Functional Medicine University

Approach to Thyroid Dysfunction Overview

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&

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Functional Medicine Thyroid Treatment Algorithm
“Balancing the HPT-HPA Axes”
6-9 months

History, Physical Exam, Past Medical Records, FMU Blood Profile

Areas to treat first (Go Slow)
• THR may be necessary as needed for hypothyroidism, providing the patient is not in adrenal failure
  • Balance Cortisol/DHEA
  • Monitor with follow-up lab tests and the metabolic temperature graph
  • Consider L-carnitine for hyperthyroidism

GI Function
Adrenal Function
Nutritional Status

Lab Tests
- Stool analysis
- Celiac panel
- ASI
- Organic Acid Panel
- Iron Panel
- Homocysteine
- HbA1C

Areas to Treat Second (go Slow)
Begin after repletion of nutritional deficiency and antioxidants

Liver Detoxification
Infrared Sauna Therapy
Case History
Case Study : 02/08/2006

Patient: Female 48 years-old

Occupation: School bus driver

Previous Occupation: Worked with/around motor vehicles; family business. Pumped own fuel daily.

Chief complaint: “All joints hurt” (Patient questions possibility of MS? RA? Autoimmune Disease?)

- Started Synthroid .05 mg: 2/7/2006
- Cancerous colon polyp removed 7/23/2004
- Herpes simplex (chronic breakouts)
- Carpal Tunnel Syndrome
- Positive TPO (Thyroid Antibody)
Review of Systems & Past History

- Enlarged thyroid
- Bruising easily and dry skin
- Weight gain, weakness, sleeping disturbances, hot flashes, low sex drive, low blood pressure, MVP, depression/mood swings
- Endometriosis/uterine fibroids
- Hysterectomy 12/26/2000; left ovary, adhesions and appendix 12/7/2001
Menstrual History

- Age 14: Menarche; irregular cycles 26-48 days
- Age 17: Began BCP; regular periods for 8 years; no health problems
- 1984: First yeast infection
- 1984: Married; stopped BCP – irregular periods began with heavy bleeding and clotting
- Age 33: Bleeding on/off during first pregnancy-delivered 2 weeks early-breast fed 3 months-stopped due to bleeding nipples
- Age 36: 2nd pregnancy no bleeding – breast fed 19 months – no problems
- Ages 38-39: Menstrual cycles better
- Age 40: Began with heavy bleeding/clotting
- Age 43: Fibrocystic breast disease
- Age 46: Began treatment with medical doctor.
Physical Exam

- Ht: 5’ 4”
- Wt: 140 lbs
- Pulse: 68 b/m
- Resp: 16
- Temp: 98.2
- BP: 110/64 R 116/70 L
- Neuro/Ortho: WNL
- Abd: left lower quadrant: significant tenderness
- Hair: Thin: pulls out easily
- Skin: Dry scalp
- Tongue: White coating, scalloped
Blood tests ordered by primary care physician prior to initial visit.

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**CONTINUATION OF REPORT - PAGE 2**

Effective June 27, 2005, Quest Diagnostics will replace the Nichols Advantage Anti-Thyroid Peroxidase assay with the DPC IMMULITE 2000 Anti-Thyroid Peroxidase assay. DPC antibody results correlate clinically with those of the Nichols Advantage but, because each patient antibody has unique binding characteristics, the actual numeric values might be different.
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**Date:** 2/11/06

**Test #:**
Dear Mrs. [Redacted],

The results of your physical examination and blood tests reveal the following diagnoses:

1. Hashimoto's thyroiditis (hypothyroidism) (autoimmune disease)
2. Hypercholesterolemia (high cholesterol)
3. Anemia (pernicious) B12, folie acid deficiency
4. Estrogen and progesterone deficiency
5. Suspected inflammatory bowel disease (based upon a history of cancerous intestinal polyp and irregular bowel function)

Hashimoto's thyroiditis is the most common autoimmune disease affecting the thyroid and is characterized by elevated levels of antibodies to thyroid peroxidase (TPO) and thyroglobulin. These antibodies cause inflammation of the thyroid gland, which can result in a goiter and lead to diminished production of thyroid hormone. Hashimoto's is much more common in women, has a genetic predisposition and is often associated with other autoimmune disorders.

I believe the synthroid should be of some help in the short term. I believe it is the autoimmune disease that is responsible for your joint pain. There are several areas that require treatment. We need to begin with normalizing your immune system and restoring hormone balance. The following are my initial treatment recommendations:

1. Food sensitivity test
2. [Redacted] (helps detoxify and reduce inflammation in the body)
3. [Redacted] (natural anti-inflammatory) 1 tablet three times a day
4. [Redacted] (essential fatty acids- aids the body by decreasing inflammation) 2 capsule three times a day
5. [Redacted] (probiotic for restoring health bacteria in the intestine- also acts as an anti-inflammatory agent) 2 capsule three times per day
6. [Redacted] (natural estrogen and progesterone replacement)
7. 84 ounces of water per day
8. Daily exercise- walk one mile per day

FOLLOW-UP IN 4 WEEKS

Thank you for allowing me to assist with your health care.

Dr. Wayne L. Sodano
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4/13/2006

For Herpes Simplex II

**Cats Claw Complex:**
- 1 tablet 3x/day for 10 days

**Lemon Balm/Melissa:**
- Topical treatment to be applied 2-3 times per day at onset of symptoms (burning, itching, or tingling) for 3-4 days or as needed
CONTINUATION OF REPORT - PAGE 2

CHEMISTRY:

- CHOLESTEROL: 199 mg/dL (<200)
- TRIGLYCERIDE: 42 mg/dL (<150)
- HDL CHOLESTEROL: 85 mg/dL (>39)
- LDL CHOLESTEROL, CALCULATED: 106 mg/dL (0-100)
- T3, FREE: 312 pg/dL (230-420)
- T4, FREE, NON-DIALYSIS: 1.5 ng/dL (0.8-1.8)
- TSH: 2.3 uIU/mL (0.4-5.5)
- THYROID PEROXIDASE AB: 154 IU/mL (Less than 35)
- THYROGLOBULIN AB: <20 IU/mL (Less than 20)
- HOMOCYSTEINE, SERUM: 9.3 umol/L (Less than 10.4)
Recommended protocols  

Daily:

- **Thyroid Sup #1**
  - 2 tablets 3x/day with meals

- **Thyroid Sup #2**
  - 1 tablet 3x/day with meals

- **C**
  - 4 tablets per day (chewable)

- Follow up 4-6 weeks
**CONTINUATION OF REPORT - PAGE 2**

### REFERENCE VALUES

**Non-Pregnant Female:**
- Follicular Phase: 0.2-1.4 ng/mL
- Luteal Phase: 3.3-26 ng/mL
- Mid-Luteal Phase: 4.4-28 ng/mL
- Post Menopausal: 0-0.7 ng/mL
- Oral Contraceptives: 0.1-0.3 ng/mL

**Pregnant Female:**
- First Trimester: 11-45 ng/mL
- Second Trimester: 26-89 ng/mL
- Third Trimester: 40-423 ng/mL

*SEX HORMONE BINDING GLOBULIN---- 111 nmol/L (8-96)*
*T3, FREE------------------------ 858 pg/dL (230-420)*
*T4, FREE, NON-DIALYSIS---------- 2.0 ng/dL (0.8-1.8)*
*TSH----------------------------- 0.03 uIU/mL (0.4-5.5)*

**Reference Range for Estradiol:**
- Female:
  - Follicular Phase: 11 - 212 pg/mL
  - Mid-Cycle: 18 - 480 pg/mL
  - Luteal Phase: Less than or equal to 247 pg/mL
  - Post-Menopausal: Less than or equal to 27 pg/mL

- Male: 13 - 54 pg/mL

No pediatric reference range established. For patients less than 18 years of age, the Nichols Estradiol assay (extraction/chromatography/RIA Method) is recommended (Order Code 30289N).

*THYROID PEROXIDASE AB------------ 112 IU/mL (Less than 35)*
*THYROID GLOBULIN AB--------------- <20 IU/mL (Less than 20)*

<<END OF REPORT - QA6773057 - TOTAL 2 PAGE(5)>>
Recommended Treatment (7-3-2006)

1. Begin supplement to increase estrogen metabolism
2. Continue with multivitamin, vitamin C, EFA’s, probiotics
3. Calcium supplement
4. Discontinue thyroid supplements (supplement 1 and 2) She also made the decision to stop taking the synthroid.
5. Decrease natural progesterone and estrogen supplementation
6. Follow up in six to eight weeks
CHEMISTRY:

PROGESTERONE------------------------- 4.02 ng/mL

*** REFERENCE VALUES ***

Non-Pregnant Female:
Follicular Phase 0.2-1.4 ng/mL
Luteal Phase 3.3-9.4 ng/mL
Mid-Luteal Phase 4.4-28 ng/mL
Post Menopausal 0-0.7 ng/mL
Oral Contraceptives 0.1-0.3 ng/mL

Pregnant Female:
First Trimester 11-45 ng/mL
Second Trimester 26-89 ng/mL
Third Trimester 48-423 ng/mL

T3, FREE-------------------------- 278 pg/dL (230-420)
T4, FREE, NON-DIALYSIS---------- 0.93 ng/dL (0.8-1.8)
TSH----------------------------- 3.9 uIU/mL (0.4-5.5)
ESTRADIOL------------------------ 16 pg/mL

Reference Range for Estradiol:
Female:
Follicular Phase: 11 - 212 pg/mL
Mid-Cycle: 18 - 480 pg/mL
Luteal Phase: Less than or equal to 247 pg/mL
Post-Menopausal: Less than or equal to 27 pg/mL

Male: 13 - 54 pg/mL

No pediatric reference range established. For patients less than 18 years of age, the Nichols Estradiol assay (extraction/chromatography/RIA Method) is recommended (Order Code 30289N).

*THYROID PEROXIDASE AB------------- 51 IU/mL (Less than 35)
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<td>T3, FREE</td>
<td>283 pg/dL</td>
<td>(230-420)</td>
</tr>
<tr>
<td>T4, FREE, NON-DIALYSIS</td>
<td>1.12 ng/dL</td>
<td>(0.8-1.8)</td>
</tr>
<tr>
<td>TSH</td>
<td>3.4 uIU/mL</td>
<td>(0.4-5.5)</td>
</tr>
<tr>
<td>THYROID PEROXIDASE AB</td>
<td>34 IU/mL</td>
<td>(Less than 35)</td>
</tr>
</tbody>
</table>
CONTINUATION OF REPORT - PAGE 3

For African American patients, please multiply the eGFR provided on the patient’s report by 1.21.

<table>
<thead>
<tr>
<th>Thyroid Peroxidase AB</th>
<th>16 IU/mL</th>
<th>(Less than 35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thyroglobulin AB</td>
<td>&lt;20 IU/mL</td>
<td>(Less than 20)</td>
</tr>
<tr>
<td>Hemoglobin A1C</td>
<td>5.7 %</td>
<td>(&lt;6.0)</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>TSH</td>
<td>8.1</td>
<td>2.3</td>
</tr>
<tr>
<td>Thyroglobulin AB</td>
<td>39</td>
<td>&lt;20</td>
</tr>
<tr>
<td>TPO AB</td>
<td>220</td>
<td>154</td>
</tr>
<tr>
<td>Free T3</td>
<td>318</td>
<td>858</td>
</tr>
<tr>
<td>Free T4</td>
<td>1.11</td>
<td>2.0</td>
</tr>
</tbody>
</table>
Functional Medicine University’s Approach to assess the cause of thyroid dysfunction

- Gastrointestinal Dysfunction
  - Environmental Factors
  - Detoxification Dysfunction

- Thyroid Dysfunction
  - Hormonal Imbalance
  - Oxidative Stress

- Nutritional Factors
- Immune Dysfunction
Mechanisms of Chemical Disruption on Thyroid Function

**NIS**

- Sodium Iodide (NIS) - Sodium Iodide Symporter
- TPO - Thyroid Peroxidase
- Tyr - Tyroside
- MIT - Monoiodothyronine
- DIT - Diiodothyronine

**Thyroid Hormone Binding Proteins**
- TBG 75%
- Transthyretin
- Albumin

**Thyroid Gland**

- Thyroglobulin
  - Tyr
  - Tyr
  - Tyr
  - MIT
  - DIT
  - MIT

- TPO
  - 6-propyl-2-thiouracil (used to treat Graves)
  - Isoflavones (esp Soy)
  - Genistein
  - Phytoestrogens

- TPO Inhibitors
  - Heme containing enzyme
  - TPO decreases with IDA

**Circulation**

- Tranthyretin
- Albumin

- T3
- T4
- DIT

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Environmental Chemical Influence on Thyroid Hormone Receptors

- It is clear that PCBs are neurotoxic in humans and animals, and that they can interact directly with the thyroid receptor.
- Another environmental toxin of concern is Bisphenol A (BPA).
- Environmental monitoring programs in Europe, Asia, North America, and the Arctic have found traces of several PBDEs in human breast milk, fish, aquatic birds, and elsewhere in the environment.
Endocrine Disruptors as Obesogens

The root cause of obesity was thought to be prolonged positive energy balance, that is, too much food and too little exercise. Recent research implicates environmental risk factors, including nutrient quality, stress, fetal environment and pharmaceutical or chemical exposure as relevant contributing influences.
Obesogens and Programming of Metabolic Set Points

Obesogens
Dysregulation of hypothalamus

Hypothalamus
• Regulates appetite center
• Regulates metabolic efficiency
• Establishes metabolic set point

Pituitary

Thyroid
• Carbohydrate metabolism
• Lipid metabolism
• Protein metabolism

• Depressed circulating T4 levels
• Decreased conversion of T4 to T3
• Reduced sympathetic activity
The Thyroid Gland and Oxidative Stress

H$_2$O$_2$ Oxidative Stress

DNA Damage

Relief of Oxidative Stress

Se

I$_2$

GP$_x$

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Oxidative Stress, Thyroid Hormone Status and Diabetes

Failure to recognize the presence of thyroid dysfunction in diabetics may be a primary cause of poor management often encountered in the treatment of diabetes.
Fatty Acids, Vitamin A, Vitamin D, and Thyroid Hormone

Retinol

Vitamin D

Fatty Acids (FA)
Diet, Adipose Tissue

Thyroid Hormone

T₄

T₃

Cell Membrane

Retinol

Homocysteine inhibits conversion of retinol to retinoic acid (nutritional deficiency/lead toxicity?)

Retinoic Acid

LOX

Prost. Leukotri

Vitamin D

Peroxisome proliferator activated receptor

RXR

RAR

RXR

VDR

RXR

RXR

RXR

RXR

VDR

Gene transcription

mRNA

protein

Hormone Response Elements

RAR – Retinoic Acid Receptor (9-CIS Retinoic Acid/All Trans Retinoic Acid)

THR – Thyroid Hormone Receptor

RXR – Retinoid X Receptor (9-CIS Retinoic Acid is the ligand)

PPAR – Peroxisome proliferator – activated receptor

VDR – Vitamin D receptor

Vit D – 1,25 dihydroxy Vitamin D

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Inhibition

Pituitary
TSH
7.49

Inhibition
CRH
Cortisol

Thyroid Gland
Free T4
1.2
small amounts of T3

Peripheral Regulation

Central Regulation

5' deiodinase
Se dependent
Free T3
3.3
most active

5 deiodinase

Reverse T3
14.6
inactive

5 deiodinase

Reference: Genova Diagnostics, 63 Zillicoa Street, Asheville, NC 28801
Proposed Functional Etiology of Thyroid Dysfunction

Functional/Preventive Intervention

Iodine deficiency
Selenium deficiency
Low antioxidants
Other nutritional deficiencies
Environmental factors

\[ \text{H}_2\text{O}_2 \text{ (Free radicals)} \]

Hyperplasia

Mutagenesis

Single cell
Somatic mutations

Goiter

Cold or hot nodules

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## Interpretive Guide for the Thyroid Scale

<table>
<thead>
<tr>
<th>State of Health</th>
<th>TSH</th>
<th>Free T4</th>
<th>Free T3</th>
<th>Temperature Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>optimal</td>
<td>optimal</td>
<td>optimal</td>
<td>Stable /normal</td>
</tr>
<tr>
<td>Adrenal Fatigue</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>Low, very unstable</td>
</tr>
<tr>
<td>Estrogen dominance</td>
<td>low</td>
<td>low</td>
<td>low</td>
<td>Low, very unstable</td>
</tr>
<tr>
<td>Primary hypothyroidism</td>
<td>High</td>
<td>Low</td>
<td>Low but to the right of T4</td>
<td>Low and stable</td>
</tr>
<tr>
<td>Hypothyroidism due to pituitary dysfunction</td>
<td>Low</td>
<td>Low</td>
<td>Low but to the right of T4</td>
<td>Low and stable</td>
</tr>
<tr>
<td>Late Hashimoto’s Thyroiditis or Hypothyroidism and adrenal fatigue</td>
<td>Optimal to high</td>
<td>low</td>
<td>Low and mildly to the right of T4</td>
<td>Low and unstable</td>
</tr>
<tr>
<td>Early Hashimoto’s Thyroiditis</td>
<td>Very low</td>
<td>high</td>
<td>High but to the left of T4</td>
<td>Variable</td>
</tr>
<tr>
<td>Grave’s Disease</td>
<td>Very low</td>
<td>Very high</td>
<td>Very high and to the right of T4</td>
<td>Tends to be high and stable early and then becomes low and unstable</td>
</tr>
<tr>
<td>Thyroid hormone resistance</td>
<td>Mildly high</td>
<td>high</td>
<td>High and to the right of T4</td>
<td>Low and mostly stable. Assess for nutritional deficiency, toxic burden, mitochondrial cytopathy</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>Optimal to mildly high</td>
<td>Optimal to mildly high</td>
<td>Optimal to mildly high</td>
<td>Mildly elevated</td>
</tr>
<tr>
<td>Iron deficiency</td>
<td>high</td>
<td>low</td>
<td>low</td>
<td>Iron deficiency is thought to impair thyroid peroxidase activity causing a decrease in synthesis of thyroid hormones.</td>
</tr>
</tbody>
</table>
Functional Medicine Approach to Treating Thyroid Dysfunction and Balancing the HPT and HPA Axes

Check List:

- Nutritional status
- Gastrointestinal Status
- Adrenal Gland status
- Liver status
- Immune status
- Environmental toxin exposure
- Oxidative Stress Status
- Medications
- Thyroid Medication
**Functional Medicine Thyroid Treatment Algorithm**

**“Balancing the HPT-HPA Axes”**

6-9 months

**History, Physical Exam, Past Medical Records, FMU Blood Profile**

**Areas to treat first (Go Slow)**
- THR may be necessary as needed for hypothyroidism, providing the patient is not in adrenal failure
  - Balance Cortisol/DHEA
  - Monitor with follow-up lab tests and the metabolic temperature graph
  - Consider L-carnitine for hyperthyroidism

**GI Function**

**Adrenal Function**

**Nutritional Status**

**Lab Tests**
- Stool analysis
- Celiac panel
- ASI
- Organic Acid
- Iron Panel
- Homocysteine
- HbA1C

**Areas to Treat Second (go Slow)**

Begin after repletion of nutritional deficiency and antioxidants

**Liver Detoxification**

**Infrared Sauna Therapy**
Thank you for joining this webinar. For more information about Functional Medicine University please visit: www.FunctionalMedicineUniversity.com or call 877-328-4035