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ENDOCRINOLOGY

# Blood Chemistry: Thyroid

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**Medical Disclaimer:** The information in this presentation is not intended to replace a one-on-one relationship with a qualified health care professional and is not intended as medical advice. It is intended as a sharing of knowledge and information from the research and experience of Dr. Ritamarie Loscalzo, [drritamarie.com](http://drritamarie.com), and the experts who have contributed. We encourage you to make your own health care decisions based upon your research and in partnership with a qualified health care professional.



# Thyroid Lab Ranges

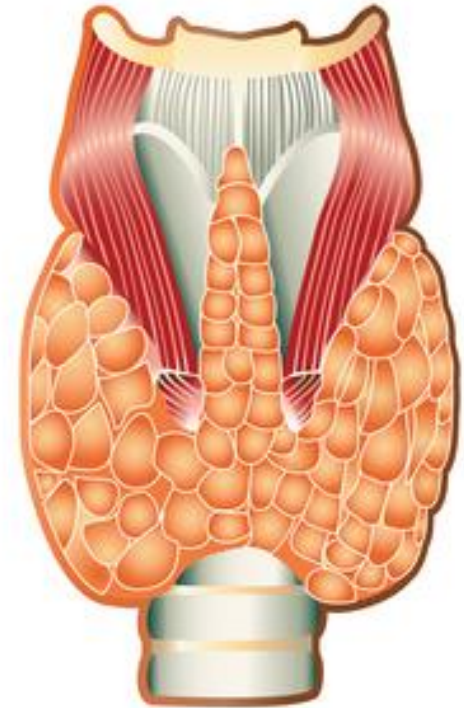


NAME of TEST	US Units	Lab Range	Ideal Range
TSH: Thyroid-stimulating hormone	μIU/mL	0.3-5.7	1.5-3.0
Total T4 or TT4 (total thyroxine)	μg/mL	4.5-12.5	6.0-12.0
Total T3 or TT3 (total triiodothyronine)	ng/dL	100.0-180.0	100.0-180.0
Free T4 or FT4 (thyroxine, free)	ng/dL	0.7-2.0	1.0-1.5
Free T3 or FT3 (triiodothyronine, free)	pg/dL	2.0-4.4	3.0-4.5
Thyroglobulin antibody screen (or antithyroglobulin)	IU/mL	0.0-1.0	0.0-1.0
Thyroid peroxidase (TPO) antibodies	IU/mL	0.0-34.0	0.0-2.0
Thyroxine-binding globulin (TBG)	μg/mL	18.0-27.0	18.0-27.0
Reverse T3 or RT3 (reverse triiodothyronine)	ng/dL	90.0-350.0	90.0-350.0
T3 uptake	%	27.0-37.0	28.0-38.0
Free Thyroxine Index (FTI)		1.2-4.9	1.2-4.9



# Types of Thyroid Dysfunction

- ✓ Hypothyroidism
- ✓ Hyperthyroidism
- ✓ Autoimmune Thyroid Conditions
  - Graves Disease
  - Hashimoto's Thyroiditis
- ✓ Subclinical Thyroid Conditions
  - Binding Protein Problems
  - Thyroid Receptor Resistance
  - Wilson's Temperature Syndrome
- ✓ Cancer



# Thyroid Lab Analysis

## Basic Screen

- ✓ Total T-4 (Thyroxin)
- ✓ T-3 uptake
- ✓ Free — Thyroxin Index (FTI) aka T-7
- ✓ TSH



## Essential Extras

- ✓ Thyroid Peroxidase Antibodies
- ✓ Antithyroglobulin Antibodies
- ✓ Free T3
- ✓ Free T4
- ✓ Total T3
- ✓ Reverse T3



# Medications Affecting Thyroid

- ✓ Antibiotics
- ✓ Antidepressants
- ✓ Diabetic medication
- ✓ Hypertensive medication
- ✓ Pain medication
- ✓ Antacids
- ✓ Cholesterol lowering medications
- ✓ Growth hormone modulators
- ✓ Anti-nausea medications
- ✓ Diuretics
- ✓ Amphetamines
- ✓ Adderall
- ✓ Anti-inflammatory
- ✓ Arrhythmia medications
- ✓ Hormone replacement
- ✓ Steroids and androgens
- ✓ Anti-addiction drugs
- ✓ Psychoactive medications, i.e. lithium, thorazine



# Thyroid Case 1

	Units	PATHOLOGICAL RANGE	FUNCTIONAL RANGE	12/22/09
Markers				
TSH	mIU/L	0.3-5.7	1.8-3.0	2.58
Total Thyroxine (TT4)	ug/d	4.5-12.5	6-12	6.7
Total Triiodothyronnine (TT3)	ng/dL		100-180	
Free T4	ng/dL		1.0-1.5	
Free Thyroxine Index	mg/dl		1.2-4.9	2.2
Free T3	pg/mL		300-450	
T3 Uptake	md/dl	27-37	28-38	33
Reverse T3	pg/ml		90-350	
Thyroid Binding Globulin	ug/dl		18-27	
Thyroid Peroxidase Antibody (TPO)	IU/mL		< 2	140
Antithyroglobulin Antibody	-	a negative test is normal	< 1	

*Would have been missed on normal screen*



# Thyroid Case 2

CATEGORIES	Units	PATHOLOGICAL RANGE		FUNCTIONAL RANGE		10/06/09	06/26/08	11/20/06	
		Min	Max	Min	Max				
<b>THYROID MARKERS</b>									
TSH	mIU/L	0.3	5.7	1.8	3.0	4.08	3.964	3.333	
Thyroxine (T4)	ug/d	4.5	12.5	6.0	12.0		7.5	7.5	
T3 Uptake	md/dl	27.0	37.0	28.0	38.0				
Free Thyroxine Index	mg/dl			1.2	4.9		2.9	2.9	
Total Triiodothyronnine (TT3)	ng/dL			100.0	180.0				
Free T4	ng/dL			1.0	1.5	1.12			
Free T3	pg/mL			300.0	450.0				
Reverse T3	pg/ml			90.0	350.0				
Thyroid Binding Globulin	ug/dl			18.0	27.0				
Antithyroglobulin Antibody	a negative test is normal	0.0	1.0	0.0	1.0				
Thyroid Peroxidase (TPO) Ab	IU/mL	0.0	34.0	0.0	2.0				



- ❖ Insufficient information
- ❖ Progressively worsening TSH
- ❖ Follow-up:
  - ❖ Thyroid antibodies
  - ❖ Total T3, T4
  - ❖ Free T3
  - ❖ T3 Uptake





# Thyroid Case 3

CATEGORIES	Units	PATHOLOGICAL RANGE		FUNCTIONAL RANGE		CURRENT 01/25/10
		Min	Max	Min	Max	
THYROID MARKERS						
TSH	mIU/L	0.3	5.7	1.8	3.0	1.38
Thyroxine (T4)	ug/d	4.5	12.5	6.0	12.0	10.4
T3 Uptake	md/dl	27.0	37.0	28.0	38.0	31
Free Thyroxine Index	mg/dl			1.2	4.9	3.2
Total Triiodothyronnine (TT3)	ng/dL			100.0	180.0	
Free T4	ng/dL			1.0	1.5	
Free T3	pg/mL			300.0	450.0	
Reverse T3	pg/ml			90.0	350.0	
Thyroid Binding Globulin	ug/dl			18.0	27.0	
Antithyroglobulin Antibody	a negative test is normal	0.0	1.0	0.0	1.0	20
Thyroid Peroxidase (TPO) Ab	IU/mL	0.0	34.0	0.0	2.0	7



Would be missed by standard analysis



- ❖ TSH below optimal
- ❖ T4 getting close to top of range
- ❖ Positive antibodies, although low
- ❖ Follow-up
  - ❖ TSI antibodies – to differentiate Hashimotos from Graves
  - ❖ Free T3, T4



# Most Important Nutrients For Thyroid Gland

✓ **Iodine \*\*\***

✓ Selenium

✓ Zinc

✓ Iron

✓ Tyrosine

✓ Vitamin A

✓ Vitamin D3

✓ Vitamin B2

✓ Vitamin B6

✓ Vitamin B12

✓ Bioflavonoids

**\*\*\* Most important nutrient for the thyroid**



# Management of Autoimmune – Hashimoto's

- ✓ Support immune system
  - Support T regulatory cells (TH1 and TH2)
  - Avoid gluten and other allergy containing foods. In my experience, 100% gluten avoidance is mandatory for recovery
- ✓ Essential fatty acids
- ✓ Balance blood sugar
- ✓ Repair gut
- ✓ Decrease stress and support adrenals
- ✓ Increase vitamin D levels: ideal closer to 100
- ✓ Antioxidants:
  - Glutathione and glutathione enhancing foods and nutrients
  - Turmeric, ashwagandha, CoQ10, rehmannia



# Vitamin D With Hashimotos



*Optimal Range: 90.0 -100.0 in the presence of antibodies*

- ✓ **Vitamin D <20:** Take 20 000 IU every day for a week or up to a month, then 10 000 IU for 2 months, then retest
- ✓ **Vitamin D 20-30:** Take 10 000 IU for 3 months, then retest
- ✓ **Vitamin D 30-40:** Take 6000 IU for 3 months, then retest
- ✓ **Vitamin D 40-60:** Take 4000 - 6000 IU per day; retest in 3 months
- ✓ **Vitamin D 60-90:** Take 2000 - 4000 IU per day; retest in 3 months
- ✓ **Vitamin D 80-100:** Take 1000 - 2000 IU per day; retest in 3 months
- ✓ **Vitamin D >100:** Get out in the sun regularly and retest in 3 months.

**It's a good idea to maintain vitamin D in the 90 - 100 range when thyroid antibodies are present.**



# Thyroid Resources and Books

- ✓ *Why Do I Still Have Thyroid Symptoms When My Lab Tests are Normal?*
  - Dr. Datis Kharrazian, DHSc, DC, MS
- ✓ *Overcoming Thyroid Disorders*
  - David Brownstein, M.D.
- ✓ *Thyroid Health: 10 Steps to Total Health*
  - Richard L. Shames, M.D., and Karilee Halo Shames, R.N., PhD
- ✓ *Iodine Why You Need It and Why You Can't Live Without It*
  - David Brownstein, M.D.

