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Nutrition and Diet Research Progress

Nutritional Supplements and Their Role in Promoting Successful Aging and Longevity

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AND
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NOTICE TO THE READER

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Preface

Every day, people must make choices. Perhaps nothing is as important, however, as what people choose to eat or not eat. While hunger, a desire to have a feeling of well-being, or purely habit motivates many of our choices, nutrition plays an essential role in our health and how successful we will be in terms of our aging process. The term "nutritional supplements" is generally used to include vitamins, minerals, herbs, meal supplements, sports nutrition products, natural food supplements, and other related products. This monograph, while not an exhaustive compilation of all nutritional supplements available, is meant to guide any reader who is interested in adding quality of life to their remaining years, and perhaps even extending their life span. Whether it is a vitamin, mineral, macronutrient, super food or herb, we have attempted to present the data available (whether anecdotal, based on animal/cellular models, or well conducted scientific studies in humans), to help the reader make a wise choice as to what to include in their diet. This may include a specific food, an ingredient, or nutritional product depending on the person. Having a more successful aging process is up to each individual, and the authors hope this monograph will help to provide an individualized path to success!

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Chapter 1

Aging in the 21st Century- We Can Have a More "Successful Aging"

Just how long each of us will live remains a mystery until the end. While our search for the eternal fountain of youth remains, even now each of us have within our power the ability to live longer, healthier, and more active lives. Unfortunately, many of us fail to maintain healthy lifestyles, eat proper nutrition, are under too much stress in our daily lives, or exposed to environmental toxins to allow their predetermined genetic make-up to reach their expected lifespan. Due to the current epidemic of childhood obesity and diabetes mellitus, babies born today are the first generation since data has been collected that is expected to have a shorter lifespan than their parents. Clearly, there is a lot we can do as individuals and as a society to maximize our longevity. While the number of years we live is important to all, perhaps equally as important is the ability to maintain as high a quality of life as possible for however many years we do have.

While a discussion of all of the things an individual can do to increase their chances of successfully blowing out the candles on their 110th birthday cake is beyond the scope of this book, every day there are choices one must make concerning whether to take one form or another of nutritional supplement or "super food" or add some form of nutrient in the diet in an attempt to be more healthy and hopefully live longer. While some are fads and without proven merit, others may have a possible benefit based on theoretical

principles or proven benefit as based on well-controlled scientific evidence. Our goal is to help you decide which nutrients, nutritional supplements and "super foods," if any, can potentially improve your functional status as you age as well as improve your chances of reaching your own genetically determined maximal lifespan. Where applicable, we will also provide you with information as to which nutritional supplements may help you prevent or treat diseases that all too commonly affect us as we reach an older age.

The longest documented living person, Jeanne Calment, passed away in 1997 in France at the age of 122, setting a record for human longevity. While there are currently 72,000 individuals in America alone who have reached100 years of age, this number is expected to reach 250,000 over the next few decades. Those over age 110 are much fewer in number with estimates only in the hundreds. We have seen a dramatic increase in the average life span of the population with the average baby born today expected to live well into their late 70's. It's important to remember, however, that there were cavemen who were thought to live to age 100 and no change in our species maximal life span of between 115-122 years has been noted despite our advances in socio-economic factors, sanitation, nutrition, and modern health care. In fact, computer models suggest that even if we cured all heart disease and cancer, the two major causes of death in America, there would still only be an 8 year increase in our average life-span and no change in our projected maximal life-span for the human species. Starting in the late 19th century, average life expectancy started to increase as fewer children were dying. This trend has continued to the present and adults have also enjoyed better health. Public health measures such as efforts in smoking cessation, improved nutrition, the introduction of antibiotics and medications to treat common disorders such as heart disease have also improved our longevity as a whole. Despite this, age takes its toll on everyone as our bodies have a more difficult time repairing damage to our DNA and inherent molecules.

While the process of aging affects us all, everyone ages differently. Not only do we have a unique genetic make-up that pre-programs how successful our aging will be, but many other factors, some of which are within our individual control, play a significant role in what diseases we develop as we age and just how successful our aging process will be. We must not take for granted that what we eat or fail to eat, how much exercise we do on a regular basis, exposure we may have to toxic factors such as ultraviolet rays and pollutants, pesticides, and germs, among many other factors all will play a role in our aging process and help to determine whether we will develop diseases

as we age that we may otherwise never have developed if genetics alone were the only factor to consider in our aging process. These external factors may also accelerate our otherwise normal and genetically pre-determined aging resulting in functional decline and reduced quality of life during our later years.

While we are beginning to understand how best to live our lives in order to maintain as high a quality of life as possible for as long as we live, making sure each of us has the proper tools to accomplish this goal is yet another challenge. While it is true that certain vitamins, minerals, and other anti-aging formulas, herbs, and super-foods can potentially add quality to one's years and may even in circumstances promote a longer life-span, there is no substitute for proper weight control, avoiding environmental hazards and toxins, and maintaining a healthy life-style and exercise regimen. For those who are seeking to have a more "Successful Aging" process, however, we have searched the literature and reviewed the scientific studies in detail and present in this book our findings. It is not meant to be an all-inclusive directory of everything one can find in the health food store or supermarket aisle, but rather a guide of what may be potentially helpful in our search for optimal aging as well as a way to either prevent or treat a number of conditions that clearly place our health at risk as we age. Aging is not something to be feared- most individuals would not want to face the alternative if given the choice, e.g., dying early- but rather embraced, enjoyed, and planned for. The choice of just how successful your aging process will be is up to you!

Chapter 2

Nutritional Supplements: Their role in Successful Aging and Longevity

The term "Nutritional Supplements" is generally used to include vitamins, minerals, herbs, meal supplements, sports nutrition products, natural food supplements, and other related products. There are many choices to make and many possible uses for adding some form of nutritional supplement to one's daily routine. While some products have proven benefits as based on well-controlled scientific studies, others remain more controversial or lack clear scientific evidence that they will improve what has been advertised. Most of these products are treated as foods and are not under the strict regulations we expect with pharmaceuticals and therefore, buyer beware. Quality control is also an issue with some containing less of a specific product than that listed on the label or contains impurities or fillers.

Nutritional supplements have been used for a variety of reasons in order to either provide the minimal amount of a necessary nutrient or to boost the nutritional content in one or more specific areas of the diet. They can be added to the diet to boost overall health and energy; provide immune system support in the hope of reducing the risk of developing illness and/or age-related changes; improve performance, both physically and mentally; support the healing process; improve vitality and/or physical appearance; and even slow down the aging process itself and hopefully increase longevity.

The Natural Nutritional Foods Association estimates that nutritional supplements are an approximate $20 billion market in the United States each year with 33% of this spent on vitamin sales, 21% on herbs, 13% on meal supplements, 10% on sports nutrition products, and 9% on mineral supplements; specialty products comprise the rest.

The following is a discussion of various vitamins, minerals, herbs and super foods that have been reported in the literature to have some beneficial effect on health and well-being. In most cases, they may help prevent or treat age-prevalent conditions or illness and thus help to promote wellness and optimal quality of life for as long as one lives. In rare circumstances, one could hypothesize that some may even have a positive impact on longevity, not only helping each of us to live a better quality of life but also to increase the quantity of high quality-of-life years. Whether any one or combination of nutritional supplements in any form can increase our otherwise genetically predetermined life span remains speculative.

It would be wrong to assume that a nutritional supplement is all that is needed for good health and optimal life span. Attention to our overall diet, what we eat or fail to eat is essential. We must avoid obesity starting in childhood and partake in life habits that will help us to reduce our exposure to environmental toxins such as excess ultraviolet light and cigarette smoking, pollutants, and toxins in our food and drinking water. We must insure that we undergo regular health screenings as recommended by the medical community to detect diseases such as colon and breast cancer at as early a stage as possible and to seek medical attention whenever we have a problem or change in our baseline condition. Let us not forget the importance of reducing our daily stress or finding ways to deal with stress that is unavoidable and the need for regular exercise. While we cannot change the genetic make-up we were born with, we all have the ability to lead healthier and more productive lives. This book will provide a guide for the reader to pick and choose which if any nutritional supplement they may want to use in their own, individualized plan for a more Successful Aging.

Chapter 3

The Role of Vitamins in Successful Aging

Vitamins are micronutrients or substances that the body uses in small amounts. This is in contrast to macronutrients such as proteins, fats, and carbohydrates that are the basic components of the food we eat. While vitamins are present in one form or another in most foods, adequate quantities of vitamins may be reduced when food is overcooked, processed or improperly stored. In addition, certain diets may be deficient in certain vitamins. Individuals who consume no animal products, for example, may have a diet deficient in vitamin B12 and need to take a supplement as in the form of a fortified food or vitamin pill itself merely to obtain the minimal quantity required for health. Processing whole wheat grain into white flour has been shown to reduce the content of vitamins B and E, fiber, and minerals such as zinc and iron. Vitamins are essential for our body's basic functions and cellular biochemistry and deficiencies may lead to the development of certain diseases that may impact negatively on our aging process and chances of reaching our maximal lifespan.

Vitamins may be found in both a natural and synthetic form. Natural vitamins are obtained from food sources while synthetic vitamins are made in the laboratory. In most cases, the differences between these are insignificant though in some cases small differences have been reported.

Vitamin E in its natural form, for example, is also known as d-alpha-tocopherol in contrast to the synthetic form that is known as dl-alpha-tocopherol. The "l" that is added to its name refers to its production in the

laboratory. The natural form of vitamin E is better absorbed by the body than the synthetic form. If synthetic vitamin E, however, is taken in higher amounts, it should be indistinguishable in terms of clinical outcome and benefit.

Vitamins are classified as being either water or fat soluble, explaining how they are distributed in the body. While most water soluble vitamins are not toxic even if taken in high quantities as the body will excrete what is not needed in the urine, fat soluble vitamins may accumulate and result in toxicities that at times can be life threatening.

Fat soluble Vitamins include vitamins A, D, E and K. An excessive amount of vitamin A may be extremely toxic and lead to a disease referred to as pseudo-tumor cerebrae, a disorder that mimics symptoms of a brain tumor. Toxicity may lead to headache, vomiting, diplopia or double-vision, alopecia or areas of baldness, dryness of the mucous membranes, bone abnormalities and even liver damage. Spontaneous abortions and birth defects including malformations of the skull, face, heart, and central nervous system have been observed in fetuses of women ingesting even "therapeutic doses" of 13-cis retinoic acid during the first trimester of pregnancy (0.5-1.5 mg/kg); large daily doses of retinyl esters or retinol, greater than 6,000 RE or 20,000 IU may cause similar abnormalities.

An excess of vitamin D may lead to a higher than normal level of calcium that at times may be life threatening. Clearly we need to be cautious when we are taking vitamin supplements, especially those that are fat soluble, to insure we do not exceed safe levels.

While a complete review of all vitamins and minerals, their actions, and potential impact on health and longevity is beyond the scope of this brief monograph, anyone who is uncertain if their diet is deficient in any vitamin or mineral can safely obtain the required minimal amounts by taking a daily vitamin supplement. In certain cases, deficiency states can be easily documented by obtaining vitamin levels as is the case for folic acid, vitamin B12, and vitamin D. There is little evidence, however, that other than providing essential nutrients to maintain health and prevent deficiency states, taking higher than minimal recommended amounts of vitamins or minerals will increase one's chances of living longer.

Successful aging is not just about living longer, however, but also having quality of life for as long as we live. The Centenarian study reported that while more women live to age 100 and above than men, those men who do live to 100 are more functional. When further analyzed, it was the reduced bone mineral content leading to osteoporosis and increased fracture risk that placed

these elderly women most at risk of losing independence and quality of life. Clearly past generations were not aware of the need to maintain an adequate mineral content in our bones and failed for the most part to take in sufficient quantities of calcium and vitamin D in their diet or through supplements. This is an excellent example of how something we may take for granted earlier in life can prove to have great benefit as we age.

Vitamin A

Vitamin A consists of a group of compounds essential for proper vision, growth, cellular development, reproduction, and proper functioning of the immune system. Retinol, retinaldehyde, and retinoic acid are naturally occurring compounds that contain some degree of vitamin A activity. A large number of synthetic compounds also have vitamin A activity and are collectively referred to as retinoids. While some of these may provide protection from deficiency states that may result from an inadequate intake of vitamin A in the diet, they may not provide complete protection. For example, retinoic acid taken in the diet does not protect against night blindness or reproductive dysfunction. Vitamin A obtained in the diet through consumption of pre-formed retinoids with vitamin A activity are usually derived from animal products and foods rich in carotenoid precursors of vitamin A such as beta-carotene, alpha-carotene, and cryptoxanthin. These are found in plants as well as in some animal fats with more than 50 natural carotenoids serving as precursors of retinol and thus considered to have pro-vitamin A activity.

An adequate intake of Vitamin A is essential to maintain health. The richest sources of preformed retinol are liver and fish liver oils. Significant amounts can also be found in whole and fortified milk and in eggs. The major contributors of vitamin A or pro-vitamin A in the American diet comes from liver, carrots, eggs, vegetable-based soups, and whole milk products. Fortified foods also contribute to dietary intake of vitamin A with approximately 1/3 of the US population currently reported to take supplements of vitamin A in one form or another. Less than one-third of total vitamin A activity in the diet is derived from carotenoids.

In addition to its effects on normal health and development, vitamin A deficiency may result in symptoms of diarrhea, night blindness and conjunctival and/or corneal xerosis and ulceration (xerophthalmia or

keratomalacia), an irreversible corneal lesion that may lead to blindness. A loss of appetite, hyperkeratosis, increased susceptibility to infections, and changes in the cell structure of cells of the respiratory tract and other organs have also been described. While vitamin A supplementation has recently been associated with reduced breast density in women, no data are available to suggest a reduction in breast cancer in women using vitamin A supplementation.

Retinyl esters are hydrolyzed in the small intestine to form retinol or may be stored directly as retinyl esters after being taken up from the blood as they pass through the liver; the liver contains approximately 90 % of the body's stores of vitamin A. Large daily doses of retinyl esters or retinol, greater than 6,000 RE or 20,000 IU are considered toxic and should be avoided. Carotenoids, on the other hand, even when ingested in very large doses for weeks to years, are thought to have limited toxicity as they have a limited ability to be converted to vitamin A in the intestine, liver and other organs. When carotenoids are taken in large doses, however, the color of the fat tissue may turn the skin, especially the palms of the hands and soles of the feet to a yellowish hue.

Vitamin A supplementation in the form of beta-carotene, however, may have undesirable effects. A 1994 study conducted in Finland with smokers taking 20 mg a day of beta-carotene found an 18% higher incidence of lung cancer as compared to those who did not take this supplement. In 1996, a study examined the effects of taking beta carotene and vitamin A in a population who were smokers as well as those persons exposed to asbestos, two major causes of lung cancer. These individuals had a 28% greater risk of developing lung cancer and a 26% higher risk of dying from heart disease as compared to those not taking this supplement. In 2002, a study of more than 72,000 nurses demonstrated that individuals who consumed the highest amount of vitamin A through diet and supplements in doses above that which is recommended, had a 48% greater risk of suffering a hip fracture.

The Institute of Medicine does not recommend beta-carotene or any form of vitamin A supplement for the general population beyond what one can obtain from a well–balanced diet or simple multi-vitamin supplement. The current RDA for vitamin A is 1,000 micrograms (3,000 IU) for men and 800 micrograms (2,330 IU) for women. The amount of beta-carotene necessary to meet the vitamin A requirement of adult men is approximately twice that of retinol.

Excessive intake of vitamin A, either acutely or chronically can lead to serious and at times, life-threatening problems including headache, vomiting, diplopia, alopecia, bone abnormalities and even liver damage. Spontaneous abortions and birth defects have also been described.

Vitamin B12

Vitamin B12 was often used by physicians in the early 20th century as a "tonic" to improve one's energy and feeling of well-being. While those who were deficient in vitamin B12 clearly would benefit from having their level repleted to normal, one can't help but wonder what effect was due to its ruby red color when placed in the syringe and given as an intramuscular injection. All B vitamins are water soluble with no known toxicities even if given to excess; they are excreted in the urine. Even today, vitamin B supplements are widely used and are included in all multivitamin preparations available on the market today. While most individuals obtain an adequate amount of the various vitamin B's from their daily diet, certain individuals either take too little or fail to absorb one or more of the B vitamins and thus may become deficient. The latter issue is particularly a problem in the elderly who are more likely to suffer from pernicious anemia, an autoimmune disorder that prevents B12 from being absorbed in the intestine despite eating foods rich in B12. Making things worse, studies have suggested that elderly persons require a higher level of circulating B12 than they did earlier in life and may be told they have a "normal level" when in fact this is not the case. Most laboratories report normal B12 levels in the mid-200 pg/ml range; persons over age 80, however, should have a level >300 pg/ml for optimal cognitive and sensory function. Due to the malabsorption of B12 as the most common cause, a monthly intramuscular injection of vitamin B12 is often the only way to insure an adequate level can be achieved. Geriatric practitioners recommend screening for B12 deficiency in older persons who may have memory loss, falls, or sensory changes even in the absence of a megaloblastic anemia that may also result when vitamin B12 levels decline below normal. Younger persons with similar problems may also benefit from having their level of vitamin B12 measured as B12 deficiency is not only a problem of old age and may occur in those persons who fail to eat foods containing B12 as is the case of persons who eat a Vegan diet or who have Pernicious Anemia.

Thiamine (B1)

Another vitamin in the B family is Thiamine (vitamin B1). Thiamine is a necessary cofactor or coenzyme required for normal carbohydrate metabolism, an energy forming process in the body. It also plays a role in the metabolism of certain amino acids that are derived from protein sources and may have a role in preserving normal nerve membrane activity. Alcohol abuse and folate deficiency may lead to a malabsorption of thiamine and caffeic acid and tannic acid found in coffee and tea, respectively, act as thiamine antagonists. Individuals who have been severely malnourished and are re-fed may become deficient in thiamine as a result of thiamine's role in metabolizing ingested carbohydrates. Prolonged deficiency of thiamine in the diet or from malabsorption as noted above results in a disease known as beriberi. Primary symptoms include changes in the nervous and cardiovascular systems. Confusion, loss of appetite, weakness and unsteady gait may result. In rare circumstances paralysis may occur and the eyes may no longer move normally. Muscle wasting, a rapid heart rate and heart enlargement may lead to heart failure.

Wernicke-Korsakoff syndrome may result with changes in mental status leading to loss of short-term memory and "confabulation."

While not a common deficiency, it is frequently observed in chronic alcoholics who have both reduced thiamine consumption and absorption and an increased requirement to metabolize products of ingested alcohol. Others who are more prone to develop thiamine deficiency are persons on chronic dialysis and individuals fed intravenously without attention to supplemental thiamine. Individuals who consume un-enriched white rice and white flour may also fail to obtain sufficient thiamine from natural sources. Thiamine is found in the "husk" of rice and wheat and thus thiamine deficiency has become more common as dietary preferences for "refined foods" has develop over time. Individuals who consume large quantities of uncooked fish may also be deficient due to the enzyme, thiaminase that is found in certain fish and is capable of degrading thiamine.

The main dietary sources of thiamine include un-refined cereal grains, brewer's yeast that is fortified, lean cuts of pork, organ meats, seeds, nuts and legumes.

Vitamin D

Vitamin D has long been recognized as being essential for the proper absorption of calcium and development of healthy bones. Children deficient in vitamin D classically develop Rickets, with bowing of the knees and knobs over the ribs commonly observed. Adults who are deficient in vitamin D may develop Osteomalacia, or bones lacking adequate mineral content and an increased risk of fractures as well as micro-fractures and skeletal bone pain. Vitamin D is also essential for maintaining normal levels of calcium and phosphorous in the blood. More recently, vitamin D has been linked to proper balance and neuro-muscular function with an increased risk of falls in persons whose level of vitamin D is below what is considered to be optimal, 30 ng/ml of the storage form of vitamin D, 25 OH vitamin D.

Exposure of the skin to ultraviolet light is necessary in order to form vitamin D3, or cholecalciferol from its precursor, 7-dehydrocholesterol. D2, or ergocalciferol, is another form of vitamin D and is the product of the ultraviolet light-induced conversion of ergosterol in plants. Once formed, D3 circulates throughout the body. When D3 passes through the liver, it becomes 1.5 times more potent when a hydroxyl (OH) group is added to form 25-hydroxy D3. This compound continues to circulate through the body and when it passes through the kidney, another OH group is added, this time to the 1 position resulting in the formation of 1,25 di-hydroxy vitamin D3, now 5 times as potent than the original vitamin D product that began in the skin. Any problem with the liver or kidney, however, may influence vitamin D metabolism and one's ability to maintain this healthy metabolic pathway essential for optimal functioning and bone health.

Vitamin D is added to many dairy products at a concentration of 10 micrograms of cholecalciferol (400 International units) per quart. Eggs and butter also contain some vitamin D. The average value of 25 OH vitamin D3 ranges from approximately 25 to 30 ng/ml with the current recommended level being at least 30 ng/ml. The concentration of 1,25 di-hydroxy Vitamin D3 is between 15-45 pg/ml in healthy adults. There appears to be little seasonal variation in the concentration of 1,25 di-hydroxy vitamin D though levels of 25 OH vitamin D are highest during summer months in relation to sun exposure and are lowest during winter and present a particular problem in northern latitudes that lack sunlight in the winter months.

Individuals regularly exposed to sunlight and without specific problems that may interfere with normal vitamin D metabolism are not considered to have a dietary requirement for Vitamin D beyond what is obtained in a normal diet. Since so many individuals do not achieve a normal balance, however, the RDA for adults is now listed as 200 IU per day with most recommending 400 IU at a minimum. In aged individuals and those with osteoporosis, the recommended daily allowance has been placed between 400-800 IU with some individuals requiring even greater amounts to achieve the desired blood level of 25 OH vitamin D of between 30-50 ng/ml.

Vitamin D has also been linked to the maintenance of proper mental health. In a study conducted in Holland on 1,282 persons over the age of 65, levels of 25 OH-Vitamin D were significantly lower in those with depression as compared to those without with consistent results even when possible variables were taken into account.

Although most healthy persons can produce adequate amounts of active vitamin D by exposing their skin to sunlight, we have become increasingly aware of the dangers of excessive exposure to sunlight and have used sunscreens and protective clothing more than in the past. These will limit the ability of the body to produce sufficient quantities of Vitamin D. In addition, skin from an elderly person is less able to produce D3 due to age related changes. For these reasons, many persons, particularly those who are elderly, benefit from taking a vitamin D supplement to insure that their circulating levels of 25 OH-vitamin D remain between 30-50 ng/ml. While a supplement of vitamin D3 or D2 should suffice for most, those persons who have liver or kidney disease and are unable to convert to the more active forms of vitamin D may benefit from taking a supplement of the most potent form of vitamin D, 1,25 di-hydroxy vitamin D. This is best done under the direction of a physician. It is important to remember that while a certain amount of vitamin D is essential for health, Vitamin D is potentially toxic and may lead to life-threatening elevations of calcium. In general, most individuals should not take more than 2,000 IU of Vitamin D supplement daily.

A recent meta-analysis of 290 prospective studies and 172 randomized trials found that moderate doses of vitamin D supplementation decreased all-cause mortality. This gain in survival was mainly in elderly women who were theorized to have low levels of vitamin D and a higher risk of falls and fractures.

Vitamin E

Vitamin E is essential for normal reproductive and neuro-muscular health. Although it was first identified in 1922, it has more recently received a great deal of attention as a potent antioxidant. A deficiency in vitamin E is rare and most commonly reported in premature infants and those who have had a problem with absorbing fat for five years or more.

The most commonly found vitamin E in nature is alpha-tocopherol. One milligram of the acetate form of vitamin E has been defined as equivalent to one IU of vitamin E. Synthetic forms of vitamin E have approximately 74 percent of the activity of the naturally occurring compound.

Tocopherols, along with selenium and vitamin C, serve as antioxidants and prevent oxidative damage that may result from free radicals. Free radicals are oxygen molecules that have lost one electron and circulate throughout the body trying to either steal or donate one electron, thus setting up a cascade of oxidative processes that may lead to cellular damage.

Vitamin E is present in all cell membranes and is associated with polyunsaturated fatty acids that are present in phospholipids distributed throughout the body; a deficiency state may lead to cell damage and eventually neurological symptoms. Low levels of vitamin E may also lead to excessive hemolysis or breakage of red blood cells due to changes in their structural membrane.

Compared to other fat-soluble vitamins, vitamin E is relatively non-toxic when consumed orally in recommended doses. The average intake of vitamin E and alpha-tocopherol among men and women is 9.8 mg and 7.1 mg, respectively. As one increases the intake of polyunsaturated fatty acids (PUFA) in the diet, however, there is a need for higher amounts of vitamin E with requirements varying between 5-20 mg/day. A ratio of alpha-tocopherol to grams of PUFA of approximately 0.4 has been suggested to insure health in adults. The daily recommended allowance of alpha-tocopherol has been set at 10 mg for men and 8 mg for women.

The tocopherol content of food varies depending on its method of processing, storage, and food preparation. The richest sources of natural tocopherol in the US diet are vegetable oils, including soybean, corn, cottonseed, and safflower oil and products that are made from them such as margarine and shortening. Wheat germ is particularly high in vitamin E as are nuts and green leafy vegetables.

Data are conflicting regarding the role of vitamin E and other antioxidant supplementation in preventing disease. Some studies have suggested that low serum concentrations of antioxidants may be associated with an elevated risk of certain cancers. Four large randomized trials in the 1980's provided support for this. When 30,000 men and women aged 40-69 were treated with five years of supplementation with a combination of vitamin E, Beta-carotene, and selenium, the rate of stomach cancer mortality was reported to be reduced by 21 percent and overall cancer mortality was reduced by 13 percent. In a study of 540 patients with head and neck cancer being treated with radiation, however, while vitamin E administration was associated with a higher cancer recurrence rate, differences between those given supplementation as compared to those who were not, failed to reach statistical significance. There was no reduction in cancer recurrence that the investigators had hoped to find.

When 19 clinical trials involving a total of 135,000 subjects were evaluated to determine the effects vitamin E, it was determined that individuals who took greater than 400 IU had a 4 percent increased risk of dying and 13 percent greater risk of developing heart failure as compared to those who took lower amounts of vitamin E in the diet and as supplements. As with any study that groups data together and involves a large population, however, many variables and unknown factors may have influenced the outcome.

Vitamin E has been studied as a way to prevent prostate cancer. While one study reported a significant reduction in the incidence of prostate cancer in those who took alpha-tocopherol supplementation for a mean of 6 years, another study on 35,000 men taking vitamin E, selenium or a combination of the two, failed to replicate these findings. A study in male physicians taking vitamin E and C also failed to demonstrate a lower incidence of prostate or other forms of cancer.

Folate

Folate and folacin are compounds that have nutritional benefits similar to folic acid. These serve as co-enzymes in the body and transport single carbon fragments necessary for normal amino acid and nucleic acid synthesis. Folate is widely present in foods with yeast, legumes, leafy vegetables and some fruits especially rich in content. While present in these foods, it is important to

remember that prolonged food storage, certain types of food preparation and cooking may reduce folate's potency.

Daily requirement of folate is approximately 50 micrograms. Since not all folate in the diet is readily absorbed, 100 micrograms is recommended as one's daily intake. The RDA for folate has been set at 3 micrograms per kilogram body weight for men, non-pregnant, non-lactating women, and adolescents or a minimum of 200 micrograms for adult men and 180 micrograms for adult females. This amount insures an adequate level of folate within the cells of the body as well as provides sufficient amount for storage in the liver to protect against the development of a folate deficiency during periods of inadequate oral intake.

There have been no reports of toxicity in humans even at doses of 10-15 milligrams daily taken for up to 4 months. Individuals on anti-seizure medications phenytoin, phenobarbital and primidone are advised to avoid excessive doses of folate as they appear to compete for absorption in the intestine and brain and may be capable of reducing the anti-seizure medication's effectiveness.

Deficiency of folic acid may result in a megaloblastic anemia similar to that found in B12 deficiency. Neurological findings may be noted including dementia and peripheral neuropathies. The tongue may lose its normal architecture and become smooth and the intestine may also be affected due to an increase in the turnover of intestinal cells.

Folic acid supplementation has been associated in at least one study with a significant risk reduction for developing colon cancer. There are conflicting reports as to the effect of folic acid supplementation on cardiovascular disease risk reduction with at least one well done study reporting a significant risk reduction, possibly related to folic acid's relation to reducing homocysteine levels and thus reducing inflammation in the body.

Vitamin K

Vitamin K is essential for the regulation of blood clotting as well as necessary in the biosynthesis of other proteins in the body. Vitamin K is plentiful in leafy green vegetables, providing 50-800 mcg of vitamin K per 100 grams portion. Small amounts of vitamin K (1-50 mcg/100 gram portion) are found in milk and other dairy products, meats, eggs, cereals, fruits and vegetables. A normal diet in the US contains 300-500 mcg of vitamin K.

Dietary intake of vitamin K should be approximately 1 mcg/kg body weight per day with the RDA for men set at 80 mcg and for women 63 mcg per day. Vitamin K is absorbed in the intestine, primarily in the jejunum and ileum. Normal biliary and pancreatic function appears to be necessary to achieve maximal absorption. Those individuals who malabsorb fats are at high risk of developing a deficiency in vitamin K. IN the liver, vitamin K is necessary to form prothrombin, also known as coagulation factor 11 and factors V11, IX, X and proteins C and S. In the absence of vitamin K, these proteins are still produced but are non-functional and increase one's risk of bleeding. Vitamin K also plays a role in various protein located in the bones, kidneys and other tissues and are thought to help bind calcium in the formation of bone and helping play a role in cell integrity.

Chronic disease, medications, and poor diet are risk factors for vitamin K deficiency. Individuals taking antibiotics chronically are at risk of deficiency due to their effect on eliminating intestinal bacterial essential for vitamin K formation. Vitamin K appears to be non-toxic when taken orally even in higher than recommended doses. When menadione, an injectable synthetic form of vitamin K is used, however, hemolytic anemia and hyperbilirubinemia have been reported to occur in adults.

Vitamin K is plentiful in leafy green vegetables, providing 50-800 micrograms of vitamin K per 100 gram portion. Smaller amounts of vitamin K are found in mild and other dairy products, meat, eggs, cereals, fruits and vegetables.

A normal American diet contains between 300 and 500 micrograms of vitamin D daily. Dietary intake of vitamin K should be approximately 1 microgram/kg of body weight daily in order to maintain normal blood clotting. The RDA for vitamin K has been set at 80 micrograms per day for men and 63 micrograms for women.

Chronic disease, medications, and poor diet are risk factors for vitamin K deficiency. Individuals taking antibiotics chronically are also at risk due to their effect on eliminating intestinal bacteria essential for vitamin K formation. Even in large doses, vitamin K appears to be non-toxic when taken orally. When menadione, a synthetic injectable form of vitamin K is administered in toxic doses, however, hemolytic anemia and hyperbilirubinemia have been reported.

Chapter 4

The Role of Minerals in Successful Aging

Calcium

Calcium is one of the most ubiquitous minerals found in the body and an adequate intake of calcium is essential for our bones to remain healthy throughout our lives as well as for normal cell function and health.

While found in almost all cells in the body, calcium is essential for proper function of the heart, bones, muscles, and nervous system. Ninety-nine percent of our calcium is found in the bones. Every year approximately 30 percent of our bone structure is "remodeled." In order that we keep in balance and continue to replace the bone mass that is lost, we must have sufficient calcium intake as well as normal hormonal function. Our bone mass peaks between the ages of 21 and 24 and we face a loss of critical bone mass as we age, but this is not inevitable with appropriate attention and care. While we need calcium throughout our lives to replace what is lost, peak times of concern for women are the peri-menopausal and post-menopausal period at which time there is an accelerated loss of bone mineral content due to the natural loss of estrogen; this is a critical problem for about 10 years after menopause. During later life, we fail to replace lost mineral from bone at the same rate as we did when we were younger. In both men and women, the loss of bone mineral content can be accelerated not only by an insufficient amount of calcium in the diet or through the use of calcium supplements, but also from physical inactivity and certain diseases such as hyperthyroidism that increase bone mineral turnover

and thus demineralization. Additional factors that have a negative effect on bone health include intake of caffeine, alcohol and colas; weight less than 127 pounds, multiple births, vitamin D status, medications including steroid use and certain medications used to treat asthma, as well as genetic predisposition to developing osteoporosis. Women of Northern European and Asian origin tend to be most affected with lower bone mineral content at baseline as compared to women of Mediterranean origin or who are African American. The daily requirement of calcium varies greatly and depends on a number of individualized factors including rate of bone turnover, bone mass, and factors that may cause bones to loose mineral content as listed above. Values between 800 milligrams to 1,500 milligrams per day of elemental calcium have been suggested with the elderly and those with osteoporosis, pregnancy and breast feeding listed at a higher range. The ability of our intestine to absorb calcium declines with normal aging and thus persons over age 60 should strive for 1,200 to 1,500 milligrams daily. Once osteoporosis has been detected, a daily intake of 1,500 milligrams of calcium is recommended.

Unfortunately, many persons are afraid to take calcium supplementation even when they are consuming a diet that fails to include an adequate intake of calcium. While increased rates of cardiac disease as well as kidney stones in persons using calcium supplements have been reported, these studies are not universally accepted. These studies did not control for total calcium intake from both dietary as well as supplemental sources and likely include individuals who exceeded recommended amounts of calcium. It is a good idea to not exceed 2 grams of elemental calcium intake daily from any source as excess calcium will be excreted into the urine and kidney stones may result. Since the average American diet is deficient in calcium, however, many persons will benefit from taking a calcium supplement to help maintain their calcium balance and bone mineral content essential to prevent osteoporosis and bone fractures later in life.

The best source of calcium in the diet is through dairy products with approximately 300 milligrams of elemental calcium in 8 ounces of milk. Skim milk contains the same amount of calcium as whole milk. Yogurt contains an equivalent amount, though many fail to realize that a commercially available container for a single serving of yogurt is rarely 8 ounces but rather 4-6 ounces. One ounce of natural cheese and 2 ounces of processed cheese also contains an equivalent amount of calcium; ice cream and cottage cheese varies in calcium content based on air content and curd size, respectively. Cream cheese should not be considered a cheese as it contains little calcium. While

other foods contain calcium in small amounts, it is exceedingly difficult to obtain sufficient calcium in the absence of dairy products in the diet. Foods with approximately 100 milligrams of calcium per serving include salmon with bones, collards, turnip greens, instant farina and kale. Sardines with bones are a relatively good source of calcium with 300 milligrams in every 2.25 ounces. Despite publicity to the contrary, it would take 10 eggs, 29 tablespoons of peanut butter, 7.75 pounds of tuna, 14 cups of rice, and 13 cups of oatmeal to give the equivalent quantity of calcium that is found in 8 ounces of milk.

Calcium may be found in a variety of compounds. While the most common calcium product sold is calcium carbonate, individuals who lack acidity in the stomach either due to achlorohydria or the use of anti-acid medications and who need to take a calcium supplement would be better off using calcium citrate. This latter form of calcium is absorbed equally as well with food or an empty stomach and its absorption is not affected by stomach acidity.

Copper and Manganese

Both copper and manganese are essential nutrients and are utilized by certain proteins and enzymes. While deficiencies are rare, they may result in serious neurological abnormalities, changes in heart function and abnormal glucose metabolism. Individuals consuming low levels of copper in the diet have been reported to have higher levels of cholesterol, glucose intolerance and heart related abnormalities. Copper is found in a variety of foods with particularly high amounts found in seafood, nuts, seeds and liver. Most diets in the US provide a daily intake of 1.0 to 3.0 mg daily. A minimum intake of between 1.5 to 3.0 mg per day is recommended. To date, no toxicities have been reported in persons taking up to 10 mg daily.

Manganese is abundant in whole grains and cereal products and is also present in fruits and vegetables. Tea has also been found to be rich in manganese. The minimum daily requirement is 2.0 to 5.0 mg per day. Toxicity rarely occurs other than from occupational exposure to toxic levels with neurotoxicity the most commonly reported problem. It is generally agreed upon that up to 10 mg per day is safe though no benefit has been reported beyond the minimal requirements.

Chromium

Chromium is necessary for normal glucose metabolism as it acts as a cofactor for insulin action. Chromium deficient animals have been reported to demonstrate impaired glucose tolerance and a diabetes-like syndrome. While concentrations of chromium appear to decline with increasing age in most tissues, concentrations in the lung reportedly increase. Chromium is absorbed by the intestine with 0.5 percent absorbed when the daily intake is 40 micrograms or higher; approximately 2 percent is absorbed when lower amounts are in the diet. Persons with low chromium in their blood and hair have been reported to have impaired glucose tolerance and a higher rate of coronary artery disease. The recommended daily intake of chromium is between 50 and 200 micrograms daily. In the occupational setting in persons exposed to higher amounts, bronchial cancer has been identified as a risk factor. Few if any side effects have been described in persons obtaining chromium from dietary sources even if intake is in excess of recommended levels.

Fluoride

One does not have to search far to find individuals who lacked fluoride in their drinking water or who failed to get fluoride treatments on their teeth. The end result is a mouth filled with dental problems resulting from “soft teeth” that are vulnerable to tooth decay. Fluorine, also referred to as its ionic form, fluoride, is present in small amounts in almost all soil, water, plants and animals and is incorporated into bones and tooth enamel in proportion to intake. While not considered to be essential, it has a valuable effect on maintaining proper dental health. The benefit on bone health is more controversial. While fluoride increases bone density, in higher amounts, 4 to 5.8 mg/liter, the bone that is formed appears to be more brittle with an actual increased rate of bone fracture. Excess fluoride intake also may lead to a chronic condition known as fluorosis and affect muscle, kidney, and nerve functioning. While some have argued that higher intake may predispose to a higher rate of cancer, there is no sound evidence to support this claim. The estimated range for safe intake of fluoride for adults is 1.5 to 4.0 mg per day derived from all sources. Younger aged individuals should not have more than

2.5 mg per day; intakes of 0.1 to 1 mg are recommended during the first year of life and 0.5 to 1.5 mg per day for children up to age 3. Higher amounts have been associated with "mottled teeth" and should be avoided.

Free fluoride as found in water is more readily available for use by the body than protein-bound fluorine found in certain foods. Approximately 65 percent of sodium fluoride, the most common supplement added to drinking water in certain communities, some milk products and baby formulas, is absorbed. The Food and Nutrition Board recommends fluoridation of public water supplies if natural fluoride levels are below 0.7 mg per liter.

Iodine

Iodine is a trace element that is essential to the formation of thyroid hormone. Thyroid hormones are major factors in regulating our metabolism and are produced through a series of enzymatic processes in the thyroid gland. Iodine is trapped by the thyroid gland and through a series of conversions starting with mono-iodo-thyronine, iodine is added to form di-iodothyronine, tri-iodothyronine and tetra-iodothyronine, names after the number of iodines that have been added. The most ubiquitous thyroid hormone is 3,5, 3', 5' tetra-iodothyronine or T4. As this circulates in the body, through a series of enzymatic degradations, one iodine is lost and 3,5,3' tri-iodothyronine is formed, a more potent form of thyroid hormone. Approximately 80 percent of T3 is formed as T4 circulates through the liver, kidney and muscles. The rest of T3 is made in the thyroid gland itself. As we age and the thyroid has a harder time keeping up with thyroid hormone production, the thyroid itself makes a greater percentage of the circulating amount of the more active thyroid hormone, T3. Since T3 is 3-5 times more potent than T4 and requires one less iodine, it is more economical for the body to shift its metabolic pathways in this fashion.

Under most circumstances, the American diet will provide a sufficient quantity of iodine to maintain a normal hormonal balance and normal levels of thyroid hormone. Iodine is absorbed from the diet and circulates largely as organic iodine with approximately 5 percent in the form of iodide. The daily iodine requirement for adults is approximately 1 to 2 micrograms per kilograms body weight. Ocean born seafoods and seaweed have high concentrations of iodine. Dairy products and eggs have variable iodine content

depending on the iodine placed in the animal feed. Vegetables are low in iodine content with amounts varying with the iodine content in the soil they are grown in. Current levels of iodine supplement provide 76 micrograms of iodine per gram of salt but only if one consumes "iodized salt." There is still salt being sold without supplemental iodine so the consumer must know what type of salt they are buying and why it is important to take one form or another. Iodine is frequently also added to commercially sold bread as well as other products.

Iodine deficiency may have significant consequences. The body strives to maintain a normal balance of thyroid hormone. In response to low intake of iodine, the body increases its production of TSH, produced in the pituitary gland as a regulatory hormone. Over time, this will result in an increase in the size of the thyroid gland leading to a goiter to be formed. This is done in an attempt to better "trap" iodine. There is also a greater shift by the thyroid gland to produce T3, a more potent thyroid hormone and requires one less iodine to be formed. If these responses still fail to produce a sufficient amount of thyroid hormone, a hypothyroid state will result.

While a deficiency of iodine produces hypothyroidism, a high intake may also lead to goiter formation due to iodine's effect on blocking thyroid hormone production, a process known as organification. This may occur when plasma iodine concentrations exceed 15-25 micrograms/ml. A daily intake of between 50 and 1,000 micrograms per day is considered to be safe and adequate for normal health. Excess amounts of iodine consumed may lead to hyperthyroidism in persons who have an underlying abnormality of thyroid hormone production, such as persons with enzymatic defects or in those who come from areas of iodine deficiency where the thyroid gland has already compensated to these situations by altering the way thyroid hormone is produced, either making the more active form of thyroid hormone to a greater degree or being more efficient in thyroid hormone production. Adding the additional iodine at this time can in effect "add fuel to the fire." Fortunately, hyperthyroidism in these cases is usually quite transient.

Iron

Iron is an essential nutrient and a component of life sustaining hemoglobin, the oxygen carrying molecule within our red blood cells. Iron is

also a building block of myoglobin and a number of key enzymes in the body. Approximately 30 percent of the body's iron is stored in the spleen, liver, and bone marrow in the form of ferritin and hemosiderin and a small amount circulates on the transport protein, transferrin.

Iron is absorbed by the intestinal mucosa and may be found in two forms, heme and non-heme. Heme iron is readily absorbable and constitutes approximately 60 percent of the iron in animal tissues; all of the iron in vegetables is in a non-heme form. Non-heme iron absorption is increased by organic acids such as ascorbic acid. Substances such as calcium phosphate, phytates, bran, polyphenols such as those in tea and antacids may decrease non-heme iron absorption. In other words, iron in the diet is largely in the form of ferrous iron and is converted to the ferric form in the stomach under acidic conditions. Without this transformation, only 1 percent of dietary iron is able to be absorbed. The percentage of iron absorbed in the diet decreases as the amount of iron present increases. Absorption of iron also depends on the iron status of the individual. Mean absorption of dietary iron is relatively low when body stores are high but increases when stores decline. This is nature's way of maintaining adequate iron stores under normal circumstances, storing what is required for reserve and avoiding excessive quantities that may lead to toxicity.

As we age, we have a reduced amount of acid production by the parietal cells of the stomach. Although few develop a complete inability to produce acid, or achlorohydria, those with diseases such as pernicious anemia or who take anti-acid medications or inhibitors of acid production may have a reduced ability to absorb iron through the diet. Since stores of iron in the body remain for long periods of time, this rarely produces problems. When blood loss occurs for whatever reason, however, a deficiency of iron may result. This may also occur through normal menstruation in women who have not yet gone through menopause. Even if there are sufficient stores of iron in the body, some individuals with chronic illness are unable to utilize iron to produce normal red blood cells. This is known as "anemia of chronic disease."

True iron deficiency results in microcytosis or small red blood cells and anemia. A hemoglobin value less than 12.0 and 13.5 grams/dL for women and men, respectively represents anemia.

Iron is readily available in the diet with meat, fish, eggs, vegetables and fortified cereals major sources. It has been estimated that women have an average iron store of approximately 300 mg and men 1,000 mg. This is thought to provide sufficient reserve against periods of negative iron balance

and in the absence of blood loss should be adequate for several months even if no additional iron was consumed. Men loose an average of 1 mg of iron per day in the absence of excess blood loss and women average an additional 0.5 mg iron loss per day during their active menstrual periods though this amount varies greatly from woman to woman and may be as high as an additional 1.5 mg per day. For this reason, many more women are anemic than men during their reproductive years. Based on normal amounts of absorption, the daily requirement of iron necessary to maintain proper health has been estimated at 10 mg for men and 15 mg for menstruating women. Post-menopausal women have the same daily requirement of iron as men, e.g., 10 mg per day.

Iron toxicity rarely occurs from excess intake of dietary sources of iron in the absence of a genetic pre-disposition to excess iron absorption and deposition known as hemochromatosis. This disorder is thought to affect as many as 4 percent of the population and is caused by an autosomal recessive gene. If affected, toxic levels of iron accumulate in the heart, testes, pancreas and other organs and may lead to life-threatening illness. While not universally accepted, excess intake of iron may be associated with a higher rate of cardiac disease. For this reason, caution is advised to avoid taking in more than the recommend amount of iron from supplemental sources unless specifically told to do so by a physician. Iron has been removed from most vitamins aimed at older individuals including women who have stopped menstruating to avoid the potential for toxicity.

Selenium

Selenium is essential to maintain an adequate defense against toxic oxidants. It is a vital component of the enzyme glutathione peroxidase. In 1979, a group of Chinese scientists reported an association between low levels of selenium and a form a cardiomyopathy affecting children and young women. Case reports exist describing muscular discomfort and weakness in persons fed entirely by intravenous methods using a selenium deficient diet; selenium supplementation eliminated these symptoms as well as improved cardiac function in several who were described to have problems as a result of the selenium deficient diet.

Selenium has been suggested as a way of preventing degenerative diseases and certain forms of cancer though claims are based on animal studies and

little exists in the literature to support these claims in humans. One well designed study that gave men large doses of selenium and vitamin E, either alone or in combination, failed to demonstrate any difference in the incidence of prostate cancer.

Selenium is found in large quantities in seafood and kidney and liver organs. Grains and seeds vary in content depending on the soil in which they grow and fruits and vegetable contain little selenium. The usual diet contains approximately 100 micrograms of selenium per day with the suggested minimum requirement of 70 and 55 micrograms per day for men and women, respectively. Intake in excess of 1 milligram may lead to symptoms of nausea, abdominal pain, diarrhea, hair and nail changes, peripheral neuropathy, fatigue and irritability. One study also reported abnormal glucose metabolism resembling diabetes mellitus when extremely large quantities of selenium were ingested. For now, selenium should be ingested cautiously with intake from selenium rich foods the best way to meet daily requirements.

Zinc

Zinc is an essential component of certain enzymes in the body and helps to regulate cell division, growth, wound healing and proper functioning of the immune system. It also appears to play a significant role in our sense of smell and taste. Requirements vary depending on the individual's zinc status. Relatively large amounts of zinc are stored in bone and muscle. Despite this, there is a short half-life of zinc. One's diet largely determines the availability of zinc with interactions occurring with other dietary components such as protein, phytates, fiber and some minerals influencing our ability to absorb zinc. Higher amounts are absorbed in association with the intake of milk, soy products, meat and certain grains.

Individuals deficient in zinc have been reported to lose appetite and have a decline in their taste sensation. There may also be growth retardation and changes in the skin if zinc deficiency is severe. Zinc deficiency during pregnancy may lead to developmental disorders in offspring; men with severe deficiency may have hypogonadism, low levels of testosterone and infertility. Problems have also been reported with wound healing.

Approximately 70 percent of zinc in the diet is derived from animal products such as meat, eggs and seafood, particularly oysters. Most of the zinc

consumed from other food sources comes from cereals, brewer's yeast, mild, beans, and wheat germ. It has been noted that increasing one's dietary intake of phosphorous increases requirements for zinc due to a reduction in zinc absorption. The average American diet provides between 10 and 15 mg of zinc per day. The minimum requirement for daily zinc intake has been set at 15 mg and 12 mg for men and women, respectively.

While not common, excessive intake of zinc may impair copper status in the body, interfere with iron absorption, and lead to impaired formation of red blood cells, neutropenia, and problems with immune system functioning. A reduction in high density lipoprotein (HDL) cholesterol, the good form of cholesterol, has also been reported in individuals who consume high amounts of zinc for prolonged periods of time. For these reasons, chronic ingestion of zinc supplements in excess of 10-15 milligrams per day is strongly discouraged.

While it is important to insure an adequate intake of zinc, caution is advised to not take excessive doses that may have potentially harmful effects. The full potential benefit of zinc in the diet remains in need of more scientific study. Although the prostate gland normally contains high concentrations of zinc and a deficiency in zinc has been linked to lower levels of testosterone, there is no scientific data suggesting that zinc use improves sexual potency or has any effect on improving prostate health. Oysters, rich in zinc, have long had a reputation for being able to promote sexual potency; no causal relationship has ever been found. Zinc has also been reported to help protect against macular-degeneration, the leading cause of blindness in the elderly and thought to result from oxidative damage from free radicals. Additional studies need to be done to better define the role of zinc in this disease process. Zinc has been claimed to help fight the common cold. To date, several studies have reported that the use of zinc helps reduce symptoms of the common cold by as much as three days. These studies have not withstood the scientific rigor necessary to make a definite conclusion and many studies failed to prove any benefit.

For now, zinc supplements are not recommended other than in a dose found in a daily vitamin that provides the minimum daily requirement. If you are taking high doses of calcium and/or are a vegan, however, a simple multivitamin and mineral supplement with zinc is suggested. There is no good evidence to suggest that a higher dose of zinc has any benefit and some evidence to suggest that it should be avoided.

Chapter 5

The Role of Protein in Successful Aging

Almost every health food store, grocery, and gym is touting one form or another of protein supplement. In many cases there is the hope that taking additional protein will enhance one's metabolic state and help build muscle or improve one's vitality and physical endurance. For many others, however, protein supplements are needed just to insure that there is an adequate intake of protein. Studies have demonstrated that the normal requirement for protein is 0.8 grams per kilogram (2.2 pounds) of body weight. This appears to be a constant regardless of age. Failure to obtain sufficient quantities of protein in the diet, however, can lead to a disease known as Kwashiorkor, or protein-calorie malnutrition. Individuals with this potentially life-threatening disorder may look "normal" and in certain circumstances, even obese. However, a deficiency in protein may lead to fatigue, changes in mood, increased infections, bloating, diarrhea, edema, and muscle wasting, among other symptoms. Rodents fed a diet deficient in protein eat more per gram body weight than normal apparently in an attempt to gain sufficient protein to maintain their health. They have an increase in Tri-iodothyronine production, T3, the most active form of thyroid hormone to help them burn off the extra, non-protein calories; despite this, these protein deficient rats are still never able to eat enough to obtain the protein they need for normal growth and development. They remain stunted in growth and develop symptoms of malnutrition. Humans behave differently, with no particular "drive" to eat sufficient protein. Instead it is essential that diets contain adequate protein in

order to maintain health. When undergoing stress, such as having surgery, trauma, or suffering from a burn, it has been suggested that recovery can be improved by increasing protein intake, at least for a short while. We now know, however, that long term excess protein intake is not healthy and should be avoided. So how much is too much? For short periods of time it is probably ok to double one's intake of protein above the accepted 0.8 grams per kilogram body weight requirement that has been advised for a healthy state. High protein diets, however, if taken for long periods of time, have been shown at least in animal models to accelerate the normal age-related decline in renal function by causing glomerular sclerosis and damage to the kidney.

Diets based on high protein intake have received mixed reviews. The most commonly used was the Atkins diet that suggested eliminating carbohydrates in exchange for increased intake of fat and protein. Most individuals given the choice of what to eat, chose to increase protein rather than fat. Protein contains 4 calories per gram as compared to the 9 calories per gram in fat and 4 calories in carbohydrates. What makes this diet so successful in the short term is that only 78 percent of protein can be utilized by the body due to the increased metabolic energy required to break down the proteins into energy. This is compared to 99 and 98 percent utilization for fat and carbohydrates, respectively. In addition, the fat and protein results in an anorectic state as compared to a diet rich in carbohydrates that increases the level of insulin and stimulates hunger. In the short term, a diet that eliminates carbohydrates in favor of fat and protein will indeed help jump start one to lose weight. As one continues on this diet, however, data suggest that individuals start adding carbohydrates and are no longer ketotic or acidotic. Hunger returns and now all you are left with is a diet too high in unhealthy fat and high protein that can damage the kidneys over time and may even increase bone turnover leading to a loss of bone mineral content. Studies have shown an equal amount of weight loss on this diet at six months as compared to those persons who were placed on a Mediterranean diet rich in vegetables, fish, and complex carbohydrates and at two years, those on the Mediterranean diet actually were healthier with a greater weight loss.

Dieting is an individual choice but is well worth understanding the benefits and risks of whatever diet one chooses to stay on. The main thing is to be conscientious and work toward a goal in mind.

For years body builders have debated the benefits of using one form of protein supplement or another to help build body mass. It has been recommended that protein intake be increased by 0.4 to 0.8 grams per

kilogram daily if the goal is to increase lean muscle. This dietary change must, however, be coupled with an exercise program. Many elderly persons find that they are losing key muscle mass as they age and are taking in less food each day; a protein supplement may be the best way to maintain their protein requirements.

While using a protein "shake" or protein rich food bar can serve as an occasional meal replacement, using these sources of protein and calories on a more regular basis should be under the direct supervision of a physician.

Nutritional supplemental shakes come in many varieties. Some are made from fresh fruits, vegetables, and natural protein that can provide essential nutrients, vitamins and minerals to maintain health. Some also include antioxidants, fiber, and probiotics.

What is a protein? Protein is made up of amino acids that are essential for health and metabolic functions in the body. Amino acids, for example, are required for optimal immune function, to catalyze enzyme reactions in the body and for proper tissue growth and cellular repair. Foods rich in protein frequently come from animal sources including beef, chicken, eggs and fish. High quality protein can also be obtained from soy products, hemp, and brown rice, all plant-based sources of protein.

Soy protein is derived from soybeans, legumes that are low in fat and have no cholesterol. Soy protein is considered a complete protein source containing all essential amino acids; the term essential is used to characterize those amino acids essential for health that we cannot manufacture in our own bodies from other nutrients. Soy contains phytoestrogens and has been shown to help improve the rate of bone turnover in peri-and post-menopausal women. Soy protein is also an excellent source of calcium, iron, potassium, Omega-3 fatty acids, and fiber. Soy can be obtained in many forms including milk powder, tempeh, and curd. Some have criticized the use of soy protein because it is often genetically modified to increase crop production. To date, however, there have been no studies definitively showing any harm from genetically engineered crops.

While hemp protein is considered one of the best of all plant-based proteins, it is a near- complete protein source and must be combined with other sources of protein to insure the diet will contain all essential amino acids the body needs. Hemp protein is easily digested, rich in fiber and essential fatty acids, and a good source of vitamins and minerals. It is, however, high in Omega-6 essential fatty acids that are pro-inflammatory.

Brown rice protein is thought to be hypoallergenic. Unlike soy, however, brown rice protein is not a complete protein source and needs to be mixed with other protein sources such as beans in order to provide the consumer with all of their protein needs. Brown rice is rich in fiber, minerals and vitamins.

Whey protein is found in milk and dairy products along with casein, another source of protein. Whey protein makes up approximately twenty percent of the protein in milk. Whey protein is considered to be a complete protein containing all essential amino acids. It is soluble, easy to digest and is frequently the preferred protein source in infant formulas and protein supplements. Body builders claim that whey protein helps build muscle better than other protein sources as it is more readily absorbed and able to be utilized by exercising muscle. Whey protein has also been reported to limit muscle breakdown and help with muscle repair and remodeling especially when consumed within sixty minutes of the exercise session when enzyme and protein synthesis is thought to occur at a maximum.

Casein protein is found in cow's milk along with whey protein. While whey can be quickly digested, casein is a slow digesting protein. This can help to provide a sense of satiety for longer periods of time. Casein makes up eighty percent of the protein found in mild. It is responsible for curd formation and thus used to make cheese. Casein is less water-soluble than whey and therefore does not mix as dwell with liquids, making it harder to use with other foods. Both whey and casein protein may be unacceptable for individuals who are lactase deficient.

Egg protein is derived from eggs and contains all essential amino acids, thus being a complete protein source. Supplements are made by separating out the yolks and dehydrating the egg whites. It is rich in vitamins and minerals but cannot be used by anyone allergic to eggs or dairy products. Egg whites themselves are an excellent source of protein with zero cholesterol as long as the egg yolk has been removed and low calorie content.

Pea protein is also plant-based and highly digestible. It is thought to be high in glutamic acid that help convert carbohydrates into energy rather than be stored as fat in the body. It is not a complete protein so once again it must be combined with other sources of amino acids such as hemp or brown rice protein to insure all essential amino acids are obtained in the diet.

Many individuals are using one form of protein supplement or another. As a powder, it can be sprinkled over cereal or added to a smoothie or juice. The options are endless. Dairy based proteins such as whey and casein provide essential amino acids, may have muscle-building potential, especially when

combined with vigorous exercise, and are rich in iron and zinc. They have been shown to help reduce muscle soreness more effectively after exercise than plant based proteins and if one is not opposed to using animal products, are an excellent choice of protein supplementation for the active or athletic individual.

Most plant-based proteins do not contain all essential amino acids and therefore are best taken in combination to insure all requirements are being met. Soy is the exception in that it contains all essential amino acids.

Protein needs can be met from whole food sources. Protein supplements just make it easier to obtain essential amino acids and incorporate these into one's daily diet. Concentrated forms of protein have been prepared by removing non-protein components from the original food source. The end result is usually a powder that is 70 to 85 percent pure protein, with the remaining components being carbohydrates and protein. Isolated protein, on the other hand, removes almost all non-protein content yielding a powder that is ninety-five percent pure protein.

Chapter 6

The Role of Fiber in Successful Aging

Fiber is essential for normal bowel mobility and function. In addition, fiber has been increasingly recognized as a natural way to improve blood sugar and even cholesterol. In modern times, our diets have become more "refined" and our fiber intake greatly reduced. The average intake of fiber in America is approximately 12 grams daily, less than half of what it should be for optimal health. Studies have demonstrated that societies that consume 30 or more grams of fiber a day have less colon cancer, constipation, diverticulosis, gallbladder disease, hypercholesterolemia, and hemorrhoids. In general, one third of one's daily fiber intake should be in the form of a soluble fiber and two-thirds as insoluble fiber. Unfortunately, few Americans consume adequate quantities of any form of fiber. Studies that have reported "little benefit" from fiber intake have based their conclusions on groups of individuals consuming lower levels than may be necessary, though more typical of the usual American diet culture. Depending on what outcome is being measured, there may also be an inappropriate conclusion made regarding fiber's benefit or lack of it.

Many persons have given up the idea of increasing fiber in their diet due to bad initial experiences- increasing the quantity of fiber in one's diet too quickly may result in abdominal cramping, indigestion, bloating and gas! A scheduled plan to increase fiber in the diet is the best way to achieve one's individual goal. For some, dietary supplements may be the only way to achieve

this high amount of fiber intake; others may be able to more easily incorporate fiber rich foods into their daily diets.

It is essential that we become familiar regarding foods that are good sources of both soluble and insoluble fiber and learn how to incorporate these into our everyday diets.

Foods particularly rich in fiber include apples, barley, beans, legumes, fruits and vegetables, oatmeal, oat bran and brown rice. High fiber foods are digested more slowly so they don't cause spikes in sugar and rapid swings in insulin levels such as one may find following intake of potatoes, bread and sweets. Water-soluble fibers include pectin, gums, mucilages, algal polysaccharides, some hemicelluloses, and some storage polysaccharides. These appear to have a greater effect on lowering serum cholesterol as compared to water-insoluble fibers. Oat bran, a rich source of soluble fiber, has been identified as particularly helpful in reducing cholesterol levels. Soluble fibers appear to increase fecal elimination of bile acids and cholesterol and thus stimulate hepatic uptake of LDL-cholesterol. Serum total cholesterol may decrease 0.5 to 2% per gram of soluble fiber and lower serum total cholesterol by approximately 15%. Simple changes to the diet can make a BIG difference. For example, every 8 ounce cup of whole wheat flour contains 15 grams of fiber as compared to only 4 grams in the same amount of white flour.

Guar and pectin have also been identified as a way to help keep blood sugar within better control and reducing the harmful swings that often lead to high insulin levels. Clearly, not all fiber is created equal and this too must be individually tailored to one's specific goals and needs. Another particular benefit from fiber is the "full feeling" it provides, an excellent adjunct to any weight reduction program.

The following are some comparative data from the US Department of Agriculture Database regarding fiber content in common foods.

Food	Serving Size	Fiber Content (grams)
Prunes	1 cup	16.4
Peas	1 cup	16.3
Black Beans	1 cup	15.0
Pinto Beans	1 cup	14.7
Oat bran	1 cup	14.5
Kidney Beans (red)	1 cup	13.1
Lima Beans	1 cup	10.8
Soybeans	1 cup	10.3
Pear, Asian	1 pear	9.9
Raspberries	1 cup	8.4

Chapter 7

Anti-Aging/Successful Aging Supplements

One of the more popular theories as to how and why we age was first proposed several decades ago by Denham Harman, MD, PhD, founder of the American Aging Association. This theory states that as oxygen travels throughout the body, one of its two electrons may be lost. This results in a newly formed "free radical." This free radical now circulates with the goal of either donating the one remaining electron it has or taking an electron from other molecules in the body. This process results in oxidative damage and thus degenerative changes thought to be due to aging. A number of products, natural and chemically produced, are thought to counteract the action of these free radicals and thus potentially have the ability to slow down the aging process. Animal models have shown a reduction in oxidative stress with the use of various antioxidant supplements including vitamin C, vitamin E, curcumin, and a number of synthetic products. Randomized studies in humans, however, have failed to demonstrate any increase in life expectancy associated with antioxidant use. Some studies have actually demonstrated an increase in the risk of certain cancers such as skin cancer in women using antioxidant supplements; there are also reports of antioxidants interfering with cancer treatment including radiotherapy and chemotherapy.

Both aerobic exercise and strength training may lead to the production of free radicals. Despite this, studies have found that consuming large amounts of vitamins C and E actually result in a slightly smaller training response. When athletes who were running and cycling, but not weight training, took these

vitamins, lower levels of certain enzymes that were capable of increasing mitochondria in muscle cells were identified. Mitochrondria help to create cellular energy. By blunting the creation of mitochrondria, the vitamins were thought to lessen the expected increase in fitness that one might otherwise have. A study was therefore done at the Norwegian School of Sports Sciences in Oslo Norway using 32 men and women who had at least some experience with weight training as subjects. Subjects were randomly divided into two groups, half taking antioxidants in the form of vitamin pills (1,000 milligrams of vitamin C and 235 milligrams of vitamin E) and the others taking a placebo; after 5 and 10 weeks of resistance-training, muscle tissue was studied. While muscles had increased in size similarly in both groups, those taking the vitamins had not added as much strength as the control group. Those subjects taking the vitamins had reduced levels of substances known to initiate protein synthesis, necessary to repair and strengthen muscles after weight training. In other words, those taking the vitamins in large doses were getting less overall response from their muscles despite following the same exercise regimen. Free radicals were theorized to be essential messengers to inform cells to grow and to improve strength and fitness. Without enough free radicals available in the circulation, it was felt that the otherwise "normal" effect of exercise was altered. While these investigators recommended against the use of "high doses" of antioxidants after endurance or weight training, they did not recommend against the use of antioxidants completely.

The following is a list of nutritional products that have been associated with having antioxidant activity as well as other healthful effects that may help improve one's chances of blowing out the candles on one's centennial birthday cake or at least enjoying as high a quality of life as possible for many years to come. While not all of these have definitely been proven to have beneficial effects and additional studies are needed, it is up to each person to decide the benefit to risk ratio of taking one or more of the following products.

Carnosine

Carnosine is a dipeptide molecule made up of the amino acids beta-alanine and histidine and is found in concentrated form in muscle and brain tissue. In the diet, it is found primarily in red meats. It was first discovered in Russia in the early 1900's. Individuals wishing to increase their blood levels of

carnosine must consume between 500 to 1,000 mg a day to avoid degradation by carnosinase, the enzyme that breaks down this compound in the body. Studies to date have largely been in animal models. Stvolinsky and colleagues published a study in fruit flies that demonstrated adding carnosine to the flies' food supply increased average life span by 20 percent in male flies. Interestingly, carnosine alone in the diet failed to increase the life span of female flies unless it was also combined with vitamin E, resulting in a reported 36 percent increase in life span.

A Russian study using mice also demonstrated that mice given carnosine supplements in their diet were twice as likely to reach their maximal lifespan as those not supplemented with carnosine. The carnosine treated mice were described as more frequently having a more "youthful appearance" with 44 percent having young, glossy coats of hair as compared to only 5 percent of those in the untreated group.

Carnosine is thought to have antioxidant properties and anti-glycation effects that are thought to help reduce the harmful cellular damage resulting from diabetes mellitus and aging. It is also thought to counteract glycation's effect to promote plaque formation in blood vessels. Some have argued that glycation is one of the major causes of the aging process itself and results in age-related tissue damage. Persons with diabetes are thought to have a particularly large problem in this regard as increased levels of glucose result in greater glycation at the tissue level. These effects are thought to accumulate over our lifetime and lead to degenerative changes and thus reduced quality of life.

When carnosine was given to rats that were experimentally made diabetic, it was noted that they had a decrease in their blood pressure. This was thought to be due to an autonomic nervous system effect. Carnosine has also been shown to stabilize red blood cell membranes and help to protect against the damaging effects of glycation products in diabetes. In animals, carnosine supplementation has been shown to delay the onset of diabetes and increase the number of insulin-secreting pancreatic cells.

Tissue culture experiments suggest that carnosine can help reduce DNA damage by acting as an antioxidant as well as to prevent the release of inflammatory cytokines in intestinal cells. At least theoretically, this may help to reduce the risk of developing colon cancers. In one study using cells growing in a culture medium containing carnosine, cells demonstrated an enhanced capacity to divide but only as long as they were in the carnosine rich medium. As cells switched back and forth between culture media with and

without carnosine, it was observed that the carnosine medium restored the youthful cell phenotype within days as compared to the standard culture medium that was associated with cells acting normally and similar to those of older age. After 55 cell divisions, cells grown in carnosine rich medium continued to survive up to 70 divisions as compared to only 60 divisions in total for cells grown in conventional medium. The cells grown in the carnosine rich medium lived an average of 413 days as compared to 130 days for those grown in standard medium.

Dr. Roberts in 1998 reported in the journal "Nutrition" that adding carnosine to the tube-fed diet of rats who had prior surgery exhibited improved wound healing. No data are available from well-controlled human studies to make any conclusion regarding the ability of carnosine to improve wound healing in humans at this time; clearly additional research is needed.

Several reports suggest that carnosine may protect brain cells after a stroke by reducing the damage that may occur from ischemic injury to cells. Using a mice model, carnosine was shown to reduce the amount of brain tissue damaged by experimentally induced strokes. Carnosine supplements furthermore appeared to protect mice brains and increased survival following experimentally induced strokes. Investigators have also reported in animal models that carnosine was capable of preventing and in certain cases even reversing injury to liver and kidney tissue following surgical procedures.

One study reported lower levels of carnosine in individuals with Alzheimer's disease suggesting a possible link to this disorder. While it is possible that carnosine deficiency contributes in some way to the development of Alzheimer's disease, it is also possible that carnosine is being used in some way by the disease process itself that results in lower levels or some other associated factor was responsible for the lower levels of carnosine described. While studies are in process evaluating carnosine supplementation as a way of preventing Alzheimer's disease as well as Parkinsonism, large studies would be needed in humans prior to making any definitive conclusions.

In a surprising study in 31 children with autism, Dr. Michael Chez reported in 2002 in the Journal of Child Neurology that carnosine taken for eight weeks improved performance on several tests that measured autistic behavior. Using a double-blind method, children who received a placebo failed to demonstrate similar changes in behavioral performance.

There is insufficient data to definitely conclude whether carnosine is safe to take for medical conditions or as an anti-aging remedy and it is best to consult your physician prior to using if you are concerned. Caution is advised

to not use carnosine if you are pregnant or breast-feeding. Carnosine has the potential to lower blood pressure and should be taken with caution in those who already have borderline blood pressure levels. No data are available regarding possible interactions with medications or other nutrients though in general, doses of 500-1,000 mg daily appear to be safe based on the limited literature available. Future studies are clearly needed prior to recommending that supplemental carnosine should be taken.

Coenzyme Q10

Coenzyme Q10 is an essential component of healthy cells. It is incorporated into the mitochondria, the energy producing component of our cells where over 90 percent of our body's energy is produced. It plays a key role in our ability to oxidize sugars and fats to create energy. With age, CoQ19 declines so that elderly persons have approximately 50 percent as much CoQ10 as they had earlier in life. While no scientific data are available in humans to demonstrate with certainty that taking Coenzyme Q10 prevents any aspect of normal aging or age-prevalent disease, its use is theoretically appealing and may provide benefit with no side-effects reported to date.

Carnitine (Acetyl-L-Carnitine)

This amino acid plays a role in mitochondrial energy production by facilitating fatty acid transport and oxidation. It is naturally produced in the body. It has been promoted for a variety of disorders including Alzheimer's disease, memory loss, neuropathy, depression, male infertility, cataracts and cardiovascular disease. Naturally occurring acetyl-L-carnitine helps the body produce energy and is important for heart and brain function, muscle movement and other body functions. While there is little scientific literature to support claims that have been made, for most adults, its side-effect profile appears to be relatively safe. Stomach upset, nausea, vomiting and restlessness have been reported and a "fishy"odor of the breath, sweat and urine may occur. Individuals who are pregnant or breast feeding are advised to not use this product and there is also some concern that it may also interfere with thyroid hormone action and is not advised to be taken by persons with

hypothyroidism. Reports of worsening seizures in those with seizure disorders have also been made and caution is advised. Acetyl-L Carnitine Arginate was developed as a synthetic form of carnitine and was shown to stimulate the growth of new nerve cells in the brain of rats in a similar manner as that induced by nerve growth factor (NGF). No similar studies to date have been done in humans and its benefit as a supplement has not been proven.

Glutamine (L-Glutamine)

Glutamine is a ubiquitous protein that is considered to be a semi-essential amino acid. Under normal circumstances the body can synthesize sufficient quantities to meet daily physiological needs. When subjected to severe stress as may accompany a traumatic event, surgery, cancer or even burns, however, the body may not be able to provide sufficient quantities of this amino acid. L-glutamine is predominately made and stored in the skeletal muscle where the amino acid L-glutamate is metabolized to form L-glutamine by the enzyme glutamine synthase. In order to complete this reaction, however, there must be sufficient amounts of ammonia, ATP, and magnesium within the cells.

L-glutamine plays an important role in regulating acid-base balance. It allows the kidneys to excrete acids and thus protects the body against acidosis. It accomplishes this effect by producing ammonia that in turn binds hydrogen ions to produce ammonium cations. These are excreted in the urine along with chloride anions. Bicarbonate ions are also released into the bloodstream. L-glutamine helps guard against ammonia toxicity by transporting ammonia in the form of L-glutamine's amide group from peripheral tissues to internal organs where it is excreted as ammonium by the kidneys or converted to urea by the liver.

L-glutamine also helps form purine and pyrimidine nucleotides, amino sugars including glucosamine, and glutathione, a potent antioxidant. It also participates in protein synthesis, energy production and helps to produce glucose and glycogen.

Following ingestion, L-glutamine is absorbed from the small intestine by way of an active transport mechanism. While some of this amino acid is metabolized in intestinal cells, the L-glutamine that is not metabolized enters the portal circulation where it is transported to the liver. Here metabolism again takes place and what remains enters the systemic circulation where it is

distributed to various tissues in the body. L-glutamine is removed from the body through glomerular filtration.

Typically, glutamine is obtained in the diet from animal and plant proteins with the average daily intake being 5-10 grams. Small amounts of free L-glutamine are found in vegetable juices and fermented foods such as miso and yogurt.

In addition to antioxidant activity, supplemental L-glutamine is thought to have immunomodulating, anticatabolic, anabolic, and gastrointestinal mucosal protective actions. L-glutamine has been shown to play a major role in protecting the integrity of the gastrointestinal tract with a particular focus on the large intestine. During states of catabolism, the integrity of the intestinal mucosa may be compromised resulting in increased intestinal permeability and movement of gram-negative bacteria from the large intestine into the body. L-glutamine is the preferred source of energy for enterocytes, colonocytes and lymphocytes. It is thought to reverse the catabolic state by sparing skeletal muscle L-glutamine. It is also thought to be able to inhibit movement of gram-negative bacteria from the large intestine as well as help maintain secretory IgA, thus preventing the attachment of bacteria to mucosal cells.

L-glutamine appears to be required for normal lymphocyte action as well as the production of interleukin-2 (IL-2) and interferon-gamma (IFN-gamma). It is required for the maintenance of lymphokine-activated killer cells and can enhance phagocytosis by neutrophils and monocytes. It is thought to help maintain the integrity of the intestinal mucosa by protecting against oxidative stress.

Despite this, little is known regarding the exact mechanism for any immunomodulatory action of supplemental L-glutamine. One theory is that it exerts an effect directly on intestinal lymphoid tissue. Supplemental L-glutamine is thought to exert its anti-catabolic/anabolic action by helping to spare skeletal muscle stores of L-glutamine.

Glutamine is frequently used when administering total parenteral nutrition to individuals unable to take in oral nutrition or who have extensive malnutrition and require significant repletion of nutritional items. This may occur in patients who have cancer, critical illness, who are undergoing transplantation, surgery or who are immunosuppressed. While few studies exist to make definitive conclusions, oral glutamine has been reported to help improve immunity and in certain cases has been shown to help protect against some of the side effects of cancer chemotherapy and radiotherapy.

While reports have been made touting glutamine's benefit in helping to prevent neurodegenerative disorders, improve mood as well as help reduce alcohol dependency, there are no scientific data in humans to support these claims.

Data does exist, however, in support of glutamine's value when added to total parenteral nutrition as a way to decrease intestinal permeability and atrophy of small intestine mucosa and villi. By decreasing permeability of the intestinal mucosa, it is thought to decrease the risk of systemic infection.

Patients having bone marrow transplants and bowel resection for colon and rectal cancers were shown to have a shorter length of hospital stay when glutamine was added to their total parenteral nutrition. When glutamine was added to parenteral nutrition in patients with critical illness requiring intensive care, they were shown to have significantly lower mortality rates as compared to those who did not have glutamine added.

When used as an oral supplement, one placebo-controlled study showed that oral glutamine significantly reduced the severity and duration of oral stomatitis in patients who had undergone bone-marrow transplantation. It was also shown helpful in reducing symptoms of oral stomatitis in patients with radiation-induced disease. One placebo-controlled study demonstrated significantly lower rates of pneumonia, sepsis and bacteremia in trauma patients with a 30 percent reduction in hospital costs.

While some individuals have used glutamine as a way of improving their exercise performance, there is little to support this claim. Lower resting levels of glutamine have been reported in athletes who have "over trained" and supposedly have reduced their immune function. Data on the use of glutamine to decrease post-exercise infection and improve measures of immunity are conflicting, however, and studies have not been well controlled to date to support their use for this purpose.

While rats that were given glutamine experimentally demonstrated a reduction in "alcohol craving," no well controlled studies are available using human subjects upon which to make any definite conclusions in this regard.

As with many other supplements, pregnant and nursing women should avoid using L-glutamine unless prescribed by a physician. It is also recommended that individuals with hepatic and/or renal failure should not use glutamine supplements.

Doses of L-glutamine up to 21 grams appear to be well tolerated. Adverse reactions, though rare, may include gastrointestinal discomfort, constipation and bloating. There is a report of two patients with psychiatric illness who

supposedly became manic when using glutamine with their symptoms resolving upon the glutamine being discontinued and caution is advised in persons with underlying psychiatric care.

L-glutamine may be taken in capsule, tablet or powder form. Typical doses for those with infections, cancer, trauma or other stress related conditions range from 4 to 21 grams a day and it is recommended that these individuals be under the direct care of a physician. For those using L-glutamine while they are undergoing chemotherapy or have radiation induced stomatitis, doses of 2 to 4 grams twice daily or 2 grams four times daily have been recommended to be used dissolved in water as a mouth rinse and swallow. Once again, this use should be done only under guidance of a physician.

Green Tea Extract

The active components in green tea consist of polyphenols (catechins) and flavonols. Epigallocatechin gallate (EGCC) is the most powerful of the catechins and functions as an antioxidant that is reportedly 25 to 100 times as potent as vitamins C and E. One 8 ounce cup of green tea provides between 10-40 mg of polyphenols and has antioxidant effects that are greater than a comparable serving of foods thought to have antioxidant properties such as broccoli, carrots, and spinach. Green tea has been touted as being able to promote memory as well as lowering levels of cholesterol. A study conducted in Japan reported that individuals who drank at least five cups of green tea daily had lower levels of cholesterol. While promising, it will be hard to deduct the amount one must take from this study to achieve this result as cup size and how the tea was prepared and its strength were not controlled for in this observational study. More scientifically rigorous studies in humans need to be done before making any definitive conclusion regarding Green Tea Extract's role in successful aging. It would appear, however, to have similar effects to other agents with antioxidant activity as well as additional effects that may result from items that may be unique to the Green Tea itself.

Lutein

Lutein belongs to the xanthophyll class of carotenoids and is a fat-soluble yellow pigment found in some plants, algae and photosynthetic bacteria. It is thought to help protect against the toxic effects of ultra-violet radiation and oxygen. In humans, lutein is thought to help protect against phototoxic damage and are found in the macula of the human retina as well as in the lens. They are considered to play a protective role against age-related macular degeneration, the leading cause of blindness in the elderly as well as help retard cataract formation. Some claims have been made that lutein also has an anti-cancer effect though data available is too limited to support this claim.

Lutein is found in plentiful quantities in corn, egg yolks and green vegetables including broccoli, green beans, green peas, brussel sprouts, kale, collard greens, cabbage, spinach, lettuce, and in the fruits kiwi and honeydew. Chicken egg yolks are rich in lutein with most containing approximately 290 micrograms per yolk. This is the result of chicken breeders feeding plant extracts consisting of marigolds to chickens in order to give their egg yolks and skin a deeper yellow coloration. The most commonly marketed form of lutein as a nutritional supplement is in the form of a lutein ester, often derived from the dried petals of marigold flowers.

Lutein dipalmitate is found in the plant Helenium autumnale, also known as helenien and has been used in France for many years for persons with visual disorders.

Lutein is naturally present in the macular of the human retina and serves to filter out potentially phototoxic blue light and near-ultraviolet radiation from the macula through antioxidant properties. A sister compound, zeaxanthin is also present in the eye and is the predominant pigment in the fovea, the central portion of the macula; lutein is the predominant pigment at the outmost periphery of the macula with mixed quantities of each of these spread throughout the macula. Zeaxanthin is thought to offer better protection than lutein against phototoxic damage caused by blue and near-ultraviolet light radiation.

Lutein is also present in the human lens of the eye and is thought to help protect against age-related increases in lens density and cataract formation. As above, it is thought that lutein exerts its beneficial effects because of its antioxidant effects helping to eliminate free-radical oxygen species that may be formed.

Lutein may be found in a free, non-esterified form or as a fatty acid ester. Esterified forms of lutein may be more efficiently absorbed when administered with high-fat meals than meals with less than 3 grams of fat. Lutein esters are hydrolyzed in the small intestine by lipases and esterases and then absorbed into the body. They are released from the cells within the small intestine into the lymphatics in the form of chylomicrons and are transported by the lymphatics into the general circulation via the thoracic duct. Within the hepatocytes, lutein is incorporated into lipoproteins that are released into the blood mainly in the form of high-density lipoproteins (HDL) and to a lesser degree, in the form of very low-density lipoproteins (VLDL). Lutein is transported in the plasma in the form of HDL. As these lipoproteins reach the eye, lutein is accumulated within the macula of the retina where it binds to the retinal protein tuberlin and is distributed throughout the retina.

Studies have identified a relationship between low plasma concentrations of lutein and the risk of developing age-related macular degeneration. A high dietary intake of carotenoids, including lutein was associated with a 43 percent lower risk of developing advance macular degeneration as compared to those individuals who consumed low quantities of these carotenoids. Upon further analysis, lutein intake was most strongly associated with reduced risk of developing macular degeneration.

In a small study of only two subjects, lutein esters when taken in an amount of 30 milligrams of free lutein per day for 140 days, reportedly had significantly increased macular pigment density, inversely related to risk for macular degeneration.

Epidemiologically, lutein has also been associated with lower risk of developing cataracts. Individuals with the highest intake of lutein were reported to have a 22 percent lower risk of cataracts requiring removal as compared to individuals consuming the least amount of lutein.

Clearly additional studies are required prior to making any definitive conclusions. While lutein is contraindicated in persons who are allergic, lutein has not been associated with any adverse side effects and is now included in most daily multivitamin preparations. Lutein is available as a supplement in free, non-esterified as well as esterified forms and may be taken as a single ingredient or combined with other vitamins and minerals. Since the optimal dosage for the prevention of macular degeneration and cataracts is not known at this time, doses being recommended are quite variable. Dietary intake of 6.9 to 11.7 milligrams of lutein daily has been reported to reduce the risk of age-related macular degeneration in epidemiological studies. Nutritional

supplements containing as little as 0.25 milligrams to as much as 20 milligrams can be found, leaving the choice up to the consumer as to what amount to use. Those seeking to supplement with lutein alone can find capsules containing anywhere from 6 to 20 mg. Most multivitamin preparations add 300 micrograms of Lutein per pill.

Lycopene

Lycopene is a member of the carotenoid family that also has antioxidant properties. It is a natural fat-soluble red pigment that is found in certain plans where it is thought to serve as a way to improve light transport as well as to protect against the toxic effects of both oxygen and light. Limited data suggest that lycopene may help protect against the development of prostate cancer as well as heart disease.

Lycopene is responsible for the red color found in tomatoes. It is also found in pink grapefruit, pink guava, papaya and watermelon. The intake of tomato-based foods has been associated with lower risk for developing prostate cancer in epidemiological studies and may also lower the risk for developing lung cancer. While the reason for this is not known, once again, lycopene is thought to exert its beneficial effects due to its strong antioxidant properties. In fact, it has the highest anti-oxidant activity of all the carotenoids of which it is a family member. In vitro, it has been shown to quench singlet oxygen to a greater degree than beta-carotene, to trap peroxyl radicals and to inhibit the oxidation of DNA. It has also been shown capable of inhibiting lipid peroxidation and the oxidation of low-density lipoproteins (LDL), the “bad” form of lipid that has been associated with higher rates of coronary artery disease.

In addition to its antioxidant properties, lycopene in vitro has been shown to stimulate gap junction communication between cells, preventing cell overgrowth due to a failure of cell signaling and theoretically reduce cancer risk. It has been thought to also be capable of suppressing carcinogen-induced phosphorylation of regulatory proteins such as p53 and capable of stopping cell division at the G0-G1 cell cycle phase. In rats, it has been reported to also modulate the liver enzyme cytochrome P450 and help protect against carcinogen-induced pre-neoplastic lesions. It may also reduce cellular proliferation in response to insulin-like growth factors.

Lycopene has been shown to inhibit cholesterol synthesis by inhibiting HMG-CoA reductase activity, and to upregulate LDL receptor activity in macrophages. In a small human study, Lycopene reportedly reduced levels of LDL cholesterol, a major risk factor for the development of coronary artery disease.

In food, lycopene exists within vegetable and fruits as part of a matrix of chloroplasts and chromoplasts. In supplements, lycopene is found in the form of an oleoresis, in phospholipid complexes and in oils. Due to its difficulty being released from tomatoes, it is found in much higher quantities in usable form in tomato products such as ketchup, pizza sauce, tomato paste or puree, and tomato juice. This is due to its release from the ruptured plant cells following the mechanical and thermal processing as well as the effect heat has in converting the trans form to cis form of lycopene. Cis-lycopene appears to have a higher bioavailability than trans-lycopene. In addition, taking lycopene with some form of lipid also increases lycopene's ability to be absorbed. Combining olive oil with tomato puree, for example, will deliver more usable lycopene than could be obtained from the tomato puree alone.

Lycopene is absorbed into the cells of the small intestine either in a solubilized form with lipids or as complexes with bile salts. These are then released from the cells into the lymphatics in the form of chylomicrons and lycopene is transported by the lymphatics to the general circulation by way of the thoracic duct. Eventually, lycopene is taken up by hepatocytes as well as other tissues of the body and incorporated into lipoproteins. Lycopene is then released into the blood stream in the form of very-low density lipoproteins (VLDL) and low-density lipoproteins (LDL), and thus transported within the plasma.

While promising, little data is available from well-controlled studies to make any definitive conclusions regarding lycopene's ability to help prevent prostate cancer or cardiovascular disease and additional studies are needed.

That said, when 47,000 men were evaluated over a period of six years as to their use of tomato-based food consumption, a lower rate of prostate cancer was reported. There was a 35 percent reduction in the risk of developing prostate cancer in those men who ate more than 10 servings of tomato products weekly as compared to those who consumed fewer than 1.5 servings weekly. The majority of tomato servings were in the form of tomatoes, tomato sauce, and pizza with tomato sauce reported to have the most beneficial effect.

Another study on Seventh Day Adventist men, also followed for a period of 6 years, reported that there was a 40 percent lower risk of developing

prostate cancer in men who ate tomatoes more than five times a week as compared to those who ate them less than once weekly.

In a review of 72 research studies evaluating either tomato consumption or blood lycopene levels and the risk of developing various forms of cancer, 57 of the 72 studies demonstrated an inverse relationship. Lycopene's protective effects were highest for cancers of the prostate, lung and stomach.

When 33 men with cancer of the prostate who were scheduled to have surgery to remove their prostates were randomized to receive either 30 milligrams of lycopene (given in two, 15 milligram capsules) or no lycopene for 30 days, examination of the prostate glands following surgery demonstrated more extensive growth of the prostate cancer in 7 of the 21 lycopene treated subjects compared similar findings in 9 or 12 of those men who did not take lycopene supplement. Whereas prostate specific antigen (PSA) fell on average 20 percent in the men taking lycopene, it was unchanged in those men not taking the supplement.

Epidemiological data suggest that there is an inverse relationship between higher levels of tissue and serum lycopene and the risk of developing coronary artery disease. Additionally, a study of nineteen healthy subjects who consumed a variety of tomato products for three weeks had significantly lower lipid peroxidation and LDL-cholesterol oxidation despite their serum cholesterol levels being unchanged. While animal data and in vitro studies also lend support for a beneficial effect of lycopene on cardiovascular health, additional well-controlled studies are needed in humans prior to making a definitive conclusion.

Lycopene supplements are available in a variety of preparations as tablets and capsules with suggested daily dosing between 5 and 15 milligrams. It is not known what is the ideal dose to take and additional research is required prior to making any conclusion. Most multivitamin preparations have already taken to adding lycopene as part of their content and add 600 micrograms per pill. For those desiring to increase the lycopene content in their diet, the following is a list of various food sources and lycopene content (micrograms/gram wet weight) that may be helpful when designing a diet.

Tomato powder (1,200); cooked tomatoes (37); tomato juice (50-116); Pizza sauce (127); ketchup (99-134); papaya (20-53); pink grapefruit (34); watermelon (23-72)

Omega-3 Fatty Acids

Omega-3 fatty acids are referred to as either eicosapentaenoic acid (EPA) or docosahexaenoic acid (DHA). While most agree that a diet containing at least 650 mg per day of an Omega-3 fatty acid is beneficial, some argue that taking 1,000 to 4,000 milligrams daily would have additional health benefits. Omega-3 fatty acids are most plentiful in cold water fish, particularly salmon, mackerel, cod, herring, sardines, swordfish and tuna. Caution is advised when consuming fish that have been found to have relatively high concentrations of mercury and should best be completely avoided by women who are pregnant, nursing or who may become pregnant and young children. Swordfish, dark forms of tuna as well as shark, king mackerel and tilefish should not be eaten more than twice a week with the total intake not to exceed 12 ounces. Caution is also advised when consuming canned tuna with some advocating only using the "white" or "light" varieties or the yellow-tail variety that is only available in fresh form. Albacore tuna, commonly used in canned preparations, should be limited to one, six ounce portion or two, three ounce portions per week. The Environmental Protection Agency (EPA) reports low mercury levels in salmon, pollock, shrimp, and canned light tuna.

Eggs are another possible source of omega-3 fatty acids though in lower amounts. While Omega-3 can be taken as a supplement, caution is advised when consuming products that contain a combination of "omega oils." These contain both Omega-3 as well as Omega-6 fatty acids, the latter of which is pro-inflammatory.

Studies have demonstrated that individuals who consume diets low in total fat and rich in monounsaturated fatty acids and Omega-3 fatty acids have the lowest rates of coronary artery disease. Furthermore, a high intake of omega-3 fatty acids has been associated with reduced levels of C-reactive protein, a marker for inflammation. High levels of C-reactive protein have been linked to the development of heart disease and rupture of plaques within the coronary vessels. This in turn leads to vessel obstruction and myocardial infarction. Omega-3 fatty acids are also thought to improve the function of endothelial cells lining blood vessels and increase nitric oxide synthesis leading to vasodilation of the blood vessels supplying blood to the heart. They have also been linked to having lower levels of triglycerides and LDL-cholesterol. Omega-3 fatty acids have also been shown to lower triglyceride levels, decrease platelet aggregation and clotting tendencies, and decrease

inflammation. These fatty acids incorporate into phospholipids and thus alter prostaglandin production and increase prostacyclin syntheses.

One study reported that men consuming 18 to 40 grams of omega-3 containing fish per day had a reduced mortality rate and a 25 to 65 percent reduction in coronary artery disease. Another study in men who already had a myocardial infarction reported that an intake of 40 grams of omega-3 containing fish per day reduced mortality by 29 percent though were unable to demonstrate any reduction in the rate of men having a repeat heart attack.

Not only may Omega-3 fatty acids benefit the cardiovascular system, but they have been associated with improved cognitive function as well. In the 1990's, a group of Dutch researchers reported that omega-3 fatty acid consumption was inversely related to the development of dementia, particularly Alzheimer's disease. High intake of total fat, saturated fat and cholesterol have been linked to an increased risk of developing dementia later in life.

When evaluating over 1,600 subjects aged 45 to 70 over a ten year period, using a variety of neuropsychological testing parameters to measure cognition including memory and psychomotor response time in relation to fat consumption, diets that were high in saturated fatty acids and cholesterol were associated with an increased risk of cognitive decline. Those who consumed diets rich in fatty fish and Omega-3 fatty acids, however, were associated with a reduced risk of cognitive decline. High levels of DHA, one form of Omega - 3 fatty acids, have been positively correlated with levels of dopamine and serotonin, both implicated in our regulation of mood and a target of antidepressant drug therapy. In animals, a low level of DHA has been linked to symptoms of depression though no data is available to make this same conclusion in humans.

Omega-3 fatty acids have also been used with some reported success for treating depression, burns, acne, asthma, and even menstrual pain. A Danish study of 200 women reported that those with the highest dietary intake of Omega-3 fatty acids had the mildest symptoms associated with menstruation.

When consuming oil in the diet, the relative ratio of Omega-3 to Omega-6 fatty acids should be considered. Two oils considered to be among the healthiest because of their relatively high percentage of monounsaturated fats, differ greatly in this regard with Olive Oil having a ratio of 1-17, Omega-3 to Omega-6 as compared to a ratio of 1:2 for Canola Oil. This is in contrast to a ratio of 1:7 for butter.

Resveratrol

Resveratrol is a polyphenolic compound synthesized in many plants such as peanuts, blueberries, pine nuts and grapes.

Moderate consumption of alcohol has been epidemiologically reported to have a beneficial effect in preventing cardiovascular disease. This potential benefit has been linked to the chemical resveratrol, a chemical compound found in the skins of certain grapes. Produced naturally by grapes to fight off fungal diseases that commonly affect grapes when they are damp, its content varies widely depending on the type of grape, where it is grown and how the wine is processed. It is almost non-existent in most white wines since resveratrol is found primarily on grape skins that are removed in white wine preparation. The highest concentrations of resveratrol are reportedly found in pinot noir grapes that grow in cooler, rainy places such as the Finger Lake region of Upstate New York and Oregon's Willamette Valley. They are also grown in the Burgundy region of France. These wines have as much as 40 times the amount of resveratrol as grapes used to make merlot and cabernet sauvignon wines.

Once a bottle has been opened, the potency of resveratrol dissipates within one day. Certain grape juices may also be relatively high in resveratrol and may offer similar benefits as long as they are not filtered in the manufacturing process or supplemented with apple juice and undesirable sweeteners.

Resveratrol has been shown to activate sirtuin 1 (SIRT1), and thus inhibit an important cellular pathway that may help regulate life span and act, at least in rats, in a similar way to that found with calorie restriction. In addition, resveratrol has been shown to inhibit the nuclear factor-kB (NFkB) pathway and act as an anti-inflammatory agent. In both animal and human studies, resveratrol has been associated with a decrease in inflammatory markers including interleukin (IL)-1, IL-6, tumor necrosis factor-alpha (TNF-alpha), chemokine ligand 3, and chemokine ligand 2. While animal studies using yeast, worm, fly fish and mice have demonstrated some anti-aging effect with use of resveratrol, there is no data in humans to suggest a specific increase in longevity with the use of resveratrol.

Resveratrol has been demonstrated to extend the life of yeast cultures and fruit flies and lower LDL cholesterol levels in humans while raising HDL cholesterol. Laboratory bred rats fed diets rich in resveratrol had significantly

longer life-spans than those who were not and comparable to those fed low calorie diet that have been shown at least in rats to extend their life-spans.

In another series of experiments, salt-sensitive rats that had high blood pressure were fed a high salt diet and a mixture of ground up grapes equivalent to 9 servings of grapes a day. These rats were noted to have improved blood pressure. Another group of these rats were fed a diet low in salt and after 18 weeks of receiving a grape supplement were noted to not only have lower blood pressure than similar rats placed on the same diet but not given the mixture of grapes but were also noted to have improved heart muscle function and structure and lower levels of markers of inflammation.

Epidemiological, in vitro and animal studies suggest that resveratrol has anti-atherosclerotic activity. It has been shown to have inhibitory effects on thromboxane B2 and had a superior anti-platelet-aggregation effect to catechin, epicatechin, alpha-tocopherol, hydroquinone and butylated hydroxytoluene. Studies in animals and in vitro have shown that resveratrol can inhibit the oxidation of LDL-cholesterol and that it is capable of reducing smooth-muscle cell proliferation, thought to be a component of atherogenesis.

While little data from human studies is available upon which to draw any definitive conclusions at this time, one study did report a lower rate of lung cancer, particularly in persons who smoked for individuals who consumed moderate quantities of red wine. Resveratrol has been demonstrated to inhibit growth of several cancer cell lines and tumors. It has been found to inhibit ribonucleotide reductase, DNA polymerase, and the transcription of COX-2 in human mammary epithelial cells as well as the activity of ornithine decarboxylase. Ornithine decarboxylase is a key enzyme of polyamine biosynthesis which is enhanced in tumor growth.

Resveratrol has also been found capable of inducing certain metabolizing enzymes involved in the detoxification of carcinogenesis well as inhibit pathways that appear to upregulate apoptosis. Resveratrol has demonstrated an ability to inhibit tumor initiation, promotion and progression. Some of its anti-proliferative activity has been attributed to its observed ability to inhibit ribonucleotide reductase and DNA synthesis in mammalian cells. It has been shown to induce apoptotic cell death in human leukemia cell lines as well as in some breast carcinoma cell lines.

Resveratrol has also been postulated to have phytoestrogenic activity that may also contribute to its cardiovascular protective effects. Bearing a structural resemblance to diethylstilbestrol, trans-resveratrol is a phytoestrogen found to have variable degrees of estrogen-receptor agonism in different

systems. Studies suggest that resveratrol acts as a mixed agonist/antagonist for estrogen receptors alpha and beta. It binds to estrogen receptor beta and estrogen receptor alpha with comparable affinity but with 7,000 fold lower affinity than estradiol. It differs from other phytoestrogens, which bind estrogen receptor beta with higher affinity than they bind to estrogen receptor alpha. Resveratrol also has been shown to exert an estradiol antagonistic behavior on the estrogen receptor alpha. It does not show estradiol antagonistic activity with estrogen receptor beta.

While one to two glasses of red wine, particularly pinot noir, or red grape juice per day may help reduce cardiovascular risk, this finding remains controversial. Since higher intake of alcohol has been clearly linked to a myriad of health problems including hepatitis, cirrhosis, pancreatitis, cardiomyopathy, increased esophageal and head and neck cancers among many other illnesses, caution is advised prior to increasing alcohol use. Alcohol also contains a relatively high amount of calories, 7 kcal per gram. There are several pharmacologically prepared resveratrol products available on the market today that hopefully will provide the beneficial benefits without the risks of alcohol intake. While claims have been made of improved insulin sensitivity, anti-atherosclerotic effects, enhanced mitochondrial function, reduced expression of inflammatory factors, anti-cancer effects, among others, scientific evidence in humans remains inconclusive to date.

Chapter 8

"Super Foods" and Successful Aging

Acai Berries

Acai berries are grapelike and are harvested from acai palm trees that are indigenous to South American rainforests. They are frequently lauded as a superfood with advocates claiming many health benefits including help in treating arthritis, promoting weight loss, lowering levels of cholesterol, helping men with erectile dysfunction, improving skin appearance and providing an overall "detoxification" and improved general feeling of well-being. The acai berry contains antioxidants, fiber and heart healthy fats. In fact, acai berries are thought to contain more antioxidants than cranberries, blueberries and strawberries though data is limited and there is no actual proof of health benefits.

Various ways exist to consume acai berries including eating them raw, using them in tablet form, making them into juices, smoothies or energy drinks, as well as making them into jelly and ice cream.

Some have advocated caution when using acai berries while taking medications for high cholesterol or diabetes or in the presence of kidney disease though limited data is available regarding adverse events in these circumstances. If there is concern, it is best to discuss their use with one's physician. In addition, there is a report of acai berries affecting MRI test results after consumption of a large quantity of berries.

Acai berries have a high fiber content and may help reduce appetite and stop hunger pangs associated with overeating and weight gain. It is rich in vitamins A, E, and C as well as calcium, iron, potassium and sodium. In addition, the ellagic acid and polyphenols found in acai berries may help retard cancer cell growth as based on in vitro experiments that reported cancer cell growth blocked by up to eighty percent with the addition of these agents. No data in humans is available. Studies have also reported increased blood circulation after use of acai berries though these experiments lack the scientific rigor upon which to make any definitive conclusion. While some have argued acai berries improve sexual stamina as well as sexual drive, these claims remain speculative.

Because acai berries possess high levels of antioxidants, they are thought to be capable of helping to slow the aging process. Claims of reduction of tooth and hair loss, prevention of wrinkles, delayed effects on the development of macular degeneration and cataract formation, among other claims have been made but lack sound scientific proof.

One study evaluated ten overweight persons who used two "packs of frozen acai berry pulp" every day for one month while allowed to eat sugar as desired. The authors reported reduced levels of fasting blood sugar and a blunted blood glucose response after consuming a standard meal. No adverse effects were reported. Unfortunately, it is hard to quantify the amount of acai berries consumed by the subjects of this study.

Another study completed in 2011 evaluated the effect of consuming acai berries for three months on pain from osteoarthritis. After daily use of acai berries, 12 subjects with advanced osteoarthritis were reported to have a reduction in pain and increased range of motion. Since this study was not done in a double-blind fashion and placebo controlled, the authors could not rule out a placebo effect as the cause of the benefit observed.

Chia Seeds

Chia seeds are derived from the plant Salvia Hispanica, a relative of mint that is native to South America. Packed with nutrients that are thought to be beneficial for both body and mind, Chia seeds are considered to be one of the healthiest foods one can eat. The word "Chia" is Mayan for "strength" and was thought to provide long lasting energy. While a major component of the

diet of Aztecs and Mayans, Chia seeds are enjoying a new found popularity as a superfood by the health conscious. One ounce or approximately 2 tablespoons of Chia seeds provides 11 grams of fiber, 4 grams of protein and 9 grams of fat, 5 of which are in the form of Omega 3 fatty-acids; one ounce contains 137 calories. Chia seeds are considered to be a "whole grain" food and are usually grown organically, non-GMO, and are gluten free.

While Chia seeds contain an abundance of antioxidants, unfortunately no scientifically sound literature is available specifically on Chia seed intake and health outcomes.

Although one ounce of Chia seeds contains 12 grams of carbohydrate, it is important to note that 11 of these are in the form of mostly soluble fiber that not only can improve one's overall digestion, fight constipation but also help to lower cholesterol and improve diabetic glucose control. Chia seeds can absorb 11-12 times their weight in water, turning into a gel-like substance that is often desirable when used to create puddings. Vegetarians and vegans find Chia seeds to be an excellent source of protein.

While Chia seeds could help aid in weight loss due to their high amount of protein and fiber and the feeling of satiety that can be advantageous to someone dieting, there have been no studies to date demonstrating effectiveness in this regard. On a weight basis, Chia seeds are high in calcium, phosphorous, magnesium and protein, all of which are essential for bone health.

Chia seeds can be added into almost anything one eats as they have little to no taste and can be eaten straight, added into puddings muffins, or other baked goods. They are frequently used to thicken sauces and added to smoothies and shakes as an excellent source of protein.

Chocolate

While chocolate to some may be a dessert, a treat, an indulgence, or just candy, to others it is much more and in fact has been touted as a way to promote health and longevity. While studies have demonstrated benefits when taken in small quantities, its relatively high calorie content will add excess pounds and with it an increased risk of developing obesity, heart disease and diabetes. In general, one ounce of dark chocolate contains 70 calories, 1.0

gram of protein, 8 grams of carbohydrate, 4.0 grams of fat, and 1.0 gram of fiber.

Chocolate is made from the cocoa bean that is found within the pods of the cacao tree. The Olmec people, an ancient tribe that lived centuries ago in Central America were the first to make a water based drink from cocoa beans. After mixing it with dried chilis and other native ingredients, this drink was called "kakawa" and was thought to enhance one's "love making." Montezuma, the famous Aztec king was said to drink this potion before retiring to his harem.

The cacao tree itself was named Theobroma cacao, or "food of the gods" by the famous Swedish botanist Linnaeus. Casanova, as the story goes, was known to consume chocolate before entertaining his many lovers. In a study published in 200 in the American Journal of Clinical Nutrition, chocolate was found to contain high amounts of the antioxidant polyphenol, similar to that found in red wine and tea. Polyphenols are theorized to help protect from heart disease by reducing the oxidation of low-density lipoproteins. Polyphenols also have been demonstrated to inhibit blood platelet aggregation, thought responsible for the occlusion of coronary arteries and thus increase one's risk of having a myocardial infarction. Cocoa has also been reported to reduce the time it takes to coagulate blood and subjects given a concentrated cocoa beverage were found to have lower platelet aggregation and took longer to form a blood clot, similar to the effects one seeks through aspirin as protective against heart attacks.

Individuals who consume dark chocolate have been found to have higher concentrations of epicatechin, an anti-oxidant and improved lipid profiles assuming no change in weight. A beneficial effect from eating dark chocolate on blood pressure has also been described in the literature. When individual with mild hypertension consumed 100 grams of dark chocolate for two weeks in place of other food with similar nutrients and calories, a significant drop in blood pressure, averaging 5 mm Hg systolic and 2 mm Hg diastolic was reported. Those who ate white chocolate, lacking the nutrients in "real chocolate," failed to have this effect.

When 28 subjects were given 100 grams of dark chocolate for seven days, lower levels of LDL-cholesterol, the harmful form of cholesterol, dropped by an average of 6 percent, and HDL-cholesterol, the good form of cholesterol, increased by an average of 9 percent; there was also a significantly reduced level of platelet aggregation. Dark chocolate intake also significantly reduced C-Reactive Protein (CRP) levels in the women in this study signifying a

reduced state of inflammation; the men in this study failed to demonstrate this same finding. While the 100 grams of dark chocolate contained 700 mg of flavonoids, the calories provided in the dark chocolate are not insignificant and any weight gain that would surely occur if this intake was continued long term would out-weight the benefits demonstrated. Clearly, additional research needs to take place to identify what exactly is causing the benefits from dark chocolate, whether it is simply the flavonoids alone or some other factor in the chocolate itself.

Since 100 grams of dark chocolate contains approximately 480 calories, it is not something that can in itself justify the high calories, especially since there are other ways to obtain equivalent beneficial nutrients without the added calories. For those who "crave" a chocolate fix, however, a small portion of dark chocolate may just be enough to provide a satisfying snack without so much guilt.

Chocolate has also been found to contain hundreds of chemical compounds including phenylethylamine or PEA. This chemical has been found to stimulate the body's release of endorphins, a hormone that is part of our endogenous or natural "opioid system" and a possible mediator of the orgasmic response. Chocolate may also potentiate the activity of dopamine, a neurochemical that serves an important role in the nervous system and is necessary for normal body movement and coordination. Dopamine is also thought to play a role in memory function and has been associated with sexual arousal. Of note, phenylthylamine has been found in higher amounts during orgasm and in individuals during the process of "falling in love."

Chocolate has been shown to increase serotonin levels, possibly also helping to explain the emotionally satisfying feeling many describe after eating chocolate. Anandamide, another chemical in chocolate has had its name derived from the Sanskrit word Ananda, meaning "bliss." This chemical binds to the same receptor in the brain as the psychotropic ingredients of marijuana, the cannabinoids.

It is clear why chocolate has earned its reputation as one of our favorite foods and craved by many. Unfortunately, chocolate has a bitter taste when unsweetened and few artificially sweetened varieties containing fewer calories with good taste have made it to market. Milk chocolate has the disadvantage of having an even higher calorie content than dark chocolate and milk appears to inactivate many of the antioxidants contained in the chocolate itself. For these reasons, dark chocolate is preferred though best reserved for that "special" occasion and even then, eaten in small amounts. Future research will hopefully

provide more insight into ways to gain the benefits of dark chocolate without the calories and their inherent health risks.

Cranberries

The name **cranberry** often brings memories of morning muffins or thanksgiving relish. Cranberries are indeed much more and you may very well want to make them a part of your daily diet. Originally known to grow wild in bogs, cranberries were first formally characterized by the Swedish botanist Peter Kalm in 1749 who compared these to lingonberries, common to Sweden, but much larger in size. The scientific name for the cranberry species, Vaccinium macrocarpon, means "large fruit." The red fruit is also quite large in relation to the plant's small green leaves. Native to America, the cranberry was referred to by the Huron Indian tribe as "toca" or "atoca" meaning "good berry." The Wampanoag Indian tribe called them "ibimi, or "bitter berry" and the Narragansett Indians used the term "sasemineash" or "very sour berry."

Cranberries originally grew wild from Labrador to North Carolina and as far west as Minnesota. With the increase in population across America, however, fewer hospitable areas remain for their growth and they became more difficult to find even in these regions. Most commercially available cranberries now come from farms located in Massachusetts and Wisconsin. Cranberries prefer moist, acidic soil that is rich in organic matter.

Cranberry juice has been used by women with urinary tract infections for many years in the hope that its ability to acidify the urine will create a more hostile environment to infection causing bacteria. The truth is that one must consume a great deal of cranberry juice in order to achieve this potential benefit. Recently another potential benefit from drinking cranberry juice has been uncovered; drinking three, 8.0 ounce glasses of cranberry juice daily for a month was found to increase HDL cholesterol levels, the "good" form of cholesterol, by 10%. This is a significant factor in helping to protect against coronary artery disease. Studies have shown that for every milligram per deciliter that a person's HDL cholesterol rises, the risk of having a heart attack is reduced by approximately 3% for women and 2% for men. When coupled with other HDL elevating foods, such as oat bran, almonds, dark chocolate, and soy protein, and an exercise program that also will raise HDL levels, a measurable risk reduction is clearly within reach.

When taken in their natural form, cranberries are also an excellent source of fiber and antioxidants including vitamin C. While natural cranberry juice is the logical choice, many find it too tart and prefer adding an artificial sweetener. Caution is advised when using juice cocktails, however, that often contain high-fructose corn syrup and other sweeteners that provide empty calories and unnecessary carbohydrates. One-half cup of fresh cranberries contains 23 calories; 0 grams protein; 6.0 grams carbohydrate; 0 grams fat; 6.0 grams fiber 8.0 ounces of cranberry juice contains 60 calories; <1.0 gram protein; 14.0 grams carbohydrate; 0.0 grams fiber

Flaxseeds

Flaxseeds have been eaten for centuries as a laxative and as a "healthy" component of cereals and breads. Also known as linseed in Europe, Flaxseeds have grown in popularity in recent times due to it being an excellent source of Omega-3 fatty acids. They also contain lignans, a type of fiber that is thought to have antioxidant properties and phytoestrogens. Lignans are broken down by bacteria in the digestive tract and converted into estrogen-like substances called enterodiol and enterolactone. While labeled estrogen-like, they bind to the estrogen receptor and are postulated to exert a beneficial effect on estrogen sensitive breast cancer by interfering with the binding of endogenous estrogens.

Flaxseeds are grown in several countries in Europe as well as grown in the US, primarily in Minnesota, Montana, North and South Dakota, and Texas. They are primarily grown as a source of linen, paper, linseed oil and flaxseed oil. While the seeds can be used whole, they are better digested if ground prior to being added to food. They can be used in food preparation or sprinkled over the food. When combined with water and blended, it forms a thick mixture that some recommend using instead of eggs in cooking recipes. Flax oil can be used as a salad oil though it is unstable at high temperatures and must not be used as a cooking oil. Flaxseeds soil easily if not stored in an airtight container and kept in the refrigerator. One-third ounce of flaxseeds contains 59 calories, 2.3 grams of protein, 4.1 grams of carbohydrate, 4.1 grams of total fat, and 3.3 grams of fiber.

Flaxseeds have been used to improve "digestion" for centuries. This likely is due to its "bulk-forming" properties. It is commonly used to prevent and

treat constipation. Flaxseeds have a relatively high fiber content and also contain mucilage that allows it to expand when it comes in contact with water. This provides a stimulus to the bowels and more regular evacuation. Bulky bowel movements may also create a healthier environment in our intestines by reducing pressure that may lead to outpouching or diverticulae. Some have argued that a high bulk stool serves to cleanse the colon by removing small polyps and abnormal cells that may form.

Flaxseed is an excellent source of soluble fiber that has been linked to improved cholesterol. In one study, individuals who consumed 20 grams of fiber per day in the form of defatted flaxseed had lower LDL-cholesterol levels. In this study, flaxseed oil containing omega-3 was first removed and thus any beneficial effect could not be considered due to Omega-3 oils. Another study demonstrated that women who consumed 50 grams of raw flaxseeds per day for one month, or approximately 1.75 ounces, added to bread had a 9 percent decline in total cholesterol and an 18 percent decrease in LDL-cholesterol.

Flaxseeds contain alpha-linolenic acid, an Omega-3 fatty acid and a precursor of EPA, a fatty acid found in fish oils. Alpha-linolenic acids is an essential fatty acid and is important in cell membrane development and blood pressure regulation. Alpha-linolenic acid is converted to EPA in the body and has been shown to have beneficial effects on reducing LDL-cholesterol though does not appear to lower triglyceride levels by itself. These fatty acids may also work to reduce blood clotting and thus lessen the chance of a heart attack. A study conducted in France in 1999 reported that a diet risk in alpha-linolenic acid significantly reduced the risk of developing a second heart attack in those with preexisting cardiovascular disease.

Lignans in flaxseed have also been reported to help alleviate menopausal symptoms including vaginal dryness, hot flashes and even memory impairment. While exciting, there is little scientific evidence to support these claims to date. Lignans reportedly compete with estrogen for binding to its receptors and have also been shown in animal studies to be an anti-angiogenic agent capable of limiting vessel growth found in tumors. Breast cancer cells implanted in mice were less able to multiply if the mice were fed flaxseeds. These animals also reportedly had reduced insulin like growth factor 1(IGF-1) and epidermal growth factor in the implanted cancer cells. Another study reported a down-regulation of the Her2 receptor in breast cancer cells of mice fed flaxseed. Women newly diagnosed with breast cancer who were given a daily single muffin containing 25 grams of ground flax seeds as compared to

control subjects given a wheat muffin without flax were reported to have a significant reduction in the expression of the cancer growth receptor Her2 and an increase in the apoptosis index of their breast cancer cells. Women waiting surgery for breast cancer who ate a flaxseed muffin daily were reported to have a slower tumor growth rate.

One study in 25 men suffering with prostate cancer demonstrated slower progression of cancer from time of diagnosis to surgery when one ounce of ground flaxseeds was added to a very low fat diet as compared to men who did not consume flaxseeds. Animal studies in rats have demonstrated that lignans may slow the growth of colon tumor cells and reduce abnormal cell growth, an early marker for the development of colon cancer. Additional research is clearly indicated.

Additional benefits from a diet high in flaxseed content have been reported for those with lupus and Crohn's disease.

Some have argued that while smaller doses may have beneficial effects, high doses are not without risk. Animal data suggest that high doses of lignans contained within flaxseed can promote cancer cell growth and alpha-linolenic acid when in high concentrations in the blood has been linked to a possible increased risk of developing prostate cancer. Higher doses of alpha-linolenic acid have also been reported to increase the risk of developing macular degeneration though other studies report that individuals consuming fish containing high levels of Omega-3 fatty acids actually had a lower risk of developing macular degeneration. Prior to using large quantities of flaxseeds or flaxseed oil, it is important to check with one's physician and to weigh all options. In addition, Omega-3 fatty acids may increase the blood-thinning effects of aspirin or warfarin used as an anti-coagulant. While this effect may be useful at times, the dose of warfarin may need to be adjusted to prevent bleeding if flaxseeds are to be continued at their prior level. Flaxseed has also been reported to slow the absorption of certain medications and discussion with one's physician is advised as to its safety and use on an individual basis.

Garlic

Garlic has long had the reputation of being a special food. It was worshipped by the ancient Egyptians and used by Greek athletes to enhance performance. Europeans in older days wore garlic as necklaces in an attempt

to ward off vampires and even as late and the early 20th century, garlic was thought to protect from contracting polio. In this latter case, it more than likely had its effect by discouraging contact from others due to garlic's potent odor. Although data is not always convincing, garlic has been used to help fight against harmful bacteria, reduce cholesterol and heart disease, improve impotence, and even fight cancer.

There are many reports in the scientific literature of varying quality that have demonstrated garlic's effect on reducing total blood cholesterol levels by as much as 12 percent, LDL cholesterol levels by as much as 16 percent, and levels of triglycerides by 13 percent. Meta-analyses of clinical trials have documented its use for lowering cholesterol in persons with hyperlipidemia and as well as being an effective treatment for hypertension. One study even reported effectiveness in treating peripheral arterial occlusive disease as measured by pain free walking distance.

In an analysis of 9 studies that assessed Garlic's effect on reducing LDL cholesterol, 7 reported a significant improvement and two did not; the mean decrease observed was 16 percent. Garlic use also decreased serum total cholesterol levels by a mean of 10.6 percent. In a study using garlic powder in a tablet form to treat 427 subjects with hyperlipidemia, there was an average decrease in total cholesterol of 10.3 percent and serum triglyceride levels declined by 13.4 percent. This was a significant difference when compared to those persons treated with a placebo.

In another study, Garlic powder when used over a one to three month period in doses of 600-900 milligrams daily resulted in an average reduction in serum total cholesterol of 9-12 percent and triglycerides by a mean of 13 percent. When individuals who had total cholesterol levels greater than 200 mg/dl were studied in a randomized, placebo controlled trial, patients treated with garlic consistently showed a greater decrease in total cholesterol levels than those receiving a placebo. Evidence suggested that garlic, in an amount approximating one-half to one clove per day decreased serum total cholesterol levels by about 9 percent.

In a 12 week study on 98 subjects comparing use of standardized garlic powder tablets with that of bezefibrate, a commonly used anti-lipid drug available in Germany, decreases in total cholesterol, LDL cholesterol and triglyceride levels were statistically significant with no differences statistically found between the two forms of treatment. This data was not confirmed in another study, however, that was thought to be superior in that it was double-blinded and placebo-controlled. One popular theory as to why there was such

different outcome between these two studies was the form of garlic used in the respective studies. The latter study that failed to show an effect used a form of garlic that was reported to release only one-third as much allicin, or the active garlic ingredient, as the tablets used in trials that did show a beneficial effect on serum lipids.

When 25 patients with moderate hypercholesterolemia were randomized in a double-blind, placebo-controlled study to receive five milligrams of a steam distilled garlic oil preparation twice daily for 12 weeks, no changes in lipids were found. When analyzed further, however, it was noted that the garlic oil was bound to a substance to form a solid slow-release tablet. This tablet formulation was later found to reduce the total absorption of the garlic oil as compared to taking the oil itself.

A six-week randomized placebo controlled study done in a double-blind fashion demonstrated that taking garlic in a dose of 900 milligrams daily prevented the increase noted in plasma triglycerides by 35 percent after consuming a fatty test meal containing 100 grams of butter. Individuals who took this garlic preparation regularly over the six weeks also had a significantly lower value of fasting triglycerides as compared to those taking a placebo.

In the longest clinical trial on garlic to date, garlic was studied as to its ability to prevent and possibly even reverse atherosclerosis. When 152 men and women who had known coronary plaque and at least one additional cardiovascular risk factor were given 900 milligrams of garlic powder as tablets per day for a four year period, the amount of plaque in both carotid and femoral arteries was shown to be reduced by an average of 2.6 percent as compared to an increase in plaque of 15.6 percent in those who took a placebo.

A Danish study using garlic tablets evaluated the effect on 48 patients taking a daily dose of 600 milligrams garlic for a period of 18 weeks. Mean serum cholesterol declined 8 percent, LDL cholesterol declined 5 percent and HDL cholesterol increased 5 percent. Of the 23 patients with mild hypertension, reductions in both systolic and diastolic blood pressure were noted with a decline of 7 and 4 percent, respectively.

Garlic's antimicrobial properties were first identified by Louis Pasteur. Dr. Pasteur reported that garlic was as effective as penicillin in- vitro (test tubes and not human subjects) in killing bacteria. More recent data has also favorably compared its in-vitro powers to the more potent antibiotic chloramphenicol. While not supported by well-designed clinical studies, garlic was historically has been used to treat a wide variety of infections including

Mycobacterium tuberculosis. Folklore stated that it worked because of the Sulphur compounds it contained; this claim has not been proven scientifically.

Folklore has also claimed that garlic has a potent aphrodisiac effect. Recent studies have suggested that garlic stimulates the production of nitric oxide synthase, an enzyme responsible for producing nitric oxide, the major mediator of erections.

Certain compounds found in high concentration in garlic have been shown to have anti-tumor effects when studied in the laboratory. Diallyl disulphide, for example, reportedly reduced tumor growth by 50 percent when injected into tumors experimentally grown in animals. Another compound found in garlic, S-allylcycteine, was reported to prevent cancer causing agents from binding to human breast cells. No clinical data are available, however, to demonstrate a direct effect of garlic on reducing levels of cancer in human subjects. A study involving 564 patients with stomach cancer and 1,131 control subjects without cancer in an area of China with a high incidence of gastric cancer reported a significant reduction in stomach cancer risk with increased consumption of vegetables that were high in Allium including garlic, onions leeks, chives and shallots.

While additional data are clearly needed prior to making any definitive conclusion, garlic remains a food that provides interesting flavor and perhaps even benefit for our bodies with minimal risks of odor and for some, indigestion.

US pharmacopeial grade garlic consists of either fresh or dried bulbs of Allium sativum and must not contain less than 0.5 percent alliin, as determined by liquid chromatography calculated on a dry weight basis. USP powdered garlic consists of garlic that has been cut, freeze-dried or dried at a temperature not greater than 65 degrees centigrade, then made into a powder form. While garlic contains a large number of compounds, only the tiosulfinates or allicin have been found to have significant activity at levels of normal garlic consumption, e.g., 3-5 grams per day. Allicin has been shown to be essential to most of the hypocholesterolemic effects of garlic and the antimicrobial data that has accumulated to date. It is less certain regarding the possible effect on cancer cells. Garlic contains approximately 1 percent alliin; this is converted to allicin in the presence of alliinase. The thiosulfinates are free radical scavenges, inhibit lipid peroxidation, stimulate fibrinolysis, and may reduce serum cholesterol levels.

It is important to remember that garlic can at best be considered as an adjuvant to a healthy program of eating sensibly, maintaining proper weight,

exercising, and when necessary using standardized medical treatments that have been tried and tested in the prevention and treatment of disease. Garlic currently has no singular role as a treatment for lipid abnormalities or as an anti-microbial or anti-cancer agent. Other than an odor that may pervade the breath and skin and rare cases of gastrointestinal symptoms, however, garlic is a safe and perhaps beneficial adjunct to those seeking a superfood to incorporate into their diet. Since there have been reports of garlic increasing bleeding times in persons taking warfarin, caution is advised when using blood thinning agents and garlic together; it is best to discuss its use with a physician.

Ginseng

Ginseng is a short, slow growing perennial plan with fleshy roots that has eleven different varieties. It has long been used in Asia in the belief that it can restore and enhance normal well-being and is perhaps the most commonly used herbal remedy in the world. It was thought to have rejuvenating powers and was considered to be a symbol of divine harmony. Legend states that the early emperors of China used Ginseng as a remedy for all illnesses and not only consumed it but also used it in creams, lotions and even soaps. The word Ginseng comes from the Chinese term "renshen" that translates into "man root." This obviously refers to the shape of the root itself that often resembles a man or at least a man's legs.

Ginseng is a light-colored root with a relatively long stalk and green, oval leaves. Both the American Ginseng (Panax quinquefolius) and Asian Ginseng (Panax Ginseng) varieties have been touted to provide an energy boost, lower blood sugar and cholesterol levels, reduce stress, promote relaxation and even treat diabetes and sexual problems in men. The American form of Ginseng was developed in Canada near Montreal and was soon found in deciduous forests in the eastern United States. At this time, it is cultivated and the state of Wisconsin is said to produce the vast majority of Ginseng grown in the United States.

There are few studies of high quality upon which to truly judge the effectiveness of Ginseng for any malady or indication. One study done at the Mayo Clinic reported that Ginseng use helped patients with cancer improve their feeling of fatigue. While a study done in China at Nantong University

reported that ginseng had some beneficial effects on cognition and quality of life, the results were far from definitive. Petkov in 1978 reported that the dried standardized extract of ginseng administered by stomach tube in doses of 20 milligrams/kg for 3 days improved learning and memory retention of Wistar rates in a maze-running situation. Administration of 100 milligrams/kg, however resulted in deterioration of most of the indices of learning and memory compared with control animals or those rats given lower doses. When rats were given ginseng extract at 50 milligrams/kg doses and their brains analyzed, it was noted that dopamine and norepinephrine levels increased significantly and serotonin levels decreased in the brain stem. Serotonin levels were significantly increased in the cerebral cortex. Ginseng extract when given at 200 milligrams/kg dosing, it was reported that there was an increase in the activity of non-stimulated adenylate cyclase in the rat brain cortex; doses of 200 milligrams/kg decreased the activity of both non-stimulated and stimulated adenylate cyclase in the cortex and brain stem.

In 1979, Bittles et al published a study that evaluated the effect of feeding a standardized extract of ginseng to mice for their lifespan while being evaluated for reaction to stress. One group was given 8 milligrams/kg/day from their 2nd month of life, one group received the same dose from the 12th month of life, and the third was not given any ginseng. While there was no difference in lifespan between the three groups of mice, the ginseng-fed group reportedly remained quiet longer, exhibited delayed and decreased exploratory movements and were more inclined to flight when exposed to a stress inducing environment, all thought to be due to an increased sensitivity or awareness of the stimuli. The group given the extract beginning at one year of age began to exhibit the same behavior patterns as the earlier-treated group.

A study at Vanderbilt University reported that Ginseng improved survival and quality of life after a diagnosis of breast cancer. While only limited data was obtained, the American Cancer Society advocated for additional research to be done on Ginseng as a possible adjuvant therapy.

In 2002, a study from Korea reported that approximately two-thirds of men who used Ginseng extract noted an improvement in symptoms of erectile dysfunction.

A study using mice lung tissue exposed to influenza virus reported that the use of red ginseng extract improved survival of lung epithelial cells grown in tissue culture medium.

Ginseng extract when analyzed by chemical structure has similarities to that of corticosteroids. Whether any of the reported effects are due to some

steroid effect is not known. Studies done in China have demonstrated that when taking high concentrations of Ginseng extract, there was an improvement in physical endurance in trained athletes. In a study done in the late 1940's, Russian investigators made an objective clinical observation with groups of men running a 3 kilometer race who had consumed an extract of Ginseng. Those taking Ginseng performed better than a control group of runners who did not. Ginseng extract was also studied in a group of radio operators and proofreaders; those who consumed a Ginseng extract had fewer mistakes. Mice who consumed Ginseng extract were described as having greater endurance when challenged with an exhausting swim test or required to run up a rope to fatigue. While promising, these early studies were conducted with unstandardized extracts of Ginseng.

Pharmacologically, it is thought that the triterpene saponins that form the basic elements of the ginsenosides are most likely responsible for the enhanced endurance properties of ginseng. Using high-performance liquid chromatography (HPLC) and field absorption mass spectrometry, it has been possible to identify the specific steroid saponins found in Ginseng. The glycosides in greatest quantity in Ginseng are the 20-S-protopanaxadiol and the 20-S-protopanaxatriol varieties. While many forms of Ginseng extract are marketed, potency varies greatly from lot to lot in terms of content. This may cloud study interpretation and results.

In a study done by Revers et al in 1976, Ginseng extract was given to a group of elderly subjects in a double-blind fashion. The extract was administered orally for 90 days. Subjects in the Ginseng group reportedly had an increased alertness and ability to concentrate, improved visual and motor coordination, improved ability to understand abstract concepts and improved physical function. In 1977, Simon et al reported on a study of 36 elderly patients given Ginseng extract for 90 days. All subjects were evaluated in terms of their mental processes both before and after ginseng use. While no significant effect on quantitative performance in attention was observed, there was a significant improvement in measures of "qualitative concentration performance" and accuracy.

In 1979, Quiroga and Imbriano published their data evaluating blood flow to the cerebral carotid circulation following Ginseng use. Subjects were aged 41-70 years of age and were diagnosed with arteriosclerotic cerebrovascular circulatory insufficiency. They reported that 36 percent of patients experienced a "very favorable" response, 54 percent a "favorable" response and 10 percent

as not having a response as compared to only 8 percent having a "favorable" response in the placebo control group.

Dorling et al conducted a double-blind study evaluating 60 subjects aged 22-80 years of age who were given daily doses of Ginseng extract. Thirty subjects received Ginseng extract and 30 a placebo for 12 weeks. Tests were conducted at 2, 4, 6, 8, 10 and 12 weeks to assess subject response to light and sound, flicker-fusion threshold, two-hand coordination, and their recovery quotients. Subjects were also questioned about their subjective physical condition, physical fitness, mental alertness, attitude to life and mood and memory and concentration and sleep patterns. While questions regarding study methods were raised, the results indicated a beneficial effect after several weeks of Ginseng use with most notable improvements in reaction time, two-hand coordination and shortening of the recovery period in terms of oxygen consumption after a work test. Based on self-assessment, those subjects taking Ginseng reported improved physical condition, fitness, and sleep behavior.

Forgo and colleagues reported that after 9 weeks of administration of Ginseng extract, subjects demonstrated lower blood serum lactate and lower pulse rates when dong physical activity as compared to those not given Ginseng. When the dose was doubled to 2, 500 mg capsules of a 7 percent total ginsenosides standardized extract per day for 9 weeks in 30 athletes, there was no increase in maximum oxygen absorption capacity, blood lactate concentrations or change in heart rate as compared with the initial dose of 2, 500 mg capsules of a 4 percent total ginsenosides daily dose.

Forgo et al conducted a double-blind study in which a standardized extract of ginseng was administered to 120 men and women subjects ranging in age from 30 to 60 years of age for 12 weeks. While there was no significant reduction in reaction times in persons between the ages of 30 to 39 taking Ginseng, those individuals aged 40 to 60 given Ginseng had a significantly reduced reaction time. Men aged 40 to 60 were also noted to have significant improvement in measures of respiratory function after 12 weeks taking ginseng including vital capacity, forced expiratory volume, maximum expiratory flow, and maximum breathing capacity. While women aged 30-39 taking Ginseng reported a significant improvement in self-assessment but the greatest improvement was observed in the men and women subjects aged 40 to 60.

While Ginseng is considered to be safe to use in small quantities, side effects that have been reported include headaches, nausea, tachycardia, anxiety and difficulty sleeping. When taken in excess, side effects may also include

diarrhea, edema, bradycardia, convulsions, delirium, seizures, blurred vision, bleeding, dizziness, and dry mouth. Women have been reported to have vaginal bleeding and swollen breasts. Ginseng should not be used with Monoamine Oxidase Inhibitors (MAOIs) as manic episodes and tremors have been reported. It should also be used cautiously with calcium channel blockers and not taken with cardiac medications without first consulting one's physician. Ginseng may also increase the risk of bleeding when used with warfarin or aspirin.

Hemp

To many the word "hemp" is synonymous with the 1960's and has a negative connotation. While it is true that hemp comes from the same plant species as marijuana, hemp in its eatable form is entirely safe and without any hallucinogenic properties. Hemp seeds are rich in protein and are an excellent source of essential fatty acids, Vitamin E, and is an outstanding source of anti-oxidants. Unfortunately, even though hemp seeds contain little to no THC, the psychoactive component of marijuana, the US Drug Enforcement Agency or DEA has attempted to ban the use of help in any form and especially in food. Despite the debate and a review in process by the US Circuit Court of Appeals as to the constitutionality of such a ban, hemp foods can be legally imported, sold and eaten.

Hemp seeds are found in granola, natural health bars, and even frozen waffles. Hemp oil is sold for salad dressing and hemp seeds can be eaten plain or sprinkled over salads or other foods.

Perhaps Hemp oil and seed's greatest benefit comes from its high concentration of essential fatty acids, essential for proper functioning of the brain, heart and other body organs. Essential fatty acids are not made by the body so we are dependent on dietary sources for our requirements. In addition to hemp seeds, essential fatty acids can be obtained from flaxseeds, salmon, spinach, and walnuts. Hemp seeds also provide gamma-linolenic acid or GLA, an omega-6 fatty acid that is thought to have a beneficial effect on blood pressure despite omega 6 fatty acids' pro-inflammatory effects. While some advocate hemp seeds as a way to treat skin conditions such as eczema, no definitive scientific evidence is available to support this claim.

Nuts: Almonds and Walnuts

Almonds have long been sought as exotic treats and sources of nutrition. The Vikings would bring their bounty of almonds from distant lands and claim victory. Perhaps this led to the Scandinavians creative ways to incorporate this treasure into their diet, especially in the form of marizipan, a mixture of finely ground almonds and sugar. Almonds have been enjoyed for centuries either plain, made into a butter, or used in cooking. While a culinary pleasure, almonds may also offer health benefits. Individuals randomly assigned to one of two diet groups with both groups consuming the same number of daily calories over a six month period of time. The group that lost more weight, 18 versus 11 percent, had a greater drop in waist circumference, 14 versus 9 percent, and had a larger reduction in blood pressure, 11 versus 0 percent, had a greater percentage of their calories derived from fat, 39 versus 18 percent with the majority of the fat in the form of monounsaturated fat. This group ate a daily three-ounce portion of almonds. The authors concluded that adding almonds to a long-term low-calorie diet enhanced weight loss and significantly improved risk factors associated with heart disease. While the study also demonstrated that individuals in both diet groups had lower glucose and insulin levels at the conclusion of the study, medication requirements for individuals with type 2 diabetes decreased more significantly in the group that ate the low-calorie, almond supplemented diet as compared to the other diet with similar calories but without almonds. This study suggests that not all calories are equivalent in terms of their effect on the body and health and that almonds may have a benefit beyond their good taste.

It was theorized that the fat in almonds may not have been completely absorbed and thus result in fewer available calories for the body to metabolize. This is in concert with a prior study that demonstrated that the cell walls of almonds are capable of acting as a physical barrier to the absorption of fat. Almonds, even in small, one ounce quantities, have been reported to provide a “full” and satisfied feeling, also helping to reduce one’s appetite despite a lower calorie intake. One ounce of almonds contains approximately 160 calories, 6 grams of protein, 5.6 grams of carbohydrate, 14.4 grams of fat, 3.3 grams of fiber and 70 milligrams calcium, 78 milligrams magnesium, 2.2 micrograms of selenium, 134 milligrams of phosphorus, and 7.4 milligrams of alpha-tocopherol (Vitamin E).

Almonds have been reported to improve lipid profiles and reduce low density lipoprotein (LDL-cholesterol) levels linked to heart disease. In one study, LDL-cholesterol was reduced by 35 percent with a diet containing almonds, oatmeal and other foods rick in viscous fiber, plant sterol-enriched margarine and foods high in soy protein. This effect was similar to that observed following use of cholesterol lowering medications such as statins.

The FDA has endorsed a health claim supporting the use of nuts in the diet. Their report states that "one and a half ounces of most nuts, including almonds, may reduce the risk of heart disease when they are part of a diet low in saturated fat and cholesterol."

Walnuts too have been enjoyed for millennia throughout the world. Excavations in France have uncovered petrified shells of nuts that were roasted during the Neolithic period, more than eight thousand years ago. Walnut groves were painted on cave walls as far back as 2000 BC and were thought to exist within Mesopotamia in the famous Hanging Gardens of Babylon. According to ancient mythology, Dionysis transformed a woman into a walnut after death. The goddess Artemis carried this message to her father and ordered that a temple be built in her memory with the temple's columns carved in wood in the form of young women. These were called "catyatides" or nymphs of the walnut tree.

The name of the walnut tree and its nut is formally known as Juglans regia (walnut tree) and nux juglandes (the walnut); this was derived from the expression "royal nut of Jove." The word "nut" is itself derived from the Latin name of nucleus, or fruit of the shell. Some believe it was also named for the Latin word night, or "nox" due to the dark juice of the nut which was used to dye wool in ancient times.

One ounce of walnuts contains 190 calories, 4 grams of protein, 4 grams of carbohydrate, 17 grams of total fat, 1.5 grams of saturated fat, 2.5 grams of monounsaturated fat, 1.3 grams of polyunsaturated fat, 10.78 grams of linoleic acid, 2.57 grams of linolenic acid and 2 grams of fiber.

The walnut and its oil has been used for centuries for a variety of purposes including it being considered a health promoting food. Joseph Sexton is credited as planting English Walnuts in Santa Barbara County, California in 1867, the first commercial planting of walnut trees in the US.

What makes the walnut so valuable is not only its taste, but its recently recognized benefit in reducing the risk of heart disease. The US Food and Drug Administration issued a report stating that "supportive but not conclusive research shows that eating 1.5 ounces of walnuts as part of a diet low in

saturated fat and cholesterol may reduce the risk of heart disease." This amount of walnuts contains approximately 2.5 grams of Omega-3 fatty acid, almost ten times that found in almonds, the second best source.

Epidemiologically, populations that consume nuts and walnuts in particular have lower cardiovascular risk. While this is thought to result from the high concentration of Omega-3 fatty acids present in nuts, other factors may also be contributory. One and one-half ounces of walnuts provides the daily requirement of essential Omega-3 fatty acids as well as a myriad of other valuable vitamins, minerals, protein and antioxidants. Next to rose hips, walnuts are the largest single source of antioxidants per gram. Omega-3 fatty acids have been demonstrated to reduce inflammation and prevent aggregation of platelets that contribute to the development of myocardial infarction. Omega-3 fatty acids have also been shown to reduce C-reactive protein (CRP), a marker of inflammatory processes also linked to heart disease. Walnuts also contain significant quantities of the gamma-tocopherol form of Vitamin E, thought capable of promoting the uptake of alpha-tocopherol into cells so that it can serve as a potent anti-oxidant and protector of cells from oxidative damage.

Phytoestrogens

Phytoestrogens are plant compounds that are converted to estrogen like substances in the intestine. The most common source of these in the human diet are in the form of isoflavones that come mostly from soybeans. Tofu, a processed form of soy, contains less than the beans themselves. Black cohosh is also thought to have estrogenic properties derived from triterpenoid glycosides and isoflavones contained within. Red Clover, another source of estrogenic activity contains coumestrol, an isoflavone also found in soybeans.

Phytoestrogens are thought to exert weak estrogenic activity and while still controversial, data suggests that phytoestrogens may have effects similar to estrogen used medicinally. Some have argued that women at risk of breast cancer or who have had breast cancer should avoid foods rich in phytoestrogens. Asian women consuming higher amounts of soy in their diet reportedly have fewer hot flushes at the time of menopause. Soy intake has been linked epidemiologically with a lower incidence of breast cancer in at

least one study though this is in contrast to popular thinking that any form of estrogen may stimulate breast cancer growth and should be avoided.

A randomized study of 104 post-menopausal women reported that the addition of soy protein their diet reduced symptoms of hot flushes. Another controlled study of 145 post-menopausal women reported that the addition of soy containing foods and flaxseed in the diet for 12 weeks reduced the number of hot flushes and vaginal dryness compared to control subjects without this dietary addition. No difference was noted, however, in overall menopausal symptoms. A double-blind six-week crossover study in 51 post–menopausal women reported that 20 grams of soy protein added to the diet resulted in a reduction in the severity of menopausal symptoms. While one study did report an increase in breast cell proliferation in premenopausal women using large amounts of soy, no definitive adverse clinical findings have been reported to date. Women who already have a history of breast cancer may want to discuss this with their physicians prior to increasing their intake of any phytoestrogen containing food source. For now, soy based products remain an excellent source of vegetable protein and may offer some benefits to women seeking an alternative to hormonal replacement therapy. Other benefits from this weak form of estrogen have not been clearly delineated.

While a diet rich in soy may help reduce serum cholesterol concentration, it remains unclear if this is a direct effect of the soy or some other aspect of the diet being used. In addition, a clinical benefit has not been demonstrated even if cholesterol levels are affected.

While not referred to as a phytoestrogen, Lignans, present in high concentrations in flaxseed and certain cereals, fruits, and vegetables are thought to have an anti-estrogenic effect by binding to estrogen receptor sites. While most of the negative estrogenic effects have been described effecting uterine and vaginal cells, if taken in excess, lignans could theoretically interfere with hormone replacement therapy.

Pomegranate

Pomegranate or Punica granatumn has been touted as a super food capable of helping to prevent or even treat a variety of diseases including high blood pressure, high cholesterol, hyperglycemia, and inflammatory disorders. Pomegranate contains polyphenols that are reported to have strong

antioxidant, anti-inflammatory and anti-carcinogenic effects. It has been said that the antioxidant potential of pomegranate juice is greater than that found in red wine or green tea. Pomegranate juice has been shown to reduce macrophage oxidative stress, free radicals and lipid peroxidation. Extracts of pomegranate have also been shown capable of preventing cell growth and promoting apoptosis, thought to be important anti-carcinogenic effects.

Pomegranate is a long-lived and drought-tolerant plant. It is cultivated in many areas of the world including Iran, India, Turkey, Spain and Morocco. While characterized as a berry, it is part of the genus Punica. Trees can grow up to 30 feet in height with leaves that are narrow and oblong. Its red, orange or pink flowers are impressive and its edible fruit usually weighs 200 grams and is five to twelve cm in diameter.

There are some phytoestrogen compounds in pomegranate seeds that have been shown to contain sex steroid hormones similar to those found in humans including 17-estradiol, closely related to estrogen.

The juice and peel are rich in polyphenols including flavonoids and tannins (ellagitannin, punicalagin and punicalin) giving it its antioxidative properties. It is also rich in proline, methionine and valine, important amino acids. They also contain catechins with high antioxidant activity and the ability to inhibit inflammatory markers such as tumor necrosis factor-alpha (TNF-alpha).

Pomegranate fruit was studied in a model of human prostate cancer cells and mice. In both cases, changes in cell function that resulted from the addition of pomegranate fruit extract supported at least a theoretical role in cancer treatment.

Human breast cancer cell lines were also studied with pomegranate seed oil. The results were a ninety percent prevention of proliferation of these cells grown in tissue culture.

Studies have also shown pomegranate juice capable of exerting a direct effect on human colon cancer cell lines with a reduction in important cellular processes including protein expression. There was a reduction in skin tumor incidence in mice fed pomegranate extract and exposed to UVA and UVB light as well and a reduction in cellular damage after UVA and UVB exposure to fibroblast cells of humans grown in tissue culture medium.

Due to its polyphenol content there has been interest in the role of pomegranate in preventing cardiovascular disease. Pomegranate juice was shown to prevent the activity of serum angiotensin-converting enzyme and has been associated with a reduced arterial blood pressure in a rat model that used

pomegranate juice (100 milligrams/kg) for four weeks. Punicic acid, a major component of pomegranate seed oil is reported to have anti-atherogenic effects. In a study on 51 hyperlipidemic patients, pomegranate seed oil was administered at a dose of 800 milligrams twice a day for four weeks. There was a significant reduction in triglycerides, total cholesterol, LDL cholesterol and glucose concentrations.

Another study that administered pomegranate juice for two weeks reported lower levels of LDL cholesterol. In a study in mice, pomegranate juice administered for 14 weeks reduced LDL oxidation by macrophages by more than 90 percent.

When pomegranate leaf extract was given to hyperlipidemic mice who were made obese by being fed a high fat diet for 5 weeks, there was an observed reduction in body weight energy intake, serum total cholesterol, triglycerides and intestinal fat absorption.

When pomegranate extract fed mice were induced to have arthritis, the severity of the joint inflammation and IL-6 levels were reduced as compared to mice not fed pomegranate extracts.

Mice treated with pomegranate juice for long periods of time were reported to have fifty percent less soluble amyloid accumulation in the hippocampus, theoretically implying a beneficial effect on preventing Alzheimer's disease. No data in humans is available.

Clearly pomegranate juice has the potential for a multitude of benefits though before one can make a definitive conclusion, additional well-controlled studies must be done in humans. For now, there is little to risk and the potential benefit appears to be substantial from incorporating pomegranate juice into one's daily routine. The exact amount that must be taken to achieve benefit, however, remains unclear.

Probiotics

The term Probiotics is derived from the Latin preposition pro meaning "for" and the Greek adjective biotikos that means "fit for life" or "lively." In 2001, the World Health Organization defined probiotics as "live micro-organisms which, when administered in adequate amounts confer a health benefit to the host." In 2010, an expert group of academic and industrial representatives established guidelines to evaluate and validate claims made

regarding the health benefits of probiotics. In 2013, a group of scientific experts met in London to once again review existing literature and make recommendations regarding the use of probiotics.

Probiotics must be alive when administered and therefore must maintain viability and stability during use and time of storage. They must have proven health benefits based on scientific evidence. A probiotic must be a toxonomically defined microbe or combination of microbes and be able to be identified as to its genotype and phenotype. Above all, probiotics must be safe to use as based on testing. Any probiotic that belongs to a species that has been shown to produce toxins harmful to humans must be tested for toxin production. In addition, any probiotic that belongs to a strain with the potential to harm blood cells must also be tested as to its hemolytic potential. Probiotics must also be made available in sufficient quantity to have a beneficial effect when used as directed. In most circumstances, effects have been observed after ingestion of a concentration of 107 probiotic cells per gram with serving size generally being 100 to 200 milligrams per day.

Perhaps the earliest use of probiotics was by ancient Roman and Greek civilizations who thought that cheese and fermented products were essential for health. In 1907, Russian scientist Metchnikoff while working at the Pasteur Institute in Paris proposed that intestinal flora could be modified to eliminate the "harmful" ones and be replaced with beneficial microbes. He went on to hypothesize that certain gut flora, such as the clostridia bacteria were capable of producing toxic substances that were at least partly responsible for our aging process. He had observed previously that certain groups of people in Russia and Bulgaria used fermented milk for a large component of their diet. He also observed that these individuals appeared to be healthy and lived longer lives than those persons consuming other diets. Metchnikoff proposed that fermented milk was capable of "seeding" the intestine with harmless lactic-acid bacteria, reduce the intestinal pH, and thus suppress the growth of proteolytic bacteria capable of producing toxins harmful to our bodies. He began consuming a diet rick in "sour milk" fermented with bacteria he called "Bulgarian Bacillus." This soon became the rage of Europe with physicians prescribing it as part of what they thought was a health promoting diet. In a recent National Health Interview Survey (NHIS), it was found that 4 million (1.6 percent) of the US adult population had used probiotics in one form or another in the past 30 days. Probiotics were the third most commonly used dietary supplement following the use of vitamins and minerals.

Whether or not there is a clear health benefit from the consumption of probiotics remains uncertain though many studies have reported positive effects on a variety of health issues.

When babies with diarrhea were given the bacteria bifidobacteria, a bacteria first isolated from a breast-fed infant at the Pasteur Institute, Dr. Tissier reportedly observed clinical benefits.

Various intestinal bacteria were experimented with throughout the 1920's and 1930's. In 1935, strains of L. acidophilus were reported to remain active when implanted into the human digestive tract and reports of benefit in individuals with chronic constipation began to be made.

Probiotics were considered a way to stimulate the growth of other "beneficial" microorganisms; this is not far from the current thinking that they are a live microbial supplement that can beneficially affect the host animal by improving its intestinal microbial balance.

A number of intestinal lactic acid bacterial species have been developed including Lactobacillus casei, Lactobacillus johnsonii, and Lactobacillus rhamnosus.

In the United States, probiotic manufacturers must only make claims supported by clinical evidence of efficacy. Failure to confirm to FDA standards poses the threat of legal action and fines.

Studies to date have sought to evaluate the effectiveness of probiotics in persons with inflammatory bowel disease, traveler's diarrhea, antibiotic associated diarrhea, cancer, and irritable bowel syndrome.

Antibiotic-associated diarrhea is thought to result from an imbalance in the colonic microbiota caused by antibiotic therapy. Alterations in carbohydrate metabolism, decreased short-chain fatty acid absorption and osmotic diarrhea may result. While data remains conflicting, there have been some reported studies that have suggested a protective effect of some probiotics in preventing antibiotic-induced diarrhea.

Treatment with probiotic formulations that include Lactobacillus rhamnosus have been reported to improve stool consistency as well as reduce the risk of diarrhea in persons taking anti-biotics. To date, however, no randomized, double-blind, placebo controlled studies have been done upon which to make a definitive conclusion as to its effectiveness and approval for this indication by the FDA has not been granted.

A Cochrane systematic review that analyzed 16 randomized clinical trial with over 3,000 subjects concluded that treatments with less than 5x109 colony forming units/day did not show significant benefit in persons with

antibiotic associated diarrhea. Patients taking greater than 5x109 colony forming units per day of Lactobacillus rhamnosus and Saccharomyces boulardii did however have a 60 percent lower risk of antibiotic associated diarrhea than untreated individuals.

A meta-analysis that reviewed data from five double-blind trials that studied the effect of taking a yogurt with probiotic strains for 2-8 weeks on serum cholesterol levels reported a modest reduction in total cholesterol concentration (4 percent decrease) and serum Low Density Lipoprotein (LDL) cholesterol (5 percent decrease).

Another study on 29 subjects who consumed a yogurt with probiotics for six months, however, failed to demonstrate a statistically significant change in total cholesterol or LDL levels. This study did report a significant increase in the level of High Density Lipoprotein (HDL) cholesterol, the "good" form of cholesterol and a beneficial LDL/HDL ratio that has been shown to be heart healthy.

For many years, women have taken yogurt as a way of preventing and/or treating vaginal infections. Probiotic treatment of bacterial vaginosis is based on using bacterial species normally found in the healthy vagina to treat the infection caused by other strains of bacteria. Since over 70 percent of healthy women have bacteria of the genus Lactobacillus as a dominant bacteria in the vagina, it is thought that the use of probiotics with this bacteria will restore health. Unfortunately, there are many other variables that make it hard to interpret test results. These may include coincident use of antibiotics, differences in age, numbers of sexual partners, pregnancy, and pathogens causing the vaginosis. In 2013, it was reported that administration of bacteria that produce hydrogen peroxide, such as Lactobacillus acidophilus and Lactobacillus rhamnosus were able to normalize vaginal pH and prevent and alleviate bacterial vaginosis.

In 2016, a composite review of 15 studies performed with human subjects revealed a surprising outcome. When probiotics from the Bifidobacterium and Lactobacillus family were taken by mouth in daily doses of 109-1010 colony forming units for 1-2 months, a variety of behavioral changes were noted including improved anxiety, depression, obsessive-compulsive disorder and even memory. Additional studies are needed prior to being able to make a definitive conclusion regarding this potentially exciting benefit.

There are some studies reporting improved incidence and even severity of Adult Attention Deficit disorder with the use of probiotics though randomized, double-blind, placebo-controlled trials are lacking and no definite conclusion

regarding their efficacy can be made at this time. A Cochrane systematic review analyzing 16 randomized trials with over 3,000 enrolled human subjects reported that patients treated with greater than 5x109 colony forming units per day of probiotics (Lactobacillus rhamnosus and Saccharomyces boulardi had 60 percent lower risk of having symptoms of Adult Attention Deficit disorder than those who were not using probiotics. Unfortunately, these studies failed to meet the scientific rigor necessary to make a definite conclusion and additional placebo-controlled, double-blinded studies are necessary prior to making any scientifically based conclusion.

Although various commercially available food products including yogurt list the number of viable cultures of probiotic per gram, there is conflicting data as to whether this is at the time of production or at the end of the shelf life. It is therefore difficult to determine exactly how much active culture is present at the time when the food is eaten.

Since there are few if any well controlled scientific studies to definitely show benefit of probiotic use, commercially available products are not allowed to claim unproven nutritional benefits or anti-disease activity. A number of warning letters have been issued to various manufacturers by the FDA after reporting what was considered to be "false claims" of benefit. Since the potential benefit of using a probiotic outweighs the risk in most circumstances, however, it is up to each consumer to make their own decision as to whether using probiotics will be beneficial to them. Probiotic products sold as dietary supplements may make claims about how the product affects some function of the body without FDA approval but they cannot make health claims that their product reduces the risk of a specific disease without first obtaining FDA approval.

Probiotics have been commercially available since 1935 when a fermented milk product with Lactobacillus casei shirota was added. Probiotics are now available not only in a variety of dairy products but also nondairy and unfermented forms including cereals and snack bars. Most common sources include certain yogurts, kefir, kimchi, sauerkraut and other fermented foods and beverages. Over $30 billion is spent in the US alone on the sales of probiotic products with other parts of the world contributing greatly to their increasing use. While live probiotic cultures are available in fermented dairy products and probiotic fortified foods, they are also available in the form of tablets, capsules and powers and one can also obtain a freeze-dried form.

It is important to remember that so far the US Food and Drug Administration (FDA) has approved no specific health claims for probiotics. In

addition, the amount of probiotics that studies have found to be beneficial vary from strain to strain and condition to condition. Since probiotics are sold as dietary supplements, they do not require FDA approval before marketing to the public. Although generally safe, individuals with immunodeficiency problems, central venous catheters, valvular heart disease, persons who have had recent surgery, and individuals with short bowel syndrome and inflammatory bowel disease are considered to be at higher risk for adverse reactions and use should only be under the direction of a physician.

It is never a good idea to replace scientifically approved therapies with probiotics or any other complementary health product. If in doubt about the use or safety of a probiotic supplement, first discuss this matter with your physician. The National Institutes of Health (NIH) is currently in the process of reviewing the safety of probiotic use as well as funding studies that will better help elucidate their mode of action and potential benefits.

Sesame Seeds

Sesame seeds come from the Sesammum indicum plant of the pedaliaceae family. This plant in different parts of the world is also known as benne, sim sim, and abongra. The plant is an erect tropical plant and grows to a height of 6 feet Drought resistant, this plant has oblong leaves and white to light rose colored flowers. Each fruit is a grooved capsule that often contains in excess of 100 seeds.

The sesame seed contains approximately 55 percent of its weight as oil and has a high concentration of anti-oxidants. Sesame seeds are in demand all over the world with most crops grown in China, India, and the West Indies. In the United States, they are grown in greatest quantities in the southern and western states. While the white seeds are most commonly sold in the US, other forms such as black, brown and red seeds are available.

Sesame seeds date back to the Assyrians who reportedly used them over 3,000 years ago. In China they were grown as a taste sensation for at least 2,000 years. The Egyptians used sesame seeds as a form of medicine and the Turks were reported to use sesame oil as far back as 900 B.C. Sesame seeds were brought to Europe from India during the first century and were used as a substitute for olive oil in certain regions. It reached the United States in the 17th century from Africa when it was brought by slaves who called it “benne.”

Sesame seeds have a nut-like flavor and can be used raw, ground, or toasted. Sesame seeds can be added to foods whole or sprinkled over vegetables, pasta, or casseroles. They can be ground and blended with mayonnaise or butter and used as a spread. Middle Eastern and Asian recipes use sesame seeds to make tasty marinades and dipping sauces as well as Halva and hummus.

All children are taught the familiar phrase "Open Sesame," a phrase that has its roots in the stories of the Arabian Nights. This refers to the "sudden popping" sound made when mature sesame seed pods split open. Over the years, sesame seeds have been used to treat anemia, blurred vision, and constipation. They have also been used for beauty oils and in cosmetics. While there are no scientific studies regarding the health benefits of sesame seeds, given their taste, ease of use in cooking or as a food additive, and anti-oxidant properties, sesame seeds remain a "super food" worth considering as part of a health promoting diet.

Soybeans

Soybeans have been cultivated and eaten in China for more than 2000 years and Japanese diets have included soy products for centuries. Soy has been credited as being at least partially responsible for the Japanese being considered one of the healthiest and longest living populations on Earth. Besides being an excellent source of protein, soybeans also contain fiber, iron, calcium, folic acid, magnesium, potassium and B vitamins.

Soy is an excellent source of protein without the saturated fat and cholesterol found in protein derived from animals. Soy protein has been widely used throughout Asia in products such as soy milk, tofu, and tempeh and is quickly gaining acceptance in the US. Soy is increasingly being added to the US diet in the form of tofu and cereals are now adding soy protein to maximize their health benefit. Soy protein powder and energy bars are widely available and can provide a quick snack or even serve as a substitute for an entire meal. Soy nuts are also an excellent snack or supplement to a meal and edamame, the Japanese name for green soybeans, can be used as a healthy snack either steamed or uncooked or as a protein source as part of a healthy meal.

The first soybean crop in the US was planted in the Savannah, Georgia area in the 1700's. In fact, an enterprising Englishman even patented the formula for a "soy sauce." Soybeans were used during the Civil War as a substitute for coffee and in 1904, George Washington Carver, the African-American agricultural scientist, identified soybeans as an excellent source of protein and recommended that it be used as an oil. In the early 20th century, soybeans were commercially made into oil and advertised as an inexpensive source of protein. In fact, Dr. John Harvey Kellogg, the brother of the famous cereal manufacturer, was a vegetarian and developed soy as a meat substitute as early as the 1920's. During the difficult times of World War 2, soy again resurged as a protein source and various soy products were produced including burgers, cereals, and food substitutes. Despite this, soy failed to achieve wide acceptance until more recent times when a more positive Asian influence began to spread in the Western world. The first soy products to become widely accepted in the US were the soy based beverages, such as soymilk.

In 1995, a research study was published in the prestigious New England Journal of Medicine that revolutionized thinking about soy and its role in the western diet. This study for the first time determined that soy in the diet helped reduce blood cholesterol. By 1999, the US Food and Drug Administration agreed to allow food labels to state that there was a potential cholesterol-lowering effect from soy. The rest is history with soy quickly gaining popularity as an excellent source of protein and as a major source of phytoestrogens.

Soy protein is a complete protein and in fact is the only plant protein that is equivalent to animal protein in terms of its amino acid content. The US Department of Agriculture evaluates protein quality using the Protein Digestibility Corrected Amino Acids Score or PDCAAS. This effectively measures the amino acid pattern of proteins and factors in digestibility. Soy protein has a PDCAAS score of 1.0, equivalent to animal protein.

Everywhere we look, soy burgers are now ubiquitous and soy is even being added to breakfast cereals to enhance its health benefit. Sales of soy have steadily increased in the US with close to a 14% increase annually from the early 1990's. Asians still consume more soy than the average American with intakes between 8 and 20 grams of soy protein per day not unusual; many feel that it is only a matter of time until the US diet catches up. There are currently over 3,000 food products containing soy available for the consumer, not to mention the availability of soy protein powder that can easily be added to any food either by sprinkling on top or through blending. Soy is now being

added commercially to bread and other baked goods and soy-based meat alternatives are increasingly gaining popularity by mainstream America and in fact are made to be look-alikes of meat and poultry with texture and taste not much far behind. The average soy burger, for example, contains approximately 10 grams of soy protein, is generally free of cholesterol and saturated fat, and has a moderate sodium content. Soy is now available as a frozen dessert, an ice cream substitute, and as yogurt for the concerned health consumer. Soy yogurt has a creamy texture and is easy to use as a substitute in recipes for sour cream or cream cheese. A soy cheese is also available that is made from soymilk. It also has a creamy texture that makes it a great substitute for most cheeses, sour cream, or cream cheese and it is also used as a topping on soy pizza. There is even a soy-based vodka manufactured by the 3 Vodka Distilling Company based in Chicago.

Soy has been shown to reduce total cholesterol, low-density lipoprotein (LDL) cholesterol, the "bad" cholesterol, and triglyceride levels, also potentially harmful to one's heart. This benefit occurs without a decrease in the "good" form of cholesterol linked to reduced rates of heart disease, HDL, and in fact soy protein has been reported in some studies to even increase HDL levels. Individuals who consume 20 to 30 grams of soy protein daily have been reported to lower their total cholesterol by 10 milligrams/dl on average. The higher one's cholesterol to begin with, the more significant the decrease when soy products are added to the diet.

Soy containing foods also are a good source of many vitamins such as folate and minerals such as iron. Soy is thought to have a beneficial effect on amino acids and proteins in the body as well as contribute isoflavones (genistein and daidzein) and phytoestrogens. Women who desire an "estrogen effect" without taking estrogens have flocked to soy as an excellent source of natural estrogens. Studies have been mixed regarding the beneficial effect of these phytoestrogens on bone, heart, and general well-being and questions remain regarding their risk in women with breast cancer. Women who are dealing with problematic menopausal symptoms without a history of breast cancer may try phytoestrogens as an alternative to short term estrogen use.

The FDA and the American Heart Association has recommended that people consume 25 grams of soy protein per day as part of a diet low in saturated fat and cholesterol to help lower elevated cholesterol levels. Of note, soy protein is different from most other proteins derived from vegetable sources and is considered to be a "complete" protein similar to animal proteins though more healthy. In other words, soy protein contains all of the essential

amino acids in sufficient quantities necessary for proper health and functioning. Another benefit is that soy protein reportedly causes less calcium to be lost from the bones as compared to animal proteins. Soy is no longer only for Hippies and vegetarians and should be considered part of a healthy diet. The following is a discussion of the various forms of soy products available.

Soy Fiber: There are three types of soy fiber: okara, soy bran, and soy isolate fiber. All are high quality, inexpensive sources of dietary fiber. Soy bran is made from the outer covering of the soybean, or hull. The hulls contain a fibrous material that can be extracted and refined for use as a food ingredient. Soy isolate fiber is soy protein isolate in a fibrous form.

Lecithin is a product that is extracted from soybean oil and is used in food manufacturing as an emulsifier in products that are high in fats and oils. Lecithin promotes stabilization of food while preventing oxidation, crystallization, and spattering. Lecithin is also a precursor in the body that is used to produce acetylcholine, a neurotransmitter that is thought to be the major chemical in the brain responsible for our memory.

Soy flour: Soy flour is made from roasted soybeans ground into a fine powder. Soy flour is 50% protein and a good source of protein when added to recipes. It can be obtained in a "defatted" or "full-fat" form. The defatted form has an even more concentrated source of protein of 70% and retains most of the bean's dietary fiber. Soy flour is gluten free. When used in the production of yeast-raised bread, it is said to have a more dense texture. Since soy flour is free of gluten, however, it fails to provide structure to yeast-raised breads. For this reason, soy flour cannot replace all of the wheat or rye flour in a bread recipe. Using 15% soy flour in a recipe, however, produces a dense bread that has a pleasant nutty flavor. Baked products that are not yeast-raised, such as "quick breads," can use soy flour for up to one-quarter of the total amount of the flour called for in the recipe. Soy flour can be used to thicken gravies and cream sauces or be used to make homemade soymilk. Full-fat soy flour should be stored in the refrigerator or freezer to preserve its freshness; defatted soy flour is more stable and can be stored non-refrigerated on the shelf.

Soy Protein Isolate: This is yet another available form of soy protein that contains 90% protein produced from defatted flakes. This is a highly digestible source of amino acids. While it has little flavor in itself, it can be used in almost any food. Soy protein Isolate should be kept sealed and dry though remains stable for many months. It easily can be added to a variety of cereals, shakes, soups, sauces, among many other meals as it provides protein and

other nutrients without affecting the flavor of the food to which it is added. It may also come in flavors that might enhance a shake.

Soy Protein, Textured: Textured soy protein refers to products made from textured soy flour and textured soy protein concentrate. Textured soy flour is produced by processing defatted soy flour or soy protein concentrate through an extrusion cooker in order to compresses the product. It contains 50% protein as well as the dietary fiber and soluble carbohydrates found in the soybean. It has long been used as a low cost additive for meat as a way of extending portion size. It can be obtained in either a granular or chunk style. Textured soy protein also is available as a "concentrate" with 70% protein content and dietary fiber. It also comes dried and when hydrated, assumes a chewy texture that mixes well with other foods. One 12-ounce package of soy burger-style crumbles is equivalent to approximately one pound of ground beef in most recipes. Recently, a variety of flavors have been added to soy products to have them resemble the taste of beef, turkey, and even pork. Textured soy protein has a long shelf life. It will keep for several months if it is stored in a tightly closed container at room temperature. Once it has been rehydrated, however, it must be stored in the refrigerator and used within a few days. Textured soy protein will triple in volume when hydrated. For example, one pound of dry textured soy protein will make approximately 3 pounds of hydrated textured soy protein. For recipes calling for one pound of ground beef, you can substitute one and one-half cups of dry textured soy protein and hydrate it with equal amount of water.

Soybean oil: Soybean oil is also known as soyoil and is the natural oil extracted from whole soybeans. It is the most widely used oil in the US accounting for more than 75% of the total vegetable oil used. Oil sold commonly as "vegetable oil" is usually 100% soybean oil or a blend of soyoil and other oils. Soyoil is cholesterol free and high in polyunsaturated fat (61%) and monounsaturated fat (24%) and an excellent source of vitamin E. It is frequently used in making margarines. Soybean oil is a good natural source of both linoleic and linolenic acids, both essential to humans. More than 50% of the fat in soy is linoleic acid; 7% of the fat is linolenic.

Soynut Butter: Soynut butter is made from roasted, whole soynuts which are crushed and blended with soybean oil and other ingredients. Soynut butter has a mild, nutty taste, contains less fat than peanut butter, and has a nutritionally sound profile.

Green vegetable soybeans (Edamame): Commonly eaten in Japanese restaurants, these large soybeans are harvested at 80 % maturity when the

beans are still green and have a sweet taste. They can be eaten as either a snack or as part of a meal. They are either steamed or prepared by boiling in slightly salted water for 15 to 20 minutes. They are high in protein and fiber, contain no cholesterol and are a taste treat. They are also available frozen both in the pod and shelled. Restaurants may add salt to the edamame and it may be beneficial to request that they defer this process if you are trying to limit your salt intake.

Do not eat soybeans raw. Soybeans must be cooked to destroy the protease inhibitor that is contained within the beans. Heating is necessary to deactivate this activity and make the beans digestible.

When cooking yellow soybeans, do not add salt or acidic ingredients, such as lemon juice, vinegar, or tomatoes until the beans are thoroughly cooked. Acidic additives delay the softening process. Black soybeans are an exception and in fact, acidic additives may help this form of soybean retain its shape through the cooking process.

When cooking dry soybeans, it is important to first soak the soybeans in four cups of water for each cup of beans for eight hours. If you plan on soaking any longer than this time, make sure you refrigerate the beans. Drain and rinse the beans, add four cups of fresh water for each cup of beans you started with, and bring to a boil. Once boiling, reduce the heat, skim off any "foam" that has developed, and simmer for approximately three hours being careful to add more water as necessary. Cook until the beans are tender. One cup of dry beans will yield approximately two to three cups of cooked beans.

Miso: Miso is a rich, salty food that can be used to make miso soup or to flavor a variety of foods such as soups, sauces, salad dressings, marinades and even pates. Miso is a smooth paste that is made from soybeans and a grain such as rice. To this mixture, the manufacturer adds salt and a mold culture prior to "aging" in cedar vats for long periods of time, usually between one and three years. Miso paste requires refrigeration.

Natto: Natto is a fermented, cooked dish consisting of whole soybeans. The fermentation process degrades the beans' complex proteins and therefore is considered to be more easily digested than whole soybeans. It has a sticky viscous coating that has a cheese-like appearance. Traditionally, natto is used as a topping for rice, added to miso soups, or used with vegetables.

Okara: Okara is a pulp fiber by-product of soymilk. While it has less protein than whole soybeans, the protein is of high quality. Its taste is similar to coconut and it can be baked or added as fiber to granola or baked goods. A sausage has also been made from okara.

Soybeans: As with other beans, soybeans undergo a maturation process from the early green phase to a ripened form that is hardened and dry. There are several varieties of soybeans including the yellow, brown and black variety. Whole soybeans can be soaked and then roasted and eaten as a snack food. They do require cooking of some form though the green-yellow bean is most commonly boiled or steamed prior to serving (see Edamame).

Soymilk: Soybeans that are soaked, ground fine and strained produce a fluid that has been called soybean milk or soymilk. It is lactose- and casein-free and is available in regular and low-fat varieties. Some brands are fortified with calcium, vitamin D, and/or vitamin B12. Soymilk can be found in a variety of flavors including plain, vanilla, egg nog, chocolate, and even strawberry. Soymilk has gained a great deal of favor as a substitute to cow's milk due to it being well tolerated, especially for those who are lactase deficient. Milk sugar or lactose requires an enzyme in the intestine (lactase) to be broken down and absorbed. If this process does not occur, the milk sugar serves as an osmotic that produces loose bowl movements, gas and indigestion. Lactase deficiency is quite wide-spread with a higher percentage of African-Americans and elderly persons effected. The lactase enzyme may also be reduced at any time in one's life by intestinal illness even in individuals who once had normal enzyme levels. Plain, unfortified soymilk is an excellent source of high-quality protein and B vitamins. Most commercially produced brands have added calcium in a similar concentration as that found in cow milk, or approximately 300 mg calcium in every 8 ounce glass. The consumer is advised to read the label to determine the exact amount of calcium and other nutrients that have been added.

Soynuts: Soynuts are usually roasted and are made from whole soybeans that have been soaked in water and then baked until brown. They are often "flavored" and may even be sold covered in chololate. They are high in protein and isoflavones and have a similar texture and flavor to peanuts.

Soy Sauce: Soy sauce is a dark liquid that is made from soybeans that have been fermented. It generally has a salty taste and sodium but can also be obtained in a "low salt" variety with approximately one-third less salt. Soy sauce can be found in three types, shoyu, tamari, and teriyaki. Shoyu is a blend of soybeans and wheat; tamari is made only from soybeans and is a by-product of making miso; teriyaki sauce is thicker and includes other ingredients including sugar, vinegar, and certain spices. Soy sauce is used to enhance the flavor of certain foods, such as fish though is also gaining acceptance as a salad dressing and marinade.

Soy Sprouts: Soybean sprouts are an excellent source of protein and vitamin C and can be used in a similar fashion as other sprouts, such as mung bean sprouts or alfalfa spouts.

Tempeh: Tempeh is a traditional food from Indonesia. It is a chunky, tender soybean cake that is made from whole soybeans that are usually mixed with another grain such as rice or millet. This mixture is allowed to ferment and forms a rich cake of soybeans that has a nutty or smoky flavor. Tempeh can be marinated and grilled. It can also be cut into smaller squares and added to soups or casseroles.

Tofu: Tofu or soybean curd is a soft cheese-like food that is made by curdling fresh hot soymilk with a coagulant. It is a favorite of cooks because of its lack of flavor and ability to take on the flavor of the dish it is added to or the marinade it is placed into. Tofu is rich in high-quality protein and B vitamins and low in sodium. It comes in a variety of forms. Water-packed tofu (firm or extra firm) is a dense solid that can be easily cut into smaller portions and added to soups or stir-fry dishes. It can also be grilled and eaten as the main protein source of a meal. It is also higher in protein and calcium than the other forms of tofu. The water must be squeezed out prior to cooking to help maintain its form.

Soft tofu is best used in recipes that call for it to be blended into the meal. Silken tofu is a creamy, custard-like product that can be used to replace sour cream in blended or pureed dishes. It also makes an excellent foundation for "dips."

Yuba: Yuba is made by skimming and then drying the thin layer formed on the surface of hot soymilk as it is allowed to cool. Yuba has a high protein content and is sold in one of three forms, fresh, half-dried, or as dried bean curd sheets. The latter are often used in place of noodles in stir-fry dishes, casseroles, and even soups.

Wheatgrass

Wheatgrass is a food derived from the wheat plant and can be traced back to ancient Egypt and possibly even Mesopotamia. The western world became enamored with wheatgrass in the 1930's due to experiments conducted by Charles Schnabel while he was attempting to popularize and market the plant. Ann Wigmore, founder of the Hippocrates Health Institute, advocated for

wheatgrass as part of a raw food diet believing that it would cleanse the body of toxins when used in conjunction with a raw food diet. Additionally she believed it could assist in treating a variety of diseases. While there are no studies that relate the use of wheatgrass to longevity, several small studies have been done and have demonstrated health benefits. Wheatgrass contains carotene and vitamin E and may also have anti-oxidant properties.

Kotharis and colleagues studied the effect of consuming fresh wheatgrass juice in a cohort of hypercholesterolemic rats. When fresh wheatgrass juice was given to these rats, cholesterol levels declined.

Wheatgrass juice was used in the treatment of active distal ulcerative colitis. In a randomized double-blind, placebo-controlled trial, Ben-Aroye and colleagues concluded that wheatgrass juice appeared to be effective and safe as a single or adjuvant treatment.

Although proponents argue that wheatgrass may have health benefits ranging from an improved feeling of general well-being to even cancer prevention, the American Cancer Society states that "available scientific evidence does not support the idea that wheatgrass or the wheatgrass diet can cure of prevent disease."

Additional well-control studies in humans are necessary prior to recommending wheatgrass as a road to a more successful aging. Limited data however does suggest that there may be health benefits in certain circumstances with minimal negative consequences from consuming limited amounts of wheatgrass juice in one's diet. Side effects, though not common, may include nausea, headaches, allergic reactions, stomach ache, skin eruptions, coughing, nasal congestion and even a mild fever.

Once ounce of Wheatgrass Juice contains 860 mg of protein, 120 IU beta-carotene, 880 mcg Vitamin E, 1 mg Vitamin C, 42 mg potassium, 8 mg magnesium, 0.30 mcg Vitamin B12, and 7.2 mg calcium. Of note, while some believe Wheatgrass is a rich source of Vitamin B12, the amount is negligible and should not be considered a source of B12 in those wishing to enrich their intake of this vitamin.

Some have advocated the use of broccoli or spinach as equivalent to Wheatgrass. While all contain relatively similar amounts of protein, however, wheatgrass contains more Vitamin E (Broccoli has only 220 mcg and Spinach 580 mcg) but less beta-carotene (Broccoli has 177 IU and Spinach 2,658 IU of beta-carotene).

Chapter 9

The Role of Herbs in Successful Aging

Black Cohosh Root

Black cohosh is a plant native to eastern North America and is found in the shady woods from Maine to Ontario Canada and from Wisconsin south to Georgia. The Latin name for Black cohosh is Cimicifuga racemosaand it is also known as black snakeroot or rattleroot. Native Americans were thought to use the root of the black cohosh as a tonic for generalized malaise as well as a way to treat a variety of problems including arthritis, malaria, and kidney ailments. It was also used to treat menstrual irregularities and played a role in childbirth. In the mid 1800's, it was marketed as a component of "vegetable Compound," sold as a way to relieve menstrual stress and nervous tension. It increasingly became a popular herbal supplement for reducing symptoms associated with menopause.

It is thought to have similar actions as estriol and has been shown to bind weakly with estrogen receptors and exerts its effects on the vaginal lining.

A number of studies have been performed in recent years to scientifically evaluate the effectiveness of Black cohosh on vaginal function as well as menopausal sumptoms. Remifemin, containing 40 milligrams of black cohosh has been sold throughout Australia, Germany and the United States. One open study of 36 women who either had contraindications to hormonal replacement therepy or who wished to be treated with a hormone-free preparation were given Remifemin, 40 drops twice daily for a period of 12 weeks. There was a

highly significant improvement in symptoms of menopause without side effects being observed.

Another open study evaluated menopausal complaints in 50 women treated with 40 drops twice daily of liquid Ramifemin for 12 weeks. Once again, women reported improved symptoms of menopause. Improvements were noted in somatic findings as well as symptoms of mood and general feeling of well-being.

When compared to a placebo, conjugated estrogens, diazepam, and estriol, the Remifemin liquid was reported to be superior to all other treatments in relieving symptoms of depressive mood and anxiety associated with menopause.

Black cohosh extract once again produced favorable results when compared against an estrogenic drug and placebo. Eighty women were treated for 12 weeks, 30 given Remifemin tablets providing 8 milligrams of extract daily, 30 given conjugated estrogens, 0.625 milligrams daily, and 20 women received placebo. The number of hot flashes declined from an average of 5 to less than 1 episode daily in the black cohosh group compared to the estrogen group that dropped from 5 to 3.4 episodes daily. Improvements in the vaginal lining were also significant. The 8 milligrams of the Remifemin used is equivalent to a dosage of 80 milligrams of black cohosh extract.

When 60 women under the age of 40 who had hysterectomies with one ovary left in place were treated with either estriol, 1 milligram daily, conjugated estrogens, 1.25 mg daily, or Remifemin, 8 milligrams of black cohosh extract daily, no differences were noted in a generalized scale, Kupperman's Menopause Index that measured quantitatively symptoms of menopause.

A double-blind clinical trial in 110 women measured efficacy of black cohosh as compared to placebo in its ability to reduce gonadotropin secretion in menopausal women. The extract not only improved menopausal symptoms but also blood hormone measurement. After eight weeks of treatment, levels of LH were reduced in the treatment group compared to placebo. No effect on FSH levels was seen in either group. While the selective suppression of LH secretion in menopausal women suggested an estrogenic effect, more recent data failed to demonstrate an estrogen-identical mode of activity raising issues as to the exact mode of the mechanism of observed findings.

In a large open study of 629 women, the ability of Remifemin to improve menopausal symptoms was evaluated and compared to preceding therapy with hormones and/or psychoactive medications. Of the 629 women, 204 had been

previously treated with hormones, 35 with psychotropic agents, 11 with both, 367 were on no previous medications. Remifemin reportedly improved menopausal symptoms in over 80 percent of the patients within six to eight weeks, improving both physical and psychological symptoms. Physicians treating seventy-two percent of these women reported happiness with the positive response observed as well as of Black cohosh's safety and tolerability by their patients. Only 7 percent of the women taking Black cohosh reported mild transitory stomach complaints.

When fifty patients who had been on hormonal treatment because of menopausal symptoms were treated with Remifemin, two tablets, twice a day, for 6 months, 28 were reported to require no further hormone treatments; twenty-three women required some hormones though less than previously required to manage their menopausal symptoms. When rated as to therapeutic effect by the womens' gynecologists, twenty-one were reported to have a "very good" result, twenty were reported to have a "good" result, and nine were reported to have a "minor response." No side effects were reported.

While additional well-control studies are required, Black cohosh should be considered an option when facing the symptoms of menopause. It's side-effect profile is excellent and it does not appear to have the increased risk of heart disease and breast cancer that has been reported with estrogen use for menopause. Black cohosh is not recommended to be taken during pregnancy or lactation and is not advised for use in children. It is important to not use the isopropanolic-aqueous extract of black cohosh as studies have failed to show any benefit with this form of the herb. Rather, a preparation that contains triterpene glycosides should be used with the standardized extract derived from dried rhizome and root, 40 milligrams providing a standardized extract of 8 milligrams to be taken daily in divided doses.

Echinacea

Almost every drug store and supermarket carries some product containing Echinacea aimed at helping to prevent or treat symptoms of the common cold. The term Echinacea refers to one of several plants that can be found in the genus Echinacea and made from the above ground components as well as the roots of the Echinacea purpurea plant. This herb was first analyzed and tested for homeopathic purposes in Europe in the 1930's. Native Americans used

Echinacea in the United States and a variety of preparations began to be best sellers in health food stores in the United States starting in the 1990's. Echineacea is reported to comprise approximately 10 percent of the total herb sales in the United States.

As stated previously, Echinacea is used to prevent and/or treat symptoms of the common cold, flu, and upper respiratory infections. It is also used in an attempt to increase one's immune system. Some have also advocated its use as a way to treat vaginal candidiasis.

While scientific data remains conflicting, there is some evidence that it may be useful for the treatment of symptoms of colds and flus but not to prevent these from occurring or in the treatment of upper respiratory bacterial infections.

Unfortunately, different plant parts and formulations have been used in studies to test Echinacea's efficacy making it hard to compare data and study results. When 23 clinical and pharmacological studies using the expressed juice of the above ground parts of Echinacea purpurea and alcoholic extracts of the roots of Echinacea pallida, angustifolia, and purpurea, were evaluated, it appeared that there was at least some clinical benefit described. A review was conducted of 26 controlled clinical studies, 18 of which were randomized and 11 double-blinded; six of the trials used Echinacea alone and 20 in combination with other ingredients. The authors concluded that preparations containing the juice or extracts of Echinacea can be efficacious immunomodulators with improvement in pharyngeal inflammation and nasal congestion. Unfortunately, the studies were not viewed as being sufficiently scientifically sound to make a definitive conclusion or recommendation.

Another review of 9 trials used for treatment and 4 trials for prevention of upper respiratory infections was conducted. The authors reported that 8 of the 9 treatment trials had "generally positive results" while 3 of the prevention trials demonstrated "marginal benefit." The studies were once again not viewed as being sufficiently well designed to make any definitive conclusions.

There have been 7 placebo-controlled, double-blind, randomized clinical trials testing the efficacy of two different Echinacea preparations and three trials that used a combination product to treat non-specific upper respiratory symptoms. A double-blind, placebo-controlled study on 108 subjects who had a history of having frequent upper respiratory infections was conducted. Half received a dose of 8 ml/day of fresh pressed juice of Echinacea purpurea for eight weeks and the other half received placebo. Thirty-six percent of those in the treatment group suffered no infections during the two months of the study

or the time between infections increased, the duration of illness shortened and severity of symptoms lessened. It was not possible to say definitely if this was better than the placebo group.

Another randomized, double-blind, placebo-controlled study utilizing fresh juice preparation evaluated efficacy in 120 patients with initial symptoms of the common cold. The preparation proved to be effective in that fewer patients developed the full symptoms, 40 percent versus 60 percent given a placebo and recovery time was shorter, four as compared to 8 days.

In yet another study done in double-blind, placebo-controlled fashion on 180 subjects, the effectiveness of an ethanol extract made from the root of Echinacea purpurea (1:5, 55% ethanol) was evaluated as to its ability to relieve symptoms and duration of flu-like infections. Subjects were divided to receive either Echinacea at 450 milligram/dose, 900 milligram/dose or given a placebo. Those who received only 450 milligram/dose showed improvement only comparable to placebo. Those who were given the 900 milligram dose, however, had a statistically significant improvement with a significant effect noted after three days with full effect noted at 10 days. A study done in Sweden on 55 patients using tablets that contained a water-alcohol extract of the fresh herb and roots of Echinacea purpurea was conducted in a placebo-controlled, double-blind fashion. Thirteen of those given Echinacea were allowed to also use additional medications to treat their cold symptoms including nasal drops and acetaminophen for fever reduction. It was reported that Echinacea was effective in 68 percent of the patients in reducing several of the 12 symptoms studied (nasal congestion, sore throat, headache/dizziness, muscle pain, fever, cough, among others); 78 percent of these same patients subjectively reported benefit from Echinacea use.

When 289 healthy subjects were given either an alcoholic extract of the root or a placebo, and were told to take 50 drops twice a day from Monday to Friday for 12 weeks, the authors reported a relative risk reduction of between 10 to 20 percent. This reduction, however, was not viewed as being clinically significant and the authors concluded that they were unable to show any difference in the number of individuals who developed cold symptoms.

When investigators attempted to study exercise-induced immunological effects of Echinacea purpurea in 42 male athletes, it was noted that none of the 16 subjects in the group taking Echinacea had an upper respiratory infection during the period of study as compared to 7 of the 26 subjects enrolled in other arms of the study and non-Echinacea users. Athletes using Echinacea also had increased serum and urine concentrations of the cytokins interleukin 6 (IL-6)

and soluble interleukin 2 receptor (sIL-2R), proteins that are thought to stimulate various immune functions. Those taking Echinacea also did not demonstrate the normal reduction in natural killer cell levels that is thought to occur due to an increase in exercise induced cortisol levels. The authors concluded that Echinacea had a preventive effect in athletes using Echinacea that appeared to counteract the immunosuppressant effects of exhaustive exercise as well as reduced their risk of contracting upper respiratory infections.

As mentioned previously, Echinacea has been touted as a way to treat vaginal candidiasis. In a study of 203 women who reported recurrent vaginal yeast infections, women were treated with either a medically accepted antifungal cream alone or in combination with Echinacea taken as an oral leaf extract. While those taking the vaginal cream alone had a 60.5 percent rate of recurrent infection with candida, only 16.7 percent of those women who combined the cream with Echinacea use had similar recurrences.

While generally considered to be safe, it has been advised that persons with tuberculosis, multiple sclerosis, AIDS and autoimmune disease use only after consulting with their physician. In general, an extract prepared from 900 milligrams of Echinacea root per day either as a liquid or tea has been used in the majority of studies showing efficacy. Lower doses as may be found in over the counter cold remedies likely are insufficient to have any effect though have not been shown to have any major side effects.

Ginkgo Biloba

Ginkgo biloba is one of the oldest living tree species and one of the best-selling herbal supplements in the world. A Ginkgo tree can reportedly live over 1,000 years and grow to a height of 120 feet. The tree itself has many short branches, fan shaped leaves, and inedible fruits that not only smell bad but also have an inner seed that is thought to be poisonous.

Chinese herbal medicine has used both the Ginkgo leaf and seeds for many years; currently Ginkgo biloba extract is made from their dried green leaves. This extract is highly concentrated and contains 40 components, only two of which are believed to have medicinal effects, flavonoids and terpenoids.

Although Ginkgo biloba has had a long history of being used to treat memory disorders as well as a way to improve blood circulation, it has also been praised for its antioxidant properties due to the presence of flavonoids and terpenoids. While highly controversial, Ginkgo biloba has been reported to improve cognition in persons with Alzheimer's disease as well as improve their social behavior, ability to conduct activities of daily living, and have fewer feelings of depression. Ginkgo biloba also reportedly can help those with intermittent claudication by improving circulation in the legs.

There have been over 400 studies in the scientific literature evaluating extracts of the leaf of the ginkgo tree. Although many persons advocate the use of Ginkgo biloba, a well-designed study from 2008 on 3,000 elderly persons failed to demonstrate that its use was any better than a placebo in preventing dementia though did not test whether there was an improvement in persons who already had this diagnosis. While studies are limited and mixed in results, several studies have reported an improvement in memory in healthy young and middle-aged persons who took Ginkgo biloba. Despite this, a randomized study comparing Ginkgo biloba with placebo failed to show that 120 milligrams twice daily had any effect on cognitive decline in older adults with normal cognition or with mild cognitive impairment.

A meta-analysis systematically reviewed over 50 clinical studies using Ginkgo Biloba for the treatment of dementia. Only four studies met the author's inclusion criteria for the analysis due to the lack of clear dementia diagnosis in the remaining studies. There were 212 subjects in each of the arms, those treated with Ginkgo and the rest given a placebo. Based on the analysis, it was concluded that administration of 120 to 240 milligrams of Ginkgo biloba extract for three to six months had a small but statistically significant effect on objective measures of cognition in persons with Alzheimer's disease without significant adverse events reported. Another study on 40 patients with Alzheimer's disease, using a randomized, double-blind placebo-controlled format was done. Each subject took 240 milligrams of extract daily. Results demonstrated a significant improvement in memory and attention span in those taking Ginkgo biloba after only one month of use; improvements were noted to continue over the three month duration of the study.

When 202 men and women aged 45 years and older who were diagnosed with mild to moderate dementia were given either Ginkgo biloba extract or placebo for 52 weeks, the 97 subjects given 120 milligrams per day of Ginkgo biloba were noted to have either improvement in standardized assessment

scales or a delay in the progression of the disease. These results were reported to be statistically different from those of persons given a placebo.

One hypothesis as to Ginkgo biloba's mode of action against dementia is that Ginkgo biloba contains flavonoids that may enhance the release of catecholamines and other neurotransmitters. It is also thought capable of inhibiting biogenic amine uptake as well as protecting catechol-o-methyltransferase and monoamine oxidase. Ginkgo biloba is also thought to protect the endothelial-derived relaxing factor mechanism in the brain and thus increase central blood circulation.

There are other potential uses for Ginkgo biloba if one believes the literature. Unfortunately once again, studies are limited and often not well controlled. One study of limited scientific quality in the literature reported improved symptoms of Attention Deficit Hyperactivity Disorder (ADHD) in children who took supplements containing 240 milligrams of Ginkgo biloba daily.

A meta-analysis from 8 studies reported that persons with intermittent claudication taking Ginkgo biloba walked 34 meters farther without symptoms of leg pain than those taking a placebo. Physical therapy and walking exercises, however, were demonstrated to provide an even better improvement than the Ginkgo biloba did without any risk of side-effects. Another meta-analysis that evaluated studies that used Ginkgo biloba extract to treat peripheral arterial disease evaluated the results of five placebo-controlled trials. Treatment was quantified by the increase of walking distance as measured using a standard treadmill exercise. The analysis demonstrated a highly significant therapeutic effect in the study group as compared to those receiving placebo treatment only. A daily dose of 120 milligrams for six months of Ginkgo biloba was reported to have a beneficial effect in the treatment of intermittent claudication in the 79 patients studied.

While often added to nutrition bars, soft drinks and fruit smoothies, the amount of Ginkgo biloba found in these products is usually too small to expect to have any effect.

Ginkgo biloba extract contains 24 to 32 percent flavonoids and 6 to12 percent terpenoids and can be taken as a capsule, tablet, liquid extract, or as a dried leaf used as a tea.

Ginkgo biloba is not advised to be given to children. Most studies have used 120 to 240 milligrams daily in divided doses. It is generally considered that it will take 4 to 6 weeks to see any effect, if one is to occur, and it is best to speak to one's physician prior to starting a treatment regimen. Interaction

with other herbs and medications is possible and side effects may include stomach upset, headaches, skin reactions, and dizziness. More serious, however, are the reported cases of bleeding including possible intracranial hemorrhage that has greatly limited its use in recent years. It is advised that Ginkgo biloba be stopped 2 weeks prior to scheduled surgery or dental procedures due to its risk of increased bleeding and that the physician or dentist be notified of its use.

Additionally, Ginkgo biloba may increase the risk of potentially life-threatening bleeding in persons using clopidogrel, warfarin, nonsteroidal anti-inflammatory medications and aspirin. Ginkgo biloba has also been associated with an increased risk of seizures, particularly in persons with a prior seizure disorder and may interfere with the effectiveness of anti-seizure medications. Ginkgo biloba may also increase the risk of serotonin syndrome in persons using selective serotonin reuptake inhibitors (SSRI's) as well as interact with MAOI's. Ginkgo may lower blood pressure as well as interact with nifedipine. Other reported drug interactions include trazodone, thiazide diuretics, cyclosporine, and oral hypoglycemic agents. Pregnant and breast feeding women are advised to not use Ginkgo biloba.

In summary, there is a wealth of data based on clinical trials to support the use of Ginkgo biloba for a variety of cognitive and peripheral vascular conditions. While not all studies have confirmed benefit, one must carefully weigh the evidence in favor and the risks involved in its use.

Guar Gum

Also known as Cyamopsis tetragonoloba, Guar gum is an annual herb which grows up to 60 centimeters in height. The plant is native to the Indian subcontinent and is thought to have originated in India, Australia, South Africa and part of the southern United States.

While the whole plan is thought to have medicinal properties, Guar gum is the powder extracted by milling from the endosperm. A dry or wet milling process separates the endosperm from the seed shell and water soluble polysaccharides comprise 85 percent while protein comprise up to 5 percent of its content.

Guar gum has been shown to lower postprandial serum glucose values by delaying the resorption of glucose from the stomach as it passes into the

duodenum. Studies have also reported an improvement in HgbA1c levels, an evening of blood glucose throughout the day, and even a lipid lowering effect.

While no health hazards have been reported using therapeutic doses, possible side effects may include a feeling of fullness, indigestion, nausea and even diarrhea. Rare cases of hypoglycemia and interference with the absorption of vitamins, minerals and other medications including contraceptives have been reported as well. Caution is advised to insure sufficient intake of fluids as the Guar gum can form a bolus in the intestine leading to constipation or even obstruction without sufficient fluid intake.

Guar gum should be kept in a tightly sealed vessel. It is available in a powdered form as well as in granules and tablets and is recommended to be taken as 5 grams, three times daily.

Juniper

Although well-controlled clinical trials on the therapeutic effects of various Juniper preparations are not available, Juniper (Juniperus communis) has been used for centuries as a way of treating a variety of ailments, most notably for its anti-inflammatory, diuretic and dyspeptic effects. Experimentally, it has been shown to inhibit cyclooxygenase and thus is thought to have anti-inflammatory effects and has been advocated by some as a treatment for arthritis. Animal studies have suggested that Juniper may also be useful to treat hypertension. While some advocate Juniper tar as a useful way to treat seborrhea, eczema and even psoriasis, clinical trials are lacking to definitely prove efficacy against these conditions. It is an active ingredient in certain OTC preparations used for its antipruritic effects. Despite this, caution is advised against using Juniper tar as it has been shown to have potential carcinogenic effects in both humans and animals and may also cause severe irritation to the eyes.

Juniper berry oil has been shown in rats to reduce hepatic reperfusion injury and reduced cell death by 75 percent improved microcirculation and reduced release of prostaglandin E2, a strong inflammatory agent.

An extract of Juniper berries was reported to alter glucose metabolism in normoglycemic rats when given at a dose of 250 milligrams/kg by increasing peripheral glucose consumption and potentiating glucose-induced insulin secretion. When an extract of 125 milligrams of berries per kg was given to

rats that were experimentally made diabetic for a period of 24 days, there was reported to be a significant decline in the levels of blood glucose.

When Juniper oil was mixed with wintergreen oil in a therapeutic bath, a double-blind, placebo controlled trial demonstrated a significant increase in peripheral circulation and reduced pain from experimentally induced pressure. It is unclear how much of the effect was from the Juniper oil as compared to wintergreen oil as both were used in the treatment arm of the study.

When a crude extract of Chinese Juniper was given to mice who were induced to have skin cancers, it was noted that the number of tumor bearing mice was less in the Juniper treated group and at 20 weeks, a 51 percent reduction in the number of skin tumors per mouse was observed as compared to the untreated animals. No data is available in other cancers or in humans.

While homeopathic providers recommend Juniper for various urinary tract and dyspeptic complaints, prolonged use or overdose may result in renal damage based on animal data. It appears that 4-Terpineol is the therapeutic aquaretic component and has not been associated with adverse renal effects as compared to the alpha and beta-pinene content (monoterpenes) in Juniper berry oils that has been reported to be toxic to the kidneys. Commercially available Juniper oil preparations vary in the ratio of nonoterpenes that are renal toxic to therapeutic 4-terpineol by 4:1 to 55:1. The concentration of toxic monoterpenes increase when unripe green berries, needles, and wood are added to the ripe, blue berries before distillation. Two toxicologic studies in rats demonstrated no renal toxicity associated with pharmaceutical grade Juniper Oil when used in ratios of 1:3 and 1:5 at doses of 1000 milligrams/kg, respectively. No similar studies have been done in humans.

External use may result in erythema, burning, blistering and edema. Internal injury including albuminuria, hematuria, tachycardia, hypertension, and even convulsions have been described with the use of higher doses. Juniper in any form is not advised during pregnancy.

Whole, crushed, or powdered forms of Juniper have been made. An essential oil is used for oral application in liquid and solid medicinal forms. Juniper berries may also be found as bath salts. For now, while some may advocate their use for a variety of reasons, caution is advised given the uncertainty of what is contained in a given preparation and toxicities that have been demonstrated with certain forms of Juniper at least based on animal data.

Pueraria Mirifica (PM)

Pueraria Mirifica is an herb that originated in Southeast Asia and has been used for many years to help alleviate menopausal symptoms without the risks of estrogen replacement therapy. This herb contains 17 different phytoestrogens. There is insufficient scientific literature to conclude whether Pueraria Mirifica can improve menopausal symptoms and about its safely. For now, this herb shows promise but additional well controlled studies will need to be done prior to being able to make a definitive conclusion as to its efficacy and risks, if any, involved with its use.

Saw Palmetto

Saw palmetto is an extract of the fruit Serenoa repens and is found in Southeastern North America, primarily in Florida. The Seminole Indians used the berries of this plant for food as well as an expectorant and antiseptic. It is also reported that these Indians also used the fruit as a diuretic agent and as a "sexual tonic"

Health care professionals in the early twentieth century advocated for the use of Saw palmetto for various conditions of the uro-genital tract in men and reproductive organs of both men and woman. Folklore stated that it was able to enlarge atrophied breasts, ovaries and testicles while at the same time minimize hypertrophy of the prostate.

In the early twentieth century, Saw palmetto was considered to be an accepted drug and was included in two editions of the United States Parmacopoeia. The recommended dosage was listed broadly from 1 to 60 drops depending on the diagnosis for which it was being used. Many clinical trials have established the safety and efficacy of Saw palmetto in treating symptoms of benign prostatic hypertrophy (BPH). It has also been suggested that there may be a reduction in prostate enlargement in this disorder. To date there is no evidence that Saw palmetto prevents prostate cancer.

Saw palmetto is thought to exert its effect on BPH through anti-androgenic, anti-estrogenic and estrogenic properties. The lipophilic extract of Saw palmetto has been shown to inhibit binding of dihydrotestosterone to the cytosolic androgenic receptor and alpha 1-adrenoceptor in the prostate and therefore prevent accumulation of the steroid that may lead to gland

enlargement. Anti-androgenic effects result from inhibition of 5-alpha-reductase and 3-ketosteroid reductase. These enzymes are responsible for the conversion of testosterone to Dihydrotestosterone (DHT) and for conversion of DHT to an androgen compound. Its anti-estrogenic action is thought to inhibit prostate growth. An anti-inflammatory effect has also been demonstrated by way of the cyclooxygenase and 5-lipoxygenase pathways.

While most studies that have evaluated Saw palmetto's efficacy in treating BPH symptoms have been of short duration, three months or less, a study of 110 men with BPH who took Saw palmetto for 28 days at a dose of 320 milligrams daily demonstrated effectiveness in diminishing painful urination, nocturnal urination and retained urine in the bladder. Urine flow rate was also notably increased.

Another study compared the results of treating BPH with the alpha-blocker Tamsulosin with Saw palmetto extract over a 12 month period of time. Seven hundred and four men with a mean age of 65.5 were enrolled and randomly assigned to oral therapy with 320 milligrams of Saw palmetto daily or 0.4 mg of Tamsulosin daily. There were clinical improvements observed in both groups without significant differences noted between these two treatments.

While not all studies have demonstrated a beneficial effect with Saw palmetto use, side effects appear to be minimal. Stomach upset has been reported to occur on occasion and patients with hormone-dependent cancers are advised to seek medical advice prior to using Saw palmetto because of its possible hormonal effects. Increased bleeding with warfarin use is also a concern and will require discussion with one's physician and closer monitoring of INR.

St. John's Wort

St. John's Wort is derived from the herb Hypericuym perforatum. This plant is indigenous to all of Europe, western Asia and northern Africa. It is now present in Australia and New Zealand and is cultivated in Poland and Siberia. St. John's Wort consists of the dried above ground part of the plant that are gathered during the flowering season. The herb is cut at the start of the season and dried quickly in bunches in order to preserve the oil and secreted content.

St. John's Wort extracts have been used to treat depression with multiple studies showing efficacy when compared to placebo in persons with mild to moderate depression. A similar antidepressant effect was reported when St. John's wort was compared to amitriptyline, imipramine, maprotiline, and fluoxetine. Serotonin reuptake inhibition and monoamine oxidase inhibition have been reported. Studies have suggested that it also reduces corticotropin releasing hormone secretion through suppression of interleukin-6 release.

In addition to its effect on depression, St. John's Wort has been reported to have anti-inflammatory activity thought due to its ability to inhibit release of arachidonic acid from membrane phospholipids, inhibition of nuclear factor-kappa B and protein kinase C. It has been described to have positive inotropic effects at low concentrations and negative inotropic effects at high concentrations.

The anxiolytic effect described with the use of St. John's Wort is thought to be due to its ability to activate benzodiazepine receptors. While not completely understood, St. John's Wort likely exerts an antidepressant effect due to its ability to modulate serotonin, norepinephrine, dopamine, L-glutamate, and GABA as based on in vitro and animal studies. When used orally in a dose of 600 milligrams, St. John's Wort stimulated cortisol secretion in 30 to 90 minutes; there was no increase in cortisol following oral intake of 300 milligrams.

Large well-controlled studies on the efficacy of St. John's Wort for treating depression or anxiety are few with case reports constituting most of the evidence for its beneficial effects. Three cases have been reported of patients with anxiety having complete relief of symptoms with St John's Wort at doses of 900 milligrams twice daily. It was noted that these individuals reported better sleep, improved ability to relax and a better ability to cope with daily stress.

St. John's Wort was demonstrated to be significantly more effective than placebo when 17 separate trials were analyzed using pooled data. The beneficial effect was reportedly as effective as tricyclic antidepressants and benzodiazepines in treating mild to moderate depression with fewer adverse reactions when data from 8 trials were pooled for analysis in studies representing 1,132 enrolled subjects. Doses were used between 350 and 1800 milligrams daily. While this showed promise, data has been criticized as due to the large heterogeneity of the study populations, varied doses of St Johns's Wort being used, short study time, and the relatively low doses of comparison antidepressants.

St. John's Wort was reported to be more effective than placebo and similarly effective as tricyclic antidepressants in moderate depression. Two trials conducted in Germany compared St. John's Wort to placebo and 4 trials compared St. John's Wort to amitriptyline, maprotiline and imipramine. St. John's Wort was used at a dose of 300 mg, three times daily. All studies were blinded and compared to placebo or standard antidepressant use. When compared with placebo, St. John's Wort demonstrated a significantly higher response rate and had lower dropout rate as compared to placebo. St John's Wort demonstrated a similar response rate when compared to tricyclic antidepressants and a lower dropout rate due to side effects or inadequate efficacy.

St. John's Wort significantly reduced symptoms of depression in a randomized double-blinded, placebo-controlled trial of 375 patients with mild-to-moderate depression once again when used in a 300 mg, three times daily regimen. Several other trials have reported similar beneficial effects when used at this dose.

When patients were treated for a more significant depression with St John's Wort (major depression), the response was no better than placebo in one study of 200 patients though had a similar effect to sertraline in another randomized, double-blinded placebo-controlled multicenter trial on 340 patients. Sertraline was used at a maximum dose of 150 mg and St. John's Wort 1,800 milligrams daily.

Side effects may include digestive complaints, constipation, photosensitization, edema, restlessness, fatigue, frequent urination, and headache. There have been a few cases of hypertensive crisis and it should not be used with MAO inhibitors and it is advised to not use tyramine containing foods while taking St John's Wort. Cases of mania, hypomania, anxiety and even schizophrenia relapse have been reported with St. John's Wort use. St. John's Work is contraindicated during pregnancy.

A number of drug interactions also have been reported and it is best to use St. John's Wort only after consultation with one's physician. For example, concurrent use of St. John's Wort and anticoagulants may result in reduced effectiveness of anticoagulants and hypoglycemia has been reported with concurrent use with anti-diabetic medications.

Turmeric

Turmeric has been used for over 4,000 years to treat a myriad of medical conditions. Studies have reportedly shown benefits in fighting infections, cancers, inflammation as well as digestive disorders. Whether the problem is heartburn, stomach pain, Crohn's Disease, Ulcerative Colitis, diarrhea, irritable bowel, or a disorder of the gall bladder, there is some case report or testimonial preaching Turmeric's benefit. Unfortunately, little scientific evidence exists to support these claims. Ayurvedic and Chinese medicine also make use of Turmeric as an anti-inflammatory agent to treat not only digestive disorders but also diseases of the skin as well as help to heal wounds. Of note, turmeric can be made into a paste and applied topically for wound care.

Turmeric is commonly used in Asian cooking and gives Indian curry its flavor as well as its yellow hue. It is most often used in its dried power form but may also be used fresh. In India, Turmeric leaves are often used to wrap food in while cooking to lend a distinctive flavor.

Tumeric is a perennial rhizomatous shrub native to southern Asia and is extensively cultivated in India, southern China, Taiwan, Japan, Burma, Indonesia, and throughout Africa. It is a member of the ginger family and the Chinese name, jianghuang, means "yellow ginger."

Curcumin, isolated from turmeric, has been shown to have anti-thrombotic effects. When prepared as an ether extract, it was shown capable of inhibiting arachidonate-induced platelet aggregation in human blood platelets. Tumeric has also been shown to have antioxidant effects and in animals a possible anti-carcinogenic action. Theories as to how Tumeric works include its effect on leukotriene inhibition and interaction with arachidonate metabolism. Both Tumeric and its product curcumin have been shown capable of protecting DNA breakage caused by singlet oxygen, even greater than the effects noted with vitamins E and A. An aqueous extract of turmeric was reported to protect human lymphocyte DNA from damage induced by smoke condensate.

Although many studies have been conducted in test tubes and in animals, even if they are scientifically sound, it is important to remember that Turmeric may not have similar effects in humans. Curcumin, thought to be one of the active ingredients in Turmeric, has been studied in an injectable form but with conflicting data.

A multicenter, randomized, double-blind study was conducted to evaluate the efficacy of turmeric to treat dyspepsia. The study was conducted in

Thailand and included 116 patients all diagnosed with acid dyspepsia. Two capsules of either turmeric or placebo, four times a day for seven days were administered. The authors reported that whereas 87 percent of the patients receiving the capsules with Tumeric reported improvement in their symptoms, only 53 percent of the patients receiving placebo responded favorably. These differences in response were statistically significant.

When 16 chronic cigarette smokers were given 1.5 grams of turmeric per day for 30 days, they were reported to excrete significantly fewer "mutagens." While this may sound promising, the study was limited in terms of the number of subjects and clinical significance of their findings. While recommended doses are quite variable, 1.5-3.0 grams per day of cut root or equivalent is suggested. This may be in the form of 1-3 grams of powder or as an infusion made by placing 1.3 grams of root in 150 milliliters of boiled water for 10 to 15 minutes, taken twice daily. Tumeric is also commercially available in pill form and standardized to contain not less than 7.0 percent (ml/g) volatile oil composed mainly of sesquiterpenes, minor amounts of monoterpenes and 3-5 percent curcuminoids.

For now, use of Turmeric appears to have no negative consequences and may offer some benefit in terms of quality of life for those suffering from GI disturbances. Additional studies, particularly focusing on the possible anti-inflammatory effects of Turmeric and any effect it may have on reducing cancer, are needed prior to making any additional definitive conclusions as to its benefit in promoting successful aging.

Chapter 10

Nutritional Supplements for Special Goals in Mind

Although many of the following nutritional supplements need to have more research done prior to making any definitive conclusions as to their benefits, each contains nutrients that have been linked to health in either human, animal or cell research models and may prove beneficial if incorporated into a well-balanced and carefully chosen diet.

Nutritional Supplements That May Have Beneficial Effects on Our Cognition

Gingko biloba, Alpha Lipoic Acid, Coenzyme Q10, DHA (an Omega-3 fatty acid), Hemp, Carnosine, Ginseng, Acetyl-L-Carnitine, Phosphatidyl serine, vitamin C, vitamin B12, vitamin D, folic acid, green tea, red apples, nectarines and grapes, thiamine.

Nutritional Supplements That May Have Beneficial Effects on Our Vision

Spinach, broccoli, chard, collards, kale, carrots, peaches, pumpkins, persimmons, vitamin A, corn, cold water fish, Omega-3 fatty acids, Lutein

Nutritional Supplements That May Have Beneficial Effects on Our Cardiovascular Health

Garlic, acai berries, onions, dark chocolate, oats, red wine, cold water fish, green tea, blueberries, raspberries, blackberries, pomegranate, hemp, acai berries, flax seeds, cranberries, lycopene, resveratrol, ginseng, carnosine, copper, chia seeds, almonds, walnuts

Nutritional Supplements That May Have Beneficial Effects to Help Prevent Cancer

Garlic, acai berries, carrots, broccoli, pumpkin, cabbage, vitamin A, vitamin E, folate, selenium, flax seeds, fiber, tumeric, red wine, blueberries, raspberries, blackberries, cranberries, lycopene, selenium

Chapter 11

Nutritional Supplements: Role in Promoting Successful Aging and Longevity

A Journey of a Thousand Miles Begins with the First Step-Confucius

Every day each of us has choices to make. Things we do or fail to do can have major effects on just how successful our aging process will be. While some effects may be noted short term, other effects may not be seen until later in life. In certain circumstances, there will never be proof of a beneficial effect from something we did or failed to do; preventing an illness or aging change. is not as easy to keep track of as dealing with a problem after it has already developed. Its impact is nevertheless just as important. While each of us has a predetermined genetic road map that will affect every cell, tissue, and organ in the body as we age, we have the ability even today to prevent an acceleration of this otherwise "normal" process. If one smokes, for example, one's lungs will be physiologically equivalent at age 50 to what it would have been at age 80. Failure to take an adequate amount of calcium in the diet will accelerate the loss of calcium from our bones and result in reduced bone mineral density. This will increase the chances of developing osteoporosis with its increased risk of bone fractures, a disease that is not inevitable in anyone.

What we eat or fail to eat is under our control. Hopefully this monograph has outlined a number of nutritional supplements that if included in an otherwise well balanced diet will not only add quality of life to one's

remaining years but perhaps also add years to one's life. The earlier one adopts healthy eating habits, strives to maintain a healthy weight, and incorporates a regular exercise program into one's daily life, the greater the potential benefit will be. Most of the nutritional items listed in this monograph can be obtained by carefully choosing what one eats each day and do not require any special purchase from a health food store or from an on-line nutritional supplement company. In certain cases, however, products may only be obtained in this way; caution is advised to make sure the product one purchases is free from impurities and is of the desired concentration.

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