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# REPORT

## The 10 Most Important Blood Tests

By Penny Baron



The Life Extension Foundation receives hundreds of calls a week from people who ask, “What can I do to improve my health and longevity?” Our response is that we basically “have no idea.”

The reason we ostensibly appear so ignorant is that unless we know what your blood looks like under a microscope, there is no way for us to identify what steps you should take to protect your health and enhance your well-being.

Annual blood testing is the most important step aging adults can take to prevent life-threatening disease. With blood test results in hand, you can catch critical changes in your body before they manifest as heart disease, cancer, diabetes, or worse. Having the proper blood tests can empower you to enact a science-based disease-prevention program that could add decades of healthy life.

Sadly, most annual medical check-ups involve the physician ordering only routine blood tests, if blood tests are ordered at all. Far too often, this blood work does not even test for important markers of disease risk. The consequences of failing to analyze blood for proven markers of disease risk are needless disability and death.

Blood tests have benefits that go far beyond disease prevention. For example, by monitoring levels of sex hormones, you can take decisive steps to enhance your quality of life, perhaps by correcting a depressive mental state, erectile dysfunction, abdominal obesity, or by improving your memory and energy levels.

In this article, we discuss the 10 most important blood tests that people over the age of 40 should have each year. Armed with the results of these tests, aging adults can work together with their physicians to avert serious health problems and achieve optimal health.

### 1. CHEMISTRY PANEL AND COMPLETE BLOOD COUNT



The Chemistry Panel and Complete Blood Count (CBC) is the best place to begin your disease-prevention program. This low-cost panel will give you and your physician a quick snapshot of your overall health. This test provides a broad range of diagnostic information to assess your vascular, liver, kidney, and blood cell status. The Complete Blood Count measures the number, variety, percentage, concentration, and quality of platelets, red blood cells, and white blood cells, and thus is useful in screening for infections, anemias, and other hematological abnormalities.

The Chemistry Panel provides information on the status of your cardiovascular system by testing

for total cholesterol, HDL (high-density lipoprotein), LDL (low-density lipoprotein), triglycerides, and the total cholesterol/HDL ratio.<sup>1</sup>

The Chemistry Panel also measures blood glucose, which is critically important for detecting early-stage metabolic syndrome, diabetes, and coronary artery disease. In light of the rapidly growing epidemic of diabetes and other related metabolic syndromes, monitoring your fasting glucose levels is as important as knowing your cholesterol.

| OPTIMAL RANGES FOR POPULAR BLOOD TESTS |                                    |                 |
|--|------------------------------------|-----------------|
|  | Current Laboratory Reference Range | Optimal Range   |
| Glucose                                | 65-99 mg/dL                        | 70-85 mg/dL     |
| Cholesterol                            | 100-199 mg/dL                      | 180-200 mg/dL   |
| LDL                                    | 0-99 mg/dL                         | Under 100 mg/dL |
| HDL                                    | 40-59 mg/dL                        | Over 55 mg/dL   |
| Triglycerides                          | 0-149 mg/dL                        | Under 100 mg/dL |

Also included in the Chemistry Panel is an assessment of critical minerals such as calcium, potassium, and iron.

## 2. FIBRINOGEN

An important contributor to blood clotting, fibrinogen levels increase in response to tissue inflammation. Since the development of atherosclerosis and heart disease are essentially inflammatory processes, increased fibrinogen levels can help predict the risk of heart disease and stroke.

High fibrinogen levels not only are associated with an increased risk of heart attack, but also are seen in other inflammatory disorders such as rheumatoid arthritis and glomerulonephritis (inflammation of the kidney).

In a recently published study from the University of Hong Kong Medical Center, researchers identified increased levels of fibrinogen in the blood as an independent risk factor for mortality in patients with peripheral arterial disease. When left untreated, peripheral arterial disease increases the risk of heart attack, stroke, and death. This 2005 study followed 139 men and women with peripheral arterial disease for an average of six years. Death from all causes increased with elevated fibrinogen levels: 80% of patients with a fibrinogen level above 340 mg/dL survived for less than three years. Researchers concluded that increased fibrinogen was an independent risk factor for mortality in this patient population.<sup>2</sup>

### OPTIMAL RANGE OF FIBRINOGEN

| Current Laboratory Reference Range | Optimal Range |
|------------------------------------|---------------|
| 193-423 mg/dL                      | 295-369 mg/dL |

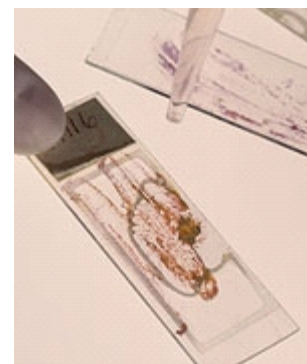
In the February 2006 issue of the *Journal of Thrombosis and Haemostasis*, researchers reported an association between increased levels of fibrinogen and risk for venous thrombosis (blood clots).<sup>3</sup> A recent study from Greece found an association between higher fibrinogen levels and the presence of multiple coronary lesions in patients who had suffered an acute myocardial infarction.<sup>4</sup>

A combination of lifestyle and behavioral changes—such as quitting smoking, losing weight, and becoming more physically active—may help to lower fibrinogen levels to the optimal range. Nutritional interventions may also help to optimize fibrinogen levels. You and your physician may wish to discuss the use of fish oil, niacin, and folic acid, along with vitamins A and C.

## 3. HEMOGLOBIN A1C

One of the best ways to assess your glucose status is testing for hemoglobin A1C (HbA1c).<sup>5</sup> This test measures a person's blood sugar control over the last two to three months and is an independent predictor of heart disease risk in persons with or without diabetes.<sup>6</sup> Maintaining healthy hemoglobin A1C levels may also help patients with diabetes to prevent some of the complications of the disease.<sup>7</sup>

According to a study published in the *New England Journal of Medicine* in 2005, type I diabetes patients who monitored their hemoglobin A1C (HbA1c) levels were able to achieve tight glucose control, thereby significantly lowering their risk of a cardiovascular disease event.<sup>7</sup> Long-term elevation of blood sugar, a hallmark of diabetes, is associated with an increased risk of heart disease and stroke.



The American Diabetes Association recommends testing HbA1c levels every three to six months to monitor blood sugar levels in insulin-treated patients, in patients who are changing therapy, and in patients with elevated blood glucose levels. Since HbA1c is not subject to the same fluctuations that normally occur with daily glucose monitoring, it represents a more accurate picture of blood sugar control.<sup>8</sup>

### OPTIMAL RANGE OF HEMOGLOBIN A1C

| Current Laboratory Reference Range | Optimal Range |
|------------------------------------|---------------|
| 4.5-5.7%                           | <4.5%         |

In a recent study, 1,340 type I diabetic patients were followed for a total of 17 years. Patients were randomly assigned to either intensive or conventional diabetic (blood glucose) control. In the group receiving intensive treatment, hemoglobin A1C levels were significantly lower and the risk of nonfatal myocardial infarction, stroke, or death from cardiovascular disease decreased by 57%. The decrease in HbA1c values was “significantly associated with most of the positive effects of

intensive treatment on the risk of cardiovascular disease.”<sup>7</sup>

Nutritional therapies may help to optimize hemoglobin A1C levels. You and your physician may wish to discuss the use of

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### 4. DHEA

Dehydroepiandrosterone (DHEA), a hormone produced by the adrenal glands, is a precursor to the sex hormones estrogen and testosterone. Blood levels of DHEA peak in one's twenties and then decline dramatically with age, decreasing to 20-30% of peak youthful levels between the ages of 70 and 80. DHEA is frequently referred to as an "anti-aging" hormone.

Recently, researchers in Turkey found that DHEA levels were significantly lower in men with symptoms associated with aging, including erectile dysfunction.<sup>9</sup> Healthy levels of DHEA may support immune function, bone density, mood, libido, and healthy body composition.<sup>10</sup>

Elevated levels of DHEA may indicate congenital adrenal hyperplasia, a group of disorders that result from the impaired ability of the adrenal glands to produce glucocorticoids.<sup>11-12</sup>

Supplementation with DHEA increases immunological function, improves bone mineral density, increases sexual libido in women, reduces abdominal fat, protects the brain following nerve injury, and helps prevent diabetes, cancer, and heart disease.<sup>10</sup>

Emerging research suggests that DHEA may have antidepressant effects. In a report in the January 2006 issue of the American Journal of Psychiatry, investigators found that in HIV-infected men and women, supplementation with DHEA was superior to placebo in treating non-major depression (with a response rate of 62% vs. 33%, retrospectively).<sup>13</sup>

In another study from the National Institute of Mental Health, investigators found that DHEA significantly improved midlife-onset major and minor depression in men and women aged 45 to 65 years old.<sup>14</sup>

#### OPTIMAL RANGE OF DHEA IN MEN\*

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| 280-640 µg/dL            | 400-500 µg/dL |

#### OPTIMAL RANGE OF DHEA IN WOMEN\*

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| 65-380 µg/dL             | 350-430 µg/dL |

\*Measured as DHEA Sulfate

Furthermore, a recently published study from Israel demonstrated that DHEA administration decreased self-administration of cocaine in rats, suggesting a potential for DHEA in reducing cravings and supporting recovery from addiction.<sup>15</sup>

In a recent study published in the Journal of Investigative Dermatology, scientists demonstrated that DHEA levels were significantly lower in elderly persons predisposed to chronic wound conditions, such as venous ulcers, and that administration of DHEA accelerated wound healing in aging mice. This led the research team to suggest that DHEA supplementation may be a safe, effective strategy to improve wound healing in the elderly.<sup>16</sup>

Natural therapies may help to optimize DHEA levels. You may wish to discuss with your doctor the use of pregnenolone or

DHEA. Those with estrogen-related cancers such as breast or prostate cancer should not use DHEA.

### 5. PROSTATE-SPECIFIC ANTIGEN (PSA) (MEN ONLY)

Prostate-specific antigen (PSA) is a protein manufactured by the prostate gland in men. Elevated levels may suggest an enlarged prostate, prostate inflammation, or prostate cancer. PSA levels may also be used to monitor the efficacy of therapeutic regimens for prostate conditions.

Elevated levels of PSA may not necessarily signal prostate cancer, and prostate cancer may not always be accompanied by expression of PSA. Levels can be elevated in the presence of a urinary tract infection or an inflamed prostate. A PSA level over 2.5 ng/mL, or a PSA doubling time (the time required for PSA value to double) of less than 12 years, may be a cause for concern.

The American Cancer Society recommends annual PSA testing for men beginning at age 50. Men who are at high risk should begin PSA testing at age 40-45. PSA levels increase with age, even in the absence of prostate abnormalities.<sup>17</sup>

More than 15% of men with PSA values between 2.6 and 4.0 ng/mL who are 40 years or older have prostate cancer, according to a prostate cancer screening study published in 2005 in the Journal of Urology.<sup>18</sup>

According to a study published in the Journal of the American Medical Association, 25% of patients with normal digital rectal exams and total PSA levels of 4.0-10.0 ng/mL have prostate cancer.<sup>19</sup> In a later study published in the New England Journal of Medicine, investigators recommended that “lowering the threshold for biopsy from 4.1 to 2.6 ng per milliliter in men younger than 60 years would double the cancer-detection rate from 18 percent to 36 percent.”<sup>20</sup> It should be noted that levels below the currently recognized cutoff of 4.1 ng/mL may not distinguish between prostate cancer and benign prostate disease.

In a recently published study in the journal Urology, prostate cancer was detected in 22% of patients with PSA levels between 2.0 and 4.0 ng/mL, and most of those cancers biopsied were significant, leading researchers to conclude that an “important number of cancers could be detected in the PSA range of 2.0 to 4.0 ng/mL.”<sup>21</sup> In another study, investigators in Spain detected significant cancers in some patients with a PSA range between 1.0 and 2.99 ng/mL. Although the risk of developing cancer for those in the low PSA range is small, the authors said, it is still relevant.<sup>22</sup>

| <b>OPTIMAL RANGE OF PROSTATE-SPECIFIC ANTIGEN (PSA)</b> |                      |
|---|----------------------|
| <b>Current Laboratory Reference Range</b>               | <b>Optimal Range</b> |
| 0-4 ng/mL   | 0-2.6 ng/mL          |

A healthy Mediterranean-type diet may offer protection against prostate cancer and other diseases associated with aging. Natural therapies may also help support prostate health. You and your physician may wish to discuss the use of saw palmetto, beta-sitosterol, pygeum, and nettle root extracts. (See also “Beta-Sitosterol and the Aging Prostate Gland,” Life Extension, June 2005.)

## 6. HOMOCYSTEINE

The amino acid homocysteine is formed in the body during the metabolism of methionine. High homocysteine levels have been associated with increased risk of heart attack, bone fracture, and poor cognitive function.

Incremental increases in the level of homocysteine correlate with an increased risk for coronary artery disease. Data from the Physicians’ Health Study, which tracked 14,916 healthy male physicians with no previous history of heart disease, showed that highly elevated homocysteine levels were associated with a more than threefold increase in the risk of heart attack over a five-year period.<sup>23</sup>

Homocysteine has also become recognized as an independent risk factor for bone fractures. In a recent study of 1,267 men and women with an average age of 76, investigators in the Netherlands concluded that high homocysteine levels and low vitamin B12 concentrations were significantly associated with an increased risk for bone fracture.<sup>24</sup> This mirrors data from two previous studies published in 2004 in the New England Journal of Medicine, in which elevated homocysteine levels were shown to be an important and independent risk factor for osteoporotic fractures, including hip fractures.<sup>25,26</sup>

Elevated homocysteine levels have recently been linked to other disorders. In three recent studies, investigators found an association between elevated homocysteine levels and age-related macular degeneration.<sup>27-29</sup> In Japan, increased homocysteine levels were found to be associated with the presence of gallstones in middle-aged men. Investigators suggested that this association “may partly explain the reported high prevalence rate of coronary heart disease” in persons with gallstones.<sup>30</sup>

A study from the Netherlands has shown that among normal

| <b>OPTIMAL RANGE OF HOMOCYSTEINE</b>      |                        |
|---|------------------------|
| <b>Current Laboratory Reference Range</b> | <b>Optimal Range</b>   |
| MALE<br>4.3-15.3 µmol/L                   | MALE<br>< 7.2 µmol/L   |
| FEMALE<br>3.3-11.6 µmol/L                 | FEMALE<br>< 7.2 µmol/L |

individuals aged 30-80, elevated homocysteine concentrations are associated with prolonged lower cognitive performance.<sup>31</sup>

Natural therapies may help to optimize homocysteine levels. You may wish to discuss with your doctor the use of vitamin B12, vitamin B6, folic acid, and trimethylglycine.

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#### 7. C-REACTIVE PROTEIN

Increasingly, medical science is discovering that inflammation within the body can lead to a range of life-threatening degenerative diseases such as coronary heart disease, diabetes, macular degeneration, and cognitive decline. By measuring your body's level of inflammation through regular C-reactive protein testing, you can devise a strategy of diet, exercise, and supplementation to halt many of these conditions.

C-reactive protein (CRP) is a sensitive marker of systemic inflammation that has emerged as a powerful predictor of coronary heart disease and other diseases of the cardiovascular system.<sup>32</sup> The highly sensitive cardiac CRP test measures C-reactive protein in the blood at very early stages of vascular disease, allowing for appropriate intervention with diet, supplements, or anti-inflammatory therapy. The cardiac CRP test detects much smaller levels of inflammation than the basic CRP test, so is therefore able to identify at-risk patients earlier, even among apparently healthy persons.

A review of epidemiological data found that high-sensitivity cardiac CRP was able to predict risk of incident myocardial infarction, stroke, peripheral arterial disease, and sudden cardiac death among healthy individuals with no history of cardiovascular disease, as well as predict recurrent events and death in patients with acute or stable coronary syndromes. This inflammatory marker provided prognostic information that was independent of other measures of risk such as cholesterol level, metabolic syndrome, and high blood pressure. Investigators concluded that greater levels of cardiac CRP are associated with higher cardiovascular risk.<sup>33</sup>

#### OPTIMAL RANGE OF HIGH-SENSITIVITY C-REACTIVE PROTEIN

| Current Laboratory Reference Range | Optimal Range       |
|------------------------------------|---------------------|
| MALE<br>0-3 mg/L                   | MALE<br><0.55 mg/L  |
| FEMALE<br>0-3 mg/L                 | FEMALE<br><1.5 mg/L |

According to a recently published article in the journal *Circulation*, "In older men and women, elevated C-reactive protein was associated with increased 10-year risk of coronary heart disease, regardless of the presence or absence of cardiac risk factors. A single CRP measurement provided information beyond conventional risk assessment, especially in [men and women at intermediate levels of risk]."<sup>34</sup>

Increased levels of C-reactive protein have previously been strongly linked with a greater risk of developing type II diabetes.<sup>35</sup> These results were confirmed in a more recent study from the Harvard School of Public Health. In a prospective study of 32,826 healthy women, elevated CRP levels were a

strong independent predictor of type II diabetes. According to investigators, these data support the role of inflammation in the pathogenesis of type II diabetes.<sup>36</sup>

C-reactive protein is also an independent risk factor for the progression of age-related macular degeneration, according to recent research published in the *Archives of American Ophthalmology*.<sup>37</sup> This follows a study by the same authors, in which elevated CRP levels were shown to be an independent risk factor for age-related macular degeneration, implicating "the role of inflammation in the pathogenesis of [age-related macular degeneration]."<sup>38</sup>

Elevated levels of CRP have also been associated with the loss of cognitive ability in seemingly healthy people.<sup>39</sup> Furthermore, elevated CRP levels have been strongly associated with major depression in men.<sup>40</sup>

High-sensitivity CRP testing likewise reveals systemic inflammation that is associated with disease activity in patients with rheumatoid arthritis.<sup>41</sup>

Natural therapies may help to optimize high-sensitivity CRP levels. You may wish to discuss with your doctor the use of fish oil, L-carnitine, and soluble fiber before meals.

## 8. THYROID STIMULATING HORMONE (TSH)

Secreted by the pituitary gland, thyroid stimulating hormone (TSH) controls thyroid hormone secretion in the thyroid. When blood levels fall below normal, this indicates hyperthyroidism (increased thyroid activity, also called thyrotoxicosis), and when values are above normal, this suggests hypothyroidism (low thyroid activity). Overt hyper- or hypothyroidism is generally easy to diagnose, but subclinical disease can be more elusive.



Because the symptoms of thyroid imbalance may be nonspecific or absent and may progress slowly, and since many doctors do not routinely screen for thyroid function, people with mild hyper- or hypothyroidism can go undiagnosed for some time. Undiagnosed mild disease can progress to clinical disease states. This is a dangerous scenario, since people with hypothyroidism and elevated serum cholesterol and LDL have an increased risk of atherosclerosis.

Mild hypothyroidism (low thyroid gland function) may be associated with reversible hypercholesterolemia (high blood cholesterol) and cognitive dysfunction, as well as such nonspecific symptoms as fatigue, depression, cold intolerance, dry skin, constipation, and weight gain. Mild hyperthyroidism is often associated with atrial fibrillation (a disturbance of heart rhythm), reduced bone mineral density, and nonspecific symptoms such as fatigue, weight loss, heat intolerance, nervousness, insomnia, muscle weakness, shortness of breath, and heart palpitations.

One study found that TSH levels greater than 2.0 mU/L increase the 20-year risk of developing hypothyroidism,<sup>42</sup> while another study found that TSH levels greater than 4.0 mU/L increase the risk of heart attack in elderly women.<sup>43</sup> Recently, published data showed that sub-clinical hypothyroidism was associated with an increased risk of congestive heart failure among older adults with TSH levels of 7.0 mU/L or greater.<sup>44</sup>

### OPTIMAL RANGE OF THYROID STIMULATING HORMONE (TSH)

| Current Laboratory Reference Range | Optimal Range |
|------------------------------------|---------------|
| 0.35-5.50 mU/L                     | 0.35-2.1 mU/L |

In healthy postmenopausal women, TSH levels at the low end of the normal range (0.5-1.1 mU/L) are associated with low bone mineral density and a 2.2-fold greater risk of osteoporosis, according to a study published in 2006 in the journal *Clinical Endocrinology*.<sup>45</sup>

Measuring TSH is the best test for assessing thyroid function. Currently, the American Thyroid Association recommends screening for TSH levels beginning at age 35, and every five

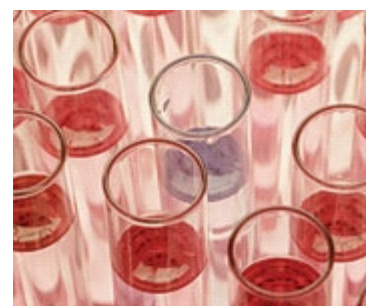
years thereafter.<sup>46</sup> If results are abnormal, assessing TSH in conjunction with levels of tri-iodothyronine (T3) and thyroxine (T4) blood levels may help assist definitive diagnosis.

Natural therapies may help to support thyroid health and optimize TSH levels. You may wish to discuss with your doctor the use of L-tyrosine, iodine, and selenium.

## 9. TESTOSTERONE (FREE)

Testosterone is produced in the testes in men, in the ovaries in women, and in the adrenal glands of both men and women. Men and women alike can be dramatically affected by the decline in testosterone levels that occurs with aging.

In the serum of both men and women, less than 2% of testosterone typically is found in the free (uncomplexed) state. Unlike bound testosterone, the free form of the hormone can circulate in the brain and affect nerve cells. Testosterone plays different roles in men and women, including the regulation of fertility, libido, and muscle mass. In men, free testosterone levels may be used to evaluate whether sufficient bioactive testosterone is available to protect against abdominal obesity, mental depression, osteoporosis, and heart disease. In women, low levels of testosterone have been associated with decreased libido and well-being, while high levels of free testosterone may indicate hirsutism (a condition of excessive hair growth on the face and chest) or polycystic ovarian syndrome. Increased testosterone in women may also indicate low estrogen levels.



**Men:** In men, testosterone levels normally decline with age, dropping to approximately 65% of young adult levels by age 75.<sup>47</sup> This drop in testosterone is partially responsible for the significant physiological changes seen in aging men. In fact, low levels of testosterone are associated with numerous adverse health conditions, including diminished libido, metabolic syndrome,<sup>48</sup> erectile dysfunction, loss of muscle tone, increased abdominal fat, low bone density, depression,<sup>49</sup> Alzheimer's disease,<sup>50</sup> type II diabetes,<sup>51</sup> and atherosclerosis.<sup>52</sup>

### OPTIMAL RANGE OF FREE TESTOSTERONE IN MEN

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| 6.6-26.5 pg/mL           | 15-26.5 pg/mL |

### OPTIMAL RANGE OF FREE TESTOSTERONE IN WOMEN

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| 0-2.2 pg/mL              | 1.4-2.2 pg/mL |

New research shows that low testosterone levels are a risk factor for ischemic heart disease in men. Recent research published in the journal *Endocrinology Research* showed a relationship between decreased testosterone levels and increased severity of thoracic aortic atherosclerosis in men.<sup>53</sup>

**Women:** Following menopause, levels of testosterone in women decrease, along with a concomitant decline in libido, mood, and general well-being. Although women produce only small quantities of testosterone, evidence indicates that this important hormone helps women maintain sexual function, as well as muscle strength and mass. Investigators reporting in the *Journal of Clinical Endocrinology and Metabolism* found that when obese women were given low doses of a synthetic testosterone analogue, they lost more body fat and subcutaneous abdominal fat, and gained more muscle mass, than women given placebo. The testosterone-supplemented

women also experienced a slight increase in resting metabolic rate.<sup>54</sup>

Optimal testosterone levels may support healthy mood, libido, body composition, and cardiovascular wellness. You may wish to discuss with your doctor the use of supplements such as DHEA and pregnenolone. Speak to your physician to determine whether prescription testosterone may also be helpful for you.

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#### 10. ESTRADIOL

Like testosterone, both men and women need estrogen for numerous physiological functions. Estradiol is the primary circulating form of estrogen in men and women, and is an indicator of hypothalamic and pituitary function. Men produce estradiol in much smaller amounts than do women; most estradiol is produced from testosterone and adrenal steroid hormones, and a fraction is produced directly by the testes. In women, estradiol is produced in the ovaries, adrenal glands, and peripheral tissues. Levels of estradiol vary throughout the menstrual cycle, and drop to low but constant levels after menopause.

In women, blood estradiol levels help to evaluate menopausal status and sexual maturity. Increased levels in women may indicate an increased risk for breast or endometrial cancer. Estradiol plays a role in supporting healthy bone density in men and women. Low levels are associated with an increased risk of osteoporosis and bone fracture in men and women as well. Elevated levels of estradiol in men may accompany gynecomastia (breast enlargement), diminished sex drive, and difficulty with urination.

**Women:** Diminished levels of estradiol correlate with low levels of bone mineral density, which is a strong risk factor for osteoporosis.<sup>55</sup> Optimizing estradiol levels in early menopausal women has been associated with relief from hot flashes, irritability, and insomnia.<sup>56</sup>

According to a recently published report from the University of Michigan School of Public Health, lower estradiol levels in women are associated with higher levels of markers of cardiovascular disease risk.<sup>57</sup>

**Men:** In older men, low levels of estradiol have been linked with an increased risk of vertebral fractures;<sup>58</sup> conversely, estradiol levels are found to be positively associated with bone mineral density, suggesting an association between low serum levels and the development of osteoporosis.<sup>59</sup> A recent study from France found a correlation between low estradiol and skeletal frailty.<sup>60</sup>

### OPTIMAL RANGE OF ESTRADIOL IN MEN

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| <54 pg/mL                | 10-30 pg/mL   |

### OPTIMAL RANGE OF ESTRADIOL IN WOMEN

| Standard Reference Range | Optimal Range |
|--------------------------|---------------|
| 0-528 pg/mL              | 352-528 pg/mL |

Significant positive correlations were found between estradiol levels and levels of total cholesterol, according to results from a recently published study of 111 men with stable coronary artery disease. Researchers suggested that estradiol has a possible role in “promoting the development of atherogenic lipid milieu in men with coronary artery disease.”<sup>61</sup>

Optimal estradiol levels may support healthy bone density, cardiovascular health, and well-being. You may wish to discuss with your doctor the use of supplements such as DHEA, pregnenolone, soy, black cohosh, and pomegranate. Speak to your physician to determine whether prescription therapies such as bioidentical estrogens may also be helpful for you.

### SUMMARY

Yearly blood testing is a simple yet powerful strategy to help you proactively take charge of your current and future health. A well-chosen complement of blood tests can thoroughly assess your overall state of health, as well as detect the silent warning signals that precede the development of serious diseases such as diabetes and heart disease.

Many diseases and disorders are treatable when caught early, but can severely impair the quality and length of your life if left unattended. Identifying these hidden risk factors will enable you to implement powerful strategies such as proper nutrition, weight loss, exercise, supplements, and medications in order to prevent progression to full-blown, life-threatening diseases. Blood testing can also detect biochemical changes that threaten well-being and quality of life, such as declining levels of sex hormones.

Armed with information on important health biomarkers, you and your physician can plan and execute a strategy to help you achieve and maintain vibrant health.

*Ordering blood tests can be easy and convenient. Just call **1-800-208-3444** to be directed to a blood testing laboratory in your area, or [click here](#) to visit our online Blood Test page.*

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