

IMMUNOHISTOCHEMISTRY

Vascular Markers

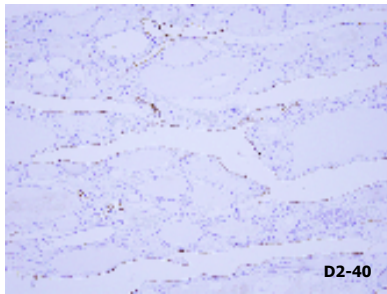
- Factor VIII
- **CD31 or CD34**
- Ulex europaeus lectin
- Laminin
- Type IV collagen



IMMUNOHISTOCHEMISTRY

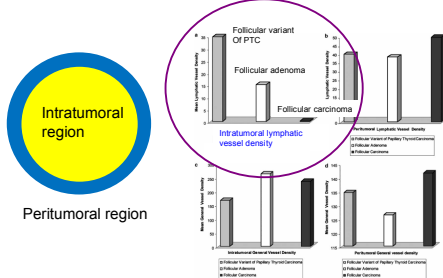
Lymphatic Markers

FLT4 Live-1 D2-40



DISTRIBUTION OF LYMPHATIC AND BLOOD VESSELS IN THE FOLLICULAR THYROID TUMOURS

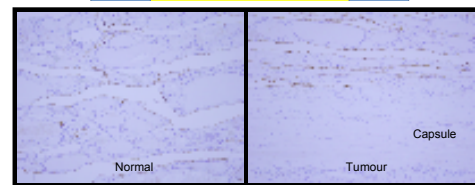
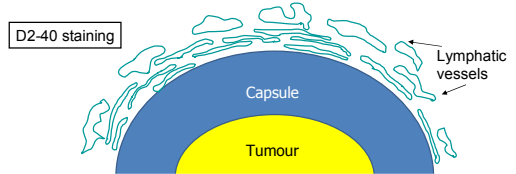
Lymphatic and blood vessel density in the follicular patterned lesions of thyroid



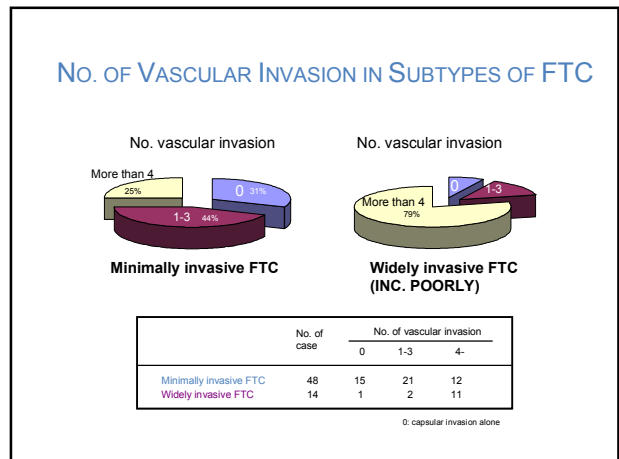
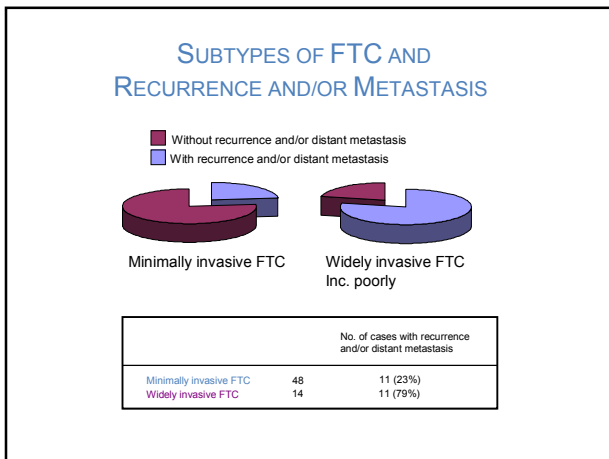
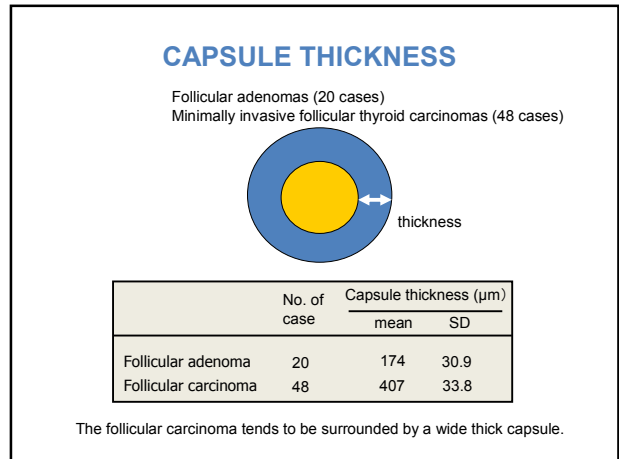
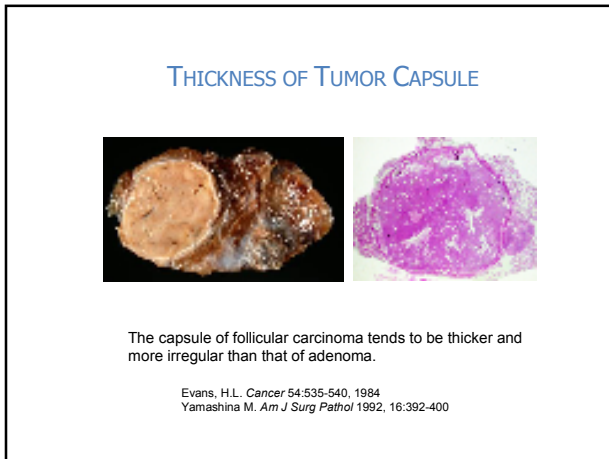
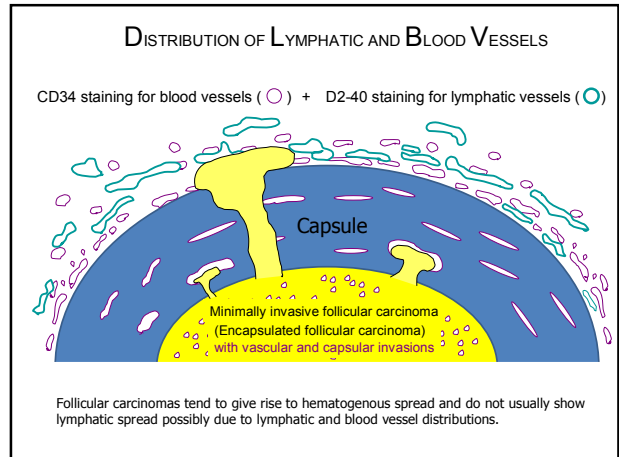
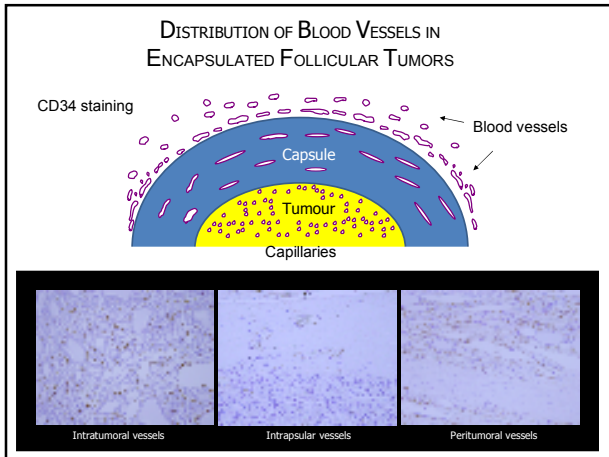
Intratumoral lymphatic vessel density was significantly higher in the follicular variant of PTC than in either follicular adenoma or follicular carcinoma.

Giorgadze TA, et al. Mod Pathol (2005) 18:1424-1431

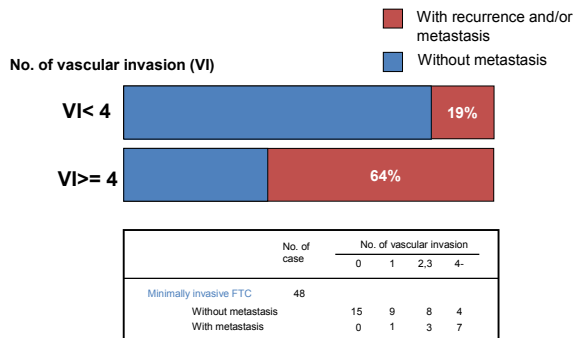
DISTRIBUTION OF LYMPHATIC VESSELS IN ENCAPSULATED FOLLICULAR TUMORS



Intracapsular lymphatic vessels: scant or none



NO. OF VASCULAR INVASION AND RECURRENCE AND/OR METASTASIS IN MINIMALLY INVASIVE FTC



SIGNIFICANCE OF INVASION

Follicular carcinoma

Encapsulated

With capsular invasion only

With limited (<4) vascular invasion

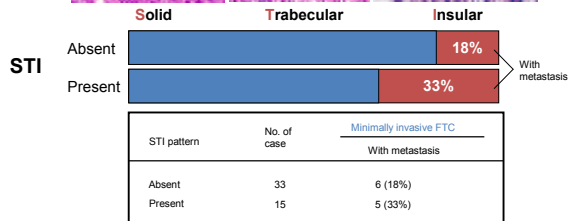
With extensive (>=4) vascular invasion

Widely invasive

Rosai J. Surgical Pathology, 9th ed. 2004

There is a prognostic difference depending on the number of vessels involved.

STI PATTERN IN MINIMALLY INVASIVE FTC



DISTANT METASTASIS IN MINIMALLY INVASIVE FTC

- **Tumour size** ● **Gender** Not significant for metastasis
- **Capsule thickness** The capsule of MI-FTC is thicker than that of adenoma
- **Capsular invasion** Not significant for metastasis
- **Vascular invasion**
 - Number of VI could be important
 - With extensive (>=4) vascular invasion*
- **Solid, Trabecular, and Insular patterns** Possible significant marker