

The Cause Of Aging

Your Key To Anti-Aging

Some of the tools of the treatment: *Human Growth Hormone (Secretagogues & Releasers), DHEA, 7-Keto DHEA, Pregnenolone, Melatonin, Progesterone Cream and DMAE.*

What are the specific benefits?

Total Hormone Rejuvenation Therapy was recently evaluated by L. Cass Terry, M.D., Ph.D., chairman and professor of neurology at the Medical college of Wisconsin in Milwaukee, USA. Dr. Terry started as a client of Dr. Chein - a leading anti-ageing doctor - in the USA and found the results were amazing. A professional neuroendocrinologist and researcher, he decided to put the treatment to the rigors of scientific evaluation. He found no negative side effects, only benefits. His results from 202 patients studied were:

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| ·88% increased muscle strength | ·75% found their sexual potency and frequency of sex improved |
| ·81% increased muscle size | ·62% noticed penile erection duration lengthened |
| ·72% lost body fat | ·57% noticed night time urination stopped |
| ·81% increased their exercise tolerance | ·58% found hot flashes reduced or eliminated |
| ·71% found their skin texture softened and improved | ·39% found lessening of menstrual pain and improved cycle regulation |
| ·68% noticed their thinning skin, thickened | ·84% noticed huge increases in overall energy levels |
| ·71% noted increased elasticity in skin | ·67% found their moods balanced, provided more emotional stability |
| ·61% noticed wrinkles faded and or disappeared | ·78% noticed their overall attitude towards life lifted |
| ·38% of men had new hair growth | ·62% found their memories and ability to recall were strengthened. |
| ·55% noticed injuries healing faster than normal | |
| ·61% noticed old injuries healing | |
| ·71% noticed overall healing capacity improvements | |
| ·83% noticed increased back flexibility | |
| ·73% found their resistance to common illness strengthened | |

HUMAN GROWTH HORMONE

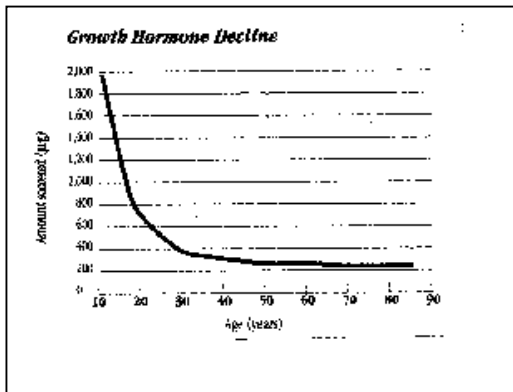
“Recently medical researchers have discovered the cause of aging. It has turned out to be quite simple. In an experiment at North Dakota State University 19 month old aged mice were given injection of either growth hormone or saline twice a week. After 13 weeks of treatment 39% of the saline mice were still alive. This is normal. Of the growth hormone treated mice 93% were still alive after 13 weeks. This is not normal at all. The injections were then stopped for 6 weeks. During this period all of the remaining saline treated mice died of old age while only 1 out of 20 mice that had received growth hormone expired. The researchers then re-instituted growth hormone injections in the remaining 19 animals for a further 6 weeks. At the end of the experiment 18 mice were still alive. And so with little fanfare the major cause of age associated mortality was discovered. Experiments with aged humans have confirmed that the administration of growth hormone brings about signs of rejuvenation such as reduction of adipose tissue, as well as increases in growth hormone-insulin-like growth factor-1 (IGF-1), muscle mass, bone density and skin thickness. The major project left in the field of aging is to discover why growth hormone secretion is suppressed with increasing age.”

- *North Dakota State University Experiment Longevity Report 33, page 4. - By Douglas Skrecky*

1. What is Human Growth Hormone (hGH)

Human Growth Hormone is one of several endocrine hormones, like estrogen, progesterone, testosterone and DHEA, which decline in production as we age. While many of these hormones can be replaced to deter some of the effects of aging, growth hormone goes far beyond the effect of any one of these hormones to not only retard biological aging, but also to significantly reverse many of the effects of aging. Researchers have proven growth hormone therapy can reverse the biological effects of aging by as much as 20 years with less than one year of treatment.

Human growth hormone is secreted by the pituitary gland. It is produced at a rate that peaks during adolescence when accelerated growth occurs. Growth hormone secretion decreases with age in every animal species tested thus far. In humans, the amount of growth hormone after age 30 declines about 14% per decade, so that total daily growth hormone production is reduced dramatically with age. In numerical values, we produce, on a daily basis, about 500 micrograms of growth hormone at age 20, 200 micrograms at age 40, and 25 micrograms at age 80. At age 40 our growth hormone production is only 40% of what we produced at age 20. The fall in IGF-1 levels with age is identical to the decline of growth hormone



Scientists do not know why persons over age 40 incur such significant decreases in growth hormone secretion with a resulting growth hormone deficiency. Medical research has revealed that the aging pituitary somatotroph cells can still secrete as much growth hormone as the young somatotrophs cells if they are adequately stimulated. This has led researchers to the theory that the reason for the decreases in hGH secretion must lie in the factors that regulate its release. Some research scientists believe the problem lies with somatostatin, the natural inhibitor of growth hormone. Somatostatin has been found to increase

with age and may act to block the pituitary's release of growth hormone. When researchers eliminated somatostatin production in old rats, they found growth hormone secretion as great as that in young rats. A second theory is that the precursor hormone, growth hormone-releasing hormone (GH-RH), which stimulates growth hormone release by the pituitary gland, becomes less sensitive to signals from the hypothalamus. Hence, insufficient GH-RH is released resulting in a decrease of growth hormone secretions over time.

A third theory is that, not only does the growth hormone secreted and available to receptors in our cells decrease with aging, but that the cell receptors become more resistant and less responsive to the growth hormone available. Under this theory, aging can be viewed as a disease of growth hormone resistance within our cell receptors similar to the way in which diabetes is a disease of insulin resistance.

Human growth hormone is primarily released in pulses that take place during the beginning phases of sleep. Growth hormone is rapidly converted in the liver to its powerful growth promoting metabolite, Insulin like Growth Factor - Type 1 (IGF-1), also referred to as Somatomedin C. IGF-1 causes most of the effects associated with growth hormone. It is measured in the blood to determine the level of growth hormone secretion. Most of the beneficial effects of human growth hormone are directly attributable to IGF-1.

The decline of growth hormone with age is directly associated with many of the symptoms of aging, including cardiovascular disease, increased body fat, osteoporosis, wrinkling, grey hair, decreased energy, reduced sexual function and other symptoms. Many of these symptoms have been found in younger adults who have growth hormone deficiency.

Most importantly, clinical evidence and recent medical research clearly demonstrate that by replacing growth hormone in IGF-I deficient adults, we can significantly eliminate these symptoms, reverse the biological effects of aging, reduce body fat, increase lean muscle mass, strengthen the immune system, improve sexual performance, lower blood pressure, lower cholesterol, restore hair colour and growth, increase bone tissue strengthen the heart and increase energy. There is no other substance known to medical science that has such extensive ability to deter and reverse the aging process.

In reviewing the benefits of growth hormone therapy listed above it is difficult to believe that growth hormone could have so many beneficial effects. However, as we examine more closely the evidence accumulated by medical research and the interaction between growth hormone and the various bodily systems that affect the areas benefited, we develop an understanding as to how an increased level of growth hormone results in so many beneficial effects.

2. History of Growth Hormone Replacement Therapy

In 1985, Keith Kelley, M.D., a research scientist demonstrated that injections of cells that secrete high amounts of growth hormone could cause the shriveled thymus glands in old rats to grow until they became as large and healthy as those of young rats.

The thymus gland is the primary organ of the immune system. Immune system enhancement as a result of an increased level of growth hormone includes the following: increased maturation of neutrophils; higher activity of natural killer cells; stimulation of macrophages, and increased production of red blood cells. Also, the manufacture of new antibodies, increased production of T-cells and interleukin 2, and the greater proliferation and activity of lymphocyte cells.

Growth hormone is a protein molecule consisting of 191 amino acids. Genetic engineering, a new technology that emerged in the 1970's, enables researchers to splice human genes. The process of gene splicing enabled researchers to clone the growth hormone protein after identifying its exact sequence of DNA. After the growth hormone protein was cloned, it was then produced in drug laboratories in commercial quantities. Consequentially, biosynthetic growth hormone began to be available to medical researchers for the first time in the 1980's. This genetically engineered recombinant human growth hormone is completely identical to the growth hormone made by the human pituitary gland and is therefore referred to as a natural hormone.

Dr. Daniel Rudman, an endocrinologist and medical researcher from Madison, Wisconsin, USA, conducted the original and remarkable research on the effect of growth hormone replacement therapy in humans. By the time Dr. Rudman began his work in the mid-1980's, the safety of growth hormone had already been well established through its use in children with growth hormone deficiency. Dr. Rudman believed that the changes in body composition, which become apparent around age 35 had to do with declining hormone levels. The only method of testing his hypothesis was to replace growth hormone in deficient elderly adults to ascertain if the growth hormone replacement reversed some of the effects associated with aging. If growth hormone replacement reversed the changes in body composition (ratios of body fat and lean body mass to total body weight) associated with aging, then growth hormone might reverse the loss of bodily structure and function that occurs with aging.

To test his theory, Dr. Rudman began by replacing missing growth hormone in a group of older men to examine its effects on lean body mass and body fat in elderly adults. Dr. Rudman studied 26 men between the ages of 61 and 80 who had experienced significant adverse changes in body composition with age, but who were otherwise healthy. These men were overweight and had significantly low levels of growth hormone.

Dr. Rudman selected growth hormone as the initial hormone to be replaced for two reasons. First, he was aware that an increase in body fat and a decline in lean muscle mass generally accompanied the decline in growth hormone after age 35. Secondly, medical researchers in Sweden and Denmark had already determined that patients who were deficient in growth hormone due to pituitary dysfunction and had received growth hormone replacement therapy became leaner.

Without altering their lifestyles, diets or exercise programs, the men in Rudman's who received growth hormone replacement gained an average of 9% in lean muscle mass while losing 14% of body fat during their six month test. Bone density increased and their skin became thicker and firmer. According to Rudman, the men who received growth hormone replacement therapy during the six months study experienced a reversal of the effects of aging by 10 to 20 years.

Dr. Rudman concluded, *"The overall deterioration of the body that comes with growing old is not inevitable"*.

Rudman's study, published in The New England Journal of Medicine in 1990, (available on request) constituted a tremendous scientific breakthrough in the field of rejuvenation medicine. The magnitude and the far-reaching impact of Rudman's published study have yet to be determined. For the first time, medical science, empowered with the recently developed genetically engineered recombinant human growth

hormone had discovered a means for reversing the effects of aging in humans. The course of the future and history for mankind was forever altered.

Dr. Rudman inspired research scientists and physicians worldwide to investigate and research the use of growth hormone replacement therapy to reverse the effects of aging and treat diseases associated with aging. Concurrent with the time of Dr. Rudman's study, medical researchers in England, Sweden and Denmark were also discovering with consistency the remarkable effects of growth hormone replacement therapy. Providing patients with growth hormone deficiencies arising from pituitary disease with growth hormone replacement had a remarkable impact upon such patients. These patients had been depressed, experiencing low vitality, fatigue, anxiety, loss of sex drive and were dying prematurely at twice the average rate due to cardiovascular disease and other problems prior to use of hGH. Growth hormone replacement therapy brought the patients out of their depression and fatigue into higher quality, productive and happy lives.

In 1996, the New England Journal of Medicine reported growth hormone replacement had reversed heart failure. Today the National Institute on Aging is conducting six clinical trials in a multimillion-dollar study of growth hormone replacement therapy to further confirm that growth hormone retards and reverses aging.

In August 1996, the Food and Drug Administration approved the use of growth hormone in adults with growth hormone deficiency due to pituitary or hypothalamic disease, injury, and surgery or radiation therapy. Studies conducted in England, Sweden and Denmark since 1985 clearly demonstrate that aging is a pituitary disease. Therefore, recent FDA approval of adult growth hormone replacement therapy may now allow physicians in the United States to prescribe growth hormone for adults with low levels of IGF-1, without knowing why there is a failure of the pituitary gland to produce adequate amounts of growth hormone. This is a legal rather than a medical question.

The FDA approved adult growth hormone replacement therapy for adults with somatotropin (growth hormone) deficiency syndrome after reviewing clinical data submitted to it by the Eli Lilly Company. Lilly secured FDA approval for adult growth hormone replacement therapy because data secured from Lilly's clinical trials demonstrated that growth hormone replacement therapy resulted in: - an increase of lean muscle mass, a decrease in body fat, an increase in exercise capacity and an increase in quality of life among adults with growth hormone deficiency.

3. What are the Benefits of Human Growth Hormone Replacement Therapy

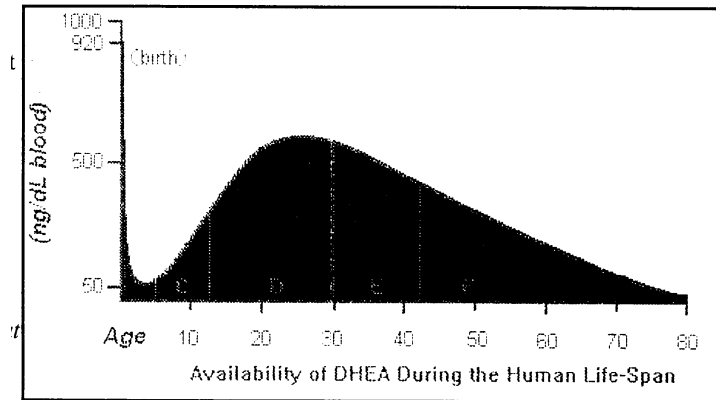
As a result of recently published worldwide medical research, Growth Hormone Replacement Therapy has proven its capacity to provide the following benefits:

- Reverse the effects of aging
- Reduce body fat an average of 14 % during the first six months of growth hormone therapy without dieting
- Increase lean muscle mass an average of 9% during the first six months of growth hormone therapy without increased exercise
- Increase energy level
- Enhance sexual performance
- Reduce stress level
- Enhance immune system
- Grow hair
- Lower cholesterol
- Lower blood pressure
- Reduce fatigue
- Strengthen the heart
- Increase cardiac output
- Restore the size of liver, pancreas, heart, kidneys, spleen and other organs that shrink with age
- Strengthen bones
- Reverse osteoporosis
- Increase exercise performance
- Accelerate wound healing younger, tighter, thicker skin
- Elevate mood
- Increase memory retention
- Improve sleep
- Reverse muscle wasting
- Improve cognitive abilities
- Prevent chronic, degenerative disease
- Improve vision
- Improve brain function
- Grow neuron dendrites to repair brain injury or treat disease

DHEA

Introduction

Dehydroepiandrosterone (DHEA) is a steroid hormone produced in the adrenal gland. It is the most abundant steroid in the bloodstream and is present in even higher levels in brain tissues. DHEA levels are known to fall precipitously with age, decreasing from age 20 to 90 by 90%.



DHEA is known to be a precursor to the numerous steroid hormones including estrogen and testosterone which serve well known functions, but the specific biological role of DHEA itself is not so well understood. It is difficult for researchers to separate the effects of DHEA from those of the primary sex steroids into which it is metabolized.

Although the specific mechanism of action of DHEA are only partly understood, supplemental DHEA has been shown to have anti-aging, anti-obesity and anti-cancer influences. In addition, it is known to stabilize nerve cell growth and is being tested in Alzheimer's patients.

Notes:

We have researched the wealth of Independent Scientific studies on DHEA to provide the following summary on the power and effectiveness of DHEA. As with all Research, it is on going, and new studies are being made across the World.

What should be noted at the outset is that, because DHEA is a naturally occurring substance, there has been no incentive for the large Pharmaceutical Companies to undertake research on its effectiveness - simply because they cannot profit by Patenting it. This has not, however, stopped the many brilliant members of both the Medical and Pharmacological Professions from recognizing its value as a substance with far reaching preventative and curative powers, and undertaking independent research to add to our fund of Medical knowledge.

It should be noted as well that the research, which is reported below, has, in line with most Scientific Medical studies, been carried out on animals, usually rats and mice. Scientifically controlled studies on Humans are proceeding, but most of the evidence of DHEA's effectiveness on humans is coming in on a case by case basis, reports of an individual's own experience. Though "uncontrolled" in Scientific terms, the sheer volume and positive nature of these reports are of significant value to sufferers of chronic ailments presently getting little relief from "Conventional" drug therapy.

Much of the Scientific Research is chronicled in the recently published book edited by Drs. Kalimi and Regelson entitled "The Biologic Role of Dehydroepiandrosterone (DHEA)". Its 24 chapters examines the work of Scientists from across the globe and is prefaced by their remarks that: "DHEA modulates diabetes, obesity, carcinogenesis, tumor growth, neurite outgrowth, virus and bacterial infection, stress, pregnancy, hypertension, collagen and skin integrity, fatigue, depression, memory and immune responses."

The following summary is itemized by ailment/disease to allow easy browsing. This summary is provided for information only and should not be used as a tool for either diagnosing or treating disease without the advice of appropriate and qualified Health Care professionals, who should be consulted in case of doubt.

Listed below are summaries of some of the current research projects:

1. DHEA: the buffering Steroid

DHEA may be unique among hormones for its lack of specificity for hormone receptor sites. Just as vitamin E has never been shown to have a specific metabolic rate (it is only proven essential as a general antioxidant), DHEA may serve an equally general purpose. It is a broad-acting hormone that only demonstrates itself under a specific set of circumstances, in that way, it is like a buffer against sudden changes in acidity or alkalinity. That is why when you get older you're much more vulnerable to the effect of stress. As DHEA declines with age, you are losing the buffer against the stress-related hormones. It is the buffer action that helps slow down aging.

The decrease of DHEA with age may result in the gradual decline of a system for suppressing enzymes systems responsible for creating the building blocks of new cells, like lipids, nucleic acids (RNA and DNA) and sex steroids. The resulting rise in enzymatic activity in advanced age may be responsible for the events (cancer) and degenerative disease that become more frequent in advanced age. In this respect, DHEA might be best considered to be an anti-hormone, which might "de-excite" steroid sensitive receptors that would otherwise lead to enhanced metabolic activity.

2. DHEA and Cancer

Early reports from England suggested that DHEA was abnormally low in women who developed breast cancer, even as much as nine years prior to the onset or diagnosis of the disease. Of the 5,000 women followed in the study, 27 developed cancer. Most of the 27 had abnormally low levels of DHEA. Another study has demonstrated that, in those women who develop breast cancer, levels of DHEA correlate with more advanced cancer at diagnosis. This finding held for both pre and postmenopausal women. If low DHEA levels contributed to breast cancer, might the opposite be true?

Many years later, Dr. Arthur Schwartz of Temple University found that supplemental DHEA significantly protected cell cultures from the toxicity of carcinogens. Cell cultures usually respond to powerful carcinogens with mutations (changes in DNA), transformations (changes in cell appearance), and a high rate of cell death. But when Schwartz added DHEA along with the carcinogen, all three of these effects were significantly diminished.

Subsequent studies by Schwartz identified powerful protective effects of supplemented DHEA for breast cancer prone mice. The results of the experiment was clear after 8 months. The control animals were getting cancer left and right while the DHEA animals had no tumors. In two later studies with different strains of mice, Schwartz found 75% and 100% reductions in tumor incidence at 8 months of age, and 50% and 75% reductions at 15 months of age. DHEA has demonstrated protective effects for cancers of the skin, lungs, bowel, bladder, breast lymphatic system and liver. According to William Regelson "Whenever DHEA has been tested in a model of carcinogenesis and tumor reduction, it has preventative effects."

3. Strengthening the Immune Systems

DHEA is known to enhance general immune response. Oral and subcutaneous DHEA has been observed to protect rodents against lethal viral and bacterial infections. In one study mice were given an injection of a virus in a dose sufficient to kill them. The group treated with DHEA all survived while the untreated animals all died. Androstenediol, which is formed from DHEA in the body, was significantly more effective than DHEA in preventing death. The same effect has been shown with several other types of animals and with both bacterial and viral infections. In humans infected with HIV, a low DHEA level in the blood has been shown to be highly predictive of rapid progression to AIDS.

DHEA has been reported to counteract the shrinking of the thymus gland and immune-suppression caused by cortisosteroids resulting in greater immune response and higher antibody levels in response to infections.

Neither DHEA nor androstenediol have any direct antiviral activity. The amount of viral load in heart, spleen, pancreas, liver, and blood tissues was unaffected by either DHEA or androstenediol administration. The effect of these Steroids appears to be strictly mediated through stimulation of lymphayter lymphoid organs, and cytokines, which are naturally occurring regulators of the immune system

4. DHEA and Cardiac Risk

DHEA has been shown to lower serum cholesterol when given to obese rats, rhesus monkeys, dogs, and mice. In a study involving postmenopausal women, serum cholesterol dropped an average of 11.3% after only 4 weeks of DHEA administration. Men who eventually had fatal heart attacks were found to have lower serum DHEA levels than age-matched controls. Low doses of DHEA have been shown to decrease the level of a substance in the blood, which inhibits plasma plasminogen activator, a substance that can prevent heart attacks.

5. DHEA, Obesity and Appetite

At about the same time that Schwartz was investigating the anti-cancer Properties of DHEA, Dr. Terrence T. Yen was studying the effect of DHEA on genetically obese mice. Although the DHEA treated mice ate normally, they remained thin - and they lived longer than control mice did. Dr. Schwartz also conspicuously noted this effect. In another experiment Dr. M. P. Cleary found that even middle-aged rats lost weight when fed DHEA-supplemented food. Diabetes, a typical complication of obesity, was also dramatically decreased. In rats genetically prone to overeating, DHEA caused a decrease in the number and size of fat cells. The weight loss seen in experimental animals was independent of food intake, in other words, these animals ate the same amount but deposited less fat in their bodies.

When DHEA levels were measured in obese, pre-menopausal women, low levels were associated with a greater degree of obesity.

In different experiments, DHEA supplementation has resulted in increased decreased and unchanged food consumption. Dr Schwarzl found that it is the level of dietary fat that influences food consumption. DHEA-treated rats on a high-fat diet ate less food than control rats, while those on a lower fat diet ate more.

Since DHEA inhibits G6PDH activity and suppresses the body's ability to synthesize fat from carbohydrate, dietary sources of fat become more important. This can affect changes in appetite. But despite possible increaser in food intake, DHEA-treated animals consistently weighed less than control animals. In other words, increases in appetite, when indulged, did not negate the anti-obesity property of DHEA.

6. The Glucose factor and Diabetes

Investigations have shown that DHEA inhibits glucpse-6-phosphate dehydrogenase (G6PDH), an enzyme that breaks down glucose. There are two glucose-metabolizing pathways in the body, the catabolic energy-yielding pathway and the anabolic, biosynthetic (fat producing) pathway. G6PDH appears to be the first enzyme in the biosynthetic pathway, the one which results in the synthesis of fatty acids and ribose (the sugar used in making deoxyribonucleic acid, or DNA). In simple language G6PDH turns glucose into fat.

DHEA inhibition of G6PDH may redirect glucose from anabolic fat-production into catabolic energy metabolism, thus creating a leaner metabolism. In the liver, it can be demonstrated that the generation of energy is less efficient, causing more calories to be burned to accomplish the same task.

In diabetic animals, DHEA has been shown to increase their sensitivity to insulin, which allows them to derive more benefit from the insulin they have, resulting in lower serum glucose levels.

7. DHEA and Aging

The body's production of DHEA drops from about 30 mg at age 20 to less than 6 mg per day at age 30. According to Dr. William Regelson of the Medical College of Virginia, DHEA is one of the best biochemical markers for chronological age. In some people, DHEA levels decline 95% during their lifetime- the largest decline of an important biochemical yet documented. In animal studies, DHEA extends rodent life spans up to 50%. The animals not only lived longer, they looked younger. The greying course-haired control animals could easily be distinguished from the sleek, black haired treated animals.

DHEA levels are directly related to the risk of death in humans. In a 12 year study of over 240 men aged 50 to 79 years, researchers found that DHEA levels were inversely correlated with mortality. Both from heart disease and from all causes. This finding suggests that DHEA level measurements can become a standard diagnostic predictor of disease, modality and life span. Furthermore, if animal tests hold true, supplemental DHEA may prevent disease, reduce mortality, and extend life span in humans.

8. Sex Drive

In a very interesting study, it was found that women with lower DHEA levels also reported lower frequencies of intercourse and lower self-rated sexual gratification scores. DHEA levels relate significantly to the four-stage sexual response process.

9. Brain Function and DHEA

DHEA may also be intimately involved in protecting brain neurons from senility-associated degenerative conditions, like Alzheimer's disease. Not only do neuronal degenerative conditions occur most frequently when DHEA levels are lowest, but brain tissue contains much higher levels of DHEA than is found in the bloodstream. One of the scientists at the forefront of this field of research is Dr. Eugene Roberts who found that very low concentrations of DHEA were found to increase the number of neurons, their ability to establish contacts, and their differentiation in cell cultures. He also found that DHEA enhanced long-term memory in mice undergoing avoidance training. It may play a similar role in human brain function.

Section I - Product Analysis

Scientific investigators interested in the biology of aging have increasingly focused their attention on the steroids dehydroepiandrosterone (DHEA) and its sulfated-form DHEAS. DHEA and DHEAS are regarded as the steroids of youth because levels of these steroids in both women and men peak in early adulthood and then decrease with age.

DHEA and DHEAS are synthesized in large quantities in humans almost entirely by the adrenal cortex. Despite the fact that the concentration of DHEAS circulating in adult men and women exceeds that of any other steroid except cholesterol, the function of this steroid in maintaining health had historically received little attention in the scientific community. In recent years, however, there has been considerable research concerning the role of DHEA and DHEAS in aging.

DHEAS and DHEA are adrenal precursor steroids which are transformed into androgens and/or estrogens in peripheral target tissues. The amounts of DHEAS and DHEA that are converted into androgens and/or estrogens are dependant upon the levels of various steroidogenic and metabolizing enzymes expressed by these tissues. The importance of DHEA and DHEAS is evident by the finding that approximately 50 per cent of total androgens in adult men are derived from these adrenal precursor steroids.¹⁴ In women, the best estimate by researchers of the formation of estrogens in peripheral tissues from DHEA/DHEAS is approximately 75 per cent before menopause and close to 100 per cent after menopause.⁵

DHEAS is a sulfate of DHEA and both are inconvertible in plasma.⁶ Thus, DHEA is converted to DHEAS and DHEAS is converted to DHEA. The liver will metabolize DHEA when it is taken orally. However, only a small portion of the ingested DHEA will appear in the blood as DHEA while the larger amount is converted by the liver into DHEAS. The metabolic clearance rate of DHEAS is smaller than that of DHEA because DHEAS is bound much more strongly to albumin, and there is direct as well as indirect metabolism of DHEAS, so that a quantitative difference in metabolites is present.⁷⁻⁸

Two observations by researchers have recently caused the scientific community to give considerable attention the DHEA and DHEAS. First, unlike other adrenal steroids whose serum levels are relatively stable with aging, circulating levels of DHEA and DHEAS decline progressively and markedly with aging. Adrenal secretion of DHEA and DHEAS increases during adrenarche in children at the age of six to eight years, and maximum levels of circulating DHEAS are reached between the ages of 20 and 30 years. Thereafter, serum levels of these steroids decrease about 2 per cent per year. In fact, at age 70, serum

DHEAS levels are at approximately 20 per cent of their peak values and by age 85-90, they may have decreased by up to 95 per cent.⁹⁻¹³ Average DHEA and DHEAS levels are as follows:

Age	DHEAS	DHEA
25-34	6.44 +/- 2.29	15.91 +/- 6.05
35-44	6.02 +/- 2.18	12.65 +/- 2.69
45-54	4.75 +/- 2.62	11.31 +/- 5.39
55-64	3.25 +/- 1.48	10.20 +/- 5.21
65-74	2.65 +/- 1.68	7.71 +/- 4.15
75-84	1.15 +/- 0.52	5.36 +/- 1.68
85-100	1.23 +/- 0.52	3.18 +/- 0.69

The 70-90 per cent reduction in the formation of DHEAS by the adrenals during aging results in a dramatic reduction in the formation of androgens and estrogens in the peripheral target tissues.

Second, numerous animal studies have demonstrated the beneficial effects of DHEA administration in preventing obesity, diabetes, cancer and heart disease, in enhancing the immune system and even in prolonging life span. These observations have led investigators to speculate that some of the degenerative changes associated with human aging may be related to a progressive deficit in circulating DHEA and DHEAS.¹⁴ However, it must be emphasized that most of these animal experiments were conducted in rodents which have little, if any, natural circulating DHEA. Thus, it is possible that the results obtained in these animal models cannot be extrapolated to humans. Hence, a major scientific question is whether any of the beneficial consequences can be shown relevant to human beings.

Studies of 50 to 100 mg supplementation of DHEA administered orally at bedtime were conducted in men and women aged 40-70 years in double-blind, placebo-controlled cross-over trials of six and twelve month durations. The first study, involving the administration of 50 mg DHEA, was six-months' duration and included 13 men and 17 women 40-70 years of age. Within two weeks of initial DHEA administration, DHEA and DHEAS levels were restored to those found in young adults and were sustained throughout the three months of supplementation. A two-fold increase in serum levels of androgens was observed in women with only a small rise in men. These androgen increases in women remained within the range of young adults. This supplementation with DHEA resulted in perceived physical and psychological well-being for both men (67 per cent) and women (84 per cent) with no change in libido. These observations, and the absence of side-effects, constitute the first demonstration of novel effects with the supplementation of DHEA in older men and women.¹⁵

The second study, of one year's duration, involved supplementation with a 100 mg oral dose of DHEA or placebo in eight men and eight women 50-65 years of age. Serum DHEAS levels increased by several times in both men and women by the end of the six months of DHEA, but not the placebo, administration. These levels were near or beyond the upper limit of young adult levels. In men, the androgen level was doubled. In women, there was a three-to-four fold increase in all androgenic steroids, and these levels were above the upper limits of normal adult women. The 100 mg supplementation caused development of facial hair in one woman, side effect... that was resolved by the end of the study. Thus, supplementation of 100 mg each day for six months appears to be excessive due to the increased androgen levels in women.¹⁶

The third study, a single-blind placebo-controlled trial of 5 months' duration, was conducted on nine healthy elderly men who were non-smokers, on no medications, and with a mean age of 63.7 years. Subjects took placebo orally every night for the first two weeks followed by oral 50 mg DHEA for 20 weeks. This study demonstrated a time-related stimulatory effect of DHEA on the immune function of aging men. These results are consistent with the animal data showing a stimulatory effect of DHEA on immunological-response parameters.¹⁶

Though side effects at low levels have not been reported, many health care professionals initiate dosage at 5 mg per day for 30 days and then titrate up to 10 mg per day and ultimately to 25 mg and more. It would appear from all the current evidence available that 50 mg would be the maximum daily dose. However, since

DHEA production continues to take place, at even advanced ages, a maximum dose of 25 mg per day should be the limit.

This is not a product to be misused, and proper warning instructions should be followed. DHEA should not be taken by any person who is under 40, pregnant, nursing, capable of bearing children, or taking any prescription medication, including hormone products. Persons suffering from any disease should consult a physician before using this product.

DHEA is a synthetically manufactured. Wild Yam extract is used by many manufacturers as a starting material in a complex methodology to convert to pure DHEA, much as many companies used Serotonin to convert it to Melatonin. Most material is approximately 99 per cent pure or better, however, the label should clearly state DHEA and not Wild Yam extract. There is no evidence that supports Wild Yam extract raises DHEA levels.

Section II - General Information

DHEA has exploded on the retail scene much as Melatonin did in early 1995. Articles in Newsweek and Vanity Fair magazines, CBS Morning News, Let's Live magazine, Wall Street Journal and others has already earned DHEA the title of "YOUTH HORMONE". This type of exposure, by the news media, is sure to be reinforced over the next several months. Several new books have recently appeared and more are on the way. The product is dynamic, appears to have proven health benefits, and appeals to the ever enlarging baby boomers' voracious appetite for alternative health treatment and the pursuit of eternal youth.

Quality is always an important issue. Proper verification of material should be mandatory when dealing with hormones. Retailers should qualify material being purchased by insisting upon HPLC (High Pressure Liquid Chromatography) evaluation as a basis to determine purity and potency. As was stated earlier, the FDA considers this a dietary supplement, i.e. "increasing the total dietary intake" to normal levels of a 25 year old. That means between 25 and 50 mg per day. No more! Our society works on the principal that if a little is good, then more is better. Well, that isn't the situation with DHEA, in view of, the total knowledge base currently understood by the scientific community. We urge all retailers to carefully review the data and make an informed, responsible decision on what they will display on the shelves for their customers.

Section III - Legal Status

It has been confirmed with the Drug Enforcement Administration (DEA) that DHEA is not an anabolic steroid and is not a controlled substance as defined in section 102(6) of the Controlled Substances Act. Substances which are steroids and promote muscle growth are by definition anabolic steroids and are controlled in Schedule III of the Controlled Substances Act. Since DHEA does not promote muscle growth, the DEA has determined that DHEA is not an anabolic steroid as defined in 21 CFR Section 1308.02. Thus, DHEA is not subject to regulation under the Controlled Substances Act.

The term "dietary supplement" is defined in Section 201 (ff) of the Federal Food, Drug and Cosmetic Act as follows:

(ff) The term "dietary supplement"

(1) means a product (other than tobacco) intended to supplement the diet that bears or contains one or more of the following dietary ingredients:

- (A) a vitamin;
- (B) a mineral;
- (C) an herb or other botanical;
- (D) an amino acid;
- (E) a dietary substance for use by man to supplement the diet by increasing the total diet intake; or
- (F) a concentrate, metabolite, constituent, extract, or combination of any ingredient described in clause (A),(B),(C),(D) or (E).

Thus, the term "dietary supplement" includes products containing "a dietary substance for use by man to supplement the diet by increasing the total dietary intake." DHEA falls within this provision because it is ingested to increase the total dietary intake of that substance.

However, if therapeutic claims are made for DHEA in product labelling or advertising, it could be regulated as a "drug" pursuant to the Federal Food, Drug and Cosmetic Act. The term "drug" is defined in Section 201(9) of the Act to include articles intended for use in diagnosis, cure, mitigation, treatment or prevention of a disease in man or other animals. Thus, if claims are made in DHEA labelling recommending the use of DHEA for the treatment or prevention of a disease, the U.S. Food and Drug Administration ("FDA") could regulate the product as a drug.

It has been confirmed through discussions with the FDA that it considers DHEA to be a dietary supplement within the meaning of the Act as long as therapeutic claims are not made concerning its use. The FDA also stated that of the few consumer complaints received concerning supplementation with DHEA, none were considered by the agency to be significant.

This product will continue to come under close scrutiny by governmental agencies. In view of the broad potential benefits that this product appears to possess, the likelihood of misuse is exaggerated, and therefore caution should be the watchword.

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7-Keto DHEA

Has been reported to garner better results than DHEA in improving energy, memory, weight loss, reducing stress effects, preventing muscle loss and stimulating the immune system. 7-Keto DHEA has all the benefits of DHEA but does NOT convert to estrogen or testosterone.

7-Keto DHEA TM is hypothesized to work by competing with the receptors that normally function with the stress hormones. Cortisol tends to become elevated with age and stress. High gluco-corticoids not only age the brain, they impair immune cell activity. By restoring the proper ratio of DHEA, which drops with aging, to cortisol, which rises with aging, these benefits accrue.

In a double blind, placebo controlled human study featured in the Oct. 99 issue of the *Journal of Exercise Physiology* determined that 200 mg of 7-Keto DHEA TM daily, combined w/ natural nutrients to support thyroid function (T-3), produced a 1 pound decrease in body fat per week over an 8 week period. Placebo participants lost less than a quarter pound of fat per week. Cholesterol, blood pressure and glucose studies revealed no significant changes. However 7-Keto DHEA TM is significantly more expensive than DHEA.

Considering the reported weight loss with 7-Keto DHEA TM, we know it can not be related to the action of testosterone, which tends to increase lean body mass, but rather through thermogenesis. Indeed a paper published in the *Proceedings of the National Academy of Sciences* showed in animal studies that 7-Keto DHEA TM burns fat through activation of thermogenic enzymes better than DHEA! (15)

As with DHEA, many of the benefits of 7-Keto DHEA TM are based on animal studies. However human studies from the University of Wisconsin, Madison, showed 7-Keto DHEA TM improved memory better than DHEA. Similar studies showed 7-Keto DHEA TM increases T-cell activity.

Interestingly, DHEA is converted into 7-Keto DHEA TM by human skin, leading to its possible role in slowing skin aging and wrinkling.

In summary, 7-Keto DHEA TM may work better than DHEA for obesity, cardiac protection, insulin sensitivity, skin aging, memory loss and the immune system. And this without the potential risks of increasing estrogen and testosterone!

Dosages and Cycling

A recent double blind, randomized study by Casson, et al., on 13 normal and overweight non-smoking and menopausal women endeavored to determine the effect of a six month 25 mg. Per day dose of oral DHEA therapy on DHEA, testosterone, blood fats, and IGF-1. At 3 months there was a positive change in DHEA and testosterone, returning to peri-menopausal levels along with a favorable rise in IGF-1. But at 6 months, hormone levels returned to baseline and HDL levels had dropped! This significant attenuation of bio-availability reflects the upregulation of DHEA metabolism in response to supplementation. Such upregulation suggests a supplementation strategy of cycling. (16)

Cycling hormone enhancements simply means scheduling a rest or break between periods or “cycles” of supplementation. Given the good results in the 7-Keto DHEA TM weight loss study, and the above study by Casson, et al., a break for a month after every two months seems a plausible strategy. Alternate strategies might include 5 days on, 2 days off, or supplementing every other day. Frankly, no one appears to know for sure what cycling strategies are best.

Generally middle aged and older men are advised to take 25 – 50 mg. per day, increasing the dosage with increasing age, stress levels and possibly with larger size. A commonly suggested dosage for women is 10 – 25 mg. per day. Though there is little circadian variation, DHEA is generally higher in the early AM and suggests dosing at bedtime or upon rising.

Most interestingly, according to Dr. Ray Sahelien, author of, “*DHEA: A Practical Guide*”, and pioneering proponent of DHEA, has lowered his dosage to 1-5 mg. daily!

Signs of Overdose

Signs of excessive consumption include chest tightness, heart palpitation, sleeplessness, irritability and extreme fatigue. More common symptoms occurring in women who take 100 – 200 mg doses daily for therapy in auto-immune disorders include facial hair, hair loss and acne. 7-Keto DHEA TM does not have this effect as is not turned into testosterone.

What To Do

It appears most men over 40 might do well to consider DHEA supplementation as evidence for benefits is fairly strong, though not conclusive, and the risk appears to be low. Certainly supplementing 5-25 mg per day with the general theme of the biologically older and the greater the stress the higher the dose seems reasonable based on present data. Certainly dosages above 100 mg warrant blood or salivary testing, the latter far more convenient and generally less expensive.

Common salivary tests include the DCT, the DHEA Challenge Test. The DCT measures DHEA and the two hormones into which it converts, estrogen and testosterone. The other is the Adrenal Stress Index (ASI) which measures DHEA and at least an early AM and a late PM cortisol. Using the 25-39 year old group as a reference, low and low normal DHEA suggests DHEA supplementation. High cortisol with normal or low DHEA suggests DHEA supplementation to obtain a 10 to 1 DHEA cortisol ratio. High estrogen in males would contraindicate DHEA supplementation and suggest 7-Keto DHEA TM, an admittedly more expensive alternative.

Because DHEA clearly raises testosterone and estrogen in women a more careful risk/benefit analysis must be considered. On one hand, women who have taken estrogen have a reported 27 – 30% lower morbidity rate from all causes. Menopausal females often experience a marked drop in testosterone with a concomitant loss in libido, muscle and bone mass, and vitality. Indeed many anti-aging doctors place post-menopausal women on natural progesterone, estrogens and testosterone for their many benefits.

Women with a history of high breast cancer or multiple risk factors, might do well to consider 7-Keto DHEA TM. (Risk factors include two or more close blood relatives with breast or prostate cancer, early menarche, late menopause, no children before 25, smoking, greater than 1 drink alcohol per day, and/or long term BCP use, and generally unhealthy lifestyles.)

Alternatively without frequent blood or saliva DCT's, women with such a history might consider a low dose of DHEA, not exceeding 10 mg/day.

Higher doses should be based on blood or saliva tests with the addition of a progesterone test to the DCT and ASI, as natural progesterone is thought by some anti-aging specialists to be breast protective when certain estrogen/progesterone ratios are maintained. (Progesterone may be prostate protective as well!)

Low and low normal DHEA with normal or low testosterone suggests supplementation. High testosterone contraindicates DHEA supplementation in women and indicates possible polycystic ovaries and/or hyperinsulinism. High estrogen levels contraindicate DHEA supplementation and suggest anti-estrogen therapies such as calcium D-glucuronate and indol-3-carbinol.

Of course, 7-Keto DHEA TM is a safe and less complicated choice. Cycling sublingual 7-Keto DHEA, 1 to 2 mg in the early AM and .5 to 1 mg in the late PM, may be a relatively conservative anti-aging schedule for anyone past their prime interested in restoring the hormones of youth safely without a doctor's guidance and/or blood/saliva testing.

Before menopause, women should only take 7-Keto DHEA TM. Pregnant women should not take 7-Keto DHEA TM at this time. The rationale for any kind of DHEA supplementation in healthy men and women under 35 is not presently convincing. Compromised immunity, insulin resistance and high stress profile may indicate DHEA supplementation at therapeutic levels in those under 40, but people, most especially females, with such a profile are advised to see a health professional familiar with natural hormone enhancement strategies.

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PREGNENOLONE

Pregnenolone and Mental Function

Pregnenolone is the precursor (building block) for all other steroid hormones. It is converted directly into DHEA and/or progesterone. DHEA converts to testosterone and estrogens progesterone converts to estrogens, cortisol, and aldosterone. It is this succession of conversions that makes human life possible. Without pregnenolone, there can be no human steroid hormone production.

Made from cholesterol, pregnenolone is a natural steroid-hormone produced primarily in the adrenal glands, but in smaller amounts by many other organs and tissues of the human body, including liver, brain, skin, gonads, and even the retina of the eye.

Like many health-promoting hormones, levels of pregnenolone drop with age. Although the data are not as abundant or definitive for pregnenolone as they are for DHEA, Dr. Eugene Roberts, a pioneer in hormone research, believes that the age-related drop in pregnenolone is as dramatic as the drop in DHEA. At 75, our bodies typically make 60% less pregnenolone than at age 35. This is a point of great concern, considering pregnenolone's numerous protective, health promoting properties.

Energizing, Anti-stress Benefits

Some of the earliest investigations of pregnenolone's many benefits showed it to be an energizing, anti-stress biochemical. During the 1940's, Drs. Pincus and Hoagland gave 50-100 mg/day of pregnenolone to various types of factory workers, as well as pilots and students trained to use a flight simulator. The factory workers noted improved production rates while taking pregnenolone. They felt less fatigued, better able to cope with their jobs and experienced an enhanced sense of happiness and well-being. Interestingly, workers in stressful job environments improved more with pregnenolone than those with less demanding tasks.

The flight simulation machine was designed to test hand-eye coordination, learning, memory and stamina. The subjects were to "fly" the "plane" correctly, avoiding obstacles and crashes. Half the subjects were airplane pilots; half were not. Tests conducted over several weeks showed that the ability of all subjects to "fly" the simulated airplane improved significantly after taking 50-mg pregnenolone before each test run. The improvement was especially noticeable after the subjects had taken pregnenolone for at least two weeks. This suggests pregnenolone's anti-stress benefits may be cumulative. Also, the professional Pilots reported that they performed better in their real flying jobs and that they suffered less fatigue during their pregnenolone-supplementing period.

Pro-memory Effects

Animal studies by Isaacson, Flood, Merely and Roberts have shown that injection of as few as 15 to 145 molecules (!) of pregnenolone directly into the areas of the brain which are thought to mediate memory, improved the ability of mice to more quickly remember the way out of a maze that they had run before. Preliminary results of St. Louis School of Medicine researcher R. Sih have shown definite memory enhancement with pregnenolone. Dr. Sih gave 500-mg pregnenolone or a placebo to men and women three hours before they were asked to perform standard memory tests. Pregnenolone resulted in improved memory in both men and women, improved spatial memory and perception in men, and improved verbal recall memory in women.

Mood Elevation

Pregnenolone is known to modulate at least two key nerve receptor systems in the brain NMDA receptors and GABA receptors. NMDA receptors, which decrease with age, are involved in learning, memory, and alertness. Pregnenolone enhances NMDA receptor function. GABA receptors promote relaxation, mental slowing, sedation and sleep. Benzodiazepine drugs (Valium, Librium, Xanax, etc.) activate GABA receptors, while pregnenolone inhibits GABA receptors. Thus, too little NMDA activity combined with excessive GABA activity would tend to promote mental sluggishness and depression. Since pregnenolone raises NMDA activity and lowers excessive GABA activity, pregnenolone seems to be a natural antidepressant. Indeed a recent study of 27 depressed patients found that their cerebro-spinal fluid (which circulates through the brain and spinal cord) was significantly lower in pregnenolone than in 10 non-depressed volunteers. Cerebrospinal fluid levels are generally believed to accurately reflect levels of various biochemicals in the brain.

Anti-arthritis Effects

During the 1940's, pregnenolone was used successfully as a treatment for rheumatoid arthritis. A 1950 review article on pregnenolone reported on a study by Henderson and colleagues which found that 300 mg pregnenolone/day for 40 days resulted in a significant decrease in joint pain, tenderness, and spasticity, with improved strength and range of motion. Another study by Freeman and colleagues, with 64 patients, used 500 mg of pregnenolone daily for periods of 2 to 30 weeks. 24 patients showed striking improvements, and 20 showed minor improvements.

Unfortunately, the advent of the "wonder drug" cortisone (Cortisol) in the 1950's caused pregnenolone to be passed by for arthritis treatment, since pregnenolone's results were much slower to manifest. "Coincidentally", pregnenolone couldn't be patented by the drug companies whereas synthetic variants of

cortisone could be (and were) patented. By the time the nightmarish side effects of excessive cortisone were widely known by the medical community in the 1960's (these side effects could include psychotic breakdown, adrenal failure, and even death), pregnenolone had been completely forgotten.

Pregnenolone's Cortisol-neutralizing Power

Small amounts of cortisol are essential to promote health and even for life itself. Yet under the prodding of chronic stress and aging, our adrenal glands often over-produce cortisol. Indeed, cortisol is the only steroid hormone whose levels tend to increase with age. The level of all other steroids, including pregnenolone, tend to decrease (often radically) with age. Excessive cortisol promotes a host of negative side effects. High cortisol levels promote depression, as does chronic, unremitting stress in many people (which results in chronically elevated cortisol). Experimental subjects such as factory workers and airplane pilots who were given pregnenolone under stressful conditions actually reported an enhanced sense of well being and happiness.

Excessive Cortisol

The following are indications of an excessive cortisol level:

- (1) accelerated skin aging and deterioration;
- (2) damaged structure and function of mid-brain regions involved in memory;
- (3) impaired wound healing, poor skin quality and excessive scar tissue;
- (4) excess fluid retention and puffy, flabby skin.
- (5) poor quality of sleep.

Most of these adverse effects of cortisol are directly counteracted by pregnenolone. For example, Papa and Kligman reported in 1965 that topical application of a pregnenolone-containing skin cream restored youthful properties to aged skin.

Experiments with humans and animals show that pregnenolone enhances the function of the same promemory areas of the mid-brain that are damaged by cortisol. A 1994 report by Guth and colleagues found that pregnenolone actually promoted successful healing of otherwise crippling spinal cord injuries in rats. Ray Feat, Ph.D., has reported successful use of pregnenolone to rid the body of cortisol-induced excessive fluid and puffiness, promoting a more lean and taut, youthful appearance to the face. Steiger (1993) used a mere 1-mg of pregnenolone in human volunteers to increase the restorative delta, slow wave, and stage IV sleep. (Larger doses of pregnenolone taken inappropriately at night may, however, also promote insomnia through "over-energization"). Thus, pregnenolone seems in many ways to be a natural "antidote" to the "dark side" of cortisol, which tends to manifest ever more with aging and chronic stress.

Chemo-protective Action

A major determinant of the body's ability to detoxify poisonous chemicals - such as pesticides, medical drugs, industrial contaminants and auto exhaust - is the health and effectiveness of the Cytochrome P450 enzyme system in the liver. This is one of the most broad-spectrum, universal detoxifying enzyme systems possessed by all mammals, including humans. Moderate levels of cortisol (the "state-of-siege" anti-stress hormone) promote the activity of this deter system. However, larger amounts of cortisol (which is all-too-often over-produced by our adrenal glands due to aging or prolonged stress) degrade the P450 system's anti-toxin effects. Although pregnenolone does not affect the rate of synthesis of the enzymes in the P450 system, it does stabilize these enzymes against the digestive activity of liver proteolytic enzymes, which would tend to break down the P450 enzymes. Pregnenolone thus increases overall P450 deter enzyme power by promoting conservation of existing P450 enzymes.

Safety

Fortunately, pregnenolone is amazingly safe, far safer than other steroids. Pregnenolone researchers working with both human and animal subjects since the 1940's have consistently commented on pregnenolone's virtual absence of toxicity. For example, the classic review article on pregnenolone by Henderson and colleagues in 1950 states: "it [pregnenolone] has an extremely low order of toxicity; has not shown any adverse effects on endocrine [hormone] physiology"

Pregnenolone has been given orally to humans at doses as high as 500 mg/day for as long as 30 weeks without evidence of adverse effects. Mice given 5 grams (1/6 ounce) per kilogram (2.2 pounds) of body weight suffered no ill effects. This would be equivalent to a 154 pound (70 kilogram) human ingesting 350

grams (approximately 3/4 pound) per day! In a long-term study, mice that were given one-gram pregnenolone per kilogram of body weight three times weekly for 50 doses suffered no toxic reaction - including no changes in the size and condition of offspring produced after the 50 doses.

In one human study, eight people received 50 to 150 milligrams per day by intramuscular injection for 75 days, with no reported side effects. Dr. Eugene Roberts gave 20 Alzheimer's patients 525 mg/day for three months with no toxicity. During rheumatoid arthritis experiments with pregnenolone, Dr. H. Freeman and colleagues gave 500-mg pregnenolone/day for up to 30 weeks, with no toxicity. And Drs. Pincus and Hoagland, two of the pioneer researchers on pregnenolone use by humans in the 1940's, found no toxic reactions with pregnenolone used by hundreds of men and women at dosages of 100 mg/day for four months.

Dosage

The classic studies on pregnenolone and stress in the 1940's by Pincus and Hoagland generally used only 50 mg/day to achieve excellent results, while arthritis studies typically used 200-500 mg daily. Thus, although pregnenolone appears amazingly safe and beneficial, there are still many unanswered questions regarding proper dosage, metabolism, and clinical effects. Keeping these uncertainties in mind, here are some recommendations for dosage.

For those wishing to err on the side of caution, 50 to 100 mg pregnenolone per day would probably be suitable for use without physician monitoring. Perhaps an additional safety margin (for this already amazingly safe substance) could be achieved through discontinuing use for one week every month. Those wishing to use the higher, anti -arthritis doses (200 - 500 mg/day) should probably do so only under the supervision of their physician, even though many human clinical studies with arthritis at these dosages yielded no problems or toxicity. Morning is the perfect time to take pregnenolone, and a single daily dose is probably best, since pregnenolone is fat-soluble, and probably follows the circadian highs and lows of DHEA and cortisol (highest in the morning, with a drop to baseline by late afternoon). On a personal note, I have taken 100 - 1,000 mg pregnenolone/day intermittently since 1987, with no discernible negative side effects.

Contraindications

While there has been no definite information published as to who should not take pregnenolone, on theoretical grounds, a few cautions can be suggested. Since pregnenolone (especially at high doses) may in some people increase estrogen or testosterone levels, I believe that men with prostate cancer (which may be worsened by testosterone) and women with breast or ovarian cancer (which may be worsened by estrogen) should probably take pregnenolone only with their doctor's consent and supervision. Men with high PSA (prostate specific antigen) blood levels a possible indicator for undiagnosed or future prostate cancer should also proceed with caution with pregnenolone use. Lastly, because of pregnenolone's anti-GABA, pro-NMDA action, persons known to suffer from epileptic seizures or who are taking an anti-seizure medication such as Dilantin, Depakote or Tegretol should probably only use pregnenolone with their doctor's supervision. Finally, as we age, the body produces ever less of the enzyme which converts pregnenolone to DHEA. Thus, while supplementary pregnenolone taken during middle age and beyond will produce at least some normalization back toward more youthful (and healthful) levels of other steroid hormones, pregnenolone will not completely substitute for other steroid hormone supplements in those with medically demonstrated needs for various specific steroids i.e., DHEA, cortisol, estrogen, etc.

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MELATONIN

Scientists say this natural hormone could reset the body's aging clock, turning back the ravages of time.

"Senescence, the downward spiral that we have come to associate with aging, does not have to occur. Dr. Waite Pierpaoli and William Regelson declare in their book "The Melatonin Miracle". "Melatonin can stop the spiral."

Melatonin, occurs naturally in nature, such as small amounts in oranges and tomatoes and is produced by the pineal gland in humans. Like most animals, humans produce melatonin abundantly throughout early life. But the levels in our blood drop slightly before puberty and decline steadily into old age. When Dr. Pierpaoli, an Italian immunologist, restores youthful levels of melatonin in mice, they outlive their life expectancies by nearly a third. And his findings are consistent with numerous other scientific studies.

Newsweek magazine reports, "melatonin is poised to become one of the hottest pills of the decade."

"Recent studies suggest that supplementing melatonin may bolster the immune system, keep our cells from disintegrating, slow the growth of tumors and cataracts, ward off heart disease, and naturally improve sleep. Studies have yet to document any hazards, even scientists are taking the plunge. "I take melatonin every night," says Russel Reiter, a University of Texas cellular biologist who has studied melatonin for 30 years. "I want to die young as late in life as possible, and I think melatonin could help."

"Travellers and office workers are using it as an antidote to jet lag, stress and insomnia."

First identified just four decades ago, melatonin is now recognized as one of life's most ubiquitous molecules. It turns up in such diverse organisms as people and protozoa, suggesting it dates back a billion years or so. Humans secrete it cyclically from the pineal gland, a pea-size structure located at the center of the brain, in response to the amount of light hitting the eyes. Physiologists know melatonin acts to keep us in sync with the rhythms of the day and the season. Through its action on other hormones, it helps determine when people sleep and horses breed, when birds migrate, dogs shed their coats and certain frogs change color.

Cellular biologists have discovered that melatonin can protect against free radical cell damage.

Cellular biologist have recently discovered that melatonin has an even more basic function, which is to protect oxygen-based life from the toxic effects of oxygen. Yes, oxygen. As we metabolize this life

sustaining gas, we generate highly reactive molecules called free radicals, which can corrode our cellular membranes and damage our DNA. The process, known as oxidation, weakens our minds and muscles as we age, and contributes to at least 60 degenerative diseases, including cancer, heart disease and Alzheimer's. The body produces several enzymes to inhibit oxidation, and nutrients such as vitamin C, vitamin E and beta-carotene can provide extra protection. But most of these so-called antioxidants work only in certain parts of certain cells. Melatonin readily permeates any cell in any part of the body--including the brain. And as Reiter's research team has recently shown in animal experiments, melatonin can protect tissues from an amazing array of assaults.

Dr. Reiter and his colleagues demonstrated that a small dose of melatonin could shield against cancer.

Reiter and his colleagues were able to show that a small dose of melatonin could shield rats from a cancer-causing chemical called safrole. Given alone, safrole quickly oxidizes liver cells, causing extensive DNA damage. But when rats received tiny doses of melatonin before their safrole shots, they exhibited 41 percent less damage than their untreated counterparts--and those receiving a slightly larger dose of melatonin suffered just 1 percent as much liver damage as the controls. In more recent studies, Reiter's team has shown that melatonin's antioxidant action can protect rats from ionizing radiation (halving the death rate from a normally lethal dose); and can shield the animals' lungs from the deadly herbicide paraquat. Melatonin may also help prevent cataracts, the cloudy lesions that appear on the eyes as oxidation damages cells in the lenses. When Reiter's researchers gave 18 newborn rats a toxic compound called BSO, all 18 developed cataracts within two weeks. But when 15 animals got the same treatment plus melatonin, 14 maintained perfectly clear eyes.

Oxidation isn't the only reason we fall apart as we age.

We also lose our immune function. The thymus gland shrinks over time, inhibiting our ability to generate infection-fighting T cells, and we produce fewer of the antibody molecules that bind with and neutralize foreign invaders, such as viruses and bacteria. Could this follow from a loss of melatonin? Test tube studies have identified receptors, or specialized portals, for melatonin on the cells and glands of the immune system. And animal experiments are showing that melatonin can preserve, or even restore a creature's defences. In other studies, Italian researchers have shown that a nightly melatonin supplement can boost the performance of immune systems compromised by age. And scientists in Israel and Switzerland have found that when mice receive melatonin, their odds of surviving infection with encephalitis virus more than double.

Growth hormone producing supplements in combination with melatonin provide a powerful anti-aging effect.

In addition to the decreased production of melatonin that occurs with age, growth hormone, which is vital to bodily function, also decreases with age. Recent studies have shown that a deficiency of growth hormone can also contribute to the aging process, although growth hormone acts differently on the body than melatonin. Studies have shown when growth hormone producing supplements were taken by humans a variety of anti-aging effects occur, such as higher energy levels, increased lean body mass, loss of fatty adipose tissue, improved muscle tone, skin elasticity, and improved immune system. Because growth hormone and melatonin work individually, the two substances complement each other and as a result can offer optimum anti-aging effects when taken together.

Questions and Answers:

1. What is Melatonin?

Melatonin is a substance produced by the pineal gland, a gland about the size of a kernel of corn that is nestled in the center of your brain. The gland produces melatonin during the night. You have virtually undetectable levels of melatonin in the daytime. For this reason, melatonin has been called "the hormone of darkness." Melatonin production declines with age. By the time you are 40 years old, you may have half the levels of melatonin you had in your youth.

2. What will it do for me?

Melatonin serves two fundamental roles in your body, hormonal regulation, and antioxidant protection. In its hormonal role, melatonin influences reproduction, and boosts the immune system, regulates the body clock, enhances sleep, influences the cardiovascular system, and may help protect against cancer. (In test tube studies, melatonin has slowed the growth of seven different kinds of human cancer cells, including breast and prostate cancer cells.) In its antioxidant role, melatonin has been shown to be an extremely potent and wide-ranging antioxidant, protecting every part of the cell and every cell in the body, including vital brain cells. Antioxidants are vital to your health because they rid the body of dangerously reactive molecules called "free radicals." Over 100 diseases have now been linked with free radical damage, including cataracts, macular degeneration, Alzheimer's disease, Parkinsonism, arthritis, cancer, and the aging process itself. Because melatonin plays so many diverse roles in your body, taking supplemental melatonin has been shown to enhance your health in a surprising number of ways. For example, clinical studies have shown that melatonin is an effective remedy for insomnia, jet lag, and shift work maladaptation. It also shows promise as a treatment for a number of other diseases and conditions, including hypertension, high cholesterol, AIDS, various kinds of cancer, autism, epilepsy, migraine, arthritis, fetal alcohol syndrome, and Alzheimer's disease. Perhaps the most startling finding is that taking small amounts of melatonin on a nightly basis, starting in middle age, may extend your healthy, productive years.

3. Is it safe?

Melatonin is one of the least toxic substances known. People have taken as much as 6 grams of the substance in carefully monitored studies with no signs of toxicity. The only consistent side effect of high doses has been drowsiness and a slower reaction time, in the most extensive clinical trial to date, a very high dose of melatonin---75 milligrams---has been given to 1400 women for up to four years with no significant ill effects. Furthermore, the Food and Drug Administration reports that in the more than two. Years that melatonin has been available for sale over-the-counter; no alarming negative side effects have been reported. However, although melatonin has been tested on humans in hundreds of studies, it has not been administered in the large-scale, carefully controlled studies necessary to determine its ultimate safety. People who choose to take melatonin at the present time are facing some unknown risks.

4. How much should I take?

Hundreds of thousands of people have decided not to wait for further study results and have begun to take melatonin. One of their most commonly asked questions is: "How much should I take?" There is no simple answer. Melatonin researchers themselves have yet to determine the optimum doses for various uses. Furthermore, the same dose of melatonin can result in widely differing blood levels in different individuals. (In one study, five healthy volunteers took the same 2-milligram dose of melatonin. There was a 35-fold difference in the amount of melatonin that entered the bloodstream.) For purposes of sleep, many people start with a 1-milligram dose and either increase or decrease the dose as needed. (The dose is too high if you feel groggy the next morning; it may be too low if you do not experience a deep, restful sleep. Ten milligrams is the highest dose currently being recommended. Doses higher than this may cause elevated levels of melatonin the next day.)

5. What time of day should I take melatonin?

Unless your physician advises otherwise, always take melatonin at night. Your pineal gland produces melatonin only at night, and the goal is to supplement your body's natural processes, not subvert them. Taking melatonin in the daytime can have negative effects, including resetting your body clock-giving you unintentional "jet lag"- or making you drowsy and increasing your risk of accidental injury. If you have difficulty falling asleep, take melatonin about an hour before bedtime. If you have difficulty staying asleep, take it when you retire.

6. Which kind should I buy?

Many companies are now marketing melatonin. Some of the products are labelled "natural" melatonin and are reputed to contain actual extracts of the pineal gland. Stay away from these products. If they contain actual animal tissue, they may be contaminated with viruses or proteins that could evoke an antibody response. Buy synthetic melatonin. Synthetic melatonin is made from pharmaceutical grade ingredients and is molecularly identical to the melatonin you produce in your own body. Synthetic melatonin is now available. Sublingual preparations also allow a higher percentage of the melatonin to be utilized because less of it is metabolized in the liver. However, sublingual tablets have the same disadvantage as regular tablets in that they generate high initial blood levels of melatonin, quite unlike the body's natural circadian production.

We recommend that you buy a preparation that does not contain additional ingredients (other than the inert filler.) Studies have not been done on these various combinations, so little is known about their safety or efficacy. Furthermore, more negative side effects seem to be associated with these products - especially those that contain vitamin B-6. There are dozens of different companies now offering melatonin and they obtain the raw material from one of a half-dozen suppliers. This raw material varies in purity.

7. What are possible negative side effects?

There is anecdotal evidence that a small percentage of the people taking over-the-counter melatonin have experienced an atypical reaction, becoming agitated rather than sleepy or having so many dreams that their sleep does not feel restful. Others have complained of headaches or stomach aches. These negative reactions have not been observed in clinical trials. Some people who have experienced one or more of these reactions have found that taking a much smaller dose has eliminated the problem. Others have found that switching to a different brand, or taking a brand that does not contain vitamin B6, seems to help. People who continue to experience negative side effects should stop taking melatonin. There is also anecdotal evidence that melatonin worsens depression in some people. For this reason, we advise that people who are depressed consult their physicians before taking melatonin. It should also be noted that many people experience a profound relief from depression while taking melatonin. Melatonin effects on mood is a sadly neglected area of research.

8. Are there any people who should not take melatonin?

It is always best to err on the side of caution. We recommend that the following people not take melatonin at the present time, or take it only with the advice and close supervision of a physician:

- People taking prescription steroid drugs;
- Women wanting to conceive;
- Pregnant women and nursing mothers;
- People with severe mental illness;
- People with severe allergies;
- People with autoimmune diseases;
- People with immune-system cancers such as leukaemia and lymphoma;
- Normal children of all ages.

9. How does melatonin affect sexuality?

Currently, there is a great deal of misinformation about melatonin's effects on human sexuality. What does the research show? In animals, seasonal changes in light levels cause the pineal gland to produce increased amounts of melatonin. The surge of melatonin will either inhibit or stimulate the reproductive organs, depending on the species. The human reproductive system does not react so predictably or strongly to the hormone. Very high doses of melatonin (75 milligrams) in a time-release formulation, when coupled with progesterone, will inhibit ovulation in most women. (A contraceptive based on this formulation is now beginning Phase III clinical trials.) Smaller doses of melatonin, as little as 10 milligrams, may inhibit ovulation in a small percentage of women. There is also a growing body of anecdotal evidence that melatonin may reduce excessive or prolonged menstrual flow and reduce the symptoms of PMS. Men have not been given high doses of melatonin for prolonged periods of time. However, it is known that 2 milligrams of melatonin taken for several months at a time has no effect on testosterone levels. Will melatonin enhance your sex life, a claim currently being made in some melatonin books? There is no evidence this is so. However, a 1995 rodent study produced an intriguing finding. Male rats that were given small doses of melatonin on a nightly basis did not experience the expected age-related decline in testosterone levels. As a result, at old age, the melatonin-treated rats had 3-4 times the testosterone levels as the control rats.

10. Will melatonin really extend my life span?

There are no human studies to support this contention. However, melatonin has caused a significant (20%) increase in life span in both rats and mice. If melatonin does indeed allow you to live longer, it may be due to its proven ability to:

- Reduce free radical damage;
- Stimulate an aging immune system;
- Protect the cardiovascular system;

- Preserve a youthful circadian rhythm;
- Stimulate the production of growth hormone.

Natural PROGESTERONE CREAM

Suggested Use of Natural Progesterone Cream

Progesterone is very well absorbed transdermally (through the skin) where it is stored in the fatty tissues for use as needed and unlike progesterone taken orally, it is not subject to being intercepted by the liver. For those women who are especially deficient in progesterone, it may take two to three months to restore optimal levels.

In the morning and at bedtime, the cream should be gently massaged by the palms of the hands into the fatty areas of the body: the lower abdomen, hips, buttocks, thighs and breasts on a rotational basis.

PMS & Infertility

Begin using a cream 14 days from the first day of menstruation. Stop using the cream on day 28. Women with more severe PMS or endometriosis have chosen to initially use twice the suggested amount of cream. In addition, women who experience uterine cramping have chosen to apply the cream just above the pubic area at the onset of cramps. Women who experience hormone-related headaches have applied the cream to the sides of the neck, just behind the earlobe, at the onset of headaches.

Menopause or Post Hysterectomy

The cream should be applied 24 days out of the month and then discontinued for 6-7 days. Women who have severe menopausal symptoms have chosen to initially apply twice as much cream per day. In addition, women who are experiencing hot flashes have chosen to apply a small dab of the cream to the inside of the wrist at the onset of a hot flash.

Osteoporosis

The cream should be applied 24 days of the month and then discontinued for 6-7 days.

Side Effects

There are no reports of any significant side effects or health problems associated with natural progesterone. A few women may experience temporary incidental spotting and/or swelling of the breasts. This stops within 1 to 3 months with the normalizing of hormone levels. Any persistent problems should always be checked by a physician.

Natural Progesterone & Women's Health - Nine Frequently Asked Questions

1. What is Progesterone and what is its relationship to estrogen?

Progesterone is one of two primary hormones produced by the female body. When a woman's monthly cycle is functioning correctly, estrogen is the dominant hormone during the first two weeks after the start of her menstrual cycle. In response to ovulation, estrogen levels drop and progesterone levels rise and assume dominance for the final two weeks of the month. When progesterone levels drop the next menstrual cycle begins in about 48 hours. Progesterone is used by the body for the production of estrogen and cortisone.

2. What are some of the antagonists to the production and utilization of natural Progesterone?

Animals in industrialized countries, especially the U.S., are routinely fed synthetic hormones and eat grain and grasses that are laden with pesticides. These synthetic compounds are concentrated in the fat of the meat and dairy products sold commercially.

Additionally, synthetic hormones sold by prescription and a wide variety of petrochemical compounds are also consumed by women. These chemical compounds are referred to as xeno-estrogens or xeno-biotics and have been shown to interfere with the production and utilization of natural progesterone.

3. What is Estrogen Dominance?

When progesterone levels fail to reach the normal 20 - 25 mg. during the final two weeks of a woman's monthly cycle then estrogen is unopposed for the entire month and this condition is referred to as "Estrogen Dominance." Interestingly, the symptoms of PMS & menopause and the conditions of infertility & osteoporosis have been shown to be the result of "Estrogen Dominance" relative to an insufficiency of progesterone.

4. Do postmenopausal women still produce estrogen and progesterone?

After menopause estrogen production decreases by about 40%. In other words the female body still produces estrogen at about 60% of pre-menopause levels. Because progesterone is the biological precursor for the production of estrogen, it is the natural choice for menopausal women as well as for pre-menopausal women to enjoy optimal health.

5. What are the conditions for which natural Progesterone cream will benefit a woman?

There are approximately 150 identified symptoms of PMS and significantly fewer symptoms associated with menopause. Most women with these two conditions respond well to natural progesterone, especially when they reduce their consumption of the antagonist to progesterone discussed in question #2 above.

Because progesterone is the "Pro-Gestational" hormone, it is the primary necessary hormone for conception and full term pregnancy.

In a three year study of 63 post-menopausal women with osteoporosis, women using transdermal progesterone cream experienced an average 7-8% bone mass density increase the first year, 4-5% the second year and 3-4% the third year! Untreated women in this age category typically lose 1.5% bone mass density per year! These results have not been found with any other form of hormone replacement therapy or dietary supplementation!

6. Why is a premium quality Progesterone Cream superior to capsules or suppositories?

Nature did not intend women to put hormones into their stomachs. Consequently, about 80% of orally administered progesterone is intercepted by the liver and passed out of the body, unused. Progesterone in suppository form is also intercepted by the liver and bound up by the wax vehicle. In either case, because there is no sound basis for putting an extra burden on the liver, informed women have chosen to use a transdermal cream which is almost 100% biologically available, as shown by salivary hormone assays.

7. Why progesterone; isn't Mexican Wild Yam enough?

A component of Yam (diosgenin) was, at one time, thought to be converted in the body to progesterone but that has been proven to be unsubstantiated. In fact, while it has certain health benefits, there are no published studies that would allow one to conclude that Yam will increase progesterone levels in humans or animals. Only supplemental Natural Progesterone has been demonstrated to increase serum and saliva progesterone levels in women, a fact that is verified by ample clinical and published scientific research.

8. Are there any reported side effects associated with Progesterone?

Yes. The Physician's Desk Reference lists a long list of side effects and contraindications for what is commonly referred to as progesterone. According to a second quarter news report in 1996, progesterone increases a woman's risk for female specific cancers. Significantly, the progesterone that has side effects is the synthetic progesterone (progestin) or Progesterone Acetate. Unlike synthetic progesterone (progestin or progesterone acetate), however, there are no reports of any significant side effects or health problems associated with natural progesterone.

9. Why is natural Progesterone the preferred cream for Women?

The cream is light and non-oily so that it is readily absorbed into the skin, through which it transports progesterone to the fat cells. Here it is stored for use as required by the body.

The natural progesterone content has been carefully calculated so that those individuals who suffer with the symptoms resulting from unopposed estrogen (Estrogen Dominance) can use the cream on a schedule that parallels the body's natural cycles of progesterone production.

DMAE (Di-Methyl-Amino-Ethanol) –The Brain Hormone

The body manufactures an important neurohormone called acetylcholine from the B vitamin choline. Acetylcholine is needed to convey motor and sensory signals from one nerve cell to the next along the nerve path. It also regulates the flow of nerve signals and is essential for all brain functions, especially memory. When there isn't enough acetylcholine in the brain and nerve cells, a person experiences symptoms ranging from depression, sluggish behavior, fatigue, slowed reflexes, muddled thinking, and poor memory to nervousness, anxiety and hyperkinetic behavior. When acetylcholine is adequately supplied, these disappear as brain and nerve functions are normalized. But when acetylcholine levels are further increased by supplementation, energy, reflexes, mental alertness, mood, memory, and learning ability often improve beyond the normal.

Despite good nutrition and plenty of dietary and supplemental choline, many people (perhaps up to 75% of the population) have acetylcholine deficiencies. This generally occurs because of membranous shields which keeps toxic waste products in the circulation from entering the brain and central nervous system can also block some necessary substances from gaining entry.

Choline must be converted by the liver into its lipid soluble form before it can cross these barriers and be turned into acetylcholine. If the body's ability to produce this form of choline is less than ideal, acetylcholine levels are likely to be low. There is an alternative way to increase acetylcholine, however, Dimethylaminoethanol (DMAE), also known as Deanol, is a safe, natural substance that easily crosses the barriers. In the brain and nerve cells it is converted first to choline and then to acetylcholine. In a sense DMAE may be regarded as a biochemical Trojan horse.

DMAE is a very efficient antioxidant and free-radical deactivator, it stabilizes lysosome membranes, preventing rupture of these scavenger bodies, which would result in leakage of collected toxins and protein-damaging enzymes. It reverses the formation of lipofuscin that causes the so-called aging spots or liver spots. This pigment also tends to clog brain and nerve cells as we age. DMAE also helps prevent sludging or clumping of red blood cells and makes more of them available for carrying oxygen to the tissues. DMAE also has several positive influences on red blood cells. It has been found that the addition of DMAE to whole blood stored for transfusion purposes doubles its storage life. When DMAE was added to the drinking water of mice that were already past their mean expected lifespan, their maximum lifespan was extended to 36.6% longer than the controls. This indicates that it may be one of the only life-extension substances that is significantly effective even when started late in life.

Because of its ability to improve muscle reflexes and increase oxygen efficiency, many top athletes now take DMAE to improve performance and gain a competitive edge.

DMAE is a choline-like compound (di-methyl-amino-ethanol) that occurs naturally in the body and is also found in certain foods.

Benefits and uses

People take DMAE to increase alertness and vigilance, boost energy levels, and elevate mood. It can also augment the ability to handle multiple tasks simultaneously and to learn new material. A few users report intensified dreams, an effect supported by a 1988 study on DMAE and lucid dreaming. Because of positive effects on maximum life expectancy demonstrated in a mice study done in 1973, some people are also taking DMAE as a potential longevity aid, though most researchers consider longevity-related claims for DMAE still unproven. DMAE may help prevent disorders of the central nervous system, including Alzheimers disease and tardive dyskinesia. From the 1950s until its producer withdrew it from the market in the early 1980s, a DMAE-based prescription drug (Deaner, deanol) was administered to children who suffered from learning disabilities associated with behavioral problems and hyperactivity. DMAE is sometimes used as a natural and less-toxic alternative to Ritalin for treating children with attention deficit disorder (ADD) and attention deficit hyperactivity disorder (ADHD).

Recent findings

Researchers who compared a DMAE-related choline analog with choline found minor differences in its effects on a structural element of cell membranes in rats.

A drug formulation containing DMAE as well as vitamins and minerals was shown to induce electrical changes in the brain that have been associated with improved concentration and memory.

Do scientists know how it works?

A number of studies suggest that DMAE can be converted into choline in the brain and thus act as a precursor for the neurotransmitter acetylcholine. Acetylcholine plays an important role in the flow of nerve signals and in various brain functions, and increased acetylcholine activity can promote memory, learning, and concentration. DMAE also helps protect cellular membranes and may have antioxidant properties that can reduce deposits of the harmful pigment lipofuscin in the skin and brain.

Food sources

Small amounts of DMAE are found in fish such as sardines and anchovies.

Types of products

Most commonly DMAE comes in 100 mg tablets.

Safety

Average doses are usually well-tolerated although some people may experience headaches, leg cramps, and muscle tension. Higher doses are more likely to cause adverse effects, especially symptoms of over-stimulation such as anxiety, nervousness, increased blood pressure, and insomnia. DMAE has not demonstrated any long-term toxicity. Women who are pregnant or breast-feeding, anyone who suffers from convulsions, epilepsy, or seizure disorders, and people with manic-depressive illness should avoid using DMAE.

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What does it do? DMAE (2-dimethylaminoethanol), like choline, may increase levels of the brain neurotransmitter acetylcholine, although not all studies confirm that DMAE serves as a precursor to acetylcholine.¹ Early research with DMAE focused on the benefits of this substance for relieving tardive dyskinesia (trembling disorders).²

One uncontrolled four-week trial of fourteen senile patients given DMAE supplements of 600 mg three times per day did not show any changes in memory but did produce positive behavior changes in some of the patients.³ However, subsequent research of a double-blind, placebo-controlled design did not find a significant benefit from the use of DMAE in people with Alzheimer's disease.⁴

Where is it found? DMAE is found as a supplement, although it is not widely available.

In what conditions might DMAE be supportive?

- Alzheimers disease
- tardive dyskinesia

Who is likely to be deficient? No deficiencies of DMAE are reported or believed to occur.

How much should I take? DMAE has been used in research studies in amounts ranging from 50–1,800 mg per day. A nutritionally oriented physician should be consulted to determine the appropriate amount based on individual health concerns.

Are there any side effects or interactions? Clinical studies of DMAE have utilized up to 1,600 mg per day with no reports of side effects,⁵ and for this reason DMAE is believed to be relatively nontoxic. However,

one study using higher intakes for Alzheimer's disease patients did report symptoms of drowsiness and confusion with the use of DMAE.⁶ An interesting side effect of lucid dreaming (in which the dreamer is conscious and in control of a dream) is suggested with DMAE use.⁷

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No information in this article should be taken as a recommendation. If you have any questions about the relationship between nutritional supplements and your health, seek the advice of a qualified physician.