**ALPHA-LINOLENIC ACID (ALA)**

**General:** essential fatty acid; omega-3;

- Deficiency widespread in Western populations;
- Precursor of several derivatives, including eicosapentaenoic acid (EPA, parent of series-3 (beneficial) prostaglandins, that keep series-2 (detrimental) prostaglandins from being produced);
- Often confused with gamma-linolenic acid (GLA), that is derived from the other essential fatty acid (LA);
- **History:** essentiality still subject of controversy, because deficiency symptoms not as easily identifiable as those for LA; human deficiency first identified in 1951; used in alternative (nutritional) cancer treatment in 1954; shown to decrease human platelet stickiness in 1964; shown to inhibit tumour formation (animals) in 1981;

**Nutrition**

- **Sources:** best: flax & chia seed; candle nut; good: fresh flax oil; fresh green vegetables; poor: old oils, oils made without protection from light, oxygen & heat; refined oils;
- **Supplements:** fresh encapsulated oils (protected from oxidation);
- **Absorption** from intestine; also absorbed through skin;
- **Improved by:** sufficient bile;
- **Antagonized by:** lack of bile;
- **Stability:** destroyed by light (generates free radicals), oxygen (peroxides = rancidity) & heat (increases rate of spoilage by light & oxygen; above 160°C, twisted trans-fatty acids begin to form); frying & deep-frying is very destructive;
- **Storage:** in fat (adipose) cells; in cell membranes; in membranes surrounding intracellular organelles;
- **Excretion:** not excreted; excess is “burned” to generate energy;
- **Metabolism:** converted into derivatives and prostaglandins;
- **Caution:** diabetics need to monitor insulin levels closely;

**Functions of ALA**

- Required for cell membrane & intracellular organelle membrane integrity;
- Necessary for production of series-3 (beneficial) prostaglandins, that regulate platelet stickiness, blood pressure, inflammation response, sodium & water excretion through kidneys & immune function;
- Necessary to limit production of series-2 (stress-related, detrimental) prostaglandins;
- Involved in regulatory activities in all cells, tissues, & organs;
- ALA is found in much lower levels in the cells and tissues of the body as compared to EPA and DHA, as dietary ALA is inefficiently converted to the longer chain and biologically active DHA and EPA. Recent research suggests that only 4% of ALA is converted into the longer chain DHA in adults and less than 1% in infants.

**Quantities**

- **Measurement:** milligrams; grams
- **Optimum** (SONA) average ranges not set; estimated optimum: 1 - 2% of calories (3–6 grams/day);
- **Individual optimum**: to be determined for each individual case; much higher quantities (up to 70 grams/day) may help in treatment of degenerative conditions;
- **Minimum** (EC RDA) not yet established; estimated at 0.54% of calories (1 - 2 grams/day);
- **Less than RDA**: no official figures; estimated over 95% of population;
- **Deficiency** of ALA from lack in diet — refined foods, choice of omega-3 poor foods; increased requirement;
- **Symptoms include**: visual disturbances, motor incoordination, tingling sensations in arms & legs (multiple sclerosis-like), failure of growth; dry skin, lack of energy & stamina, increased blood triglycerides, proneness to tumours, increased platelet stickiness; excess series 2 prostaglandins in tissues;
- **Toxicity**: excess energy (sleeplessness); nausea (from weak liver);
- **Reversed by**: lowering intake;

**Therapy with ALA**

- Therapeutic dose: 15 to 35 grams/day or even more;
- Alleviates symptoms of ALA deficiency;
- Increases energy level & stamina; increases metabolic rate; shortens time necessary for fatigued muscles to recover from exercise; speeds wound healing; may improve visual function, colour perception & mental acuity in older people; may induce feeling of calmness; may improve behaviour of delinquents resistant to counselling;
- Softens dry skin; makes hair & nails strong; enhances beauty of show animals;
- Decrease platelet stickiness; lower blood triglycerides; lower high cholesterol in some;
- Lowers amount of insulin required by diabetics (close monitoring required);
- May be helpful in allergies, asthma; may improve liver function;
- Decrease water retention (oedema); decrease inflammation & arthritis pain;
- Enhances immune function; helps fight strep and malarial infections;
- Reverses & inhibit tumour formation; transformed human cancer cells in tissue culture are killed by ALA;

**GAMMA-LINOLENIC ACID (GLA)**

**General**: essential fatty acid derivative; omega-6;

- Rarely found in oils; best studied source is evening primrose oil;
- **History**: identified in 1949 in oil of evening primrose; studies of effects of GLA on health began in 1959; first GLA-containing evening primrose oil marketed in 1972;

**Nutrition**

- **Sources**: best: evening primrose oil; fair: borage, black currant seeds, hemp seeds;
- **Supplements**: encapsulated 10% GLA cold-pressed (no solvent) evening primrose oil, evening primrose oil and borage oil blends.
- **Absorption** from intestine; also absorbed through skin;
- **Improved by**: sufficient bile;
- **Antagonized by**: insufficient bile;
- **Stability**: destroyed by light (generates free radicals), oxygen (peroxides = rancidity) & heat (increases rate of spoilage by light & oxygen; above 160°C, twisted trans-fatty acids begin to form); frying & deep-frying is very destructive;