

# **Hyperthyroidism**

**Elderly People**

**Michael T. McDermott MD**

**Director, Endocrinology and Diabetes Practice**

**University of Colorado Hospital**

# Thyroid Function Testing

## Screening / Case Finding

**TSH**

```
graph TD; TSH[TSH] --> TSH_low[↓ TSH]; TSH --> TSH_high[↑ TSH]; TSH_low --> Thyrotoxicosis[Thyrotoxicosis]; TSH_high --> Hypothyroidism[Hypothyroidism]; Thyrotoxicosis --> T4_T3[Free T4 + Total T3]; Hypothyroidism --> T4_only[Free T4 Only];
```

**↓ TSH**

**Thyrotoxicosis**

**↑ TSH**

**Hypothyroidism**

**Free T4 + Total T3**

**Free T4 Only**

# Thyrotoxicosis

Determine the Severity

↓ TSH

```
graph TD; A[↓ TSH] --> B[↑ Free T4 +/- or ↑ Total T3]; A --> C[NI Free T4 and Total T3]; B --> D[Overt Thyrotoxicosis]; C --> E[Subclinical Thyrotoxicosis];
```

↑ Free T4 +/- or ↑ Total T3

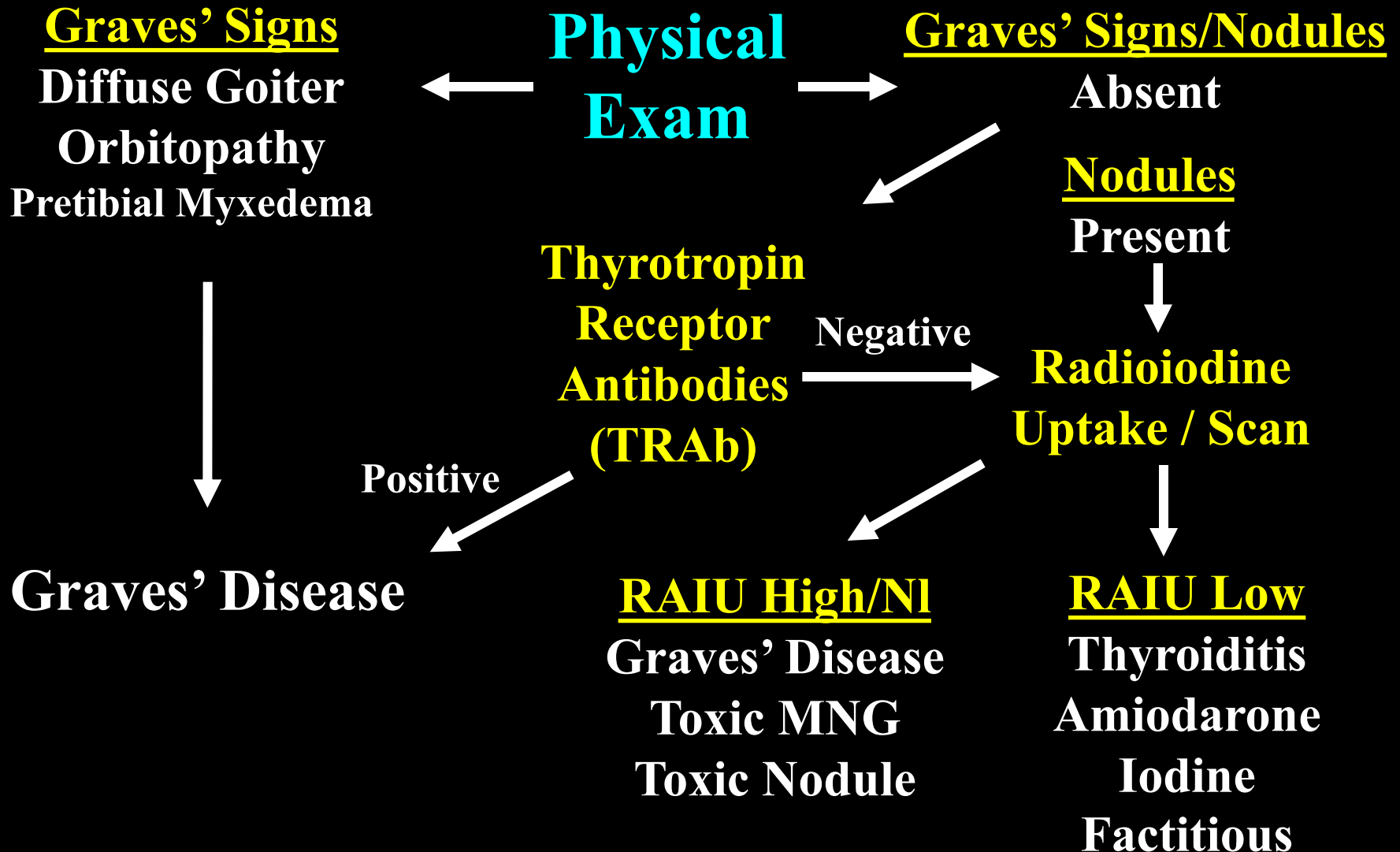
NI Free T4 and Total T3

**Overt  
Thyrotoxicosis**

**Subclinical  
Thyrotoxicosis**

# Thyrotoxicosis

## Determine the Cause



# Graves' Disease Specific Signs

## Orbitopathy



# Thyrotoxicosis

## Differential Diagnosis - RAIU

### RAIU High/NI

- Graves' Disease
- Toxic MNG
- Toxic Nodule
- TSH Tumor
- HCG Tumor

### RAIU Low

- Postpartum Thyroiditis
- Silent Thyroiditis
- Subacute Thyroiditis
- Amiodarone Induced
- Iodine Induced
- Factitious T4/T3 Use

Tests Sometimes Needed for Differential Diagnosis

TPO Ab, Thyroglobulin, ESR, Ultrasound

# Thyrotoxicosis

**Radioiodine Uptake High or Normal**

## RAIU High/NI

- Graves' Disease
- Toxic MNG
- Toxic Nodule
- TSH Tumor
- HCG Tumor

## Hyperthyroidism

This term applies only to thyrotoxicosis with high or normal RAIU

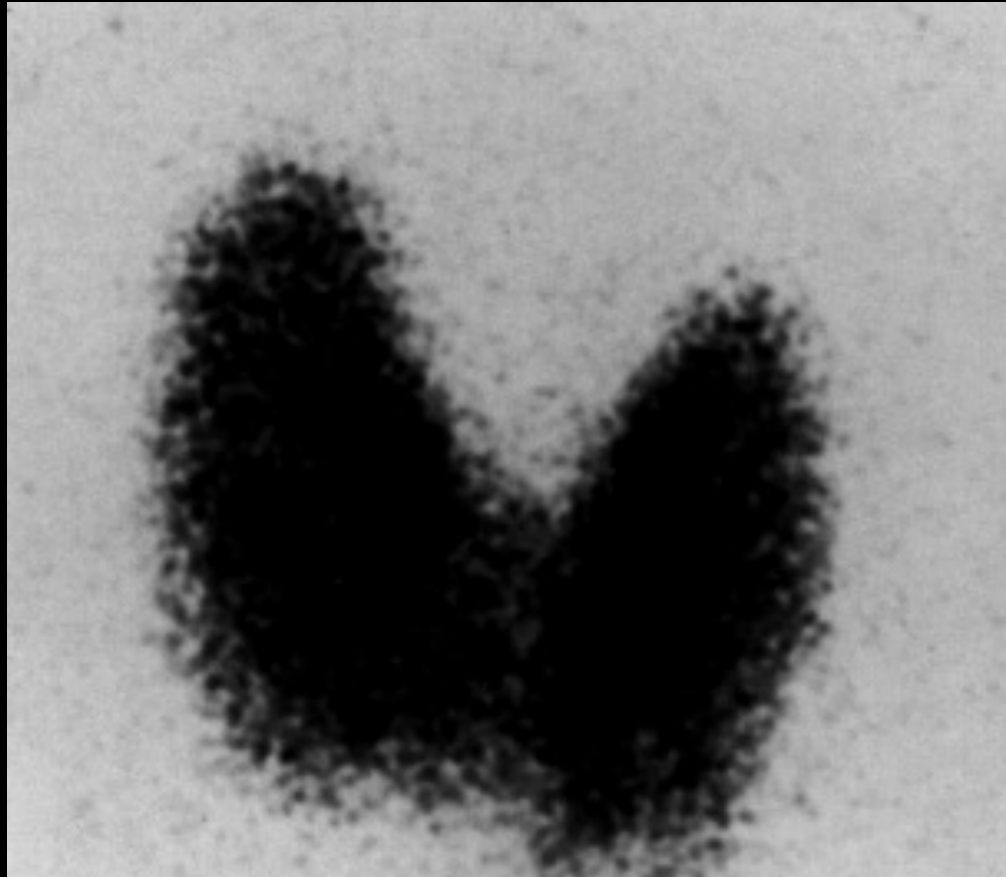
**Thyroid Scan**



**Diffuse Uptake  
Patchy Uptake  
Solitary Uptake**

# Graves' Disease

## Diffuse Uptake



## **TSH Receptor Antibodies**

**Autonomous Thyroid Function in All Thyroid Cells**



# Toxic Multinodular Goiter

## Patchy Uptake

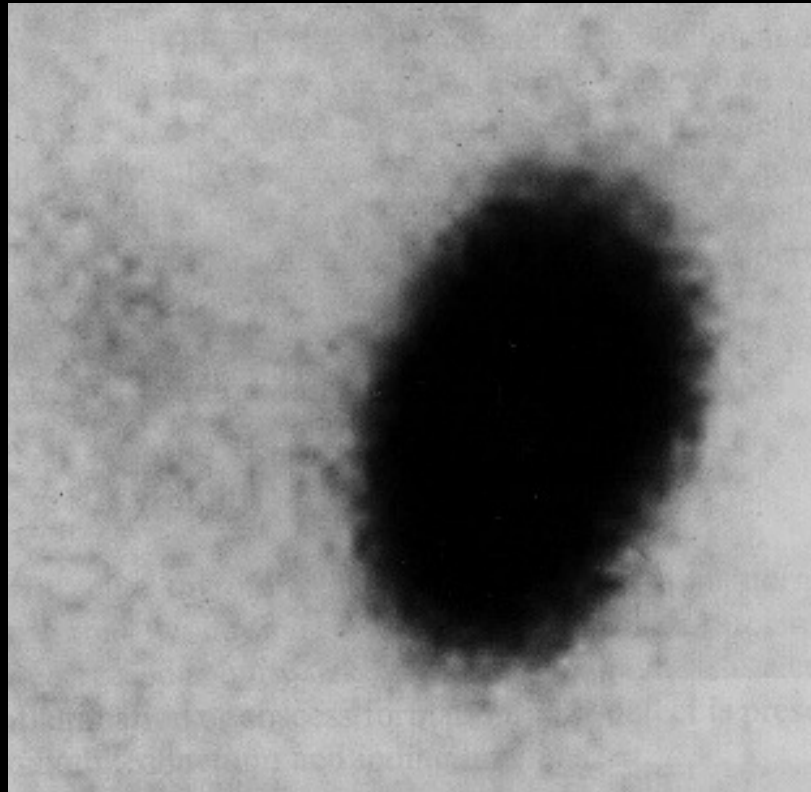


**Activating Mutations**

**Autonomous Function in Multiple Nodules**

# Toxic Thyroid Nodule

## Solitary Uptake



**Activating Mutations**

**Autonomous Function in Single Nodule**

# Thyrotoxicosis

## Radioiodine Uptake Low

### RAIU Low

**Destructive  
Thyroiditis**

**T4 and T3  
Spill into  
Circulation**

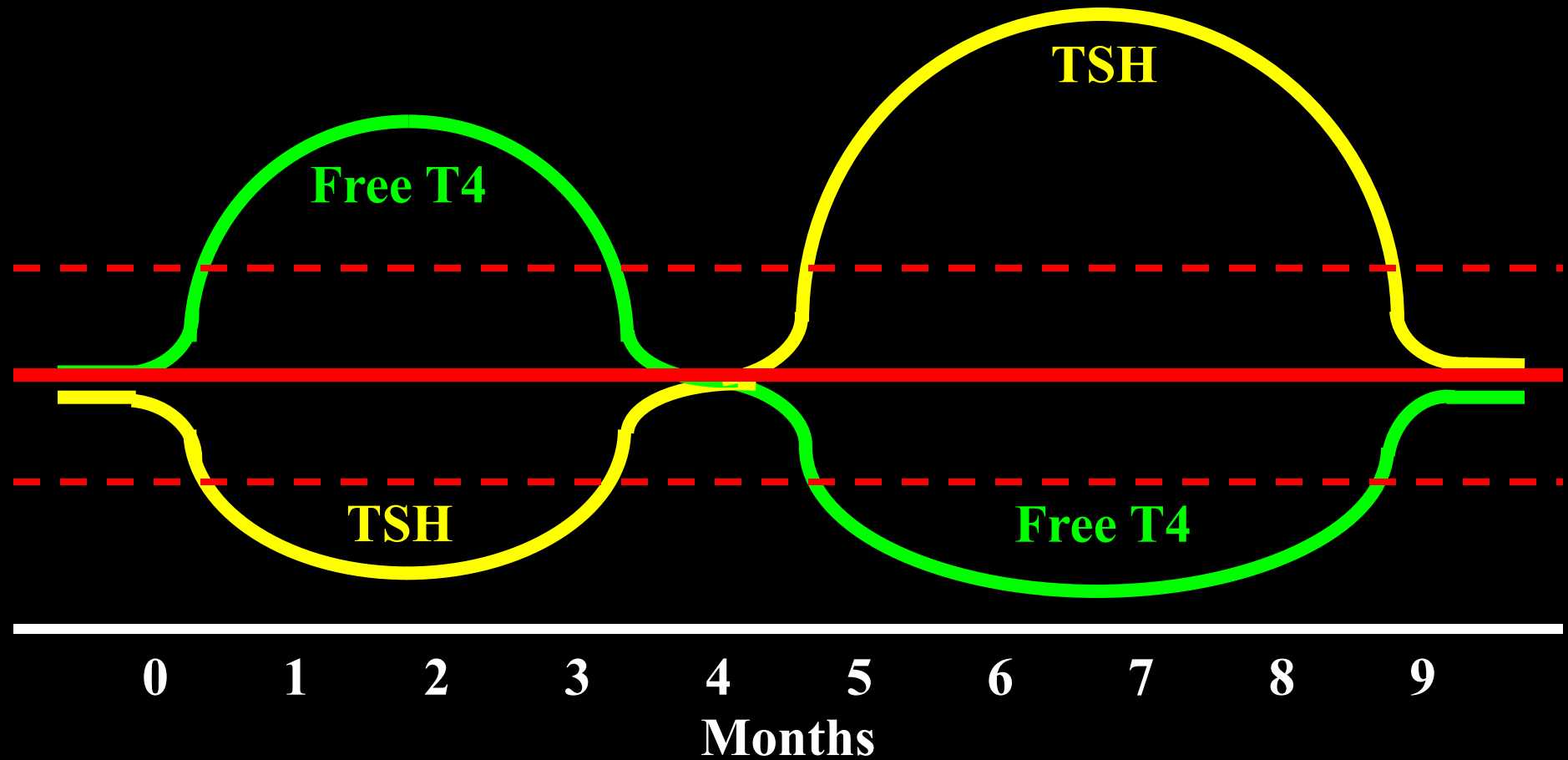
- Postpartum Thyroiditis
- Silent Thyroiditis
- Subacute Thyroiditis
- Amiodarone Induced
- Iodine Induced
- Factitious T4/T3 Use

**No Thyroid Scan Needed**

# Destructive Thyroiditis

## Clinical Course

Postpartum, Silent, and Subacute Thyroiditis



20-25% Remain Hypothyroid

# Graves' Disease

## Medical Treatment

### Anti-Thyroid Drug for 12-18 Months

- **Methimazole:** Initial dose based on Free T4 level:
  - Free T4 1.0-1.5 x upper limit - Methimazole 5-10 mg QD
  - Free T4 1.5-2.0 x upper limit - Methimazole 10-20 mg QD
  - Free T4  $\geq$  2.0-3.0 x upper limit - Methimazole 30-40 mg QD
  - Reduce dose in 1-2 months
- **Beta Blocker:** until euthyroid, then stop

**Goal:** Symptom Relief → **Remission: ~ 50%**

### Side Effects

- Methimazole ( $\uparrow$  Alk Phos), PTU (Liver Failure)
- Agranulocytosis  $\sim$ 1/200 (CBC: Febrile/Sore Throat)

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62

# Graves' Disease

## I-131 Ablation or Surgery

### Radioiodine (I-131)

- **Hypothyroidism: ~ 80-100% (3-12 Months)**

### Thyroidectomy

- **Hypothyroidism: ~ 80-100% (1-2 Weeks)**

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62

# Toxic MNG / Nodule

## Treatment

### Anti-Thyroid Drug

- For 4-6 weeks prior to I-131 or Surgery
- Chronic low dose therapy when patient does not want or has contraindication to I-131 or Surgery

### Radioiodine (I-131)

- **Hypothyroidism:** ~ 50% (3-12 Months)

### Thyroidectomy

- **Hypothyroidism:** ~ 50% (1-2 Weeks)

**Monitor As Recommended for Graves' Disease**

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62

# Destructive Thyroiditis

## Treatment

Postpartum, Silent, and Subacute Thyroiditis

### Thyrotoxic Phase (1-3 months)

- **Beta Blockers:** for symptoms only
- **NSAIDS / Steroids:** for pain
- **Anti-Thyroid Drugs:** NOT EFFECTIVE

### Hypothyroid Phase (3-6 months)

- **Levothyroxine:** for symptoms only

### Resolution

- **75-80% Return to Normal**

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62



# Subclinical Thyrotoxicosis



0.8

Free T4 ng/dl

1.8



.01

0.45

TSH mU/L

4.5

10.0

# Mild Thyrotoxicosis

# Subclinical Thyrotoxicosis

## Risks if Age > 60 Years

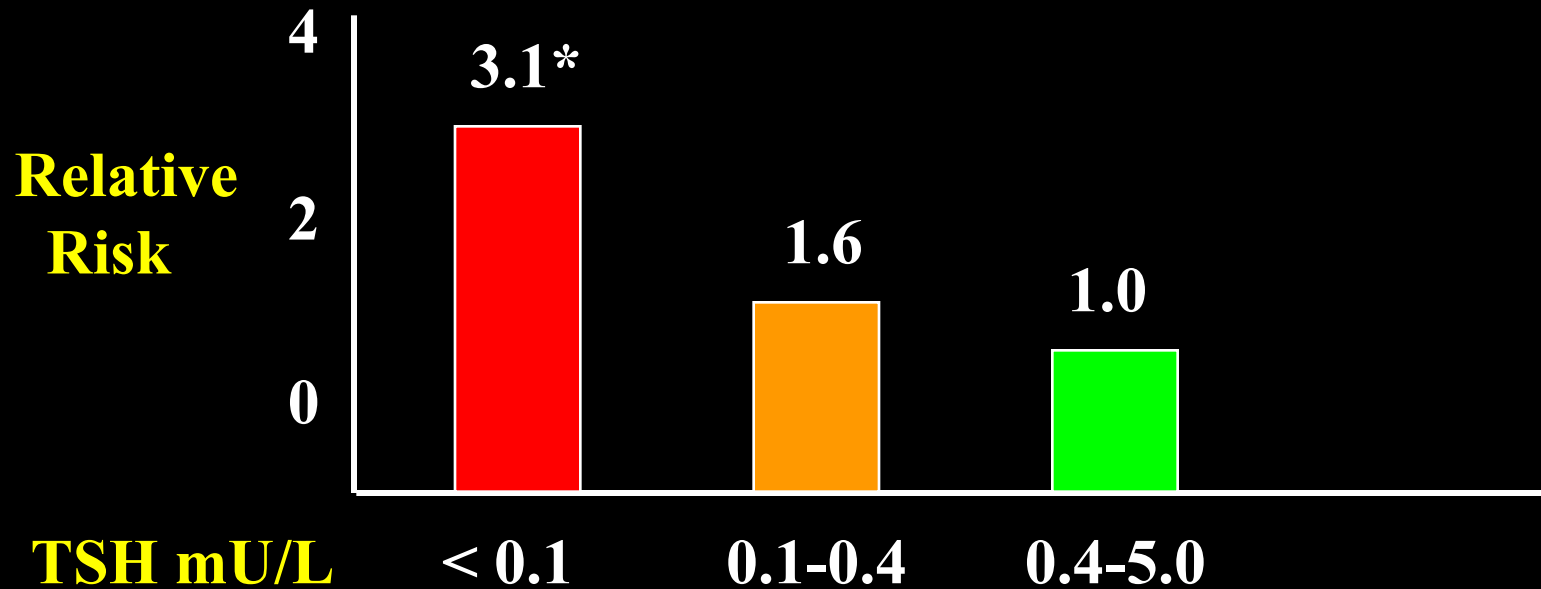
- **Atrial Fibrillation**
- **Osteoporosis**
- **Mortality**

# Subclinical Thyrotoxicosis

## Atrial Fibrillation

**2,007 Subjects:** Age > 60 (1193 Women, 814 Men)

**Prospective:** TSH Measured; 10 Year Follow-up



# Subclinical Thyrotoxicosis

## Osteoporosis Fractures

15 Studies (15 Women, 5 Men)

9 Cross-sectional

3 Longitudinal

3 Retrospective Cohort

- **Suppressed TSH (any cause): ↑ Fracture Risk**
- **LT4 Therapy (if TSH normal): No Effect**

# Subclinical Thyrotoxicosis

## Mortality

**Pooled-Analysis:** 52,674 Subjects from 10 Cohorts  
2,188 Subjects with Endogenous SC Thyrotoxicosis

| <u>Condition</u>    | <u>HR (95% CI)</u> |
|---------------------|--------------------|
| Total Mortality     | 1.24 (1.06-1.46)   |
| CHD Mortality       | 1.29 (1.02-1.62)   |
| Atrial Fibrillation | 1.68 (1.16-2.43)   |

# Subclinical Thyrotoxicosis

## Consensus Recommendations

### Strongly Consider Treatment:

Hyperthyroid Symptoms, Age  $\geq$  65,  
Cardiac Risk Factors, Osteoporosis

### Consider Treatment:

Hyperthyroid Symptoms, Age  $\geq$  65,  
Cardiac Risk Factors, Osteoporosis

---

0.1

0.45

**TSH mU/L**

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62

# Subclinical Hyperthyroidism

## Treatment

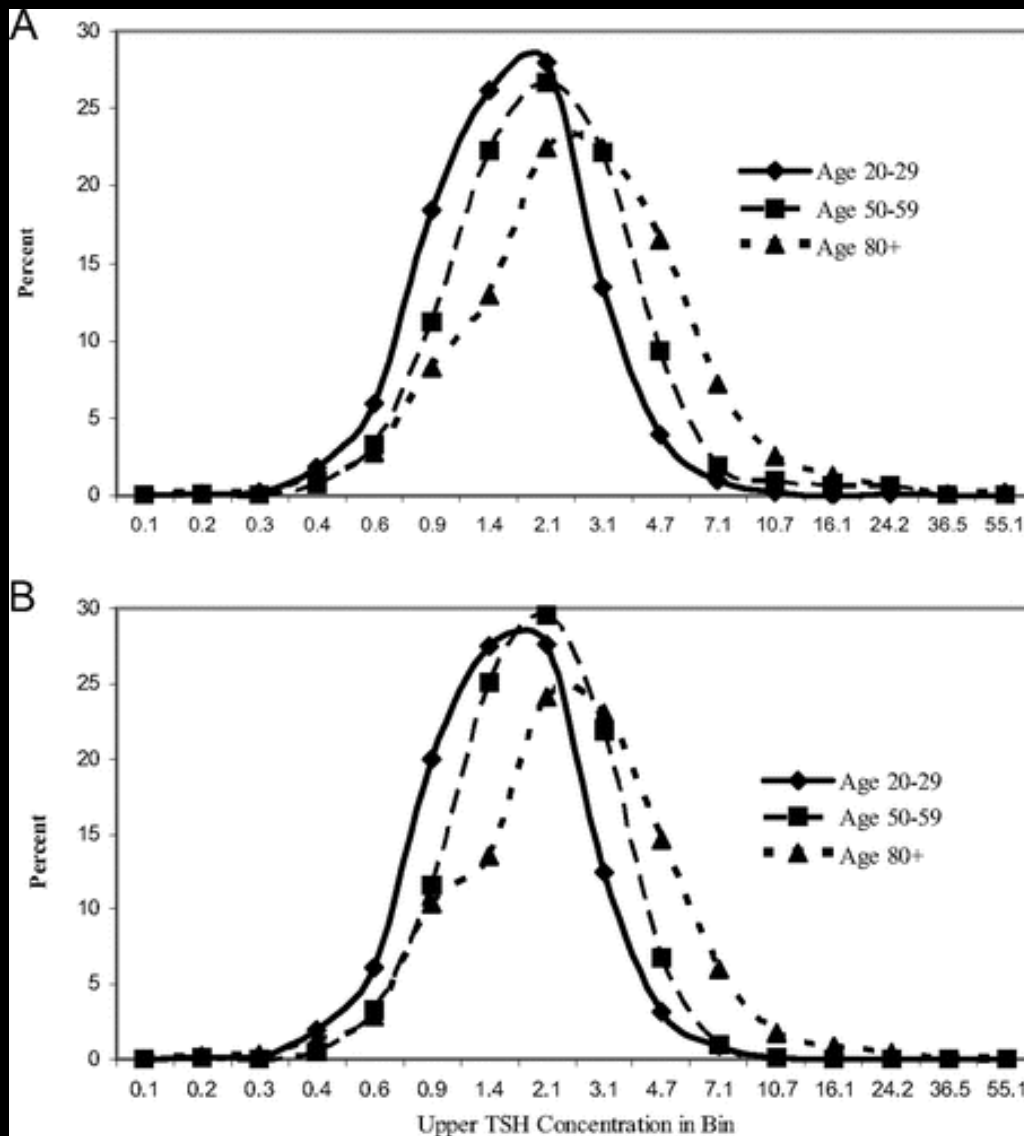
Graves' Disease, Toxic MNG, Toxic Nodule

- Methimazole 5-10 mg/day: **Starting Dose**
- Recheck TSH: **4-8 Weeks**
- Titrate Dose: **TSH, FT4 in Reference Range**

Ross DS. Thyroid 2016; 26:1343-1420

McDermott MT. Ann Intern Med 2020 April 7; ITC49-62

# TSH Distribution Changes with Age





# Hypothyroidism Treatment Guidelines American Thyroid Association 2014

## TSH Goals in the Elderly with Hypothyroidism

Reasonable to raise the **target TSH** to **4–6 mU/L**  
in persons greater than **age 70–80 years** being  
**treated for hypothyroidism**

# Thank You

