

Welcome to Women's Health Empowerment Series on Functional Medicine.

This session is designed as a learning opportunity and your participation is optional. The material discussed at this session is intended for informational purposes only and does not necessarily reflect the views of the GE company.

Intro to Functional Medicine

Modern solutions for modern health care needs.

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Intro to Functional Medicine

1. Filling the health care gaps
2. The Functional medicine paradigm.
3. Functional medicine and women's health.
4. Topics in Functional medicine.
 - a. The gut microbiome
 - b. Hormones
 - c. The immune system and inflammation
 - d. Toxicants & detoxification
5. How to find a Functional medicine practitioner.



Why are we here?

Why are we talking about this?

Modern day health care leaves gaps in our health care needs.

Current medical paradigm	Current medical needs
Acute, reactive care	Prevention and reversal
Disease management	Health and wellness optimization
Medicating symptoms	Investigating and treating underlying causes
Single cause disease	Multiple, chronic conditions with multiple, complex underlying causes



Today's health care needs: **Multiple, chronic conditions**

...With multiple & complex underlying causes.

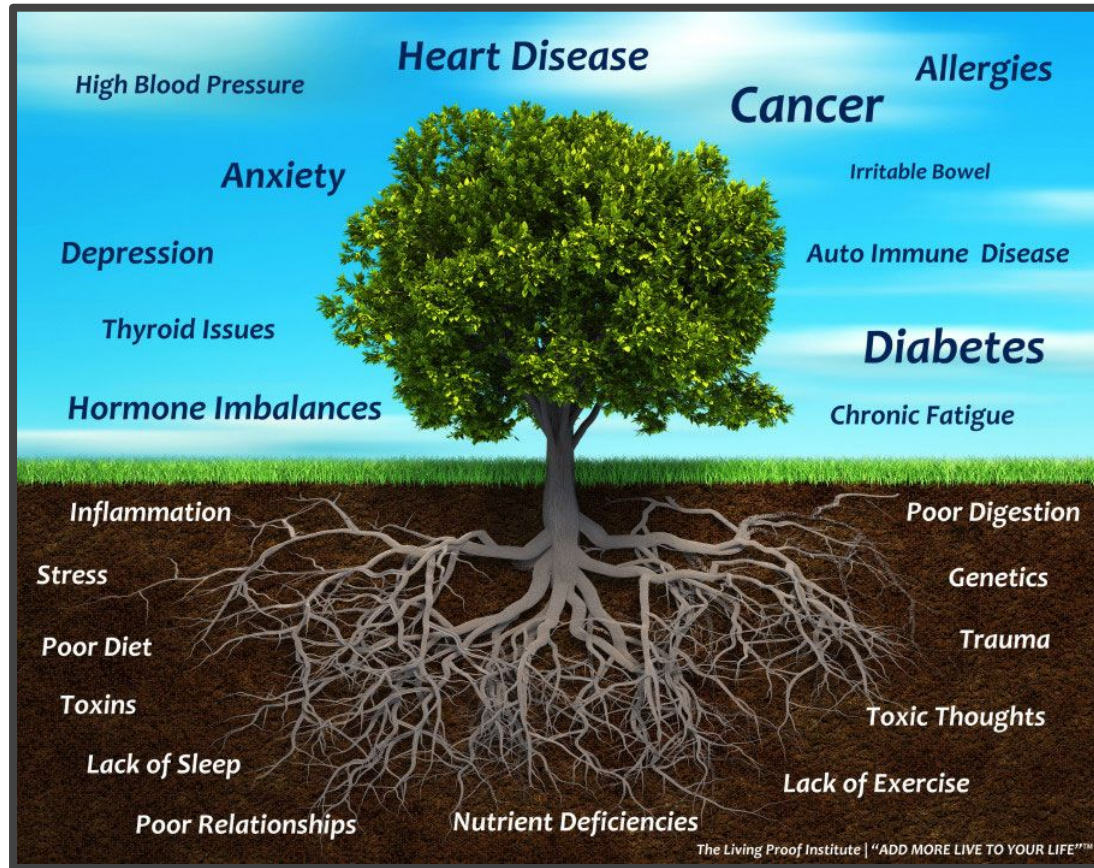
Single cause	Multiple/complex underlying causes
Polio, tuberculosis, car accident, Down's syndrome, sickle cell anemia, Rickett's, (colds and flus).	CVD, cancer, diabetes, high blood pressure, hypothyroidism, Alzheimer's/dementia, fatigue, mood disorders, autoimmune disease, cancer, PMS, fertility, menstrual disorders gastrointestinal and digestive disorders, addiction.

Filling the Gaps: Functional Medicine

- FM investigates the underlying mechanisms that lead to health symptoms and diseases.
 - Lab investigations.
 - Narrower interpretation of lab values.
 - Life history analysis.

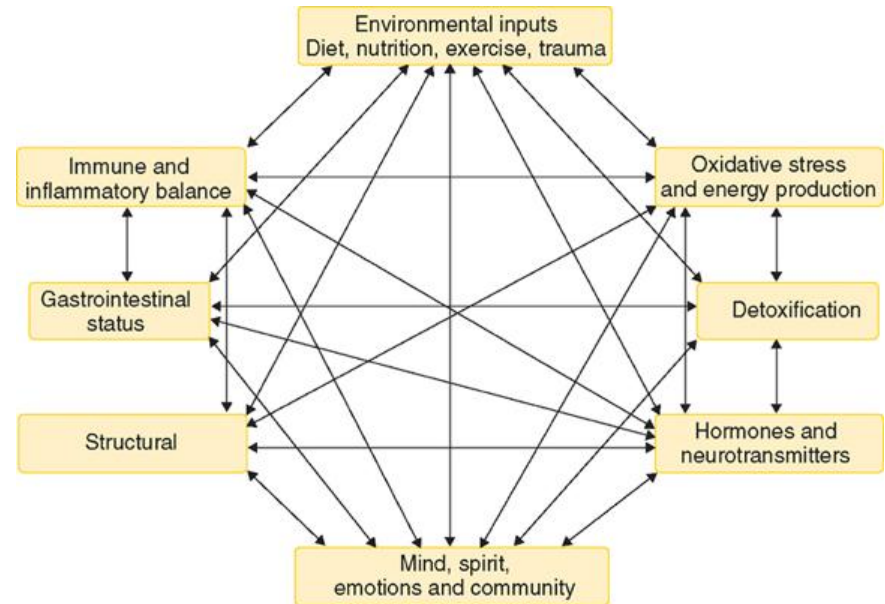


FM paradigm: Underlying Mechanisms



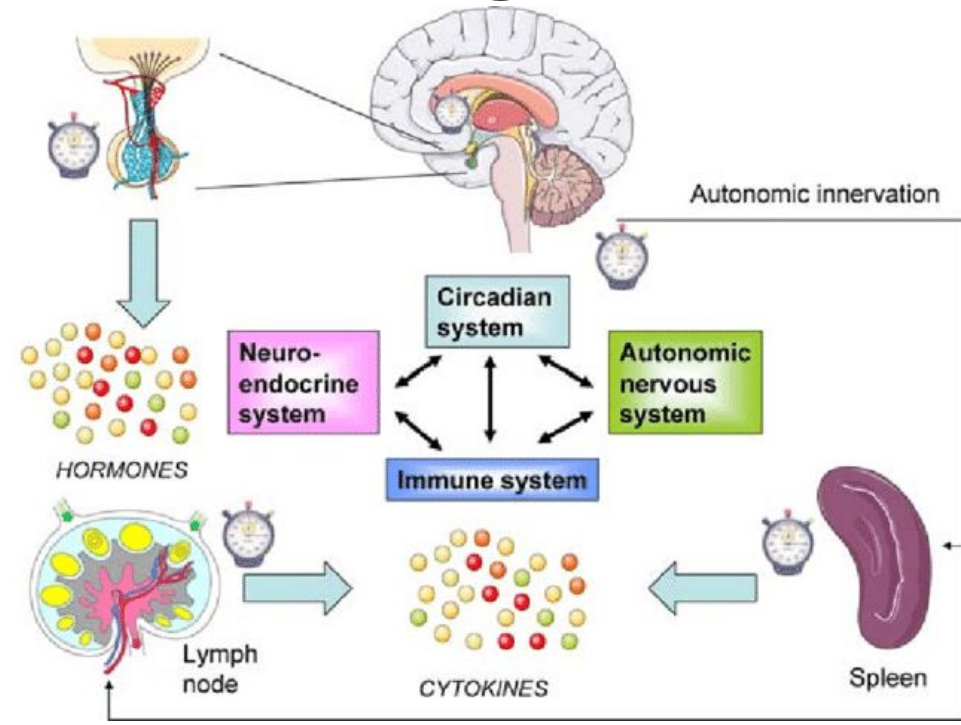
Filling the Gaps: Functional Medicine

- It focuses on **prevention, disease reversal and health optimization.**
- It understands that same-named diseases can have **multiple causes** and these causes can vary from **individual to individual.**



The Functional Medicine Paradigm

- Is the *clinical application of systems biology and biochemistry research.*



The gut microbiome and elevated cardiovascular risk in obesity and autoimmunity



Atherosclerosis

Volume 271, April 2018, Pages 203-213

Cardiovascular disease associated with obesity and [autoimmunity](#) is the leading cause of death in these populations and significant residual risk remains despite current treatment approaches. Obesity, [type 1 diabetes mellitus](#) (T1DM), [rheumatoid arthritis](#) (RA), and systemic *lupus erythematosus* (SLE) are linked to [chronic inflammation](#), and subjects with these disorders have characteristic shifts in their [gut microbiome](#) composition. Recent data suggest that alterations in gut microbial and metabolic composition may be responsible, in part, for induction of chronic inflammation, thus promoting cardiovascular disease. Common [microbiome](#) changes observed in obesity, [T1DM](#),

Premenstrual syndrome is associated with altered cortisol awakening response

Lulu Hou, Yamei Huang & Renlai Zhou 

Pages 640-646 | Received 15 Aug 2018, Accepted 13 Apr 2019, Published online: 06 May 2019

Previous studies have revealed stress-induced dysregulation of hypothalamic-pituitary-adrenal (HPA) axis in women with premenstrual syndrome (PMS). So far, however, the results about the relationship between HPA axis dysregulation and PMS are mixed. To this end, it is necessary to investigate the basal activity of the HPA axis in women with PMS instead of only assessing a certain stressor. Therefore, this study evaluated the relationship between the cortisol awakening response (CAR) and PMS. Thirty-two women with PMS (mean age 22.47 ± 2.20 years) and 36 healthy controls (mean age 22.28 ± 2.43 years) were included in this study. Saliva samples of our participants were collected successively at 0, 30, 45, and 60 min after awakening to assess CAR during each of two phases of the menstrual cycle (the mid-follicular phase and the late luteal phase). The results showed a significantly attenuated CAR in women with PMS compared with the healthy controls, especially at 45 and 60 min after awakening, regardless of the menstrual cycle phases. Furthermore, there was a significant negative correlation between PMS severity as measured by PMS scale and AUC_i (i.e. the Area Under the Curve with respect to increase) in the mid-follicular phase. Our findings suggested that an attenuated CAR activity profile may be an important risk factor for the development of PMS.

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Sum: The Functional Medicine Paradigm

- Symptoms and diseases are the expression of **underlying mechanism**.
- We should investigate and treat the causes, alleviate the symptoms.
- Most diseases/syndromes/symptoms have **multiple underlying causes**.

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Sum: The Functional Medicine Paradigm

- Each individual is biochemically and physiologically unique.
 - Same disease: different mechanisms.
 - Different diseases: same mechanisms.
- Support the body's innate ability to self-regulate and heal.
- Healthcare should be preventative.
- Healthcare should optimize health, not just treat disease.

“Health is not just the absence of disease. Health is a state of optimal well-being.” -World Health Organization

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Functional Medicine & Women's Health

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Functional Medicine and Women's Health

- Women have different health issues than men.
- We may also develop the same diseases for different reasons.
- Women's health issues are multifactorial.
- Diseases are researched and treatments are standardized in men.
- Women's health care issues have limited, symptom-based treatment options.

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Why do we need FM for Women's Health?

- 75% of autoimmune disorders are in women.
- Women are 5-8 x more likely to have hypothyroidism.
- IBS is the most common GI disorder, is ~2x more prevalent in women and is functionally different in women.
- Heart disease is the leading cause of death in women.
 - Women are more likely to have a 'silent' heart attack.
 - The role of menopause and heart disease.
 - Heart disease can present differently in women.
 - Most of what we know about heart disease comes from studies of middle aged men.

Women's Health Care Options are Limited

Current medical options:

- Birth control
- Antidepressants
- Pain-control
- Surgical procedures

FM Options:

Analysis and Treatment of:underlying drivers:

- Hormones (thyroid, adrenal, sex)
- Gut microbiome
- Nutrition/nutrient status
- Toxicants/detox
- Lifestyle and stress management
- Infections and immune support



Topics in Functional Medicine

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Topics in Functional Medicine

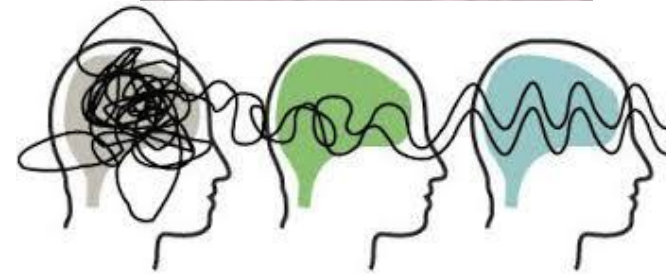
1. The Foundation
 - a. Diet, nutrients, sleep, stress management, movement.
2. The gut microbiome and digestion.
3. Advanced hormone analysis.
4. The immune system, inflammation and infection.
5. Toxicity and detoxification.
6. Genetics.
7. Mitochondrial function.
8. Oxidative stress and antioxidants.



The Foundations



1. Diet and nutrients
 - a. Eat real food mostly plants
2. Sleep
 - a. Solid 7-8 hours/night
3. Stress management and mindfulness
 - a. Mindfulness-Based Stress Reduction (MBSR)
 - b. Neurofeedback
 - c. Meditation
4. Movement



Nutrient Testing

NutrEval Results Overview			
Normal	Borderline	High Need	Supplementation for High Need
Antioxidants			
<ul style="list-style-type: none"> Vitamin A / Carotenoids Vitamin C Vitamin E / Tocopherols 	<ul style="list-style-type: none"> α-Lipoic Acid CoQ10 		
B-Vitamins			
<ul style="list-style-type: none"> Niacin - B3 Biotin - B7 Cobalamin - B12 	<ul style="list-style-type: none"> Thiamin - B1 Folic Acid - B9 	<ul style="list-style-type: none"> Riboflavin - B2 Pyridoxine - B6 	<ul style="list-style-type: none"> Riboflavin - B2 - Dose = 50 mg Pyridoxine - B6 - Dose = 50 mg
Minerals			
<ul style="list-style-type: none"> Manganese Molybdenum 	<ul style="list-style-type: none"> Magnesium Zinc 		

The Gut Microbiome and Digestion

- 100 trillion microbes live in your gut.
 - 10x more cells than you.
- 75-80% of your immune system is in your gut.
- “Leaky gut” is likely involved in all autoimmune disorders (including hypothyroidism).
- Microbes eat what you eat.



BACTERIOLOGY CULTURE

Expected/Beneficial flora

4+ Bacteroides fragilis group
 3+ Bifidobacterium spp.
 3+ Escherichia coli
 3+ Lactobacillus spp.
 3+ Enterococcus spp.

Commensal (Imbalanced) flora

3+ Alpha hemolytic strep
 4+ Gamma hemolytic strep
 2+ Staphylococcus aureus

Dysbiotic flora

4+ Proteus mirabilis

3+ Clostridium spp.
 NG = No Growth

BACTERIA INFORMATION

Expected /Beneficial bacteria make up a significant portion of the total microflora in a healthy & balanced GI tract. These beneficial bacteria have many health-protecting effects in the GI tract including manufacturing vitamins, fermenting fibers, digesting proteins and carbohydrates, and propagating anti-tumor and anti-inflammatory factors.

Clostridia are prevalent flora in a healthy intestine. Clostridium spp. should be considered in the context of balance with other expected/beneficial flora. Absence of clostridia or over abundance relative to other expected/beneficial flora indicates bacterial imbalance. If *C. difficile* associated disease is suspected, a Comprehensive Clostridium culture or toxigenic *C. difficile* DNA test is recommended.

Commensal (Imbalanced) bacteria are usually neither pathogenic nor beneficial to the host GI tract. Imbalances can occur when there are insufficient levels of oral contraceptives or other medications; poor fiber intake and high stress levels.

Dysbio
 number
 oral cor

YEAST CULTURE

Normal flora

Dysbiotic flora

2+ Candida albicans

MICROSCOPIC YEAST

Result: **Expected:**
 Many None - Rare

Yeast in stool is expected at a level of none-rare. A microscopic finding of yeast in stool of few, moderate, or many may be helpful in identifying potential yeast overgrowth, or non-viable or dietary yeast.

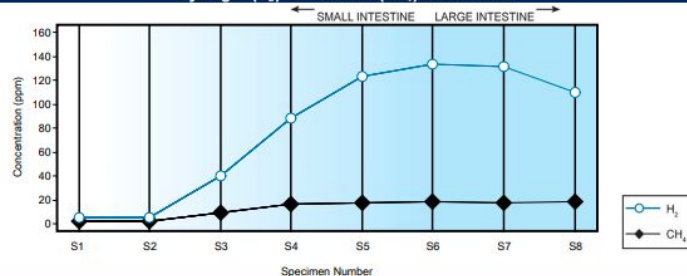
YEAST INFORMATION

Yeast may normally be present in small quantities in the skin, mouth, and intestine. When investigating the presence of yeast, disparity may exist between culturing and microscopic examination. Yeast are not uniformly dispersed throughout the stool and this may lead to undetectable or low levels of yeast identified by microscopy, despite culture and identified yeast species. Conversely, microscopic examination may reveal a significant amount of yeast present but no viable yeast cultured. Yeast may not always survive transit through the intestines. Nonviable diet-derived yeast may also be detected microscopically. Consideration of clinical intervention for yeast detected microscopically should be made in the context of other findings and presentation of symptoms.

Comments:

Methodology: GC-TDC/SSS

Hydrogen (H₂) and Methane (CH₄) Breath Gases



Hydrogen (H₂), Methane (CH₄) and Carbon Dioxide (CO₂) (ppm)

	Baseline 0 min (S1)	20 min (S2)	40 min (S3)	60 min (S4)	90 min (S5)	120 min (S6)	150 min (S7)	180 min (S8)
H ₂	5	5	40	88	123	133	131	109
CH ₄	<2	<2	9	16	17	18	17	18
H ₂ + CH ₄	NR	NR	49	104	140	151	148	127
CO ₂ **	✓	✓	✓	✓	✓	✓	✓	✓

Actual Collection Times

Actual Time	10:30	10:50	11:10	11:30	12:01	12:30	1:00	1:30
Actual Interval	0 min	20 min	40 min	60 min	91 min	120 min	150 min	180 min

**CO₂ is measured for quality assurance. ✓ indicates the CO₂ level is acceptable. X indicates room air contamination exceeding acceptable limits.

Evaluation for Hydrogen (H₂)

Hydrogen increase over baseline by 90 minutes

Result	Expected Value
Change in H ₂ 118 H	<20 ppm

A rise of ≥ 20 ppm from baseline in hydrogen by 90 min should be considered a positive test to suggest the presence of SIBO

Evaluation for Methane (CH₄)

Peak methane level at any point

Result	Expected Value
CH ₄ Peak 18 H	<10 ppm

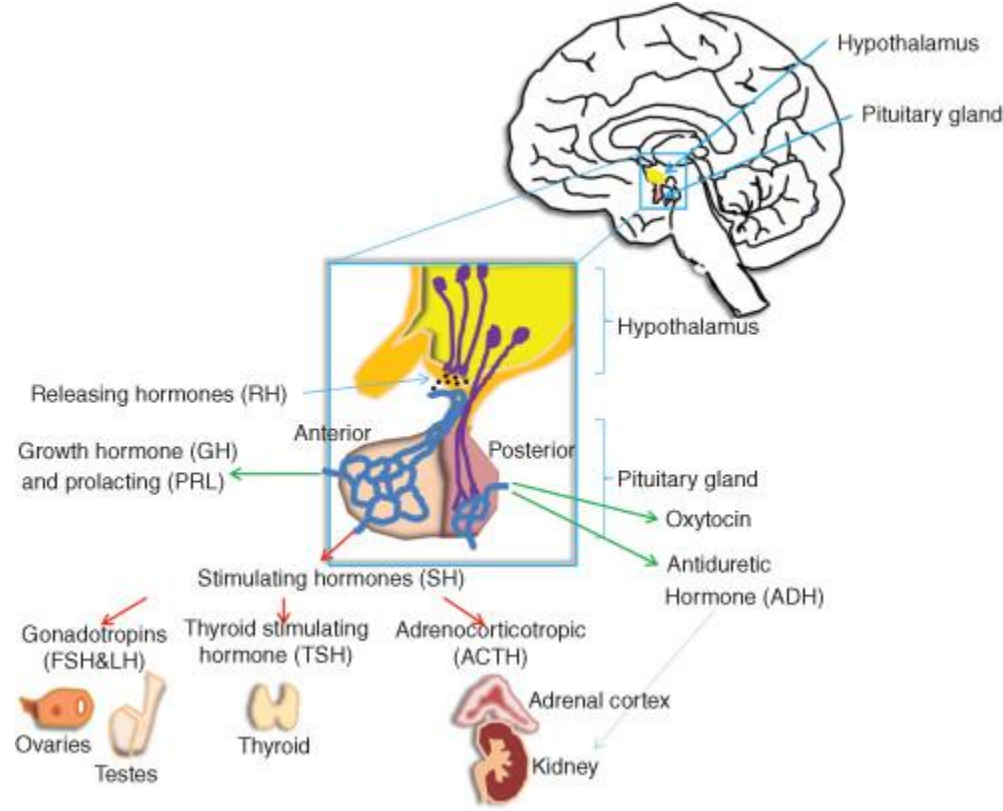
A peak methane level ≥ 10 ppm at any point is indicative of a methane-positive result.



Hormone Analysis

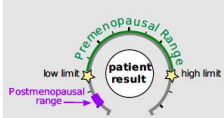
Hypothalamus-pituitary-adrenal axis dysregulation (HPA-axis dysregulation)

- Full thyroid panel
- Sex hormones
 - Estrogen, progesterone, testosterone and metabolism
- Adrenals
 - Cortisol
- Lots more we don't measure or understand!



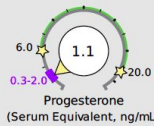
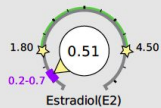
Advanced Hormone Testing

Key (how to read the results):

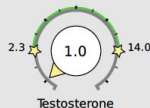


Sex Hormones

See Pages 2 and 3 for a thorough breakdown of sex hormone metabolites

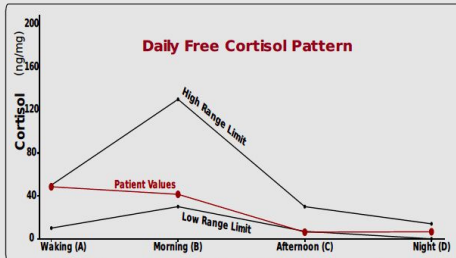


Progesterone Serum Equivalent is a calculated value based on urine pregnanediol.



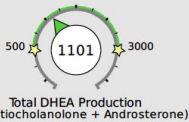
Adrenal Hormones

See pages 4 and 5 for a more complete breakdown of adrenal hormones



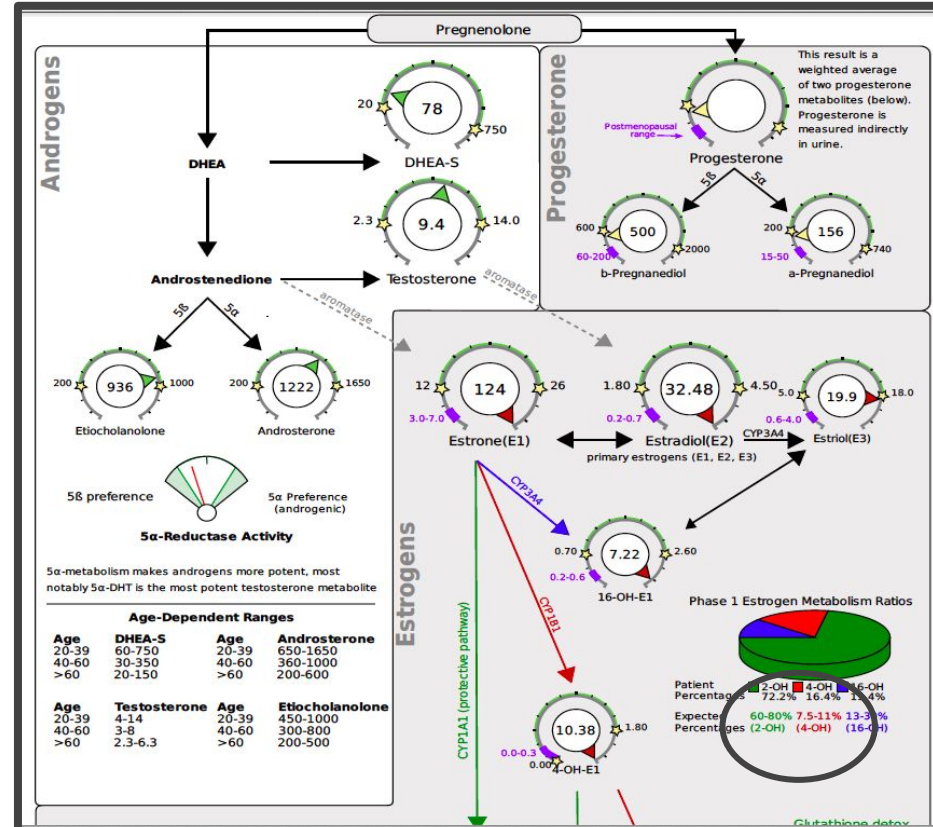
Total DHEA Production

Age Range
20-39 1300-3000
40-60 750-2000
>60 500-1200



cortisol metabolism
Metabolized Cortisol (THF+THE) (Total Cortisol Production)
2750 7605 6500

Free cortisol best reflects tissue levels. Metabolized cortisol best reflects total cortisol production.



		Average High	1.00 - 3.00 >3.00	
Homocyst(e)ine	6.4	umol/L	0.0 - 15.0	01
TSH	2.190	uIU/mL	0.450 - 4.500	01
Thyroxine (T4)	6.1	ug/dL	4.5 - 12.0	01
T3 Uptake	27	%	24 - 39	01
Free Thyroxine Index	1.6		1.2 - 4.9	
Triiodothyronine (T3)	97	ng/dL	71 - 180	01
Triiodothyronine (T3), Free	2.8	pg/mL	2.0 - 4.4	01
Reverse T3, Serum ^A	21.1	ng/dL	9.2 - 24.1	02
T4, Free (Direct)	1.06	pg/dL	0.82 - 1.77	01
Thyroid Peroxidase (TPO) Ab	8	IU/mL	0 - 34	01
Thyroglobulin Antibody	<1.0	IU/mL	0.0 - 0.9	01
Thyroglobulin Antibody measured by Beckman Coulter Methodology				
Insulin	8.7	uIU/mL	2.6 - 24.9	01
Copper, Serum ^A	117	ug/dL	72 - 166	02
		Detection Limit = 5		
Zinc, Plasma or Serum ^B	94	ug/dL	56 - 134	02
		Detection Limit = 5		
Methylmalonic Acid, Serum	143	nmol/L	0 - 378	02
Disclaimer:				02
This test was developed and its performance characteristics determined by LabCorp. It has not been cleared or approved by the Food and Drug Administration.				
				01
CBC, Platelet Ct, and Diff				01
WBC	5.0	x10E3/uL	3.4 - 10.8	01
RBC	4.73	x10E6/uL	3.77 - 5.28	01

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The Immune System, Inflammation & Infection

- An immune system response = inflammation.
- Inflammation is part of most all disease processes.
- **Inflammation is our body's response to try and fix a perceived threat**
- **Inflammation? Ask WHY?**
- Inflammation is both the “chicken” and the “egg” in complex and/or chronic disease.
- Dr Richard Horowitz: MSIDS.
- Dr Dale Bredesen: Reversing cognitive decline

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MSIDS Model of Chronic Disease

Multiple Systemic Infectious Disease Syndrome

1. Infections
2. Immune dysfunction
3. Inflammation
4. Toxicity
5. Allergies
6. Nutritional & enzyme deficiencies/FM abnormalities in biochemical pathways
7. Mitochondrial dysfunction
8. Psychological disorders
9. Neurological dysfunction
10. Endocrine dysfunction
11. Sleep disorders
12. ANS dysfunction +/- POTS
13. G.I. disorders
14. Elevated LFT's
15. Pain syndromes
16. Deconditioning

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Dr Dale Bredesen: Reversing Cognitive Decline.

36 point program, to target differential mechanisms resulting in dementia.

- Intermittent fasting
- Gut microbiome health
- Hormone optimization
- Heavy metals
- Nutrients
- Mitochondria
- Optimizing antioxidants & reducing oxidative stress
- Mindfulness, stress reduction and yoga

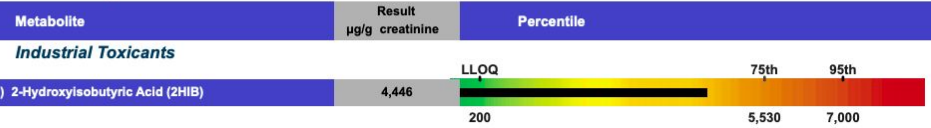
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Toxicity and Detox

1. Avoid contaminants in food and your environment.
2. Optimize detox by providing essential cofactors (diet and nutrients).
3. Decrease load by reducing inflammation.
4. Exercise.
5. Testing and detox protocols.

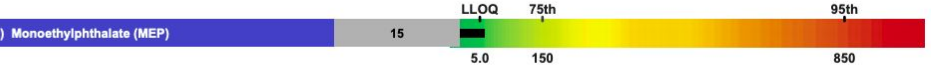
Toxicant Testing

Toxic Compounds



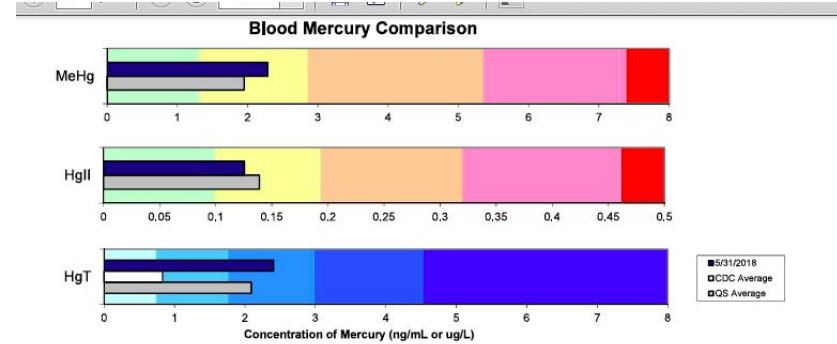
Parent: MTBE/ETBE

MTBE and ETBE are gasoline additives used to improve octane ratings. Exposure to these compounds is most likely due to groundwater contamination, inhalation or skin exposure to gasoline or its vapors, and exhaust fumes. MTBE has been demonstrated to cause hepatic, kidney, and central nervous system toxicity, peripheral neurotoxicity, and cancer in animals. Very high values have been reported in genetic disorders. Because the metabolites of these compounds are the same, ETBE may be similarly toxic.



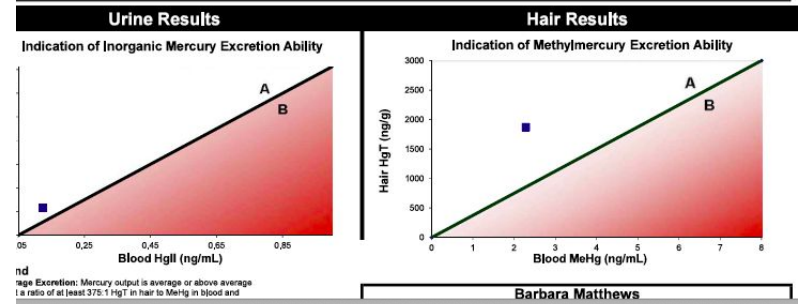
Parent: Diethylphthalates

Phthalates may be the most widespread group of toxins in our environment, commonly found in many bath and beauty products, cosmetics, perfumes, oral pharmaceuticals, insect repellents, adhesives, inks, and varnishes. Phthalates have been implicated in reproductive damage, depressed leukocyte function, and cancer. Phthalates have also been found to impede blood coagulation, lower testosterone, and alter sexual development in children. Low levels of phthalates can feminize the male brain of the fetus, while high levels can hyper-masculinize the developing male brain.



	Barbara Matthews Results (ng/mL)			Reference Ranges						
	5/31/2018	NA	% Change	Source	Range	Average	50th	75th	90th	95th
Mercury— MeHg	2.28	NA	NA	QS	<0.003 to 23.3	1.95	1.2	2.9	5.4	7.4
Mercury— Hg ^{II}	0.126	NA	NA	QS	<0.007 to 1.75	0.139	0.10	0.19	0.32	0.46
HgT	2.41	NA	NA	CDC	0.038 to 9.96	0.833	0.7	1.7	3	4.6

Reference Values: Quicksilver Scientific (QS) Data represents 1011 males and females that have utilized our testing. CDC data represents 1928 females, ages 16 to 49. QS concentrations are higher than CDC because QS analyzes blood a population that already suspects mercury toxicity.
 Analysis Information: Mercury speciation was performed at Quicksilver Scientific, and all values are in concentrations of ng Hg per mL of blood



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How Do I Find a Functional Medicine Practitioner?

How can I utilize Functional Medicine?

- 1) ADAPT Academy
 - a) <https://kresserinstitute.com/directory/>
- 2) Institute for Functional Medicine
 - a) <https://www.ifm.org/find-a-practitioner/>
- 3) Ask the labs
 - a) Genova
 - b) Doctor's Data
 - c) DUTCH
 - d) Great Plains Labs
 - e) QuickSilver Scientific
 - f) IgeneX



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Functional Medicine: Sum

- Prevention, disease reversal, health optimization
- Investigating and treating underlying causes
 - Multiple causes, chronic health issues
- Extensive lab testing and health history analysis.



Functional Medicine: Sum

- The Fountains: Diet and lifestyle
 - Diet, sleep, stress management, movement

I believe that the greatest gift
you can give your family and
the world is a healthy you.

Joyce Meyer

Questions & Comments?

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Case Study.

Case study 1: “Elsa”



Patient:

- 47 year old woman
- Difficulty falling and staying asleep
- Low energy, hard to get out of bed, can barely make it to evening, then has evening “surge” of energy
- Feels irritable, easily cries, more so before menses
- Menses is heavy and long, irregular, increased fatigue
- Reflux, bloating and increased gas with eating, alternating C/D
- Low libido, vaginal dryness
- Stiff and achy, esp in mornings
- Cold intolerance, Raynaud’s
- Numbness and tingling in fingers
- Hypothyroid

“Elsa,” conventional approach

Labs:

- CBC: normal
- CMP: elevated cholesterol, triglycerides, LDL, low HDL
- Thyroid study
 - TSH: high normal
 - T4: low normal
 - T3: low normal
- Hct/Hgb: borderline low
- MCV/MCHC: borderline high
- Everything else “WNL”

Diagnosis:

- No apparent problems

Recommendations:

- Statins (high cholesterol)
- Wellbutrin (mood)
- Birth control (heavy periods)
- Laxatives (constipation)
- Prilosec (heartburn)
- Linzess (IBS)

“Elsa:” FM approach



Advanced diagnostic investigation

- Ferritin: low normal
- Iron: normal
- TIBC: normal
- Reverse T3
- SHBG: slightly elevated
- ANA: slightly elevated
- DUTCH (see next)
- GI Effects (see next)
- NutraEval (see next)
- IgG Food sensitivities (see next)

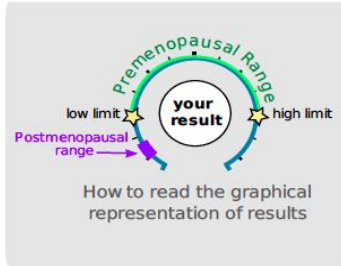


SCIENCE + INSIGHT

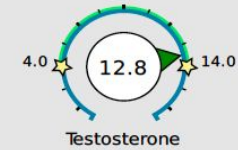
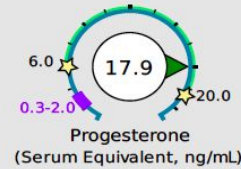
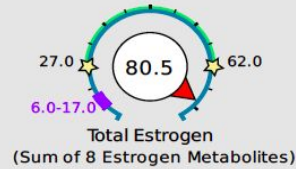
A clinical laboratory providing innovative, accurate specialty testing since 1972.

Hormone Testing Summary

All units are given in ng/mg creatinine

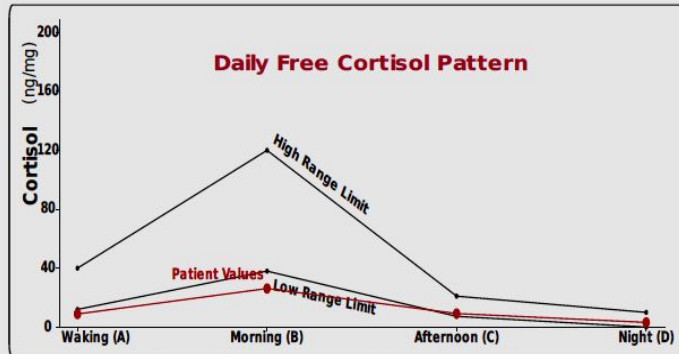


Sex Hormones See Pages 2 and 3 for a thorough breakdown of sex hormone metabolites



Progesterone Serum Equivalent is a calculated value based on urine pregnanediol. This value may not accurately reflect serum when progesterone is taken by mouth.

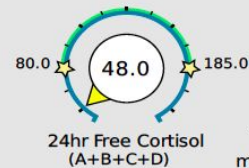
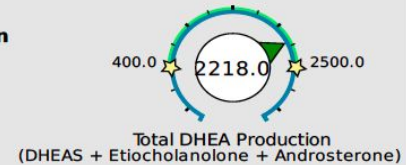
Adrenal Hormones See pages 4 and 5 for a more complete breakdown of adrenal hormones



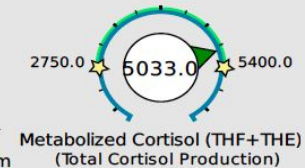
Free cortisol best reflects tissue levels. Metabolized cortisol best reflects total cortisol production.

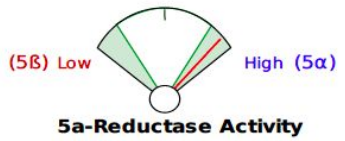
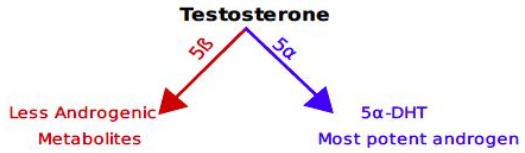
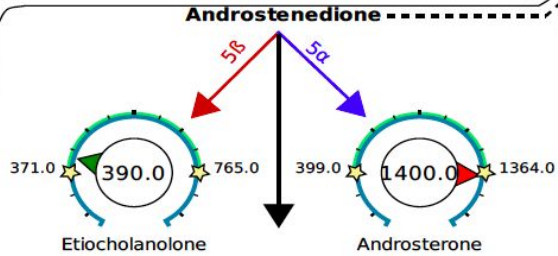
Total DHEA Production

Age	Range
20-40	800-2500
40-60	530-1550
>60	400-1350

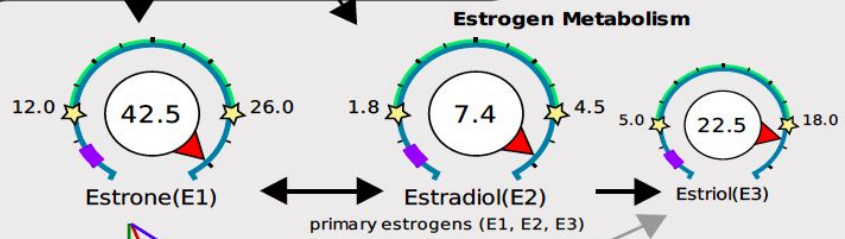


cortisol
metabolism



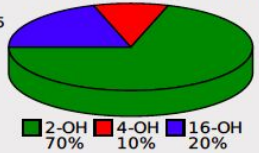


5α-metabolism makes androgens more androgenic, most notably 5α-DHT is the most potent testosterone metabolite (~3x more potent than testosterone itself). 5α-Reductase activity is assessed using the ratio of Androsterone (5α) to Etiocholanolone (5β).

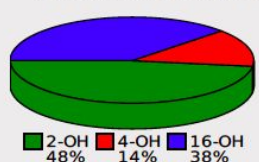


protective pathway

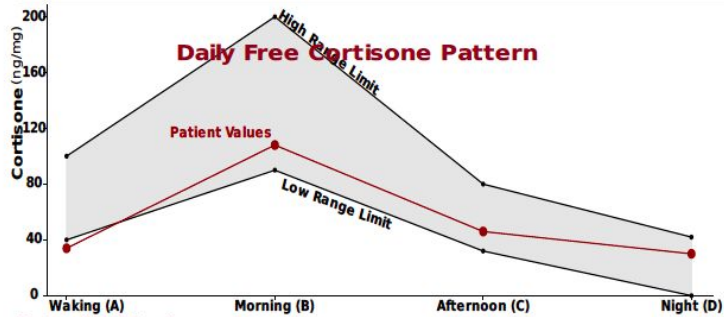
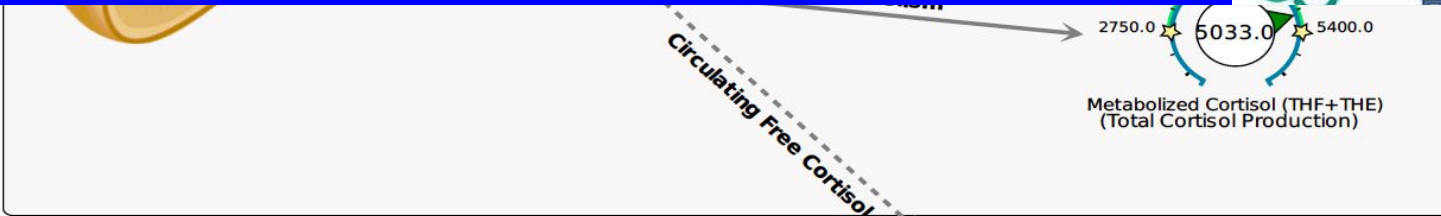
Normal Estrogen Metabolism



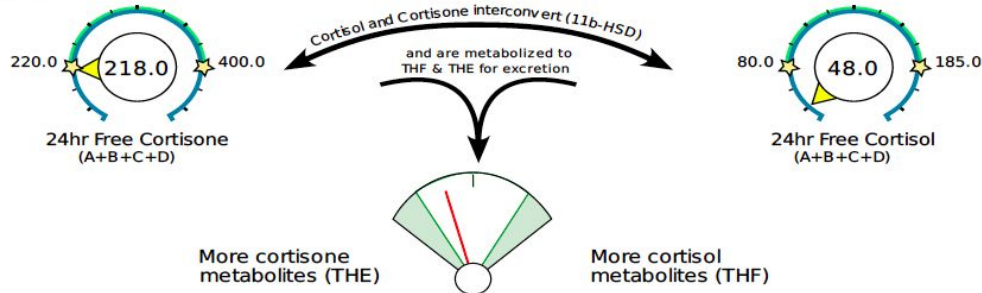
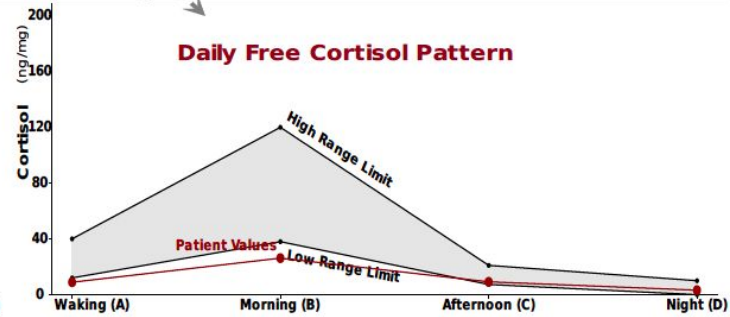
Patient Estrogen Metabolism



4-Methoxy-E1
(Protective, but not enough in urine to measure)



Note: "Waking" samples reflect overnight production



NutrEval Results Overview

Normal

Borderline

High Need

Supplementation for High Need

Vitamin A / Carotenoids
Vitamin C
Vitamin E / Tocopherols

α-Lipoic Acid

CoQ10

B-Vitamins

Thiamin - B1

Riboflavin - B2

Riboflavin - B2 - Dose = 50 mg

Niacin - B3
Pyridoxine - B6
Biotin - B7
Folic Acid - B9
Cobalamin - B12

Minerals

Magnesium
Manganese
Molybdenum
Zinc

Vitamin D

Vitamin D

Vitamin D - Dose = 4,000 IU

Malabsorption and Dysbiosis Markers

Malabsorption Markers Reference Range

Indoleacetic Acid (IAA)	1.5	<= 4.2
Phenylacetic Acid (PAA)	0.22	<= 0.12

Bacterial Dysbiosis Markers

Dihydroxyphenylpropionic Acid (DHPPA)	3.0	<= 5.3
3-Hydroxyphenylacetic Acid	8.6	<= 8.1
4-Hydroxyphenylacetic Acid	21	<= 29
Benzoic Acid	0.21	<= 0.05
Hippuric Acid	423	<= 603

Yeast / Fungal Dysbiosis Markers

Arabinose	79	<= 96
Citramalic Acid	7.3	<= 5.8
Tartaric Acid	<dl	<= 15

Cellular Energy & Mitochondrial Metabolites

Carbohydrate Metabolism Reference Range

Lactic Acid	5.3	1.9-19.8
Pfuvic Acid	17	7-32
β-OH-Butyric Acid (BHBA)	2.8	<= 2.8

Energy Metabolism

Citric Acid	476	40-520
Cis-Aconitic Acid	17	10-36
Isocitric Acid	68	22-65
α-Ketoglutaric Acid (AKG)	34	4-52
Succinic Acid	<dl	0.4-4.6
Malic Acid	2.8	<= 3.0
β-OH-β-Methylglutamic Acid (HMG)	5	<= 15

Fatty Acid Metabolism

Adipic Acid	1.5	<= 2.8
Suberic Acid	1.3	<= 2.1

Creatinine Concentration

Reference Range

Neurotransmitter Metabolites

Reference Range

Vanilmandelic Acid	2.4	0.4-3.6
Homovanillic Acid	2.7	1.2-5.3
6-OH-Indoleacetic Acid	12.2	3.8-12.1
3-Methyl-4-OH-phenylglycol	0.13	0.02-0.22
Kynurenic Acid	<dl	<= 7.1
Quinolinic Acid	3.3	<= 9.1
Kynurenic / Quinolinic Ratio	NR	>= 0.44

Vitamin Markers

Reference Range

α-Ketoadipic Acid	1.1	<= 1.7
α-Ketovaleric Acid	0.62	<= 0.97
α-Ketocaproic Acid	0.47	<= 0.89
α-Keto-β-Methylvaleric Acid	2.2	<= 2.1
Formiminoglutamic Acid (FIGlu)	0.8	<= 1.5
Glutaric Acid	0.45	<= 0.51
Isovalerylglycine	2.5	<= 3.7
Methylmalonic Acid	2.3	<= 1.9
Xanthurenic Acid	0.39	<= 0.96
3-Hydroxypropionic Acid	7	5-22
3-Hydroxyisovaleric Acid	22	<= 29

Toxin & Detoxification Markers

Reference Range

α-Ketophenylacetic Acid (from Sifrene)	0.39	<= 0.46
α-Hydroxyisobutyric Acid (from MTBE)	6.4	<= 6.7
Orotic Acid	0.50	0.33-1.01
Pfuroglutamic Acid	32	16-34

Tyrosine Metabolism

Reference Range

Homogentisic Acid	10	<= 19
2-Hydroxyphenylacetic Acid	0.54	<= 0.76

All biomarkers reported in micromoles per deciliter unless stated otherwise.

Nutritionally Essential Amino Acids

Amino Acid	Reference Range
Arginine	10.9 (6.0-17.5)
Histidine	9.7 (6.5-13.3)
Isoleucine	10.63 (5.79-18.69)
Leucine	21.3 (12.1-36.1)
Lysine	30.1 (13.7-34.7)
Methionine	3.1 (2.3-6.5)
Phenylalanine	10.14 (6.07-17.46)
Taurine	7.68 (4.41-10.99)
Threonine	12.62 (6.42-16.32)
Tryptophan	5.46 (2.65-6.67)
Valine	31.5 (18.3-42.6)

Nonessential Protein Amino Acids

Amino Acid	Reference Range
Alanine	39 (23-62)
Asparagine	6.6 (3.5-11.6)
Aspartic Acid	0.37 (<= 0.67)
Cyst(e)ine	11.8 (5.9-19.9)
γ-Aminobutyric Acid	<dl (<= 0.06)
Glutamic Acid	8.9 (2.0-14.5)
Glutamine	48 (44-111)
Proline	24 (15-57)
Tyrosine	9.9 (6.2-18.5)

Methodology: LC/MS/MS

Amino Acid Reference Ranges are age specific.

Amino Acids (Plasma)

Intermediary Metabolites

B Vitamin Markers	Reference Range
α-Aminoadipic Acid	0.15 (<= 0.28)
α-Amino-N-butyric Acid	3.36 (1.76-9.99)
β-Aminoisobutyric Acid	0.22 (<= 0.72)
Cystathionine	0.03 (<= 0.09)
3-Methylhistidine	0.48 (<= 0.78)

Urea Cycle Markers

Citrulline	4.9 (1.6-5.7)
Ornithine	10.58 (4.38-15.42)
Urea	565 (216-1,156)

Glycine/Serine Metabolites

Glycine	12 (5-23)
Serine	5.1 (2.1-7.0)
Ethanolamine	0.76 (0.19-0.78)
Phosphoethanolamine	0.20 (0.15-0.64)
Phosphoserine	<dl (<= 0.39)
Sarcosine	0.09 (<= 0.15)

Dietary Peptide Related Markers

	Reference Range
1-Methylhistidine	1.16 (<= 1.64)
β-Alanine	0.4 (<= 0.7)

Interpretation At-a-Glance

INFECTION



INFLAMMATION

Calprotectin ▲
Fecal Lactoferrin ▲
EPX ▲
Fecal secretory IgA ▲



INSUFFICIENCY

Fecal Fats (Total) ▲

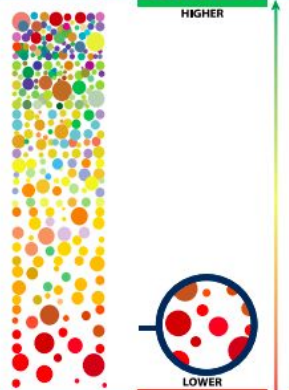


IMBALANCE

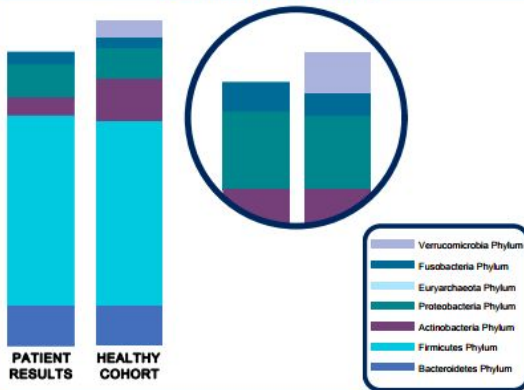
PP Bacteria ▲
Beneficial Bacteria ▼
n-Butyrate ▼
Beta-glucuronidase ▲



DIVERSITY ASSOCIATION



RELATIVE ABUNDANCE



GI Effects™ Comprehensive Profile - Stool

Methodology: GC/MS, Automated Chemistry, EIA

Results	QUINTILE DISTRIBUTION					Reference Range
	1st	2nd	3rd	4th	5th	
Digestion and Absorption						
Pancreatic Elastase 1 †	>500	100	200			>200 mcg/g
Products of Protein Breakdown (Total*) (Valerate, Isobutyrate, Isovalerate)	6.6					1.8-9.9 micromol/g
Fecal Fat (Total*)	41.8 H					3.2-38.6 mg/g
Triglycerides	3.5 H					0.3-2.8 mg/g
Long-Chain Fatty Acids	28.3					1.2-29.1 mg/g
Cholesterol	7.7 H					0.4-4.8 mg/g
Phospholipids	4.3					0.2-6.9 mg/g
Inflammation and Immunology						
Calprotectin †	693 H	50	120			<=50 mcg/g
Eosinophil Protein X (EPX) †	10.3 H	1.1	4.6			<=4.6 mcg/g
Fecal secretory IgA	>UL H					<=885 mcg/g
Gastrointestinal Microbiome						
Metabolic						
Short-Chain Fatty Acids (SCFA) (Total*) (Acetate, n-Butyrate, Propionate)	45.6					>=23.3 micromol/g
n-Butyrate Concentration	6.6					>=3.6 micromol/g
n-Butyrate %	14.5					11.8-33.3 %
Acetate %	62.4					48.1-69.2 %
Propionate %	23.0					<=29.3 %
Beta-glucuronidase	6,237					368-6,266 U/g

Gastrointestinal Microbiome

Commensal Bacteria (PCR)

Result CFU/g stool	QUINTILE DISTRIBUTION					Reference Range CFU/g stool		
	1st	2nd	3rd	4th	5th			
Bacteroidetes Phylum								
<i>Bacteroides-Prevotella</i> group	2.9E9	H						3.4E6-1.5E9
<i>Bacteroides vulgatus</i>	3.8E9	H						<=2.2E9
<i>Barnesiella</i> spp.	<DL							<=1.6E8
<i>Odoribacter</i> spp.	6.6E6							<=8.0E7
<i>Prevotella</i> spp.	1.8E7	H						1.4E5-1.6E7
Firmicutes Phylum								
<i>Anaerotruncus colthominis</i>	7.2E7	H						<=3.2E7
<i>Butyrivibrio crossotus</i>	3.2E4							5.5E3-5.9E5
<i>Clostridium</i> spp.	7.0E9							1.7E8-1.5E10
<i>Coprococcus eutactus</i>	7.0E5							<=1.2E8
<i>Faecalibacterium prausnitzii</i>	1.2E10	H						5.8E7-4.7E9
<i>Lactobacillus</i> spp.	3.7E8							8.3E6-5.2E9
<i>Pseudoflavonifractor</i> spp.	3.2E8	H						4.2E5-1.3E8
<i>Roseburia</i> spp.	1.0E9							1.3E8-1.2E10
<i>Ruminococcus</i> spp.	8.9E7	L						9.5E7-1.6E9
<i>Veillonella</i> spp.	2.4E7							1.2E5-5.5E7
Actinobacteria Phylum								
<i>Bifidobacterium</i> spp.	4.1E7							<=6.4E9
<i>Bifidobacterium longum</i>	8.7E6							<=7.2E8
<i>Collinsella aerofaciens</i>	<DL	L						1.4E7-1.9E9
Proteobacteria Phylum								
<i>Desulfovibrio piger</i>	<DL							<=1.8E7
<i>Escherichia coli</i>	8.7E7	H						9.0E4-4.6E7
<i>Oxalobacter formigenes</i>	8.2E5							<=1.5E7
Euryarchaeota Phylum								
<i>Methanobrevibacter smithii</i>	<DL							<=8.6E7
Fusobacteria Phylum								
<i>Fusobacterium</i> spp.	1.8E5							<=2.4E5
Verrucomicrobia Phylum								
<i>Akkermansia muciphila</i>	<DL							>=1.2E6
Firmicutes/Bacteroidetes Ratio								
<i>Firmicutes/Bacteroidetes</i> (F/B Ratio)	7	L						12-620



“Elsa:” Findings & Recommendations

- Treat the gut microbiome/infections to treat the thyroid
 - The root of inflammation
- Support and balance the endocrine (hormone) system
 - Adrenal, thyroid, sex hormones
- Insure sleep
 - There is no substitute or supplement for sleep
- Treat vitamin/mineral status for biochemical optimization
 - Nutrients are the backbone of the trillions of biochemical reactions in our body
- Support hormone, toxin and xenobiotic detox
 - Chronic health conditions, aging, stress, inflammation/infection and poor diets compromise our ability to detox and increase our detox load.

“Elsa:” Findings & Recommendations

DUTCH hormone:

- Support hormone balance, synthesis and metabolism.
- Estrogen dominance
 - Poor Phase I detox (high 4-OH E1, low 2-OH E1)
- Low testosterone
- Low daytime cortisol, preference for cortisone metabolites
 - Indirect measurement of thyroid function (HYPO)
- Elevated nighttime cortisol

“Elsa:” Findings & Recommendations

Estrogen dominance, poor estrogen metabolism:

- DIM (200 mg, BID)
- Progon B (10 drops, orally, before bed)
- Calcium d-glucarate

Support Thyroid

- T-150, 2, am 30 minutes before breakfast

Low testosterone:

- Fenugreek, maca and piri

Cortisol

- Day: Gaia HPA homeostasis
 - 2am, 2 afternoon
- Night: phosphatidylserine, ashwagandha



30 minutes before bed

"Elsa:" Findings & Recommendations

NutraEval:

- Low mag, B1, 2, vitamin D, methylmalonic acid
- Elevated markers for gut dysbiosis, poor absorption/digestion
- Poor mitochondrial function
- Low Omega 3 status
- Detox:
 - OptiCleanse (Xymogen): 1 shake/day, for 1-3 months
 - Followed by several months of liver detox supplement
- Vitamins to address **nutrient deficiencies**
 - Supports energy production, hormones, detoxification, methylation, immune system, nervous system function
 - Recheck Vitamin D levels after 3-5 months
- **Mitochondria:**
 - L-carnitine, 500mg, BID
 - Nicotinamide riboside: 1-2, am 30 minutes before breakfast
- **Omega 3:**
 - 3 grams of high DHA/EPA cod liver oil for 3 months, then recheck
- Incorporate **gut/digestion** information when looking at GI Effects...

“Elsa:” Findings & Recommendations

GI Effects:

- Digestive **enzymes, bile** and **hydrochloric acid** support for digestion
- First, **treat overgrowth**:
 - Herbal antimicrobials for 6 weeks
- **Hypoallergenic diet**
 - Paleolithic diet
 - Weston A Price
 - Whole foods, unprocessed, flour/sugar/chemical and preservative free
 - Filtered water
- **Restore SCFA**
 - Soluble fiber, prebiotics
 - Butyrate (Tesseract)
- **Probiotics** (rotate) and probiotic foods
 - Kraut, kimchi, kombucha, fermented dairy (try goat, sheep)
- Low butyrate and SCFA (short chain fatty acids)
- Bacterial overgrowth, high methanogens
- Low elastase, elevated fat and protein in stool

"Elsa:" Findings & Recommendations

IgG Food sensitivities Test

- 3+ foods: eliminate for 4 months, follow hypoallergenic diet
- Once all symptoms resolved, feel fully healthy
 - Can add in 2+ foods, one at a time, every 4-5 days, to test for reactivity



“Elsa:” Follow up: 6 months

- Digestive symptoms resolved, with dietary maintenance
 - Tapered off prilosec, Linzess
 - Tapered off of digestive support after 6 months, still uses some enzymes and digestive support when strays from diet
- Sleep much improved
 - Uses kavinace and ashwagandha for intermittent need for sleep support
- Energy much improved
- No more excessive fatigue and mood irregularity with period, flow normal
 - Period is somewhat irregular as approaching menopause, but is no longer
 - Off of birth control, antidepressant
- Numbness, tingling and Raynaud’s resolved
- Thyroid: numbers and symptoms resolved
- Mood: well



A decorative grey quarter-circle graphic is located in the top-left corner of the slide.

“Elsa:” Follow up

- Cholesterol normalized
 - Off of statins
- On-going therapies:
 - Supplements for sleep
 - Use of supplements as
 - Acupuncture
 - Meditation
 - Exercise
 - Counseling
 - Massage





Questions?



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Comments?

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Cold and Flu season

Anti-virals

- Andrographis 500-1000 mg, every 3-4 hours
- V-Clear (Integrative Therapeutics); 2 dropperfuls 3-4x/day

Sinuses:

Both, 2 sprays/nostril, 2-3x/day

- Colloidal silver nasal spray
- X-Clear (xylito) nasal spray

Cold and immune support:

- Elderberry: 1-2 tsps, every 3-4 hours
- Zinc lozenges: every 3 hours
- Echinacea/goldenseal tincture: 2-4 dropperfuls/every 3-4 hours
- ColdQuell: 5-6 capsules, every 3 hours

REST



Underlying mechanisms >>

Disease name

Same health problem, different causes.

Different health problem, same causes,

- The same health issues can have different underlying causes, and hence different expressions and responses to treatments.
- Different diseases can have similar underlying causes
 - Eg: different autoimmune diseases

- IBS
- Autoimmune disease
- CVD
- Migraine
- PMS
- Dementia/Alzheimer's

Functional Medicine: What to expect

- **Longer appointments**
 - First appointments are 1-3 hours and include a complete health history
- **Personalized approach, personalized attention**
 - Differentiation between disease processes that may lead to similar symptoms or diagnosis
 - Individualized therapeutic prescriptions
 - The therapeutic processes that help your arthritis may differ from the process of someone else with arthritis
- **Lab testing**
 - Traditional labs
 - Functional medicine labs

Functional Medicine: What to expect



- **Patient involvement, empowerment and responsibility**
 - This is a healing journey, which may require you to change fundamental ways you have eaten and lived and to adopt therapeutic regimens that require commitment and motivation
- **Health optimization**
 - In peeling back the layers of variables that lead to your health condition, expect resolution of health problems, renewed vitality and enhanced quality of life.

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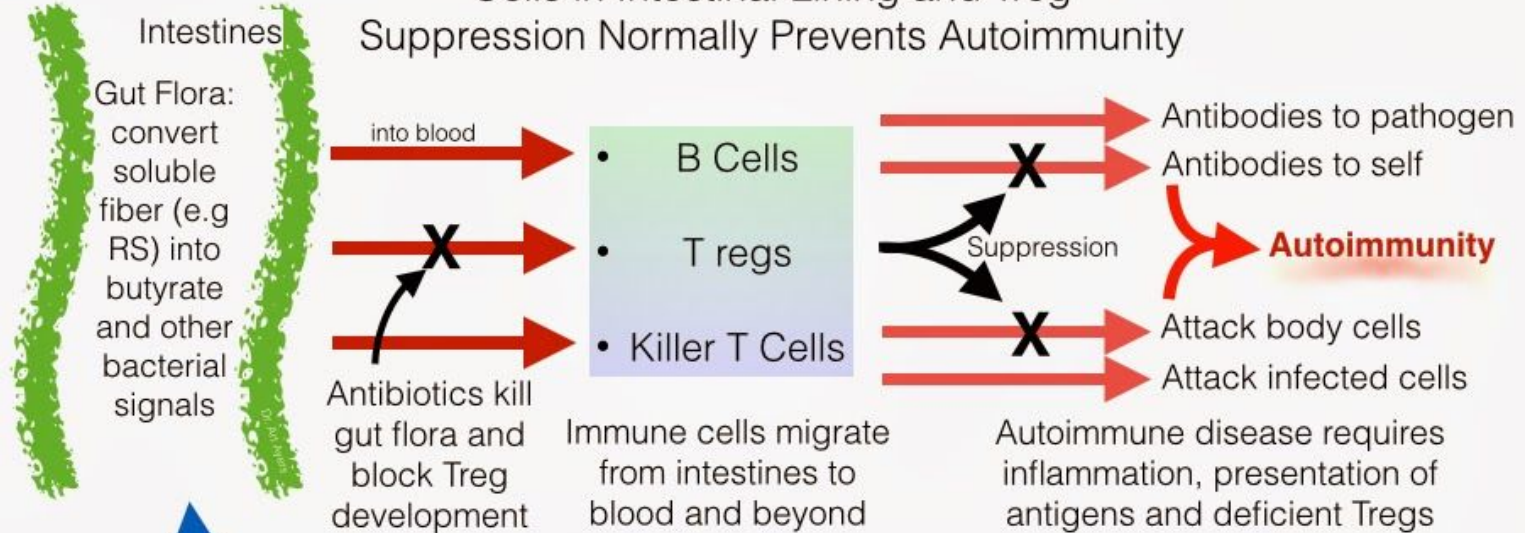
The Functional Medicine Process

A health journey

1. Take a **full history**
2. Review and **integrate former medical record**
3. Order **further testing** (as needed, patient ability to complete)
 - a. May begin some foundational protocols while waiting for test results to return, including diet, sleep, stress management and anything indicated from former testing that is not already being done.
4. Review and **integrate new lab findings**
5. **Begin protocols to address dysregulation** indicated by history, symptoms and lab findings
6. **Regular checkups, adjust protocols** based on therapeutic response, additional testing as necessary.

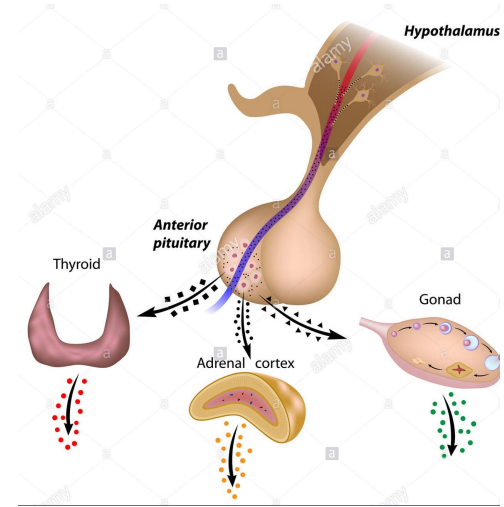
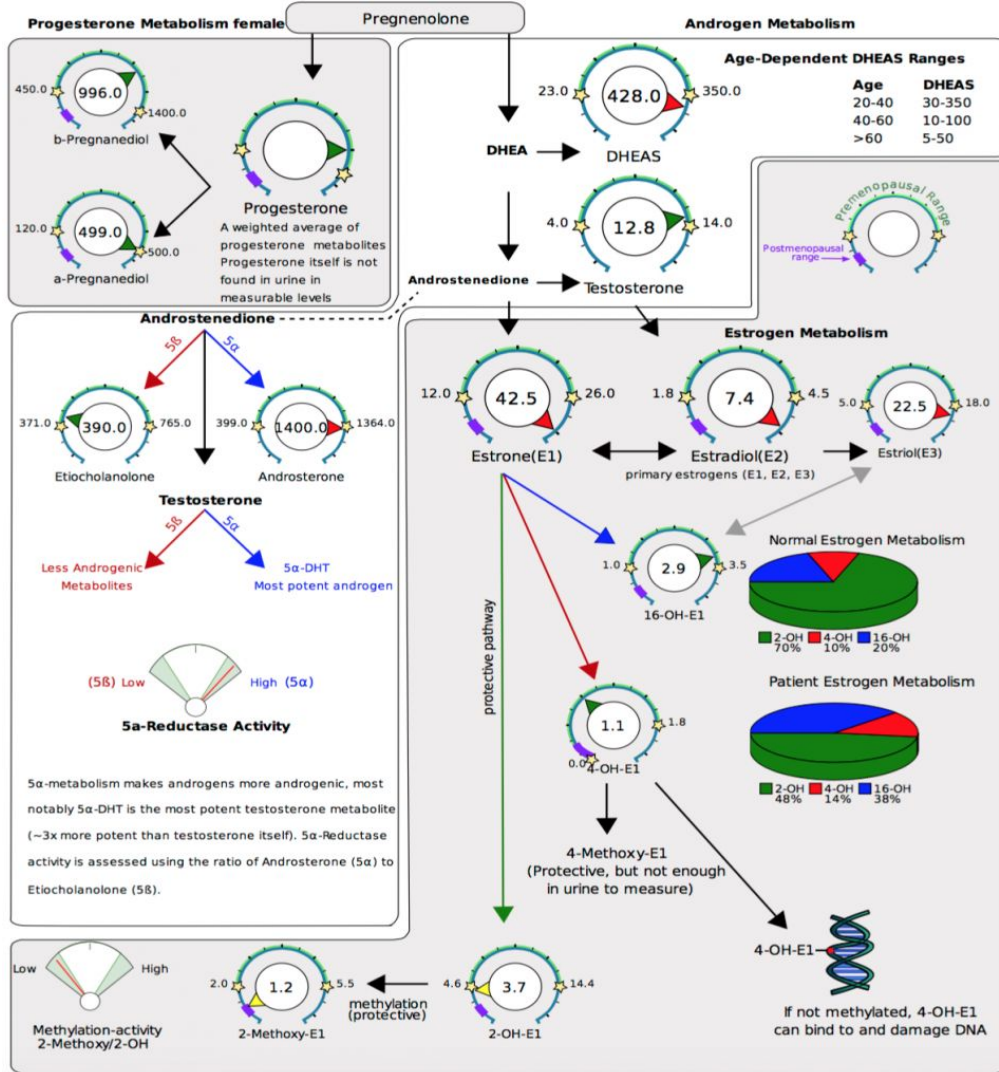
The Gut Microbiome

Gut Flora Controls Development of Immune Cells in Intestinal Lining and Treg
 Suppression Normally Prevents Autoimmunity



The cure for autoimmune disease is repair* of gut flora and redevelopment of immune suppression/tolerance.
 *Dairy probiotics help only temporarily

Advanced hormone analysis



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The Functional Medicine Process

Diet and lifestyle: The foundation of all health practices

- Whole foods, unprocessed **diet**
- **Sleep:** 7-9 hours/night
 - Regulated circadian rhythms
- **Exercise:** cardio, strength and stretching
- **Non-exercise Activity Thermogenesis (NEAT):** Move, don't sit for long periods of time.
- **Healthy relationships, social connections and support**
- **Mindfulness:** meditation, communication
 - Meditation
 - Quiet time, slowing down
 - Heartmath

Functional medicine: What is it good for? 3 levels:

1. Wellness and preventative care
2. Health optimization
 - a. Athletics, optimal aging, optimal wellness
3. Disease reversal and improved management
4. Illness





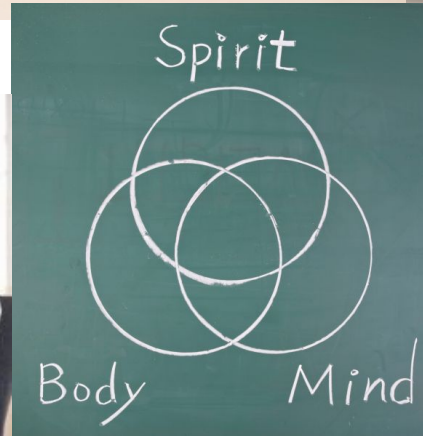
Functional medicine: What is it *not* good for?

- When FM isn't enough:
 - Acute care
 - Trauma, sepsis, heart attack.
 - Cancer
 - Integrative oncology
- FM includes the proper use of pharmaceuticals:
 - Infection
 - Symptom management
 - Disease management
 - Acute health management
 - Patient ability for compliance

While FM aims to understand and address underlying causes, not all physiological states of health dysregulation can be reversed or restored to how they were before dysregulation occurred.

The Functional Medicine Process

- **Wholistic care**
 - Acupuncture
 - Nutrition consulting
 - Counseling
 - Personal training
 - Cranial-sacral
 - Physical therapists
 - Massage therapists



Multiple, Underlying Causes

