

The Wonderful New World Of Self- Quantification



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The 12 Best Blood Biomarkers To Test

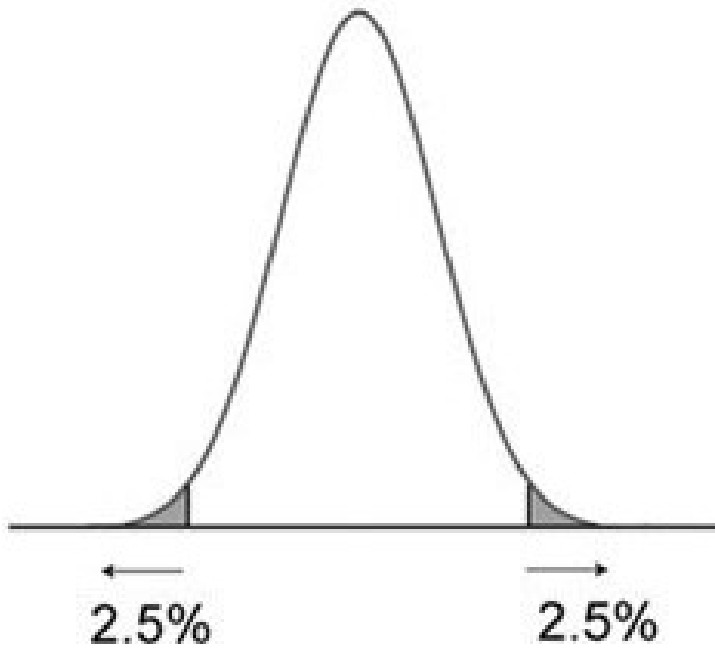


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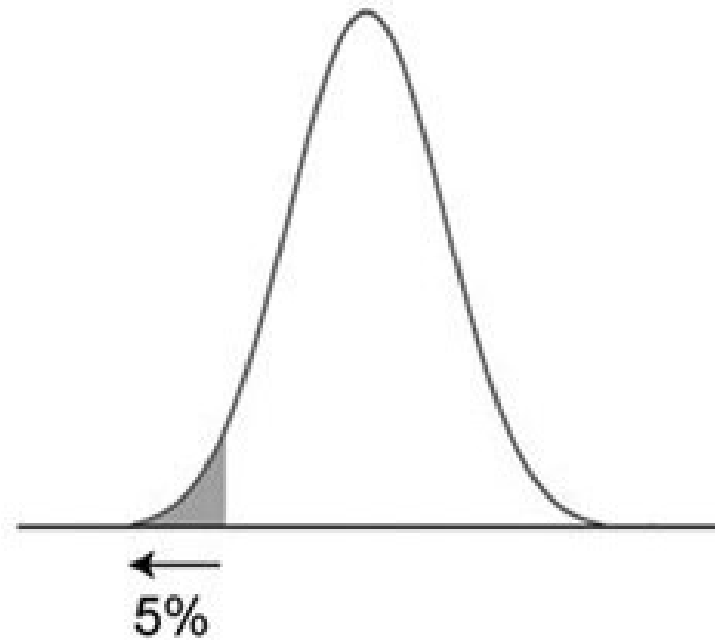
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Caution: Reference Ranges

A



B



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Reference Ranges

#1: 5% of people fall outside curve

#2: Ranges widely vary from lab to lab

#3: Reflect absence of disease, not “good to great”

#4: Male vs. female

#1: RBC Magnesium

- Insulin sensitivity, physical performance & sarcopenia potential
- Use RBC to see intracellular magnesium
- Ideal ranges: 6.0 to 6.5 mg/dl
- Can do tongue scrape as blood alternative (Intracellular Diagnostics)



#2: Estradiol



- Bone mass, oxidative stress, nitric oxide, glutathione, muscle repair, muscle strength
- Ideal ranges men 10-82pg/ml
- Ideal ranges women
 - Less than 50 pg/ml during menstrual periods
 - Up to 200 pg/ml during follicular development
 - Up to 400 pg/ml just before ovulation
- DUTCH panel

#3: Testosterone & Free Testosterone



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#4: Testosterone & Free Testosterone

- Libido, sexual performance, energy, strength, bone density, muscle mass, cardiovascular disease, mortality
- 2% of T should be free, (as a ratio, your T levels should be at least 1-to-49 free-T-to-bound-T)
- Example: if your total T is 500 ng/dl, then free T levels should be ~10.2 ng/dl



- For men, ideal levels of free T typically range from 4.6 to 22.4 ng/dl, and ideal levels of bioavailable T (which includes albumin-bound T and free T) range from 110 to 575 ng/dl. For women, ideal levels of free T range from 0.02 to 0.5 ng/dl, and ideal levels of bioavailable T from 0.5 to 8.5 ng/dl
- Males around the age of twenty should have high levels of DHEA (around 1,200 ng/dL). By age ninety, the level is usually closer to 180 ng/dL
- Salivary test best (e.g. DUTCH)

#5: DHEA

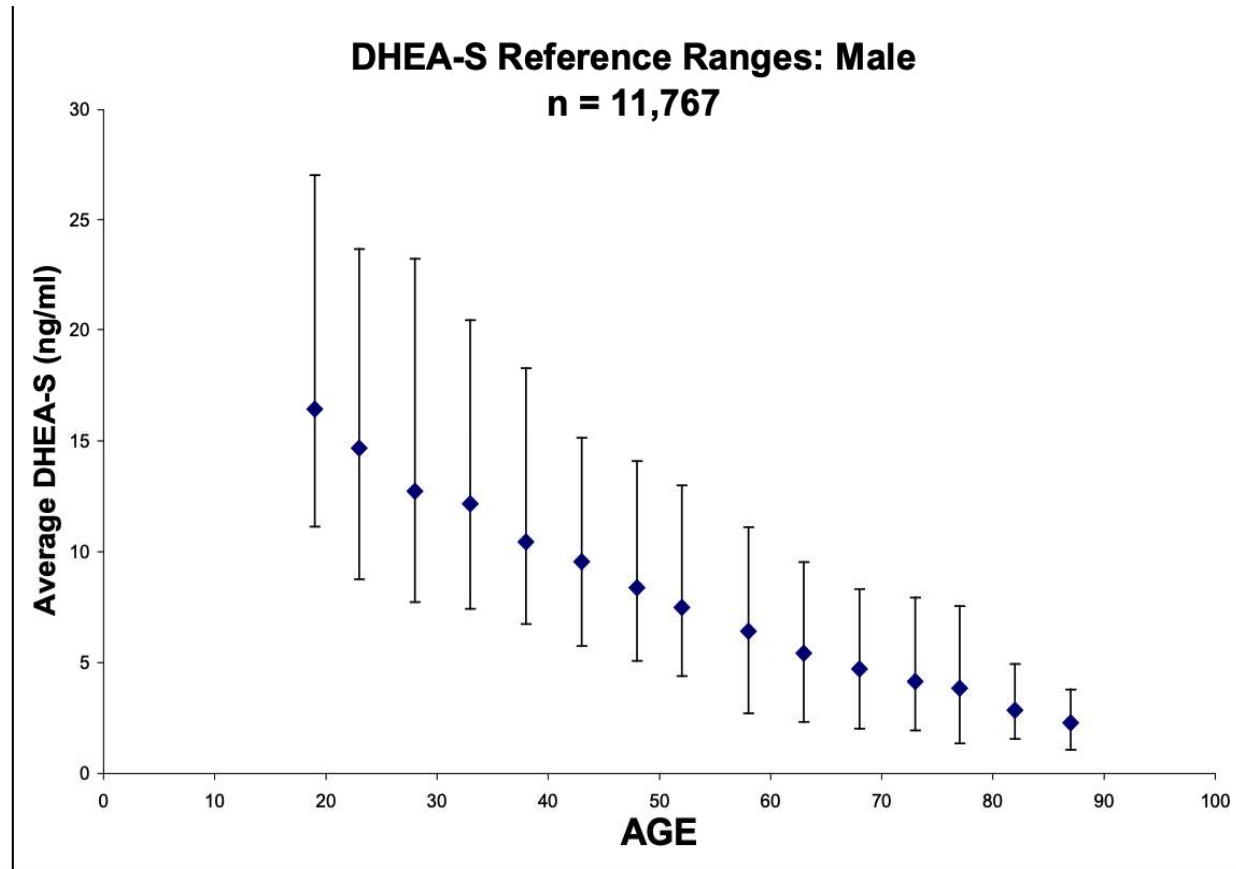


Figure 16. DHEA-S Age-Dependent Reference Ranges for Males



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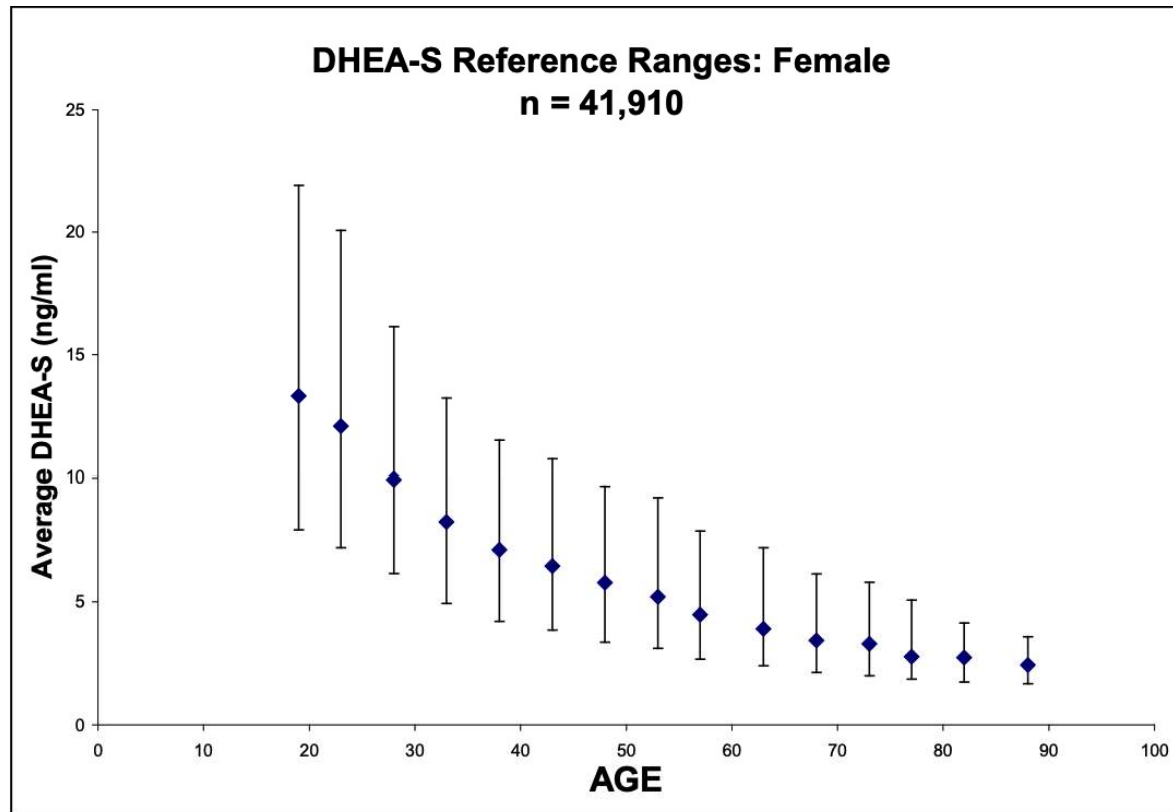



Figure 15. DHEA-S Age-Dependent Reference Ranges for Females



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How About Hormones?



Accession # 00239871
Jane Doe
123 4th St.
Anytown, FL 97155



PRECISION ANALYTICAL INC.
SIMPLY · BETTER · TESTING

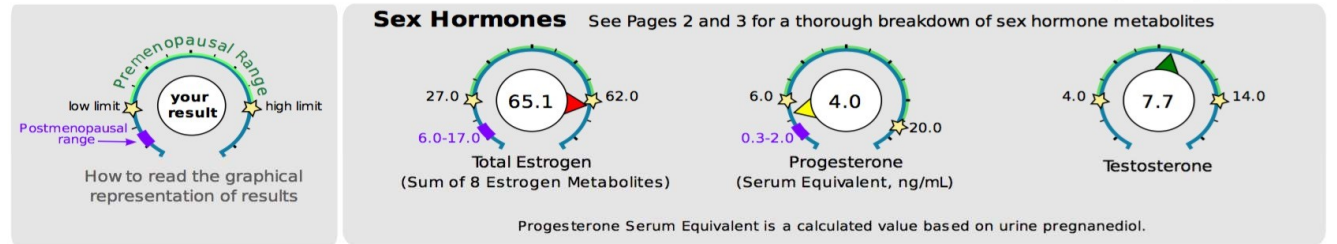
Ordering physician:
Precision Analytical

DOB: 1976-01-03
Age: 40
Gender: Female

Last Menstrual Period:
Collection Times:
2016-10-01 06:00AM
2016-10-01 08:00AM
2016-10-01 06:00PM
2016-10-01 10:00PM
2016-10-01 02:00AM

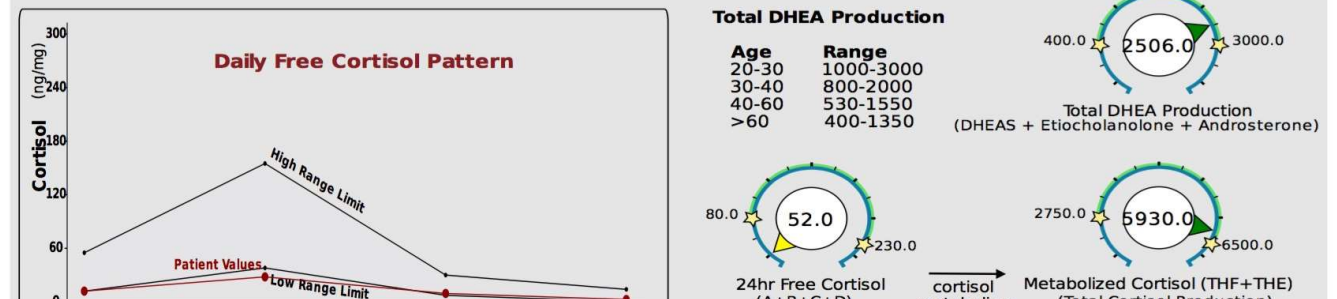
Hormone Testing Summary

All units are given in ng/mg creatinine



Adrenal Hormones

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

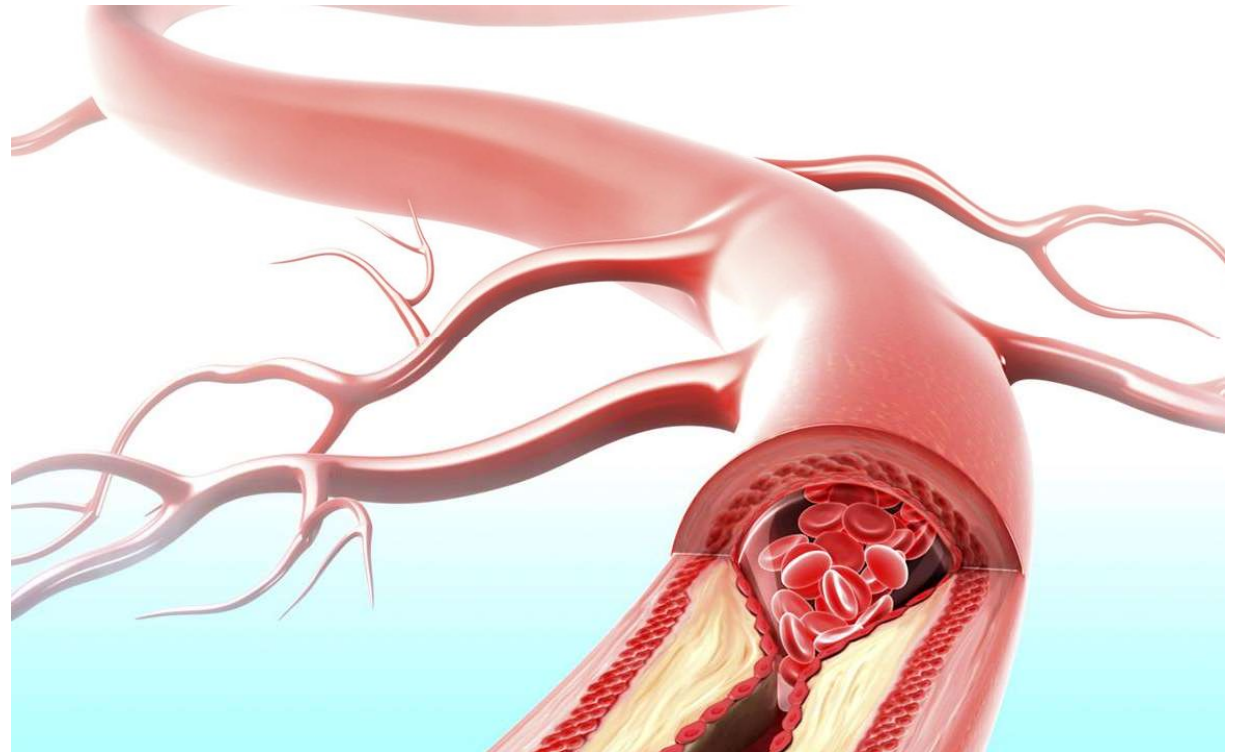


- Free cortisol (the majority of cortisol circulates bound to corticosteroid-binding globulin (CBG) and albumin. Normally, less than 5% of circulating cortisol is free (unbound). Only free cortisol can access the enzyme transporters in liver, kidney, and other tissues that mediate metabolic and excretory clearance)
- Free cortisone (a corticosteroid closely related to cortisol)
- Creatinine (a breakdown product of creatine)
- Tetrahydrocortisone, a-tetrahydrocortisol and b-tetrahydrocortisol (all metabolites of cortisol breakdown)

- DHEAs (the most abundant circulating steroids in humans)
- The progesterone metabolites a-pregnenediol and b-pregnenediol
- The androgen metabolites etiocholanolone, androsterone, testosterone, 5a-DHT 5a-androstenediol, 5b-androstenediol and epi-testosterone
- The estrogen metabolites estrone, estradiol, estriol, 2-OH-estrone, 4-OH-estrone, 16-OH-estrone, 2-Methoxyestrone and 2-OH-estradiol
- 6-OH-melatonin-sulfate (the major, active metabolite of melatonin)

#6: High Sensitivity C-Reactive Protein

- Inflammation, heart attack risk
- Eccentric exercise can affect results
- Ideal ranges 0.2 or below



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#7: Triglyceride to HDL Ratio



- All-cause mortality, heart disease, insulin resistance

Important trends:

- Triglycerides should ideally go down over time, while HDL should trend upwards
- HDL-Cholesterol ratio – Lower is better and usually indicates fewer atherosclerotic LDL particles. 0.24 or higher is ideal
- Triglyceride: HDL ratio – Lower is better and usually indicates larger LDL and fewer particles. Ideally, this ratio should be close to 1 or lower

#8: Full Lipid Panel with Omega 3's

- Cardiovascular risk, inflammation
- Total LDL particles < 1000 nmol/L
- Total small LDL particles < 600 nmol/L
 - LDL size > 21 nm
 - HDL size > 9 mmol/L
 - VLDL < 0.1 nmol/L



- Omega index = Omegaquant, Great Plains, Quest, WellnessFX, etc.
- The Omega-3 Index test is EPA and DHA in red blood cell membranes (for example, if you have 64 fatty acids in a cell membrane and 3 are EPA and DHA, then you would have an Omega-3 Index of 4.6)
- Index of 8% or higher is ideal (most are around 6% or below and in the US, most people are at 4% or below – the highest risk zone - translates to a 90% higher risk of sudden cardiac death!)
- Stearic-acid-to-oleic-acid ratio (non-alcoholic fatty liver disease, prostate cancer, colon cancer, gallbladder cancer. Ideal ranges 0.97 to 1.02.)

#9: IGF-1

- Cancer, weight, muscle-building, mortality
- Sweet spot longevity/performance between 80 and 150 ng/ml



#10: Insulin

- Cancer, weight, diabetes, mortality
- Below 5 IU/dL, but ideally below 3



#11: Complete Blood Count with Differential



- White blood cells (immune cells) and red blood cells (information carriers)
- WBC: a healthy functional range is between 5 and 8. Higher indicates a possible infection. Lower than that indicates a depressed or suppressed immune system
- Consistently high WBC counts = increased risk of death at an earlier age, particularly from cardiovascular disease
- Risk of cardiovascular mortality increases progressively with increasing WBC counts

- Increased risk of mortality associated with high WBC counts is maintained over 40 years of follow-up
- Neutrophils - 40-60%. Higher = viruses, autoimmunity or detoxification challenges.
- Lymphocytes - 25-40%. Higher = illness or chronic infection.
- Monocytes - 0-7%. Higher = liver dysfunction, prostate problems, or recovering from an infection (or Epstein Barr virus)
- Eosinophils - 0-3%. Higher = food sensitivities, environmental allergies, or parasites
- Basophils - 0-1%. Higher = histamine intolerance

- RBC's=hemoglobin, MCVVolume, MCHemoglobin, MCHemoglobin Concentration, RDistributionWidth, MPlateletVolume and PDistributionWidth
- Unusual red blood cell results can sometimes indicate dehydration
- For women, 4.2 - 5.4 million/mcL RBC
- For men, 4.7 - 6.1 million/mcL RBC
- For children 4.1 - 5.5 million/mcL RBC
- Low=anemia, high=erythrocytosis or polycythemia

#12: Iron



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- Hydroxyl radicals, inflammation
- Cancer, heart disease, diabetes, Alzheimer's, Parkinson's
- Typical reference range used by most laboratories for ferritin ranges from 200 to 300 ng/mL for women and men
- Actual ideal levels for adult men and non-menstruating women are between 30 and 60 ng/mL - Ideally you don't want to be below 20 ng/mL or above 80 ng/mL
- GGT also indicates excess free iron. Ideal levels are less than 16 U/L men, less than 9U/L women

Snack Break



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Food Allergies & Sensitivities

TEST	RESULT			
Array 4 – Gluten-Associated Cross-Reactive Foods and Foods Sensitivity **	IN RANGE (Normal)	EQUIVOCAL*	OUT OF RANGE	REFERENCE (ELISA Index)
GLUTEN-CONTAINING/GLUTEN-CONTAMINATED				
Rye, Barley, Spelt, Polish Wheat	0.81			0.4-1.4
Instant Coffee			2.70	0.3-1.9
GLIADIN CROSS-REACTIVE FOODS				
Cow's Milk	0.70			0.1-1.3
Alpha-Casein + Beta-Casein	0.57			0.1-1.7
Casomorphin		1.45		0.2-1.6
Milk Butyrophilin			1.90	0.2-1.8
Whey Protein	0.71			0.1-1.3
Milk Chocolate	0.86			0.1-1.4
Yeast			1.26	0.2-1.2
Oats			1.82	0.2-1.0
Millet			1.75	0.3-1.5
Rice			2.48	0.4-1.6
Corn			1.63	0.3-1.4
NEWLY-INTRODUCED AND/OR OVER-CONSUMED ON GLUTEN-FREE DIET				
Buckwheat			1.44	0.4-1.3
Sorghum		1.07		0.3-1.2
Hemp			1.93	0.3-1.5
Sesame			1.52	0.1-1.3
Amaranth			2.04	0.2-1.3
Quinoa		1.36		0.5-1.5
Tapioca			1.35	0.1-1.1
Teff			2.05	0.2-1.1
Potato			2.35	0.6-1.4
COMMON ANTIGENIC FOODS				
Egg, Raw + Cooked		1.57		0.2-1.7
Soy			2.02	0.5-1.5

** All analytes are tested for IgG and IgA combined.

* Reference ranges are calculated based on the mean ± 2 standard deviations (SD). Results > 1 SD, and < 2 SDs above the mean are considered to be equivocal. An equivocal result represents the range between negative and suspicious low positive results. Results > 2 SDs are considered out of range, and positive.

Mark G. Kartub, M.D., Medical Director

Cyrex Laboratories is certified under the Clinical Laboratory Improvement Amendments of 1988 ("CLIA") as qualified to perform high-complexity clinical testing. Test result data on its own does not constitute a diagnosis. Only a physician or qualified healthcare professional should interpret the significance of a clinical lab test or make a diagnosis. This test was developed and its performance characteristics determined by Cyrex Laboratories, LLC. The names and titles of tests and arrays are for reference purposes only.



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- Cyrex uses more advanced extraction and purification techniques to ensure that it assesses reactivity to the un-adulterated antigen, resulting in greater specificity.
- As foods contain different levels of protein, Cyrex technology uses specific protein concentrations for each antigen to ensure that optimum protein ratios are achieved to detect immune reactivity.
- They validate each food antigen individually, rather than applying one arbitrarily chosen reference curve to an entire group of different foods.
- They run each patient specimen in side-by-side duplicate. Correlation between the parallel tests must be met before reporting results.

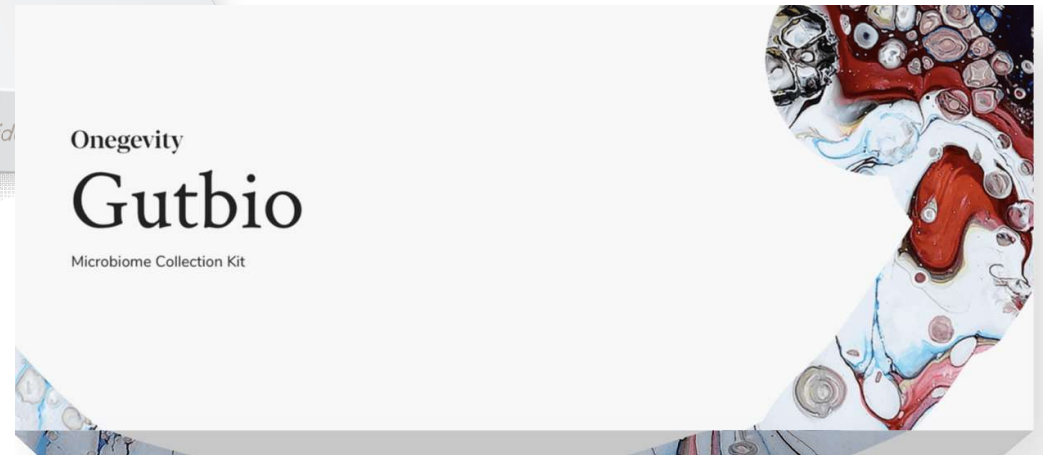
- Popular for doing food-sensitivity tests from companies like ALCAT and Metamatrix, which use enzyme-linked immunosorbent assay (ELISA) methodology, which tests allergies and sensitivities to a variety of common allergens, or an Antibody Assessment Panel that tests for IgG and IgA
- Eating food above 118°F changes its protein structure and therefore its antigenicity. Cyrex is testing for both raw and cooked forms of common foods on the same panel
- Cyrex tests for reactivity to cross-reactive antigens, such as food aquaporin and shrimp tropomyosin, which are known to cross-react with human tissues, as well as “pan-antigens” such as parvalbumin and latex hevein

- Rather than individual food proteins, Cyrex also tests for reactivity to common food combinations
- Many food products especially gluten-free products, use gums often as a substitute for gluten to hold ingredients together. Cyrex tests for reactivity to large gum molecules
- Binding isolates, such as plant-derived lectins and agglutinins, have an affinity for specific human tissues. Cyrex tests for reactivity to binding isolates
- Artificial food colors are small-molecule chemicals. Cyrex measures reactivity to these by assessing levels of antibodies to such chemicals bound to human tissue



- Oils once thought to be free of proteins do contain hidden proteins, called oleosins. Cyrex tests for reactivity to oleosins
- Meat glue is a combination of transglutaminase with other ingredients and is used to turn small pieces of meat into larger pieces of meat. So rather than testing for reactivity to meat alone, Cyrex tests for reactivity to meat glue as well
- Some patients produce more IgA than IgG, or vice-versa. By combining the two on one panel, Cyrex reduces the possibility of missing reactivity

Microbiome Testing for Food Allergies



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Microbiome

Onegevity

Overview

Results

Inflammation

Constipation

Diarrhea

Digestive Capability

Pathogens

Keystone Phyla

Probiotics

Community Breakdown

Personalized Recommendations

Diet

Supplement

Activity

Micronutrients

Our analysis of your gut bacteria reveals the types of food you currently digest best.

Never is it more true that “you are what you eat” than in your gut microbiome. Your diet is a primary driver of diversity in your gut microbiome. Different gut microbiota specialize in the digestion of different foods, so what you eat on a regular basis largely determines which microbiota live in your gut.

If you eat a diet rich in plant fiber, for instance, you’re likely to have high levels of Prevotella and other microbial species that thrive on fiber. If you consume a ketogenic diet, which tends to be low in plant fiber, those types of bacteria will be less common. It’s generally best to consume a diet that encourages microbial diversity. Doing so will enable you to efficiently digest many different types of food while lowering your risk of diseases related to a nondiverse gut microbiome.

Study, Clinical. Study Name: Here’s an example of the headline of the study, Lab Med 2018;49(2):123-129.

Print Results

Micronutrients

LowOptimal

LowOptimal

LowOptimal

LowOptimal

Improve your score

1

Review the 3 interventions recommended to improve your Irritation score.



- Decreased lactobacilli and increased *Staphylococcus aureus* are associated with egg and milk allergies
- Decreased levels of *L. rhamnosus*, *L. casei*, *L. paracasei*, and *Bifidobacterium adolescentis* are accompanied by allergies to cow's milk and egg whites
- Reduced bacteroides, proteobacteria, and actinobacteria are also associated with general food allergies and sensitivities

- A lack of microbiome diversity may also predispose humans to food intolerances such as gluten, FODMAP, and histamines
- Certain species of bacteria can assist in the breakdown of gluten proteins, and a lack of these could predispose to you to gluten intolerance
- Bacterial overgrowth of the small intestine is a common cause of FODMAP intolerance and can result when there is a deficit of good bacteria
- Histamine intolerance may occur when there is an overgrowth of bacteria that produce histamines or enzymes that interfere with the metabolism of histamine

Mold Toxicity



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- Many symptoms of food allergies or intolerances are actually brought on by mold and mycotoxin exposure.
- Quest Diagnostics LabCorp, etc. can measure c4a, TGF-beta-1, MSH, VIP, VEGF, MMP-9, and leptins, and these give a snapshot of how the immune system may have been impacted by mold toxicity.
- Markedly elevated levels of c4a, TGF-beta-1, MMP-9, and leptins and low levels of MSH, VIP, and VEGF all point in that direction.
- Cyrex has mold/mycotoxin panels too (Array 11 and 12)

Micronutrients



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All biomarkers reported in mmol/mol creatinine unless otherwise noted.

Malabsorption and Dysbiosis Markers

Malabsorption Markers		Reference Range
Indoleacetic Acid (IAA)	0.8	<= 4.2
Phenylacetic Acid (PAA)	0.06	<= 0.12

Bacterial Dysbiosis Markers

Dihydroxyphenylpropionic Acid (DHPPA)	0.2	<= 5.3
3-Hydroxyphenylacetic Acid	1.5	<= 8.1
4-Hydroxyphenylacetic Acid	8	<= 29
Benzoic Acid	0.03	<= 0.05
Hippuric Acid	141	<= 603

Yeast / Fungal Dysbiosis Markers

Arabinose	47	<= 96
Citramalic Acid	2.5	<= 5.8
Tartaric Acid	8	<= 15

Cellular Energy & Mitochondrial Metabolites

Carbohydrate Metabolism		Reference Range
Lactic Acid	7.4	1.9-19.8
Pyruvic Acid	34	7-32
β -OH-Butyric Acid (BHBA)	1.2	<= 2.8

Energy Metabolism

Citric Acid	333	40-520
Cis-Aconitic Acid	12	10-36
Isocitric Acid	39	22-65
α -Ketoglutaric Acid (AKG)	12	4-52
Succinic Acid	1.4	0.4-4.6
Malic Acid	1.1	<= 3.0
β -OH- β -Methylglutaric Acid (HMG)	6	<= 15

Fatty Acid Metabolism

Adipic Acid	0.9	<= 2.8
Suberic Acid	0.8	<= 2.1

Creatinine Concentration

Reference Range	
Creatinine *	9.5 3.1-19.5 mmol/L

The performance characteristics of all assays have been verified by Genova Diagnostics, Inc. Unless otherwise noted with *, the assay has not been cleared by the U.S. Food and Drug Administration.

Metabolic Analysis Markers

Neurotransmitter Metabolites

Reference Range	
Vanilmandelic Acid	1.7 0.4-3.6
Homovanillic Acid	2.4 1.2-5.3
5-OH-indoleacetic Acid	8.6 3.8-12.1
3-Methyl-4-OH-phenylglycol	0.09 0.02-0.22
Kynurenic Acid	1.4 <= 7.1
Quinolonic Acid	4.4 <= 9.1
Kynurenic / Quinolonic Ratio	0.32 >= 0.44

Vitamin Markers

Reference Range	
α -Ketoadipic Acid	0.5 <= 1.7
α -Ketoisovaleric Acid	0.43 <= 0.97
α -Ketoisocaproic Acid	0.61 <= 0.89
α -Keto- β -Methylvaleric Acid	1.1 <= 2.1
Formiminoglutamic Acid (FIGLU)	2.2 <= 1.5
Glutaric Acid	0.27 <= 0.51
Isovalerylglycine	1.6 <= 3.7
Methylmalonic Acid	0.8 <= 1.9
Xanthurenic Acid	0.41 <= 0.96
3-Hydroxypropionic Acid	9 5-22
3-Hydroxyisovaleric Acid	12 <= 29

Toxin & Detoxification Markers

Reference Range	
α -Ketophenylacetic Acid (from Styrene)	0.21 <= 0.46
α -Hydroxyisobutyric Acid (from MTBE)	4.5 <= 6.7
Orotic Acid	0.52 0.33-1.01
Pyroglutamic Acid	26 16-34

Tyrosine Metabolism

Reference Range	
Homogentisic Acid	8 <= 19
2-Hydroxyphenylacetic Acid	0.49 <= 0.76

Metabolic Analysis Reference Ranges are Age Specific



- Poor sleep, less-than-stellar workouts, brain fog, appetite cravings, sore joints, inability to lose weight, food cravings etc.
- Vitamins B1, B2, B3, B5, B6, B12
- Folic acid, vitamins A, E, D
- Beta-carotene
- Coenzyme Q10
- Amino acids
- Fatty acids
- Organic acids
- Lipid peroxides
- Homocysteine
- Compounds with yeast/fungal origins

Gut

31 Effects™ Comprehensive Profile - Stool

Interpretation At-a-Glance

INFECTION



INFLAMMATION

EPX ▲

Fecal secretory IgA ▲



INSUFFICIENCY



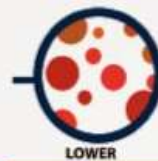
IMBALANCE



DIVERSITY ASSOCIATION



HIGHER



LOWER

RELATIVE ABUNDANCE



Verrucomicrobia Phylum
Fusobacteria Phylum
Euryarchaeota Phylum
Proteobacteria Phylum
Actinobacteria Phylum
Firmicutes Phylum
Bacteroidetes Phylum



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Genes



RS#	Call	Risk Allele	Gene	Variation	Result
rs1051266	CC	T	SLC19a1	G80A	-/-
rs2236225	AA	A	MTHFD1	G1958A	+/+
rs1801131	GT	G	MTHFR	A1298C	+/-
rs1801133	AG	A	MTHFR	C677T	+/-
rs1801394	AG	G	MTRR	A66G	+/-
rs1532268	CT	T	MTRR	C524T	+/-
rs72558181	CC	T	MAT1A	R264H	-/-
rs28934891	CC	T	CBS	D444N	-/-
rs4920037	GG	A	CBS	C19150T	-/-

-/- = not present; +/- = one mutation; ++ = double mutation; +/+* = mutation on the X chromosome in a male.

Predicted NAT2 acetylator phenotype with probability estimate: **SLOW (0.997182)**

- Carb/fat response
- Detox ability
- Anti-oxidant capacity
- Muscle fiber composition
- Endurance vs. power responder
- Caffeine metabolism
- Disease risk
- Lactose intolerance
- Celiac predisposition
- Vitamin D needs
- Warrior vs. worrier (neurotransmitters)
- Ancestry

- DNAFit
- 23andMe
- 23andYou
- Stratagene
- Genetic Genie
- Promethease
- TreeOfLife
- The DNA Company

Blood Glucose

- Within two hours after a meal such as a large breakfast, lunch or dinner, levels should be less than 140 mg/dl. 120/mg/dl or lower even better.
- Healthy fasting blood sugar 70–99 mg/dl (caveat for low-carb dieters)
- Dexcom G6 gold standard

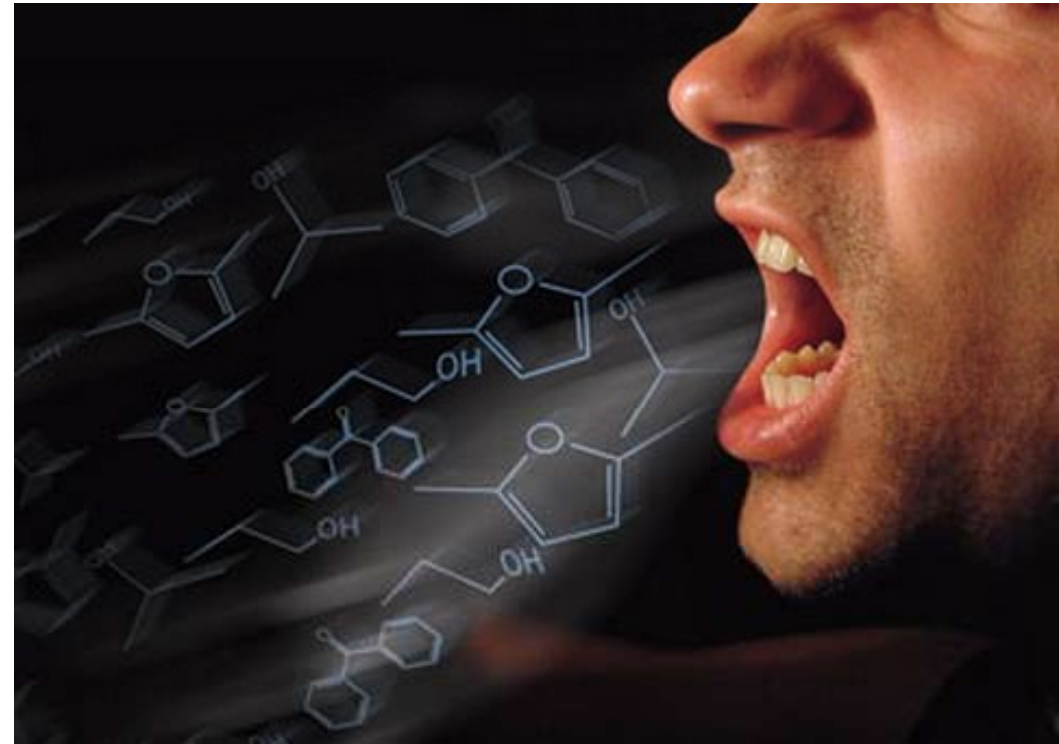


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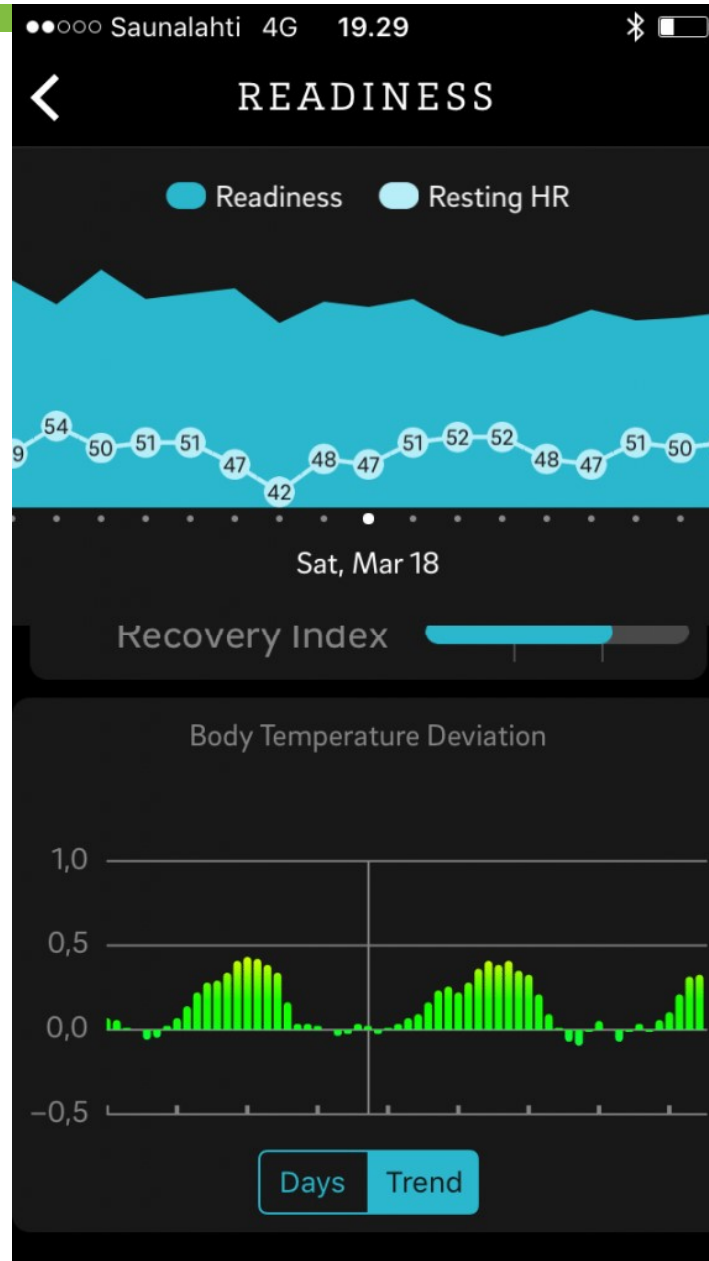
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Ketones

- Breath vs. blood vs. urine
- Urine=acetoacetate (urine strips)
- Breath=acetone (Ketonix, Keyto, LEVL)
- Blood=BHB (optimum 0.5-3.0 mmol)



HRV & Readiness



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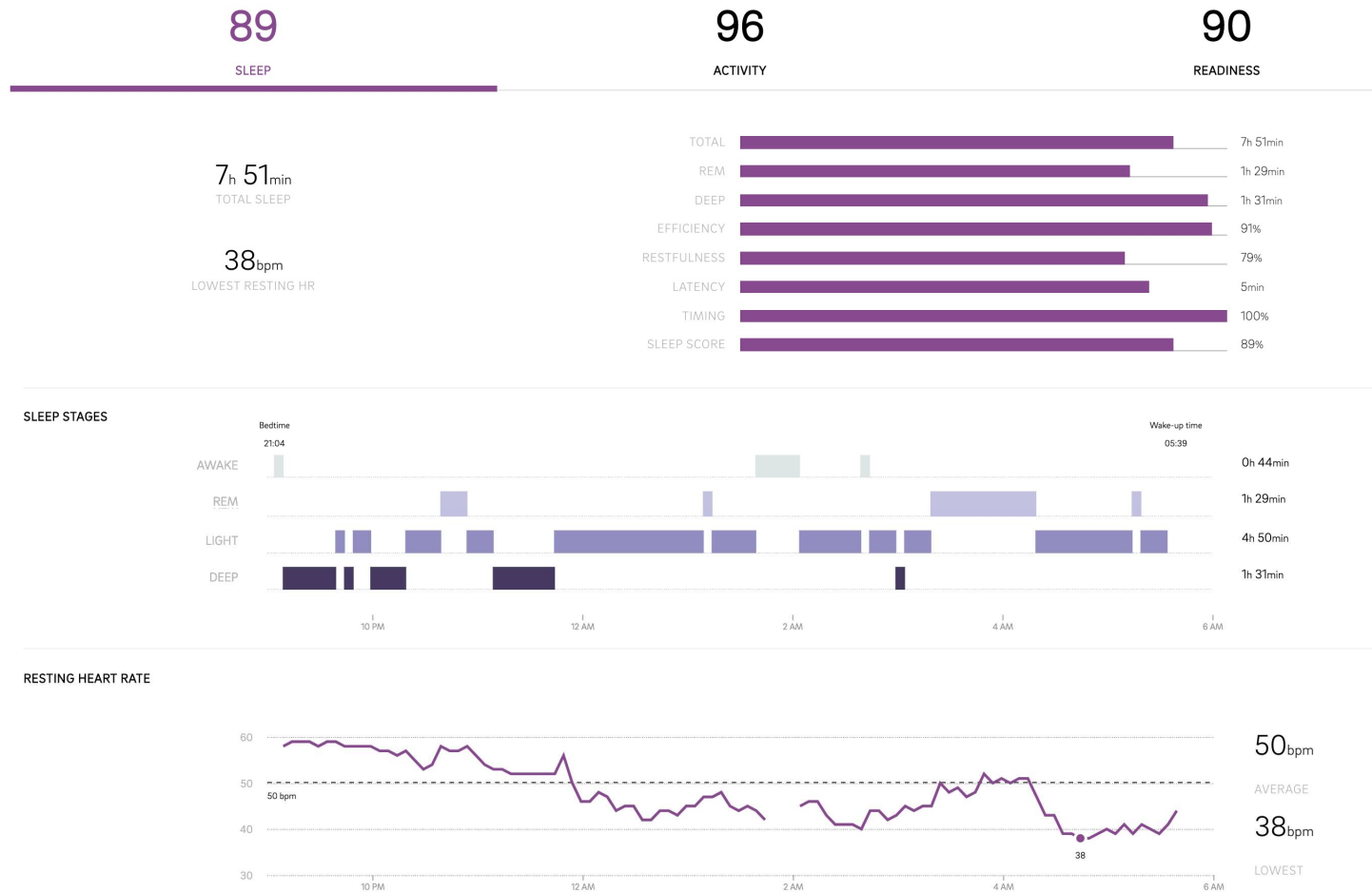
- Previous Night's Sleep
- Sleep Balance
- Previous Day's Activity
- Activity Balance
- Body Temperature
- Resting Heart Rate (RHR)
- Recovery Index
- Heart Rate Variability (HRV)

Sleep

- Total Sleep
- Efficiency
- Disturbances
- REM Sleep
- Deep Sleep
- Sleep Latency
- Sleep Timing



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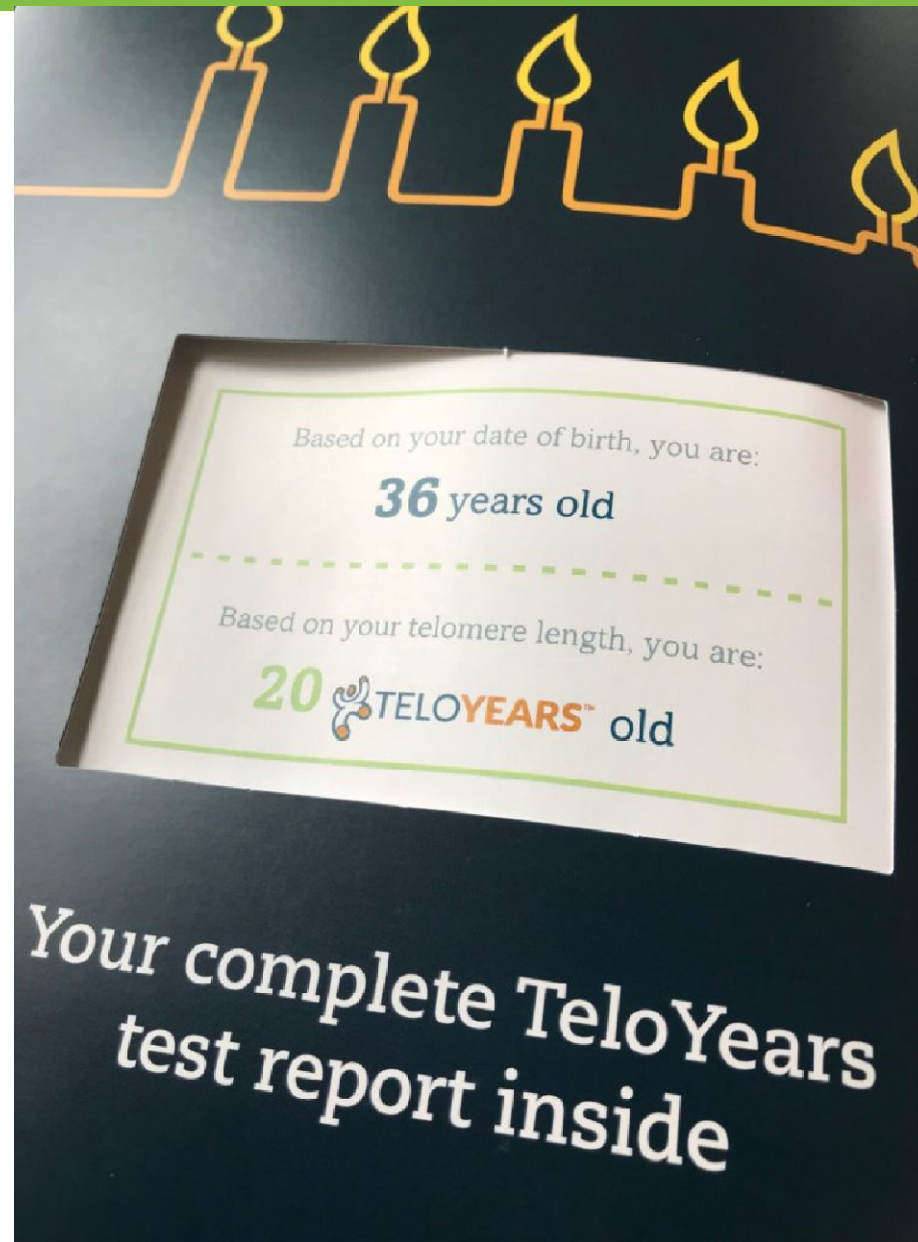


Telomeres

- TeloYears
- RepeatDx
- Lifelength
- Osiris Green
(epigenetic alterations
in DNA over time)



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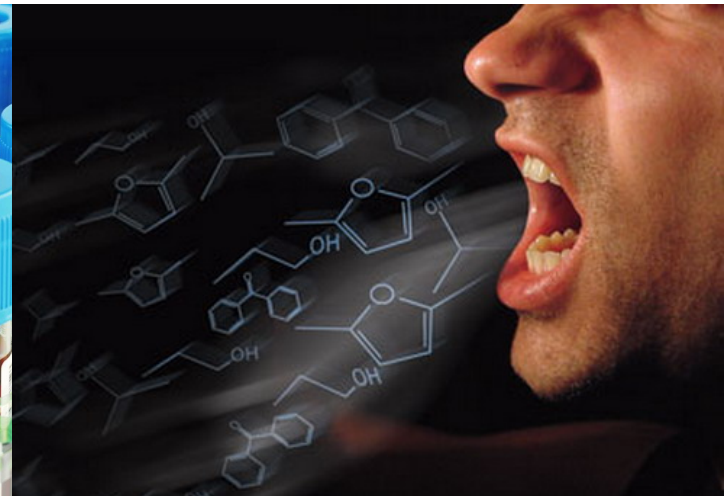


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Keeping Track Of It All

- Headsuphealth
- Human.os
- Apple Health
- Onegevity
- TrainingPeaks
- Dropbox





Q&A

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