

# THYROID & PARATHYROID

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# Incidence of Thyroid Disorders in Connecticut

(Annual physical Examination, 1544 Patients – One Year)

	<u>#</u>	<u>%</u>
Simple goiter	29	1.88
Graves' disease	15	0.97
Iatrogenic hyperthyroidism	2	0.10
Hot nodule	9	0.58
Multinodular goiter	13	0.84
Thyroiditis	8	0.51
Single cold nodule	8	0.51
Hypothyroidism	6	0.39
Cancer	0	0.00
Total	90	5.78

# Nodular Goiter

- Prevalence Rate: .08%/yr
- Clinical incidence- Adults: 4-7%
  - Females > Males
- Incidence with ionizing radiation: 20-30%
- Autopsy incidence: 50%
- Occult cancer (Autopsy): 4-28%

# Cancer Incidence and Deaths Estimated- U.S. 2005

<b><u>Organ System</u></b>	<b><u>New Cases</u></b>	<b><u>Deaths</u></b>
Lung	172,570	163,510
Colon	104,950	56,290
Rectum	42,000	7,000
Pancreas	32,180	31,800
Breast	212,930	40,870
Stomach	24,000	14,000
Thyroid	25,690	1,490
Prostate	232,090	30,050

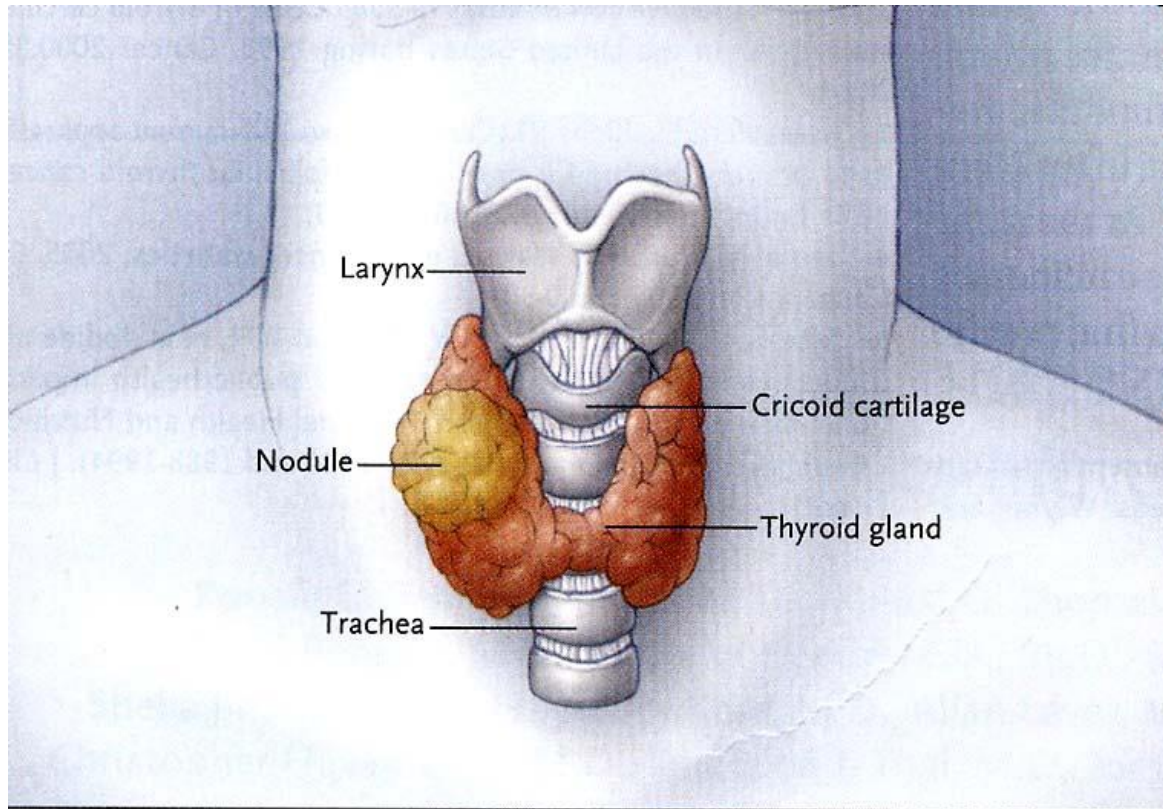
# Thyroid Cancer

	<u>1985</u>	<u>1994</u>	<u>1998</u>
New Cases	10,000	13,900	17,200 (↑ 72%)
Deaths	1,100	1,120	1,200 (↑ 8%)

American Cancer Society 1998

# Evaluations of Nodular Thyroid Disease

- History- symptoms, duration, familial
- Physical findings, i.e. topography, firmness, surface, lymphadenopathy
- Thyroid functions tests- TFT (s) - TSH



### Benign Nodules (95%)

Hyperplastic nodules (85%)  
 Adenomas (15%)  
 Cysts (<1%)

### Carcinomas (5%)

Papillary (81%)  
 Follicular and Hürthle-cell (14%)  
 Medullary (3%)  
 Anaplastic (2%)

**Common Varieties of Thyroid Nodules.**

# Diagnostic Studies- Thyroid Cancer

Fine Needle Aspiration- Establishes Cytologic Diagnosis

Thyroid function tests (TSH- 1<sup>st</sup> in Thyroiditis)

Technetium Scan- reflects trapping function,  
“hot nodule”

Ultrasonography- reflects volume, composition,  
occult nodules



# Thyroid Cancer- Diagnosis

- Cytology
- Scans
  - Technetium
  - Radioiodine
  - Sestamibi
  - MR/CT/PET
- Ultrasound
- Frozen Sections
- Fixed Sections

# Thyroid Cancers\*

Papillary	80%
Follicular	11%
Hürthle	3%
Medullary	4%
Anaplastic	2%

\*National Cancer Data Base  
31,513 patients (1985-1995)

# Papillary Carcinoma

- Ames (Age, Distant Metastases, Extent, Size)
- 89%- Low risk; Mortality 1.8% and
- 11% High Risk, Mortality 46%

# Bathesda reporting

- I. Nondiagnostic or Unsatisfactory** Cyst fluid only Virtually acellular specimen Other (obscuring blood, clotting artifact, etc) •
  - II. Benign** Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc) Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context Consistent with granulomatous (subacute) thyroiditis Other •
  - III. Atypia of Undetermined Significance or Follicular Lesion of Undetermined Significance** •
  - IV. Follicular Neoplasm or Suspicious for a Follicular Neoplasm** •  
Specify if Hürthle cell (oncocytic) type
  - V. Suspicious for Malignancy** Suspicious for papillary carcinoma •  
Suspicious for medullary carcinoma Suspicious for metastatic carcinoma Suspicious for lymphoma Other
  - VI. Malignant** Papillary thyroid carcinoma Poorly differentiated carcinoma Medullary thyroid carcinoma Undifferentiated (anaplastic) carcinoma Squamous cell carcinoma Carcinoma with mixed features (specify) Metastatic carcinoma Non-Hodgkin lymphoma Other •
- \* Adapted with permission from Ali and Cib

# Adjuvant Therapy

Thyroxine → TSH Suppression

Radiiodine (Ablation/Rx)

Thyroxine ↓ → TSH ↑

Recombinant TSH

External Radiation (?)

Chemotherapy (?)

# Hyperparathyroidism

- Rarefaction of bone
- Multiple cystic bone tumors, giant cell sarcoma
- Muscular weakness and hypotonia
- Abnormal excretion of calcium and formation of calcium stones
- Abnormally high serum calcium

# Primary Hyperparathyroidism

Abnormal relationship between calcium and PTH levels with changes in parathyroid mass and calcium setpoints.

# Hyperparathyroidism

- Incidence 1:700 (0.14%)
- Most common cause of Hypercalcemia in non-hospitalized patients
- Female greater than male
- Most common in peri/post menapausal female
- Rare in children



# Hyperparathyroidism (Classification)

- I. 1° HPT- Idiopathic inappropriate secretion of PTH
- II. 2° HPT- Hypersecretion of PTH 2° to ↓ Ca<sup>++</sup>
- III. 3° HPT- Autonomous hypersecretion of PTH/2° HPT

# Hyperparathyroidism (Classification)

- IV. Ectopic Hyperparathyroidism  
(Humoral Hypercalcemia of Cancer)
- Pseudo Hyperparathyroidism  
(Bone Resorption via Local Mechanism)
  - Prostaglandin E
  - Cytokines (Osteoclast Activating Factor)
    - Interleukin-1
    - Cachectin (Tumor Necrosis Factor  $\alpha$ )
    - Lymphotoxin (Tumor Necrosis Factor  $\beta$ )

# Table 1. Symptoms and Signs of Hypercalcemia\*

	Percent
Symptoms	
Fatigue	28
Mental status change	24
Depression	12
Gastrointestinal	24
Signs	
Cardiovascular	14
Nephrolithiasis	28
Bone disease	47
Pancreatitis	2
Asymptomatic	11

\*Many patients had more than one symptom or sign.

# Clinical Manifestations of Hyperparathyroidism

- Renal
  - Hypercalciuria, negative calcium balance
  - Renal parenchymal calcification: nephrocalcinosis
  - Obstructive uropathy: nephrolithiasis
- Skeletal
  - Increased bone resorption (also increased formation)
  - Greater loss of cortical than trabecular bone
  - Brown tumors presenting as lytic lesions (uncommon)
- Gastrointestinal
  - Anorexia, nausea, vomiting, weight loss, constipation
  - Pancreatitis
- Neuromuscular
  - CNS depression: lethargy, coma
  - Muscle weakness, hyporeflexia
  - Peripheral neuropathy: axonopathy

# Hyperparathyroidism in the Elderly ( $\geq 65$ )

- Incidence – 1.5%
- 40% - Hypercalcemia A Serendipitous Finding
- Neuromuscular Symptoms
- Easy Fatigability
- Emotional Instability
- Anorexia
- Sudden Accentuated Aging
- ↓ Intellectual Capacity
- Lack of Initiative

(From Tibblin, et. al.: Ann. Of Surg., 197:135, 1983.)

# Evaluation of 1° Hyperparathyroidism

- SERUM ELECTROLYTES
- BUN, CREATININE
- iPTH
  
- Alkaline Phosphatase
- Bone Density Studies
- Urinary Calcium
- Localization Procedures

# Parathyroidectomy Indications

- Symptomatic Patients
- Asymptomatic Patients
  - Calcium  $\geq 11$  mgms. % ( 1 mg > Normal )
  - Not Amenable to Surveillance
  - Decreasing Bone Density, Osteopenia Hypertension, Hypercalciuria Decreasing Renal Function

# Parathyroid Imaging- Localization

- Experienced Surgeon
- Ultrasound
- Scintigraphy (sestamibi:technetium<sup>99m</sup>)
- Venous sampling (qPTH – pre-intraoperative)
- Computerized tomography
- Magnetic resonance imaging
- Angiography (selective digital subtraction angiography)
- Fine needle aspiration: cytology/iPTH



# End Stage Renal Disease

- Eu- hypercalcemia
- Hyperphosphatemia
- ↑ alkaline phosphatase
- ↑ iPTH
- Osteodystrophy

# Renal Osteodystrophy

## Indications for Parathyroidectomy

- Bone pain
- Proximal myopathy
- Persistent hypercalcemia
- Calcinosis – unresponsive to Rx
- Calciphylaxis