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REPORT

Male and Female Hormone Testing

An Underutilized Tool for Maintaining Optimal Health

By Edward R. Rosick, DO, MPH

When you walk into your doctor's office for an annual physical, you may be given a slip for some routine blood work. Many doctors run a CBC (complete blood count) and serum chemistry tests to get an overall snapshot of primary health markers. However, very few doctors will run tests on vital, life-giving hormones such as DHEA, testosterone, and progesterone.

Unfortunately, millions of people and most medical doctors fail to realize that a youthful balance of hormones—the body's vitally important chemical messengers—is essential to overall health and well-being. If our hormones are greatly depleted—and science has demonstrated that several hormones decline in aging adults—then you could be at risk.

For years, the Life Extension Foundation has provided its members with information on hormones, the importance of regularly testing for them, and ways to restore and maintain ideal hormone balance. In this article, we will examine the individual components of Life Extension's Male and Female Hormone Panel blood tests. These are some of the most important blood tests you will ever take.

HORMONE TESTING: ESSENTIAL TO EVERY ANTI-AGING PROGRAM

Given the voluminous scientific data demonstrating the myriad associations between declining hormone levels and age-related disorders such as Alzheimer's and heart disease,[1-3] there should be no doubt that hormone testing is an essential element of every annual check-up and disease-prevention program.

As this article underscores, it is simply not enough to test for one or two individual hormones. All of the major human hormones are created and continuously interact within an extraordinarily complex biochemical cascade. Life Extension has identified comprehensive hormone panels for men and women that allow you and your physician to accurately and fully assess your hormone status.

TSH: TESTING THE THYROID

One blood test that I order for almost all my new patients, men and women alike, is thyroid stimulating hormone. Thyroid stimulating hormone (TSH) is produced in the pituitary gland, which has such broad-ranging effects on human health that many consider it the "master gland." The thyroid itself exerts these powerful effects through at least four hormones, two of which—thyroxine (T4) and triiodothyronine (T3)—are produced in the highest quantities. The secretion of thyroid hormones is controlled, via a feedback loop, by the pituitary gland; if the pituitary detects low levels of thyroid hormones in the bloodstream, it secretes thyroid stimulating hormone (TSH) to trigger the thyroid to release more of its own hormones.

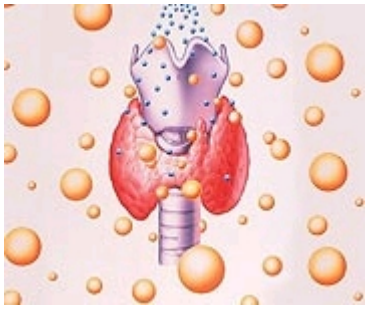

Illustration of the human thyroid gland, with colored spheres representing the hormones it produces and those that control it. The thyroid gland, wrapped around the windpipe at the front of the neck, consists of two soft lobes (red) joined by a small isthmus. It makes

Thyroid hormones influence body weight, mood, cholesterol levels, heart function, the metabolism of carbohydrates, proteins, and fats, and numerous other bodily processes. If the thyroid is not working properly, all of these critically important functions will be adversely affected.

The condition known as subclinical hypothyroidism has been described in the medical

literature for decades. With a prevalence of 4-10% in the general population and 7-26% among the elderly,[4] subclinical hypothyroidism is defined as an elevated level of thyroid stimulating hormone accompanied by normal levels of the T4 and T3 hormones. Subclinical hypothyroidism affects millions of people, yet some conventional medical doctors continue to insist that treating this condition is a waste of time. This flies in the face of numerous studies showing that people with subclinical hypothyroidism suffer from a variety of debilitating conditions, such as poor memory and fatigue,[5] peripheral arterial disease,[6] hyperlipidemia and coronary arterial disease,[7] and musculoskeletal disorders.[8] Fortunately, supplemental thyroid hormones can be used to improve thyroid function even when levels of the T4 and T3 hormones appear to be normal—that is, if you have checked for a deficiency in the first place!

two hormones, triiodothyronine (T3) and thyroxine (T4), shown here as yellow spheres, which control the way the body uses chemical energy. Blood levels of these hormones are controlled by thyroid-stimulating hormone (blue spheres), which is made by the pea-sized pituitary gland in the base of the brain. An imbalance of these hormones causes serious illness.

PREGNENOLONE: THE ULTIMATE PRECURSOR HORMONE

It may be difficult to find a doctor's office or a laboratory that offers pregnenolone testing. For those interested in optimal aging and avoiding degenerative diseases, however, knowing one's pregnenolone level is essential. In fact, if one hormone could rightfully be called the "ultimate" hormone, it would be pregnenolone. This important biochemical literally functions as a hormonal building block—that is, your body can use it to make other health-regulating hormones, such as DHEA (dehydroepiandrosterone), estrogen, progesterone, and testosterone. Unfortunately, like levels of most other hormones, pregnenolone levels begin to decline dramatically once we reach our thirties.[9,10]

Pregnenolone supplementation has been used since the 1940s to treat a variety of inflammatory diseases such as arthritis.[11] In women, this versatile hormone has been used to combat myriad menopausal symptoms caused by declining levels of estrogen and progesterone. Women convert this precursor hormone into whatever other hormones—such as estrogen—their bodies may be lacking.

Men as well as women can benefit from optimal pregnenolone levels. When elderly men were given pregnenolone in clinical trials, they tested better on visual spatial tasks. In addition, pregnenolone is thought to act in men as it does in women; if a man is deficient in testosterone, for example, pregnenolone is more likely to be converted to testosterone.[12]

DHEA-S: THE MOST ABUNDANT STEROID HORMONE

When you test for DHEA, you are actually testing for DHEA-S. DHEA (dehydroepiandrosterone) is secreted by the adrenal glands and then converted in the body into DHEA-S or dehydroepiandrosterone-sulfate. DHEA-S is the storage form of this hormone in the body. So the test will show how much DHEA has been converted and is circulating throughout the body.

DHEA is a precursor for many other hormones, including testosterone and estrogen. As with other major hormones, the body's production of DHEA begins to diminish in one's thirties, dropping by about 10% per decade of life in both women and men. Studies show that this decline is correlated with many of the degenerative diseases of aging, such as heart disease, cancer, and osteoporosis.[13]

One of the most notable studies on the use of DHEA supplementation to counteract the effects of aging was conducted by researchers at the University of California School of Medicine.[14] This randomized, double-blind, placebo-controlled trial followed 17 women and 13 men, aged 40-70, over a six-month period. The subjects were given 50 mg of DHEA a day for three months, and then were given a placebo for three months. Within two weeks of beginning DHEA supplementation, the patients had attained DHEA blood levels comparable to those of young adults. After three months of DHEA supplementation, 84% of the women and 64% of the men reported a remarkable increase in self-perceived physical and psychological well-being, including improved quality of sleep, less anxiety, increased energy, and better ability to handle stress.

In addition to promoting overall health, DHEA supplementation can also help women regain their sexual edge. A recent study published in the Journal of Sex and Marital Therapy examined the effects of DHEA supplementation (50 mg per day) on 111 premenopausal women, aged 35-55, over a period of two to six months.[15] Women taking DHEA supplements reported marked improvements in sexual function, in terms of desire, arousal, lubrication, satisfaction, and orgasm.

One of the most ambitious studies on the relationship between aging and DHEA levels was begun in 1958 in Baltimore and continues to this day. Known as the Baltimore Longitudinal Study of Aging, it has been carefully examining the aging process in more then 1,000 people between the ages of ages 20 and 90. A recent study in the prestigious journal Science examined the correlation between certain biomarkers, including DHEA-S, and overall health.[16] Men who had higher levels of DHEA-S lived longer, healthier lives than men with lower levels of DHEA-S, leading the study authors to conclude, "DHEA-S, which declines in . . . humans during normal aging, may be important in health maintenance and may serve as another potential longevity marker."

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TOTAL TESTOSTERONE AND FREE TESTOSTERONE: A CRITICAL HORMONE FOR MEN AND WOMEN

Mention the hormone testosterone and most people immediately think of men and male characteristics like a deep voice and greater muscle mass. Like other hormones, however, testosterone is vitally important for women as well as for men. As in men, levels of testosterone in women peak in their twenties and decline thereafter, especially after menopause.

In an article published in 1999 in the journal Clinical Endocrinology and Metabolism, Dr. Susan Davis, a renowned researcher in the area of female sexual function, offered a detailed report on testosterone replacement therapy in women.[17] Dr. Davis wrote that in women who are postmenopausal or have had an oophorectomy (surgical removal of the ovaries), judicious therapy with testosterone has produced direct, sustained improvement in sex drive, arousal, and frequency of sexual fantasies.

Besides helping women enjoy a more fulfilling sex life, testosterone may help them ward off heart disease and breast cancer. An intriguing report in the Journal of Women's Health examined the hypothesis that testosterone deficiency is a key factor in heart disease in aging women or women who have had a hysterectomy, since these women have a threefold greater risk of cardiovascular disease compared to women who have not had this surgery.[18] The study authors postulated that the "data we have demonstrating cardioprotective effects of testosterone, together with what we know about the loss of testosterone production both in instances of oophorectomy with hysterectomy and in women whose remaining ovarian function has been compromised by hysterectomy, point to testosterone deficiency as a significant factor [in] the reported increased incidence of cardiovascular risk factors [in women]."

Testosterone production declines precipitously in aging men. Most anti-aging physicians consider plummeting testosterone levels to be a biochemical hallmark of the condition known as andropause. Testosterone levels peak in a man at approximately the age of 30. By the age of 40, 5% of men are thought have low testosterone, a figure that rises sharply to at least 40-50% by the age of 70.[19] With this drop in testosterone comes deleterious effects such as declines in libido, sexual function, muscle mass, and strength, and a greater incidence of fatigue and depression.

Multiple studies have shown that testosterone supplementation improves sexual function, increasing both libido and erectile function.[20-22] Other studies have demonstrated that testosterone helps alleviate many other symptoms of andropause—relieving depression, restoring loss of energy, and lowering levels of potentially dangerous low-density lipoprotein (LDL), often a marker of heart disease.[23,24] Testosterone supplementation can also help reverse the debilitating effects of muscle loss (sarcopenia) and osteoporosis that are often seen in older men with low testosterone levels.[25,26]

Yearly testosterone level checks are very important in monitoring a man for andropause. However, it is also important to ensure that your doctor checks your free testosterone level—that is, testosterone that is not protein-bound—to determine optimal testosterone levels. A number of middle-aged male patients who have come to me with andropausal symptoms had total testosterone levels within normal levels (and were thus told by their doctors that their symptoms were "all in your head"), but had clinically low free testosterone levels. If this is the case, then supplemental testosterone can help men restore their vitality and zest for life when andropause hits.

The Life Extension Hormone Panel tests testosterone and free testosterone for both men and women.

BALANCING ESTROGEN AND PROGESTERONE—IN MEN AND WOMEN

Men produce estrogen and progesterone, though they produce far less estrogen than do premenopausal women. In the Life Extension Hormone Panel, men are measured for estradiol and progesterone, whereas women are measured for total estrogens and progesterone.

Just as testosterone is intimately associated with masculinity, estrogen and progesterone are related to femininity. As with testosterone, however, the association is not as simple as it seems. While it is true that estrogen is what makes a woman a

woman, and that hormonally healthy men do not produce much estrogen, categorizing estrogen and progesterone as purely female hormones would be just as erroneous as labeling testosterone an exclusively male hormone.

When a woman reaches puberty, her body begins to produce more estrogen. Estrogen is actually three hormones—estradiol, estrone, and estriol—and is produced in a woman's ovaries, body fat, and adrenal glands. Throughout a woman's lifetime, estrogen promotes bone strength, protects heart and brain function, and maintains sex drive. During perimenopause and menopause, decreasing estrogen levels can cause hot flashes, night sweats, mood swings, headaches, vaginal dryness, and other symptoms.

Decreasing levels of progesterone, another hormone whose production increases at the start of puberty, can cause irritability, headaches, and anxiety. Only by monitoring and maintaining a balance between these two vitally important hormones can a woman avoid many of the most distressing symptoms associated with menopause. Moreover, regular hormone testing can also reveal whether estrogen levels are too high, which can lead to life-threatening diseases such as breast cancer, or too low, which can lead to debilitating conditions such as osteoporosis.

Until very recently, estrogen and progesterone were thought to play little, if any, role in men's health. Fortunately, we now know otherwise. Estrogen, which is also produced by men, is important for bone health. In fact, a just-released study of 793 men reported in the American Journal of Medicine showed that men with lower levels of estrogen had a more than threefold greater risk of hip fractures compared to men with higher estrogen levels.[27]

While maintaining adequate estrogen levels may help protect men against bone fractures, having too much estrogen relative to plummeting levels of testosterone may predispose them to prostate cancer. A recent article published in the World Journal of Urology summarized the possible link between estrogen and prostate cancer: "Estrogenic stimulation . . . in a milieu of decreasing androgens [testosterone] contributes significantly to the genesis of benign prostate hyperplasia, prostate dysplasia, and prostate cancer." [28]

If you ask most conventional medical doctors whether men need progesterone, the answer may well be "no." In fact, emerging research shows that progesterone—which, like estrogen, is produced in small amounts in men—is vitally important for optimal health in men. Like testosterone levels, progesterone levels decline in aging men. Researchers believe that one of progesterone's roles in men is to inhibit the toxic effects of excess estrogen. Progesterone is also thought to protect men from prostate cancer by stimulating genes that prevent the cellular overgrowth seen in both prostatic hypertrophy and prostate cancer.[29]

PSA TESTING FOR MEN

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.

CONCLUSION

Achieving and maintaining an optimal balance among the body's vital chemical messengers is critical to ensuring lifelong health and well-being. Through regular blood testing, aging adults can keep abreast of their hormone status and use hormone supplementation as needed to optimize their quality of life and protect against many of the most dreaded diseases of aging.

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