

Chia Seed

Chia seed, known scientifically as *Salvia hispanica L.* is a real superfood. In addition to containing over 20% ALA omega 3 it can also absorb up to 15 times its weight in water forming a sticky gel like coat on hydration,

The story of *Salvia hispanica* goes back over 3,000 years to the Aztecs of Central America.

Chia was one of the four main foods of the Aztecs, along with corn, amaranth and beans. ("chia" is the Mayan word for "strength"). After the arrival of the Spaniards, the plant became almost extinct because of cultural and religious reasons even having been used as currency in the Inca civilisation.

However, consumption from rudimentary production or wild plants never stopped and re-emerged as an agricultural crop in Argentina and Australia over the last 15 years

Chia Seeds are great for weight loss...

Chia seeds have been acclaimed as a dieters dream food. The primary reason chia seeds are great for weight loss is the low calorie content combined with their jelly like coating that makes you feel full longer. When chia seeds are exposed to water they absorb up to 10 times their weight in water forming a liquid jelly coating. This jelly coating is slowly removed in your intestines, hydrating you and slowing down the absorption of your food, so you feel full longer.



Chia seeds are a superfood...

Chia seeds are a great superfood to use in a variety of raw food recipes because they are virtually tasteless and take on the flavor on whatever is around them. Chia seeds have:

- 15 times more **Magnesium** than Broccoli
- 6 times more **Calcium** than whole milk
- Nearly 9 times more **Omega 3** than Salmon
- More **fiber** than flax and bran flakes
- Nearly 3 times more **Iron** than spinach
- More **Protein** than soy (and has NO plant estrogens or Cholesterol)



Chia Seeds are a mucilaginous seed and can made to taste like anything.

Chia seed typically contains from 30% to 35% seed oil, of which approximately two-thirds is Omega-3. The following charts show that it is the highest natural known source of Omega-3 oil:

Omega-3 content as the percentage of ALA in the seed oil.

Common name	% <i>n3</i> content
Chia	64
Kiwifruit	62
Perilla	58
Flax	55
Lingonberry	49
Camelina	36
Purslane	35
Black Raspberry	33

There has been a great deal of confusion in the marketplace about what constitutes an "omega-3", a term now used widely, yet loosely, to describe many important poly-unsaturated fatty acids. Omega-3, also known as ALA, is an Essential Fatty Acid, as is Omega-6, also known as LA. These are called essential as the human body needs them for normal functionality, yet the body does not produce them. Omega-6 is readily available in the Western diet as it's found in corn and soybean oils used prevalently in cooking, baking and frying. Omega-3 however is rarely found

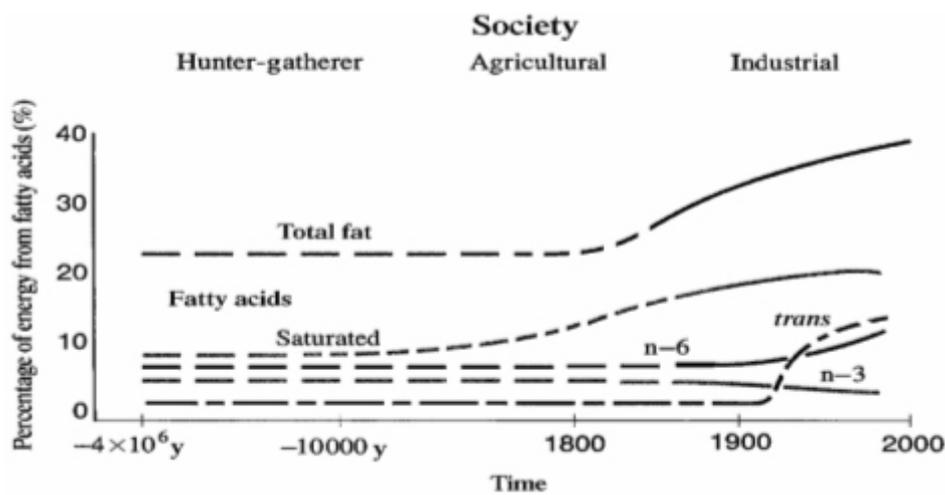
naturally in the Western diet, only derived from certain fish, and therefore should be supplemented.

ALA's biological significance:

Western diet is characterised by poor level of the essential omega-3 and is rich in omega-6 fatty acid. It is also characterised by its high level of saturated fat and its increasing levels of trans-fatty acid content, (UK Food industry is beginning to remove TFA's from processed foods).

The following chart shows the historical consumption and significance of such dietary changes in Western man

Total Fat and Fat Composition Changes in Man Over Time



Much can be concluded from the chart above but in short it shows that modern western man has dramatically increased intake levels of saturated fat, Omega-6 LA and trans fat at the expense of omega-3 consumption. Is this a trend worthy of note?

The following chart leaves no doubt in the scientific community about the relevance of these dietary changes over time.

The LA to ALA Ratio and Its Correlation to Cardio Vascular Disease Mortality in Man

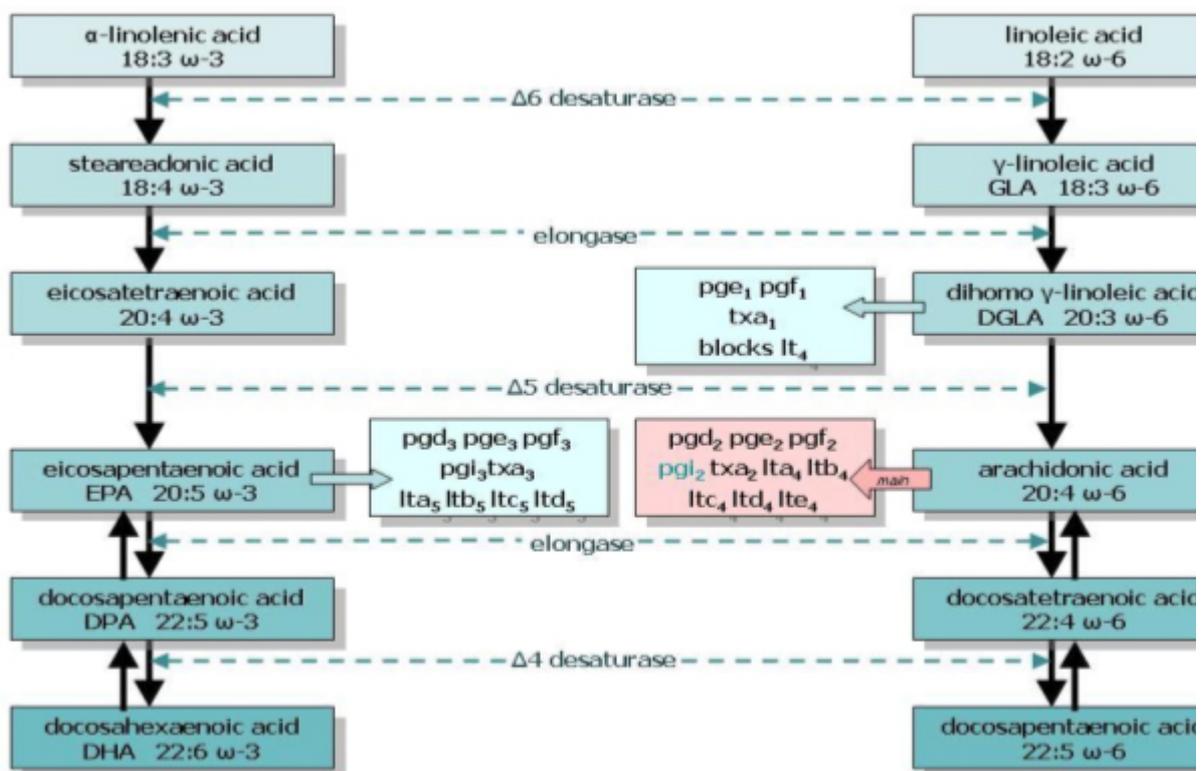
	USA / EU	Japan	Greenland Inuit
Ratio LA/ALA	30 / 1	12 / 1	1 / 1
CVD Mortality / 1000	45	12	5

As the charts indicate, Western diets rich in the omega-6 LA are highly correlated with severe cardiovascular mortality when compared to the more balanced omega-3 diets found elsewhere in the world.

In addition, ALA is an extremely important down regulator of the LA metabolic cascade that leads to the poly-unsaturated fatty acid arachidonic acid ("AA"), the biological precursor responsible for the *in vivo* production of the highly inflammatory prostaglandins, the potent platelet aggregating thromboxanes that lead to strokes and MI's and the eicosanoids responsible for immune response. When AA is available in excess quantities in cellular membranes it sets your body up for over-reaction to stress stimuli. This is why a healthy diet is characterized with a balance of ALA and LA.

The data presented below demonstrates the mutual dependence of omega 3 and omega 6 on the same enzyme cascades for metabolisation in the body and further proof that these two essential fatty acids should be consumed in equilibrium. The cascade diagram explains the mutually competitive pathways of how your body converts ALA to EPA and DHA and why you need to avoid excessive omega-6 (LA) intake.

ALA/LA Cascade & Associated Cyclic Oxidation Products



EPA is required for heart protective benefits

DHA forms 40% of the wet weight of human brain

Both need to be consumed in the diet, as does ALA, the 'precursor' to properties of EPA and DHGA

Chia Nutrition Facts			
		100 grams	1oz 28.35g
Energy	kcal	536	152
Protein	g	17.20	4.88
Total lipid (fat)	g	32.80	9.30
Carbohydrate	g	44.00	12.47
Fiber, total dietary	g	27.60	7.82
Lipids			
Saturated	g	3.08	0.87
Monounsaturated	g	2.36	0.67
Omega-6	g	6.66	1.89
Omega-3	g	20.34	5.77
Cholesterol	mg	-	-
Minerals			
Calcium, Ca	mg	820	232
Phosphorus, P	mg	924	262
Potassium, K	mg	700	198
Sodium, Na	mg	<20	<5
Zinc, Zn	mg	6.8	1.9
Copper, Cu	mg	2.12	0.60
Manganese, Mn	mg	5.84	1.66
Iron, Fe	mg	16.40	4.65
Magnesium, Mg	mg	392	111
Vitamins			
Vitamin A	IU	44	12
Thiamin (B1)	mg	0.22	0.06
Riboflavin (B2)	mg	0.04	0.01
Niacin	mg	6.40	1.81

Source: Ricardo Ayerza (h), Wayne Coates (2005).

Diet	I Control	II 15% chia seed	III 5% chia oil
Initial Weight gr/rat	42	41	41
Final Weight gr/rat	206	238	236
Cholesterol	108	96	106
Triacylglycerols	207	70	83
HDL	26	32	40
LDL	30	31	28
LDL/HDL	1.15	0.97	0.70
TG / HDL	8.04	2.22	2.00

Source: Ricardo Ayerza (h), Wayne Coates (2005).

Chia's Benefits and Why They're Important:

Omega Fatty Acids: Chia seeds contain about 32% Omega fatty acids which is very high and rare for a seed. They are 61% **Omega-3** (ALA) and 20% Omega-6 (LA). Both are essential fatty acids and ALA assists in the prevention of heart disease. (see Lyon heart study, Prof. M DeLorgeril)

Fiber: Chia seeds contain about 42% fiber; 5% soluble fiber and 36% insoluble fiber. Fiber is essential for a healthy gastrointestinal system and inhibiting constipation.

Protein: 21% protein and high in essential amino acids, the building blocks of protein, for healthy cellular function.

Calcium: A serving of chia seeds (1TbIs) contains as much calcium as two cups of milk. The calcium in chia seeds aids in bone health as well as para-thyroid, liver

and kidney function.

Extras: Chia seeds also provide iron, magnesium, potassium (equivalent to 3-4 bananas worth), Vitamins A, B1, B2, B3, phosphorus, manganese, copper, iron, molybdenum, niacin, zinc, naturally boost energy and are gluten-free.

Unique 'fullness' or 'Satiety' with chia. The hunger hormone, 'ghrelin', is primarily found in the cells of the stomach epithelial tissue, but also in various areas of the brain and hypothalamus. Before we eat the levels of ghrelin in our bodies are very high and stimulate brain cells. This tells us that we should eat. After we eat, the levels of the hunger hormone decrease considerably. This is one's sense of 'fullness'. This happens because when chia is immersed in a liquid, eg water or milk, over time it swells up to 10-15x its original size thereby significantly increasing the size of the quantity consumed with the whole mass having a natural gel coat so with the gel coat and husk (or hull) of the seed it takes time to digest, hence its unique satiety benefits.

Why Chia vs Other Omega-3 Sources (Flax)

Currently, the main source of vegetable -3's among dietary supplements is flax seed or flax seed oils. However, flax seeds need to be milled for effective use in human Ω -3 absorption, and unfortunately after grinding, it becomes rancid very quickly. Like flax seed, chia also contains no gluten, however the protein levels in chia seed are much higher than those found in whole flax seed. Thus, if choosing a seed based high omega-3 oil, chia seed is the safe and healthy choice over flax.

Novel Foods status. FSA/EU has permitted use of chia at 5% in bread and is reviewing its use in cereal bars and cereals. And since 9th May 2011, The Chia Company, based in Australia, applied to the Food Standards Agency for approval to market chia seed in **baked goods, breakfast cereals**. A novel food is a food or food ingredient that does not have a significant history of consumption within the European Union before 15 May 1997. Thus before any new food product can be introduced on the European market, it must be assessed rigorously for safety. In the UK, the assessment of novel foods is carried out by the Advisory Committee on Novel Foods and Processes (ACNFP), an independent committee of scientists appointed by the Food Standards Agency.

Salvia hispanica L. ("Chia") contains one of the highest mixed levels of the essential omega-3 and omega-6 fatty acids known in nature with a total of 33 wt/wt percent oil content in the seed at a very favorable and heart healthy 3.3:1 ratio of ALA to LA, the perfect counterbalance to the Western diet while sporting only 9-10% of saturated fat. In addition, the seed contains 20% protein, which when digested, provides a well balanced mixture of amino acids, including those essential to man. The remainder of the seed is mainly insoluble fiber, less than 3 percent carbohydrates, contains antioxidants not associated with the phytoestrogenic lignin found in flax seed, and the chia seed is gluten free.

With all these facts in hand it is easy to recognize the significance of chia seed as a new entrants in the race for improved diet as a source of omega 3 as well as its unique satiety properties.