Many people have a negative attitude about hormones. For them, the thought of taking hormones conjures up images of growing pimples and excessive hair, getting fat or depressed, or, worst of all, developing cancer. Hormones are small molecules which have a powerful influence on every cell in your body. However, we seem to be aware of them most when they are out of balance. Hormones are actually not molecules at all. In fact, without them, you would not be healthy, or even alive. Problems occur when hormones get out of balance, either too much or too little of one, or an improper ratio of one to another. On the other hand, hormones have been used therapeutically for many different conditions and are some of the most powerful biologic agents known.

There is a hormone produced by the adrenal glands which has until recently received little attention. However, new evidence suggests that this hormone is so beneficial for so many different conditions, that it may turn out to be the most important medical advance of the past decade. I am not talking about cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis. I am talking about dehydroepiandrosterone (DHEA), another adrenal hormone, which may turn out to be as much of a “wonder drug” as cortisone, that double-edged sword which has saved the lives of many people, but which also can cause severe side effects. Including osteoporosis.

Therapeutic Value of DHEA

Current research suggests that DHEA may be of value in preventing and treating cardiovascular disease, high cholesterol, diabetes, obesity, cancer, Alzheimer’s Disease, other memory disturbances, immune system disorders including acquired immunodeficiency syndrome (AIDS, and chronic fatigue.) DHEA may also enhance the body’s immune response to viral and bacterial infections. Perhaps most interesting, DHEA is currently being investigated as an anti-aging hormone. DHEA may also be of value in preventing and treating osteoporosis.

When one reads the list of conditions for which DHEA is currently being investigated, it tends to read somewhat like a snake oil salesperson’s compendium. Nevertheless, it is not unreasonable to suggest that a substance which occurs naturally in the body could have such a wide range of seemingly unrelated effects. Deficiency of vitamin C, for example, can cause fatigue, depression, impaired immune system function, arthritis, heart and blood vessel disease, poor wound healing, bone abnormalities, bleeding gums, and other problems. Why, then, should it not be possible that a deficiency of a hormone could result in a broad spectrum of dysfunctions. A brief summary of some of the research published on DHEA is presented below to give you a perspective on how powerful the substance appears to be.

**Diabetes**

A certain inbred strain of mice has a genetic disorder which causes them to develop diabetes. Their pancreatic beta cells, those cells in the pancreas which make insulin, are also spontaneously destroyed during the course of their lifetime. When this strain of mice was given 0.4 percent DHEA in their diet, the diabetes was rapidly reversed and the beta cells were preserved. In a study of other animals without this genetic disorder, DHEA reduced the severity of diabetes resulting from administering a diabetes-induced chemical called streptozotocin.

**Heart disease**

A study published several years ago in the New England Journal of Medicine showed that DHEA may play a role in preventing heart disease. Plasma levels of DHEA-S (the “S” stands for sulfate) were measured in 242 men, aged 50—79 years (DHEA-S is a by product of DHEA which is easier to measure and which provides a rough estimate of DHEA levels). In men with a history of heart disease, DHEA-S levels were significantly lower than in those with no history of heart disease. Furthermore, among men with healthy hearts, those who had low levels of DHEA were 33 times more likely to die of heart disease during the next 12 years than those with normal DHEA levels.

Administration of DHEA has also been shown to lower serum LDL-cholesterol, the “bad” form of cholesterol which is associated with heart disease. These results raise the possibility that, in individuals with low DHEA levels, supplementing with DHEA may help prevent heart disease.
Obesity
Animal studies suggest that DHEA may be effective in treating obesity. In a strain of mice which has a genetic predisposition to obesity, administering DHEA at a dose of 500 mg per kg of body weight, three times a week, prevented the development of obesity. DHEA did not cause any toxic effects and did not suppress appetite, indicating that its effect was to speed up the metabolism. In another study, administering DHEA (0.6% of the diet) decreased body weight and body fat in both lean and obese Zucker rats. The decrease in body fat was primarily due to the decrease in the number of fat cells in lean rats and to decreases in both the number and size of fat cells in obese rats.

Cancer
In contrast to estrogen, which may promote cancer under certain circumstances, DHEA show promise as an anti-cancer agent. In a strain of mice that develops spontaneous breast cancer, long-term administration of DHEA prevented the cancer from occurring. Treatment of mice with DHEA also delayed the appearance of colon tumors resulting from administering the carcinogen 1,2-dimethylhydrazine. In addition, administering DHEA inhibited the development of liver cancer in rats treated with chemical carcinogens. Other studies indicate that there is an association between DHEA levels and human breast cancer. In one study, urinary excretion of DHEA was below normal in a group of premenopausal women with breast cancer. Other researchers confirmed that DHEA levels are low in premenopausal breast cancer patients, but found that some postmenopausal women with breast cancer had elevated DHEA levels. It appeared that the low levels in the premenopausal patients were due primarily to decreased production, while the elevated levels in the postmenopausal patients were due to delayed breakdown. Whatever the reason for the changes, these studies suggest a possible role for DHEA in the prevention or treatment of at least some cases of breast cancer.

Autoimmune diseases
Conditions in which the immune system mistakenly attacks the body’s own tissues are called autoimmune diseases. Various types of arthritis, systemic lupus erythematosus (SLE), inflammatory bowel disease (ulcerative colitis and Crohn’s disease), and other inflammatory or connective tissue disorders are considered autoimmune diseases. Many other common conditions, including diabetes, hypertension and heart disease, are thought to have an autoimmune component. Studies in animals suggest that DHEA may have a beneficial effect on the process of autoimmune attack. The New Zealand Black mouse is a strain of mice which spontaneously develops an autoimmune syndrome resembling SLE. Administering DHEA to these animals prevented the kidney failure and the hemolytic anemia associated with this syndrome. DHEA to these animals prevented the kidney failure and the hemolytic anemia associated with this syndrome. DHEA has been shown to increase the production of interleukin-2 a component of the immune system which is consistently decreased in individuals with SLE. Because of these intriguing observations, Dr. Jim McGuire, Associate Professor of Medicine at Stanford University of Medicine, is currently conducting a clinical trial of DHEA in patients with SLE. DHEA is also being tested in patients with multiple sclerosis. Preliminary findings indicate that DHEA produces a significant improvement in stamina and in sense of well being in people suffering from multiple sclerosis.

Dr. Davis Lamson, a private practitioner in Kent, Washington, has also been seeing some exiting results with DHEA in various autoimmune disorders. He finds that serum levels of DHEA are often lower in the lower end of normal or below normal in people with rheumatoid arthritis or ulcerative colitis. Lamson has given DHEA to six patients with ulcerative colitis who had failed to respond to a combination of conventional therapy and nutritional treatments. In all six cases, the bleeding, diarrhea and overall condition improved. Dr. Lamson has also found DHEA therapy to be of value in treating rheumatoid arthritis and other forms of arthritis, as long as the initial DHEA level is on the low side.

AIDS
Another immune system related condition in which DHEA may play a role is acquired immunodeficiency syndrome (AIDS). DHEA has been reported to inhibit the replication of HIV, the virus believed to cause AIDS. In addition, this hormone has been shown to enhance the immune response to viral infections. Furthermore DHEA levels are reduced in people infected with HIV and these levels decline even more as the disease progresses to full-blown AIDS. In a recent study, 10 HIV-positive men with marginally low helper T-cell counts between 200 and 400 were observed. Men with serum DHEA levels below normal were 2.54 times as likely to progress to AIDS as were those with normal DHEA levels. These studies provide evidence that a deficiency of DHEA occurs in individuals with HIV infection and that this deficiency may be one of the factors contributing to immune system failure.

Chronic Fatigue Syndrome (CFS)
This debilitating condition was first described in the early 1980’s and is becoming increasingly prevalent among young adults and middle-aged Americans. The cause of this problem has not yet been identified, although several viruses are suspected. Conventional treatment has so far been unsatisfactory. Nutrition-oriented doctors have had some success treating CFS with allergy diets, thyroid hormones, nutrient injections (particularly magnesium and B-vitamins) and other treatments. During the past several years, a growing number of doctors have begun giving DHEA to individuals whose levels are low-normal or below normal. In some cases, this treatment produces definite improvement in energy level, stamina and general well-being.

Aging
Preliminary results in mice suggest that DHEA may retard the aging process. Animals treated with this hormone looked younger, had glossier coats, and less gray hair than control animals. In humans, serum levels of DHEA are known to decline with age; the levels in 70 year old individuals are only about 20% as high as those in young adults. This age-related decline is not known to occur with any of the other adrenal steroids. It has therefore been suggested that some of the manifestations of aging may be caused by DHEA deficiency. In my experience, some elderly people who suffer from weakness, muscle wasting, tremulousness, and other signs of aging experience noticeable improvements within several weeks of beginning small doses of DHEA (such as 5-15 mg/day)

Ovarian Hormone Affects Bone Health
Osteoporosis is another one of the manifestations of aging and there is evidence that the decline in DHEA levels may be a factor in age-related bone loss.
loss. It was mentioned above that DHEA is manufactured by the adrenal glands. Of note, however, is that DHEA is also one of the four major hormones produced by the ovaries; the other being estrogen, progesterone and testosterone. Both estrogen and progesterone have been found to have beneficial effects on osteoporosis; the former by inhibiting bone resorption, and the latter by stimulating bone formation. Testosterone has also been shown to improve osteoporosis. It would be surprising, therefore, if the fourth major ovarian hormone, DHEA, did not also play a role in the ovary-osteooporosis connection.

In fact, when one looks at the various biochemical effects of DHEA, they tend to read like the “who’s who of osteoporosis prevention.” First, one of the breakdown products of DHEA, a compound called androsterone-38, 178, is known to bind strongly to estrogen receptors. Therefore, DHEA, like estrogen, might inhibit bone resorption. Second, there is evidence that androsterone (a class of hormones which includes DHEA and testosterone) stimulate bone formation and calcium absorption. DHEA might, therefore, augment the bone-building effect of progesterone. As far as we can tell, DHEA is the only hormone which appears capable of both inhibiting bone resorption and stimulating bone formation.

DHEA Increases Levels of Other Hormones

A third factor of DHEA, that of a precursor hormone, almost certainly results in a beneficial influence on osteoporosis. As mentioned above, DHEA can be converted by the body into other hormones. Of particular interest in that DHEA is converted into both estrogen and testosterone, both of which play a role in prevention of bone loss. In a study of postmenopausal women, administering DHEA increased serum levels of both testosterone and estrogens (estradiol and estrone).

Finally, DHEA may be capable of raising the levels of progesterone. Although DHEA is not converted directly into progesterone, it may, through a feedback mechanism, indirectly increase the production of progesterone. Both DHEA and progesterone are produced from the same precursors hormone, pregnenolone. If enough DHEA is present, then pregnenolone will be converted primarily to progesterone, rather than to DHEA.

These multiple functions of DHEA seem rather impressive. Not only does this hormone apparently have a direct effect on both resorption and formation of bone, but it can also increase the levels of the other major hormonal “players”: namely, estrogen, progesterone, and testosterone. Furthermore, there is no need to worry that taking DHEA will cause cancer, because the evidence suggests that it actually prevents cancer.

DHEA and Osteoporosis

It has been shown that menopause is associated with a reduction in DHEA levels. In one study, the average plasma levels of DHEA (mg/100 ml) was 542 in premenopausal women, 197 in postmenopausal women, and only 126 in women whose ovaries had been surgically removed. In a group of women between the ages of 55 and 85 years, there was a significant correlation between serum levels of DHEA (measured as DHEA-S), and bone density of the vertebral spine. In other words, women with higher levels of DHEA had greater bone mass than those with lower DHEA levels.

Since bone mass and serum DHEA both decrease with aging, one cannot be certain that falling DHEA levels are actually the cause of reduced bone mass. On the other hand, there is evidence that aging alone cannot explain the relationship between DHEA levels and bone mass. In a recent study of Belgian women, significant correlations were found between bone mineral content and DHEA levels (measured as DHEA-S) even after correcting for the effects of age. In another study, serum DHEA levels were significantly lower in 49 women with osteoporosis that in women of similar age without osteoporosis. Although DHEA levels declined with age in both groups of women, those with osteoporosis has lower levels of DHEA at all ages. These studies support the proposed role of DHEA in maintaining bone mass.

DHEA, Rheumatoid Arthritis, and Corticosteroids

DHEA levels have also been found to be low in women with rheumatoid arthritis, a condition frequently associated with osteoporosis. In a study of 49 postmenopausal women with rheumatoid arthritis, DHEA levels (measured as DHEA-S) were significantly lower than in healthy controls. DHEA levels were reduced to a greater extent in women taking corticosteroids for their arthritis than in those who were not. That finding is not surprising, since administering these drugs is known to reduce the levels of adrenal androgens such as DHEA. However, DHEA levels were also significantly reduced in arthritic women who were not receiving corticosteroids. In this group of 49 women, DHEA levels correlated significantly with bone mineral density of the neck of the femur (a bone in the hip) and the spine. The serum level of DHEA was able to predict bone mineral density, even after corticosteroid therapy was taken into account.

This study suggests that DHEA might be of benefit to people with rheumatoid arthritis, a condition commonly associated with osteoporosis. Rheumatoid arthritis is a condition commonly associated with osteoporosis. Rheumatoid arthritis itself is associated with low DHEA levels and corticosteroid therapy appears to make DHEA deficiency worse. Corticosteroids are known to be an important cause of osteoporosis. Indeed, that is one of the main reasons doctors are so reluctant to prescribe these drugs. Perhaps, one of the reasons corticosteroids cause osteoporosis is that they deplete DHEA. Would simultaneous administration of DHEA inhibit some of the side effects of corticosteroids, including osteoporosis? Our natural adrenal secretions contain both of these hormones, and nature usually does things for a reason. Animal studies suggest that DHEA does, in fact, modulate some of the effects of corticosteroids.

It appears, then, that supplementing with DHEA might prevent the individuals with rheumatoid arthritis, particularly in those who are taking corticosteroids, in addition, DHEA may impact positively on the arthritic process itself. According to Dr. Lamson, who has given DHEA to several arthritic patients with low serum levels of DHEA, this treatment often relieves pain and morning stiffness, increases strength, and reduces the need for anti-inflammatory medication. In a study of 45 postmenopausal women being treated with corticosteroids, administering DHEA (20 mg/day) resulted in an increased sense of well-being, with no side effects.

Osteoporosis: Additional Evidence

An additional clue to the relationship between DHEA and bones comes from a study of individuals with Addison’s disease, also known as adrenal insufficiency. This condition results form a
failure of the adrenal cortex to produce adequate amounts of adrenal hormones. Bone mineral density measurements at the radius (a bone in the forearm) showed normal values in premenopausal women with Addison’s disease. However, in postmenopausal women with this disorder, there was a dramatic loss of bone which exceeded the typical postmenopausal decline. This accelerated bone loss was associated with a profound reduction in plasma DHEA levels, which averaged 94 percent lower than those of healthy postmenopausal women. Plasma concentrations of estrogen and testosterone, two of the by-products of DHEA, were also reduced.

These findings strongly suggest that DHEA secreted by the adrenal cortex plays an important role in maintaining bone mass in postmenopausal women. In premenopausal women with Addison’s disease, enough DHEA is apparently made the ovaries to compensate for the weak adrenal glands. That most likely explains why these women do not develop osteoporosis. After menopause, however, when ovarian production of DHEA slows down, the adrenal glands are not capable of taking over, and a marked deficiency of DHEA results. It is quite possible that giving DHEA to postmenopausal women with adrenal insufficiency would prevent the accelerated bone loss that these women experience.

The Future of DHEA Therapy

A number of innovative doctors are currently using DHEA and finding exciting results. We do not know at the present time what the optimal dose of DHEA is. Practitioners using DHEA are typically prescribing 3-30 mg/day, although much larger doses are being given to patients with cancer, AIDS, and other serious conditions. We also do not have a clear understanding of who should receive DHEA, or when it should be started. Commercial laboratories can measure blood levels of DHEA and DHEA-S. These measurements may provide a crude estimate of DHEA status, but they cannot predict with certainty who will benefit from treatment or what the dosage should be. Jonathan V. Wright, MD, a leading authority in nutritional medicine, has observed that the absence of hair on the lower third of the legs is suggestive of DHEA deficiency.

DHEA appears to be quite safe. Dosages as high as 1,600 mg/day have been given for periods of 28 days without any serious side effects. Although mild abnormalities of blood sugar metabolism occurred in some cases. Minor side effects, such as acne or a slight increase in hair growth on the arms and legs, may occasionally occur when DHEA is taken.

At the present time, most physicians are unaware of the importance of DHEA. Furthermore, DHEA is available at only a handful of pharmacies in the United States. As is typical of most natural, non-patentable substances, the pharmaceutical industry has had no interest in putting its research funds or promotional dollars into DHEA. Nevertheless, as the research on DHEA continues to come in, a growing number of doctors are becoming interested in the therapeutic potential of this “hormone that does it all.” Until we know more about this exciting substance, we should use it with caution and should monitor closely for possible long-term side effects.