

# Thyroid Nodules Guidelines–Oriented Practice

By  
Professor:– Megahid Abuelmagd  
Diabetes and Endocrinology unit  
Mansoura university 2011

**Practice guidelines are documents developed by a group of experts to facilitate clinical decision making and improve standards of care. To help clinicians, guidelines must be clear, concise, up-to-date and preferably evidence based. These recommendations are to supplement, not replace, clinical judgment.**

**American Association of Clinical  
Endocrinologists and Associazione  
Medici Endocrinologi Medical  
Guidelines for Clinical Practice for the  
Diagnosis and Management of Thyroid  
Nodules**





يخرب بيت اللي يحكم بعد كده  
التبرعات بالدولار لو سمحتو

# Single Nodule

- ▶ **29-year-old woman**
  - Referred because of a recent thyroid nodule.
  - Exam confirmed a non-tender, firm, solitary 2 cm right nodule.
  
- ▶ **Questions**
  - How common is this problem?
  - What are predictors of malignancy?
  - What tests to order?
  - Optimal management?

# How Common are Thyroid Nodules?

- ▶ A very common clinical problem.
- ▶ Prevalence is 5% by palpation, 30–50% by US; 100 million people affected in U.S.
- ▶ 350,000 new nodules will be diagnosed this year.
- ▶ More common in women, in elderly, with I–deficiency or after radiation.
- ▶ 95% are benign.
- ▶ 20–48%—palpable one nodule by US—additional nodule

# Clinical Features Favoring Malignancy

- ▶ History of head/neck radiation.
- ▶ FHx of MEN2 or MTC I .
- ▶ Age <20 or >70 yr.
- ▶ Male sex.
- ▶ Growing nodule.
- ▶ Firm, a hard or fixed nodule.
- ▶ Cervical adenopathy.
- ▶ Persistent dysphonia –dysphagia or dyspnea.



# Lab Tests

## ▶ TSH

- Always measure serum TSH Upper limit of serum TSH is in dispute.

## ▶ CT

- Measurement of basal calcitonin may be a useful text.
- Mandatory if MTC.

## ▶ TG

- Suspected Not recommended.



# Serum TSH

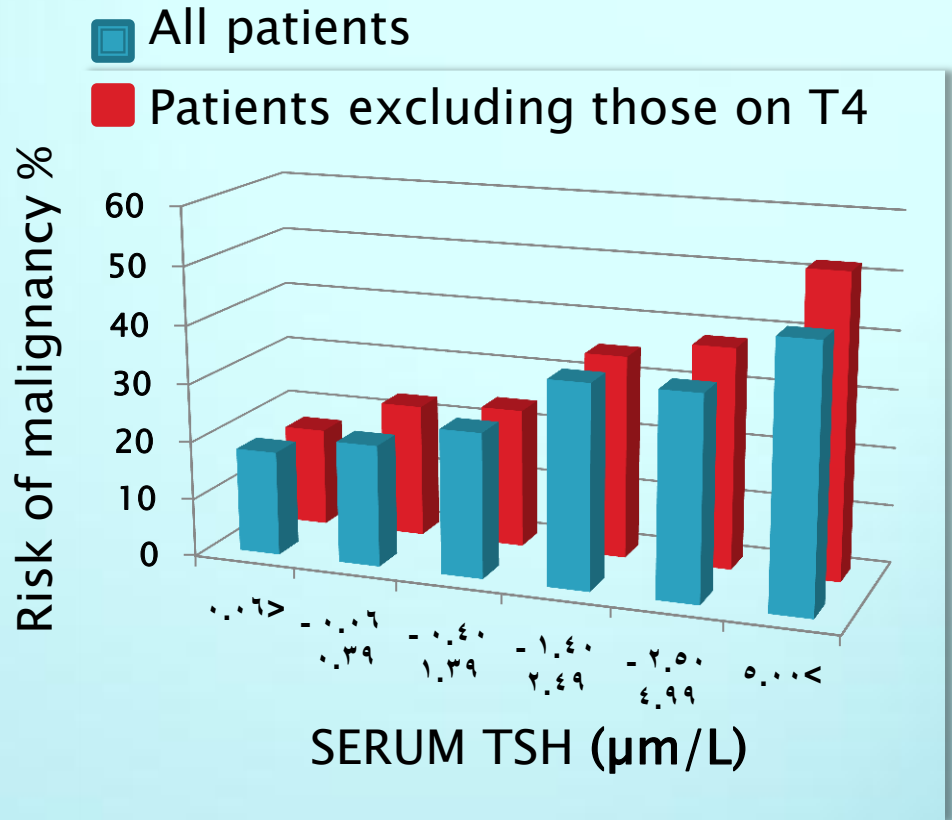
- ▶ No further tests if TSH is normal.
- ▶ If TSH is elevated measure FT4 & TPO.
- ▶ If TSH is low, follow with FT4 & FT3 to hyperthyroidism.
- ▶ A hyperfunctioning nodule on isotope scan precludes the need to FNA.
- ▶ Consider TSH level another risk factor for malignancy .

# Evidence: Serum TSH & Cancer Risk

Age (Yr)		TSH ( $\mu\text{m/L}$ )	Calculated risk of malignancy
40	Solitary	0.3	8.1
40	Solitary	0.5	8.4
40	Solitary	1.0	9.4
40	Solitary	3.0	14.6
40	Solitary	5.0	21.9
40	Solitary	6.0	26.4

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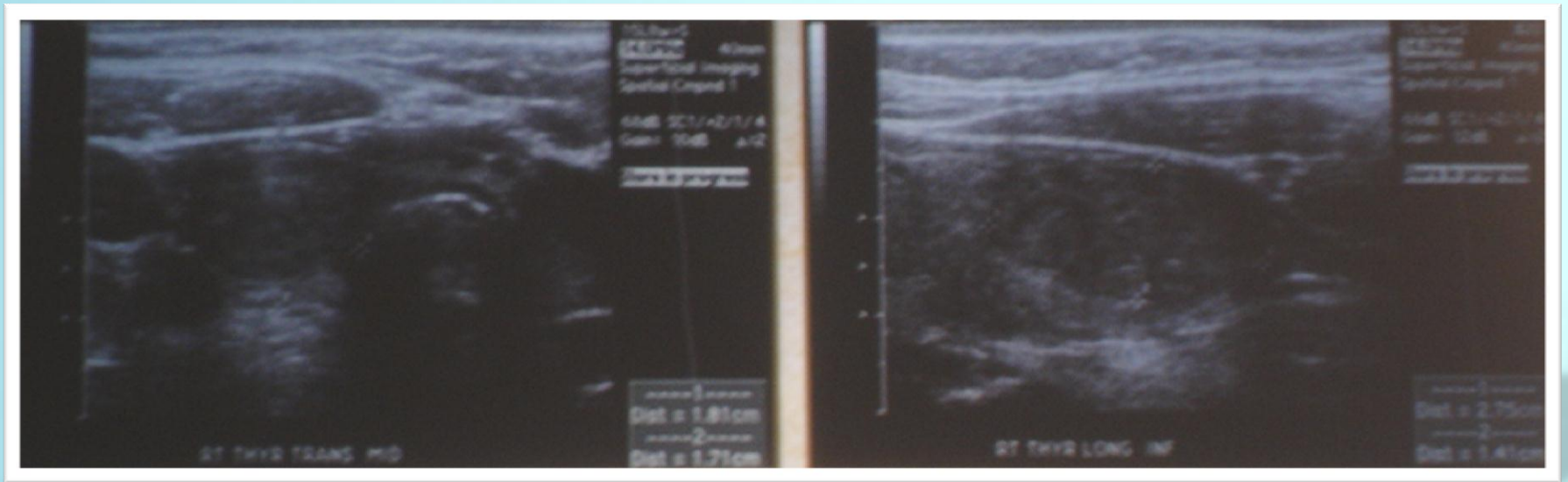
**Routine serum calcitonin screening in patients undergoing evaluation for thyroid nodules appears to be cost effective in the United States, with C/E comparable to the measurement of thyroid stimulating hormone, colonoscopy, and mammography screening.**

# Ultrasound Exam

- ▶ **Recommended for:**
  - Pt with high risk for thyroid cancer
  - Pt with palpable nodule or MNG
  - Pt with adenopathy suggestive of ca
- ▶ **Always describe**
  - Nodule position, shape, size, margins, content, echogenicity and vascular features.



# 29 years old woman



**Hypoechoic. solid 1.8 x 1.2 x 2.8 cm right nodule**

# Risk of malignancy using US features of thyroid nodules

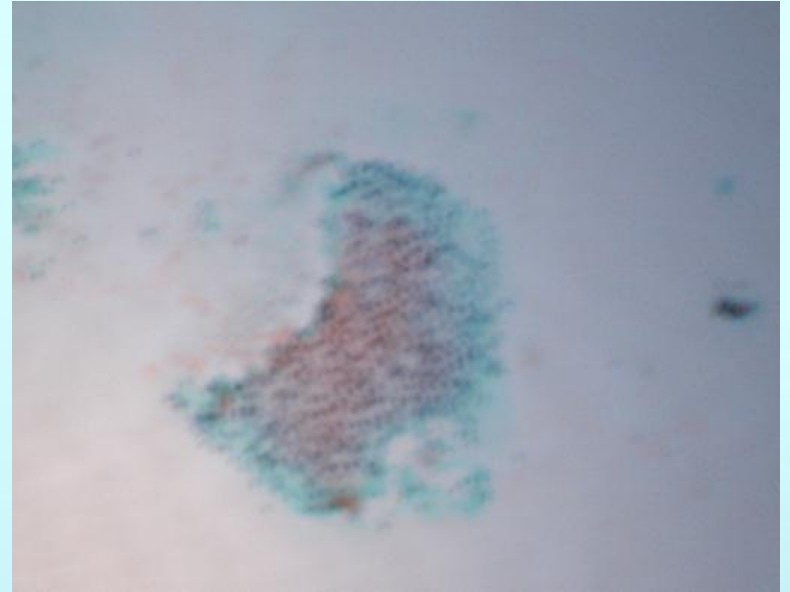
Features	Low risk	High risk
Margins	Clear	Poorly defined
Shape	Regular	Irregular
Microcalcifications	Absent	Present
Echogenicity	Euth or hyper	Hypo
Structure	Cystic - spongiform	Solid
Color doppler flow	Peripheral	Chaotic
Adenopathy	Absent	present

# FNA Biopsy

- ▶ FNA is the most accurate test and cytology is more reliable if FNA done with US.
- ▶ Clinical management of TN should be guided by both US and FNA.
- ▶ Guidelines suggest US-guided FNA to increase accuracy of results.

# 29 years old woman

- ▶ **FNA: benign colloid nodule**
- ▶ **What is risk of cancer In this report?**



# New Thyroid FNA Classification

▶ Cytologic category	▶ Risk of malignancy
◦ Benign	<1
◦ Follicular lesions	<10
◦ Suspicious for malignancy	80–75
◦ Malignant	100
◦ Nondiagnostic	<3%



# FNA – Benign Nodule

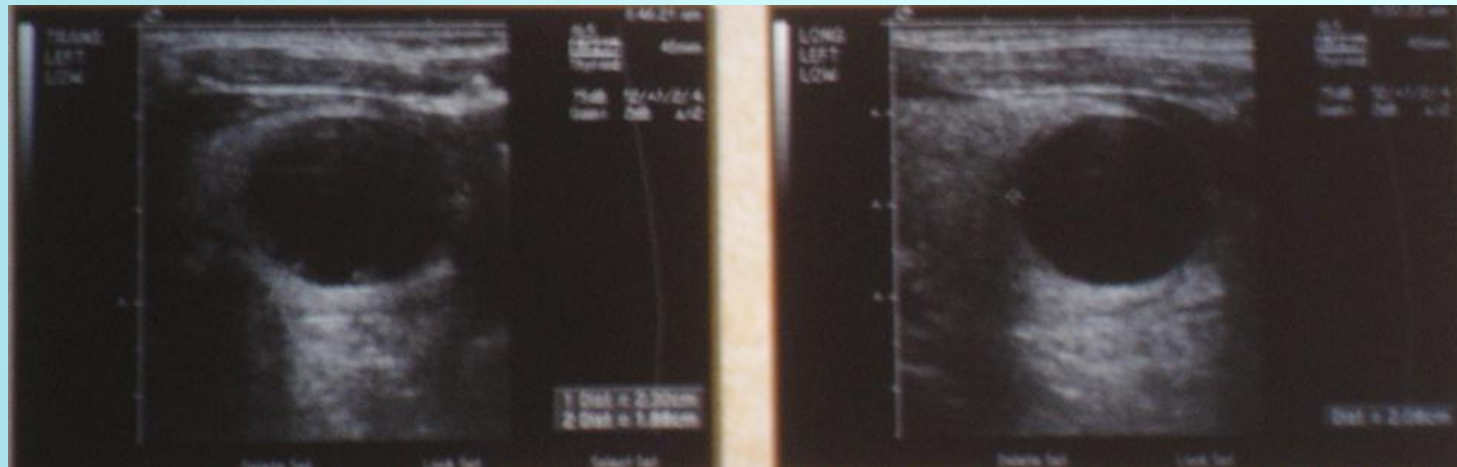
- ▶ **Management and follow-up**
  - Routine T4 Rx is not recommended
  - Should repeat US in 6–18 months
  - Repeat FNA if nodule volume increases  $> 50\%$



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# Cystic Nodule

- ▶ 43-year-old man
  - Reports recent left neck pain
  - No prior Hx thyroid disease or radiation
  - Exam showed a tender 2x3 cm left thyroid mass
  - TSH 2.2 mIU/L

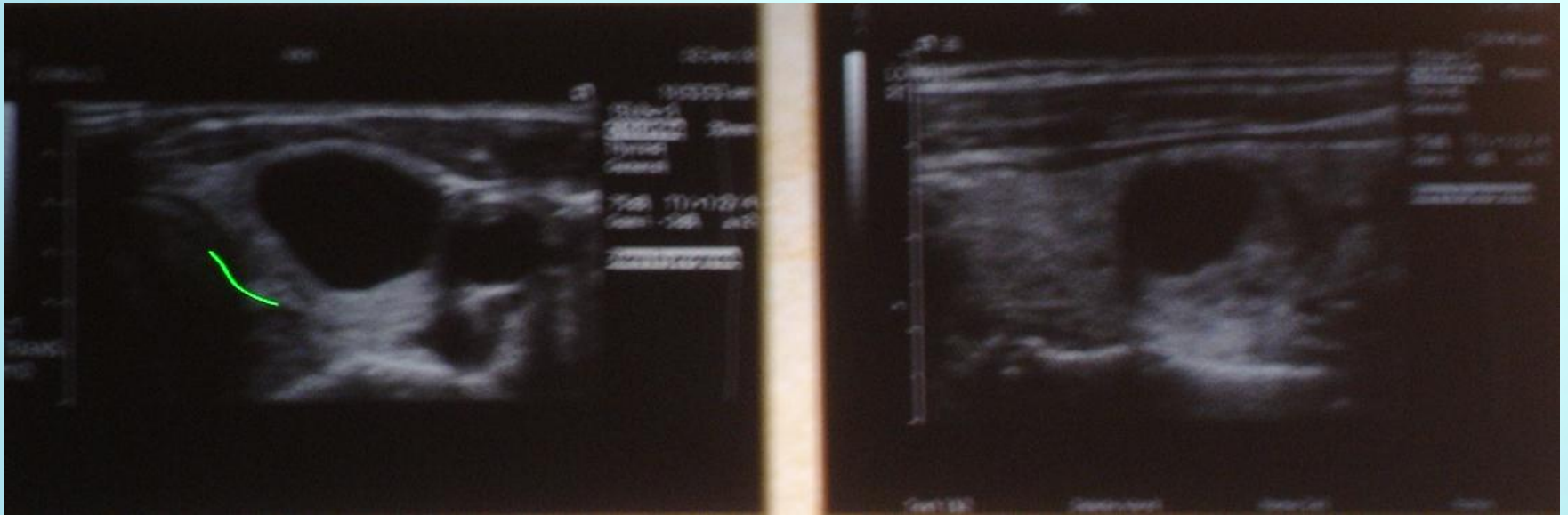


# Cystic Nodule

- ▶ FNA yielded 12 mL yellow-colored, clear fluid
- ▶ What if fluid was clear, colorless?
- ▶ Fluid was acellular but biopsy cytology was benign
- ▶ What else to do? Follow, surgery, or alcohol ablation?

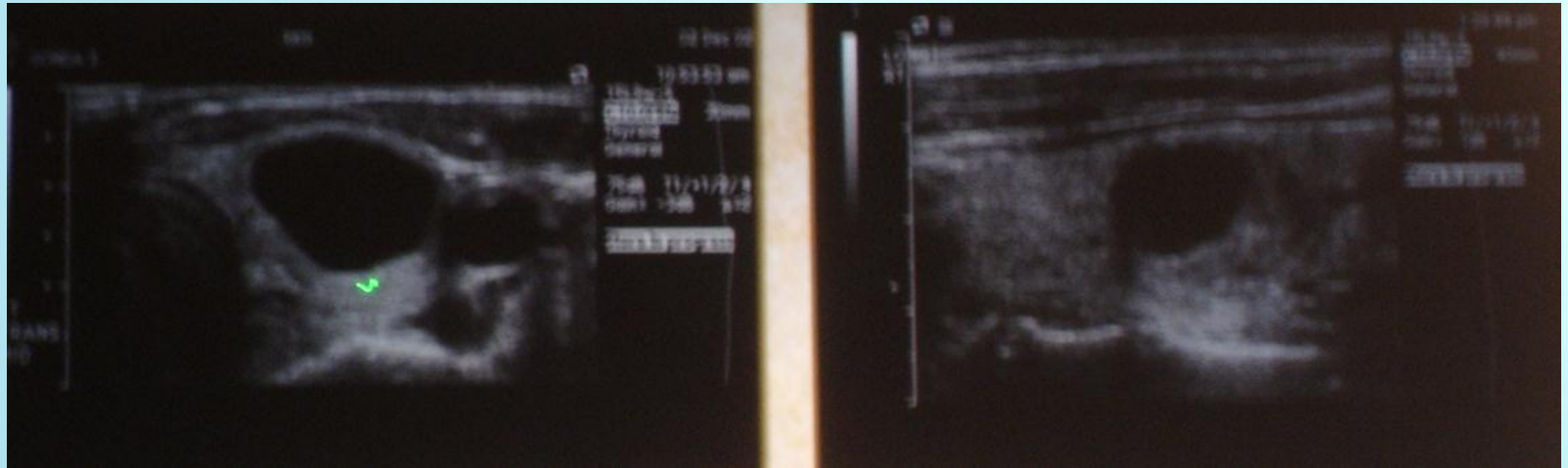


# Which Cyst is Benign?

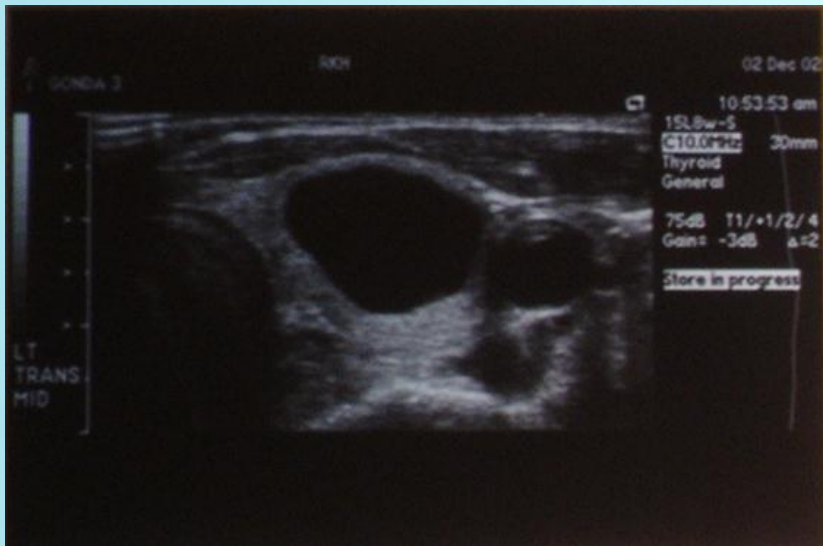




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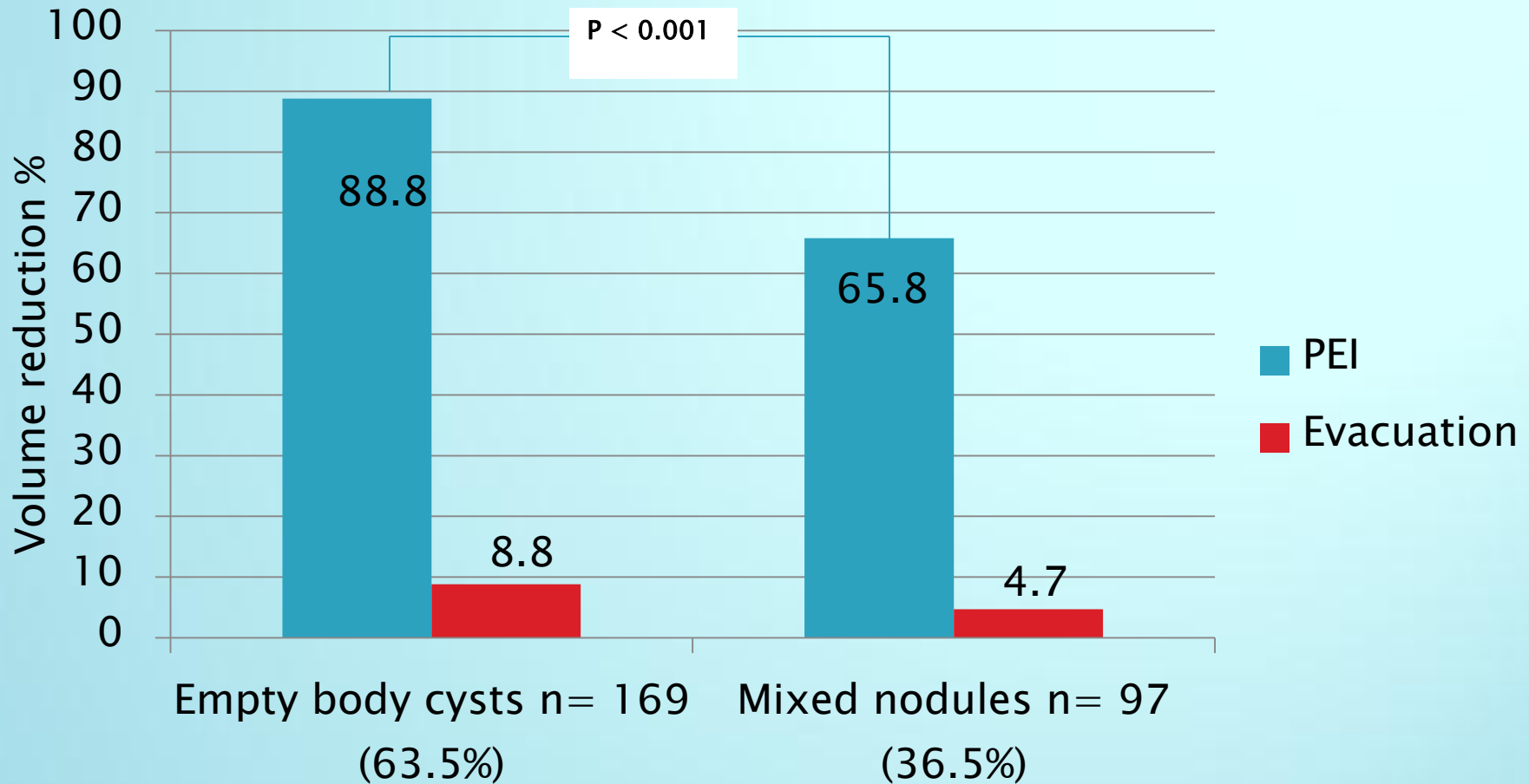


Benign

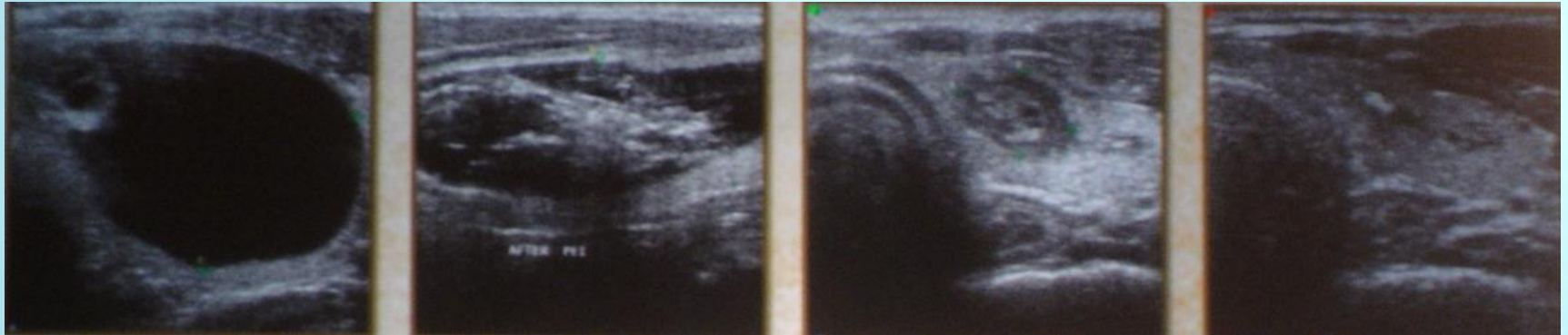


Malignant

# Percutaneous Ethanol Injection (PEI) Empty Body vs Mixed Cysts



# PEI for Thyroid Cyst



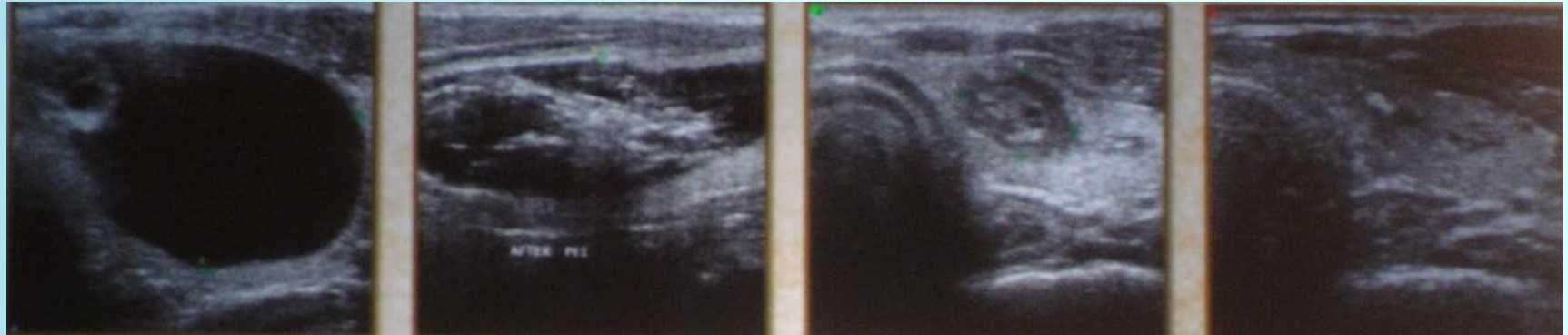
**Pretreatment**  
vol 17.6 mL

**Ethanol infusion**  
vol 10 mL

**1-month**  
vol 3.6 mL

**12-month**  
vol 0.04 mL

# PEI for Thyroid Cyst

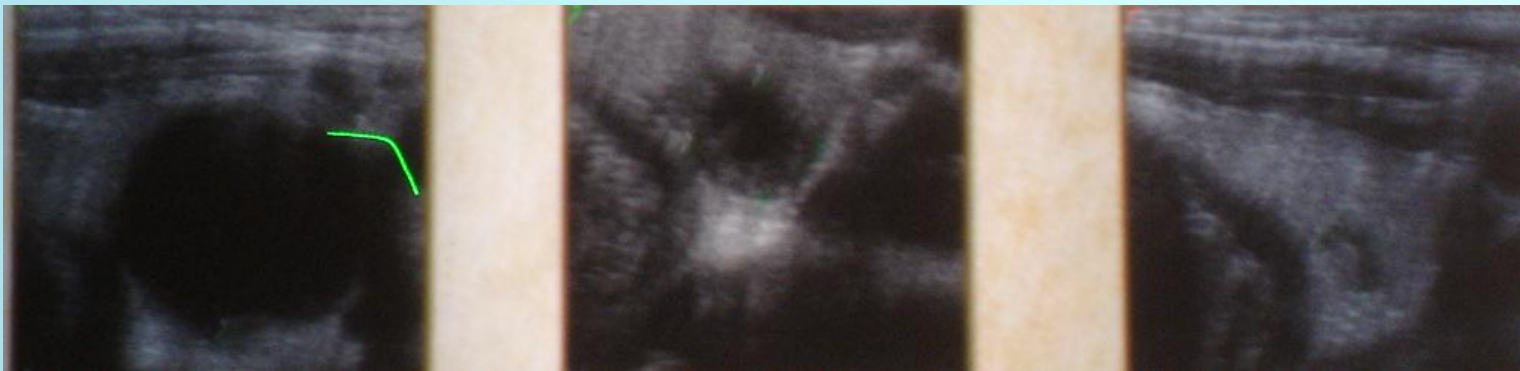


Pretreatment  
vol 17.6 mL

Ethanol infusion  
vol 10 mL

1-month  
vol 3.6 mL

12-month  
vol 0.04 mL



Pretreatment  
vol 2.2 mL

1-month  
vol 0.6 mL

6 month  
vol 0.068 mL reduction by 96.6%



# PEI

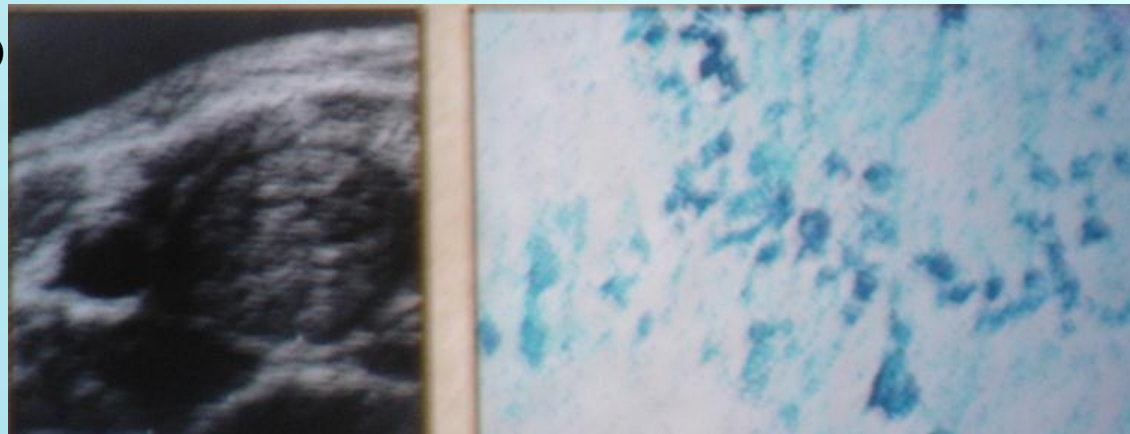
- ▶ High recurrence rate after simple aspiration.
- ▶ Is highly effective for thyroid cysts with a large fluid component.
- ▶ Safe office procedure when performed by experienced personnel.
- ▶ Mild temporary pain and dysphonia.
- ▶ Should not be performed on solid, cold nodules or large, toxic nodules.



# Suspicious nodule

- ▶ 46 year-old woman
  - Discovered to have a right thyroid mass by her gynecologist
  - Exam confirmed a 3 x 2 cm firm, solitary right lobe nodule; left normal
  - TSH 0.6 mIU/L

SOLID



FN

# When Initial FNA Shows FN You Can

- ▶ Just follow

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- ▶ Just follow.
- ▶ Repeat FNA.

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- ▶ Just follow.
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- ▶ Do core needle biopsy.

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- ▶ Do core needle biopsy.
- ▶ Get a thyroid scan.

# When Initial FNA Shows FN You Can

- ▶ Just follow.
- ▶ Repeat FNA.
- ▶ Do core needle biopsy.
- ▶ Get a thyroid scan.
- ▶ Order molecular markers.



# Management of FN

- ▶ Do not repeat FNA
- ▶ Do not use CNB
- ▶ Do not order molecular markers
- ▶ Consider lobectomy; frozen section not useful.

# Current molecular markers

- ▶ **BRAF**
- ▶ **PAX8/PPAR<sub>v</sub>**
- ▶ **Galectin 3**
- ▶ **HBME 1**
- ▶ **RET/PTC**

# AAACE-AME-ETA Cytologic Classification – 2010

- ▶ **Nondiagnostic**
- ▶ **Benign**
- ▶ **Follicular lesion**
- ▶ **Suspicious**
- ▶ **Malignant**

# Bethesda Thyroid Cytology Classification

## ▶ Cytology

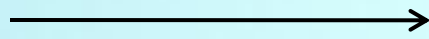
- Non-Dx



## ▶ MGT

Repeat FNA

- Benign



Follow

- Atypia



Repeat FNA

- FN



Lobectomy

- Suspicious



NTT

- Malignant

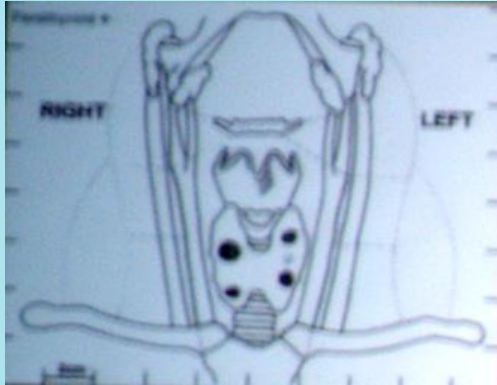


NTT

# Multiple nodules

- ▶ **54-year-old woman**
  - Referred for consultation after exam suggested a nodular thyroid
  - There is no prior history of thyroid disease or treatment; no h/o neck radiation
  - Exam showed a small nodular goiter
  - TSH 1.3/FT4 1.4/TPO neg

# 54-year-old woman



- ▶ R lobe: 1.4 cm solid cystic plus 8 mm solid nodule
- ▶ L lobe: 0.8 cm cyst plus 1.3 cm hypoechoic solid nodule



# Risk of Malignancy

- ▶ **Contrary to previous statements that large or solitary nodules carry increased risk of cancer, recent reports show that neither nodule size nor nodule number influences risk of malignancy,**

# Cancer risk and nodule number

Study ( yr. location)	Individuals (no.)	Definition of nodularity	FNA technique	Cancer form	
				1 nodule	Multiple nodules
McCall et al (1984 U.S.)	442	Scan/ HX	palpation	17	13
Cochand-Priolett (1994 France)	132	Scan/ US	US	13	14
Sachmechi et al (2000 U.S)	443	Scan		8	10
Marqusee et al (2000 U.S)	156	US	US	7	9
Papini et al (2002 Italy)	494	US	US	9	6
Deandrea et al (2002 Italy)	420	US	US	5	7
Frates (2006 U.S)	1,985	US	US	14.8	14.9

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# How to Select Which Nodule to Biopsy?

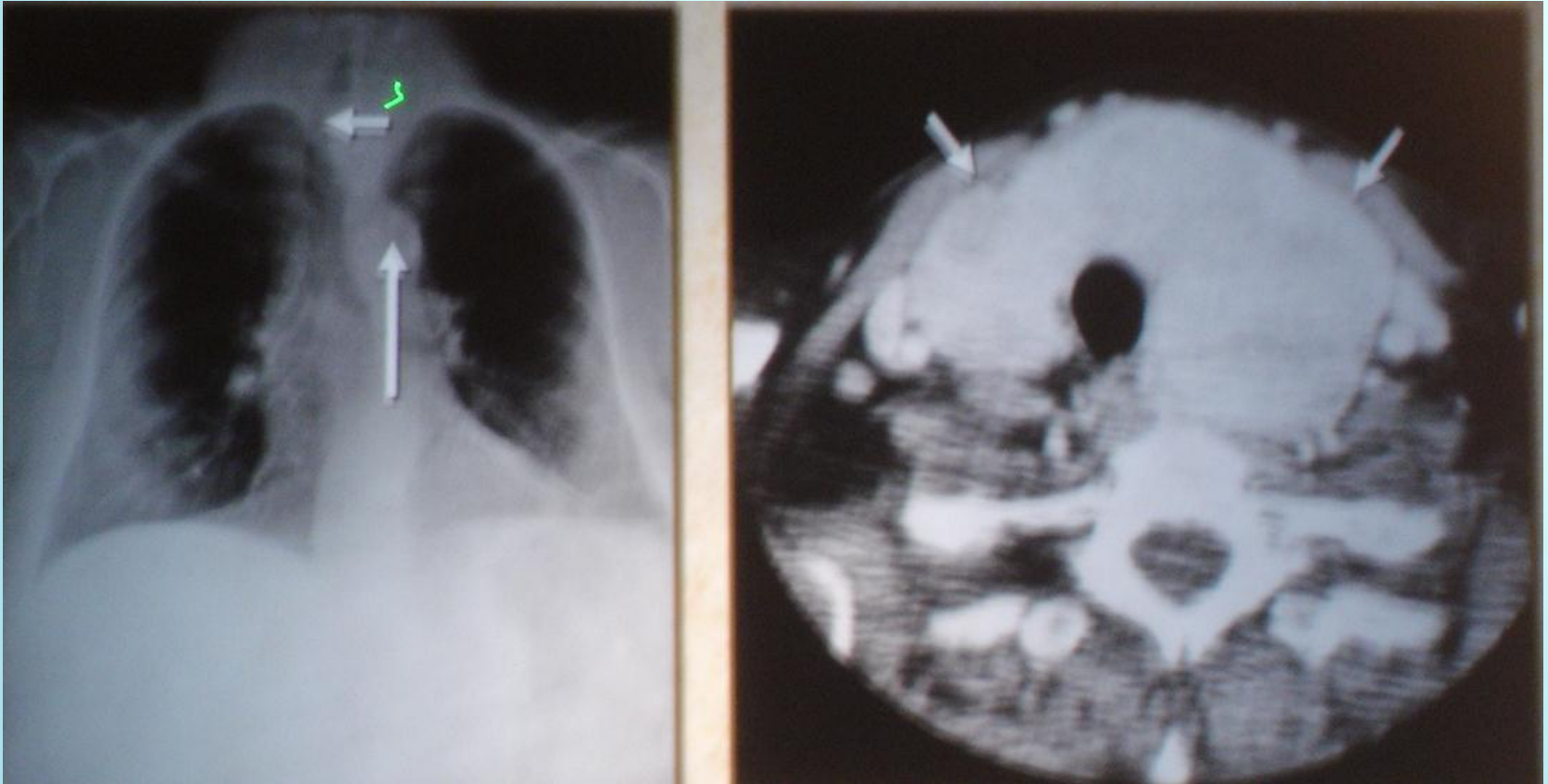
- ▶ Use US features rather than nodule size or number.
- ▶ Solid, hypoechoic nodule  $>1.0$  cm.
- ▶ Nodule of any size with features of malignancy or in high-risk pt (radiation, FMTC).
- ▶ Seldom necessary to FNA more than 2 nodules.

# Non toxic nodular goiter (NNG)

- ▶ **84 years old woman**
  - Recent goiter
  - Reports neck pressure, mild DOE, cough and poor sleep
  - CAD. CHF, DM. DJD
  - Exam showed a diffusely enlarged NNG

# 84-Year-Old Woman

TSH 0.9; FT 41.5; T3 155

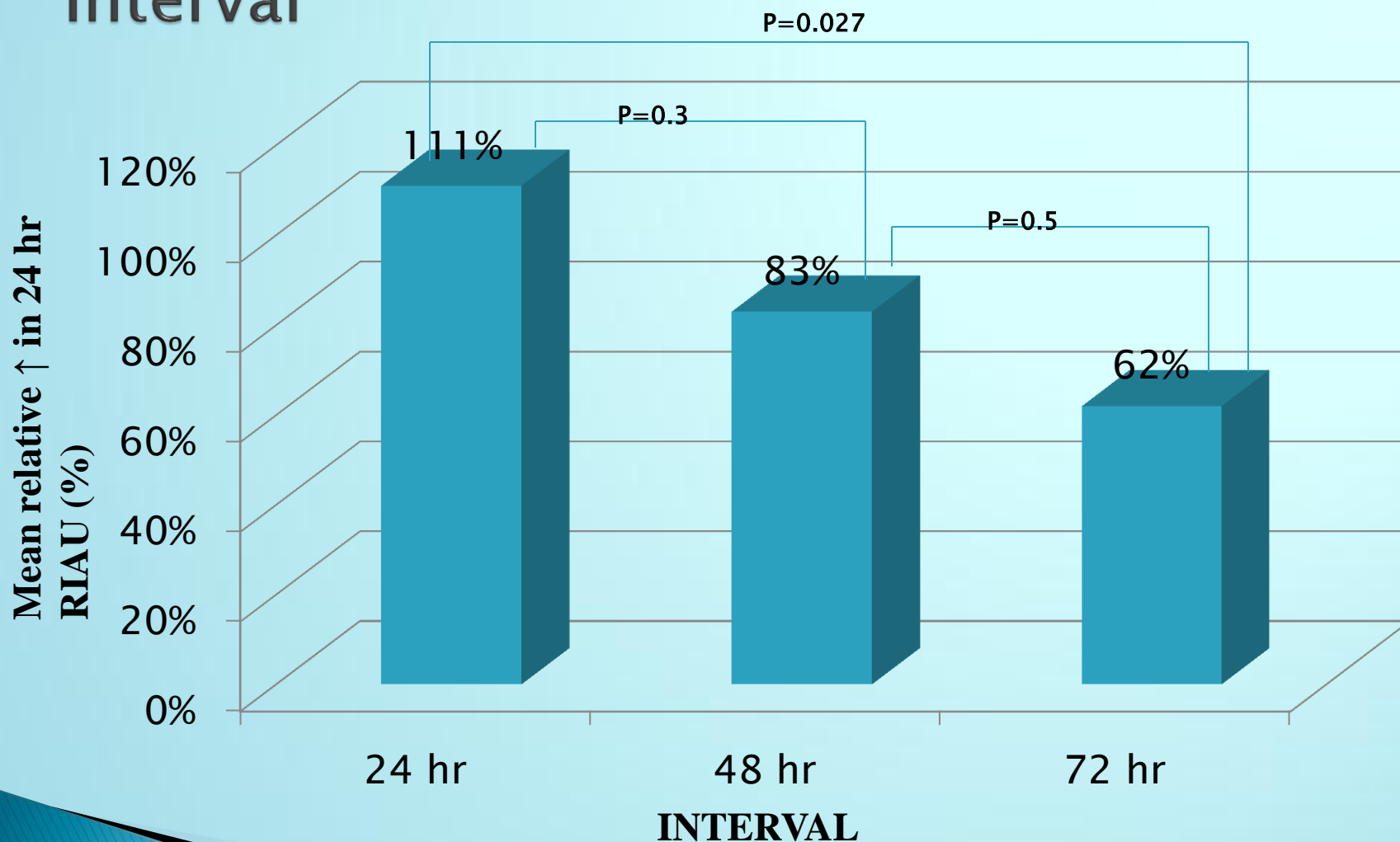




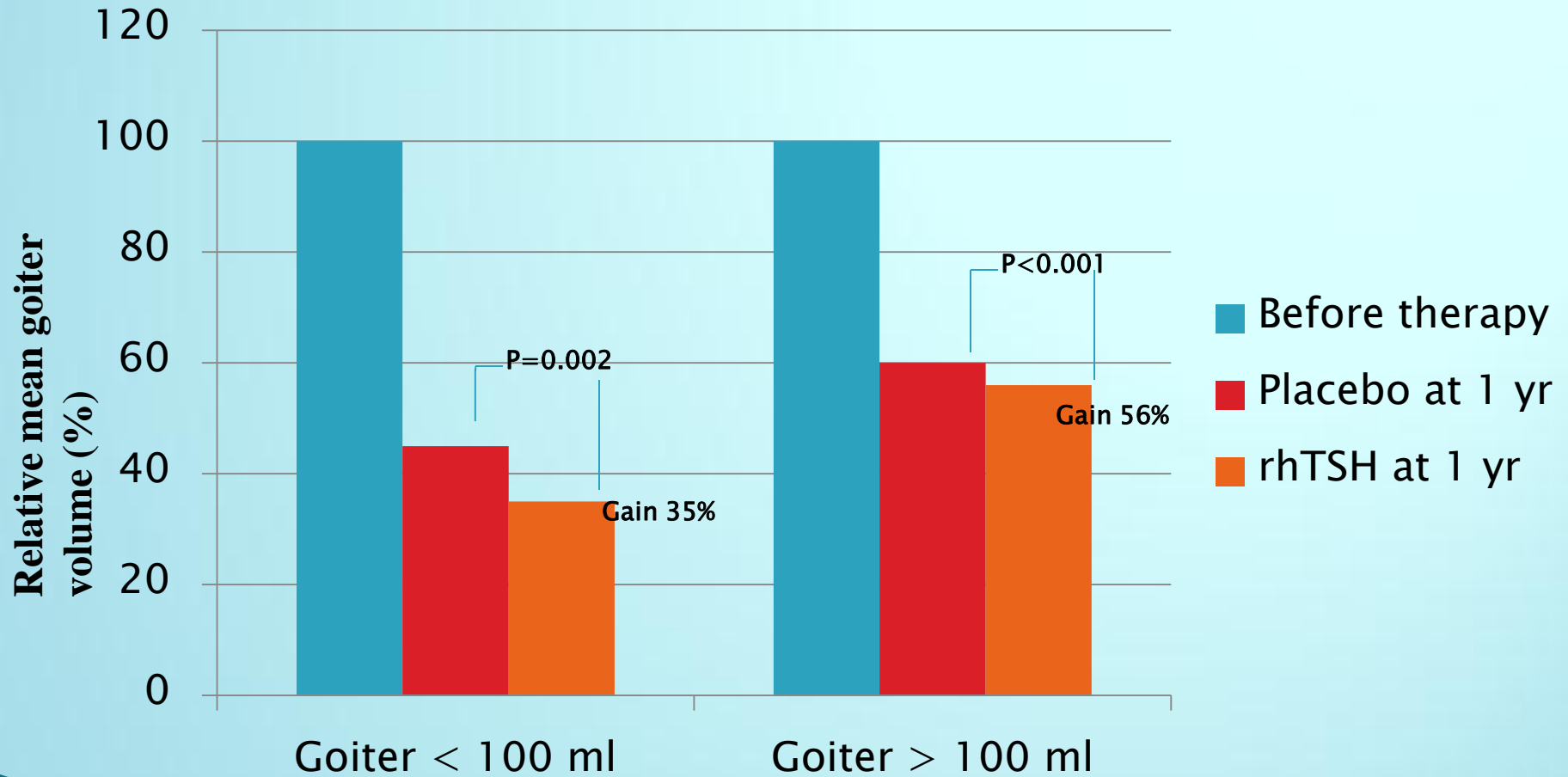
# Management Options for NNG

- ▶ Follow-up without Rx
- ▶ T4Rx
- ▶ RAI
- ▶ Surgery

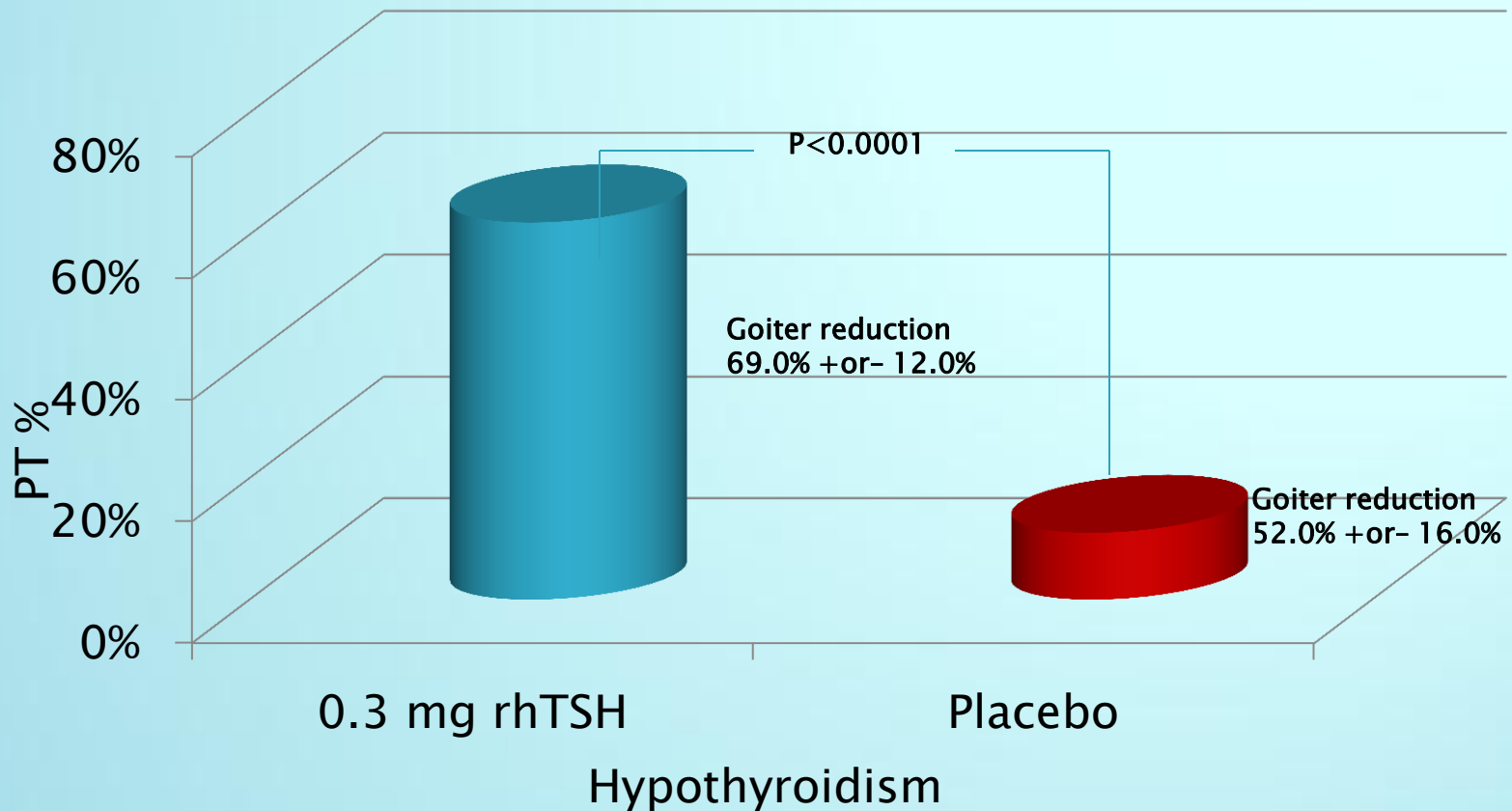
# Effect of 0.1 mg rhTSH on 24 Hour RAIU Comparison of the 24, 48, and 72 Hour Interval



# GVR After RAI With/Without rhTSH

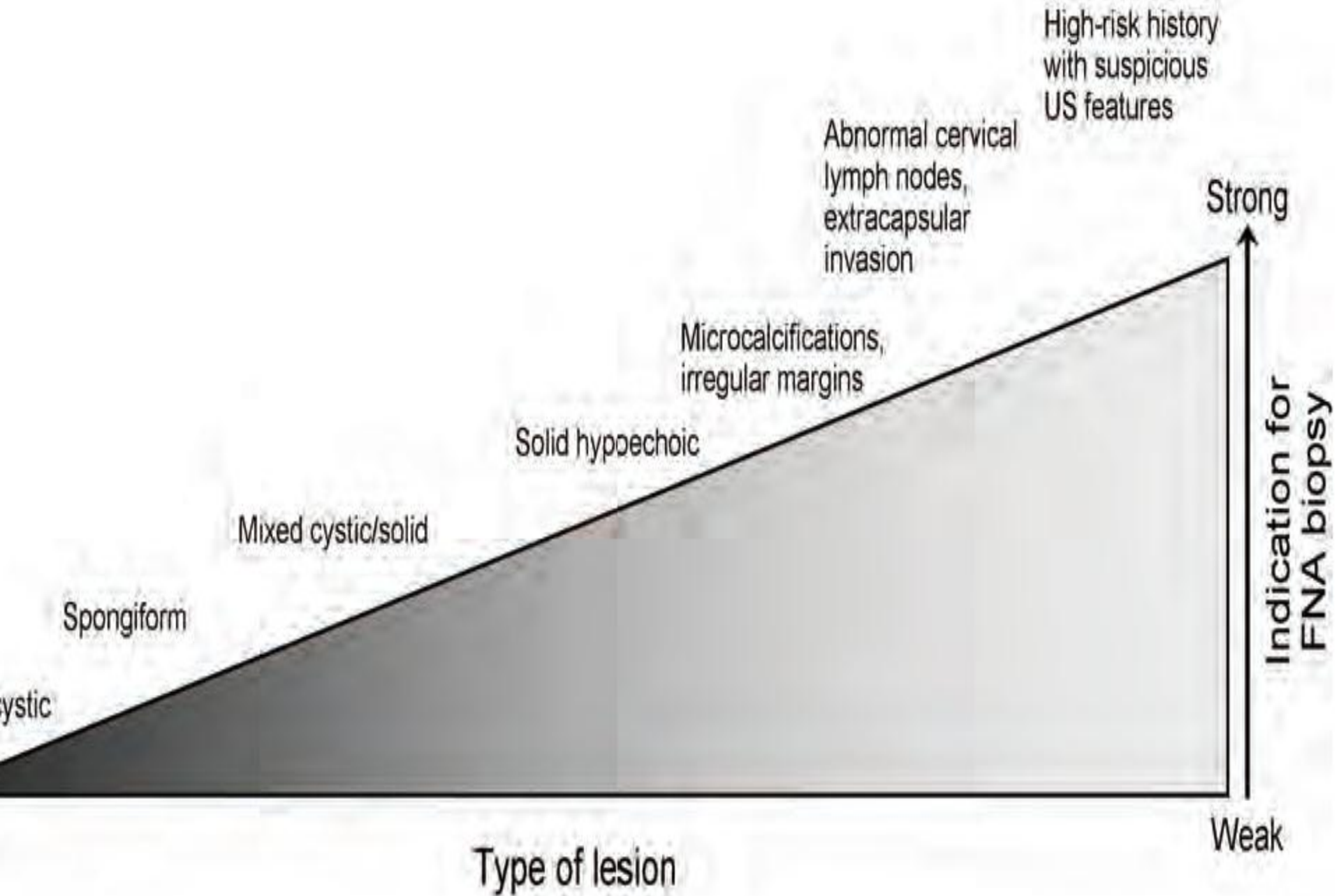


# Effects of 0.3 mg rhTSH and Radioiodine Hypothyroidism at 1-Year Follow-Up



# Management of NNG

- ▶ Observation is acceptable for mild–moderately enlarged, nontoxic, asymptomatic goiter
- ▶ Thyroidectomy has been the preferred Rx if prompt resolution of local symptoms is desirable
- ▶ RAI is a safe and effective alternative that can be used to treat small (<100 ml) NNG



## Ways to Minimize False–Negative Results

Use ultrasound–guided fine–needle aspiration (UGFNA) biopsy

Perform multiple punctures of the nodule so that several areas are sampled

Consider repeated UGFNA biopsy for follow–up of benign nodules

For multiple nodules, prioritize the nodule to biopsy according to ultrasonographic findings

For cystic lesions, sample solid areas with UGFNA biopsy and submit cyst fluid for examination

Obtain at least 6 properly prepared thin cell smears

Use immediate wet fixation for Papanicolaou staining technique

Review slides with an experienced cytopathologist



In the case of a strong clinical suspicion of cancer, surgery is recommended, regardless of the results of fine-needle aspiration biopsy (FNAB).

In the case of a suppressed level of serum thyrotropin, thyroid scintigraphy should be performed, since a functioning nodule almost invariably rules out cancer. In the case of a nondiagnostic FNAB, a repeated biopsy yields a satisfactory aspirate in 50 percent of cases. If ultrasonography reveals additional nodules that are more than 10 mm in diameter, FNAB could be performed on one other nodule, in addition to the one that is clinically detectable. The therapeutic options shown cover both solid and cystic nodules. In the case of a recurrent cyst, the possibilities of treatment are repeated FNAB, surgery, and ethanol injection. I do not recommend levothyroxine therapy for the thyroid nodule

# Conclusions & Recommendations

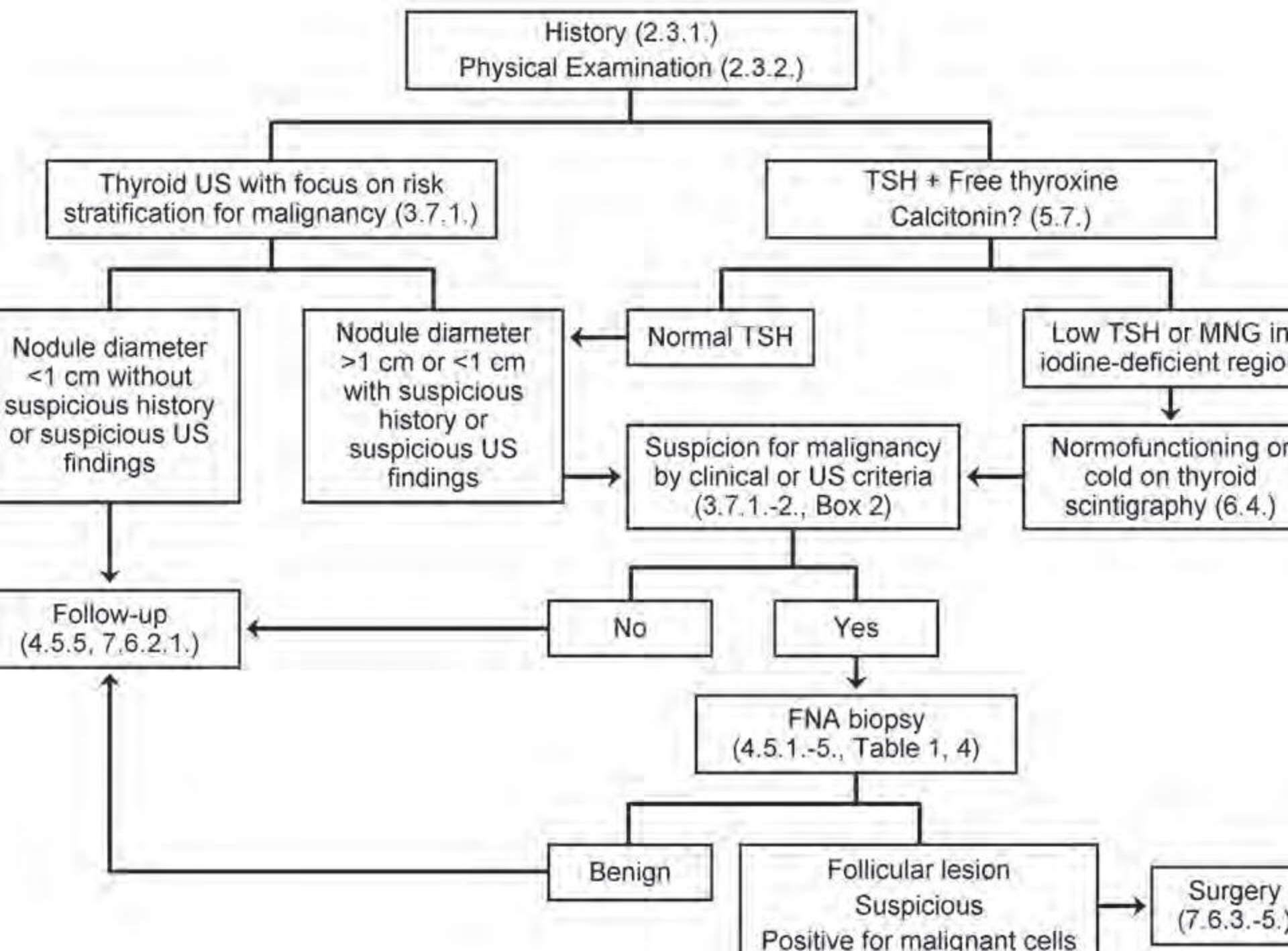
## (1)

- ▶ Guidelines offer evidence based and practical recommendations for care of pt with nodular thyroid disease.
- ▶ Initial evaluation should include TSH, US and FNA.
- ▶ FNA is the most accurate diagnostic test esp when done with US.
- ▶ Neither nodule size nor number predicts malignancy.
- ▶ Follow benign nodules by US without T4 Rx.

# Conclusions & Recommendations

## (2)

- ▶ Surgical excision is best for FNs – frozen section or molecular markers are not recommended
- ▶ In pt with multiple nodules, select for FNA US-suspicious ones
- ▶ Surgical treatment or RAI can be used for NNG
- ▶ Use of rhTSH enhances GVR (goiter volume reduction) effect of RAI but it also increases post-Rx hypothyroidism





الموقوفية تعتذر  
للشعب المصري



# THANK YOU

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