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REPORT

The Most Important Tool for Disease Prevention

By Julius G. Goepf, MD

Optimal health does not occur by accident. If your goal is to live longer and healthier, then monitoring your biological markers enables you to identify problems early on, when there is the greatest opportunity to reverse underlying disease states.

Annual blood testing not only provides a picture of your present state of health, but also a window into the future.

In this article we'll review the most important tests all members should have each year, along with optional tests that certain individuals may consider adding.

MALE OR FEMALE LIFE EXTENSION PANELS

The cost of ordering the many separate blood tests required to assess overall health is prohibitive.

Life Extension resolved this problem long ago by consolidating the most important blood tests into one Male or Female Panel that can save members 80% compared with what commercial labs charge.

The Male or Female Blood Test Panels provide invaluable information that every aging human should know about their own biochemistry. When these tests detect an abnormality, actions can be taken to prevent serious degenerative disease from manifesting.

The first measurements in the comprehensive Male and Female Panels are complete blood cell counts (CBC) and serum chemistries. The results most people look for first are cardiac risk markers such as cholesterol, glucose, triglycerides, low-density lipoprotein (LDL), high-density lipoprotein (HDL), and very low-density lipoprotein (VLDL). Surprisingly, many expensive commercial lab test panels do not include all these basic markers of heart attack and stroke risk. Abnormalities of these cardiac markers can usually be corrected by lifestyle changes, adjustment of one's hormone balance and nutrient intake, and if all else fails, low-dose prescription medications.

The chemistry panel also evaluates liver and kidney functions. Anyone taking prescription medications needs these tests to make sure the drugs are not damaging their vital organs. Aging individuals also want to make sure these hard-working organs are not entering a degenerative state. Finding out that one's liver or kidney function is impaired at an early stage can enable corrective action to be taken before catastrophic organ failure occurs.

Aging people and those taking certain prescription drugs can suffer a lethal imbalance of blood minerals such as calcium, potassium, iron, and sodium. The chemistry portion of the Male or Female Panels analyzes these mineral levels to enable one to guard against a host of common disorders including kidney stones, heart valve injury, cancer, nerve damage, and lethal cardiac arrhythmias.

The three primary types of blood cells counted are red cells, white cells, and platelets. The complete blood cell count also looks at indices of red blood cells to detect red blood cell size and shape, along with subtypes of white blood cell to assess specific immune cells. Platelets are counted to help ensure that blood can properly form healing clots in response to injury, but that the blood is not overly saturated with platelets that could cause an abnormal clot to form in a coronary or cerebral artery.

MEASURING YOUTH HORMONES

The Male and Female Panels measure the most important hormones that are adversely affected by aging and chronic disease.



DHEA (dehydroepiandrosterone) levels decline as humans enter middle age. An abundant volume of published research links DHEA decline to a host of common age-related degenerative disorders.¹⁻⁴ Fortunately, very low-cost DHEA supplements are freely available. The problem is that there is a wide range of variability when it comes to the optimal dose of DHEA each individual should take. The Male and Female Panels evaluate DHEA blood levels so you can fine-tune your DHEA dosage to the optimal range.

Testosterone deficiency occurs in many aging men, and a surprising number of aging women also experience the detrimental impact of suboptimal testosterone.⁵ Low testosterone is associated with loss of lean body mass and bone density, decline in mood, diminished energy, increased heart attack risk, and sexual dysfunction.⁶ The Male and Female Panels measure levels of both total and free testosterone, so that one can take nutritional and pharmaceutical steps to restore this vital hormone to youthful ranges.

The predominant estrogen in the body, estradiol can beneficially or adversely affect numerous tissues in both women and men.⁷ Aging men often have dangerously high levels of estradiol (combined with low testosterone) that can contribute to benign and malignant prostate disease, abdominal adiposity, as well as an increased propensity of blood to abnormally clot within vessels. In women, low estradiol can induce menopausal symptoms and bone loss, while excess estradiol contributes to increased risk of estrogen-dependent malignancy like breast and endometrial cancer as well as possible vascular risks. Estradiol is included in the Male and Female Panels to enable men and women to achieve optimal levels of this important, but too often out-of-balance hormone.



Progesterone is included in the Female Panel because of the important role it plays in helping to maintain bone density and protecting against common cancers. Progesterone has demonstrated beneficial effects on cognition, memory,⁸ and in traumatic brain injury.⁹⁻¹¹ Progesterone levels fall precipitously with advancing age, but progesterone supplements and pharmaceuticals are available to restore youthful levels if a blood test reveals a deficiency.

ASSESSING ADDITIONAL RISK FACTORS FOR HEART ATTACK AND STROKE

Excess levels of homocysteine result in cognitive decline, along with higher risk of heart attack and stroke.¹²⁻¹⁵ Excess homocysteine is often associated with insufficient intake of folic acid, vitamin B12, and vitamin B6. As people age, however, some need to take more aggressive approaches to bring homocysteine into optimal safe ranges. The Male and Female Panels measure homocysteine so that every adult can take action if levels are dangerously high.



C-reactive protein (CRP) is a well-established measurement of systemic inflammation in the body.¹⁶ In recent years, researchers have found that the “high-sensitivity CRP” is an especially effective way of determining risk for a host of conditions including type 2 diabetes, heart attack and stroke, chronic inflammatory diseases, and cancer. The Male and Female Panels measure high-sensitivity C-reactive protein (CRP) to alert members of their status of this marker of overall mortality risk. Elevated CRP can be brought into safe ranges with lifestyle changes, hormone-nutrient balancing and, if needed, drug interventions.

DON'T DIE OF PROSTATE CANCER

The PSA test in combination with the digital rectal exam (DRE) performed by your physician is a cost-effective way of screening for prostate cancer.

Prostate-specific antigen (PSA) is a protein produced in normal prostate tissue. Like other tissues, when the prostate becomes diseased or damaged, injured cells “leak” their contents into the bloodstream, where they become available for testing. Men with normal prostates typically have very low circulating levels of PSA. When PSA levels begin to rise, they serve as a very sensitive marker for prostatitis, benign prostate enlargement, or prostate cancer—the most common malignancy in aging men.¹⁷

THE MALE PANEL INCLUDES:

- Complete Blood Count
- Blood Chemistries
- Homocysteine
- C-reactive Protein
- DHEA
- Total and Free Testosterone

THE FEMALE PANEL INCLUDES:

- Complete Blood Count
- Blood Chemistries
- Homocysteine
- C-reactive Protein
- DHEA
- Total and Free Testosterone

Estradiol
PSA
Non-member retail price: \$399
Every-day member price: \$299
Blood Test Super Sale price: \$198
Enjoy this 50% savings until June 2, 2008

Estradiol
Progesterone
Non-member retail price: \$399
Every-day member price: \$299
Blood Test Super Sale price: \$198
Enjoy this 50% savings until June 2, 2008

The comprehensive Male and Female Blood Test Panels offer an incredible amount of invaluable information on a variety of health parameters critical to achieving optimal health and living longer. All members should have this done annually. The remainder of the article discusses optional tests some members should consider.

HOW MUCH COQ10 IS IN YOUR BLOOD?

Life Extension recommends that healthy adults over the age of 30 should strive to maintain coenzyme Q10 (CoQ10) blood levels that are consistently around 2.5 to 3 mcg/mL. Aging individuals with cardiovascular health concerns should strive for CoQ10 levels of at least 3.5 mcg/mL, while those with neurological disorders should seek CoQ10 blood levels around 7 mcg/mL.

Healthy people taking around 150 mg/day of the ubiquinol form of coenzyme Q10 (CoQ10) are attaining desired CoQ10 blood levels.

Those with serious disease states, however, may need higher CoQ10 doses.^{19,20} For example, Life Extension Scientific Advisory Board member and leading CoQ10 expert Peter Langsjoen, MD, noted that raising CoQ10 blood levels to approximately 4.1 mcg/mL in patients with severe congestive heart failure increased their ejection fraction (a measure of the heart's pumping capacity) from 24% up to 46%—a dramatic increase in cardiac output that yielded remarkable clinical improvements in these very ill individuals.²¹

While the cost of CoQ10 blood testing has come down, it may only be necessary at this time for those with underlying disease states to measure their CoQ10 blood levels. Healthy people who take at least 150 mg of ubiquinol are probably reaching desired levels based on findings from several human absorption studies.



Coenzyme Q10 Blood Test

Every-day member price: \$145

Blood Test Super Sale price: \$108.75

ARE YOU GETTING ENOUGH VITAMIN D?

Long-recognized for its value in maintaining bone strength and promoting calcium absorption, vitamin D has exploded onto center stage as possibly the most important vitamin humans can take to reduce their risks of cancer, heart disease, immune deficiency, and overall mortality.²²⁻²⁹

Despite its proven value, a shockingly large proportion of people don't get enough vitamin D.^{30,31} Vitamin D is converted to its active form by sunlight acting on skin, and many people may not get enough sunlight—especially in winter months. Another problem is that aging skin is less effective at converting vitamin D into its active form, making the risk of deficiency even greater as people grow older.³²

Scientists are now redefining the blood levels of the vitamin that are considered optimal. Indeed, the term "vitamin D insufficiency" is now used to describe vitamin D levels that are above the bare minimum needed for bone health but below the middle of the so-called optimal range.^{33,34} A whopping 42-57% of Americans are vitamin D-insufficient by these newer, more rigorous criteria, and nutritionists strongly recommend monitoring levels of vitamin D in the blood.^{28,35,36}

Life Extension recommends that a healthy serum level of vitamin D (25-hydroxyvitamin D) is 30-50 ng/mL (75-125 nmol/L) based upon current research, with most recent research suggesting that maintaining levels in the upper one-third of the range is optimal. Some doctors are recommending vitamin D levels greater than 60 ng/mL of blood.

Vitamin D levels do not always correspond to ingested doses of vitamin D supplements or to sunlight exposure. Factors like body mass affect how much supplemental vitamin D is needed to achieve optimal ranges.

Most experts suggest that a minimum of 2,000 IU a day of supplemental vitamin D is necessary, with most aging individuals needing closer to 5,000 IU to achieve optimal serum 25-hydroxyvitamin D levels. To make sure you are taking enough vitamin D, a blood test can provide a definitive answer.

Vitamin D (25-Hydroxyvitamin D) Blood Test

Every-day member price: \$47

Blood Test Super Sale price: \$35.25

MEASURING GLYCATION REACTIONS IN YOUR BODY

Every red blood cell in the body is packed with hemoglobin, the vital protein that carries oxygen to our tissues. This ubiquitous protein is therefore constantly exposed to the glucose found in the bloodstream—and over time, sugar molecules attach themselves to hemoglobin. The resulting protein-sugar compound is called hemoglobin A1C (HbA1C), and it provides a very useful measure of how much glycation the entire body has “seen” over the preceding one to four months.³⁷ Glycation is the non-enzymatic process of binding sugar molecules to proteins, and an elevated HbA1c reflects both aberrant blood sugar control as well as oxidative damage/free radical stress due to dangerous glycotoxins that speed up the aging process.

Diabetic patients are quite used to measuring their HbA1C levels regularly—and their physicians use the results as a means of “double-checking” on how well the patients are managing their blood sugar. But as we’ve learned more about the impact of chronic exposure to even “normal” blood sugar levels, researchers are finding that HbA1C is associated with cardiovascular disease in non-diabetic subjects as well, and can be used to guide improved dietary and lifestyle choices to avoid the risk of future cardiovascular disease.³⁷ Indian researchers have found, for example, that non-diabetic patients with hypertension have higher HbA1C levels than non-hypertensive patients.³⁸ Korean researchers found that as HbA1c levels increased in non-diabetic adults, so did their risk for the metabolic syndrome; they concluded by suggesting that HbA1c might be a predictive measure of early fasting glucose impairment, the metabolic syndrome, and its associated cardiovascular risk factors.³⁹



Monitoring HbA1c may also provide an important means of assessing inflammatory activity. According to leading Swedish researchers, “low-degree inflammatory activity is not only increased in diabetic patients, but also increased with increasing HbA1c in non-diabetic individuals with HbA1c within the normal range.”⁴⁰ This kind of finding makes it critical for everyone to have regular HbA1C testing—along with a thorough discussion with your physician about the meaning of apparently “normal” results. In other words, in light of these new findings, what we once thought of as “high normal” HbA1C may in fact be a harbinger of serious trouble that can be addressed readily with proper diet, lifestyle, and attention to appropriate supplementation.

A crucial but often overlooked aspect of maintaining HbA1C levels within a healthy range is to minimize the intake of dietary glycotoxins. Glycotoxins are dangerous, pro-inflammatory agents that are abundant in foods that are highly processed and those cooked at high temperatures. To minimize your intake of dietary glycotoxins, choose foods that are prepared at temperatures below 250 degrees Fahrenheit (using methods such as steaming, boiling, or poaching), avoid processed and high-fat foods, and increase your intake of fresh, raw fruits and vegetables.⁴¹

Hemoglobin A1c Blood Test

Every-day member price: \$31

Blood Test Super Sale price: \$23.25

PROTECTING AGAINST A DANGEROUS TESTOSTERONE METABOLITE

Dihydrotestosterone (DHT) is a steroid sex hormone that is produced from testosterone via the enzyme 5-alpha-reductase. DHT is the most potent naturally occurring androgen (male hormone)—in fact, scientists have estimated that DHT’s growth-promoting effects on prostate tissue are 10 times more potent than testosterone.⁴²

Dihydrotestosterone is crucial to the development of normal male characteristics. Elevated levels of DHT in adult men, however, may have numerous deleterious effects. For example, long-term exposure to DHT can contribute to benign prostatic hyperplasia (BPH)—a non-cancerous enlargement of the prostate gland that causes unpleasant symptoms such as urinary frequency, urgency, and weak stream.⁴³ Ominously, elevated levels of DHT (along with increased levels of estradiol) have been associated

with an increased risk of prostate cancer.⁴⁴ Furthermore, increased DHT levels in the scalp have been linked with androgenic alopecia, or male pattern baldness.⁴⁵

Measuring DHT levels and taking steps to decrease elevated levels (such as using prescription drugs like Avodart® or Proscar®) ⁴⁵⁻⁴⁷ can help protect aging men against the unwanted effects of this potent male hormone.

Dihydrotestosterone (DHT) Blood Test

Every-day member price: \$45

Blood Test Super Sale price: \$33.75

MEASURING THE ATHEROGENIC POTENTIAL OF BLOOD LIPIDS

The Vertical Auto-Profile (VAP™) assesses subclasses of lipids that are known or emerging risk factors for cardiovascular disease, such as LDL particle size and lipoprotein(a).⁴⁸ This enables cardiologists and nutritionists to help high-risk patients to identify these new risk factors for cardiovascular disease that are based on the amounts and sizes of cholesterol and other fat molecules that circulate in the blood. Comprehensive tests such as the VAP™ can provide all the information that doctors and patients need to make informed decisions about diet, lifestyle, supplements, and medication changes.

One of the chief advantages of the VAP™ method over other techniques of measuring lipid profiles is that it can actually determine not only the types of cholesterol particles (HDL, LDL, VLDL, etc), but also their individual size and density.^{49,50} That's vital because people who produce small, dense LDL particles, for example, are known to be at increased risk of heart disease.⁵¹ The VAP™ test also measures lipoprotein(a), a particularly dangerous lipoprotein that can lead to heart attacks and strokes.

Knowledge of particle size and density is critical for determining the next steps in management of people who may have achieved their “target” lipid values, but who still have high-risk lipid particle types.⁵² In essence, the VAP™ provides a “higher-resolution” picture of what’s really going on in a person’s lipid profile, allowing them to customize their management regimen. It can even help detect early risk factors in people who have apparently “normal” lipid profiles on older kinds of tests—according to Krishnaji R. Kulkarni, one of the experts who helped to develop the test, “Because VAP™ measures so many different parameters of the lipid profile, it can identify patients at high risk for coronary heart disease who cannot be identified using the standard lipid profile.”⁵³

The VAP™ can be used to monitor the results of specific treatments, such as statin therapy, to assure that goals are being met. When the VAP uncovers hidden risk factors, additional approaches using diet, lifestyle, supplements, and certain drugs are advised.

Vertical Auto-Profile (VAP™) Blood Test

Every-day member price: \$185

Blood Test Super Sale price: \$138.75

GUARDING AGAINST SUBCLINICAL HYPOTHYROIDISM

A simple way of assessing thyroid hormone status is to measure basal body temperature before getting out of bed. This procedure is fully described in the “thyroid” section of the reference book *Disease Prevention and Treatment* that most members have.

A blood test that can detect thyroid hormone deficiency is one that measures TSH (thyroid-stimulating hormone). This hormone is produced in the pituitary gland located at the base of the brain, and when levels of TSH are elevated, it indicates that the thyroid gland is not producing enough thyroid hormones. One reason that TSH measurement is important is that many people suffer from subtle thyroid gland dysfunction that can rob them of energy and may even have an impact on memory, cognition, and learning.⁵⁵ The most common form of thyroid dysfunction is hypothyroidism, in which the thyroid gland produces insufficient amounts of its several vital hormones. Doctors are only now beginning to realize that many people with apparently normal or borderline levels of thyroid hormones actually suffer from a mild form of hypothyroidism; this condition known as “subclinical hypothyroidism”⁵⁶ is more common in young women and aging people of both sexes.^{57,58} In one recent large study, nearly one out of every five women over age 60 was diagnosed with subclinical hypothyroidism!⁵⁶

Subclinical hypothyroidism can cause elevations in total cholesterol and LDL, while reducing the heart’s ability to pump blood effectively and increasing arterial resistance to blood flow—a setup for subsequent cardiovascular disorders.

In addition, subclinical hypothyroidism may be related to depression, panic disorders, weight gain, and abnormal cognitive testing.⁵⁹

The normal reference range for TSH is typically 0.2-5.5 mU/L, with readings above 5.5 mU/L indicating low thyroid hormone and possible hypothyroidism. However, a growing body of evidence suggests that TSH levels above 2.0 mU/L may signify less-than-optimal thyroid function. The optimal range of TSH is thus considered to be 0.2-2.0 mU/L.

Thyroid-Stimulating Hormone (TSH) Blood Test

Every-day member price: \$31

Blood Test Super Sale price: \$23.25

The Clotting Factor Associated with Increases in Cancer, Stroke, and Heart Attack Risk

Fibrinogen is a protein molecule involved in the normal blood-clotting process— but it has also been found to be a sensitive marker for inflammation throughout the body.⁶⁰ When tissue inflammation is present anywhere, fibrinogen levels begin to climb, which makes measurement of fibrinogen critical in monitoring consequences of the inflammation-driven metabolic syndrome such as an increased risk of cardiovascular disease and stroke.⁶¹ People with high fibrinogen levels appear more likely to suffer from these potentially disastrous inflammatory processes.⁶²⁻⁶⁴

In fact, elevated levels of fibrinogen have been linked with an increased risk of heart attack, stroke, and cancer.⁶⁵ Furthermore, scientists found that increased levels of fibrinogen were an independent predictor of mortality risk in patients with peripheral arterial disease.⁶⁶

As we learn more about the relationship between inflammation and cancer, interest also increases in the use of fibrinogen levels as a means of assessing severity and prognosis in certain types of cancer.⁶⁷ One recent study showed that C-reactive protein (another marker of inflammation) and fibrinogen were among the best means of differentiating between cancer patients and healthy individuals and also provided a means to differentiate between healthy individuals and patients with infection.⁶⁸

Scientists believe that like CRP, fibrinogen may be considered an acute-phase protein (a protein whose plasma concentration increases or decreases by at least 25% with certain inflammatory conditions). Fibrinogen is known to be associated with the production of new blood vessels (angiogenesis) that is required for tumor growth, and it is also associated with metastases and other complications of cancers.^{69,70}

Fibrinogen levels should ideally not rise above 300 mg/dL in the blood.

Fibrinogen Blood Test

Every-day member price: \$31

Blood Test Super Sale price: \$23.25

SUMMARY

As scientists grow increasingly savvy about the biochemical markers that contribute to health and longevity, it has become even more vital to obtain and interpret information that can be gleaned only through comprehensive blood testing. People who are genuinely committed to making informed decisions that impact their quality as well as their quantity of life are wise to take advantage of the hidden data about themselves that blood testing reveals. This strategy can help you maximize the benefits of regular exercise, healthy lifestyle choices, and appropriate nutritional supplementation.

If you have any questions on the scientific content of this article, please call a Life Extension Health Advisor at 1-800-226-2370

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