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HEMP SEED: *THE MOST NUTRITIONALLY COMPLETE FOOD SOURCE IN THE WORLD*

Part Two: Hemp Seed Oils and the Flow of Life Force

by Lynn Osburn

Hemp seed oil comprises 35% of the total seed weight. This oil has the lowest amount of saturated fatty acids at 8%, and the highest amount of the polyunsaturated essential fatty acids at 80%, total oil volume. Flax seed oil comes in second at 72% combined total essential fatty acids.

Linoleic acid (LA) and linolenic acid (LNA) cannot be made by the human body and must be obtained through the diet, so they are called essential fatty acids (EFA). LA and LNA are the most important fatty acids in human nutrition and health. They are involved in producing life energy from food and the movement of that energy throughout the body. EFAs govern growth, vitality and state of mind. Still, much is unknown about their functioning in the body.

Fat is the second most abundant substance in the human body (water is first). The exact percentage varies with diet, exercise, genetic disposition, age and gender. The average is 15% to 22% of body weight as fat. The average adult American eats 135 lbs. of fat each year. That works out to over 50% of all calories consumed. The percentage and types of fats eaten are 34% saturated, 40% monounsaturated and 15% polyunsaturated fatty acids (fats are really fatty acids). Many U.S. health organizations recommend fat consumption be reduced to 30% of calories in the diet, with the fats divided equally between saturated, monounsaturated and polyunsaturated fatty acids. Some private researchers believe this is still to much fat in the diet and it will not help to reduce the incidence of fatty degeneration and cardiovascular disease (CVD).

Ideally, one third of the fat consumed should be EFAs. At least 10% of daily calories should be LA and at least 2% LNA. The optimal ratio of LA to LNA in the diet is between 2 to 1 and 5 to 1. The 2 to 1 ratio of LA to LNA is more advantageous in stemming fatty degeneration diseases. Flax seed oil is 58% LNA, possibly making it the best seed oil to combat degenerative disease, but it contains only 14% LA. Hemp seed oil is 55% LA and 25% LNA, or 2.2 times more LA than LNA, making it the best seed oil for optimal health and prevention of fatty degeneration.

The distinction between saturated and unsaturated fatty acids makes a world of difference to the body. Both are made up of carbon atoms connected to each other in chains with a CH_3 methyl group at one end. That is the fat portion. The other end of the chain is finished with a COOH carboxylic group. That is the acid portion. And there the similarity between saturated and unsaturated fatty acids ends.

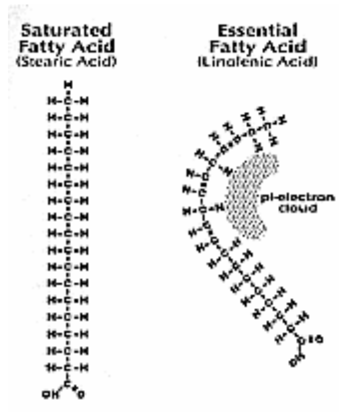
Saturated fatty acids (SFA) are not essential to the human diet. The body can make them from proteins or carbohydrates. Saturated fatty acids are straight line molecules consisting of carbon atoms connected to each other in single bond chains with a hydrogen atom at every bonding site on the carbon chain. Since all available bonding points on the carbon atoms are filled the chain is said to be saturated.

LA, LNA and the highly unsaturated fatty acids the 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.

The body burns SFAs up to 14 carbons long to produce energy much like we burn hydrocarbon fuels to power automobiles. Only the body's biochemical engines burn clean, leaving no "smog" as long as the body is in good health. Enzymes (globular proteins) within the cell break SFAs into successive 2-carbon fragments (acetates) starting from the acid end. The acetates are then burned (oxidized) in the cell's energy furnace, the mitochondria. The chemical energy produced is stored in ATP (adenosine triphosphate) molecules and can be released to fuel chemical reactions whenever the cell needs it. The remaining energy dissipates as heat and that keeps the body warm. (The first law of thermodynamics says energy cannot be created nor destroyed, but can change forms. Heat radiation is a form of kinetic energy; the bonding energy that holds chemical compounds together is called chemical energy. Heat can make or break chemical bonds, and chemical reactions can absorb or release heat.)

SFAs are sticky. The longer the chain the more readily the fatty portions tend to dissolve into each other. SFAs longer than ten carbons are solid at body temperature. Saturated fatty acid chains with 16 or more carbons can interfere with normal metabolic functions and clog arteries when consumed in excess. They are found in animal fats; primarily in beef, lamb and pork; and in coconut and palm kernel oil.

Unsaturated fatty acids are also made up of carbon atoms connected to each other like the saturated fatty acids, but at certain places along the chain two carbon atoms are connected by double bonds. To accomplish this two hydrogen atoms must be removed, one from each of the two carbon atoms forming the double bond. Because hydrogen atoms are removed to make the double bond between carbon atoms the fatty acid chain is said to be unsaturated.



These molecular diagrams illustrate the structural differences between saturated fats and the essential dietary oils. The bent shape of the essential fatty acids keeps them from dissolving into each other. They are slippery and will not clog arteries like the sticky straight shaped saturated fats and the trans-fatty acids found in cooking oils and shortenings that are made by subjecting polyunsaturated oils like LA and LNA to high temperatures during the refining process.

LA and LNA 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. Their very sensitivity causes them to break down rapidly into toxic compounds when refined with high heat.

Plants have enzymes capable of inserting these double bonds starting at the third carbon atom. Human enzymes can make double bonds starting at the ninth carbon atom only. If the fatty acid has just one double bond it is called a monounsaturated fatty acid. Oleic acid (named after olive oil) has one double bond between the ninth and tenth carbons. Human enzymes make oleic acid from stearic acid (an 18-carbon SFA found in beef, lamb and pork) in an attempt to keep body fats from solidifying.

If the fatty acid has more than one double bonded carbon pair it is polyunsaturated. Linoleic acid has two unsaturated pairs in its 18-carbon chain. Linolenic acid has three pairs in its 18-carbon chain. Naturally unsaturated fatty acids always 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, 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 the cells, and the oils within the cell membranes. Like static electricity in a capacitor these charges can produce measurable bio-electric currents important to nerve, muscle, heart and membrane functions. EFAs are extremely important to the body's overall energy exchange potential -- the flow of lifeforce.

LA and LNA are involved in transferring oxygen from the air in the lungs to every cell in the body. They play a part in holding oxygen in the cell membrane. There it acts as a barrier to invading viruses and bacteria, neither of which thrive in the presence of oxygen. Oxidation is the single most important living process in the body.

Linoleic acid and linolenic acid are precursors to the prostaglandins, a short-lived hormone-like family of substances that regulate many functions in all tissues. About thirty prostaglandins have been identified. They are divided into three series. LA is the starting material for series 1 and 2; series 3 is derived from LNA.

Prostaglandin E1 (PGE1) is the best known in series 1. Some of the series 2 prostaglandins have the opposite effect of PGE1, and the series 3 prostaglandins have properties similar to series 1. PGE1 helps prevent heart attacks and strokes associated with cardiovascular disease by keeping blood platelets from sticking together and forming clots in the arteries. PGE1 retards cholesterol production and improves circulation by dilating blood vessels. It controls series 2 prostaglandin production. It is involved with T cell functions in the immune system and may well help to prevent cancer growth by regulating the rate of cell division. PGE1 improves nerve action and gives a sense of well being.

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Over half the oil found in dark green plant leaves is Linolenic acid (green leaves contain 1% or less oil). It is even more concentrated in the membranes of the chloroplasts where photosynthesis takes place. The pi-electron clouds of the cis- double bonds in LNA absorb photon energy from sunlight striking the plant leaves and become excited like electrons in laser materials. The pi-electrons transform the solar energy into chemical energy and LNA transports that energy wherever it is needed.

LNA is about five times more reactive to light than LA. Light increases LNA's ability to react with oxygen by a thousand times. The unsaturated fatty acids with more cis- bonds are extremely sensitive to light and will spoil rapidly when exposed to it. The oils quickly become rancid and unfit to eat. So the special nature of the EFAs that make them essential to life -- absorption of oxygen and transformation of solar energy -- causes them to decompose when exposed to air and light.

When the EFAs and their highly unsaturated cousins are exposed to sunlight, free radical chain reactions begin. A single photon may be caught by an electron on a carbon next to the cis- bonded pair. That excited electron leaves orbit and crashes into another one or takes off with a hydrogen nucleus causing a chain reaction that continues for 30,000 cycles. Bonds break along the chain. New and different molecules are formed. Many including, ozonides and peroxides which destroy lung tissue, hydroperoxides, polymers and especially hydroperoxyaldehydes are toxic to the body.

Though life cannot flow without the light and oxygen sensitive EFAs, they quickly become toxic when handled incorrectly. Nature solves this paradox by making powerful antioxidants and free radical scavengers that control the oxidation rate and trap free radicals before chain reactions get out of control. Two of the best are vitamins A and E. Nature designed them to dissolve into her remarkable polyunsaturated oils and shield them while they enable life energy to flow.

Plants have created the perfect container to safely store the EFAs and protect them from light and oxygen damage. It is the seed. And as long as we get our essential fatty acids by eating whole seeds the lifeforce within us is charged with vitality. Hemp seeds contain the perfect balance of the essential fatty acids required by the human body. Hemp seed oil is indeed the oil of life.

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