The Unexpected Hormone Triad:

The Gut
Adrenals —— Thyroid

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Endocrine Society’s Second Scientific Statement on EDC’s

A number of chemicals, including but not limited to PCBs, PBDEs, some phthalates, and perchlorate, can reduce circulating levels of thyroid hormone. Interestingly, not all of these chemicals also cause an increase in serum TSH.

Epidemiological data in humans support cognitive deficits and diminished IQ in children exposed to certain thyroid disruptors prenatally.

Thyroid Effects
EDC’s = Endocrine-Disrupting Chemicals

The Gut: The Seat of our Health

- Surface area = 200x > skin
- Our biggest inside/outside surface
- Small Intestine = 6 meters (20 feet) long, with a surface area = tennis court
- Large Intestine = 1.5 meters (5 ft) long

In continuous contact with:
- Nutrients
- Microbes
- Toxins
- Food additives
- Drugs
- EDC’s
- Hormone metabolites
- Neurotransmitters

The Gut: The Seat of our Health

- Body

The Gut Microbiome: Our Co-Pilot

- Microbiome weighs up to 2 kg (4.4 lbs)
- Gut flora outnumbers our cells 10:1
- 10^11 = 100,000,000,000,000 trillion bacteria and archaea
- Our own personal "galaxy"
- Microbiota’s pooled genetic material is 150x that found in human cells
- Four bacterial phyla:
  - Gram-negative: Bacteroidetes + Proteobacteria
  - Gram-positive: Actinobacteria + Firmicutes
- 1100 prevalent species
- Approx. 165 species per individual

The Gut: Our Accessory Endocrine Organ

Glucuronide pathway:

- LIVER: A variety of cancer-causing chemicals (incl. 16-OH estrogens), steroid hormones, and other toxins are bonded to glucuronic acid
- BILE: Glucuronide metabolites are dumped with the bile in the intestines
- FLORA: Intestinal bacteria with the enzyme beta-glucuronidase can cleave the bound toxin/metabolite and release it to re-enter the circulation
- Foods high in D-glucarate: Cucurbitaceae family (squash, zucchini, pumpkin, melon); the Rosaceae family (apples, strawberries, cherries, plums, pears, blackberries, currants); and the Leguminosae family (beans, soy, lentils, peas, chickpeas)
Reasons for Developing Leaky Gut Syndrome

- Dysbiosis (SIBO, Candida, pathogenic bacteria)
- Acute gastroenteritis
- Infections, inflammation
- Stress
- Steroids
- Alcohol and caffeine
- AGEs (Advanced Glycation End Products)
- Food allergies & sensitivities
- Gluten (Gliadin)
- Enzyme deficiencies
- NSAIDs
- Chemicals (pesticides, artificial ingredients)
- Surgery/Trauma

Leaky Gut Syndrome or “Gut Dyspermeability”

1. Effects on Nutrient Absorption
   - Macromolecules (partially digested proteins) get through gut epithelium
   - Micromolecules are not absorbed efficiently due to damage to epithelium
   - Zinc, iron, and vitamin B12 deficiency
2. Effects on hormone balance
3. Effects on disease evolution
   - Over-activation of Th1 immune pathways
   - Weakened immune system increases susceptibility to pathogens
   - Chronic inflammation keeps the disease "fire" burning
   - Exposure to bacterial LPS (lipopolysaccharide) – a potent immune activator
**ADRENAL GLAND**

(Hormones)

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**STRESS RESPONSE SYSTEM**

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**THYROID HORMONES**

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**Progression of Stages of Adrenal Exhaustion**

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**Four Stages of Adrenal Exhaustion:**

- **Stage 1: Alarm**
- **Stage 2: Adaptation**
- **Stage 3: Insufficiency** (aka Fatigue stage)
- **Stage 4: Failure**

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**CORTISOL PATTERNS**

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**HPA axis dysfunction**

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**Emotional**

**Xenoestrogens**

**Food Allergens**

**Infections**

**Free Radicals**

**Blood Sugar**

**Heavy Metals**

**Toxins**

**Chronic Pain**

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**Thyroid Gland**

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**Thyroid hormones**

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**Phytoestrogens**

**Triiodothyronine (T3)**

**Thyroxine (T4)**

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**BALANCE**

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Presence of Celiac Disease Antibodies in Autoimmune Thyroid Diseases

169 Patients with Autoimmune Thyroid Disease (thyroiditis + Grave’s)

- 11.18% Antinuclear Antibodies
- 14.79% Anti-TTG Ab’s
- 15.98% IgA Anti-gliadin Ab’s
- 51.48% IgG Anti-Gliadin Ab’s

Levothyroxine Therapy:
- 125 – 150 mcg daily
- 19.69 ng/dl IgA antigliadin Ab’s
- 50 – 100 mcg daily
- 13.00 ng/dl IgA antigliadin Ab’s

IgA and IgG anti-gliadin, IgA anti-tissue transglutaminase and antinuclear antibodies in patients with autoimmune thyroid diseases and their relationship to thyroidal replacement therapy.

Role of Gluten-tTG Complex in Autoimmunity

The Gut’s Role in Development of Autoimmune Thyroiditis

Celiac Disease and Autoimmune Thyroiditis (aka Hashimoto’s)

Tissue Transglutaminase II (TGase II) is ubiquitous:
- Found within cells, cell nuclei, extracellular matrix, & cell surfaces
- Found within thyroid follicular epithelial cells
- Found extracellularly in the interfollicular area

“Sera from TGase II IgA-positive serum of Celiac disease patients bound to thyroid follicular cells as well as extracellularly in the interfollicular space. The pattern of immunofluorescence seen with active celiac disease patient sera was not observed with the sera of TGase II-IgA–negative patients on a gluten-free diet or in the control populations.”

Autoimmune Thyroiditis: Hypothyroidism

What are the triggers?

INFLAMMATION / OXIDATIVE DAMAGE:
- Celiac disease: TG Ab’s
- H2O2 Oxidative Damage to the thyroid follicular cells
- Iodine excess fuels the fire
- Anti-TGB & Anti-TPO Ab’s trigger thyroid cell destruction

INFECTIONS:
- EBV, chronic
- Candida
- Mycoplasma
- H. pylori
- Yersinia enterocolitica

HORMONE IMBALANCE:
- Estrogen dominance
- Xeno-estrogens

Breakdown of the Autoimmune Thyroid Patient

- Hashimoto’s is the most common cause of hypothyroidism
- 99% of autoimmune thyroiditis is due to Hashimoto’s
- > Women: Men 8:1
- Most common onset: puberty, after pregnancy, at menopause

Most Common Symptoms:
- Fatigue
- Weight gain
- Cold intolerance
- Joint and muscle pains
- Constipation (less than 3 BM’s per week)
- Dry, thinning hair
- Irregular periods
- Infertility
- Depression
- Memory problems
- Slow heart rate
- Dry skin
- Doughy skin
- Puffy, rosy cheeks
Iodine: Friend or Foe of the Thyroid?

Thyroid iodine requirement: 150 – 200 mcg/day

Greece Epidemiological Study: 1960's: Iodine deficiency - goiter prevalence
1980's – 90's: “Silent iodine prophylaxis” due to improved socioeconomic conditions
- Iodine deficiency eliminated
- Decreased goiter prevalence
- Emergence of autoimmune thyroiditis (especially among young girls)

To Follow the TSH or Not! That is the Question…….

Normal TSH
0.4 – 3.0 mU/L

Thyroid Replacement Therapy

Synthetic T4:
- Synthroid
- Tirosint
- Levoxyl
- Levothroid
- Levothyroxin (generic)

Synthetic T4/T3 Combo:
- Thyro-T (Japan)
- Compounded formulas

Synthetic T3:
- Cytomel (Liothyronine)
- Slow Release T3

Biologics:
- Armour Thyroid
- Nature Throid
- Westroid

Other Therapies to Consider:
- Betaine-HCl + Pepsin
- Broad-Spectrum Enzymes
- Gluten-free, dairy-free diet
- Gluten Digest Enzymes (DPP-IV)
- Elemental & trace minerals
- Iodine
- Vitamins

Common Meds that may Contain Gluten:
- Ambien CR
- Advil (Liqui-gels, Migraine)
- Amitiza (used for IBS-C)
- Trivora-28 (BCP)
- Maxalt MLT
- Fosamax D

Gluten-Free Thyroid Meds:
- Tirosint
- Levoxy
- Levothyroxine (Lannet, Mova brands only)
- Cytomel
- Armour Thyroid
- Nature-Throid
- WP Thyroid (Westroid)
Factors that Affect Thyroid Function

Three Organ Systems: Multiple Triggers, Interconnected Disturbances

- Dysbiosis (SIBO, Candida, pathogenic bacteria)
- Acute gastroenteritis
- Infections, inflammation
- Alcohol and caffeine
- Enzyme deficiencies
- Gliadin (Gluten)
- NSAIDs
- Food allergies & sensitivities
- Stress
- Steroids
- AGES (Advanced Glycation End Products)
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Thank you!

CHANGING THE WAY WE DO MEDICINE, AND THE MEDICINE WE DO.