

Biomarkers and Objective Measures -- practical, at a reasonable cost

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www.AgingIntervention.org/1_BiomarkerPersonalPracticalBasicList.pdf

Last updated May 24 2019. Constantly improved. Check for updates.

These are common biomarkers and objective measures I use. They may vary depending on the therapy.

I have found these to be practical and reasonably priced for my own self-directed age management program and for the use of others.

This list is not perfect. I don't claim to know it all, or even very much.

CONTACT ME with your improvements and any corrections.

Friendly disclaimer: It's not my intention to provide specific medical advice but rather to provide others with information to better understand their health. This is not medical advice including diagnosis and treatment. Always seek the advice of a trained health professional for medical advice, diagnosis or treatment.

A rather large, not particularly well organized biomarker list collected over the years is also at www.aginginterventionfoundation.org/1_BiomarkersOfAgingAndHealthMeasures_AllInfo.pdf

End Results We Are Seeking

Most of us are looking to maintain or enhance these end results – and to have them last a very long time:

- **Mobility – ability to easily move around in, and interact with, our environment**
- **Mental function – clarity of thought, problem solving, productivity**
- **Subjective feeling of well-being, enjoyment, fulfillment, feeling that life is meaningful, and engagement with life**
- **Freedom from discomfort and pain**

You could drill down to others, like strength, balance, sensory etc., but most affect the above. There are sophisticated systems to quantify physical, mental, emotional, social functioning and other domains.

Reason for Biomarkers and Objective Measures

***** YOU CAN'T MANAGE WHAT YOU DON'T MEASURE *****

We hope an aging therapy will make us feel younger, but may not subjectively experience the effect of an age management therapy. Biomarkers and objective measures are useful indicators of the end results we seek, and how long we might expect them into the future.

We will generally have objective measures done before an aging intervention therapy, and at some time interval after – and are looking for a shift to a more youthful value. Some measures actually render a biological age. Or we might look for lower LDL cholesterol, or decreased inflammation.

List of categories of tests I believe are most important.

May vary depending on therapy.

- **Safety – That’s MOST important. Your physician can best determine what to measure. Liver, kidney, blood, lipids, cerebrovascular are considered at the top. Many measures are included in . . .**
- **Chemistry Panel & Complete Blood Count (CBC)**
- **DNA methylation (DNAm)**
- **Inflammation**
- **Spreadsheet for calculating phenotypic age (apparent biological age as implied by blood variables) and other measures from CBC and CRP. Details below.**
- **Mental / Cognitive**
- **Physiological – grip strength, measures of stamina etc.**
- **Subjective / self assessment**

Worth consideration, require expert interpretation:

- **Immune**
- **Endocrine**

Others are below

There are comprehensive biomarker systems consisting of a great number of tests. With increased complexity, questions and problems can arise, like

- The logistics of doing a large number of tests.
- Costs of a large number of tests. Costs add up.
- Will the phlebotomy lab or mobile phlebotomist be able to handle it?
- What is the published – and real – error of the tests? (I’ve seen 50% error between replicates from an advanced state-of-the-art lab)
 - o Will you need to do replicates (2 or 3) or multiple days to get desired accuracy?
- Will the test be available in the future?
- Do you get expert interpretation of the tests?
 - o Will interpretation, or the same interpretation, be available in the future?
- Will the test change in the future, making for difficult comparisons? One example is reliance on Illumina chips, which have had upgrades resulting in modifying or upgrading the panel so apples to oranges comparisons.
- Be prepared to have to deal with managing the data.

- Consider the practicality of sophisticated online systems
- Will data management systems be available in the future?
 - Will costs increase, will the design change, how will that affect interpretation

If you have complex testing, also having standard, simple lab tests done for ongoing comparison over the years might be a good idea.

Types – from James Kirkland MD PhD presentation at IAGG/GSA conference 2017

Dosing and pharmacokinetics biomarkers

Pharmacodynamic biomarkers

Mechanism biomarkers

Surrogate endpoint biomarkers

Life Extension (LEF) blood tests – doctor’s order not needed, probably not covered by insurance (but you can try).

www.lifeextension.com/Vitamins-Supplements/Blood-Tests/Blood-Tests 1-800-678-8989

I list them because I have found them easy to use with very good customer support. Others experience varies.

They have a new aging panel to be released soon.

Others:

HealthLabs <https://www.healthlabs.com>

WellnessFX www.wellnessfx.com

LabsMD www.labsmd.com

Kiosk Labs www.koslabs.net

Walk In Lab NOTE: I had a problem clicking on this. You may have to type it in your browser.

www.walkinlab.com

Google around for others.

The main lab I most rely on is LabCorp. My circle of associates standardizes on LabCorp. Quest is also top tier. They’re similar, but methods, reference ranges etc. are different and not exactly comparable, so suggest standardizing on LabCorp.

Age Management Blood Test Panel

www.lifeextension.com/INE801E

HealthLabs CBC+CMP+UA+LP+TSH

<https://www.healthlabs.com/standard-health-testing-panel-cbc-cmp-ua-lp>

Some categories and a few details

SAFETY -- By far the most important.

Like liver, kidney, blood, lipids, cerebrovascular, and others.

Chemistry Panel & Complete Blood Count (CBC) covers some of these. Discuss with your doctor.

Suggested Safety Panel (Dec 2015) – Yours may differ. Follow your doctor's recommendations.

Comprehensive Metabolic Panel (CMP)

Kidney functions

- Albumin
- Calcium total
- Chloride
- Carbon dioxide
- Creatinine
- Glucose
- Potassium
- Sodium

Liver functions

- Alkaline phosphatase (ALP)
- Alanine Aminotransferase (ALT)
- Aspartate Aminotransferase (AST)
- Bilirubin total
- Protein total

Complete Blood Count (CBC) with Auto Differential WBC

Red blood cells (RBC)

- Hematocrit (HCT)
- Hemoglobin (HGB,Hgb)
- Mean Corpuscular Hemoglobin Concentration (MCHC)
- Mean Corpuscular Hemoglobin (MCH)
- Mean Corpuscular Volume (MCV)

- Platelets (PLT)

White blood cells (WBC)

- Basophils
- Eosinophils
- Lymphocytes
- Monocytes
- Neutrophils (ANC)

Inflammation

High sensitivity C-reactive protein (hsCRP)

Lipid Panel

- Cholesterol
- High density lipoprotein (HDL)
- Low density lipoprotein (LDL)

Muscle function (damage)

Creatine Kinase (CK) also known as creatine phosphokinase(CPK)

Misc

Hemoglobin A1c (HbA1c) (glycated hemoglobin)

Chemistry Panel & Complete Blood Count (CBC)

A basic test for any therapy

From LEF – doctor’s order not required <https://www.lifeextension.com/Vitamins-Supplements/itemLC381822/Chemistry-Panel-Complete-Blood-Count-CBC-Blood-Test>

Description from the web site: A comprehensive metabolic panel (CMP) is a blood test that measures your sugar level, electrolyte and fluid balance, plus kidney and liver function. Our CBC/chemistry profile also includes a lipid panel and complete blood count (CBC) so you have the opportunity to detect signs of heart disease, anemia, clotting, and immune disorders, as well as metabolic conditions that could threaten your health.

LEF instructions say

This test may be done fasting (note from Johnny: that’s about 12 hr) or 2-6 hours after eating.

Both ways provide valuable information, though 2-6 hours after a meal provides a more realistic assessment of the state of your blood in everyday life. Stay hydrated and take your medications as prescribed.

From LabCorp directly – with doctor’s order, insurance may cover TEST 005009 CPT:

85025 <https://www.labcorp.com/test-menu/23041/complete-blood-count-cbc-with-differential>

Description from the web site: To determine your general health status; to screen for, diagnose, or monitor any one of a variety of diseases and conditions that affect blood cells, such as anemia, infection, inflammation, bleeding disorder or cancer.

DNA METHYLATION AGE / EPIGENETIC CLOCK

I rely on Zymo Research.

There’s also Osiris Green, Steve Horvaths lab, Cygenia, MD Anderson, Malav at Nova Southwestern, Willard Freedman’s “Targeted DNA Methylation & Mitochondrial Heteroplasmy Core” at the University of Oklahoma Health Sciences Center

INFLAMMATION – an effect and cause of aging

Note: Chronic measures of inflammation are highly important.

As of 11/24/18 CRP, IL-6, TNF-alpha are beginning to be considered somewhat transient measures, and questions raised as to their validity as chronic measures.

Research is being conducted into whether measures like

CXCL9 (Chemokine (C-X-C motif) ligand 9) = MIG (Monokine induced by gamma interferon), TRAIL, IFNG (Interferon gamma), EOTAXIN, GROA and some others are better long term measures, and how they can be measured.

Stay tuned.

C-Reactive Protein (CRP) – has been considered the most useful and reliable measure of inflammation

Fibrinogen

RANTES (T-Cell Specific Protein)

TNF-alpha

IL-6 Do IL-6 measurements in the morning as there's a trough in the morning, peak in the afternoon.

One expert advised: FYI for anyone considering doing an IL-6 test for this purpose it would be best to not do any exercise for 1-2 days prior to taking the test to make the results are more reliable and comparable. This is because IL-6 is a myokine that is released from muscles into the blood circulation in response to exercise so if you exercised not long ago it's possible that IL-6 levels in the blood are still elevated in response to the exercise. I'm not sure how long it is elevated but it would depend on the half-life of IL-6 and the intensity and length of the exercise. 1-2 days of no exercise prior to the test would probably be sufficient for accurate results.

Other advanced

Haptoglobin

IL-10, IL-17, TNF tumor necrosis factor

Cystatin?

Top level inflammation biomarkers: Myriad RBM InflammationMAP

And do complete blood test and metabolic panel

Note: Myriad is state-of-the-art, but some of these can have high variations. Replicates are suggested.

www.myriadrbm.com/products-services/humanmap-services/inflammationmap

Others

www.myriadrbm.com/products-services/humanmap-services

Some "basic" inflammation biomarkers on a budget

C-Reactive Protein

LEF Item# LC120766: <https://www.lifeextension.com/Vitamins-Supplements/itemLC120766/C-Reactive-Protein-CRP-Cardiac-Blood-Test>

Labcorp directly: TEST: 120766 CPT: 86141 <https://www.labcorp.com/test-menu/23381/c-reactive-protein-crp-high-sensitivity-cardiac-risk-assessment>

Tumor Necrosis Factor alpha (TNF- α)

LEF LC140673: www.lifeextension.com/Vitamins-Supplements/itemLC140673/Tumor-Necrosis-Factor-Blood-Test

Labcorp directly: TEST: 140673 CPT: 83520 www.labcorp.com/test-menu/36231/tumor-necrosis-factor-%CE%B1

Fibrinogen

LEF LC001610: <http://www.lifeextension.com/Vitamins-Supplements/itemLC001610/Fibrinogen-Activity-Blood-Test>

Labcorp directly: Fibrinogen Activity TEST: 001610 CPT: 85384 <https://www.labcorp.com/test-menu/25316/fibrinogen-activity>

IL-6/IGF-1 LEF: Item# LC375046

<http://www.lifeextension.com/Vitamins-Supplements/itemLC375046/IL-6-IGF-1-Blood-Test>
Not available through LabCorp directly(?)

Interleukin 6 (IL-6) LEF Item# LC140916

<http://www.lifeextension.com/Vitamins-Supplements/itemLC140916/Interleukin-6-IL6-Blood-Test>

Labcorp: Interleukin-6, Serum 140916 CPT: 83520

<https://www.labcorp.com/test-menu/29791/interleukin-6-serum>

Haptoglobin Special order through Life Extension

LabCorp direct Haptoglobin

TEST: 001628 CPT: 83010

<https://www.labcorp.com/test-menu/26926/haptoglobin>

Just found, **considering – checking whether the reports have exact values, Myriad InflammationMap has reference range as “<XX”**

Cytokine Panel LCCYT

www.lifeextension.com/Vitamins-Supplements/itemLCCYT/Cytokine-Panel-Blood-Test

LEF site www.lifeextension.com/Magazine/2003/5/report_inflam/Page-01

SPREADSHEET FOR CALCULATING PHENOTYPIC AGE (APPARENT BIOLOGICAL AGE AS IMPLIED BY BLOOD VARIABLES) AND OTHER MEASURES.

A highly useful spreadsheet that uses measures from inexpensive and easy to obtain blood tests to calculate phenotypic age (apparent biological age as implied by blood variables) and other measures.

You can download it here -- includes some background information and enhancements I put in.

https://www.AgingIntervention.org/DNAmpHenoAge_gen_Enhanced.xlsx

It was developed by John Cramer from a Levine Paper:

<https://www.ncbi.nlm.nih.gov/pubmed/29676998>

Download the original spreadsheet directly from John's dropbox

Note: click the download link on the upper right.

I suspect there will be upgrades.

https://www.dropbox.com/s/8wj94be28lt9k7q/DNAmpHenoAge_gen.xls?dl=0

Values:

LinComb = linear combination of variables times weights that it the final input that generates the mortality scores and ages.

MortScore = Mortality Score (probability of death in the next ten years)

Ptypic Age = Phenotypic Age, i.e., your apparent biological age as implied by your blood variables.

est. DNAm Age = apparent DNA methylation age
est. D MScore = revised estimate of probability of death in 10 years, based on the estimated DNAm age.

MENTAL / COGNITIVE

Note: Experts advise cognitive tests can be terribly misleading because practice effects will give a “blizzard of false positive results”.

One expert with very good experience in it has advised that with loss of cognitive function we lose our ability to learn with practice.

Trailmaking B (and A)

It can be downloaded here (it's a powerpoint):

<https://www.AgingIntervention.org/TrailMakingAandB.PPT>

Info <https://www.sciencedirect.com/science/article/pii/S0887617703000398>

* Be aware some of the B tests you can find to download (typically the numbers and letters are in a box) are missing number 13.

After an innovative intervention one acquaintance had a pronounced improvement in Trailmaking B results. Upon retesting over a period of time (after no treatment) it went back, almost to baseline. Then within an hour after re-treatment a pronounced improvement in Trailmaking B – suggesting it had to do more with signaling than rebuilding neurons.

If any member would be interested in locating a version of the Trailmaking B test that varies the position of the numbers or letters – or a programming whiz would create an online version that places the numbers and letters in random positions – please proceed and keep us informed.

Reaction time, number memory, verbal memory, visual memory

Human Benchmark www.humanbenchmark.com

New digit-span measurement page that can enable visitors to check the earliest cognitive changes at the very start of the 20-year pathway toward age-associated cognitive decline, MCI and Alzheimer's:

Digitspan Online Measurement www.HealthspanStudy.com/digitspan

Useful: Biomarkers of Alzheimers, see Early Indicators of Alzheimer's Disease
www.maxwellbiosciences.com/articles/research/biomarkers-alzheimers-disease

background on the central importance of digit-span data:

<https://www.ncbi.nlm.nih.gov/pubmed/?term=wrap+blsa+digit+span>

Worth considering

<http://www.memtrax.com> \$4.99/mo \$48/yr Try it once for free

Along with these measurement pages, web pages currently used for the 2002-2018 Wild Blueberry Health Study will also be available to participants in the Microbiome SIG.
<http://www.blueberrystudy.com>

PHYSIOLOGICAL/PERFORMANCE/STAMINA

Basic

- Body weight
- Temperature
- Blood pressure
- Body Mass Index (BMI)
- Heart rate variability
- Grip strength
- Sit in chair -- number of times can stand up and sit down
- Number of push ups can do
- How long can stand on one leg with arms held to the side (hopefully >20 sec)
- Reaction time www.humanbenchmark.com/tests/reactiontime
- How many times subject can lift a weight from the ground to above head in a circular motion.
- Walking speed / gait speed
 - 4 meters, walking normally, how many meters/sec
 - or
 - 400 meters, walking normally, how many meters/sec at 0 and each 100 meter mark (measuring slow down)
 - or
 - How much ground you can cover in a minute, or 6 minutes

Rowing machine -- Concept 2 or other with digital readout. (benefit is that it's working all muscles)

Ten pulls on the rowing machine -- measure calories (per hour), peak power, maybe watt output or other.

This depends on what machine in that lab is set up to do.

Stair ascending test (SAT)

Example: At start of trial and appropriate number of days after therapy (one senolytics test used 21 days). Subjects warm up, rest 5 min, then climb 180 steps at a rate of 2 steps per second.

Measure blood pressure before, 10 minutes and 20 minutes post-exercise. Look for reductions in post-exercise blood pressure resulting from therapy.

After warming up with fast walking for 10 min, measure how much ground you can cover in 20 sec on an about a 15-20 degree upward hill.

Pulse Oximeter

iHeart -- includes pulse oximeter, calculates "internal age" from aortic pulse wave velocity
Measures bpm (pulse rate), SpO2 (blood oxygen level), AoPWV (aortic pulse wave velocity).

<https://goiheart.com/faqs>

www.concordhealthsupply.com/iHeart-Your-Internal-Age-p/75007.htm
www.concordhealthsupply.com/Articles.asp?ID=261

Ketones

KETO-MOJO Blood Ketone and Glucose Testing Kit

Monitors ketones, glucose, hematocrit, hemoglobin

<https://keto-mojo.com/pages/glucose-ketone-index-gki>

<https://keto-mojo.com/products/ketone-glucose-meter-basic-starter-kit>

The next are measures of stamina. Consistency from test to test is important. This may be individualized depending on one's available equipment, whether a track is available, and inclination.

There's an element of subjectivity involved, but I suggest you know when you "really want to stop" so for your consideration.

Examples

- Time walking as fast as possible until you *really* want to stop
(somewhat subjective, but useful and fairly accurate)

and/or

- Time on a treadmill at a fast speed and incline until you *really* want to stop

- **BE CAREFUL NOT TO FALL WITH THIS ONE:** Running on treadmill with 4% incline at 5 mph, how long until you feel a need to grab rails –

Evaluates how old a person looks from uploaded photo.

Might be useful but I haven't evaluated it.

www.how-old.net

Info: www.lifewire.com/website-that-can-guess-your-age-3486143

- Quality of Life self evaluation

Daily or Weekly, rate from -10 to +10.

0 is neutral, plus or negative numbers indicate better or worse than neutral.

Overall health

Peacefulness

Sharpness

Energy

Mood

Sleep quality

Aches and pains

Total for Score

Weekly

List anything new, like change to routine, exercise, foods, medicines, supplements etc this week

Worth considering but I don't do these now

- Variability of blood cells (and mortality)

- Visual contrast sensitivity (eyes and olfactors are extension of the brain)

- FEV1 -- forced air velocity, although this takes a long time to change. (takes long time before you can see changes)
- Is this energy production?-->Resting Metabolic Rate www.bodyspec.com/what-is-rmr
- VO2 max testing www.bodyspec.com/what-is-vo2
- lean body mass, total body fat, visceral adipose tissue, and bone density
DEXA scan www.bodyspec.com/what-is-dxa (takes 2 yr before you can see changes)

Various other assessment batteries are available

H-Scan

InSilico Medicine www.aging.ai Is this ready for prime time?

www.aging.ai

HRV – Heart Rate Variability

CorSense finger sensor (better than Polar sensor strap)

Software:

EliteHRV software – cell phone, download from Android PlayStore or iPhone App Store

Cystatin C – kidney, and general measure of youthfulness

SENESCENT CELL MEASUREMENT

I worked with some high level scientists at a university lab to develop an innovative senescent cell test for before and after senolytics therapy. It measures gene activity by isolating RNA. It determines the differential expression of a panel of senescence associated genes in human PBMCs (peripheral blood mononuclear cells) before and after administering senolytic drugs. We're evaluating it now, used it in our small D+Q test. More later. As of Oct 2018 our group is using this in a senolytics small study.

Here's a selection of LabCorp tests (available through Life Extension) for a relatively simple and low cost measurement of before and after senolytics results collected by our senior scientist friend Bryant Villaponteau. Note: this was created specifically for his product Senex, and may be useful for other senolytics.

Description	Tests For
C-Reactive Protein (CRP)	Inflammation
Carbohydrate antigen 19.9	Aberrant Cells
Carcinoembryonic antigen	Aberrant Cells
Fasting Glucose	Energy Metabolism
Hemoglobin A1C	Glycation
Interleukin 6 (IL6)	Inflammation
Insulin-Like Growth Factor 1	Growth & Repair
Insulin	Energy Metabolism

C-Reactive Protein (CRP)

<https://www.lifeextension.com/Vitamins-Supplements/itemLC120766/C-Reactive-Protein-CRP-Cardiac-Blood-Test>

Carbohydrate antigen 19.9

www.lifeextension.com/Vitamins-Supplements/itemLC002261/Carbohydrate-Antigen-199-Blood-Test

Carcinoembryonic antigen

www.lifeextension.com/Vitamins-Supplements/itemLC002139/Carcinoembryonic-Antigen-CEA-Blood-Test

Tumor Necrosis Factor-alpha

www.lifeextension.com/Vitamins-Supplements/itemLC140673/Tumor-Necrosis-Factor-Blood-Test

Hemoglobin A1C (HbA1C)

<https://www.lifeextension.com/Vitamins-Supplements/itemLC001453/Hemoglobin-A1C-HbA1C-Blood-Test>

Fasting Glucose AND Insulin (combined in one test)

<https://www.lifeextension.com/Vitamins-Supplements/itemLC302186/Fasting-Glucose-and-Insulin-Blood-Test>

Interleukin 6 (IL6) AND Y Insulin-Like Growth Factor 1 (combined in one test)

<https://www.lifeextension.com/Vitamins-Supplements/itemLC375046/IL-6-IGF-1-Blood-Test>

IMMUNE

My circle of associates and I are seeking immune testing with interpretation from the Advanced sources below.

Note: Trying to be our own immunologist or relying on a physician who is not highly skilled in immunology can be a problem, in that we might miss something as basic as evaluating whether a pneumonia vaccination is needed.

If going to use the Stanford HIMC, then would becoming the patient of a Stanford immunologist be advised?

Advanced

We all need comprehensive testing with expert interpretation, standard for our group. UCLA Immune Assessment Core is upgrading its panel to include more age related measures, starting with TEMRA, and naïve memory cells or naïve T cells.

www.pathology.ucla.edu/iac

www.pathology.ucla.edu/iac-services

Stanford HIMC <http://iti.stanford.edu/himc.html>

Stanford Immunological Center

<http://iti.stanford.edu/human-systems-immunology-center.html>

Quantrex

National Jewish Labs www.NJLabs.org

A major initiative is underway to develop markers as a fee for service. Details later.

CD4/CD8 ratio

Senescent T cells

Produce naïve T cell (production)

Primary NK cells

T cells
B cells

Streptococcus pneumoniae Antibody IgG 23 Serotypes lab test

Seems best to evaluate the immune systems ability to mount a defense after a pneumonia inoculation.

IgA, IgG, IgE, IgM
Lymphocyte subset panel 5-quest
CBC with adiff blood, comprehensive metabolic panel

NLR, LMR, PMR

Most of the studies are done on patients with diseases.

I would look forward to hearing from you about your experience using NLR, LMR and PLR.
neutrophil to lymphocyte ratio (NLR)

NLR, LMR, PMR and age. See table 2

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6039688/>

Individuals aged 18 to 50 years had significantly lower NLR (p=0.019) and PLR (p<0.05) than older individuals aged 51 to 85 years.

www.omicsonline.org/open-access/reference-values-of-neutrophillymphocyte-ratio-plateletlymphocyte-ratio-and-mean-platelet-volume-in-healthy-adults-in-north-centra-.php?aid=68492

For cancer patients this study suggests that the survival advantage is in part due to having a low NLR.

www.nature.com/articles/s41598-018-22425-3

lymphocyte to monocyte ratio (LMR) – Is higher better (unless out of range)? >5 is good

platelet to lymphocyte ratio (PLR)

In this study lower PLR associated with younger subjects (and higher in males than females)

<https://www.omicsonline.org/open-access/reference-values-of-neutrophillymphocyte-ratio-plateletlymphocyte-ratio-and-mean-platelet-volume-in-healthy-adults-in-north-centra-.php>

Also mean platelet volume (MPV) – not on LabCorp, but said to be part of standard CBC.

These LEF/LabCorp are useful but not comprehensive.

LC096925 T-Lymphocyte Helper/Suppressor Profile (has CD4, CD8 and ratio)

www.lifeextension.com/Vitamins-Supplements/itemLC096925/T-Lymphocyte-Helper-Suppressor-Profile-Blood-Test

LC505016 Natural Killer Cell Surface Antigen (CD3-CD56+ Marker Analysis)

www.lifeextension.com/Vitamins-Supplements/itemLC505016/Natural-Killer-Cell-Surface-Antigen-CD3-CD56-Marker-Analysis-Blood-Test

What else?

HORMONE / ENDOCRINE

hGH

Testosterone

Free T4

Cortisol

TSH

Prolactin

FSH

Leutenizing Hormone

ACTH, Plasma

IGF I, Lc/Ms

 Z Score (Male

Others?

LEF/LabCorp Male/Female panels can be useful

[http://www.lifeextension.com/Search#q=male%20panel&sort=relevancy&f:hierarchicalcategory=\[Products\]](http://www.lifeextension.com/Search#q=male%20panel&sort=relevancy&f:hierarchicalcategory=[Products])

[http://www.lifeextension.com/Search#q=female%20panel&sort=relevancy&f:hierarchicalcategory=\[Products\]](http://www.lifeextension.com/Search#q=female%20panel&sort=relevancy&f:hierarchicalcategory=[Products])

SELF ADMINISTERED HEALTH EVALUATIONS

Normally we don't like subjective measures, but how we feel (even placebo) can be useful – or may even be the most important. *“If it's placebo – I'll take it!”*

Medical Outcomes Study Questionnaire Short Form 36

Health Survey (SF-36)

https://www.brandeis.edu/roybal/docs/SF-36_website_PDF.pdf

https://www.rand.org/health/surveys_tools/mos/36-item-short-form.html

Credit to Rolf Martin for these healthspanstudies@gmail.com

Do it yourself

Daily

Quality of Life rate from -10 to +10

Overall health

Peacefulness

Sharpness

Energy

Mood

Sleep quality

Aches and pains

Score (total of the above, or apply weights to each according to what's important to you)

Weekly

List anything new, like observations, changes to routine, exercise, foods, medicines, supplements etc this week

www.HealthspanStudy.com/HowAreYouToday

www.HealthspanStudy.com/MyDiary

www.HealthspanStudy.com/DietSurvey

TELOMERES

www.LifeLength.com

Worth considering, less extensive www.TeloYears.com

The following may be too specialized and expensive:

MICROBIOME – our Microbiome Special Interest Group is researching this uBiome

Second Genome – mostly for larger scale partnerships

Zymo?

Mapmygut?

AmericanGut www.americangut.org

Others to be determined

ENERGY PRODUCTION. BIOLOGICAL

- Sit in chair -- number of times can stand up and sit down

- Resting Metabolic Rate www.bodyspec.com/what-is-rmr

- Zymo ATP test??

- Actions similar to pushups and chair stand-ups like: How many times about a 15 lb weight can be lifted from the floor to above the head with arms extended (in a somewhat circular motion)

- Indirect calorimetry

- The Urinary Metabolic Profile, US BioTek

- Mitochondrial energy assay

DNA DAMAGE

CONSIDERING 8-hydroxyguanine

<https://www.cellbiolabs.com/8-ohg-rna-damage-elisa> \$419

www.cellbiolabs.com/8-ohg-rna-damage-elisa

Day of the Week to do lab draws

This developed after conversation with my long time MD friend, recently retired head of pathology and lab.

I do lab tests on Tuesday mornings (or Wed if cannot do Tues)

Later in the week it's possible the blood will be sitting around over the weekend

or lab techs may not be as attentive.

Not Monday because I usually take Sunday completely off and rest, so hormones etc may not be representative of normal – and lab techs are coming off a weekend.

Time of day

Mornings, consistently same time. I go in 10:00-10:15 after fasting from 11:00 pm the previous night.

Different labs use different techniques and different normalization standards for the same tests, so one to one comparisons of the same biomarker will not be accurate.

My circle of associates uses LabCorp

Ratios of 2 different biomarkers can be useful.

Neutrophil/Lymphocyte ratio

CD4/CD8 (standard)

Two professional statisticians recommended doing tests in sets of three and averaging them. If there is an outlier, omitted and average the two.

When you get an unexpected lab measurement, repeat it.

Sometimes it's wrong.

We want parameters that don't have daily/weekly/monthly/yearly fluctuation
That show changes over a short period of time (like 3 month)

Do tests at the same time of day of the week.

Lab Tests -- no MD order required

Life Extension Foundation blood tests

You do not need doctor or prescription -- order through them. It's done at LabCorp.

They send requisition and list of LabCorp locations near you

They often have sales

www.lifeextension.com/Vitamins-Supplements/Blood-Tests/Blood-Tests

800-678-8989

LabsMD

www.labsmd.com

Kiosk Labs
www.koslabs.net

Walk In Lab

NOTE: I had a problem clicking on this. You may have to type it in your browser.
www.walkinlab.com

Over the counter urine, saliva tests at drug stores, internet like
glucose
keytone

others only available w/physician prescription

Labs don't want to be liable for self diagnosis – they could get sued.

Be aware of potential negative consequences of self-diagnosis and independent action

This is one in a set of four. See companions to this document:

1) Background and outlines our mission:

www.AgingIntervention.org

2) Describes main methods:

www.agingintervention.org/1_SmallStudyFormat.pdf

3) Biomarkers and objective measures of results:

www.agingintervention.org/1_BiomarkerPersonalPracticalBasicList.pdf

4) Therapies my group of associates and I are evaluating and testing on ourselves:

www.agingintervention.org/1_UpcomingPersonalTherapies.pdf

Age Reversal Network — a Valuable Resource

* Please let me know if you review their info or join – Jadams@grg.org or (949) 922-9786 *

www.age-reversal.net

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