Thyroid Center of San Francisco

Current guidelines for integrated evaluation and treatment of thyroid nodules

CME Grand Rounds

California Pacific Medical Center

September 29, 2009

Thank you...

Dr. William Harvey II, Radiology
Dr. James Klein, Head and Neck Surgery
Dr. Kirk Moon, Radiology
Dr. John Moretto, Pathology
Dr. Allan Pont, Endocrinology
Dr. Mark Singer, Head and Neck Surgery

Dianna Kane

Kevin Goon, Zonare Medical Systems

The physicians participating in this CME have no relevant financial relationships.

Thyroid Center of San Francisco

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- **Andrea Yeung, MD**

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- **Kjersti Kirkeby, MD**
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Today's Presentation

Streamlined Approach to evaluating patients with thyroid nodules based on current national guidelines
Dr. Diana Antoniucci

Use of Office Ultrasound in Thyroid Surgery Practice
Dr. Andrea Yeung

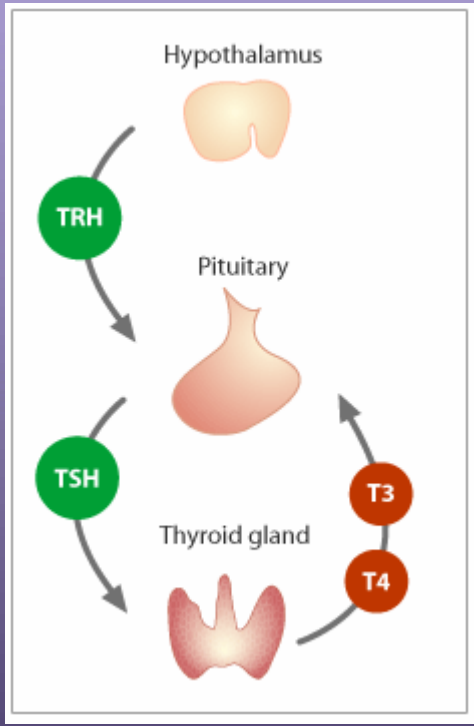
Indications, Clarifications, and Therapeutic Implications in FNA of the Thyroid
Dr. Ian Jaffee

Advances in Thyroid Surgery
Dr. Andrea Yeung

Show the value of integrated care for patients with thyroid nodules
Dr. Jacob Johnson

Thyroid Center of San Francisco

Streamlined approach to evaluating patients with thyroid nodules based on current national guidelines



Diana Antoniucci, MD

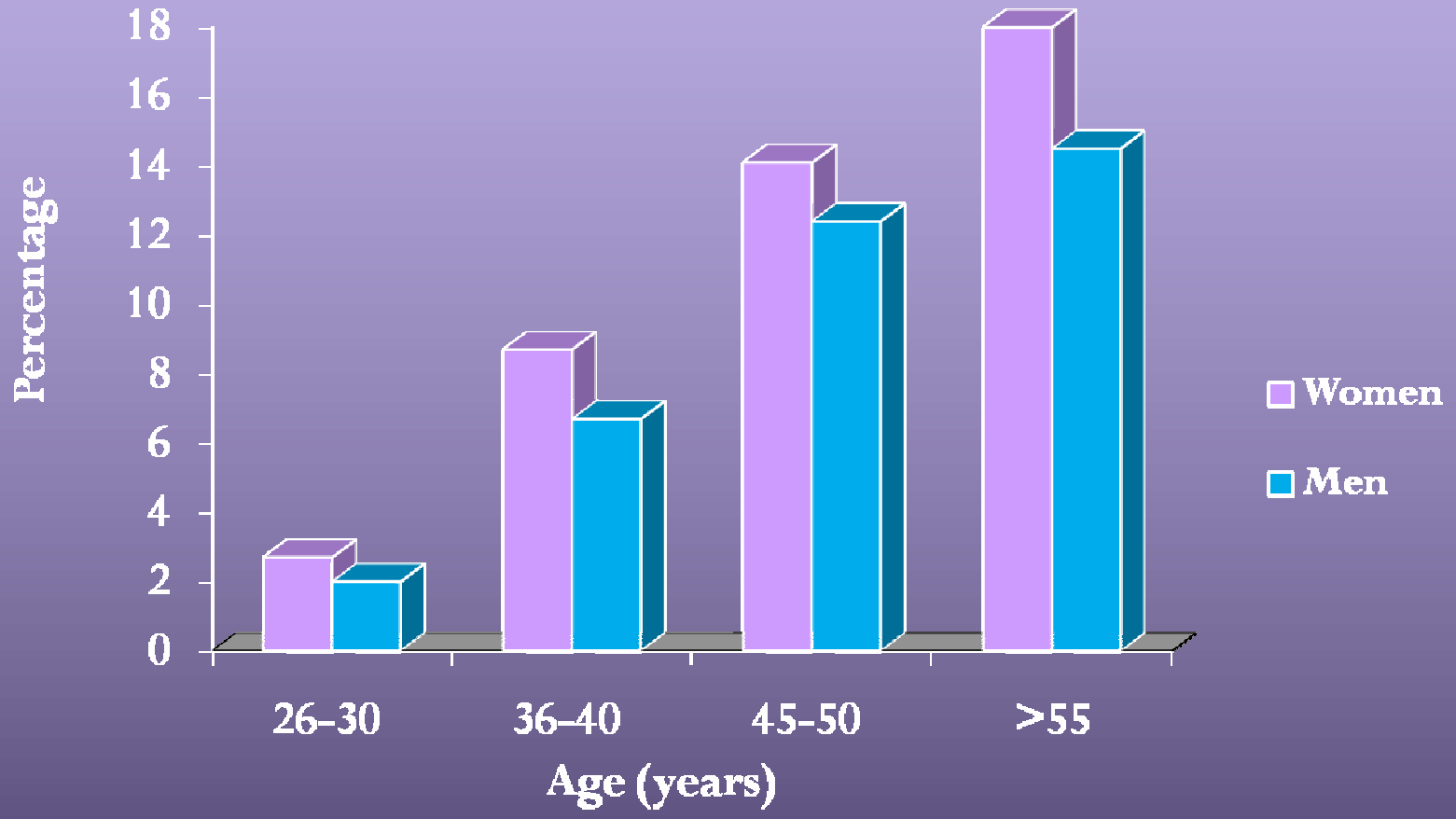
Endocrinology

Epidemiology

- Thyroid Nodules are common
  - Clinically palpable nodules[1]:
    - 6.4% women, 1.5% men
  - Unselected subjects using ultrasound[2,3]:
    - 20-76% of women: at least 1 thyroid nodule
- Nodular goiter prevalence increases with age

1. Vander et al Ann Int Med 1968
2. Ezzat S et al. Arch Int Med 1994
3. Brander A et al Radiology 1991

Prevalence of Nodular Goiter



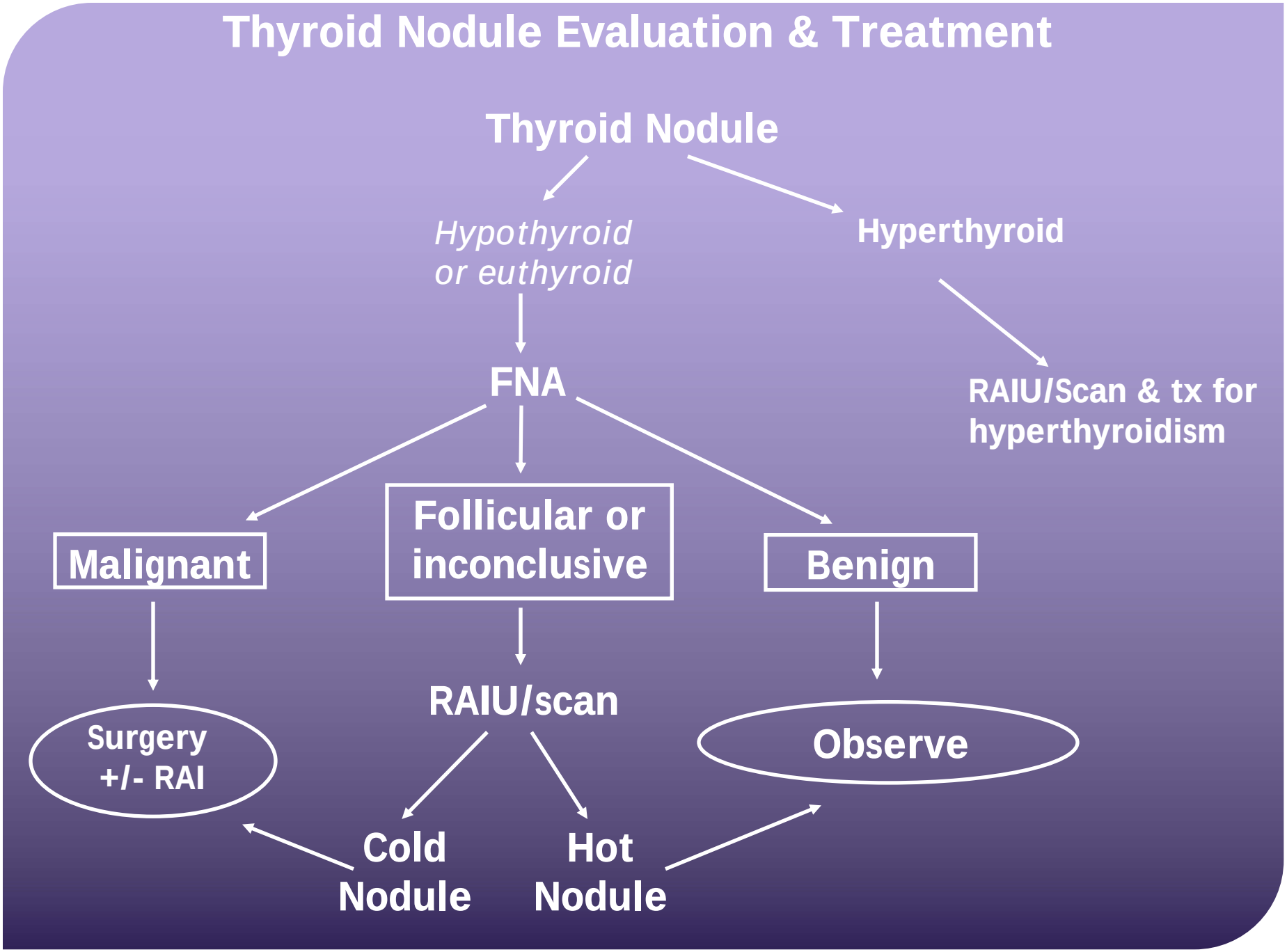
Reiners C et al Thyroid 2004

Risk Factors for Malignancy

- Most thyroid nodules are benign
  - Rates of cancer vary depending on study and referral bias
    - As high as 28% in surgical series
  - Best estimates: ~5% are thyroid cancer
- Higher risk of malignancy if:
  - Children
  - Men
  - Adults < 30 yo or >60 yo
  - History of radiation to head or neck
  - FHx of thyroid cancer
  - Voice changes, suggestive of vocal cord paralysis

Nodule Evaluation

- Thyroid function
  - Check TSH
  - Hot nodules much less likely cancer
- Look for obstructive symptoms
  - Dysphagia, dyspnea, snoring, Pemberton's sign
- Rule out thyroid cancer with FNA


Thyroid Nodule Evaluation & Treatment
Thyroid Nodule
Hypothyroid
or euthyroid
Hyperthyroid
FNA
RAIU/Scan & tx for
hyperthyroidism
Malignant
Follicular or
inconclusive
Benign
RAIU/scan
Surgery
+/- RAI
Observe
Cold
Nodule
Hot
Nodule

Multinodular Goiters

- Rate of cancer in nodules>1 cm
  - Single nodule: 14.8%
  - Multiple nodules: 14.9%
- Diagnostic yield (%) of sequential aspiration strategies in 120 pts with multiple nodules and cancer

FNA on	No. Nodules > 10 mm.		
	2 (n 73)	3 (n 27)	4 (n 20)
Largest nodule	86.3	51.8	55
Largest 2 nodules	100	81.5	85
Largest 3 nodules		100	95
Largest 4 nodules			100

Frates MC JCEM 2006

Nodule Evaluation Cont'd

- Rule out thyroid cancer
  - FNA any non-hot nodule over 1 cm
  - FNA if worrisome U/S characteristics
    - Hypoechogenic
    - Solid
    - Microcalcifications
    - Irregular borders
    - Central blood flow

Use of Office Ultrasound in the Thyroid Surgery Practice

Andrea H. Yeung MD
Head and Neck Surgery

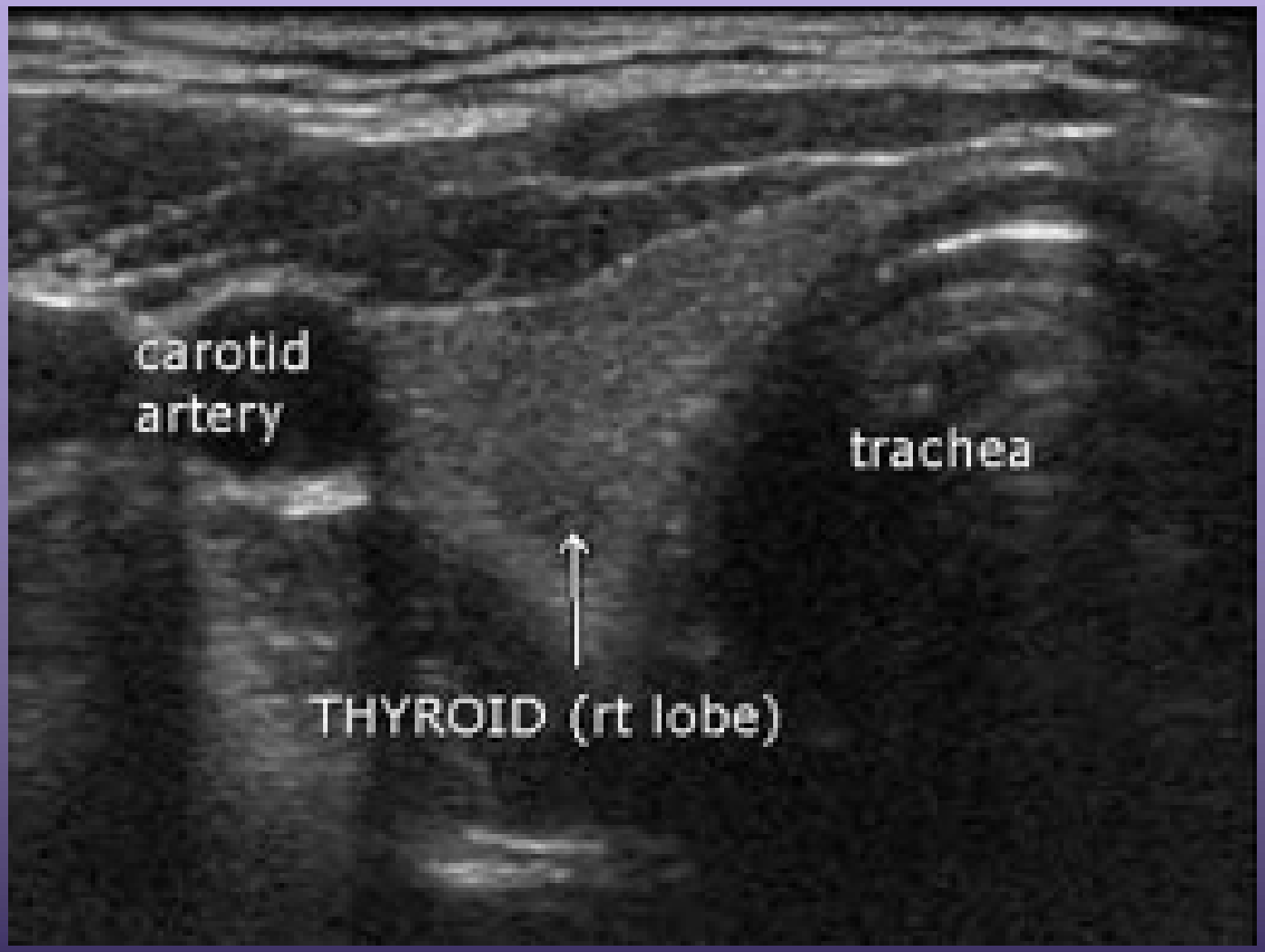
Thyroid Ultrasound

- Diagnosis of thyroid nodules
- Measure and characterize nodules (cystic vs solid, size, echogenicity, vascularity, calcifications, ..)
- Objective monitoring over time
- Characterize thyroid disease (thyroiditis, Graves)
- Guide biopsy (and procedures)
- Assess extrathyroidal neck disease
- Follow thyroid cancer
- Dynamic assessment of function

Office-based Head and Neck US

- Knowledge of patient history and physical exam
- Familiarity with anatomy
- Correlate studies (*I scan, CT, MRI, etc.)
- USGFNA possible during the same appt
- Simultaneous patient education
- Facilitate surgical planning and use intraoperative US

Normal Thyroid/Neck US Anatomy



Ultrasound Characteristics
Benign vs. Malignant Thyroid Nodules

Benign

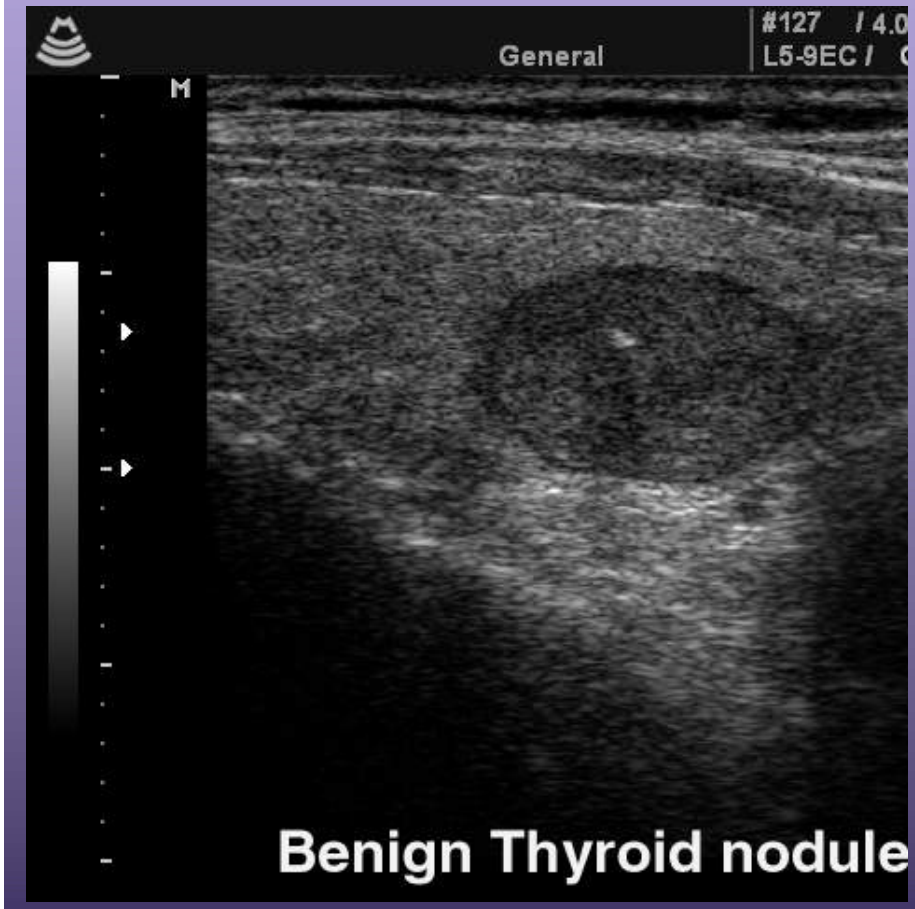
- Isoechoic/hyperechoic
- Coarse calcifications
- Thin, well defined halo
- Regular margin
- Hypovascular
- No lymphadenopathy

Malignant

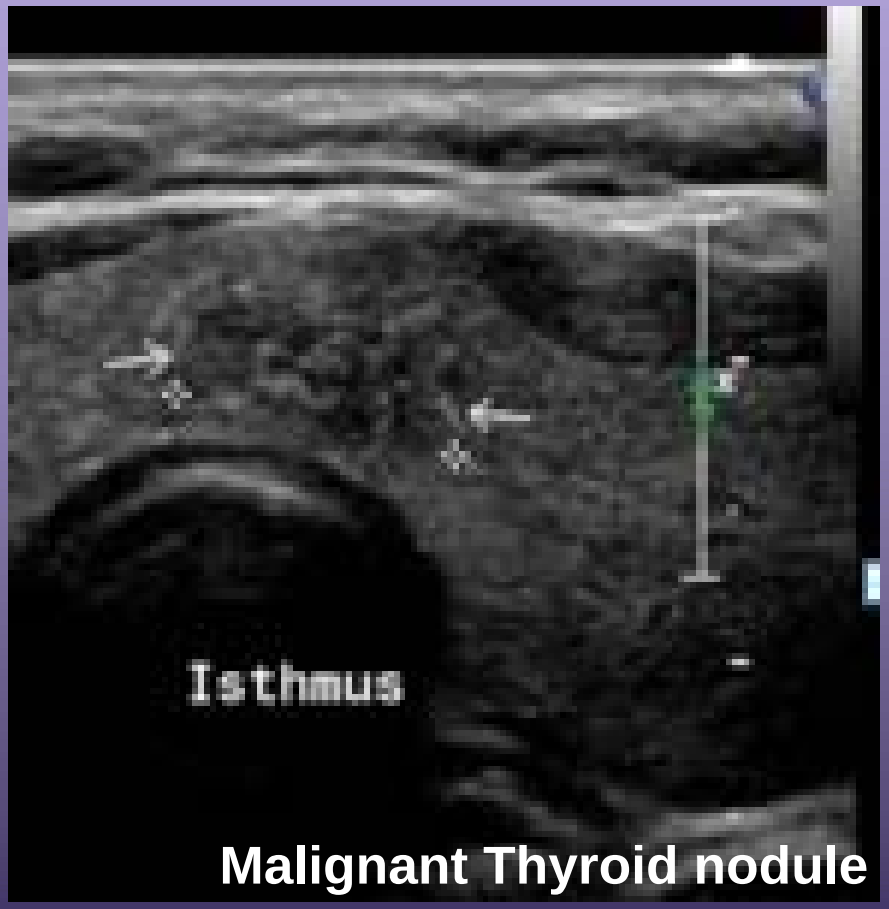
- Hyperechoic
- Microcalcifications
- Thick or absent halo
- Irregular margin
- Increased vascularity
- Lymphadenopathy

Thyroid Nodule

BENIGN



MALIGNANT



Ultrasound Characteristics
Benign vs Malignant Lymph Nodes

Benign

- Oval and Small
- Hilum visible- vascular pattern
- Isoechoic/hyperechoic
- No calcifications
- Regular margin
- Single
- Distinct from surrounding tissues

Malignant

- Round and Large
- Hilum not visible
- Hypoechoic/heterogeneous
- Microcalcifications
- Irregular margins
- Multiple
- Invasion of surrounding tissues

Benign Lymph Node

- Oval (L:W ratio >2:1)
- Visible hilum
- Solitary
- Well-defined

Thyroid Cancer Lymph Node Metastasis

- Hyperechoic
- Heterogeneous
- Irregular, extranodal spread
- Microcalcifications

Value of Preoperative Ultrasonography in the Surgical Management of Initial and Reoperative Papillary Thyroid Cancer

- Preop US detected nonpalpable LN mets in 33% of pts with PTC, thereby altering the procedure performed
- Even in pts with palpable LN's, US helps to guide the extend of lymphadenopathy

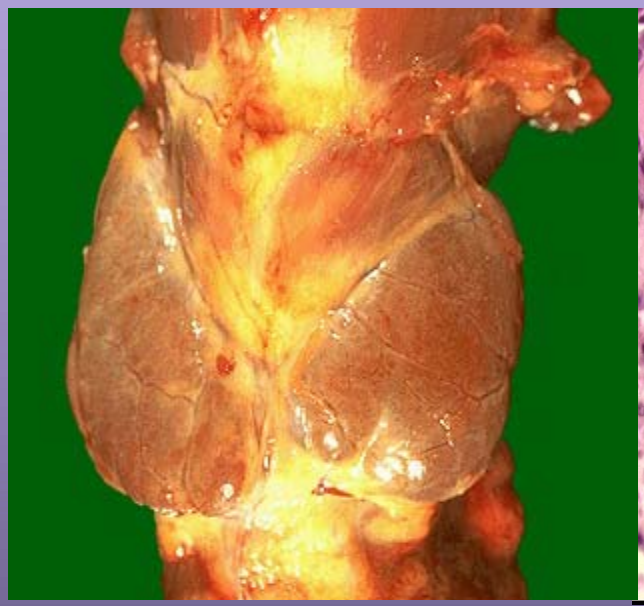
Stalak JM et al. Value of Preoperative Ultrasonography in the Surgical Management of Initial and Reoperative Papillary Thyroid Cancer. Arch Surg. 2006;141:489-496

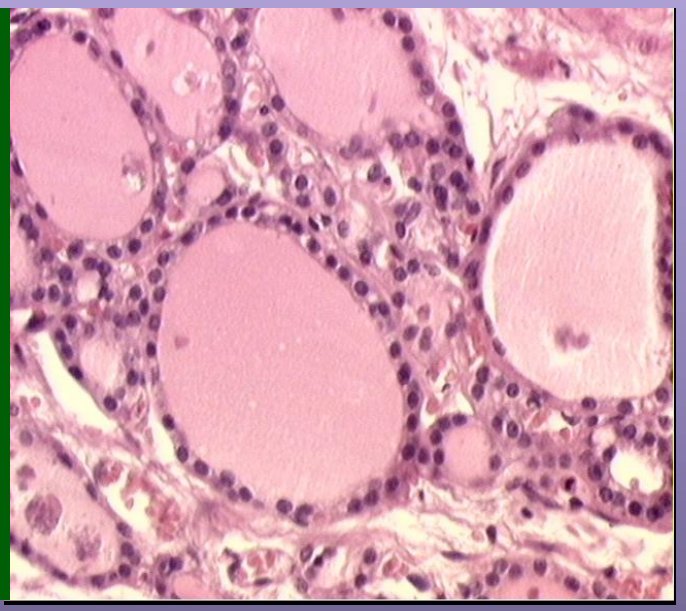
Comparison of Imaging Modalities for Papillary Thyroid Cancer Lymph Nodes

	Sensitivity	Specificity	Accuracy
PET/CT	30%	96%	87%
US	41%	97%	89%
CECT	35%	96%	87%

Jeong HS et al. Integrated 18F-FDG PET/CT for the initial evaluation of cervical node level of patients with papillary thyroid carcinoma: comparison with ultrasound and contrast enhanced CT. Clin Endocrinol 2006.Sep;65(3):402-7.

Indications, Clarifications, and Therapeutic Implications in FNA of the Thyroid





Ian M. Jaffee, M.D.
Director of Cytopathology
CPMC, Department of Pathology

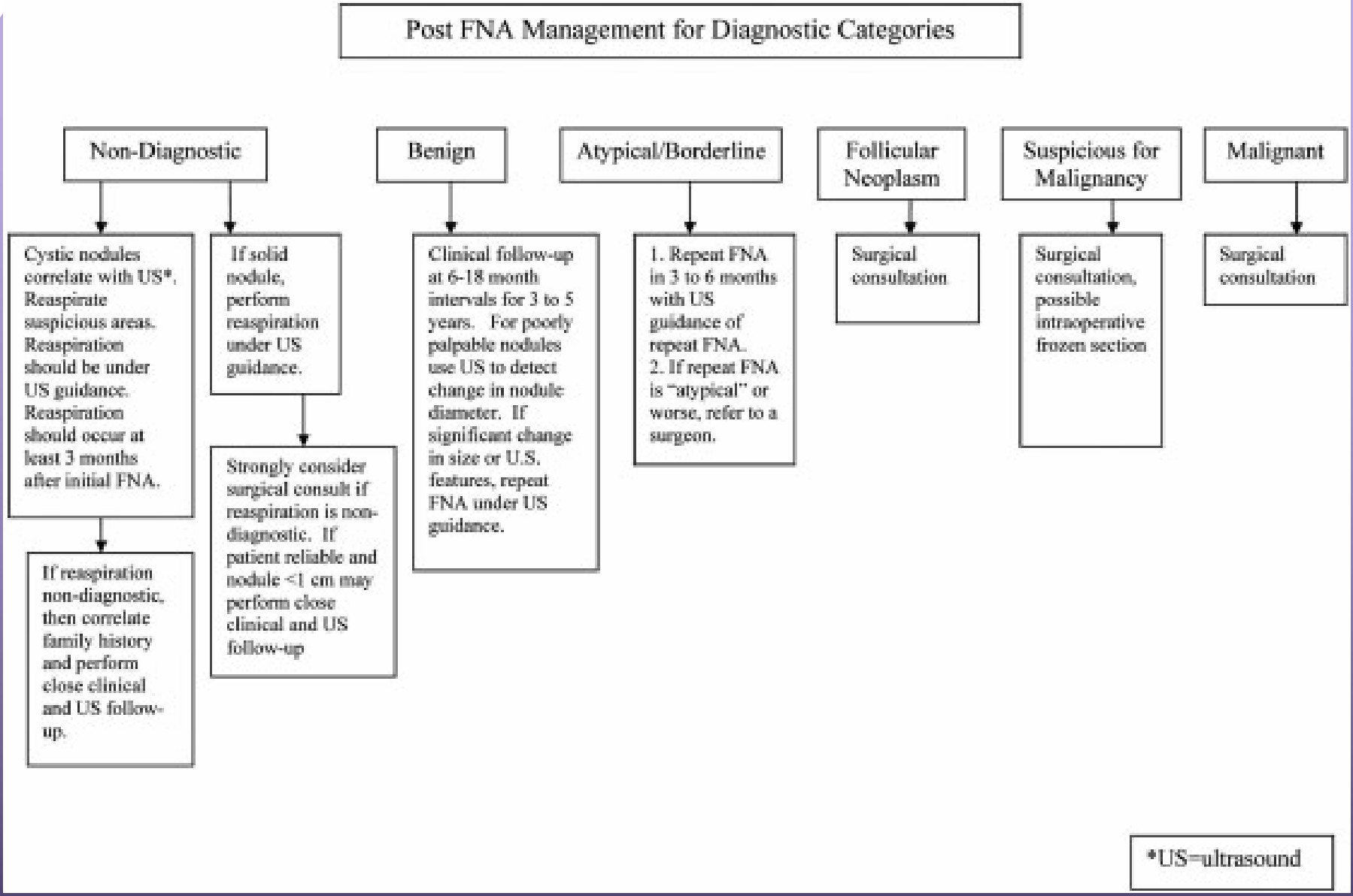
General indications for FNA

- No universally accepted guidelines
- 1.0 cm or greater by palpation
- Nodules 1.0 cm or greater by imaging- incidentalomas
- Sonographically suspicious (regardless of size)
  - Microcalcifications
  - Hypoechogenic and solid
  - Irregular or lobulated margins
  - Intranodular vascularity
  - Extracapsular spread
- Simple cysts?

Diagnostic Terminology, Risk*, and Follow-Up

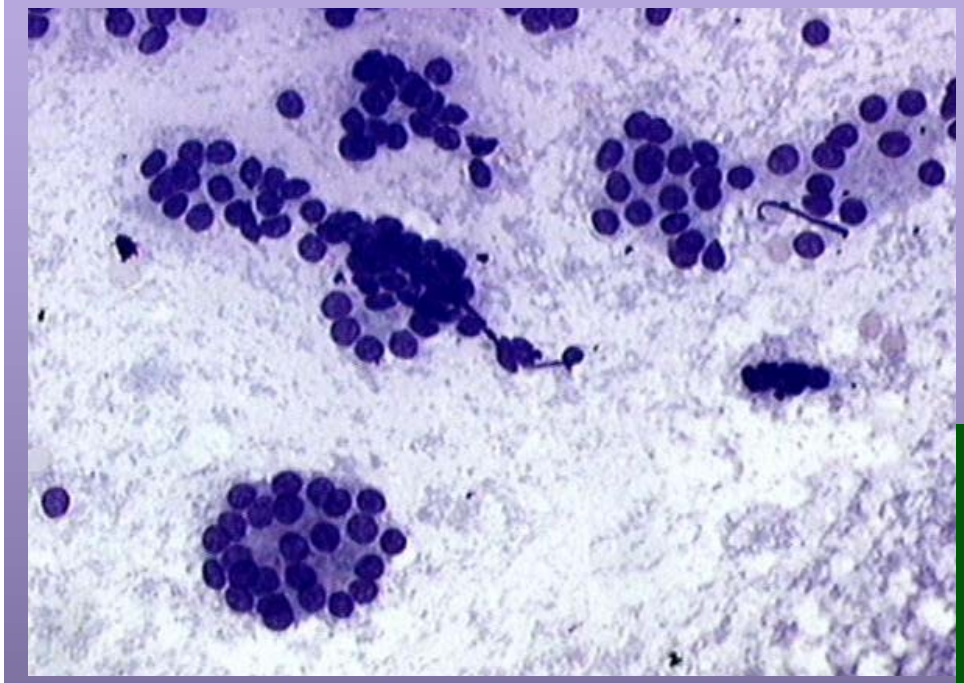
- Benign (<1%-ish)
- Indeterminate (5-10%)
  - Indeterminate follicular lesion
  - Atypical follicular lesion
  - Cellular follicular lesion
- Neoplasm (20-30%)
  - Suspicious for follicular neoplasm
- Suspicious for malignancy (50-75%)
- Malignant (~100%)
- Non-diagnostic

*Baloch, et al. The NCI Thyroid FNA state of the science conference: A summation. *CytoJournal.* 2008.

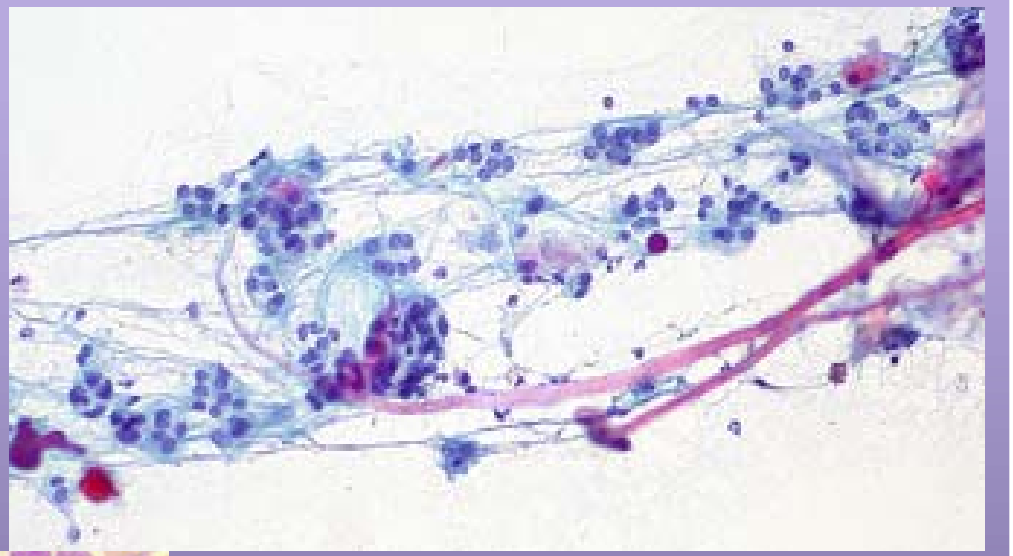


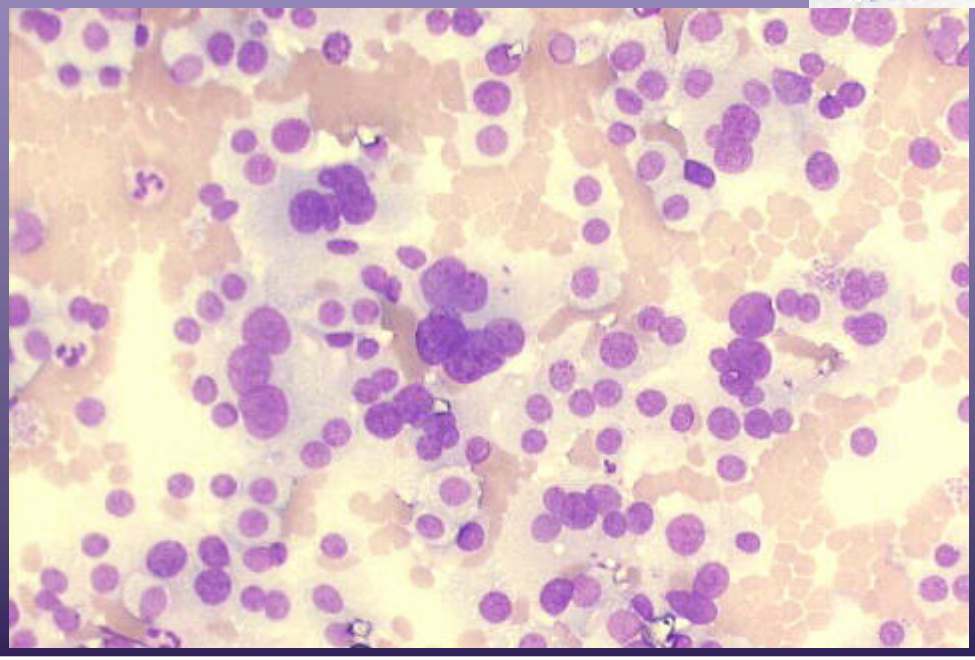
Layfield, et al. Thyroid Aspiration Cytology: Current Status. *Ca Cancer J Clin*2009.

Benign



Follicular Lesions





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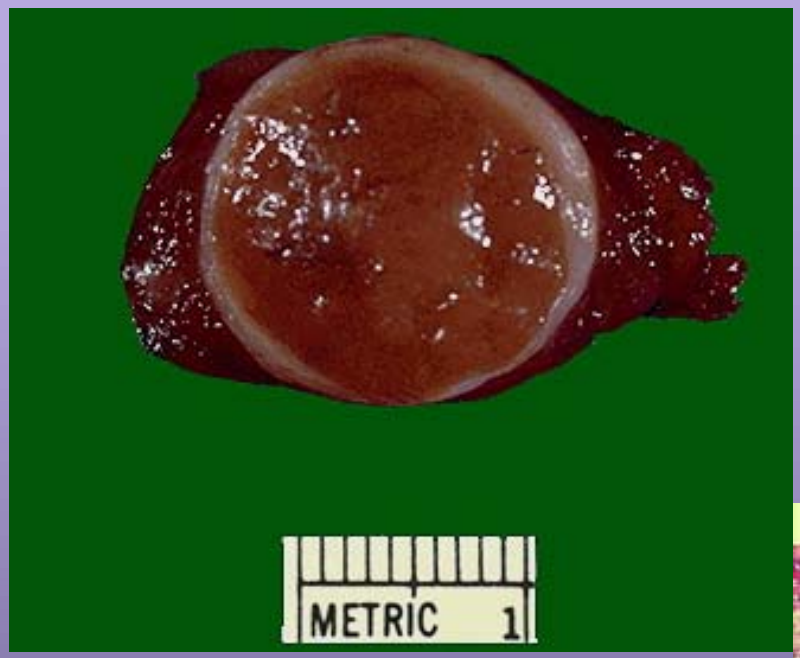
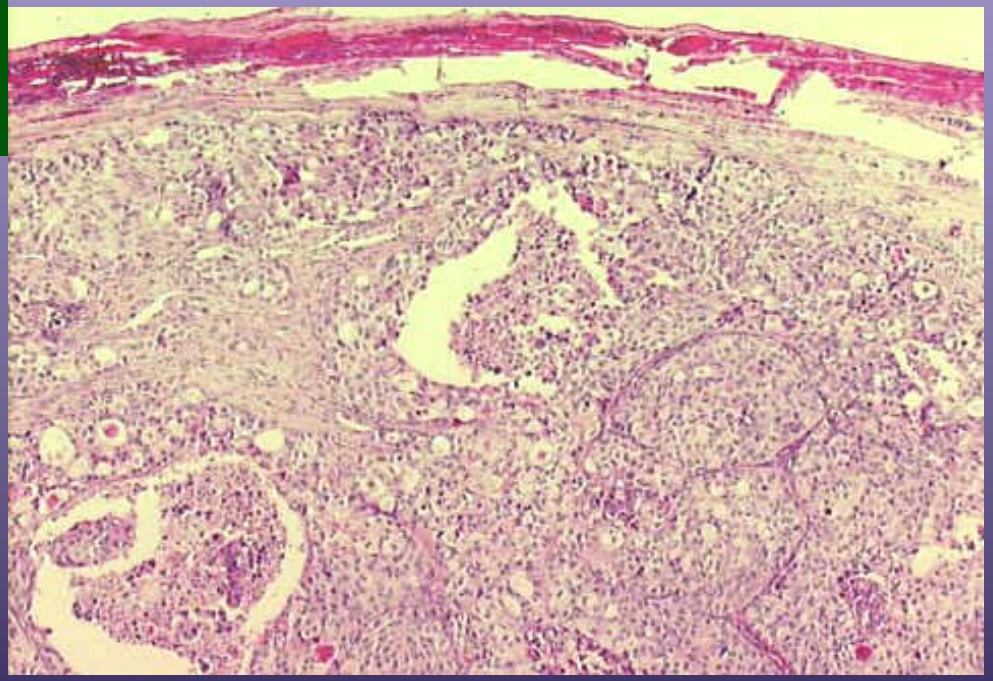
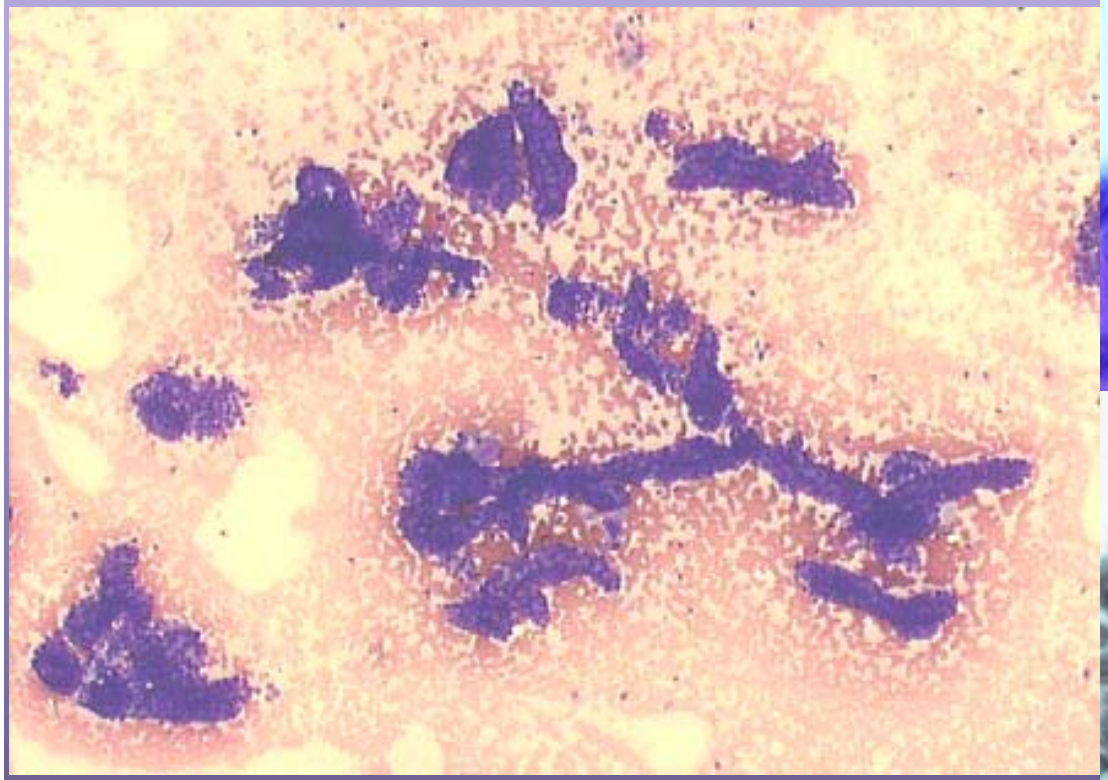


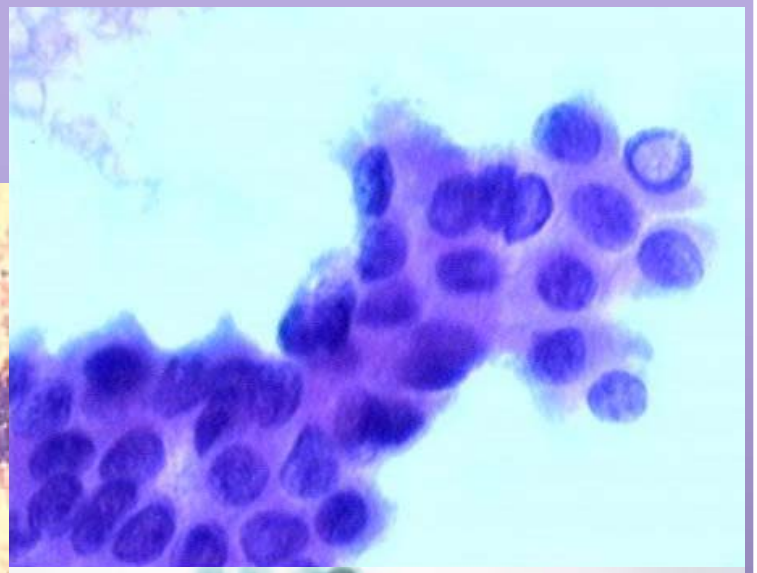


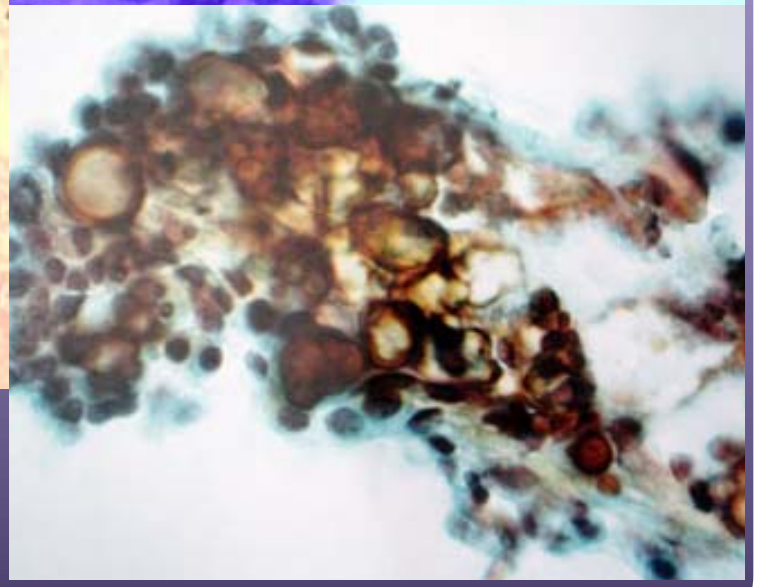
Malignant

- Papillary carcinoma
- Follicular carcinoma
- Medullary carcinoma
- Undifferentiated carcinoma (anaplastic)
- Lymphoma
- Sarcoma
- Metastasis

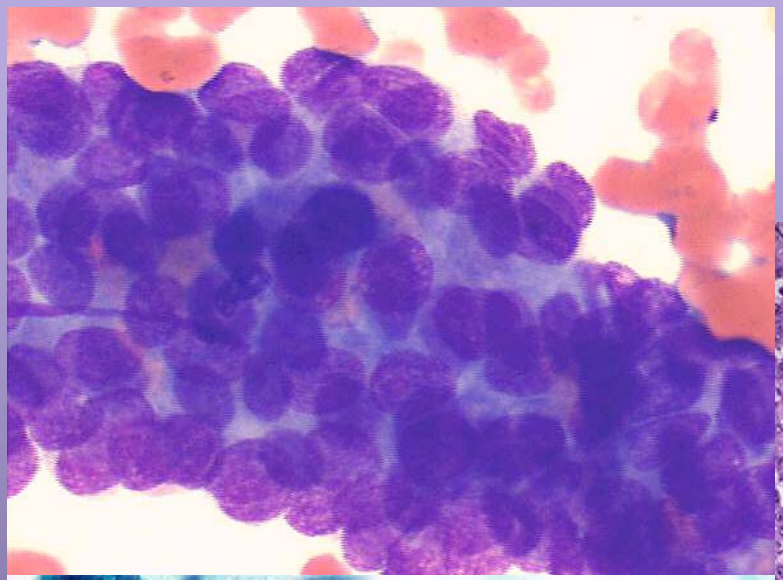
Papillary carcinoma

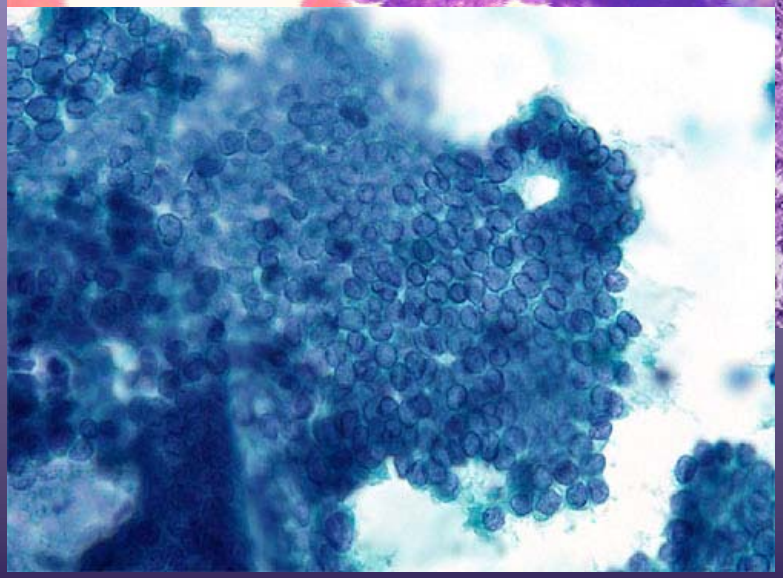


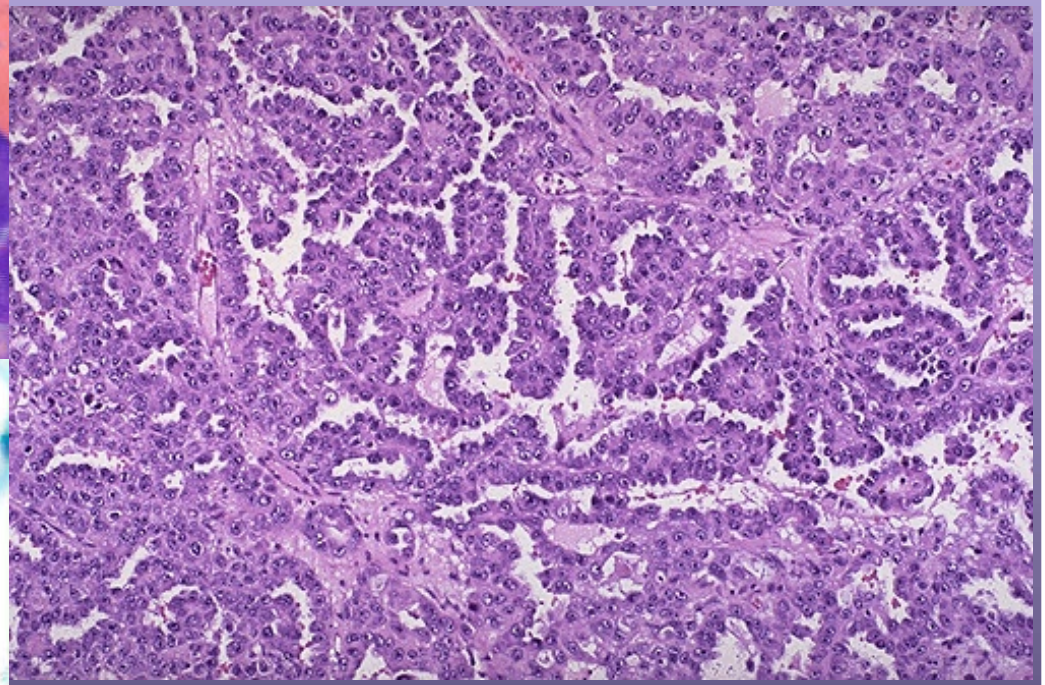




Papillary carcinoma



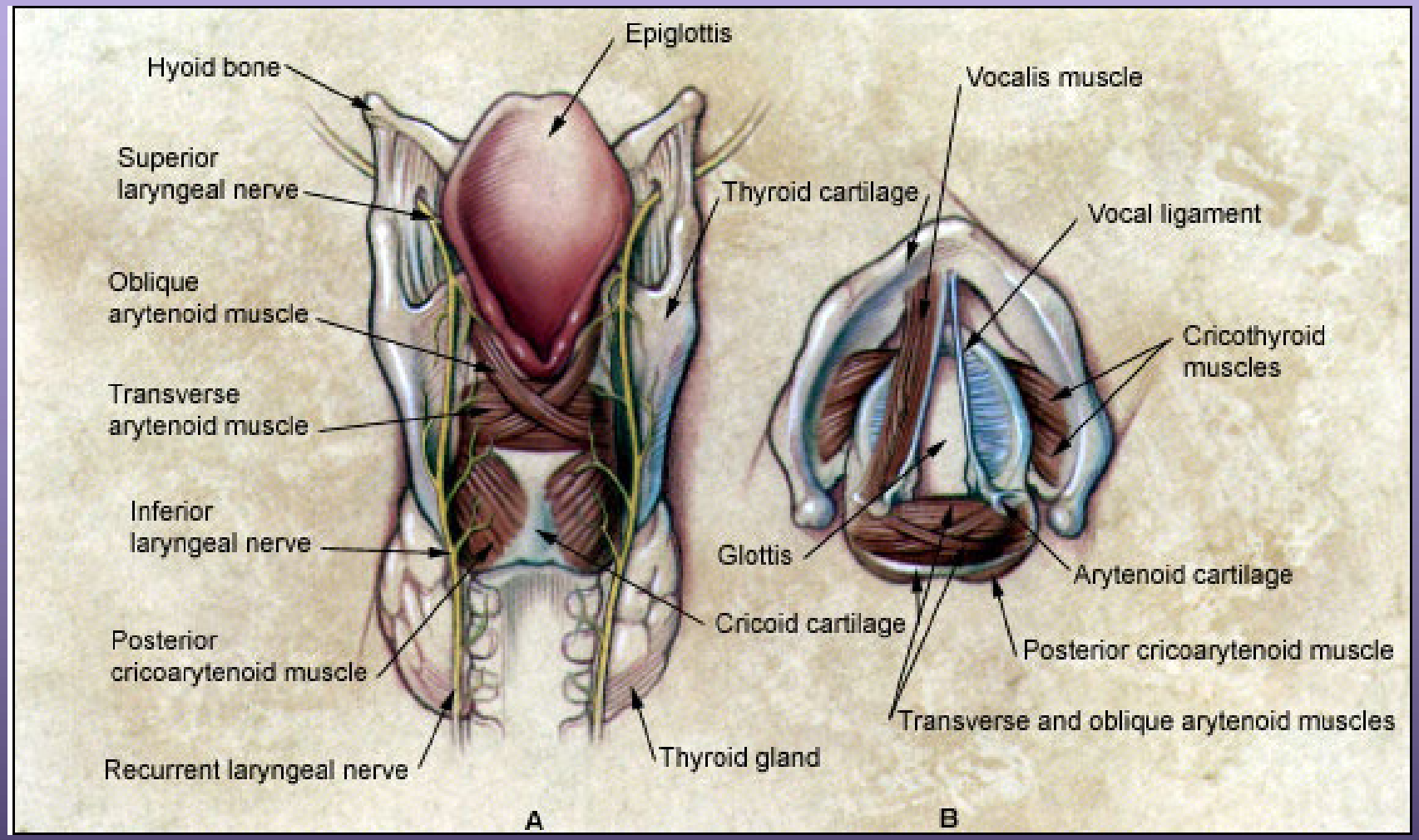




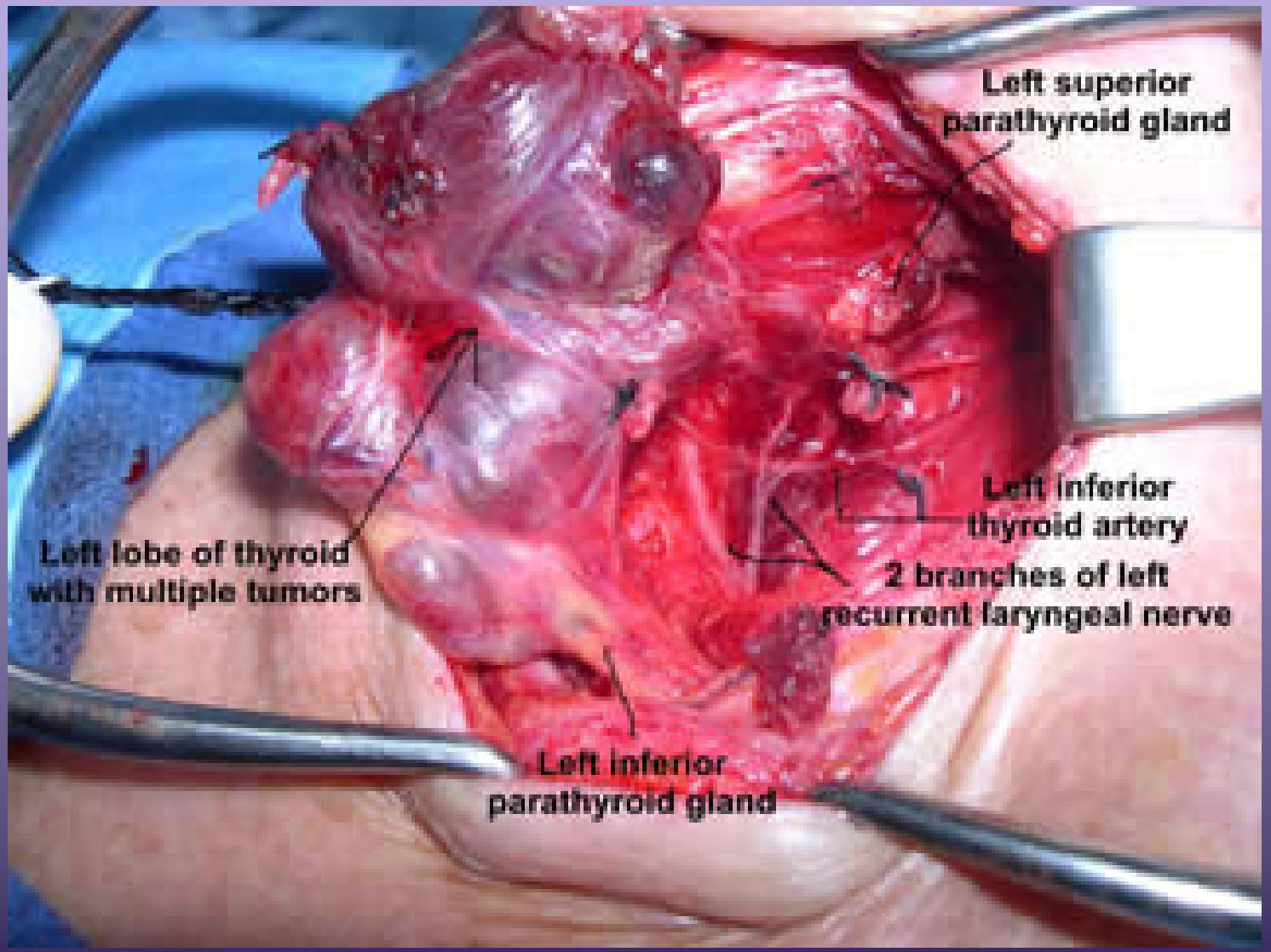
Advances in Thyroid Surgery

Andrea H. Yeung MD
Head and Neck Surgery

Recurrent Laryngeal Nerve (RLN)



Recurrent Laryngeal Nerve (RLN)



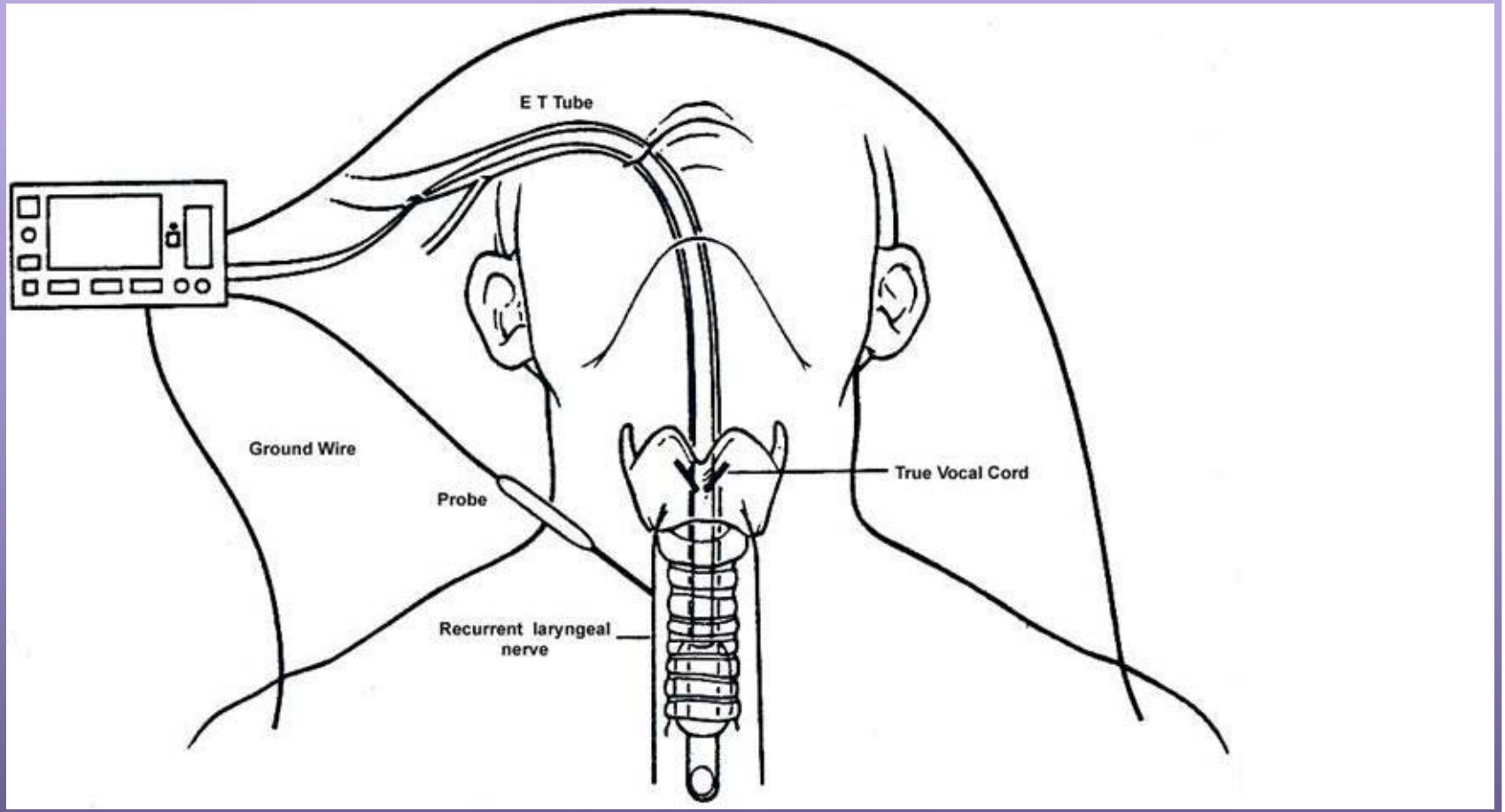
RLN injury during thyroidectomy causes vocal cord paralysis

- Physical or electrical injury, ischemia – all without transection – all invisible to the surgeon
- Surgeons significantly underestimate RLN injury
- *Lo C-Y et al. Arch Surg 2000*: 6.6% VCP by postop exam laryngeal exam; only 1.1% of injured nerves were recognized visually during surgery
- *Dralle et al. World J Surg. 2008:* RLN monitoring vs. visual ID only: permanent RLN paralysis *tended* to be lower with RLN monitoring rates ranged from 0-11%

Intra-operative RLN Monitoring

- Cranial nerve monitoring
  - Otologic, parotid surgery, neurosurgery: the norm
  - Thyroid/parathyroid surgery: growing awareness and use
- No prospective multicenter trial, as no one is willing to accept randomization to a non RLN monitored control group
- Introduced RLN monitoring at CPMC

Endotracheal tube-based monitoring



Low pressure cuff ET with integrated wire electrodes, insulated except for 30mm at glottic level

Left and right electrode pairs skewed anterior for optimal VC contact

ETT cuff in lower subglottis/proximal trachea

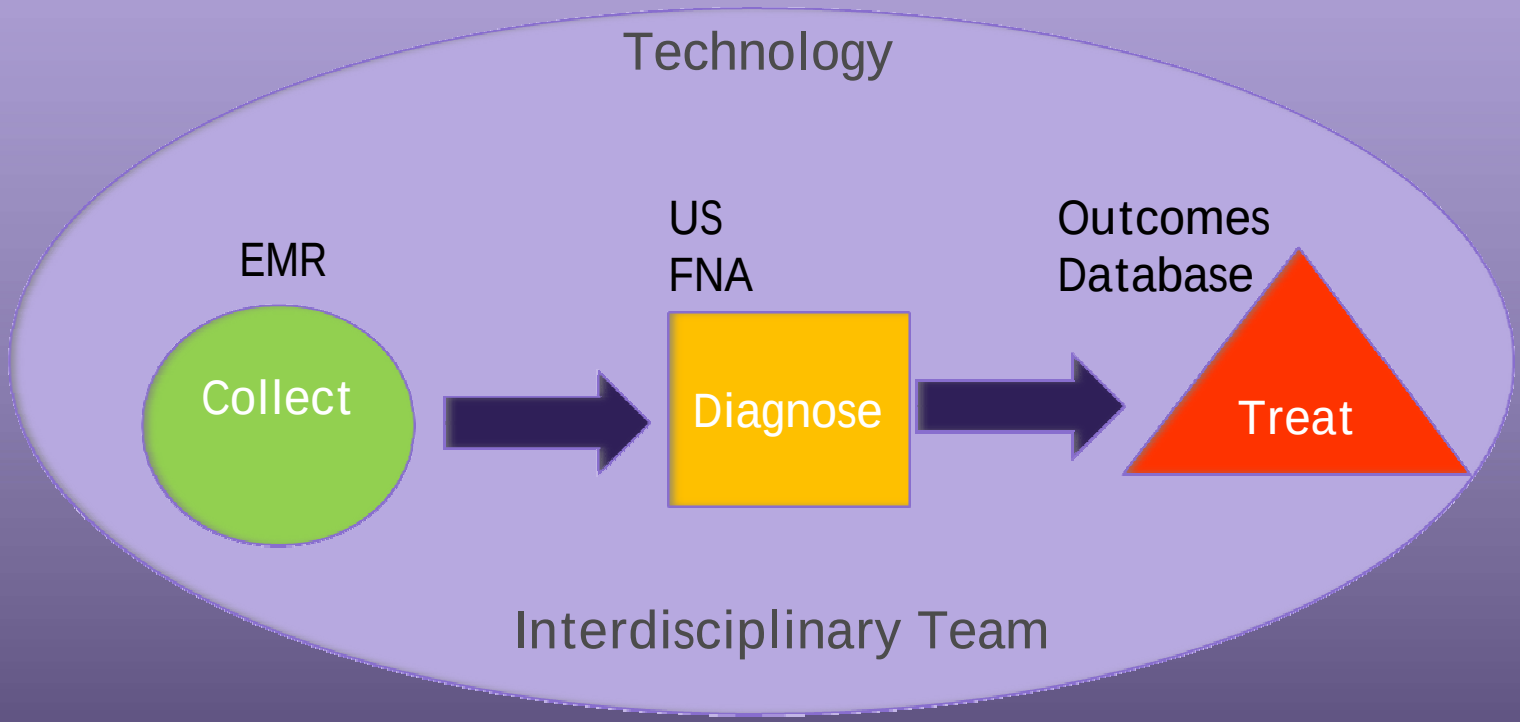
Nerve Integrity Monitoring System

- EMG measures muscle activity
- NIM oscilloscope with audio supplement to visual EMG display on monitor
- Ground and stimulator anode surface electrodes
- Hand-held pulse generator
- Probe stimulates nerves; electrodes “listens” for a response

Reasons to Monitor

- Electrical testing is better than visual inspection alone
- Aid in identification of RLN (speed, accuracy)
- Aid in dissection (or avoidance) of RLN
- Neural prognostic evaluation during and at the end of surgery (avoid bilateral VC paralysis)

Show the value of integrated care for patients with thyroid nodules



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