Hemp Seed Products

Hemp Seed Protein

Hemp seeds are second only to soybean in protein content. Proteins serve a variety of functions in the human body such as acting as enzymes, antibodies, and the structural components of tissues, hormones and blood protein. The main function of dietary protein is to supply amino acids for the growth and maintenance of body tissue. Digestion disassembles proteins into their basic building blocks - the amino acids.

Hemp protein contains all 20 known amino acids including the 9 essential amino acids (EAAs) our bodies cannot produce. Proteins are considered complete when they contain all 9 essential amino acids in a sufficient quantity and ratio to meet the body's needs. Hemp seeds contain an adequate supply of these high quality proteins (EAAs) for a well balanced diet.

Hemp protein is free of the tryspin inhibitors which block protein absorption and free of oligosaccharides found in soy, which cause stomach upset and gas. Approximately 65% of the protein in hemp seeds is made up of the globulin protein Edestin and is found only in hemp seed. Edestin aids digestion, is relatively phosphorus-free and considered the backbone of the cell's DNA. The other one third of hemp seed protein is Albumin, another high quality globulin protein similar to that found in egg whites.

Hemp Seed Oil

The oil contained in the hemp seed is 75-80% polyunsaturated fatty acids (the good fats) and only 9-11% of the lesser desired saturated fatty acids. Hemp seed oil is reputed to be the most unsaturated oil derived from the plant kingdom. The essential fatty acids (EFAs) contained in hemp seed oil are required in our diet more than any other vitamin, yet our bodies do not naturally produce them. They must be obtained from external sources in the food we eat. EFAs are involved with producing life's energy throughout the human body and without them, life is not possible. In general, North Americans have a high dietary deficiency in EFAs due to our high intake of animal fats versus plant fats, caused by our high consumption of processed foods and meats versus natural organic foods. Hemp seed oil has been dubbed "Nature's most perfectly balanced oil", due to the fact that it contains the perfectly balanced 3:1 ratio of Omega 6 (linoleic/ LA) to Omega 3 (alpha-linolenic/ LNA) essential fatty acids, determined to be the optimum requirement

for long-term healthy human nutrition. In addition, it also contains smaller amounts of 3 other polyunsaturated fatty acids in Gamma-linolenic acid (GLA), oleic acid and stearidonic acid. This EFA combination is unique among edible oil seeds. Extensive studies have demonstrated that many common illnesses are related to deficiencies or imbalances of specific fatty acids in the body. Symptoms are often related to a lack of Omega 3 and Omega 6 fatty acids and their derivatives, the postaglandins. Most people eating a healthful diet, one that includes a balanced ratio of essential fatty acids, also have healthy skin and a strong immune system. Yet some individuals may experience shortages in specific fatty acids or their metabolites due to dysfunctional enzyme systems or other inhibitions in their metabolic pathways caused by genetic, immune-system-related, or even environmental factors. It has been proven in several clinical studies that dietary supplementation with EFAs or their metabolites (such as GLA) will often prevent or even cure these illnesses. Since hemp seed oil contains both EFAs in a desirable balance while also providing two of the EFA metabolites, it is a good resource for the prevention and treatment of certain illnesses. Hemp seed oil also provides an adequate supply of antioxidants (Vitamin E), carotene (precursor to Vitamin A), phytosterols, phospholipids and a number of minerals including calcium, magnesium, sulfur, potassium, phosphorus, along with modest amounts of iron and zinc. Hemp seed oil also provides a good source of chlorophyll. The daily recommended allowance of hemp seed oil is 14-28 ml (1 to 2 tablespoons). This allowance provides between 8 and 16 grams of Omega 6 (LA) and between 3 and 6 grams of Omega 3 (LNA). And lastly, unlike other Omega-rich alternatives (flax, evening primrose, borage or fish oils) that are sold mainly as a vitamin supplement, hemp seed, hemp oil and hulled hemp seed all have a flavorful "nutty" taste that will create consumer demand and can easily be added into most any recipe to obtain a balanced diet!

Caution: Highly unsaturated vegetable oils such as Hemp Seed Oil are denatured by heating above 150ºC (300ºF), which can result in the production of unhealthy trans-fatty acids and increased peroxide values. Use Hemp Seed Oil as a flavor-enhancer in many recipes. Do not use as a substitute for frying oils. Keep bottles tightly sealed after opening and store in the refrigerator or freezer.

Hemp Carbohydrates

In addition to the high quality protein and oil found in hemp seeds, 34% of this nutritional package deal is rounded out with carbohydrates made up of dietary fiber and a small amount of sugar. This dietary fiber is made up of 3% soluble fiber and 27% insoluble fiber.

Benefits of consuming Hemp Seed & Oil

- Excellent source of essential fatty acids including Omega 3, 6 and GLA

- Lower blood LDL cholesterol levels

- Lower blood pressure

- Improve cardiovascular circulation & function

- Improve organ function

- Improve immunity levels

- Increased energy levels & metabolic rate

- Reduce symptoms of PMS & menstrual cramps

- Reduce inflammation and the symptoms of arthritis

- Improve recovery of muscles after exercise

- Reduce & treat dry skin and hair conditions

- Reduction of many degenerative diseases through preventative measures

Hemp products are GMO-Free, Gluten-free, Herbicide & Pesticide free, peanut free, Vegetarian approved, Kosher certified, No THC and Tryspin inhibitor.

Hemp products have a wonderful nutty flavor that can easily be incorporated into your diet while providing a powerful daily supplement.

Hemp Food Nutritional Comparison

Hemp seed oil has been dubbed, "Nature's most perfectly balanced oil" due to the fact that it contains the perfectly balanced 3:1 ratio of both the required essential fatty acids (EFAs) for long term human consumption. Omega 6 -Linoleic Acid (LA) : Omega 3 - Linolenic Acid (LNA). Hemp oil is also an excellent source of the LA derivative super-polyunsaturated Gamma Linolenic Acid (GLA) at 2.5-3% of volume. Based on EFA composition noted in research crop reports conducted in Manitoba and other provinces of Canada during the last three years.

Only Hemp seed oil contains Omega 6, Omega 3 and GLA Only Hemp seed oil contains 75-80% polyunsaturated fatty acids - highest in the plant kingdom and unique among seed oils.

Biochemist Dr. R. Lee Hamilton said, "The EFAs are responsible for our immune system." She, along with fellow UCLA researcher William Eidleman, conducted promising research using the EFAs in the treatment of AIDS immune deficiency. In an open letter concerning the valuable hemp seed, released by the two researchers (Dec. 29, 1991), they announced that the possibility that feeding the world "is at our fingertips" and went on to state, "what is the richest source of essential oils? Yes, you guessed it, the seeds from the cannabis hemp plant. What better proof of the life giving values of the now illegal seed. What the world needs now is intelligent re-legalization of cannabis hemp, especially for medical intervention."

Studies done by seven time Nobel Prize nominee, Dr. Johana Budwig have shown unparalleled results in the use of EFAs in the treatment of terminal cancer patients. In her book, *Flax Oil as a True Aid Against, Arthritis Heart Infraction, Cancer, and Other Diseases*, Dr. Budwig indicates that a balanced diet of essential fatty acids would keep our cells biologically electron rich. Saturated fats and trans-fats , which make up the vast majority of the food oils we now use alter the electronic charge of the unsaturated oils in cell membranes, decreasing the cells ability to store and receive electrons from the sun. Budwig goes on to quote quantum physicist Dessauer: "If it were possible to increase the concentration of solar electrons tenfold in this biological electron rich molecule, man would live to be 10,000 years old."

And the tree of eternal life is as it appeared by God's will, to the North of Paradise, so that it might make eternal the souls of the pure, who shall come forth from the modeled forms of poverty at the consummation of the age. — "On the Origins of the World," *The Nag Hamadi Library Gnostic Scriptures*

Marriage of the Sun and Moon

Dr. Budwigis one of the most lucid and penetrating sages of our time. She is a Master of Science and reveals to us the mysterious marriage of the sun and moon in terms of modern science: the transcendent sun-god, Photon, and the moon-goddess, Electron :

Light is the fastest traveler from star to star. There is nothing that travels faster than light. Light speeds along with time. It is eternal. Physicists emphasize that the photon, the quantum, the smallest component of the sun's ray's is eternal. The

photon is always in motion. Nothing can ever halt its motion. The photon is full of color, and can change its color, its frequency, when present in large numbers. The photon— acknowledged to be the purest form of energy, the purest wave, always in motion — can unite with a second photon when it is in resonance with the other, to form a "short-lived particle." This particle, known as a $\pi 0$ particle, can break up into two photon s again, without mass, as a pure wave in motion. This is the basis for the wonderful back and forth movement between light and matter. This photon can never be pinned down to one location. Herein lies the foundation for the Theory of Relativity.

This very active, very dynamic very energetic photon can be captured by electrons that are in resonance with the photon. What does that mean? Electrons are already a component of matter. They are also continuously in motion. They constantly oscillate on their own wavelength. They have their own frequency, just like a radio receiver that is set to a specific wavelength.

The electron loves photons. It attracts photons by its magnetic field. When an electrical charge moves, it always produces a magnetic field. The moving photon also has a magnetic field. Both fields, the magnetic field of the electrons and the magnetic field of the photons attract each other when the wavelengths are in tune. The wave length of the photon — which the photon can change — must fit into the wavelength of the orbiting electron so that the orbit maintains a complete wavelength. This feature is extremely interesting in terms of its physical manifestation, its biological and even its philosophical consequences. All matter has its own inherent vibration. Of course, this also applies to living substances. The energy which is being absorbed must correspond to the inherent wavelength.

The sun's rays are very much in harmony with humans. It is no coincidence that we love the sun. The resonance in our biological tissue is so strongly tuned to the absorption of solar energy that physicists who occupy themselves with this scientific phenomena, the quantum biologists, say that there is nothing on earth that has a higher concentration of solar energy photons than humans. This enrichment with solar energy depends strongly on the "like energy" aspects, a wavelength that is compatible with humans, and this is supported when we eat foods that have electrons with electromagnetic fields that attract the electromagnetic waves of solar rays — the photon An abundance of these electrons, which are tuned to the solar energy frequency, exist, for example, in many seed-oils. Scientifically these oils have even been designated as electron-rich, "essential," highly unsaturated fats. But when we began processing fats to prevent them from spoiling,

nobody thought about the significance that this would have for the survival and the further development of the human species. We destroyed their extremely important wealth of electrons, which are very mobile and react so wonderfully to sunlight.

When the sunshine beams down on the leafy canopy of a tree and is absorbed through photosynthesis, a flow of electrons is produced. A magnetic field is also produced between these trees as they conduct electrons and water. If we, who have an abundance of electrons and possess living tissue that is capable of conducting a current, move through this electromagnetic field of the woods, our tissues also become charged with solar-compatible electrons. As our blood flows through the body, it induces an electrical charge on the lipids, the unsaturated fats, on the membranes of the red corpuscles as it passes through the magnetic fields. In this way, many inductions and reverse inductions occur. With every heartbeat, a dose of lymph containing the body's own electron-rich, highly unsaturated fats is injected into the bloodstream, and thus into the heart, from the lymphatic system. This stimulates and strengthens the electromotive power of the heart. The emitting of electromagnetic waves is associated with the very flow of the bloodstream, in accord with the fundamental, natural law governing electromagnetic waves.

This transmitter in humans is always in operation. The cylindrical structure of our nerves with the different layers and ganglions, with the difference in electrical potential between the neurons and dendrites, immediately supplies the picture of how strongly an electric current in a magnetic field leads to the emitting of electromagnetic waves. When I think a positive thought about another person, this involves the emitting of electromagnetic waves. The reception also depends on the wavelength to which the receiver is tuned. There are amplifiers, as well as transmitters that interfere. This encompasses a whole host of situations that are known under different names such as telepathy, hypnosis, mental telepathy, and many others. Among Nordic peoples, it is known that the isolated native inhabitants use a tree to amplify thought transmission, for example, to inform the husband who had gone to town, that he should bring back some salt. Bismark described how, during periods of trouble or pressure, he found relaxation by putting his arms around a tree and leaning his forehead against the trunk. In both cases, it involves electromagnetic waves that behave in accord with Maxwellian mathematical equations. —Dr. Johanna Budwig, *The "Fat Syndrome" and the Photons of Solar Energy*

The scene Dr. Budwig paints harkens back to the sacred groves planted by the ancients as a place where one could commune with Nature and the gods. Groves planted not to yield food for the body but to nourish the soul. All the peoples of the Near East and the Mediterranean worshipped privately or in small groups in sacred groves that had been laid out and planted according to divine inspiration.

They took solitary morning walks to places which happened to be appropriately quiet, to the temples or groves... They thought it inadvisable to converse with any one until they had gained inner serenity, focusing their reasoning powers. They considered it turbulent to mingle in a crowd as soon as they rose from bed, and that is the reason why these Pythagoreans always selected the most sacred spots to walk. —*The Pythagorean Sourcebook and Library*, Kenneth Sylvan Guthrie, translator and compiler.

In the sacred groves they gathered around the master or his interpreters and the lesson was conducted in the cool shade of the tall trees. — Edouard Schure, *The Ancient Mysteries of Delphi, Pythagoras*

The Hebrews and Christians were the only ones to ever destroy the sacred groves of their neighbors. Now, the global economy polluted with Judeo-Christian anti-humanist notions has nearly cut down the Sacred Groves planted by Mother Nature — the old growth forests of the world. Dr. Budwig explains scientifically and lucidly the chilling details of how we have generated the diseased backward-looking anti-human of the twentieth century:

It is interesting that in the science of physics the concept of "anti-human" has already been coined. It is man, with the highest accumulation of photons, always striving toward the future, who possesses within himself the highest potency of solar energy on the earth. The mirror image of this human being — electron-poor, photon-poor, and directed into the past — expresses, physically speaking, the image of the "anti-human."

Anti-human" and "radiation damage" are new concepts that follow from modern physics. The physicists project from mathematical equations that man, with his wealth of electrons, is directed forwards in time. As we heard before, the photon speeds with time; it has, so to speak, eternal life. Mathematical equations representing comprehensive interrelationships in physics can be altered, while still remaining mathematically correct, so that time is directed backwards, instead of forwards. One only has to give the "time quotient" of the equation a negative sign. Remember that this is possible while retaining the integrity of the mathematical laws. It follows that for many physical "particles," there exists a corresponding "anti-particle."

Using mathematical equations that are valid in physics, reversing the time quotient represents the mirror image of man — the "anti-human," whereas man represents the picture of highest rank in terms of physics, i.e. directed against entropy, the "anti-human," according to the equation of physics, is electron-poor. The "anti-human" is directed back in time. The "anti-human" possesses few solar energy photons, a low rank, in physical terms.

The physical processes which are generated through the use of X-rays, gamma rays, atom bombs, or cobalt radiation, are pointed in the same direction as the development toward the "anti-human," from the perspective of physics and mathematics. The electron structure of the life functions is destroyed by these rays. According to the so-called "World Line" and the Theory of Relativity of modern physics, time and space are connected together in one equation. The "anti-human is directed into the past. The inner structure of man with its interchange between solar energy photons and the treasure house of electrons, with its concentration of photons in life processes, with the dynamic of life functions based on solar energy, is directed into the future. This forward-directed human being can develop dynamic energy. The "anti-human," electron-poor, directed into the past — also in his thinking — is paralyzed in his life functions, lacks energy and strength because he is missing the electrons that are in harmony with the sun as "life-element."

It is very interesting to investigate our food from this perspective. Fats that have had their electron structure destroyed to make them keep longer — they normally attract oxygen — have a very detrimental effect on the future-directed, electron-rich human being, according to the "World Line diagram." Fats that have had their electron structure destroyed, promote the development of the "anti-human," within space and time. Fats that disturb the electron exchange within living tissue because they, like tar, act as insulators against electrical conductivity, plainly deaden the life functions at the respective operative locations, e.g. in organs, and in growth centers of the body, as well as throughout the whole body.

Tars were among the first ingredients that were known to cause cancer. What is cancer? Every significant circumstance in the "world of elementary particles" that promotes the development toward the "anti-human," also promotes cancer. A high component of slow particles from the "world of elementary particles" in our food — food that has been robbed of its wealth of electrons — promotes the development toward the "anti-human." they promote the emergence of cancer. For example, solidified fats belong to this category. These are electron-poor. They behave like tar, as insulators relative to the transport of electrons in living tissue. *Electron-rich nutrition, electron-rich highly unsaturated oils, natural aromatics from herbs and spices, fruits which are rich in aromatics and natural color components that correspond to the colors of the photons of sunlight — all these increase the absorption, storage and utilization of the sun's energy.*
...After I have treated patients, and these patients then lie in the sun, they notice that they feel much better — rejuvenated. On the other hand, these days we frequently observe that the heart fails on sunny beaches, and not infrequently heart attacks occur. We can observe both: some individuals in our times experiencing

stress from exposure to the sun's energy, whereas others respond with dynamic improvement in all vital functions. The stimulating effect that sunshine has on the secretions of the liver, gall bladder, pancreas, bladder, and salivary glands is easy to observe. These organs only dry out upon exposure to sunshine when the substances that stimulate secretions are missing. The decisive factor in all these observations is whether the surface-active, electron-rich, highly unsaturated fats are present as a "resonating system" for solar energy, or if they are missing. The doctor tells cancer patients to avoid the sun; that they can't tolerate the sun. That is correct. As soon as these patients — also cancer patients — were placed on my Oil-Protein diet for just 2-3 days, i.e. a diet that contains an abundant supply of essential fats, they were able to tolerate the sun very well. Yes, they emphasize how well they suddenly feel in the sun, how the life forces are stimulated and that they feel dynamically energized. —Dr. Johanna Budwig, *The "Fat-Syndrome" and the Photon*

The High Priests of Commerce

Like prophets in ages past, Dr. Budwig's revelation of Truth threatened the ambitions of the high priests. In her case the high priests of Commerce controlling Science for Profit. Dr. Budwig ran afoul of the powerful corporations that process food oils when she discovered that fatty substances in soft tumors contained polymerized fats of marine animal origin. These polymers are formed when highly unsaturated fish and whale oils are heated to very high temperatures. She knew these oils were used to make margarine, a partially hydrogenated fat that cannot be made without high temperatures.

The director of the institute where she worked had financial interests in margarine and held patents on its manufacture including the hydrogenation processes that produced the toxic polymers she had found in tumors. He was afraid her discoveries would ruin margarine sales. He offered her money and ownership of a drugstore to keep her quiet. But Dr. Budwig refused to be bribed and in her official capacity made public statements warning people of the possible health hazards from consuming margarine.

Access to her laboratory was cut off. She was prevented from using research facilities at other institutes, and she could not get anymore of her papers published in the fat research journals. This was astonishing because she had worked in collaboration with several hospitals, plus she held a high government post. It was her official responsibility to monitor the effects of drugs and processed foods on health.

Dr. Budwig courageously fulfilled her public duty in the face of FOC (Food Oil Companies) opposition and threats to her career. She left the government position in 1953 and opened the clinic where she has successfully treated cancer patients by

nutritional therapy. Because this great woman was blackballed by FOC greed, EFA research has been slowed for over thirty years. Current investigations are merely following in her footsteps.

The Life Force and Linoleic Acid

The special relationship between photons, electrons and EFAs described by Dr. Budwig is due to the amazing molecular structures of LA(*cis*- linoleic acid), LNA(*cis*- linolenic acid), and other even more highly unsaturated oils manufactured from them within the human body. Plants have enzymes capable of inserting *cis* double bonds starting at the third carbon atom on a fatty acid carbon chain. Human enzymes can make double bonds starting at the ninth carbon atom only. If the fatty acid has more than one double bonded carbon pair it is polyunsaturated. LA has two unsaturated pairs in its 18-carbon chain. LNA has three unsaturated pairs in its 18-carbon chain. Naturally unsaturated fatty acids made by plants have their double bonds three carbon atoms apart.

These unsaturated bonds cause the normally straight line shape of the carbon chain to bend at the double bonded pair because nature always removes the hydrogen atoms from the same side of the fatty acid molecule. This greatly changes the fatty acid's physical and chemical characteristics. Biochemists call this *cis*-configuration. The bent structure keeps the EFAs from dissolving into each other. They are slippery, not sticky like the SFAs (saturated fatty acids, e.g., butter, lard, coconut oil), and they are liquid at body temperature. EFAs possess a slightly negative charge and have a tendency to form very thin surface layers. This property is called surface activity, and it provides the power to carry substances like toxins to the surface of the skin, intestinal tract, kidneys and lungs where they can be removed. EFA surface activity also helps disperse materials which react with or dissolve into the EFAs. Essential *cis*- unsaturated fatty acids do not clog arteries like SFAs.

The *cis*- configuration allows de-localized electron clouds (pi-electrons) to form in the bend produced on the chain. The resulting electrostatic force enables the EFAs to capture oxygen molecules and hold proteins within cell membranes. And because of the pi-electron clouds in the *cis*- bonds, EFAs are able to form phase boundary electrical potentials between the water inside and outside of cells, and the oils within the cell membranes. Like static electricity in a capacitor these charges can produce measurable bioelectric currents essential to nerve, muscle, heart and membrane functions. EFAs are extremely important to the body's overall energy exchange potential — the flow of *life force*.

LA, LNA and the highly unsaturated fatty acids the human body makes from them are necessary in the most active energy and electron exchanging and oxygen requiring tissues; especially the brain, retina, inner ear, adrenal and testicular

tissues. They carry the high energy required by the most active tissues, and ensure very high oxygen availability to them. Life force travels through the body via the essential fatty acids and their derivatives.
Over half the oil found in dark green plant leaves is linolenic acid (green leaves contain one percent or less oil). It is even more concentrated in the membranes of the chloroplasts where photosynthesis takes place. The pi-electrons transform the solar energy into chemical energy and LNA transports that energy wherever it is needed.
The forward looking human of the New Golden Age will be a consumer of highly unsaturated oils cold pressed from fresh seeds. Hemp seeds provide the ratio of LA to LNA that is the closest to the ideal requirement for the human body, about three times more LA than LNA. Hemp seed oils can reduce fat-clogging in arteries of the sluggish anti-humans and at the same time increase electron cloud densities in these unfortunate and sometimes mean spirited wretches. An increase in pi-electron cloud density means an increase in vital energy that is necessary for superior mental function and essential for manifestation of a bright mind looking forward to a bright new future.

The Alchemy of DNA
Throughout the ages the sages and prophets have described God and Mind as a cloud. The trinity of body, spirit and soul is a religious union in God [The one within]. The trinity of matter, energy and mind is a philosophical union in Man. Both have been studied by the alchemists. This trinity of electron, photon and pi-cloud is a material union manifest as life force that is a manifestation of Mind and God. Electrons can absorb and release energy as photons when energy flux passes through them. In the pi-electron cloud flux photons are emitted and re-absorbed constantly as bioelectric and bio-magnetic currents course through the nervous and circulatory system. The chaotic flow of photon emergence and absorption is tantamount to the light of mind unfocused. When the light of mind becomes meaningful, then revelation of ideas proceeds to focus the chaotic flow of photons into functional mathematical relationships. The sages frequently used the analogy of the fire or light of God pulsing through the cloud of knowing in the world-soul as giving rise to All. This trinity of being in existence was a source of profound inspiration to the Pagan prophets and philosophers.
To the Neo-Platonist Plotinus, the world-soul is the energy of the intellect. He compares the One, the primordial creative principle, with light, the intellect with the sun, and the world-soul with the moon. The One, designated as Uranos, is transcendent; the Son (Kronos) has dominion over the visible world; and the world-soul is subordinate to him. The One, or *ousia* of existence in totality, is described by Plotinus as hypostatic, and so are the three forms of emanations: thus

we have one being in three hypostases. According to Plotinus, the world-soul has a tendency towards separation and divisibility, the *sine qua non* of all change, creation, and reproduction. It is an "unending All of life" and wholly energy; a living organism of ideas which only become effective and real in it. The intellect is its progenitor and father, and what the intellect conceives the world-soul brings to birth in reality. "What lies enclosed in the intellect comes to birth in the world-soul as Logos, fills it with meaning and makes it drunken as if with nectar." Nectar, like soma, is the drink of fertility and immortality. —C.G. Jung, *Symbols of Transformation*

Certainly DNA is the blueprint of living molecular organization. It is protected inside a nuclear membrane inside every cell which, in turn, is protected by its own cell wall, and all healthy membranes are rich in essential lipids containing pi-electron clouds. Whether DNA sends an RNA messenger to initiate functioning depends upon the quality of vitality in all feedback systems in the "youniverse" of the human being in the universe of the human body. And the quality of energy feeding back to the DNA is dependent upon the density and vibratory energy in the chain of pi-electron clouds throughout the system. So in this system DNA is like the essential body, from which the whole organism can be built, and the life force coursing through the pi-clouds is the energy-spirit that operates it.

Since the most highly unsaturated fatty acids are located in the brain and nervous system, there we find the highest density of pi-electron cloud flux, and in the cloud flux, the brain generates mind. Mysteriously, mind, which cannot be measured directly by any scientific devices to date, acts upon the nervous system moving the living body to work against entropy toward its own goals. Those goals are manifest as ideas and images in the mind. And what are ideas and images in the mind but meaningful light revealing possibilities erupting from the super-unknown. The revelation of ideas erupting from the super-unknown into the mind of one can be conveyed to other minds. Each mind awakened to the revelation of ideas can further convey revelation and ideas to still others. And each mind acting and reacting to revelation and ideas is itself part of a neural net of minds collectively and individually manifesting the super-conscious Mind of God. In the New Golden Age the "youniverse" of mind in the body of Man will unite with the "youniversal" Mind of God in the body of the universe.

The development of scientific and technical knowledge has been essential to the greater understanding of the phenomenal universe. This advancement of knowledge about the operations of the universe has lead to reformations of previous religious ideas as humanity evolves toward the golden age when union with the godhead becomes an every day event in the lives of forward looking humanity. Revelation of ideas within the "cloud of knowing" in a mind rich in pi-

electron cloud flux connects that individual with divine gnosis in the transcendent "youniversal" Mind.

If the revelation of ideas is not happening from within because the "cloud of knowing" is vapid from an inadequate flux of pi-electron cloud energy, then the revelation of ideas has to be conveyed by those in the cloud of knowing. The dim ones must accept revelation on faith or some justification employing reason or logic. Still, it is easier for the dim ones to repeat in comfort the rhetoric of the past as orthodox tradition — until their own mind clouds are invigorated by nutritional therapy with EFAs obtained from seed oils, especially hemp seed oils.

Inertia, one of the manifestations of universal entropy, is difficult to overcome. When the mind has been dimmed because *cis*-polyunsaturated fatty acids are lacking in the brain, new ideas can be seen as offensive because the change involved may require more energy than is available to neutralize the mental inertia. For instance, the United States government has been allowing the import of hemp seeds as long as they were steam sterilized at 212° F to prevent the possibility of sprouting. That temperature does not ruin the EFAs though it does somewhat uncoil the highly nutritious edistin protein in the seeds. Now that hemp seed consumption has increased dramatically in the U.S., the federal government has decreed that the seeds must be dry heated to over 300° F. causing the EFAs to denature and become toxic.
The anti-humans in charge cannot accept the truth that hemp seeds are the most nutritious single food source on earth for humans. They cannot accept the validity of spiritual revelations initiated in humans by the religious use of hemp for fear it might conflict with their position in the orthodox social hierarchy. They uphold and enforce ignorant mistakes made in the past that keep them focused on the past, and they are unwilling to make the changes in habits that are killing one out of every three of them as well as the rest of Americans with heart disease and cancers directly or indirectly attributable to consumption of fats altered by high heat.[4] Since they see no reason to stop their own slow deaths on the trail of anti-human degenerative pathology, they feel no remorse forcing others off the highway of individual health and revelation leading into the new Golden Age.

This information about vitality and hempseed nutrition has been circulated within the counterculture for about ten years now. Its general acceptance there has caused a dramatic increase in demand for hempseed foods for human dietary consumption. A bright mind is contagious, and healthy living is universally admirable. Those already tasting the benefits of Golden Age vitality are not willing to dim out with the anti-humans. Fortunately as current events indicate most stuck on the *loway* of

anti-human devolution and degenerative disease want to change directions for the *highway* of genuine vitality and wholeness.

Hemp Butter: Peanut, Almond, Cashew, and Macadamia nut butters, are familiar to most Americans. It is safe to say that Peanut butter is the most favored of these, used in traditional ways handed down by generations of caring parents, who were concerned about their children having good protein in their diet. The problem is that some proteins are potential allergens, which include soy, and dairy, as well as peanut proteins. Peanuts may also carry unacceptable amount of a potent carcinogen found on other field crops as well. They are known as Aflatoxins, and are derived from the presence of mold before they are harvested.

The good news is that hemp butter is made from hemp seeds, and no hemp seed allergies have ever been reported. Although most nut butter users have not heard of Hemp Butter, times are changing, and hemp butter is now available in the marketplace. Not the least important fact about hemp butter is that it is a dark green color due to the rich content of chlorophyll,which is a powerful antioxidant.

However, what makes hemp butter so important is its unusual proteins. They are edestins, and are globular in structure. Biologically active proteins in our bodies are mainly globulins, and include such things as hormones, hemoglobin, immunoglobulins (antibodies), and enzymes. Although the human body can make globular proteins out of any protein, it is much easier to make globulins out of globular starting material.

So then, hemp butter is rich in the globular proteins that are precursors to some of the most vital chemicals in the body:

a)hormones, which regulate body processes

b)hemoglobin, which transports oxygen, carbon dioxide, and nitric oxide

c)enzymes, which catalyze and control biochemical reactions

d)antibodies, which fend off bacterial invasion, many pathogens, as well as toxins or antigens as they enter the body

The total protein content of hemp seed is about 65% edestins. Even more remarkable, the other protein found in hemp seeds is albumin, which is highly digestible because it too has a globular structure. It is a major free radical scavenger, and the industry standard for protein quality evaluation. As the hemp seeds are ground adding hemp oil to create a smooth butter-like spread, there is nothing lost in the process. There is more good news.

Hemp protein contains all twenty-one known amino acids, including thenine essential ones adult bodies cannot produce. Proteins are considered complete when they contain all the essential amino

acids in sufficient quantities and ratios to meet the body's needs. The following are the 21 most common amino acids.

• alanine

• arginine

• aspargine

• aspartic acid

• cysteine

• glutamic acid

• glutamine

• glycine

• histidine

• isoleucine

• leucine

• lysine

• methionine

• phenylalanine

• proline

• serine

• taurine

• threonine

• tryptophan

• tyrosine

• valine

• taurine (considered essential for premature babies)

• histidine (considered essential for children, but not for adults)

Before we talk about recipes, and how to use hemp butter, and it is good in every recipe where other nut butters are indicated, it is important to mention what is missing.

The hemp butter products most found in this country come from Manitoba, Canada, and do not contain Trans Fats, hydrogenated oils, cholesterol, added sugar, gluten, preservatives, or artificial colors or flavors. The hemp is grown from non-FMO hemp seed, without any pesticides, or herbicides.

So then, a small amount of hemp butter, about two tablespoons, will deliver about eleven grams of protein, of the highest quality protein available. It is a bit more liquid than peanut butter and will easily mix into smoothies, as well as spread onto toast or crackers. Here is a recipe for a salad dressing using hemp butter as one ingredient.

Hemp Seed Oil Salad Dressing

1/3 cup Hemp Seed Oil

2 Tablespoon Hemp Butter

1/2 Teaspoon fresh diced garlic

1/2 Teaspoon fresh minced ginger

2 - 4 Tablespoons Lemon Juice, or favorite vinegar to taste

Dash of stevia (natural herbal sweetener)

Dash of salt and pepper

As a spread, hemp butter can be used right from the little green jar. It is especially delicious when used in combination with raw honey, and a dash of cinnamon. It does tend to be a bit more liquid than other butters, so a sandwich made the night before a school lunch is packed would be just fine.

The quality of the protein in hemp seed butter in unequalled. It may take a bit of getting used to, as any new food might, but it may be one of the most important pro health decisions you will ever make.

Ashitaba

Ashitaba is an Asian green vegetable rich in antioxidant—chalcone. Recent studies in Japan and the U.S. have shown that chalcone helps guard against heart problems, cancer, oxidation of LDL cholesterol, osteoporosis, diabetes, and even Alzheimer's disease.
Donald Buhler and his colleagues at Oregon State University found that minute amounts of Chalcone in hops were six times as potent as those antioxidants found in citrus fruit, almost four times as potent as those in soy, and two times more potent than those found in green tea.
Due to Ashitaba's blood purifying and detoxifying properties, cells stay healthy and thus metabolism, immune system, and all other body functions, especially liver and kidneys, can maintain proper balance. As a result, the aging process is retarded on a cellular level and degenerative diseases are prevented.

Ashitaba has been consumed as a vegetable and medicine for many hundreds of years by inhabitants of Seven Islands of Izu (Longevity Islands). In Japan, Ashitaba is used to treat hypertension. As a diuretic, it has no side effects such as western medicines frequently have. Ashitaba is very useful in treating menstrual cramps and pains. It helps to make menopause more comfortable," said Dr. Kevin Lance Jones, O.M.D. Further, Ashitaba is useful in the

treatment of a wide variety of gynecological conditions and provides women with therapeutic alternatives to hormone replacement therapy and hysterectomies.

Studies by Dr. Kimie Baba of Osaka University show that Ashitaba has antibacterial, antiviral, anti-ulcer, anti-thrombus and strong anti-tumor effects, inhibiting skin and lung cancer; The Biomedical Group in Takara, Japan recently found that the plant can stimulate the production of nerve growth factor (NGF) is an added benefit to diabetics and to brain health. Ashitaba is a celery-like plant belonging to the Angelica family. Because it grows very fast, in the Japanese language it literally means 'leaves of tomorrow'. Now, mounting evidence suggests it may well prove to be an essential healing agent of tomorrow and indeed in the longer term too.
Most plants are devoid of vitamin B12, which is normally only obtainable through meat, fish and eggs. However, Ashitaba is a good source of this nutrient, making it an ideal supplement for strict vegetarians and vegans, who omit these foods from their diets and are at risk of suffering from a deficiency. A shortage of B12 can cause serious cognitive and nervous system problems, in addition to increasing the risk of cardiovascular disease and pernicious anaemia.
The yellow color of the juice of the Ashitaba is due to pigments known as chalcones, which are flavonoid compounds almost unique to Ashitaba. Chalcones are rarely found anywhere in the natural world! Research has shown that the unique properties of Ashitaba are at least partly due to these unique compounds. All these compounds fall into the general category of plant phenols. The many potential effects of flavonoids include defending cells against carcinogens, curbing the oxidation of LDL cholesterol and preventing blood clotting. Major flavonoid classes include flavonols, flavanones, catechins, anthocyanins, isoflavones, dihydroflavonols and chalcones.

Chalcones in Ashitaba include xanthoangelol, xanthoangelol E and 4-hydroxyderricin. A great number of clinical trials have been performed with Chalcones to assess their properties and effects. There are no side effects. Chalones are potent anti-oxidants, and helps to protect the organs from destructive free radicals and slows the aging process on a cellular level.

Xanthoangelol:
Ref: M. Kozawa et al., Chem. Pharm. Bulletin., 25, 515, 1977 T. Miyase et al., Chem. Pharm. Bulletin, 28, 1172, 1980 K. Baba et al., Chem. Pharm. Bulletin, 29,

3907, 1990 T. Okuyama et al., Planta Med., 57, 3, 242, 1991(pmr,ms) M. Kozawa et al., Yakugaku Zasshi, 98, 210, 1978
4-Hydroxyderricin 2',4-Dihydroxy-4'-metoxy-3'-prenylchalcone
)
Chalcones were revealed through extensive research to be antibiotic and active against staphylococcus in vitro. Chalcones were found to work on the mucus membrane in the stomach and suppress the excessive secretion of gastric juice. Read more. Chalcones were found to inhibit general inflammatory processes. Constituent Compounds in Ashitaba: : 9-Angeloyloxy-8(S),9(R)-dihydrooroselol, Angeloyloxy-8(S),9(S)-dihydrooroselol, Archangelicin, Ashitaba chalcone, Edulitine, 4-Hydroxyderricin, Isolaserpitin, Laserpitin, Xanthoangelol, Xanthoangelol B, Xanthoangelol C, Xanthoangelol D, Xanthoangelol E.

The Biomedical Group of Takara Shuzo found that the plant can stimulate *in vivo* production of Nerve Growth Factor (NGF), and that this amazing process is enhanced by several compounds which are contained in Ashitaba. The plant is reported to provide immune system stimulation, healthy function of stomach and intestines, and demonstrates anti-viral and anti-bacterial activity. NGF is a biological substance which is essential in the development and survival of certain neurons in both the central and peripheral nervous systems.

Coumarins: psoralen, imperatorin, columbianagin, isorhazelpitin, rhazelpiton, selinidin.
A class of widely occurring phenolic compounds, especially abundant in citrus fruits.
These compounds are ubiquitous in higher plants and are particularly prevalent in citrus oils and certain vegetables, such as cilantro and celery. The potential anticarcinogenic properties of these natural coumarin derivatives are being examined in preclinical studies of skin tumorigenesis with promising results. These compounds are ingested regularly by humans, and their potential as chemopreventive agents is promising.
Cai Y, Kleiner H, Johnston D, Dubowski A, Bostic S, Ivie W, DiGiovanni J. Effect of naturally occurring coumarins on the formation of DNA adducts and tumors induced by enzo[a]pyrene and 7,12-dimethylbenz[a]anthracene in skin. Carcinogenesis 18:1521-1527, 1997
4-hydrodexydelisin glycosides: Isoquercitrin, Ruteorin, Angelic acid, Bergapten.
Melatonin. Significant melatonin content of the this plant is beneficial to the body. The effect of melatonin, an antioxidant, is well known; one effect is that it helps to calms the body and contribute toward stress reduction.

Vitamins: β-carotene, vitamin C, potassium, calcium, iron. Ashitaba also contains vitamin B12, normally produced in animals and not plants.
Article: "Ashitaba, A Medicinal Plant and Health Method" By Kazuo Hida
Article: " Research on the Effects of Ashitaba" by Dr. Kevin Lance Jones, O.M.D.

Fact: 100 grams of Ashitaba extract contains the approximate nutritional equivalent of: Vitamin A content of 4 carrots Vitamin B2 content of 28 garlic cloves Vitamin C content of 4 lemons Nine times the Iron in spinach Fiber equal to 56 celery stalks Protein equivalent to 1200 g Milk

and more
Antioxidant Activity in Chinese Foods
Japanese Research Study Reports
1) Tooru Okuyama, Miraculous Ashitaba, Heart shuppan, 1994 2) Kimie Baba, Healthy vegetable Ashitaba, Chikuma shuubansha, 1995 3) Hida, Medicinal herb Ashitaba, Tsuchiya shyoten, 1991 4) Kazuo Izawa, Color Encyclopedia of Medicinal Herbs, Shufunotomo-sha, p501, 1998

Ashitaba harmonizes the Spleen and Stomach. It helps to balance the Earth element. There is a patient in Texas that has Insulin- Dependent Diabetes that is currently taking the herb. He says that he now has to use less Insulin because his blood sugar no longer spikes with attacks of Hyperglycemia. Another Diabetes patient in Japan took Ashitaba for six months and his blood sugar level dropped from 400 mg./dL to 150 mg./dL. Dr. Baba at Osaka University School of Pharmacy has published a paper showing the decrease of the rate of acid production in the stomach with Ashitaba. In her paper he also showed a decrease in the severity of stress related to stomach ulcers. The extract of Angelica Keiskei Koidzumi also exhibited an anti-bacterial action. Esoteric Anthropology shows that a healthy body and mind, emotion and spirit not only produces a longer life, but produces the base environment required for embodied ascension.

Moringa

Independent research validates **Moringa oleifera's** amazing health benefits and rich wealth of nutrients. Study after study in research conducted by U.S. and international governments, universities, international scientific, charitable and humanitarian funded research points to the extraordinary benefits of Moringa and its rich supply of nutrients, super-antioxidants, anti-inflammatories, anti-aging compounds and vast health-promoting benefits (cardiovascular, endocrine,

including improved sleep, mental clarity, wound healing, digestion, detoxification and many more benefits).
Discoveries and achievements in research and analysis also validate the many ancient and historical references to Moringa as the treatment of choice in hundreds of indigenous, folk remedies and traditional Ayurvedic medicine worldwide.
The possible role of Moringa oleifera in HIV/AIDS supportive treatment.
Aims: To present Moringa powder supplementation as an immune stimulant for HIV+ people, particularly those who cannot afford good nutrition and medicines in Africa. Introduction: 70% of all HIV positive people live in sub-Saharan Africa where malnutrition is rife. The collapse of the immune system in an HIV+ individual results in the symptoms of AIDS. It is known that certain elements and vitamins (For example Vit C,E,A elements Zinc, Iron) can stimulate the immune system and thereby improve the health and lifestyle of an individual for many years. ISSUE: Dried leaf powder from the Moringa oleifera is an excellent nutrient source and can easily supplement basic food intake of African people. Moringa is exceptionally rich in Vit A/[beta] carotene, Vit C, E and key elements including selenium, but also contains almost a full RDA of other nutrients required for a healthy lifestyle. Literature reports support a synergism between Nutrition Acquired Immunodeficiency and Acquired Immunodeficiency Syndrome. This suggests that enhanced nutrition (such as that which can be achieved via Moringa) could benefit a person with AIDS. The effects of Moringa powder supplementation are currently under investigation in a phase 1 clinical trial of HIV patients at the Medical Faculty, University of Stellenbosch, South Africa.
RECOMMENDATION: Moringa dry leaf powder may be a valuable nutrient for the poor communities of Africa by boosting the immune system to fight infections and thereby enhancing the well-being of HIV+ persons. The typical synthetic multivitamin tablet is only about 10 percent absorbable by the body, while nutrients derived purely from plants phytonutrients are close to 100 percent absorbable. Hence, nature and plants like Moringa loaded with phytonutrients are making a comeback.
Moringa oleifera is a slender, drought-resistant tree reaching as high as 9 meters (29.5 ft.) with white fragrant flowers that turn into pendulous, 9-ribbed pods. Native to Southern India, Pakistan, Bangladesh, and Afghanistan, it is now widely cultivated in all tropical regions including Africa, the Caribbean, and the Pacific Islands including the Philippines and other surrounding countries.
A fast growing tree with roots that taste like *horseradish* (hence the name), it was used by the Egyptians, Greeks, and Romans. Its other names include: the drumstick or *benzolive tree, kelor, marango, mlonge, moonga, mulangay, nebeday, saijhan, sajna or benoil tree,* and *"malunggay"* in Filipino.

Health Benefits of Moringa oleifera

Several studies have shown Moringa's health benefits.

• It is a strong antioxidant effective against prostate and skin cancers, an anti-tumor and an anti-aging substance.

• It modulates anemia, high blood pressure, diabetes, high serum or blood cholesterol, thyroid, liver, and kidney problems.

• It has strong anti-inflammatory properties ameliorating rheumatism, joint pain, arthritis, edema, and Lupus.

• It is effective against digestive disorders including colitis, diarrhea, flatulence (gas), ulcer or gastritis.

• As an anti-bacterial, anti-microbial, and anti-viral agent, it is affective against urinary tract infection, typhoid, syphilis, dental caries and toothaches, fungus, thrush, common cold, Epstein-Barr Virus, Herpes-Simplex, HIV AIDS, warts, parasites, worms, schistosomes, and trypanosomes.

• As a detoxifying agent, it is effective against snake and scorpion bites.

• It is effective against nervous disorders including headaches, migraines, hysteria, and epilepsy.

Nutritional Benefits

Leaves, tender young capsules, immature seeds, fruits, and roots are all edible. Leaves can be eaten cooked or raw, are rich in vitamins K, A, C, B6, Manganese, Magnesium, Riboflavin, Calcium, Thiamin, Potassium, Iron, Protein, Niacin, and dietary fiber. Leaves can be dried (in the shade to preserve nutrients), reduced into powder and added to foods. Cooked Moringa leaves resemble spinach in flavor and appearance. In developing countries where rice is the staple diet, and where vitamin A deficiency is prevalent, Moringa provides an affordable and widely available source of the vitamin. One cup of boiled leaves contains 7,013 International Units (IUs) of vitamin A - more than 2.5 times the daily adult requirement for the vitamin.

Immature seeds can be eaten like garden peas. Young pods taste like a cross between green beans and asparagus.

Young roots can be used as *spice* but care must be taken because of its alkaloid content. Flowers are mixed with other foods, or fried in butter or oil. Note: The leaves and branches are also used by farmers for fodder when nothing else is available.

Apricots

Health Benefits of Apricots

Health Benefits of Apricot :

1. Apricot has high mineral content, that makes it beneficial in cases of anemia, tuberculosis, asthma, bronchitis, and toxemia.
2. Apricot is high in vitamin A, that is why it is very helpful in the removal of skin pimples and other skin disorder.
3. Apricot contain lycopene, this substance can help prevent cancer and help to protect LDL cholesterol from oxidation, which may help prevent heart disease.
4. It helps destroy intestinal worms.
5. It may help remove gallstones.
6. It is it helps in preventing cancer in organs lined by epithelial tissue, due to its high vitamin A content.

Nutritive Values : Per 100 grams

- Vitamin A : 2,790 I.U.
- Vitamin B : Thiamine .3 mg.;
- Vitamin C : 7 mg.
- Calcium : 16 mg.
- Phosphorus : 23 mg.
- Carbohydrates : 12.9 gm.
- Protein : 1.0 gm.
- Calories : 51

A Strong Anti-Oxidant Team

The unique mix of compounds found in apricots also makes this fruit a good choice for helping to fight heart disease. Along with beta-carotene, apricots contain the other powerful anti-oxidants, Vitamin C and lycopene. Combined, these compounds help protect against cancer, heart disease and stroke.

In the Beginning

Nearly 4000 years ago, a fruit belonging to the rose family was discovered on the mountain slopes of China. Today, it's generally accepted that the Chinese first cultivated this ancient fruit, the wild ancestor to the present day apricot. It is also believed that the Chinese considered the apricot to contain special fertility enhancing properties.

With the strong sensory appeal of apricots' delicate, velvety skin and intensely sweet fragrance and flavor, apricot cuttings traveled across the Persian Empire to the Mediterranean where they flourished. Many varieties of the fruit differing in size, color and flavor are still grown with popular appeal throughout the world today.

The Start of California's Apricot History

In the 18th century, Spanish explorers introduced apricots to the New World. California inherited the golden blush fruit planted in the gardens of Spanish missions. In 1792, the first major production of California apricots was recorded.

By 1920, California proudly claimed a flourishing apricot industry located in the Santa Clara Valley, an area south of San Francisco also known for peaches, plums and cherries. Only fifteen years later, 2,737 California apricot growers farmed a total of 18,631 acres in the valley alone.

After World War II, the valley once known for fruit farming was fast becoming an area known for a growing computer industry and the development of the "Silicon

Valley." Consequently by the end of the century, California's apricot orchards had been relocated to the San Joaquin Valley where they are predominately found today.

Raisins

Raisins are naturally endowed with both an array of valuable nutrients and a pleasantly sweet flavor. Raisins as part of the daily diet provide essential nutrients, soluble and insoluble fiber and health protective bioactive compounds, or phytochemicals. This combination of nutritional bounty and enjoyable taste is the reason raisins have been popularly considered a healthy food for millennia. Raisins' natural resistance to spoilage and ease of storage and transport only serve to strengthen their appeal and widespread consumption.

The relationship between diet and health has been recognized since ancient times. Until as recently as the early 20th century, physicians prescribed specific foods and diets as remedies for illness and for their disease preventive value. Over the last 30 years food and nutrition research has focused on the role of certain foods and diets in lowering the risk of degenerative and chronic disease, and nutritionists have broadened their understanding of what makes up an optimal diet: one that does more than simply just provide sufficient nutrients to sustain growth and reproduction, but also promotes health and longevity and lowers disease risk. While the composition of an adequate diet is widely known and agreed upon, that of an optimal diet remains elusive.

Recent research suggests that diets largely based on plant foods, such as the Mediterranean diet, may be the best model to follow. Epidemiological studies have shown a consistent, inverse relationship between a diet rich in fruit and vegetables and a lower risk for many chronic diseases including cancer, heart disease and stroke. Researchers are also investigating the beneficial role of fruits and vegetables in inflammatory diseases such as arthritis; in lowering the incidence of obesity and controlling diabetes; and in age-associated neurological problems such as Alzheimer's and Parkinson's Disease. Fruits and vegetables also appear to have a role in the prevention of cataracts and macular degeneration, and may also protect from osteoporosis. Finally, they may enhance the immune system and potentially modulate certain aspects of immune function. The protective effect of an abundance of fruits and vegetables in the diet is long lasting. Higher intake of fruits and vegetables during childhood is associated with a lower incidence of cancer and stroke, respectively, during adulthood.

The strength of the association between fruit and vegetable consumption and health has led organizations around the world to recommend that populations increase their daily fruit and vegetable intake. In the United States, dietary guidelines issued

since 1977 by health agencies have vigorously endorsed and promoted this message. In 1982, the National Academy of Sciences published a report on diet and cancer that emphasized the importance of fruits and vegetables in the diet. In 1989, they expanded their message in another report***, Diet andHealth***, which promoted the consumption of at least 5 servings of fruits and vegetables per day in order to reduce risk of both cancer and heart disease. In 1991, the National Cancer Institute started the national "5 A Day for Better Health" program (Produce for Better Health, PBH), which called for 5 or more daily servings of fruits and vegetables. In 2003, the recommendations were expanded to encourage people to eat from 5 to 9 servings a day: "Eat 5 to 9 A Day for Better Health". The most recent Dietary Guidelines for Americans, published by the United States Department of Agriculture (USDA) in 2005, recommends that adults eat 7 to 13 servings, according to their caloric expenditure, and children eat 4 to 10, depending on their age. This has prompted the new message: "Fruits & Veggies – More Matters," beginning in early 2007.

Despite these campaigns and educational efforts, Americans' fruit and vegetable consumption has not increased during the past two decades. A significant gap still remains between the amount of fruits and vegetables recommended by the USDA and PBH campaigns and the quantities Americans actually eat. Looking at fruit intake specifically, in the period from 1988 to 1994 only an estimated 27% of adults met the USDA guidelines of two servings or more. From 1999 to 2002, only 28% of adults met these guidelines. During the past 15 years, reports put the mean fruit daily intake at 1.8, 1.4 and 1.2 servings (including fruit juices) for 4 to 5 year olds, 11 to 18 year olds and adults, respectively. Clearly, American eating patterns have yet to reflect an appreciation for the benefits of a diet rich in fruits.

Fruits and vegetables are not only important sources of vitamins, minerals and fiber in the diet but also provide a wide array of bioactive components or phytochemicals. These plant compounds are not designated as traditional nutrients since they are not essential to sustain life, but play a role in health and longevity and have been linked to a reduction in the risk of major chronic diseases. It is estimated that more than 5,000 individual phytochemicals have been identified but a large percentage still remain unknown. Convincing evidence suggests that the benefits of phytochemicals in fruits and vegetables may be even greater than is currently understood, since they affect metabolic pathways and cellular reactions believed to be involved in the etiology of a wide range of chronic diseases. However, the precise mechanisms by which specific compounds exert their observed biological effects remain largely hypothetical and are thus still the subject of intense investigation.

Raisins should be of particular interest in these investigations due to their unique phytochemical composition and the natural qualities that make raisins an appealing source of nutrients. Raisins, like other fruits, are devoid of fat, saturated fat and cholesterol. They provide both soluble and insoluble fiber at levels that represent a meaningful contribution to daily fiber intake and at levels that benefit cardiovascular health. They are a source of fructooligasaccharides (fructans), which act as prebiotics, contributing to colonic health, and are a major dietary source of tartaric acid, a fruit acid that is fermented by colonic bacteria and has been shown to have a beneficial role in intestinal function. In the American diet, raisins are also among the richest sources of boron, a recognized essential trace element that may have an important role in bone health.

It is in their phenolic content, however, where raisins may prove to have the most important health effect. Raisins are rich in phenolic compounds: flavonoids and phenolic acids. Flavonoids are not only potent antioxidants but also have a multitude of functional capabilities, which may have an effect on health. Raisins provide the flavonoids quercetin, kaempferol and rutin, and are among the richest fruit sources of the isoflavones daidzein and genistein. Raisins are also a good dietary source of the phenolic acids caftaric and coutaric acids. By virtue of their antioxidant activity, these raisin constituents may lower oxidative stress in humans and thereby lower risk of chronic disease.

Raisins are a fruit rich in cultural and nutritional value that may offer a convenient step toward healthier eating and a means to bridge the gap between recommended intake of fruits and the amount Americans actually consume. The raisin's unique flavor and nutritional qualities are reaffirmed by its prevalence throughout human history. Wherever viticulture flourished, it seems, raisins soon followed, and they eventually became popular in countless cultures and societies around the world. Even in areas where the climate did not support the sun-drying process, raisins were imported and included in local cuisines.

Since ancient times, raisins have been valued as a form of preserving grapes so they would last through the winter months and could be more easily stored and transported. Grapes were considered to be a nutritious and healthful food and raisins a good source of energy because of their high sugar content. Sun drying was seen as a natural way to produce raisins that not only gave them a particular intense flavor, but also maintained the delicate balance of nutrients of the original fruit. Some saw this age-old process as an extension of the natural ripening cycle of the grape. Indeed, it is almost certain that raisins and grapes occurred naturally before men intended to cultivate them.

The consumption of grapes and raisins, in particular, dates back to prehistoric times. Wild grapes existed as far back as 35,000,000 BC, when the species ***Vitis***

sezonnensis was known to grow in what is now southern France. Hunter-gatherers likely recognized the healthful qualities of wild grapes and may have noticed that grapes took on an edible dried form after having fallen off the vine and lain in the sun. Following this natural example, grapes were probably dried for storage and travel in the Neolithic period, leading to the early production of raisins. There is evidence of early use of raisins as food and decorations, from prehistoric murals in the Mediterranean region to Bronze-Age archaeological finds at Lachish in Israel. Grape cultivation first began in Armenia and the eastern regions of the Mediterranean, including ancient Phoenicia and Persia. Grapes were also important in Anatolia, where the Hittites regularly offered them to the gods. In the near east, raisins were sometimes made by burying grapes in the desert sands. Viticulture soon spread to the Tigris-Euphrates region of North Africa, where raisins were made as early as the fourth millennium BC, owing to ideal environments and the already established tradition of drying fruits. Grapes and raisins spread next to the Far East and the rest of North Africa, such as Morocco and Tunisia. The early Phoenicians and Egyptians, however, were eventually the ones to popularize the production and use of raisins and spread them throughout the western world, where they were valued for easy storage and transport.

In the European regions along the Mediterranean, the transition to increased production of raisins was particularly easy because of the preexisting tradition of viticulture and the existence of countless vineyards. Sun drying had already become a custom there, making raisins and other preserved fruits easy to store and grind after harvest. Raisins were seen as a key source of nutrition that complemented the grains, beans, and cultured milks forming the foundation of the Mediterranean diet when Roman and Greek civilizations were at their peak. In fact, Ancient Greece and Rome represented the first major markets for raisins. The cultivation of grapes in Corinth in 500 BC later led to the naming of an early raisin variety as "currants," deriving from "raisins of Corinth" and "black Corinth." Ancient Romans ate raisins in spectacular quantities and all strata of society, included them as a major part of common meals, along with olives and bread. They picked the sweetest and plumpest grapes to dry, and featured them as a key part of the menu at Bacchanalian celebrations. Roman doctors also promoted the medicinal properties of raisins, prescribing them as a cure for a wide variety of ailments. Raisins were so valued that they transcended the food realm and became rewards for successful athletes as well as a premium barter currency. With the help of Roman legionnaires, vineyards and their products spanned the reaches of the empire, and remained a vital crop throughout Europe long after its fall.

The history of raisins becomes a bit hazy until their reappearance in the 12th century AD. For the next 200 years of the Crusades, increased trade and movement between Europe and the East reinforced the popularity of the raisin, which was

especially valued by traveling soldiers and adventurers. This became especially important with the coming of the Age of Exploration. Spain in particular began to export raisins during the late 13th century. Soon afterwards, raisins became a popular luxury food in 14th century England. During the reign of Queen Elizabeth I, currants were used as a form of currency. Raisins later held an integral role in international markets as part of the "Triangular trade" in the 1700s between Europe, Africa and the Americas. Modern Europeans continued to value raisins as durable sources of energy and nutrients. In the two World Wars, raisins were seen as an ideal food for soldiers, and also helped to enliven "war cakes" and breads during times when eggs and sugar were in short supply.

Raisins, like most fruits, possess a combination of an appealing, sweet taste and nutritional value. Raisins provide essential nutrients, soluble and insoluble fiber, and health protective bioactive components, or phytochemicals. Table 1 shows selected nutrient compositions of raisins and of Thompson Seedless grapes as a reference. ***Both raisins and grapes provide similar amounts of sugar (19.6g and 21.4g, respectively), divided almost equally between fructose and glucose with minimal amounts of sucrose. Raisins, like all fruits, are high in potassium and low in sodium. Compared to other fruits, they are high in magnesium and iron. Raisins are among the 50 major food contributors of boron in the American diet, having the highest concentration of boron at 2.2mg per 100g.39 Boron, a putative essential trace element† is crucial for the growth and maintenance of healthy bones and joints.***

Controlled animal studies have shown that boron is essential for normal growth of both bone and cartilage and appears to have a role in the maturation of the bone growth plate. Boron supplementation in rats and chicks has been shown to increase bone strength. Boron deprivation, on the other hand, affects the skeletal system, the effect being most evident when the animals are simultaneously exposed to a nutritional stress, such as a deficiency in vitamin D, calcium, magnesium or potassium. Boron thus appears to positively affect vitamin D, calcium and magnesium metabolism. Boron deficiency has been reported in studies of rats and chickens and in three human clinical studies.

Boron may also have a preventive or therapeutic effect on osteoporosis by reducing bone calcium loss in postmenopausal women. Controlled boron deprivation studies indicate that boron has an essential role in maintaining bone density. In clinical studies including both men and women, boron supplementation after consumption of a low-boron diet increased previously suppressed 25-hydroxycholecalcipherol (vitamin D) levels. Supplementation of a low-boron diet with an amount of boron commonly found in diets high in fruits and vegetables induced changes in postmenopausal women consistent with the prevention of calcium loss and bone demineralization. In one study, estrogen therapy increased

serum 17-beta-estradiol in postmenopausal women but not if they were fed low-boron diets. Although a mechanism that explains how boron affects bone formation and remodeling has yet to be defined, it appears that dietary boron may be required to convert estrogen and vitamin D to their more active form (17-beta-estradiol and 1,25-OH2D3, respectively). Recent animal studies support this hypothesis as results indicate that boron works synergistically with estrogen to exert its beneficial role on calcium and magnesium homeostasis. Investigators believe that ***boron may be an important nutritional factor determining the incidence of osteoporosis.***

Boron may also play a role in preventing arthritis. People suffering from osteoarthritis have been shown to have lower boron concentrations in femur heads, bones and synovial fluid than those without the disorder. In areas of the world where boron intake is usually 1mg or less per day, the estimated incidence of arthritis ranges from 20 to 70%, whereas in areas where boron intake is usually 3 to 10mg, the estimated incidence of arthritis ranges from 0 to 10%. In Australia, where much of the produce is grown in boron-deficient soil, there is a high occurrence of osteoarthritis, and boron supplements have been widely considered an effective treatment. Experimental evidence suggests that boron is also involved in the inflammatory process, or immune function. When an antigen was injected in rats to induce arthritis, those given boron supplements exhibited less swelling of the paws and lower circulating neutrophils concentrations than did those deficient in boron.

In conclusion, raisins are rich in boron, a mineral which is important for bone growth and maintenance. Boron in raisins may protect against osteoporosis by preventing bone loss and may have a role in preventing arthritis.

High fiber diets have been promoted to help reduce the risk of developing various conditions, including constipation, heart disease, diabetes, diverticular disease, colon cancer and obesity. The Institute of Medicine and the Dietary Guidelines for Americans 2005 recommends that children (ages 1 and up) and adults consume 14g of fiber for every 1,000 calories of food they eat each day. However, most Americans consume far less fiber than the recommended amount. Dietary fiber intake among adults in the US averages about 15g. Raisins are a good source of soluble and insoluble fiber and help meet dietary fiber recommendations.

The total dietary fiber content of raisins is 3.7g/100g, according to the USDA Nutrient Database. However, ***other investigators have reported higher fiber levels for sun-dried, dipped and golden raisins: 5.05g 100g, 5.37g/100g and 5.05g/100g, respectively (Table 2).***

Soluble fiber accounts for about 30% of total fiber, golden raisins having slightly higher values.

Mannose is the predominant sugar in the soluble fiber. Insoluble fiber contains slightly more glucose than mannose residues. Pectin (measured as uronic acids) accounts for over 50% of total fiber. Lignin levels are low in all types of raisins.
It is important to be aware that raisins provide over 5g of fructans per 100g
Fructans, also known as fructooligosaccharides (FOS), are fructosyl units bound by a beta (2-1)-glycosidic linkage. They are formed from the sugars in the grapes during the dehydration process. Fresh grapes themselves have no detectable fructans. Both the American Association of Cereal Chemists and the Food and Nutrition Board definitions include fructans as components of dietary fiber. Yet, compounds in this group, which includes inulin, are soluble in aqueous ethanol and thus are not recovered in the Association of Official Analytical Chemists dietary fiber methods. ***Adding fructans to total fiber values of raisins nearly doubles their fiber content, suggesting that raisins can provide more fiber in the diet than was previously believed.***
Studies have reported that dietary patterns, lifestyle exposure patterns, physical inactivity and obesity all increase colorectal cancer risk, especially in genetically predisposed populations.
One element in the diet that has been strongly associated with protection from colorectal cancer is fiber. The mechanisms for the beneficial effect of fiber in humans are still being elucidated and seem to be manifold. The presence of fiber in the diet decreases stool transit time, and so may hasten the elimination of carcinogens. The addition of 120g of raisins (3 servings) to a daily diet shortened transit time by 14 hours. Another mechanism involves the fermentation of fiber by colonic bacteria to produce short-chain fatty acids (SCFA). These acids are beneficial substrates for colonic epithelial cells and have a positive impact on the cells' resilience. *In vitro* studies using colon cancer cell lines have shown that butyrate may be potentially chemo protective by inhibiting cell proliferation, stimulating cell differentiation, and inducing apoptosis. Fibers that promote a butyrate-producing colonic ecosystem would thus have a protective effect against the developing of colorectal cancer. A study by Beyer-Sehlmeyer *et al* showed that the effects of butyrate are enhanced *in vivo* by the mixture of products derived from the fermentation of fibers in the colon.
The increased concentration of acids in the colon would also inhibit the conversion of primary bile salts (cholic acid and chenodeoxycolic acid) to secondary bile acids (deoxycholic and lithocholic acids). A number of studies have shown that colorectal cancer patients have a higher level of secondary bile acids both entering and leaving the colon. Inclusion of raisins in the diet reduced the ratio of secondary to primary bile acid salts in the stools. Thus, the acidic environment might be protective against the development of colon cancer.

In conclusion, raisins are a high fiber food. Even a single serving of raisins provides a significant amount of fiber in a daily diet and can have beneficial effects on colon health.
Adding fiber from high fiber foods such as raisins is preferable to using isolated fiber supplements because raisins deliver additional nutrients and phytochemicals that may also help to lower disease risks in other ways.
Raisins, unlike grapes, are a significant source of prebiotic compounds in the American diet. An important effect of increasing fiber in the diet is its impact on the intestinal microflora.
The growth of bacteria in the colon depends on the substrates that are available to them, i.e. compounds that have not been digested in the small intestine. ***A prebiotic has been recently defined as "a non-digestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacteria in the colon."***
Sun-dried raisins contain 5.7g fructans per 100g of fruit, higher than all commonly consumed fruits. Fructans escape digestion in the upper g.i. tract and reach the large intestine practically intact. Here they are fermented by bacteria that can cleave the beta (2-1)-glycosidic bonds between fructosyl units and act as prebiotic compounds by selectively stimulating the growth of beneficial intestinal microflora, namely bifidobacteria and lactobacilli. Clinical studies have shown that when taken in the diet, even at relatively low levels (5-20g/day), fructans increase manifold the numbers of these bacteria in the colon mucosa.
A balanced microbiota in the intestinal track is essential for health and well being. Prebiotics, such as fructans, help keep this balance by selectively stimulating the growth of health-promoting bacteria. The products of colonic fructan fermentation are lactic acid and short-chain fatty acids (SCFA), mainly acetate, propionate and butyrate, which play a significant role not only in colonic health but also the well being of the entire organism. ***The production and presence of SCFA and lactate in the colon alter the surroundings, creating a bacteriocidal environment for enteropathogens such as Escherichia coli and Clostridium perfringes. Including 120g of sun-dried raisins for 9 weeks in the diet of healthy adults increased total SCFA excretion.***
Prebiotics in raisins may play a role in colorectal cancer protection. Research using experimental animal models indicates that fructans have anticarcinogenic properties. For example, in rats, dietary fructans inhibit the formation of chemically-induced aberrant crypt foci. These are neoplastic lesions in the colon from which adenomas and carcinoma may develop. The growth of bifidobacteria, have been shown to modify ras ocogene activity.
Ras-gene activation is one of the earliest and most frequent genetic alterations associated with human cancers, specifically with colon cancer. Elevated levels of

ras-p21 (the ras gene product) have been correlated with increased cell proliferation. Studies in rats have shown that ***Bifidobacteria longum*** can significantly suppress the expression of ras-p21 in the colonic mucosa and reduce tumor incidence. In studies using human cell lines, fructan fermentation products have been shown to inhibit tumor cell growth, modulate differentiation and reduce metastatic activities.

Prebiotics in raisins may offer cardiovascular benefits through a triglyceride- and cholesterol-lowering effect. A recent meta-analysis of 16 clinical studies showed that dietary fructans significantly reduce serum triglycerides. The mechanism for this effect is still not clear, but it appears that fructans, like other soluble dietary fibers, reduce the capacity of hepatocytes to synthesize triglycerides from palmitate and so lower net hepatic triglyceride synthesis.

Given that fructans are not absorbed, how this effect is mediated is still a matter of speculation.

One possible mechanism involves its fermentation products: an increased production of SCFA in the large intestine, particularly of propionic acid. This fatty acid has been shown to inhibit lipogenesis in isolated hepatocytes. Other mechanisms involve modification of intestinal synthesis of cytokines and incretins, which enhance postprandial insulin secretion and so affect hepatic lipogenesis.

Studies on the cholesterol-lowering effect of fructans are not consistent, but encouraging results have been observed among hyperlipidemic subjects. Fructans, like fiber, may bind bile acids and increase their excretion in the feces. A continual depletion of bile in this manner may lower serum cholesterol levels by diverting cholesterol for bile acid synthesis. It is also possible that propionic acid, which increases with fructan colonic fermentation, inhibits hepatic cholesterol synthesis.

Prebiotics in raisins may stimulate calcium and magnesium absorption and so increase bone mineral content, bone density and maintain bone structure. Both animal and human studies have shown that non-digestible oligosaccharides can enhance mineral absorption, calcium retention and bone mineralization. In humans, the most convincing data comes from studies in young adolescents and postmenopausal women. The proposed mechanisms are manifold and include: increased solubility of minerals due to higher levels of SCFA generated by intestinal bacteria; increased surface area for mineral absorption via enhanced proliferation of enterocytes by fermentation products (lactate and butyrate); and increased expression of calcium-binding proteins in the large intestine. Other methods by which fructans may increase mineral absorption include: modulating expression of bone-relevant cytokines; degradation of mineral-complexing phytic acid; increasing bioavailability of bone-modulating factors such as phytoestrogens from foods; and improving overall intestinal health. These hypotheses have the experimental support of animal studies and continue to evolve.

In conclusion, fructooligosaccharides (fructans), formed from grape sugars during dehydration, give raisins a unique set of health benefits. Not only do they increase dietary fiber content and help regulate bowel functions, but acting as prebiotic agents, they stimulate health-promoting intestinal flora, maintain intestinal balance, may contribute to cardiovascular health, may protect from colon cancer, may increase absorption of calcium and magnesium and so enhance bone mineralization during growth and protect from osteoporosis after menopause. Humans have shown beneficial effects of fructans at doses as low as 7g per day. A single serving of raisins provides about a third of this amount. Sun-dried raisins have beneficial effects on colonic function that go beyond those due to their fiber content alone. Grapes and raisins are the only fruits that contain significant levels of tartaric acid (TA) in temperate regions of the world. Because of its low solubility in water, some of the TA in grapes is lost during processing of grape juice and wine, and so ***grapes and raisins remain the most practical sources of tartaric acid in the American diet***. Grapes contain 0.6-0.9g/100g of TA and raisins contain 2.0-3.5g/100g of TA. Studies on tartaric acid have shown that its presence in the diet has a positive impact on colonic health. A study comparing the effect of a low-fiber, grape-free diet to one containing either 120g of sun-dried raisins or 5g cream of tartar (approximately equivalent to the amount of TA in the raisins) on intestinal function in healthy adults found that both diets shortened intestinal transit time. The effect was greater among those in the raisin diet. Because of the higher fiber content of this diet, fecal bulk and fecal moisture content also increased. In a second study by the same investigators, participants consumed diets containing 84g, 126g or 168g of sun-dried raisins daily. Transit time decreased and fecal weight increased with increasing content of raisins in the diet. Both studies found that sun-dried raisins and TA lowered total fecal bile acid concentration, mainly due to a reduction in lithocholic and deoxycholic acid. All these parameters of intestinal function may play a role in the prevention of colon cancer. A shortened transit time may hasten the elimination of carcinogens, toxic compounds and byproducts of metabolism and an increased fecal weight may result in dilution of fecal carcinogens – either endogenous or exogenous. Fecal bile concentration has been directly associated with colon cancer risk, both lithocholic and deoxycholic acid acting as co-mutagenic compounds in a variety of *in vitro* assays. The results of these studies suggest ***that tartaric acid and fiber in raisins work synergistically to maintain a healthy digestive system. They also make a strong case for the advantages of combining foods with beneficial effects, such as raisins with high cereal fiber foods***.

Tartaric acid has also been shown to help increase the bioavailability of minerals in the diet, such as calcium and iron. *In vitro* studies indicate that tartaric acid increases the uptake of iron by Caco-2 cells by lowering intestinal pH and by

forming soluble iron-acid complexes, especially with ferric ion. Studies using *in vitro* simulated gastrointestinal digestion showed that tartaric acid increases the calcium availability from vegetables. Investigators trying to find a way to reduce the rates of anemia in India developed an iron-fortified biscuit and tested iron bioavailability with and without tartaric acid. They found that by adding tartaric acid, they were able to increase iron availability by 338%. ***Tartaric acid content of grapes and raisins make a strong case for adding these fruits to foods where minerals are poorly absorbed.***

Raisins paired with iron-fortified cereals will enhance iron absorption; raisins in vegetable salads may not only add zest but may enhance calcium absorption.

Unlike other fruit acids (such as malic and citric acid), tartaric acid bypasses the small intestine and is fermented by colonic bacteria to produce short-chain fatty acids (SCFA). As discussed in the previous section, these acids play a significant role not only in colonic health but also in the well being of the entire organism.

Tartaric acid may act synergistically with fructans to enhance the potential of raisins as a prebiotic food.

Raisins are an excellent source of polyphenols in the American diet. Polyphenols make up the largest group of phytochemicals in the diet and they appear to be, at least in part, responsible for the potential health benefit associated with the consumption of diets abundant in fruits and vegetables.

Polyphenols are synthesized by all vascular plants and are therefore present in all plant foods contributing to their color and taste. Polyphenols have many functions essential to plant growth and survival. In animals and humans who consume them, they affect cellular biochemistry. They are potent antioxidants and may protect cell constituents against oxidative damage. They chelate metals, modulate enzymatic activity, inhibit cellular proliferation and alter signal transduction pathways. Current evidence strongly supports a role for polyphenols in the prevention of cardiovascular disease, cancer and osteoporosis and suggests a role in the prevention of neurodegenerative diseases, diabetes and inflammatory disorders. Total polyphenol content can be estimated from absorbance measures at 280 nm or by using specific agents such as Folin Ciocalteu.† Using this assay, raisins, figs and prunes show similar total phenolic content ranging from about 9mg to 12mg of gallic acid equivalents per gram of fruit . Values are higher for dried fruit than the corresponding values for fresh fruit because the phenols are concentrated during the dehydration process. However, total phenolic values are still higher when expressed on a per serving basis (from NLEA defined serving size).

Plant polyphenols are very diverse and have complex chemical structures. They can be classified into flavonoids and phenolic acids. There are several subclasses of flavonoids in foods. ***In raisins, the most abundant are the flavonols quercetin and kaempferol. Raisins are unique among fruits and nuts in their relatively***

high content of the isoflavones daidzein and genistein. In addition, raisins are rich in the phenolic acids caftaric and coutaric acid.

While the phenolic composition of grapes, grape juices and wines have been investigated by many researchers, there are only two reports in print on the polyphenol composition of raisins (Karadeniz *et al***,** Parker *et al*) in addition to the USDA Database for the Flavonoid Content of Selected Foods. Raisin polyphenolic profile is strikingly different from that of Thompson Seedless grapes . This is due to both enzymatic oxidation and non-enzymatic browning reactions that happen during dehydration of grapes. Both reports show similar trends: the concentration of quercetin glycosides are the highest among flavonols followed by that of kaempferol glycosides. The content of rutin is relatively low among the flavonols determined and was detected only in raisins by Parker *et al.* On the other hand oxidized cinnamics and protocatechuic acid were only detected in sun-dried and dipped raisins. Golden raisins contained the highest amount of *trans*-caftaric and *trans*-coutaric acids. Sulfur dioxide curtails oxidation in these raisins resulting in a higher phenolic content. When compared to fresh grapes, Karadeniz reported a loss in phenolic acids of up to 90% and a loss of flavonols in the order of 60%. This is not consistent with Parker's report, who reports lower losses. According to Karadeniz, procyanidins and flavanols are completely degraded during raisin formation. This is also inconsistent with the USDA database which lists raisin catechins content of 0.42mg/100g, epicatechins at 0.10mg/100g and cianidin at 0.03mg/100g of fruit.

Unfortunately, the original report from which these results are based is not yet in print. Finally, Karadeniz detected no resveratrol or ellagic acid in fresh grapes or raisins. While the many changes that grape polyphenols undergo during their conversion into raisins is out of the scope of this paper, one should be aware that they yield highly complex structures, many flavonoids (e.g. flavanols) condensing into large molecules or polymers (tannins). The difficulty in working with the raisin matrix and interference with non-phenolic compounds may explain the difference in the reported values.

Daidzein and genistein are isoflavones with estrogenic activity in humans, and therefore are known as phytoestrogens. Structurally they resemble 17β estradiol and in *in vivo* assays they compete with the hormone at the receptor level. As other flavonoids, they may act as cellular antioxidants; they are potent tyrosine kinase inhibitors and affect cell cycle. They have been shown to protect against breast, prostate and other cancers, lower risk of cardiovascular disease and alleviate menopausal symptoms.

The concentrations of daidzein and genistein have been determined in a variety of fruits and nuts commonly eaten in Europe. ***Of the 36 samples of fruits and nuts that contain daidzein or genistein, currants and California raisins are the richest***

sources, containing 2.25 and 1.84mg/kg, respectively. The other 34 foods contain between 0.250 and .001mg/kg wet weight of food . In comparison, soybeans contain approximately 2g/kg wet weight. While even a small portion of a soy product in the diet adds very significant concentrations of daidzein and genistein, ***inclusion of raisins in the diet will contribute to the daily intake of these protective phytochemicals.***

By virtue of their high polyphenol content, raisins are an important source of antioxidants in the American diet. ***These phytochemicals are believed to account for a major portion of antioxidant capacity in plant foods. Antioxidants can lower oxidative stress and so prevent oxidative damage to critical cellular components.***

Current scientific thought regards oxidative stress as an important contributing factor in the development of heart disease and cancer, the two leading causes of death in the US. It is also implicated in the development of neuronal degeneration such as in Alzheimer's and Parkinson's disease as well as in the aging process itself. Oxidative stress is an imbalance between the production of reactive oxygen species (ROS) and the antioxidant defense system and can result from either a deficiency in the antioxidant defense mechanism or from an increase in ROS levels. ROS is a collective term that includes oxygen and non-oxygen radicals and comprises superoxide, hydroxyl, peroxyl, alkoxyl and nitric oxide derived products. They are generated as byproducts of normal cellular respiration that is essential to life and by the immune system and so contribute to our defenses. Higher levels can be generated from excessive activation of ROS systems, such as those mediated by chronic inflammation and infection or by instances of increased oxygen uptake such as in strenuous exercise. Exposure to ROS-generating chemicals and environmental toxins (i.e. tobacco smoke, pollutants, food constituents, ethanol and radiation) contribute to the total burden. Organisms have developed a very delicate system to eliminate or neutralize ROS, but it is not 100% effective. In addition to endogenous antioxidant enzymes, they can be scavenged by antioxidants obtained from the diet. The term "antioxidant" has been defined by the Institute of Medicine of the National Academy of Sciences as "a substance in foods that significantly decreases the adverse effects of reactive species, such as reactive oxygen species, on normal physiological functions in humans." Examples include phenolics, carotenoids and vitamins E and C found predominantly in plant foods.

Many *in vitro* methods have been used to compare the oxidation/reduction potential of foods and their phytochemicals. These include the oxygen radical absorbance capacity (ORAC), total radical-trapping antioxidant parameter (TRAP); Trolox equivalent antioxidant capacity (TEAC);

and the ferric reducing/antioxidant power (FRAP). These assays are based on different mechanisms using different radical or oxidant sources and therefore generate different values and cannot be compared directly. In general, a food that has a high value for one measure of antioxidant capacity will also be high for another measure. The ORAC assay is considered by some to be a preferable method because of its biological relevance to the *in vivo* antioxidant efficacy. Researchers at the USDA have measured both lipophilic (L-ORAC) and hydrophilic (H-ORAC) antioxidant capacities of common foods in the US using the ORAC assay. They have calculated total antioxidant capacity (TAC) by combining L-ORAC and H-ORAC, and a database is available. Most recently, the cellular antioxidant activity assay (CAAA) has been developed to measure antioxidant activity in cell culture. It is a more biologically relevant assessment because it takes into account some aspects of antioxidant cellular uptake, metabolism and location within cells.

Values for antioxidant capacity of raisins and/or grapes assessed by different methods are listed in Table 7. ***TAC per 100g of fruit in sun-dried raisins is higher than in fresh Thompson Seedless and red grapes due to the concentration of antioxidants during dehydration (3037, 1118 and 1260 µmol/100g of fruit).*** This is consistent in all dried fruits. Other than the phenolic compounds, several components of raisins and dried fruits can contribute to their antioxidant potential such as organic acids and Maillard Reaction products. However, this has not yet been investigated. It is interesting to note that the ORAC for golden raisins is much higher per gram than the value for sun-dried raisins (10,480 versus 3,740 µmol/100g, respectively). Golden raisins are treated with hot water and S02 to inactivate polyphenol oxidase and to inhibit nonenzymatic browning, probably allowing the raisin to retain the phenolic antioxidants of the original grape, which are then concentrated during drying. Total antioxidant activity in dried fruits, much like in all fruits, parallels their phenolic content.

Fruits are among the major antioxidant sources in our diet. Grapes and raisins on a per serving basis have intermediate to high values of TAC among fruits commonly consumed in the US, lower than berries and plums and higher than all melons, bananas, peaches, nectarines, apricots and many citrus fruits. ***When fruits and vegetables are categorized into groups ranked by their H-ORAC expressed on a per serving basis, raisins are grouped within the highest quartile . Because H-ORAC makes up most of the TAC, the foods in this group can be regarded as the best source of total antioxidant capacity.*** Lipophilic values are very low in most fruits and vegetables compared to hydrophilic ones, which make up ≥90% of TAC. ***The contribution of L-ORAC to TAC is similar in fresh and dried fruits indicating that the drying process does not change the proportion of hydrophilic and lipophilic ORAC.***

Prunes consistently have the highest antioxidant values followed by dried apricots and Deglet Noor dates. Sun-dried raisins have intermediate values.
The higher antioxidant activity of prunes is probably due to its higher phenolic content and to the high levels of caffeoylquinic acid isomers which have been shown to have high antioxidant capacity.
Antioxidant quality is a measure of the effectiveness of the antioxidant(s) present as a pure compound or a mixture. Investigators have estimated the quality of antioxidants in fruits and vegetables extracts by determining the IC50 (the concentration to inhibit *in vitro* oxidation of LDL particles by 50%) of the pooled phenol extracts. Figure 4 compares antioxidant quality of dried fruits to that of antioxidant vitamins expressed as 1/IC50. The higher the value, the better the antioxidant quality. ***The antioxidant quality of phenols in the dried fruits is significantly higher than that of vitamins by nearly a factor of 10***. These investigators have shown that phenolic antioxidant quality seems to improve during the drying process. The 1/IC50 values for fresh cranberries, green grapes and plums are 1.16, 1.32 and 1.42, respectively. Those for dried cranberries, raisins and dried plums are 2.38, 3.45 and 4.38, respectively. They contend that the quality of antioxidants is important since polyphenols are usually present in plasma at concentrations not exceeding 10 UM after eating fruits. The average 1/IC50 was 3.3 UM for the dried fruits. ***Thus the polyphenols from dried fruits can be potent antioxidants at physiological concentrations***.

Sun-dried raisins increase blood antioxidants and antioxidant capacity in healthy adults.

As with plasma phenolic content, plasma antioxidant capacity increases following consumption of phenolic-rich foods. Diets containing 10 servings of fruits and vegetables daily for 15 days significantly increased fasting baseline plasma ORAC of 35 healthy adults. However, as with plasma phenolic levels, the changes are transient unless phenolic antioxidants have a high lipid solubility (e.g. soy isoflavones). Therefore, changes are more difficult to observe after an overnight fast and are most evident immediately after consumption of phenol rich foods. Keene fed 59g, 104g or 163g of sun-dried raisins per day to healthy adults for 4 weeks. Plasma antioxidant activity increased as measured by the FRAP assay (but not the TRAP assay) after 2 and 4 weeks. In another study, 210g of sun-dried raisins homogenized in water (equivalent to 3570 μmol TE) were fed to 12 healthy adults. Their plasma ORAC was measured at fasting (baseline) and 15, 30 and 60 minutes after drinking the raisin preparation. Blood ORAC levels were higher at the three testing times, reaching peak values at 30 minutes and declining after 60 minutes, while still remaining higher than baseline values. In the most recent study, healthy adults were fed 250g Thompson Seedless grapes, 50g of sun-dried raisins or 50g golden raisins for 4 weeks. Serum ORAC was measured after a 12-hour fast

and 1 and 2 hours after eating the test sample with a bagel and water. There was an apparent trend toward increasing serum antioxidant capacity by the second and third week of sample consumption, although values fell again in the fourth week). Authors speculated that there may be a physiological plateau approximately 2 or 3 weeks after consistent consumption. Participants however were free living and no restrictions were made on their diets during the study, so many explanations are possible. No consistent serum ORAC changes were seen 1 and 2 hours after grapes/raisins and bagel consumption. Other studies have shown that antioxidant rich foods are able to increase postprandial antioxidant capacity. For example, feeding SpriteTM lowers plasma antioxidant capacity, but feeding SpriteTM plus dried figs raises plasma antioxidant capacity above baseline levels for up to 4 hours, overcoming the pro-oxidant effect of the sugar consumption.

A recent study found that eating raisins daily raises serum ORAC in healthy but overweight individuals. ORAC measures the combined capacity of antioxidants, particularly water soluble ones, to lower levels of oxidants that may damage susceptible molecules. ORAC is thus influenced by blood levels of vitamin C, uric acid and flavonoids. In this study, 17 overweight men and women either ate 90g raisins or isocaloric placebos for 14 days in a randomized, cross-over design while following a low-flavonoid diet. After the raisin intervention, individuals had higher blood ORAC levels . This suggests that the antioxidants in raisins, probably phenolic compounds and flavonoids, may raise the antioxidant defense capacity of blood either through direct scavenging or by modulating the activity of other antioxidants. It has been hypothesized that fruit consumption may also raise total blood antioxidant capacity because of the higher uric acid levels resulting from fructose metabolism.

While blood ORAC increased with the raisin intervention, urinary 8-epi PGF2α level, a measure of oxidative stress, did not change. This lack of consistency between measures of antioxidant capacity and markers of oxidative stress have previously been reported. Because of the complex relationship between the two, future studies that include a range of oxidative stress markers may be necessary to fully investigate the potential antioxidant effects of raisin consumption.

Investigators have looked at the effect of feeding different antioxidant vitamins and diets high in certain fruits and vegetables on levels of 8-hydroxy-2-deoyguanosine (8OHdG) in the urine or in leukocytes. **8O**HdG is a product of free radical oxidative damage to DNA or to the DNA precursor pool. Studies looking at the effect of pure antioxidants such as the vitamins E and C, beta-carotene or coenzyme Q10 do not change 8OHdG, whereas feeding polyphenol-rich fruits and vegetables such as wine, Brussels sprouts and mixed diets high in phenolics.

Intense physical activity increases oxygen uptake with a potential for increased

formation of reactive oxygen species. These can cause damage to large biomolecules such as proteins and DNA if such an increase exceeds the protective capacity of the antioxidant defense mechanisms. Oxidative stress therefore points to a risk of degenerative disease and premature aging from extreme exercise.

Foods high in phenolic antioxidants can protect against DNA damage during intense physical activity by counteracting oxidative stress.

Feeding 170g of sun-dried raisins prior to and during a triathlon to trained athletes significantly lowered 8OHdG urine levels compared to feeding of a glucose drink with the same amount of calories. This suggests ***that during strenuous exercise, foods rich in phenolic antioxidants such as sun-dried raisins can protect from DNA damage due to oxidative stress.***

Another measure of oxidative stress is a measure of circulating oxidized LDL particles (ox-LDL). They can provide a measure of tissue damage and can be a useful marker for identifying patients with a high risk for coronary artery disease (CAD) since 94% of the subjects with high ox-LDL have cardiovascular disease. Many studies have shown that diets high in polyphenols reduce the susceptibility of LDL oxidation in CAD patients. A diet providing 2, 3.5 and 5.5 ounces of raisins per day for 4 weeks lowered ox-LDL levels.

In conclusion, because of their high phenolic content, raisins are an important source of antioxidants in the diet. Raisins have higher polyphenol antioxidant content than Thompson Seedless grapes. In terms of their antioxidant capacity (as measured by H-ORAC) raisins are ranked within the highest quartile among fruits and vegetables. This is important because the antioxidant effect of polyphenols has been suggested as an explanation for the protective effect of fruits and vegetables. Raisins not only have high antioxidant capacity in vitro but also have been shown to raise blood antioxidant capacity and to protect against a marker of oxidative stress: oxidative damage to DNA and oxidation of LDL particles.

Raisins are a good source of fiber and polyphenols in our diet. Both of these food components are important for cardiovascular health.

Cardiovascular disease (CVD), primarily from heart disease (CHD) and stroke, is the leading cause of death in the United States for both men and women among all racial and ethnic groups. More than 850,000 Americans die each year from CVD accounting for nearly 40% of all deaths. The cost of heart disease and stroke in the United States in 2005 is estimated at $393 billion, including health expenditures and lost productivity. These costs are expected to increase by 2010.

Many studies have established that high plasma levels of total cholesterol and LDL cholesterol are among the most important modifiable risk factors for heart disease. While the mechanisms through which these factors lead to atherosclerosis and heart disease are not completely understood, evidence points to the oxidation of

LDL particles by either free radical byproducts, or by mediators of inflammatory processes, as a probable causative process.
Large epidemiological studies, such as the Nurses' Health Study and the Scottish Heart Health Study show that individuals who consume diets high in fiber have a lower risk for heart disease. Soluble fiber may be of particular preventive value since it appears to lower plasma cholesterol levels. The mechanisms which may explain how fiber lowers serum cholesterol have been extensively reviewed and include: lower cholesterol absorption, higher bile acid excretion, changes in bile-acid type present in the intestinal tract, and influences of short-chain fatty acid production by intestinal flora.
Epidemiological and experimental evidence suggests a protective effect of polyphenol-rich foods against CHD and stroke. Polyphenols in fruits, vegetables and beverages may protect from atherosclerosis because of their antioxidant potential and through their anti-inflammatory activity. Flavonoids are known to react with a variety of disease promoting free radicals and to induce antioxidant enzymes. While human data is limited, *in vitro* and *in vivo* studies have shown that many polyphenols, quercetin among them, and polyphenol-rich foods, inhibit LDL oxidation. They can modulate nitric oxide synthesis, promote vascular relaxation and inhibit platelet adherence to the vascular endothelium . Atherosclerosis is now viewed as a chronic inflammatory disease. Recent studies suggest that flavonoids protect from initiation and progression of atherosclerosis by modulating inflammatory pathways. They have been shown to inhibit mast cell secretion of pro-inflammatory cytokines and inhibit TNF-stimulated induction of endothelial cell adhesion molecules. Many excellent reviews on flavonoids and heart health have been published.
Raisins as part of a diet high in unrefined foods have been shown to have a beneficial effect on blood lipid levels. Spiller *et al* were the first to study the hypocholesterolemic effect of plant-based diets, which included more than one serving of sun-dried raisins daily.
They fed hypercholesterolemic adults Mediterranean-style diets high in whole grains and nuts, and that provided 84g raisins daily, for 4 weeks. By the end of the study total cholesterol and LDL cholesterol were 9% and 15% lower, respectively, than at baselines. There were no significant changes in HDL levels. Bruce *et al*, in a crossover study, showed that a diet rich in unrefined foods, that also provided 126g of raisins daily, lowered total cholesterol and LDL cholesterol by 13% and 16%, respectively, in hyperlipidemic volunteers. In a randomized study, Gardner *et al* showed that a plant-based, low-fat diet (which included raisins as snacks) significantly lowered total and LDL cholesterol levels among moderately hypercholesterolemic volunteers compared to those who consumed a more conventional, low-fat diet based on convenience foods. ***While many foods can***

account for the observed hypolipidemic effect of the experimental diets, these findings show that sun-dried raisins can be consumed as part of a cholesterol-lowering, plant-based diet.

In a recent study, Puglisi *et al* showed that raisins alone could have a beneficial effect on blood lipids. Thirty four volunteers were assigned to consume 1 cup of raisins daily, increase the number of steps walked in a day or a combination of both for 6 weeks. Raisins substituted for other foods to ensure weight maintenance. Both interventions alone or in combination lowered plasma LDL cholesterol and increased LDL receptor expression .

Triglyceride levels did not change among the volunteers in the raisin and in the raisin and exercise group. This study also looked at the effect of these interventions on inflammatory cytokines. Subjects in the raisin group had significantly lower levels of TNF-α and sICAM-1.

TNF-α is a powerful pro-inflammatory cytokine. Reducing TNF-α could potentially prevent progression of inflammatory damage. sICAM-1 is a cellular adhesion molecule. Lower levels of this sICAM-1 could potentially prevent progression of atherosclerosis by decreasing adhesion of monocytes to the vascular endothelium.

None of the diets containing raisins mentioned above increased triglyceride levels. This is important because it is often assumed that increasing intake of carbohydrates, often consumed in their refined, low-fiber form, and lowering intake of fat adversely affect serum triglycerides.

However, carbohydrates rich in fiber and phytochemicals do not have this effect. Spiller *et al* fed volunteers a typical Western diet for 3 weeks and then switched their diet to a NCEP (National Cholesterol Education Program) Step 1 diet supplemented with raisins and whole wheat raisin bread for 13 weeks. Triglyceride levels were 19% lower (non-significant) than baseline values. ***These results suggest that carbohydrates rich in fiber and phytochemicals such as sun-dried raisins do not increase triglyceride levels.***

In summary, raisins are a good source of both fiber (soluble and insoluble) and polyphenols. Raisins, as part of a diet high in whole and unrefined foods, have a beneficial effect on lipid levels. The addition of raisins to the a daily diet has been shown to lower total and LDL cholesterol levels, reduce markers of inflammation, increase plasma antioxidant capacity and lower circulating levels of oxidized LDL, a marker of coronary heart disease risk.

Cancer causes over 550,000 deaths each year, making it the second leading cause of death in the United States, after heart disease. Lung cancer accounts for the majority of these mortalities, while prostate cancer and breast cancer rank second among men and women, respectively, before colorectal cancer.123 While these statistics are sobering, cancer is in part a preventable disease: it is

estimated that nearly one-third of all cancer deaths in the United States could be avoided through appropriate dietary modifications. Raisins are fruits with unique nutrient value that offer a convenient step towards healthier eating.
Epidemiological studies have consistently shown that diets rich in fruits and vegetables help prevent many types of cancer. The inverse association between fruit and vegetable consumption and cancer incidence is strikingly consistent, and has led organizations around the world to recommend that populations increase their daily intake of these foods. Many components found in fruits and vegetables have been proposed as candidates for the observed protective effects, such as soluble and insoluble fiber and, more recently, polyphenolic compounds, particularly flavonoids. ***Raisins are an important dietary source of both of these cancer-protective compounds.*** Health benefits of fiber in raisins, including its potential cancer protective effect, are discussed in section VII, iii.
Although it is not well understood exactly how flavonoids work in the body to prevent cancer, they appear to affect the various stages of carcinogenesis: cancer initiation, promotion and progression. Flavonoids are potent antioxidants *in vitro* and are able to scavenge a wide variety of reactive molecules that can harm cell constituents. They have been shown to repair DNA damage; modulate nuclear receptors and gene expression; stimulate or inhibit enzymes that detoxify or activate carcinogens, and influence the cell cycle, signaling pathways and angiogenesis. A number of reviews have described the above mechanisms in detail. The main flavonoids present in raisins are the flavonols quercetin and kaempferol. Quercetin inhibits carcinogen-induced cancer in many animal models. In cell culture studies, quercetin suppresses the growth of ovarian, prostate and breast cancer cells and inhibits proliferation of ovarian and lung tumor cell lines. The exact molecular pathways that explain these effects are yet to be established, but may involve stimulating the production of the antiproliferative transforming growth factor β1; inhibiting cell growth and inducing apoptosis (programmed cell death) in damaged cells.
Despite considerable experimental evidence supporting the notion that certain flavonoids have anti-carcinogenic activity, data from human population studies are still limited. Reviews on epidemiological studies conclude that, while there is only modest evidence that total flavonoid intake is inversely associated with cancer risk; the evidence is stronger for an association between the intake of quercetin and the risk for lung and colorectal cancers. Recent studies are consistent with this assessment. A population-based, case-controlled study in California showed that intake of certain flavonoids including catechins; epicatechins, quercetin and kaempferol were inversely associated with lung cancer risk among tobacco smokers, but not among non-smokers. A large prospective, case-controlled study in Scotland found a 27% reduction in colorectal cancer risk in people with the highest

quartile of flavonol intake when compared to those with the lowest intakes. The reduction in risk was 32% when comparing quercetin intakes. A series of multi-center, case-control studies conducted in Italy between 1991 and 2005 analyzing the relationship between intake of the six main classes of flavonoids (isoflavones, anthocyanins, flavan-3-ols, flavanones, flavones and flavonols) and the risk of different types of cancers further supports a protective effect for flavonols. Investigators found a reduced risk of developing ovarian cancer, breast cancer, oral and pharyngeal cancers, and colorectal cancer with higher intakes of selected flavonoids including flavonols. No association was found for prostate cancer risk. Investigators evaluating prospectively the association between intake of flavonoids and colorectal cancer in 71,976 women from the Nurse's Health Study and 35,425 men from the Health Professionals Follow-Up Study found no significant association with intakes of flavonols, including quercetin and kaempferol. The Multiethnic Cohort Study in Hawaii and California looked at the association between intake of three flavonols (quercetin, kaempferol and myricetin) and the incidence of pancreatic cancer among 183,518 participants. While intake of total flavonols was associated with a significantly lower cancer risk, kaempferol showed the greatest preventive effect. It is noteworthy that in a prospective study of fatal pancreatic cancer among 34,000 California Seventh-day Adventists, the higher levels of dried fruit consumption (raisins, dates and other) were associated with a highly significant protective effect on pancreatic cancer risk (< 1 times per month = 1.0; 1-2 times per month 0.47; ≥ 3 times per week 0.35, trend $p = 0.009$). These data provide support for the limited but growing epidemiologic evidence that certain flavonoids are associated with a lower risk of cancer. Therefore, foods rich in flavonoids may be important determinants of cancer risk in the population.
Only one animal study has investigated the anti-cancer effect of raisin-containing diets.
Dannenberg fed cancer-susceptible mice diets made to contain 1% and 10% raisins for 70 days.
Mice on the raisin diets had about one third less tumors ($p < 0.047$) than mice on the control diets. There was no dose response since both concentrations caused similar tumor inhibition.
The apparent effectiveness in preventing intestinal cancer could be due to their relatively high fiber content in addition to their flavonoid content.
Diets high in fruits and vegetables have been associated with a lower risk of developing cancer and other chronic diseases. Over the years, many phytochemicals, bioactive compounds that contribute to these benefits, have been identified and studied. Scientists believe that it is the additive and synergistic effect of phytochemicals in fruits and vegetables that are responsible for their anticancer activity.147 148 The benefit of a diet rich in fruits and vegetables is a

result of the complex mixture of phytochemicals present in them. Raisins, with their unique combination of nutrients, polyphenols and fiber are an important ingredient of a dietary strategy for optimal health.

Diabetes is the 7th leading cause of death in the United States. An estimated 20.8 million people in the US – 7% of the population – have diabetes, a serious, life-long condition. Overall, the risk of death among people with diabetes is about twice that of people without diabetes of similar age. Diabetes also increases the risk of heart disease and complications include damage to the retina, kidneys and peripheral nerves. Controlling blood sugar levels and keeping these closer to normal values will lower the risk of disease and death from complications. Since dietary carbohydrates have the most direct impact on blood sugar levels, controlling the amount of carbohydrate consumed per meal is the focus of diabetes nutrition management.

Raisins, like all commonly consumed fruits, provide carbohydrates as the only caloric macronutrient; many questions arise as to when and how much fruit should be consumed. The American Diabetes Association recommends following a dietary pattern, which includes carbohydrates from fruits, vegetables, whole grains, legumes and low-fat milk, as well as monitoring dietary carbohydrates, whether by carbohydrate counting, exchanges or experience-based estimates, to achieve glycemic control. The use of the Glycemic Index in addition to the consideration of total carbohydrate may provide an added benefit. Of course, frequent blood glucose monitoring is strongly recommended, as it indicates which foods, physical activities and/or meal times elevate blood glucose levels. Individuals diagnosed with diabetes should work with a registered dietician to create a meal plan that accommodates the patient's weight, medication, carbohydrate needs and lifestyle.

As with the general population, people with diabetes are encouraged to consume a variety of fiber-containing foods. The nutritional guidelines proposed by the general public's healthy-lifestyle recommendations are also appropriate for those with type 2 diabetes. They are therefore encouraged to consume fruits, including raisins. It is no surprise then that raisins feature prominently in recipes promoted by the American Diabetic Association.

In addition to their high antioxidant activity and dietary fiber content, raisins have a low to moderate Glycemic Index – a measure of how a food affects blood sugar levels. These three factors are important tools in diabetes management.

Raisins could be useful for both athletes and people with impaired glucose tolerance because they provide energy to fuel physical activity without causing excessive increases in the postprandial blood glucose or insulin response. The GI is a measure of how a food affects blood sugar levels. The GI of raisins was first assessed at 64 □} 11 (glucose =100) in a study

involving 6 healthy, non-diabetic individuals. A more recent study measured raisin GI and Insulin Index in 10 sedentary adults, 10 pre-diabetic individuals, and 11 endurance athletes.
The GIs, using glucose as the reference food, were 49.4 ☐} 7.4, 49.6 ☐} 4.8 and 62.3 ☐} 4.8, respectively . The Insulin Index was 47.3 ☐} 9.4, 54.4 ☐} 8.9 and 51.9 ☐} 6.5 for these groups . This is important because high fasting and/or postprandial insulin levels can increase cholesterol synthesis and impair fat mobilization from adipose tissue. Kern *et al*
calculated a raisin GI of 62 in 8 endurance-trained cyclists, a value which is consistent with those above.
The GI is determined by measuring the postprandial (2-3 hours) increase in blood glucose resulting from ingesting a portion of food containing 50 grams of available carbohydrate. The incremental area under the curve (AUC) is calculated for the test food and divided by the incremental AUC achieved from ingestion of 50 grams of carbohydrate from a reference food (i.e. white bread, glucose solution) and expressed as a percentage.
GI = Blood glucose AUC from test food X 100
Blood glucose AUC from reference food
The Insulin Index is calculated in a similar way, though sometimes energy, rather than the carbohydrate content of the meal, is used to standardize the equation.

The actual raisin GI value was 88, obtained using white bread as a standard.

Foods with high fiber content generally have a low GI. However, other factors also contribute to a food's glycemic response, such as the type of carbohydrate or sugar present, the physical characteristic of the food matrix and the presence of organic acids. For example, one study found considerable differences in blood glucose response between processed snack meals (chocolate-coated candy bar or a cola drink with crisps) and whole-food snack meals (raisins and peanuts or bananas and peanuts), which were designed to provide equal amounts of fat and energy. Peak glucose concentrations tended to be higher after the candy bar snack and the cola drink snack than after either of the peanut snacks. Plasma insulin levels were significantly lower after the raisin-peanut snack than after the candy bar and cola drink snack. The area under the insulin curve was 68%, 75% and 52% lower after the raisin-peanut snack than after the candy bar, the cola drink and the banana-peanut snacks, respectively. The comparison between the raisin-peanut snack and the banana-peanut snack is particularly interesting, since both meals had similar total carbohydrate, sugar, fat and protein content. Factors thought to contribute to raisins' lower glycemic response were the viscous texture of its food matrix when

chewed; the presence of tartaric acid and the type of sugar present (about 50% fructose).

In conclusion, all studies assessing raisin GI show that raisins are a low to moderate GI food and that the insulin response is proportional to their GI.

Given the potential for flavonoids to protect the body against free radicals and other oxidative compounds, it is biologically plausible that consumption of flavonoids or flavonoidrich foods such as raisins may reduce the risk of diabetes.

Several small dietary intervention trials have shown that eating flavonoid-rich foods is associated with a significant increase in flavonoid levels in the blood of diabetic patients.

Flavonoids are potent antioxidants because they function as free radical scavengers and metal chelators. It has been hypothesized that free radicals may contribute to autoimmune destruction of pancreatic β-cells, leading to diabetes and impaired insulin action. Flavonoids may preserve β-cell function by reducing oxidative stress-induced tissue damage and so protect against the progression of insulin resistance to type 2 diabetes.

Three large epidemiological studies have investigated the relationship between dietary flavonoids and development of type 2 diabetes. Knekt examined the association between flavonoid intake and the incidence of a variety of chronic diseases, including diabetes, using data from the Finnish Mobile Health Examination Survey. A lower risk of type 2 diabetes tended to be associated with higher quercetin and myricetin intakes. Adjustments for cardiovascular disease risk factors or dietary sources did not alter the results. However, the Women's Health Survey, a large prospective study of American middle-aged and older women, found no association between risk of type 2 diabetes and intake of either total or individual flavonoids as well as of most flavonoid-rich foods. In a subset of 344 non-diabetic women, total flavonoid intake was not significantly related to plasma insulin levels. Results from this study are consistent with those from the Iowa Health Study of postmenopausal, predominantly white women where investigators found no association between flavonoid intake and the incidence of diabetes. A possible limitation of these studies is the small variation in the participants' intake of flavonoids and flavonoid-rich foods. Also, flavonoids consist of more than 4,000 different compounds, but quantitative information is only available on a handful of them in food composition databases. Further research is evidently needed before firm conclusions can be drawn regarding the role of dietary flavonoids in the development of type 2 diabetes.

Snacks are an important part of a child's diet. Young children need more frequent meals than adults and need snacks between meals to support growth and development. However, the snack's nutritional value should take precedence over its caloric content. Overweight and obesity in children have become the most

prevalent nutritional problem in the US. Since the 1980s, the rates have doubled for children and tripled for adolescents. More than 15% of all 6 to 19 year olds are overweight. Childhood obesity is often referred to as an epidemic in both the medical and nutrition community settings.

A mid-morning and a mid-afternoon snack should be an opportunity to increase a child's intake of dairy, fruits and vegetables. A healthy snack will also cut down on the feeling of hunger and overeating at meal times. ***The American Dietetic Association158 lists raisins among "The Perfect Snack," foods that provide energy and also help meet nutritional needs. The Committee on Nutrition Standards in Schools, in their recommendations for snacks, foods and beverages offered in schools, has designated raisins as a Tier 1 Food. Tier 1 Foods "provide important health benefits that warrant encouraging consumption by school-age children, and do not exceed levels of certain nutrients and compounds that may be unhealthful for school-age children when consumed in excess."***

Healthy snacks should be promoted among children participating in sport activities. Too often children are provided with high sugar snacks and drinks, with little nutrient value beyond energy, that override the benefits of exercising. ***Raisins either alone or with nuts have been shown to maintain steady glucose levels and support the demand for energy during sports activities in young soccer players*.**

Carbohydrate-rich foods enhance endurance and performance when eaten either before or during exercise. They help promote carbohydrate availability and maintain blood glucose levels.

Although not all studies agree, research suggests that pre-exercise carbohydrate snacks of low to moderate glycemic index (GI) are more effective in enhancing performance than high GI ones. ***Raisins, an excellent source of carbohydrates and a moderate GI food, are the ideal pre-exercise snack to provide sustained energy and ensure optimal athletic performance***.

A recent study compared raisins to a commercial, sucrose-based, high GI sports gel to see if one offered cyclists a performance advantage. Researchers fed endurance-trained cyclists the equivalent of either 3 one-ounce gel packs or 2 small boxes of raisins, 45 minutes before exercising. Both snacks supplied about the same amount of carbohydrates (1 gram of carbohydrate per kilogram of body weight), to supply the readily available fuel needed for strength and endurance. Despite the differences in GI, both snacks elicited similar metabolic responses after 45 minutes of exercise. There was no difference in performance during a subsequent 15-minute exercise bout. The researchers concluded that raisins, being less expensive than sports gels and a source of naturally occurring nutrients, offer an advantage to those athletes desiring a "food first" approach to nourishment. Furthermore, they commented, the benefits of raisin-nut based trail mixes should be studied because

research suggests that adding protein in post-exercise feedings may be useful during recovery.

Research shows that carbohydrate-rich foods fed prior to exercise enhance endurance performance. Raisins are a nutritious, cost-effective source of carbohydrate, an excellent choice to prepare an athlete for the upcoming activity. Raisins may promote healthy teeth and gums. Contrary to longstanding popular perception that raisins promote cavities, recent studies indicate that raisins may benefit oral health. Phytochemicals found in raisins may benefit oral health by fighting bacteria that cause cavities and gum disease. Oleanolic acid, oleanolic aldehyde and 5-(hydroxymethyl)-2-furfural have been shown to inhibit the growth of two species of oral bacteria: Streptococcus mutans, which cause cavities, and Porphyromonas gingivitis, which causes periodontal disease.

These compounds were found to be effective at concentrations ranging from about 200mcg to 1,000mcg per ml. Two other compounds isolated from raisins, betulin and betulinic acid, also exhibit antimicrobial activity, but much higher concentrations are needed to achieve similar effects. At concentrations of 31mcg per ml, oleanolic acid also blocks the adherence of S. mutans to experimental surfaces. This quality is significant because adherence is bacteria's first step in forming dental plaque, the film that accumulates on teeth.

Raisins have been thought of as cariogenic foods because they are sweet and sticky.

However, recent research has shown that perceived "stickiness" bears little relationship to the actual retention of food particles on tooth surfaces (or objective measures of tooth retention) and the clearance of food-derived sugars from saliva. In these studies, ***raisins have been shown to exhibit rapid clearing rates, placing them among the least retentive foods within a sample of 21 commercially available snack foods.***

Finally, ***the predominant sugars in raisins are fructose and glucose, with minimal amounts of sucrose***. Studies comparing the cariogenicity of different sugars (sucrose, maltose, lactose, fructose and glucose) invariably demonstrate that sucrose, more than any other type of sugar, induces the most smooth-surface-type and fissure-type caries.

Papaya

The health benefits of fruits and vegetables can not be equated to that promised by nutritional pills and supplements. Nutrition experts advocate generous intake of fruits for optimum health as these food items are loaded with all the benefits. Fruits are goldmine of vitamins, minerals and fibre and are ideal to consume at least 4-5 servings in a day. Since they are in the natural form, account for largest part of water and 100% bad cholesterol free, it's much easier for the body to process and absorb the vitamins and minerals from the fresh fruit.

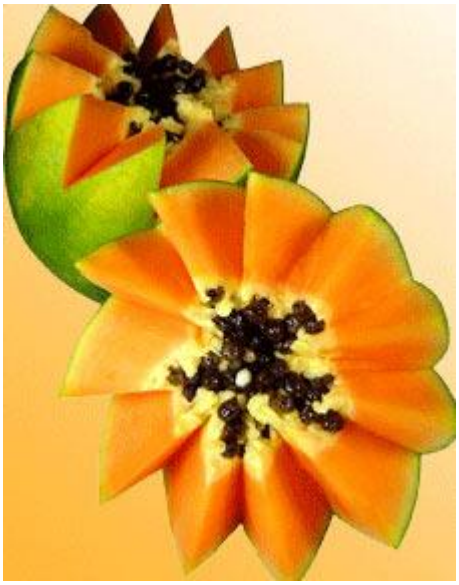
Yellow and orange fruits and vegetables contain varying amounts of antioxidants such as vitamin C as well as carotenoids and bioflavonoids, two classes of phytochemicals that scientists are studying extensively for their health-promoting potential. In addition, a new scientific base is emerging to support a protective role for this group of fruits and vegetables in prevention of cataract formation, chronic obstructive pulmonary disease, diverticulosis, and possibly, hypertension.

"Papaya" is recommended to be one such pick from the group of Yellow and orange fruits, which promises abundant health benefits. It is a melon like fruit with yellow- orange flesh with dozens of small black seeds enclosed in skin that ranges in color from green to orange. Papaya has high nutritional benefits. It is rich in Anti-oxidants, the B vitamins, folate and pantothenic acid; and the minerals, potassium and magnesium; and fiber. Together, "these nutrients promote the health of the cardiovascular system and also provide protection against colon cancer." In addition, papaya contains the digestive enzyme, papain, which is used like bromelain, a similar enzyme found in pineapple, to treat sports injuries, other causes of trauma, and allergies. Vitamin C and vitamin A, which is made in the body from the beta-carotene in papaya, are both needed for the proper function of a healthy immune system. Papaya may therefore be a healthy fruit choice for preventing such illnesses as recurrent ear infections, colds and flu.

This highly loved tropical fruit was reputably called "The Fruit of the Angels" by Christopher Columbus. In the 20th century, papayas were brought to the United States and have been cultivated in Hawaii, the major U.S. producer since the 1920s. Today, the largest commercial producers of papayas include the United States, Mexico and Puerto Rico.

Gluten refers to a group of proteins that are difficult for humans to digest. One group of proteins called gliadin is thought to do most of the damage to the intestinal lining. Glutenins are another group of proteins found in gluten and thought to be associated with autoimmune skin diseases and asthma. Gluten proteins are extremely resistant to intestinal digestion, despite grinding, cooking, processing and digestion.

Nutritive value of Papaya : Per 100 gm.



- VITAMINS

o Vitamin A : 1,750 I.U
o Vitamin B : Thiamine 0.03 mg.
o Riboflavin : 0.04 mg.
o Niacin : 0.3 mg.
o Vitamin C : 56 mg.
o Also contains Vitamin E and K.

- MINERALS

o Calcium : 20 mg.
o Iron : 0.3 mg.
o Phosphorus: 16 mg.
o Potassium : 470 mg.

- FAT : 0.1 gm.
- CAROHYDRATES : 10gm.
- PROTEIN : 0.6gm.
- CALORIES : 39

Reported Health Benefits of Papaya

- Papaya contains the digestive enzyme papain and therefore valuable for aiding digestion.
- The unique protein-digesting enzymes; papain and chymopapain have been shown to help lower inflammation and to improve healing from burns in addition to helping in digestion of proteins. The antioxidant nutrients found in papaya, including vitamin C, vitamin E, and beta-carotene, are also very good at reducing inflammation.
- The ripe fruit is easily digestible and prevents constipation.

- Case studies indicate that this food taken alone for two or three days has a highly beneficial tonic effect upon the stomach and intestines.
- The juice of the papaya aids in relieving infections of the colon and has a tendency to break down pus and mucus reached by the juice.
- May help prevent cancer in organs and glands with epithelial tissue (ripe papaya). Papaya's fiber is able to bind to cancer-causing toxins in the colon and keep them away from the healthy colon cells. In addition, papaya's folate, vitamin C, beta-carotene, and vitamin E have each been associated with a reduced risk of colon cancer
- Prevents nausea (includes morning sickness and motion sickness)
- The seeds are antihelmintic, for expelling worms and they are given with honey. Chew and swallow two teaspoonfuls of seeds after each principal meal (three times a day).
- Papayas may be very helpful for the prevention of atherosclerosis and diabetic heart disease. Papayas are an excellent source of vitamin C as well as a good source of vitamin E and vitamin A (through their concentration of pro-vitamin A carotenoid phytonutrients), three very powerful antioxidants.
- Papayas are also a good source of fiber, which has been shown to lower high cholesterol levels.

Guava

The health benefits of guava include treatment of diarrhea, dysentery, constipation, cough, cold, skin care, high blood pressure, weight loss, scurvy, etc.

Many of you might have tasted this mouth-watering treat, or at least have seen it or heard about it. Guava is very common in Asian countries. It is a good looking pear shaped or round shaped seasonal fruit, light green or yellow or maroon in color from outside when ripe, with white or maroon flesh and lots of small hard seeds enveloping very soft and sweet pulp. It is eaten raw (ripe or semi-ripe) or in form of jams and jellies. This attractive fruit is a real storehouse of nutrients. If it is "An apple a day keeps the doctor away" in Europe and Americas, it must be "A few guavas in the season keeps the doctor away for the whole year" in the Indian Subcontinent and places where guavas grow. Its scientific name is Psidium Guajava.

Let me share some of its brilliant health benefits with you.

- **Diarrhea & Dysentery:** Guava is very rich in astringents (compounds those make your gums feel tighter and fresh after you chew guava leaves or eat a raw guava or use some toothpaste) which binds up loose bowels in diarrhea. These astringents are alkaline in nature and have disinfectant and anti-bacterial properties, thus help cure dysentery by inhibiting microbial growth

and removing extra mucus from the intestines. Further, other nutrients in guava, such as vitamin-C, Carotenoids and potassium strengthens and tones up the digestive system and disinfect it. Guava is also beneficial in gastroenteritis due to reasons stated above.

- **Constipation:** Guava is one of the riches sources of dietary fiber. Its seeds, if ingested whole or chewed, serve as excellent laxatives. These two properties of guava help forming bowels, retaining water and clean your intestines and excretory system thoroughly. It is said that single constipation can lead to seventy two types of ailments. It is absolutely true. Every way to your total health goes through proper digestion and more importantly, proper excretion. Guava ensures both of these.
- **Cough & Cold:** Juice of raw and immature guavas or decoction of guava-leaves is very helpful in giving relief in cough and cold by loosening cough, reducing mucus, disinfecting the respiratory tract, throat and lungs and inhibiting microbial activity due to its astringent properties. Guava is one of richest in vitamin-C and iron which are proven to be preventive against cold and viral infections. In some areas in India, roasted ripe guava is used as a remedy against extreme cases of cough and cold and congestion.
- **Skin Care:** Guavas can help improve your skin texture and avoid skin problems more than the best of beauty creams or skin toner gels can do. This is chiefly due to the abundance of astringents in its fruits (more in immature ones) and in leaves. You can benefit from it either by eating the fruits (this help tighten your muscles apart from your skin) or by washing your skin with the decoction of its immature fruits and leaves. It will tone up and tighten the loosened skin. In addition to the astringents, guava is very-very rich in vitamin-A, B, C and potassium which are very good anti oxidants and detoxifiers and keep your skin glowing and free from aging, wrinkles and other disorders.
- **High Blood Pressure:** Guava helps reduce cholesterol in blood and prevents it from thickening, thereby maintaining fluidity of blood and reducing blood pressure. Studies have shown that food stuffs which lack fiber (such a refined flour) add to blood pressure, due to quick conversion to sugar. Guava, being very rich in fiber and hypoglycemic in nature, helps reduce blood pressure.
- **Weight Loss:** Guava is very helpful for those who want to lose weight without compromising with their intake of proteins, vitamins and fiber. Guava, being very high in roughage and very rich in vitamins, proteins and minerals, but with no cholesterol and less digestible carbohydrates, is very filling and satisfies appetite very easily. Just have a medium sized guava in the lunch and you will not feel hungry till night. But ironically, it helps

gaining weight in lean and thin people. This is probably due to its richness in nutrients, which keeps your metabolism right helping proper absorption of nutrients.

- **Scurvy:** Guava can outdo many other fruits, including orange and other citrus fruits, when it comes to concentration of vitamin-C, whose deficiency causes scurvy and which is the only remedy to it. It contains five times the vitamin-C in oranges.
- **Other Benefits:** Where to begin? Shall I start with the fact that guava helps control diabetes, protects prostrate, its Lypocene reduces the risk of cancer, the juice of the leaves cures toothache, swollen gums & oral ulcers, heals wounds when applied externally, convulsions, epilepsy, bacterial infections and so on and so forth.

Nutritional Value of Guava

Given below is the amount of nutrients present in 1 cup (165 gm) of Guava, apart from Iron and Folic Acid:

- Calcium - 50 mg
- Carbohydrates - 19.6 gm
- Fiber - 8.9 gm
- Niacin - 2 mg.
- Phosphorus - 48 mg
- Protein - 1.35 gm
- Total Fat - 0.9 gm
- Vitamin A - 412 IU
- Vitamin B - 1.15 mg
- Vitamin C - 498 mg
- Calories - 84

Health & Nutrition Benefits of Eating Guava

- Guava is a very good source of vitamins, fibers as well as minerals.
- Being rich in Vitamin C; guava is effective in treating male infertility caused by sperm clumping, adhesion and other abnormalities.
- Guava has been associated with healing of wounds, when applied externally.
- Guava has general haemostatic properties and can be used for treating bleeding nose, gums and minor internal hemorrhaging.
- Guava helps cure dysentery, by inhibiting microbial growth and removing extra mucus from the intestines.

- Guava helps the body in combating free radicals produced during metabolism and aids in preventing age-related chronic diseases, such as Alzheimer's, cataract and rheumatoid arthritis.
- Guava is one of the richest sources of dietary fiber and thus, is good for those suffering from constipation.
- Guava strengthens and tones up the digestive system and even disinfects the same.
- Guava, having high content of roughage, no cholesterol & less digestible carbohydrates, is good for those trying to lose weight.
- Guavas can improve the texture of skin and help avoid skin problems. For the purpose, you can either eat it raw or make wash your skin with a decoction of its immature fruits and leaves.
- Juice of raw and immature guavas or decoction of guava-leaves is known to bring relief in cough and cold.
- Researches have shown that guava is pretty effective in preventing cancer and even heart diseases in people.
- The presence of complex carbohydrates and dietary fibers in guava makes it effective in lowering cholesterol and blood sugar levels.
- The presence of Vitamin C and other phytonutrients, such as caretenoids, isoffavonoids and polyphenols, in guava has led to it being an effective antioxidant.

Guava has been found to be beneficial for people suffering from the following ailments:

- Acidosis
- Asthma
- Bacterial Infections
- Catarrh
- Congestion of the Lungs
- Convulsions
- Epilepsy
- High Blood Pressure
- Obesity
- Oral Ulcers
- Poor Circulation
- Prolonged Menstruation
- Scurvy
- Swollen Gums
- Toothache

Pomegranate

Pomegranates are a superfood full of cancer-fighting antioxidants. Pomegranate health benefits range beyond fighting cancer, however, aiding the whole body.

Pomegranate Health Benefits

The human body contains free radicals, which are unstable molecules that can damage DNA and cell membranes. This most often leads to cancer and other diseases such as Alzheimer's. Antioxidants fight these free radicals and prevent these diseases. Eating pomegranates, which contain antioxidants such as polyphenols, tannins and anthocyanins, can therefore lower a person's risk of cancer, Alzheimer's and premature aging.

Furthermore, these antioxidants clear arteries of plaque, preventing heart disease and lowering blood pressure and the risk of stroke. They also lower the bad kind of cholesterol (LDL) in the body. Consuming pomegranates or pomegranate products also reduces dental plaque build-up, which helps decrease the chance of bad breath and gum disease.

In addition to antioxidants, pomegranates contain an element that combats the enzyme that eats away at cartilage. This delays the onset of osteoarthritis. The fruit also contains anti-inflammatory qualities which would treat the disease after onset. Recent studies also should that eating pomegranates can increase libido in both men and women.

Pomegranate Products

The most direct means of consuming pomegranate is, of course, through eating the fruit itself. In the United States, fresh pomegranates become available from September to December – contributing the fruit's nickname as the "jewel of winter." A person trying pomegranate for the first time, however, may be intimidated by the fruit, not knowing how to eat it properly. In order to get at the good stuff, she should make vertical incisions in the rind and pry the fruit open. This will expose the seeds, which she can then pluck from the white membrane and eat whole.

f this seems like too much work, pomegranate juice health benefits rank equally with the fruit itself. This is a tasty alternative also containing many antioxidants. Those who wish to consume the pomegranate in this form can either press the seeds themselves or look into purchasing the juice from companies like Pom Wonderful. This is also a cheaper alternative to purchasing the fruit, which can be expensive in some cases.

Dried Sugar Cane Juice

No doubt sugarcane is sweet to taste but there is much more than the unique plant grown in the sub-tropical regions. India is the second largest producer of sugarcane and it is therefore an economical juice of fruit juice in summer seasons.

Best tasted, when served with hints of rock salt and lemon juice, sugar cane juice can be enjoyed throughout the year and is well known to quench thirst in dry humid tropical weathers of India.

The health benefits of this fruit are numerous. It most amazing thing is that this sweet thing can be drunk by diabetic patients as well. It has a low glycemic index; this means that one may have a sugar cane drink without worrying much about the huge calorie intake that comes with sweet drinks.

It is especially helpful in summer where it provides body with much needed hydration. It solublizes in body quickly and therefore provides instant energy to the body. Sugar cane is a rich source of carbohydrates.

It has been known to strengthen gastrointestinal system and provides nutrition even if a meal of the day is skipped. It is a good home remedy for people facing trouble with urination. It decreases acidity of the urine. Provides relief in conditions of enlarged prostate, cyctitis and nephritis.

It is one of those few juices that can provide substitute to protein shakes. The sugar cane provides body with proteins, especially in condition of Febrile disorders where, there occur a considerable amount of protein loss by the body.

The jaundice patients are asked to liberally take sugarcane since it provides fast recovery.

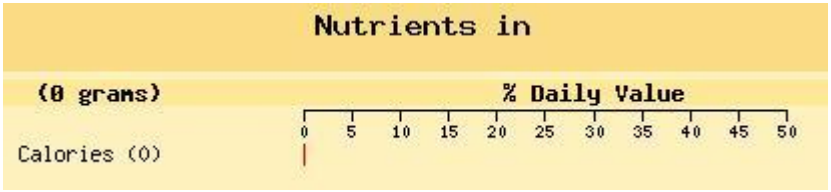
It also has the capability to fight carcinogenic cells. Researches have shown results that support sugar cane to fight breast cancer and prostate cancer.

Regular intake has also shown to strengthen organs such as sex organs, kidney and heart.

Cane juice

Evaporated cane juice is a healthy alternative to refined sugar. While both sweetners are made from sugar cane, evaporated cane juice does not undergo the same degree of processing that refined sugar does. Therefore, unlike refined sugar, it retains more of the nutrients found in sugar

cane. Cane juice is available throughout the year.



This chart graphically details the %DV that a serving of Cane juice provides for each of the nutrients of which it is a good, very good, or excellent source according to our Food Rating System. Additional information about the amount of these nutrients provided by Cane juice can be found in the Food Rating System Chart. A link that takes you to the In-Depth Nutritional Profile for Cane juice, featuring information over 80 nutrients, can be found under the Food Rating System Chart.

Health Benefits

Face it - every once in a while people just have to have something sweet. So what do you reach for? Hopefully not for the white, refined sugar. Studies have shown that the use of this over-processed food product is associated with such debilitating conditions as adult-onset diabetes and colon cancer. Avoiding foods with white sugar is probably a good idea. So what are the options - artificial sweeteners? Well, the problem there is that certain artificial sweeteners may be even worse for your health than white sugar. Some people attribute negative side effects such as headaches, poor concentration, and even conditions like Attention Deficit Disorder and auto-immune diseases to some of these products. Others have been shown in some animal studies to increase risk of illnesses like cancer.

So it seems like you have to deny your need for sweets or choose between the frying pan and the fire, right? Well, fortunately, there is another option. Certain sweeteners are more natural and less refined than the standard white table sugar crystals. One of those sweeteners is natural dried cane juice. The use of this substance (in moderation of course) has not been associated with any negative side effects or dangerous medical conditions. So you don't have to deny your needs for something sweet and tasty. As long as you use it sparingly, dried cane juice is a natural source of sweetness that can be a part of a healthy diet.

Description

Evaporated cane juice can be used just like sugar for sweetening foods and beverages as well as in cooking. Since it is considered to be more wholesome, it is also used as a sweetener in a host of processed, natural foods. It may also be known by a variety of other names including dried cane juice, crystallized cane juice, milled cane sugar and direct consumption sugar. In Europe it is known as "unrefined sugar".

Evaporated cane juice is available in a variety of forms that vary in texture and flavor, although they share the characteristic of being darker in color than white refined sugar:

- Milled Cane: small grained crystals with a golden color and subtle molasses flavor

- Demerara: coarser grained, slightly sticky crystals that feature a noticeable molasses flavor

- Muscovado: very fine crystal sugar that has a very distinctive molasses flavor.

Although not technically considered an evaporated cane juice, raspadura (also known as rapadura or panela) is another alternative natural cane sugar that has its traditional roots in Latin American countries. Rapadura undergoes even simpler processing than evaporated cane juice with the sugar cane being simply boiled to remove its water content.

History

The history of evaporated cane juice runs mostly parallel to the history of sugar since it only recently that refinement technology was developed that created methods of processing sugarcane so as to create white, refined sugar. For much of history, what we call evaporated cane juice was the sweetener of choice by all of the different cultures that used sugarcanes.

The domestication of sugarcane is ancient, originating in New Guinea about 10,000 years ago. This plant spread westward throughout the globe, being widely grown in India. Yet, it was not until the Moors, who had learnt from the Indians the secrets of how to process sugarcane into sugar, conquered Spain in the 8th century that sugar began its expansion into Europe. The type of sugar produced varied in color, size, form and molasses content depending upon the exact processing techniques used and the preference of the region in which it was produced. Christopher Columbus is credited with introducing sugar into the New World and the European countries quickly introduced sugarcane cultivation into their colonies in South America and the Caribbean Islands.

In the last few centuries, sugar refineries were built and there was a move towards the creation of refined sugar, often referred to as "white gold". It has only been recently, in the United States, that there has been a renewed interest in these more natural and less processed form of sugar cane, owing to an increased focus on whole foods and nutrition.

How to Select and Store

Choose the form of evaporated cane juice that best suits your taste preferences and cooking needs. Remember that demerara and muscavado have a deeper molasses flavor than milled cane juice.

Evaporated cane juice should be stored in a tightly sealed container in a cool, dry place where it will keep indefinitely.

How to Enjoy

For some of our favorite recipes, click Recipes.

A few quick serving ideas:

Use evaporated cane juice in place of sugar when sweetening coffee or tea.

Muddle fresh mint leaves, limes and cane juice and add this mixture to sparkling water to make a non-alcoholic version of a mojito, the popular Cuban drink.

Use cane juice in place of refined sugar for baking.

Sprinkle cane juice on top of a sliced grapefruit and broil.

Enjoy one of the favorite kids' classics - cinnamon toast - with a healthy twist. Drizzle flaxseed oil onto whole wheat toast and then sprinkle with cinnamon and cane juice.

Individual Concerns

Cane juice is not a commonly allergenic food and is not known to contain measurable amounts of oxalates or purines.

Cane juice, evaporated

In-depth nutrient analysis:

Cane juice, evaporated (Note: "--" indicates data is unavailable)		
amount	1.00 oz-wt	
total weight	28.35 g	
Basic Components		
nutrient	**amount**	**%DV**
calories	111.43	6.19

calories from fat	0.03	
calories from saturated fat	0.00	
protein	0.20 g	0.40
carbohydrates	27.40 g	9.13
dietary fiber	0.00 g	0.00
soluble fiber	0.00 g	
insoluble fiber	0.71 g	
sugar - total	25.71 g	
monosaccharides	0.00 g	
disaccharides	0.00 g	
other carbs	0.00 g	
fat - total	0.09 g	0.14
saturated fat	0.00 g	0.00
mono fat	0.00 g	0.00
poly fat	0.00 g	0.00
trans fatty acids	0.00 g	
cholesterol	0.00 mg	0.00
water	0.19 g	
ash	0.66 g	
Vitamins		
nutrient	**amount**	**%DV**
vitamin A IU	0.00 IU	0.00
vitamin A RE	0.00 RE	
A - carotenoid	0.00 RE	0.00
A - retinol	0.00 RE	
A - beta carotene	0.00 mcg	
thiamin - B1	0.00 mg	0.00
riboflavin - B2	0.16 mg	9.41
niacin - B3	0.20 mg	1.00
niacin equiv	-- mg	

vitamin B6	-- mg	--
vitamin B12	-- mcg	--
biotin	-- mcg	--
vitamin C	0.00 mg	0.00
vitamin D IU	-- IU	--
vitamin D mcg	-- mcg	
vitamin E alpha equiv	-- mg	--
vitamin E IU	-- IU	
vitamin E mg	-- mg	
folate	-- mcg	--
vitamin K	-- mcg	--
pantothenic acid	0.09 mg	0.90
Minerals		
nutrient	**amount**	**%DV**
boron	-- mcg	
calcium	32.57 mg	3.26
chloride	-- mg	
chromium	0.00 mcg	0.00
copper	0.09 mg	4.50
fluoride	-- mg	--
iodine	-- mcg	--
iron	0.57 mg	3.17
magnesium	2.49 mg	0.62
manganese	0.09 mg	4.50
molybdenum	-- mcg	--
phosphorus	0.01 mg	0.00
potassium	162.86 mg	4.65
selenium	-- mcg	--
sodium	-- mg	--
zinc	0.00 mg	0.00

Saturated Fats		
nutrient	**amount**	**%DV**
4:0 butyric	-- g	
6:0 caproic	-- g	
8:0 caprylic	-- g	
10:0 capric	-- g	
12:0 lauric	-- g	
14:0 myristic	-- g	
15:0 pentadecanoic	-- g	
16:0 palmitic	-- g	
17:0 margaric	-- g	
18:0 stearic	-- g	
20:0 arachidic	-- g	
22:0 behenate	-- g	
24:0 lignoceric	-- g	
Mono Fats		
nutrient	**amount**	**%DV**
14:1 myristol	-- g	
15:1 pentadecenoic	-- g	
16:1 palmitol	-- g	
17:1 heptadecenoic	-- g	
18:1 oleic	-- g	
20:1 eicosen	-- g	
22:1 erucic	-- g	
24:1 nervonic	-- g	
Poly Fats		
nutrient	**amount**	**%DV**
18:2 linoleic	-- g	
18:3 linolenic	-- g	
18:4 stearidon	-- g	

20:3 eicosatrienoic	-- g	
20:4 arachidon	-- g	
20:5 EPA	-- g	
22:5 DPA	-- g	
22:6 DHA	-- g	
Other Fats		
nutrient	**amount**	**%DV**
omega 3 fatty acids	-- g	--
omega 6 fatty acids	-- g	
Amino Acids		
nutrient	**amount**	**%DV**
alanine	-- g	
arginine	-- g	
aspartate	-- g	
cystine	-- g	--
glutamate	-- g	
glycine	-- g	
histidine	-- g	--
isoleucine	-- g	--
leucine	-- g	--
lysine	-- g	--
methionine	-- g	--
phenylalanine	-- g	--
proline	-- g	
serine	-- g	
threonine	-- g	--
tryptophan	-- g	--
tyrosine	-- g	--
valine	-- g	--
Other		

nutrient	amount	%DV
alcohol	-- g	
caffeine	-- mg	
artif sweetener total	-- mg	
aspartame	-- mg	
saccharin	-- mg	
sugar alcohol	-- g	
glycerol	-- g	
inositol	-- g	
mannitol	-- g	
sorbitol	-- g	
xylitol	-- g	
organic acids	-- mg	
acetic acid	-- mg	
citric acid	-- mg	
lactic acid	-- mg	
malic acid	-- mg	
choline	-- mg	--
taurine	-- mg	

Carob

Nutritional Value of Carob

Amount of Carob Flour: 1 cup
Total Weight of Carob Flour: 100 g

Nutrients	Amount
Basic Components	
Protein	4.8 g
Water	3.7 g
Ash	2.3 g
Calories	
Total Calories	229
Calories From Carbohydrate	204
Calories From Fat	6
Calories From Protein	19
Carbohydrates	
Total Carbohydrate	91.6 g
Dietary Fiber	41 g
Sugars	50.5 g
Fats & Fatty Acids	
Total Fat	0.7 g
Saturated Fat	0.1 g
Monounsaturated Fat	0.2 g
Polyunsaturated Fat	0.2 g
Total Omega-3 Fatty Acids	4.1 mg
Total Omega-6 Fatty Acids	218 mg
Vitamins	
Vitamin A	14.4 IU
Vitamin C	0.2 mg
Vitamin E (Alpha Tocopherol)	0.6 mg
Thiamin	0.1 mg
Riboflavin	0.5 mg
Niacin	2 mg
Vitamin B6	0.4 mg
Folate	29.9 mcg
Choline	12.3 mg
Minerals	

Calcium	358 mg
Iron	3 mg
Magnesium	55.6 mg
Phosphorus	81.4 mg
Potassium	852 mg
Sodium	36.1 mg
Zinc	0.9 mg
Copper	0.6 mg
Manganese	0.5 mg
Selenium	5.5 mcg

Nutrition and Health Benefits of Eating Carob

- Carob tannins contain Gallic acid that works as an analgesic, anti-allergic, antibacterial, antioxidant, antiviral and antiseptic.
- Carob improves digestion and lowers cholesterol level in the blood.
- It is used for treating diarrhea in children and adults alike.
- Since it does not contain caffeine, carob benefits people with high blood pressure.
- Regular use of carob helps in preventing lung cancer.
- The vitamin E content in carob helps in treating cough, flu, anemia and osteoclasis.
- The Gallic acid in carob helps in preventing and treating polio in children.
- Carob fights against osteoporosis, due to its richness in phosphorus and calcium.
- Carob pod husks are chewed by singers to clear the voice and throat.

Carob, or "Ceratonia Siliqua", is cultivated in the Mediterranean region. It is mostly cultivated in the eastern and southern area of Spain. It's natural habitat is Southern Anatolia, Cyprus, Syria, Greece, Spain, Morocco, Tunisia, Algeria, Israel and Libya. It is an evergreen tree with large and shiny leaves. It grows in warm climates and may live to be 120 years old. Carob contains carbohydrates, tannins, proteins, minerals and dietary fibers. It is included in dairy products, baked goods, snacks and cereal as dietary fiber.

New Testament. According to the legend, St. John subsisted on carob beans mixed with honey during his crossing of desert. Hence, it also known as Saint John's Bread. The seeds of carob is used to weight gold. It is eaten on the Jewish holidays and it's juice is consumed by Muslims during the Islamic month of Ramadan.

Most of the people in Israel know the carob tree (or locust tree) but they don't the benefits of it for health. This article covers the benefits of carob for health. Here is a great list of benefits of locust tree.

Improves digestion. Lowers cholesterol level in the blood. Carob seeds don't have a cholesterol agent. It acts as an antioxidant. It can be used to treat diarrhea in children and adults.
It contains an active substance that is effective against asthma. Carob is also used for asthma problems caused by allergies. It is a good expectorant. If the smokers use it for a few days, they will see how to expectorate. It doesn't contain caffeine. It works nicely for patients that have high blood pressure . It can help to prevent lung cancer, if used regularly.
It contains vitamins E and is used for the treatment of cough, flu, anemia and osteoclasis. Carob tannins have Gallic acid. Gallic acid is analgesic, anti allergic and antibacterial. It is also antioxidant, antiviral and antiseptic. It is used for the treatment of polio in children, as the Gallic acid in carob tannins helps to prevent polio. It is rich in phosphor and calcium. For this reason, it is used in the fight against osteoporosis.

Carob has historically been thought of as a spiritual stimulant, and total food for health, and strength.

Apple Pectin

A highly methoxylated apple pectin (HMAP) may counter changes in metabolism and cardiovascular health associated with the metabolic syndrome, according to a study from Spain.

Zucker rats, an animal model of genetic obesity and the human metabolic syndrome, fed a high-fat diet and supplemented with the pectin experienced similar cholesterol reductions as animals supplemented with beta-glucan, according to research published in the *Journal of Agricultural and Food Chemistry*.

"This finding is important because beta-glucan is a fibre with well-known hypocholesterolaemic effects, to the extent that the U.S. Food and Drug Administration allows cardiovascular risk reduction claims for oat beta-glucan," wrote the authors from the University Complutense and the Hospital Central de la Defensa (CDEAS) and Natraceutical company.

If the results can be repeated in humans, it may see HMAP establish itself as a health ingredient against metabolic syndrome, a condition that affects an estimated 15 per cent of adult Europeans, and a staggering 32 per cent of American adults.

"These results warrant evaluation in humans to determine if HMAP could be used as a functional ingredient to reduce lipid profile, insulin resistance, and other cardiometabolic risk factors," wrote the authors.

Metabolic syndrome (MetS) is a condition characterised by central obesity, hypertension, and disturbed glucose and insulin metabolism. The syndrome has been linked to increased risks of both type 2 diabetes and CVD.

Study details

The researchers divided 30 female Zucker rats into three equal groups, and fed them a standard diet (control group), or the standard diet supplemented with 10 per cent HMAP (apple pectin with 73 per cent methylation degree, provided by Obipektin, a division of Natraceutical), or the standard diet supplemented with beta-glucan (oat bran concentrate provided by Glambia Nutritionals) for seven weeks.

At the end of the study, a significant reduction in body weight, total cholesterol, triglycerides and blood glucose levels were observed in the HMAP group, compared to the beta-glucan group, report the researchers.

Furthermore, consumption of both fibres was associated with reductions in blood insulin levels and in the indices of insulin resistance and insulin secretion. Interestingly, these characteristics were similar in animals fed HMAP and lean control animals.

"It is worth mentioning that HMAP has demonstrated itself to be more efficient than beta-glucan in preventing some of these cardiovascular risk factors related to metabolic syndrome," wrote the authors.

"The difference in the chemical structure of HMAP and beta-glucan, responsible for their physical properties, may explain the more remarkable results obtained in this study when HMAP was used.

"More studies with these fibres are nevertheless desirable, and the use of other experimental models may help to completely elucidate the mechanism(s) involved in HMAP effects," they concluded.

According to Natraceutical, the Obipektin HMAP has an ultra low viscosity, enabling it to reportedly enrich healthy and functional drinks without changing remarkable to viscosity of the product. It also has a neutral taste.

Pectin and health

The potentially health-promoting effects of pectin are not new, with other studies reporting the positive effects of the fibre, including potential prebiotic activity.

However, in the current health claims environment most pectin producers do emphasise the healthy aspect of the ingredient.

Glacial Blue Solution

The solution is composed of Purified Water, anhydrous Citric Acid, an equal quantity of anhydrous Di-Potassium Carbonate, forming a salt; silver electrode is inserted and a current of 12 volts, 5-7 amps depending on the temperature of the solution and pH+tds levels. After the solution appears very gray in color, when most of the citric molecules have silver ions attached to them, shamanic energy is transferred to the solution for those things related to silver practice; then a copper electrode is used; when the solution is then a dark blue-green, again shamanic life energy is transferred to the solution; the solution still being rather cloudy is removed to a solar room or area where shamanic, solar photons and universal photonic energies from natural vortices can energize the solution with "Life Force" for one or two days, then bottled and distributed.

Two primary purposes for the solution; in this application, the elimination of potential pathogens from the ingredients by soaking them in the solution for ten minutes prior to processing, a thin film of solution remains on the ingredients preventing micro-organisms from degrading the ingredients, and enhancing the "Life Force" transfer from the nutrients of the fruit bar to the human or animal eating them. Second, the solution has wound care and regeneration capabilities of its own by dedifferentiating cellular material of the body to pre-natal stem cells, which are the proliferated and used by the body to rebuild itself according to the DNA of the damaged area or organ, and with the fruit bars, now have the added capacity to return the human or animal to optimum homeostasis, and adjusting body mass up or down as required by the bone structure. An anti-human may take several months to completely reverse the damage they have done to themselves, and put them on the physical path to embodied ascension. Of course they can ascend at any time, but they must leave the rotting body here.

A complete body regeneration is possible of all organs and physical systems in time, a year or two by visiting a spa set up for the Ascension process at least once a week.