Eating healthy is important for both longevity and the quality aspects of a man's life. Statistically it has been reported that men live five to seven years less than women and will face major health risks, many of which are considered nutrition-related. Research has demonstrated that nutrition can play a strong role in the prevention and treatment of acute and chronic diseases including certain types of cancer, cardiovascular disease (CVD), non-insulin dependent diabetes mellitus (NIDDM) and obesity. Complementary nutrition has also been linked to the prevention of illnesses that affect the qualitative aspects of men's health, such as stress, prostate conditions, bone and joint problems. In 2003, Congress proposed the Men's Health Act to help promote men's health awareness. This will amend the Public Health Service Act and establish an Office of Men's Health within the U.S. Department of Health and Human Services (HHS).

It is important for men to realize that eating healthy is essential throughout life. This requires an inventory of the diet and a re-evaluation to include more fresh fruits and vegetables, plenty of fiber, sufficient water to replace losses, and limiting fats and carbohydrates, which may contribute excess calories and limited nutrient value to the diet. Men should balance this healthy eating goal with a daily regimen of exercise. Also, adequate sleep is equally important, serving as a significant period of time for the body to regenerate and repair itself. Finally, research encourages all men to use a multivitamin daily as a complement to these suggestions.

Recognizing and incorporating these suggestions into one's daily lifestyle creates an ideal way to attain optimal wellness, and it works! What follows is a look at ways to utilize complementary nutrition to attain optimal men's health with a focus on three major men's health topics including prostate health, cardiovascular health and bone health.
Chair’s Corner:
Rick Hall, MS, RD Chair 2004-2005

It is hard for me to believe that the fall edition of the NCC Newsletter is already here. This past summer has been very eventful and has just seemed to go by too quickly for me digest. The rest of this year promises even more action, with the Presidential election raising public awareness of issues important to all of us.

If you haven’t already planned to come, consider taking a break from your regular life to attend the American Dietetic Association’s 2004 Annual Food and Nutrition Conference and Exhibition (FNCE) in Anaheim, CA. It is just around the corner and there will be several opportunities to network with other NCC members.

This year, our member’s breakfast and annual meeting will be on Sunday morning, where we will enjoy an executive breakfast thanks to sponsorship from Celestial Seasonings. On Sunday night, our member’s reception will be hosted again in collaboration with the Nutrition Entrepreneurs and the Dietitians in Business Communications practice groups, thanks to sponsorship provided by Centrum. This year’s theme will be tropical and will be guaranteed-fun! Both of these events are completely free for NCC members. If you haven’t already done so, please RSVP online if you plan to attend these meetings through the member’s only section of the NCC website (http://complementarynutrition.org).

Before closing, I want to officially welcome the new members of the NCC executive board and thank the outgoing members who have served our group so well for several years. The volunteers who keep this organization together are too numerous to mention individually in the small space I have left, but a glance at the back cover of this newsletter will give you a glimpse of who our current and new leaders are. I look forward to working with all of you.

Editor’s Notes:
Sarah Harding Laidlaw, MS, RD, MPA

It is hard to believe that it is time for FNCE! It seems like just last week that we were in San Antonio learning cutting edge nutrition information and taking in the sights of the city. This year’s offerings in Anaheim appear to be as interesting and stimulating as ever, with an increasing number of topics on complementary nutrition. As interest in complementary and alternative medicine continues to grow, the potential for those of us in the field of complementary nutrition grows as well. What place is better suited than FNCE for networking with peers who practice in the field and to learn how to incorporate the newest concepts in our practices.

The articles in this issue compliment the topics being offered at this year’s meeting. New findings on Diet and Men’s Health, Plant Power, and various presentations about the importance of nutrition and essential nutrients in our aging population are just some of these complimentary topics. For a full listing of presentations of interest to NCC members and NCC sponsored events, please see page 26.

As always, I hope to meet many of our members and readers in person and to offer the opportunity for commenting on the newsletter. This is your newsletter and I am committed to providing the most current and cutting edge information that you want to learn about, but in order to do so, it is important for me to know what you want. I am continually looking for topic ideas, authors, reviewers, and persons interested in contributing to the success of the newsletter. NCC is looking for volunteers in other areas too; I can direct you to Executive Committee and board members who need your interest, enthusiasm, and expertise. Please seek me out at any one of our events if you are interested in volunteering. Or, if you are unable to attend FNCE this year, please contact me at peaknut@cascadeaccess.com or 702-346-7968. I look forward to seeing you there, or if not, hearing from you in the near future.
Public health nutrition has evolved over time from addressing issues related to inadequate food intake and nutrient deficiency, to solving problems of overconsumption and chronic disease. In the past year chronic diseases with diet-related factors were predicted to soon surpass smoking as the primary cause of preventable death. Simultaneously, nutrition science evolved from investigating nutrition for disease treatment, to looking at the roles of nutrients and non-nutritive food components in disease prevention. The isoflavones are just one example of non-nutritive food components eagerly being studied for their potential roles in protecting against cancer, osteoporosis, and cardiovascular disease.

A Tool for Studying Diet and Health

Research tools, such as food and nutrient databases, are imperative for gaining knowledge of diet-health relationships. The Nutrition Coordinating Center (NCC) at the University of Minnesota is a research resource providing state-of-the-art methods for collecting and analyzing dietary intake data. Since 1974, NCC has maintained a uniquely comprehensive, research-quality food and nutrient database. The National Heart Lung and Blood Institute initiated the center to provide standardized data for collecting and analyzing dietary intake data. Today the database is linked with a web-based interview system called the Nutrient Data System for Research or NDS-R. This software is prominent in its class due to unique features for capturing food intake detail from diet recalls. In addition to gathering recalls, the software is used to calculate food records, menus, and recipes. NDS-R can provide nutrient totals and RDA comparison reports, and data can be exported to various output files for further review and statistical analysis.

Adding Isoflavones to the Database

Originally the database included the energy nutrients, five minerals, five vitamins, cholesterol, and fatty acids. It has been continually updated to remain current with the market place and meet the needs of researchers. Today it includes 18800 foods and 156 nutrients, nutrient ratios, and food components. New nutrient are added when there is a strong interest for them by the research community. In addition, there must be data available for imputing. The USDA Database for Standard Reference serves as the primary source of data, in addition to peer-reviewed scientific literature, food manufacture information, published food tables, and occasionally unpublished data.

The most recent NDS-R version includes six new nutrient fields. These are the isoflavones: daidzein, genistein, and glycine; two isoflavone derivatives: formononetin, and biochanin A; and coumestrol, a phytoestrogen from the coumestan flavonoid class. NCC used the USDA-Iowa State University Database on the Isoflavone Content of Foods – 1999 as its main data source. Details on the development of this database can be found on the USDA Nutrient Data Laboratory Website. Additional values came from current journal articles and foreign studies not available in the USDA database. NCC chose literature data that was determined by standard chromatographic analysis and based on food samples similar in description and preparation to NCC database foods. In instances where no analytic values were available for direct imputing, database staff calculated them using standard methods.

Chemical Forms and Bioavailability

Soybeans and soy foods can contain twelve different isoflavone isomers. These include three aglycones: daidzin, genistin, and glycine, which are considered the “free forms” of isoflavones. There are also three glucose isomers: daidzin, genistin, and glycine, which have a glucose molecule conjugated to the free phenolic compound. The three glucose isomers may then have an acetyl or malonyl group esterified to glucose, making six additional glucoside forms possible. Biochanin A and for- mononetin are separate from the twelve isomers just mentioned. They are the methylated precursors of genistein and daidzin, respectively, and are found at highest levels in clover and sprouted legumes. In soybeans and non-fermented soy foods, isoflavones are predominantly present as the glucoside forms.

Isoflavones are absorbed from the intestine as aglycones, and uptake depends on the initial hydrolysis of the attached glucose by resident bacterial beta-glucosidases. Fermented soy foods, such as tempeh and miso, have much higher levels of aglycone forms compared to non-fermented soy foods due to hydrolysis during fermentation. Some studies show ingesting isoflavones as aglycones results in greater plasma concentrations than ingesting the glucoside. However, other research has suggested greater plasma concentrations with the intake of glucosides. Differences may be attributed to whether the isoflavones are fed in a purified tablet form or in a food matrix or whole food form. Also, the composition of gut microflora in participants, or perhaps characteristics such as gender, age and dietary habits, alter isoflavone bioavailability. Still, it is clear that healthy humans have the ability to absorb isoflavones regardless of form. One viewpoint is that the conjugate forms are more of an academic interest, and of little relevance physiologically or nutritionally. This is because the gastrointestinal tract has a tremendous capacity to hydrolyze glucosides efficiently. A more important factor influencing serum levels may be the dose received from the soy food. Research shows plasma concentrations of isoflavones are dose-dependent, and we generally do not absorb all the isoflavones we ingest.
extracts. However, other complementary nutrients are being investigated and may play a beneficial role in prostate health. In the Physician’s Health Study, reduced risk of prostate cancer was correlated with high plasma levels of lycopene.6

Previously it was hypothesized vitamin D deficiency increases the risk of prostate cancer.7 Vitamin D is linked to antiproliferative responses, which occur through multiple mechanisms in human prostate cancer cells. These anti-cancer properties suggest that vitamin D may be therapeutically useful.8 Numerous benefits attributed to adequate vitamin D status are well documented and suggest a need for increased intake of this vitamin daily. The antioxidants, vitamin E and selenium, may also reduce the risk of prostate cancer.9-12 Disulfiram and sulforaphane and other phytonutrients derived from cruciferous vegetables have demonstrated prostate health benefits in animal models.13-17 Finally, new research indicates that flaxseed supplements may produce a positive effect on inhibiting the growth and development of prostate cancer cells.18

Saw palmetto, also known as Serenoa repens or Sabal serrulatum, is an herb that is most commonly used for problems related to benign prostatic hyperplasia (BPH). BPH is a nearly universal result of the aging process in men. As the prostate gland enlarges, it can cause both symptoms of obstruction and irritation; however, the size of the prostate gland is not predictive of the symptoms that patients experience. Saw palmetto is reported to be an effective treatment for BPH, yet no research has evaluated the effect of long-term outcomes in patients with BPH.19

The authors note there are other complementary ingredients reviewed in the literature in connection with prostate health, including the botanicals Pygeum africatum, stinging nettle, ginseng, and the mineral selenium. Further research is warranted in the complementary role these components perform.

Cardiovascular Health

Antioxidants neutralize, or render harmless, oxygen free radical molecules. These are highly reactive toxic by-products of biochemical reactions that occur both as a part of normal cell metabolism and when our bodies are exposed to smoking, pollution, and other damaging environmental influences. As long as we are alive, eating, and breathing in a polluted world, our bodies will have to contend with free radicals. As a result, we need antioxidants to help reduce the impact of damage caused when their numbers become too great.

Free radicals cause damage both to the structure and to the function of cell membranes, DNA, and proteins. This damage has been linked to the onset of many degenerative diseases including atherosclerosis. A diet rich in tocopherols gives front line support to the antioxidant system as it protects our cells from free radical attack. Numerous research studies have been conducted which suggest the beneficial role of vitamin E as a protective nutrient against heart disease.20-25 The specific form of vitamin E and its mechanism of action in this role are still being evaluated.

Homocysteine is an amino acid found in blood. High levels are related to an increased risk of coronary heart disease and peripheral vascular disease (fatty deposits in peripheral arteries). The American Heart Association (AHA) has not yet classified high homocysteine levels in blood as a major risk factor for cardiovascular disease. For cardiovascular disease prevention the AHA advises a healthy, balanced diet that includes at least five servings of fruits and vegetables a day. Because the consumption of fruits and vegetables among men is very poor, the National Cancer Institute (NCI) has developed a program called “Shoot for 9.”26-27 A diet rich in fruits and vegetables and low in fat is associated with reduced risk for heart disease, high blood pressure, and stroke. Overall, heart-healthy diets should be rich in fruits and vegetables (8 to 10 servings a day), low in saturated fat and cholesterol, and emphasize low-fat dairy foods and whole grains. Such diets can significantly lower blood pressure and cholesterol levels and may reduce the risk for developing heart disease.

Homocysteine levels in the blood are strongly influenced by both diet and genetic factors. Folic acid and other B vitamins help break down homocysteine in the body, with dietary folic acid and vitamins B-6 and B-12 having the greatest effects. Several studies reported that higher blood levels of B vitamins are related, at least in part, to lower concentrations of homocysteine. Other evidence suggests that low blood levels of folic acid are linked to a higher risk of fatal coronary heart disease and stroke.3

Emerging science of omega-3 fish oils, including eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), as well as coenzyme Q10, offer promise for their application as complementary nutrients in cardiovascular health.18,28

Bone Health

Nearly 30% of hip fractures occur in men.29 Men reach peak bone density by their early 20s and age-related bone loss begins at about age 50.30 Heredity, nutrition, hormonal effects and environmental factors influence peak bone density. It has become generally accepted that adequate calcium intake during the formative years is an important bone density factor.31 Statistically, about 4-6% of men older than 50 have osteoporosis and 33-47% have osteopenia (diminished bone loss not meeting diagnostic criteria for osteoporosis). Starting at about age 75, the incidence of hip fracture increases rapidly. Once hip fracture occurs, men have higher rates of morbidity and mortality than women. Men are twice as likely as women to die in a hospital after a hip fracture.32

In light of these observations, calcium and vitamin D intake should seriously be considered for men. Other nutrients worth mentioning for their role in bone health are boron and vitamin K. For calcium, the literature suggests intakes of 1,000 to 1,500 mg per day and for vitamin D intakes of 400 to 800 IU per day.31 Calcium supplementation is important because only 50-60% of older adults meet calcium intake recommendations.32 Because vitamin D is necessary for calcium to build bones, some experts recommend routine sun exposure to help synthesize vitamin D naturally. Other experts express concern for the development of skin cancer resulting from solar irradiation.
ation, UVA and UVB rays. Considering the potential risk in solar exposure, selecting a vitamin D supplement or a calcium and vitamin D combination supplement can be a wise choice for men throughout life to minimize the risk of later developing osteoporosis and hip fracture.

**Complementary Nutrition Guidelines**

Successful aging is closely related to proper nutrition throughout life. Coupled with proper exercise, a healthy diet can help prevent disease, provide more energy, and promote well being. The prevalence of obesity among U.S. adults is increasing. Reports estimate 21.4 million men are obese. Wise food selection including an increased intake of fruits and vegetables has favorable health implications. Nutrition professionals need to take pro-active steps to educate men, their families, and other health care providers about the importance of complementary nutrition. This education should include the use of a comprehensive daily multivitamin, as well as other complementary nutrient supplements. The combination of supplements, exercise with proper rest, and early disease detection could result in reduced rates of mortality from male-specific diseases. In the end, nutrition professionals who take such pro-active steps will improve men’s quality of life and help them attain optimal health.

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**References**


The University of Arizona is offering NCC members a great opportunity for learning! “Nutrition & Cardiovascular Health” - a 16.5 CPEU online course offered by the Program in Integrative Medicine. Sign up online at: www.integrativemedicine.arizona.edu and receive a 10% discount. To obtain the discount use the code: NCC1

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Other Events of Potential Interest to NCC Members

Sunday, October 3rd
10:30a-12:00p New Findings on Diet and Men’s Health
3:30p - 5:00p Omega-3 Fatty Acids in Maternal and Infant Health

Monday, October 4th
12:30p - 2:00p Beyond Antioxidants: Plausible Mechanisms for Cardiovascular and Other Diseases
2:30p - 4:00p Integrative Medicine: the Past, Present and Future

Tuesday, October 5th
8:00a – 9:30a Plant Power From ORAC and the Portfolio Diet

The Solgar facilities are the cleanest I have ever seen. When it comes to selecting, testing and handling raw materials, every company should follow Solgar’s standards. For example, any materials that fail Solgar’s stringent tests are immediately returned to the supplier.

We have a huge section of Solgar products in our store. People come in and ask for Solgar by name. I use several Solgar products myself. I feel like I have more energy when I take Solgar products and that impresses me.

Hal Maddox  
*Back to Earth, NY*

Back to Earth operates Health Food Stores located in Nyack and New City, New York. Consumers appreciate the selection offered at Back to Earth. The stores offer a wide variety of organic and natural foods and have been recommending Solgar Vitamin and Herb for nearly 20 years.
Variation in the Content of Foods

The isoflavone content of soy foods depends primarily on the isoflavone content of the soybean source they are derived from.20 A study of eight American and three Japanese soybean varieties found significant differences in isoflavone concentration due to genetics, crop years, and growth locations.21 Seven of the American varieties were commonly used for tofu production. In an accompanying paper, the same researchers evaluated isoflavone concentrations for 29 commercial soybean foods.6 The results showed isoflavone contents were affected by soybean variety, soy processing, and dilution of foods with non-soy ingredients.6 Another study sampled identical brand soy foods from grocery stores in a variety of geographical areas and found significant differences in soy milk and tofu by lot or even by city.22

Effects of Soy Processing

Processes used to manufacture soy foods from soybeans can cause significant losses of isoflavones.22 Minimally processed soy flour can retain levels that are similar to whole beans.6 However, in the manufacture of soy protein isolate, isoflavones are lost during extraction, precipitation and washing, at amounts of 19, 14, and 22%, respectively.23 When making traditional tofu, isoflavones are lost during coagulation, as well as from the discarded okara and whey portions.10, 24, 25 Aseptically packaged tofu may retain higher levels of isoflavones because soy milk is coagulated in the package and no whey is removed.26 For tempeh production, losses occur in the soaking and cooking water, but not during fermentation.10 The original soy processing techniques were developed prior to knowledge of the phytochemicals in soy and their potential benefits.23 For example, using an alcohol wash for soy protein manufacture can remove nearly all of the isoflavones.6 It is the interest of food scientists to optimize processing conditions and reduce the loss of isoflavones from soy products.10 Methods such as isoelectric precipitation and acid wash retain much larger amounts of isoflavones in soy protein.17 Currently, some manufacturers are marketing propriety methods for reduced phytonutrient loss during soy processing.27-30

Cooking Soy Foods

When determining isoflavone values of raw to cooked foods, NCC typically did not apply nutrient retention factors. This is because isoflavone levels remain constant under normal cooking conditions.8, 22, 31 In contrast, a wealth of research shows cooking and processing can change the profile of isoflavone chemical forms in soy foods.8, 10, 23, 32 But as mentioned earlier, in healthy people the distribution of isoflavone forms may not be of great importance with regard to overall bioavailability and physiologic effects.17

Implications to Databases and Factors of Food Labeling

Due to the high variability in isoflavone content for soybeans and soy foods, some have raised questions regarding the accuracy and usefulness of isoflavone databases.17 Using database values to calculate absolute isoflavone intake for individuals may prove to be imprecise. However, this could easily be the case for any nutrient. On a population or epidemiologic basis, databases are essential for discovering what roles food components and nutrients may play in human health.

All isoflavone values entered into the NCC database represent the amount of aglycone forms in foods. The total weight of the aglycone gives an indication of the potential maximum bioavailable amount for the food.17 Therefore, any values reported as glucosides were converted to milligrams of aglycones using published conversion factors based on molecular weight.20 The weight of a glucose unit is approximately 40% of the total glucoside weight, and adding a malonyl or acetyl group can increase it to 50%.33 Without correcting for molecular weight, the true aglycone isoflavone amount in foods can be overestimated.
Another issue that could impact labeling is the inconsistencies with analytic results for the methods used to measure isoflavones. Currently, no gold standard reference method is available for determining isoflavones; but before such a method can be adopted, highly purified chemical standards and certified reference materials need to be produced. In addition, the level of isoflavones incorporated into foods by manufacturers may be arbitrarily chosen, rather than based on physiological need and knowledge of isoflavone pharmacokinetics. The fact that food and supplement manufacturers do not have standardized procedures for measuring and reporting isoflavones raises legitimate concerns about the reliability of label data.

Take Home Message

The condition of the gut environment is essential for isoflavone bioavailability. Any person with reduced microflora levels or intestinal impairment, will potentially be unable to absorb and metabolize isoflavones normally. Second, labels listing the isoflavone content of products do not follow regulated standards for measuring or reporting isoflavones as standards are currently being developed by analytical food and nutrition scientists. Sometimes isoflavones may be deducted by assuming 1–2 mg isoflavones/g soy protein. Calculating isoflavones in this manner would probably be very inaccurate. Despite fairly consistent levels of soy protein, studies have shown great variation in isoflavone levels in both soybeans and soy foods. Finally, isoflavone losses that occur during processing can vary by the methods used; it would be a rare incident to find a manufacturer that discloses soy processing methods on labels. The good news is, the intake of most soy foods can still provide the 40–150 mg amount of isoflavones per day that has demonstrated health benefits. This level of isoflavones can be achieved by consuming three servings of traditional soy foods. For example, a 3 ounce serving of regular tofu, a quarter cup of soy nuts, and one cup of soy milk provides approximately 100 mg of isoflavones and 30 g of soy protein. Soybeans and soy foods are the only major source of isoflavones for humans, and this sets them apart from other foods. One could predict consumers will continue to increase consumption of soy, especially as new FDA health claims are approved.

The volume of studies demonstrating positive health effects from consuming soy protein is notable; however, questions still waiting to be answered include how soy provides its benefits, and whether isoflavones, other bioactive non-nutrients, or a combination of processes will continue to be a popular area of research. The NCC’s food and nutrient database and data collection software are valuable tools for researchers looking to answer questions specific to isoflavone intake and health. It is prudent for nutrition professionals to stay current on the scientific findings, as well as the labeling and manufacturing practices related to isoflavones. In the meantime, nutrition professionals should focus more on converting consumers to servings of soy foods rather than isoflavone counting.

References


Remaining healthy for a long time is a goal that has occupied people throughout the ages, including such historical figures as Alexander the Great and Ponce de León, who was searching for the “fountain of youth” when he discovered Florida. Today, there are dietary supplements, longevity clinics, and assorted treatments available that claim to combat the aging process.

Alas, the term “anti-aging” is an oxymoron. People get older from the moment of conception and nothing stops the passage of time, including anything found in a bottle. The body’s structures accumulate random damage over time and eventually wear out, leading to declines in muscle and bone mass, mental acuity, skin elasticity, and the like. We must all eventually die of something.

On the other hand, chronological age doesn’t necessarily reflect biological age, which encompasses how we look and feel, our state of health, and physical and mental performance. Most reputable anti-aging research is not about reversing the aging process, but rather on helping us feel good at any age; in addition to preventing or reducing the severity of medical problems that become more prevalent as we get older, like cardiovascular disease, cancer, arthritis, cataracts, and dementia.

Life expectancies at birth in the United States have improved dramatically in the 20th century from 46 to 74 years for males and from 49 to 80 years for females. This is due in large measure to better sanitation, vaccines and antibiotics, and improved nutrition. Furthermore, many Americans over 65 are in reasonable physical shape, aside from some loss of mental sharpness, vision, and mobility. Over the past 50 years the mortality rate of this group has decreased by 35%. This was driven in part by sharp declines in death rates for heart attack and stroke, and since 1995 a slight decline in cancer death rates. Among the reasons for such improvement are medical advances, healthier lifestyles, and having better health at earlier ages.

Supplements to Modulate the Aging Process?

Aging baby boomers spend billions of dollars on supplements, including antioxidants and hormones, touted as having anti-aging properties. Following is an evaluation of several popular ones.

**Antioxidants**

Antioxidants are a large group including nutrients like vitamins C, vitamin E, and selenium. In addition to other food constituents like beta carotene, coenzyme Q10, lipoic acid, and polyphenols. The free-radical theory of aging has given antioxidants the reputation of being age erasers. This theory proposes that the cumulative wear and tear on body and brain comes largely from electron-poor, oxygen-containing molecular fragments. These free-radicals then damage cells and tissues in their frenetic quest to become whole again. Their attacks on proteins, genetic material, and fats in cell membranes in turn generate more free radicals, initiating a chain reaction of destruction. Biological oxidation is inevitable since free radicals are produced by mitochondria in cells as they turn food into energy. Free radicals are also generated from air pollution, cigarette smoke, and ultraviolet radiation from the sun. However, some oxidation is essential to health. For example, when cells of the immune system deploy free radicals to destroy invading microorganisms and cancerous cells.

Living organisms have developed an incredibly complex antioxidant network that consists of compounds and enzymes designed to limit biological oxidation to acceptable levels. The free-radical theory of aging proposes that slowly over time the balance tips in favor of excessive oxidation, causing a person to look and feel older and become more susceptible to diseases. Some nutrition researchers think that antioxidant supplements force a more favorable balance, especially in middle age and beyond. But many others believe that sufficient protection is provided by simply not smoking and by eating foods naturally rich in antioxidants and other constituents, which enable the body to build and maintain its defenses. Supporters of antioxidant supplements have not proven that people who take these products look younger or live longer. They primarily point to laboratory studies showing, for example, that cells with higher concentrations of antioxidants divide more times and generate fewer undesirable compounds.

As for the ability of antioxidant supplements to reduce the risks of age-related diseases like heart disease and cancer, there is some promise but mostly uncertainty. Comprehensive literature reviews conclude that so far these products haven not shown to be nearly as important as taking such actions as maintaining a healthy weight, not smoking, and being active. Some population studies, for example, show a link between higher vitamin E intakes and a lowered risk of cardiovascular disease, but clinical trials using vitamin E supplements to reduce its progression...
sion and decrease death rates “have been largely disappointing.”12 Evidence linking vitamins C and E as antioxidants to reduce the risk of cancer is exceeded by data that do not support such a connection.13 Perhaps supplements of vitamins C, E, carotenoids, selenium, and other antioxidants provide the best protection when begun before the underlying pathologies of various chronic diseases take hold, such as in adolescence or early adulthood. Only future research will reveal if this possibility has merit.7

Some doctors and nutrition experts recommend that healthy adults take supplemental antioxidants, but they do not agree on which ones to take or at what doses. This suggests yet again the scientific uncertainty about their value. For example, popular alternative-medicine physician Andrew Weil’s daily antioxidant regimen consists of 200 mg vitamin C, 400-800 IU natural vitamin E (or 80 mg tocopherols and tocotrienols), 200 mcg of selenium, and 25,000 IU of mixed carotenes.14 Lester Packer, PhD, a noted antioxidant researcher at the University of California at Berkeley, recommends a more comprehensive package. His basic antioxidant cocktail includes a morning dosing with vitamin E (100 mg tocotrienols and 200 mg mixed tocopherols), 30 mg coenzyme Q10, 50 mg lipoic acid, 250 mg ester vitamin C, 400 mcg folic acid, 300 mcg biotin, and 2 mg vitamin B6. The evening regimen consists of 200 mg natural alpha tocopherol (vitamin E), 50 mg lipoic acid, 250 mg ester vitamin C, 30 mg ginkgo biloba, and 200 mcg selenium.5 While there is no unequivocal proof that following either regimen will slow the aging process or maintain health longer, neither is there proof that these regimens are unsafe when used by healthy people - with some exceptions. Smokers, for example, should probably avoid taking separate carotenoid supplements, especially those containing beta carotene, since they could increase the risk of lung cancer.4 Also, supplemental antioxidants may reduce the effectiveness of some cholesterol-lowering medications.15 In one double-blind trial, 160 men and women with coronary heart disease and low HDL cholesterol levels were randomly assigned to one of four treatment regimens: 1) the statin drug simvastatin (Zocor) plus niacin (2,000 mg/day); 2) an antioxidant supplement containing 25 mg beta carotene, 800 IU vitamin E, 1,000 mg vitamin C, and 100 mcg selenium; 3) simvastatin plus niacin plus the antioxidant supplement; 4) a placebo. Over three years, those taking the statin-niacin combination fared the best, with substantial increases in HDL, HDL particle size, and apolipoprotein A-I. Those taking the combination plus antioxidants had less favorable increases and no increase in HDL2 cholesterol (the most heart-protective fraction). The group taking the antioxidants alone had no significant lipid changes.

Dehydroepiandrosterone (DHEA)

DHEA is the most abundant steroid hormone in the body, manufactured from cholesterol primarily by the adrenal glands in the sulfated form known as DHEAS. It is ultimately converted into the sex hormones testosterone and estrogen in both men and women by way of androstenedione. DHEA was popularized by baseball slugger Mark McGwire, but is now an effectively banned supplement.16-18 Production peaks in young adults then slowly declines. Blood concentrations in a 70-year old person may be only 20% of that in a 25-year old.17 Anti-aging enthusiasts contend that using supplements to restore levels of this hormone, and others like human growth hormone and melatonin to youthful levels can slow aging and improve health. Claims for DHEA sound so amazing that every aging baby boomer should be taking it. For example, William Regelson, MD, professor of medicine at Virginia Commonwealth University, claims in his 1996 book The Superhormone Promise, that DHEA can do the following: energize, enhance libido, restore memory, rejuvenate the immune system, tame stress, fight cancer, prevent heart disease, reduce body fat, quell menopausal symptoms, help erase fine wrinkles, and heal burns.19

But most health professionals are skeptical about the value of DHEA supplements beyond using them to treat disorders of adrenal insufficiency or the autoimmune disease lupus. Despite years of research, very little is known about DHEA’s actions in the body and potential benefits and risks when taken in supplemental amounts.17 Most studies - which have included both young and old men and women, couch potatoes to athletes - are methodologically flawed. They were conducted for only a few weeks or months and provide contradictory results. For example, some suggest that DHEA might enhance libido and erectile function in aging men and improve feelings of physical and psychological well-being. But recent studies show that DHEA doesn’t seem to improve muscle strength or immune function in middle-aged and older adults.20-21 Taking DHEA at 10-50 mg/day will raise its blood levels to that of adults in their 20s. And while doses of up to 200 mg/day seem safe to take for several weeks or months, longer-term use could be problematic. DHEA supplements may cause acne and growth of facial hair in women by raising blood levels of testosterone. In addition, they may lower HDL cholesterol levels, alter the metabolism of various medications, affect blood levels of other hormones, and more rarely - lead to mania or injure the liver.16-18 Diabetics may find that taking DHEA makes it more
difficult to control their blood sugar levels by altering insulin resistance or sensitivity. Of special concern is the fact that long-term use of DHEA may raise the risk of cancers that are sex-hormone responsive, including prostate cancer in men and cancers of the breast, ovaries, and lining of the uterus in women. Pregnant and lactating women should ordinarily not supplement with DHEA, since how it might affect a developing fetus or nursing infant is not known.

DHEA in supplements is typically synthesized from diosgenin extracted from wild yams. These supplements are quite inexpensive and the majority of DHEA products available provide about 25 mg per pill. Unfortunately, the actual amount of DHEA in supplements may not always match their label claims. ConsumerLab.com, an independent evaluator of supplements, reported that three of 17 products it examined came up short, providing only 19%, 79%, and 84% of the labeled amounts.

**Human Growth Hormone**

Secreted by the pituitary gland, human growth hormone (HGH), also known as somatotropin, promotes the development of muscle, bone, and tissues throughout the body by stimulating protein synthesis and cell division. Many of these actions are mediated by insulin-like growth factor-1 (IGF-1), which the liver and other cells secrete in response to HGH. Levels of the hormone are typically high during puberty and decline with advancing age. The amount of HGH produced is controlled by the hormones somatostatin and growth hormone releasing hormone (GHRH), which are secreted by the brain's hypothalamus. Somatostatin inhibits HGH production and GHRH stimulates it. Other compounds apparently influencing HGH production include amino acids, peptides, and brain neurotransmitters.

HGH is a commercially available prescription drug approved by U.S. Food and Drug Administration (FDA) to correct growth-hormone deficiencies in children and adults and to reduce muscle wasting in AIDS patients. However, doctors are also injecting it into tens of thousands of healthy adults to help them feel and look better, increase muscle mass, minimize fat stores, reduce bone loss, and improve libido - treatments that can cost thousands of dollars a year. Yet the safety and effectiveness of using HGH as anti-aging therapy is hotly debated. In a recently published study, 131 men and women 65-88 years of age were given HGH with or without sex hormones for 26 weeks. The treatment group improved their body composition, gaining significantly more muscle and losing more fat than those who received placebos. But there were side effects. Half the men taking HGH developed diabetes or impaired glucose tolerance and were significantly more likely to experience joint pain and carpal tunnel symptoms. Women receiving the HGH were much more likely to develop edema than those on placebos.

HGH is not a dietary supplement but a powerful regulator of body growth and development. It must be given by injection because swallowing it would cause this protein hormone to be broken down into its constituent amino acids in the gut. Over-the-counter products containing homeopathic or nanogram levels of HGH (some in the form of nasal or under-the-tongue sprays) provide negligible amounts of the hormone and are not absorbed.

Creative minds in the dietary-supplement industry have developed a host of products they say will increase pituitary secretion of HGH. Some supplements claim to increase HGH by inhibiting somatostatin, the hypothalamic hormone. These so-called secretagogues or HGH releasing agents, consist primarily of amino acids. One such supplement provides a daily packet of powder containing 5 gm of an amino acid blend (glycine, glutamine, tyrosine, arginine, lysine, pyroglutamic acid, and GABA) with 25 mg of anterior pituitary substance (brain tissue), carbohydrate, artificial sweetener and coloring, plus other ingredients. A one month supply of this supplement costs $74.95.

There are no good studies to show that any of these products work. The small amount of research on the HGH secretagogues indicates that while they may raise HGH levels temporarily, they do not alter body composition or improve muscle strength, or typically even raise blood IGF-1 levels.

Instead of spending considerable money on HGH-boosting supplements patients should be advised to eat high-protein foods, get adequate sleep each night, and do plenty of exercise that includes resistance training. These are all better ways to raise blood HGH levels and slow its decline over time. Of course eating well and getting sufficient activity and sleep promotes health in other ways as well.

**Melatonin**

Melatonin is a hormone produced in the brain, primarily by the pineal gland, that regulates the body's daily sleep-wake cycles known as circadian rhythms. Greater amounts are secreted in the evening as the amount
of light reaching the retina of the eye diminishes, encouraging one to become tired and sleepy. Melatonin supplements came to wide public attention in 1995 with the publication of *The Melatonin Miracle*, a best-selling book by Walter Pierpaoli and William Regelson. Both are medical doctors who describe melatonin as nature’s age-reversing, disease-fighting, sex-enhancing hormone. Dr. Regelson also touts DHEA as nature’s antidote to aging, as mentioned in the previous section. The authors contend, that melatonin is the regulator of our body’s aging clock. Its chemical name is N-acetyl-5-methoxytryptamine. The body synthesizes melatonin from serotonin, a critical neurotransmitter in the brain. Serotonin in turn is derived from tryptophan, an essential amino acid found in protein-containing foods.

Melatonin is considered an anti-aging supplement by some because it is a potent antioxidant that has increased the lifespan of mice. Unfortunately, there is simply no proof that taking it can add years to human life or slow the aging process. Some aging baby boomers take supplemental melatonin, and hormones like DHEA, because they believe that blood levels decrease with age and desire to raise them to levels found in people in their 20s. However, a recent study showed no significant differences in the daily average melatonin concentrations of 34 elderly men and women (ages 65-81 years) and 98 healthy young men (ages 18-30 years). Blood levels of the hormone may be reduced in people with certain medical problems, such as heart disease or fibromyalgia, or when they take medications like beta blockers and even ibuprofen.

In reality, many people take melatonin simply to get a good night’s sleep or to combat jet lag. Melatonin supplements may help with occasional insomnia, especially among the elderly, shortening the time it takes to fall asleep and increasing total sleep time. As for jet lag, a recent review of nine studies comparing melatonin to placebo concludes that the supplement “is remarkably effective in preventing or reducing” it, especially when traveling eastward and crossing five or more time zones. The usual protocol is to take up to 5 mg of melatonin close to bedtime at the final destination to help one fall asleep faster and sleep better the first night of arrival. However, take it too early and one might find it even harder to sleep and acclimate to the local time. The studies suggest that side effects are rare and that a dose of 5 mg is better than 0.5 mg, though higher doses are not more effective.

Melatonin, despite being a hormone, is available as a dietary supplement because it occurs naturally in food, albeit in tiny amounts; 40 bananas or 10 bowls of rice provide 1 mg. Melatonin in most supplements is synthetically derived.

The two basic types of melatonin supplements are regular or quick release, and time- or controlled release (extended release). The regular is recommended to get to sleep quickly and the time-release form to sleep longer. Melatonin comes in tablet, capsule, liquid, and powder forms. It is also available in sublingual tablets that dissolve when placed under the tongue for quicker absorption. Supplements typically contain from 0.5 to 3 mg melatonin per pill at a cost of about $5-15 per milligram. The overall quality of melatonin supplements is good, at least according to one recent analysis. ConsumerLab.com reported that 16 of 18 melatonin supplements met their label claims, containing between 100-135% of the amount listed on their labels. Of the two failing products, one contained only 83% of its declared amount while the other was contaminated with a small amount of lead.

Melatonin may be effective for minor sleeping problems, beginning with 0.3-0.5 mg, a dose that maintains blood concentrations at healthy levels. It should be taken 30 minutes to an hour before bedtime and caution should be taken since melatonin can impair mental alertness and physical coordination as it lowers body temperature and blood pressure slightly. The dose should be incrementally increased up to 5 mg/night, if smaller amounts aren’t helpful, while understanding that taking too much can result in sleepiness and tiredness in the morning. Taking melatonin with herbs like valerian or kava, alcohol, or other calming, sleep-promoting medications may enhance sedation. People with persistent insomnia or chronic sleep problems should get a medical evaluation to identify the cause.

Unless a health professional advises otherwise, melatonin should not be taken for more than a few months at a time since its long-term safety has not been studied. The supplement can produce side effects, especially at doses of 5 mg or more. Most common side effects are headache, confusion, agitation, depression, and alterations in blood concentrations of other hormones. Melatonin may also interact with a variety of prescription drugs, including immunosuppressants, tranquilizers, antidepressants, oral contraceptives, and other hormones.

**L-Carnitine and Alpha-Lipoic Acid**

Both compounds are critical to the function of the energy-producing mitochondria. L-carnitine is a small nitrogen-containing acid that transports fatty acids into cellular organelles, while alpha-lipoic acid is a sulfur-containing antioxidant required in the actual process of oxidation.
tion. They are produced in at least adequate, if not optimal, amounts, in most people. Therefore, they are not considered to be essential nutrients.\(^5,18\)

These two compounds are combined in a dietary supplement called Juvenon Energy Formula (JEF) that, according to the label, “boosts energy levels, improves metabolic efficiency, and promotes healthy cells.” Biotin is also added to the mix so that large doses of lipoic acid, which is similar in molecular structure, won’t displace biotin from enzymes where it is required as a cofactor. While such claims for a supplement are usually best ignored, they deserve more attention in this case. The reason being that these claims come from Bruce N. Ames, PhD, a distinguished professor of biochemistry and molecular biology at the University of California at Berkeley, who established Juvenon the company in 1999.

According to Ames, JEF’s two main ingredients work synergistically to increase mental and physical vitality. The carnitine is thought to restore mitochondrial membrane potential and to increase oxygen utilization and concentrations of cardiolipin, a key fat. The lipoic acid, in turn, is an antioxidant that reduces free-radical concentrations, as well as damage to fats in cell membranes and genetic material (RNA) in brain neurons.\(^34\) In one published study, older rats given JEF exhibited biochemical and physical signs that they were functioning more like their younger counterparts. For example, mitochondrial activity improved, the animals became more active, and liver concentrations of vitamin C increased while levels of malondialdehyde (an indicator of oxidative damage to lipids) decreased.\(^35\)

But does Juvenon help people? The company website (http://www.Juvenon.com) states that JEF promotes “a healthier, more energetic body” and “is particularly effective in protecting tissue from toxic oxidants, which increase with normal daily stress-producing activities and exercise, as well as the aging process.” However, the basis for these claims appears to be a self-described informal and anecdotal investigation, in which about 50 older men and women took JEF for an unspecified amount of time. According to this unpublished work described only briefly on the website, subjects experienced many positive effects, including “increased energy, elevated mood, steady emotional state, improved sleep, enhanced cognitive function” and “weight loss, or improved weight control.” Furthermore, most showed evidence of improved cellular health as measured by various biomarkers of antioxidant status.

Dr. Ames is selling JEF to raise funds to be able to conduct high-quality human clinical trials.\(^34\) For those who want to play guinea pig and contribute to the cause - JEF is available from Juvenon’s website. A one-month supply of 60 tablets costs $39.95 plus shipping & handling. Each tablet provides 200 mg of alpha lipoic acid and 500 mg of acetyl-L-carnitine HCl (the hydrochloride form of an L-carnitine ester), along with 100 mcg of inositol.

**Hyaluronic Acid and Collagen**

Residents of the Japanese village of Yuzuri Hara expect to live long and healthy lives. More than 10% are 85 or older, but their skin does not belie their age, even among those who smoke and spend considerable time in the sun; and they are rarely sick. It is not clear why, but some credit the unique local diet. Consisting largely of root vegetables rather than rice, they believe that the starches in these foods stimulate the body’s production of hyaluronic acid (HA), a component of the protein collagen. When ABC News broadcast a story about this “Village of Long Life” in November 2000, HA gained a reputation as a “fountain of youth” supplement.\(^36\)

Collagen is a fundamental constituent of bone and the connective tissues that support, bind, and cushion various structures throughout the body. It is responsible for the toughness and resilience of bones, tendons, and the skin. HA is a polysaccharide chain that binds tightly to water and both hydrates and nourishes collagen, keeping it from cracking and degrading. It is also known as a glycosaminoglycan, composed of repeating units of glucosamine and glucuronic acid. Collagen is part of cartilage, the stiff and firm tissue at the ends of the bones in a joint that protect them as they move against each other. There are many forms of collagen especially in cartilage and vitreous fluid in the eye.

Writer Bill Sardi tries to make a case for HA being an anti-aging supplement in a book provocatively titled _How to Live 100 Years Without Growing Old_.\(^37\) According to Sardi, supplements of HA help prevent wrinkles and give the skin a more youthful appearance, improve eyesight, reduce symptoms of osteoarthritis, enhance immunity, cut the risks of cancer and heart disease, and much more. His thesis appears to be supported primarily with anecdotes and selective citations from medical and popular sources.

It is true that preliminary and mostly laboratory research suggests that HA has potential as a therapeutic agent. It may, for example, act as an antioxidant, affect the functioning of the immune system, promote wound healing, reduce inflammation, and inhibit the breakdown of cartilage in joints.\(^18\) But few reputable scientists think that supplements of HA or collagen can slow the aging process,
and there is no conclusive evidence that it does. In fact, very little is known about HA absorption and its fate in the body once swallowed. HA has been administered by injection for osteoarthritis of the knee and is approved by the FDA for this purpose. But whether it actually decreases joint pain and stiffness and reduces cartilage destruction is controversial.38

HA is manufactured by the body to meet its needs. However, Sardi in his book contends that adults, especially after age 60, lose about 150 mg/day more HA than they produce and advises supplementing with at least this amount. He also recommends supplements of Type II collagen and chondroitin, which he claims boost HA levels in the body. In fact, chondroitin’s popularity is due to the fact that it has been shown in numerous studies to ease the pain of osteoarthritis. In particular, relieving osteoarthritis of the knee at a daily dose of 1,200 mg with or without 1,500 mg of glucosamine.39

Type II collagen comes in several forms. The undenatured, or native form, has been used with some success to reduce the swelling and tenderness of joints in adults and children suffering from rheumatoid arthritis.40 In theory, native collagen works by decreasing the immune system’s self-destructive attacks on its own cartilage. Sardi, however, recommends taking hydrolyzed, denatured collagen which may be better absorbed from the gut.37 Both native and hydrolyzed Type II collagen in supplements is extracted from cartilage in the sternum of chickens. Pure HA is obtained from rooster combs or synthesized by bacteria in fermentation tanks. While these supplements appear to be safe when taken for a short time, perhaps with the exception of people allergic to chicken or eggs, they are not well studied.18

Patients with rheumatoid arthritis who would like to try collagen supplements should check with their doctor first. But it seems premature at best to consider taking supplements of HA, with or without the collagen and chondroitin, to do battle against the normal aging process.

Products Under Growing Scrutiny

Many people take anti-aging supplements despite the lack of good research demonstrating their value. Sometimes these supplements are taken with the encouragement of health professionals who specialize in anti-aging medicine, a specialty not recognized by the American Medical Association. The aggressive selling of these products has generated concerns from some biomedical researchers and even Congress.

In the summer of 2002, 51 scientists from around the world who study aging, issued a document to warn consumers that there is “no truth to the fountain of youth.”1

S. Jay Olshansky is a professor of public health at the University of Illinois at Chicago. He and his colleagues say they are concerned about the proliferation of so-called anti-aging dietary supplements and the longevity clinics that recommend and typically sell these products. The document states that while exciting new research promises to increase our understanding of the aging process and how to alter it, “no currently marketed intervention - none has yet been proved to slow, stop or reverse human aging, and some can be downright dangerous...anyone purporting to offer an anti-aging product today is either mistaken or lying.”1

The Senate Special Committee on Aging held a hearing on September 10, 2001 to investigate “the hype and hope of marketing anti-aging products to seniors.”41 Among those testifying was Janet Heinrich of the Congress’s General Accounting Office (GAO). She who described many ways in which older Americans might be harmed physically and economically by taking various dietary supplements in the hopes of living longer and self-treating their health problems. The GAO released a report summarizing its concerns, which includes the possibility of harm from supplements interacting adversely with some prescription medicines that older people are likely to be taking.42

The Senate hearing paid special attention to the marketing practices of Almon Glenn Braswell and his company, GB Data Systems, Inc. For about 25 years GB Data Systems, Inc. has been one of the country’s largest sellers of anti-aging products (like Gero Vita GH3, Longevity Caps, and HGH Activator), which are heavily promoted in its magazine the Journal of Longevity. Both he and Ron Tepper, editor of the journal, appeared at the hearing under subpoenas, but refused to testify. Braswell was convicted of mail fraud in 1983 for selling anti-baldness products with false marketing claims and was under criminal investigation. However, this politically connected businessman was pardoned by former President Bill Clinton.43 Then in January 2003, he and two associates were indicted on federal tax-evasion charges. Braswell pled guilty to the charges this past March.44

Take Home Message

Some dietary supplements may be helpful to people as they get older, especially to ensure they obtain recommended amounts of vitamins and minerals. For example, sufficient levels of calcium and vitamin D slows down bone demineralization, and folic acid together with vitamins B6 and B12 protect the heart (arguably with supple-
mental vitamin E). But be wary of supplements that claim to prevent aging or promise to extend one's life, especially those containing hormones or putative hormone precursors or secretagogues. The recent lessons learned about using hormone replacement therapy, as used by menopausal women, provides an important warning: taking potent regulators of body function may provide benefits in the short run, but have harmful consequences that become apparent only years later.

PROVEN LIFE EXTENDER

How life is lived is more important than the genetic traits one inherits from parents in determining life expectancy. Instead of endlessly searching for that right combination of supplements, individuals should first attend to the following real age busters:

Eat well

Fruits, vegetables, whole grains, nuts, legumes, and seeds are rich in nutrients and beneficial phytochemicals, many of them antioxidants. Also consider a multivitamin-mineral supplement for nutritional insurance.

Achieve a healthy weight

Two of every three adult Americans are overweight, with one in three defined as obese. Excess weight reduces life expectancy by increasing the risk of cancer, diabetes, cardiovascular disease, and other disorders.

Be physically active

One in four adults live completely sedentary lives, and most Americans don't move enough to improve their health and quality of life. Being active reduces the risk of premature death, heart disease, hypertension, colon cancer, and diabetes; maintains the health of muscles, bones, and joints; and improves mental health. Try to get at least 30 minutes of moderate-intensity activity on most days.

Don't smoke or stop smoking now

Adult smokers lose more than 13 years of life, on average, due to their deadly habit.

Get periodic medical checkups

Regular checkups increase the chances that any problems can be detected and treated before becoming more serious or even life threatening.

Paul Thomas is a nutrition educator who wrote and published The Dietary Supplement newsletter. Currently he is working on a consumer-oriented book about supplements. Contact Paul at TheDietarySupplement@earblink.net or (301) 881-7008.

References

15. Brown BG, Zhao XQ, Chait A, et al. Simvastatin and...
CPE: Anti-Aging Supplements: Might They Help to Turn Back the Clock?


44. U.S. Department of Justice. Former owner of Cont. on page 38


Questions for Anti-Aging CPE Article
Fall 2004  Expiration Date: September 2006

T/F  1. The average life expectancy for men is 65 years and for women 76 years.

T/F  2. Biological oxidation is largely avoidable through proper diet.

T/F  3. Vitamin E shows the greatest efficacy for reversing the effects of aging.

T/F  4. DHEA is manufactured from cholesterol in the adrenal glands and is a precursor to testosterone and estrogen.

T/F  5. DHEA can be synthesized from diosgenin found in wild yams.

T/F  6. Insulin-like growth factor mediates production of somatotropin.

T/F  7. Human growth hormone secretagogues are as effective as human growth hormone in decreasing adipose tissue, increasing libido, and increasing muscle tissue.

T/F  8. Taken correctly, melatonin appears to treat many symptoms of jet lag.

T/F  9. L-carnitine shuttles fatty acids across the mitochondrial membrane.

T/F  10. Most hyaluronic acid supplements are vegetarian friendly.

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