

MAIN TOPIC: Nutrigenomic and Agriculture

Healthy claims of Sunflower oil with modified PUFA composition

Logo
progetto

PARTNERSCHIP

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Premise

Nutraceuticals Market by Type: Functional Food products:

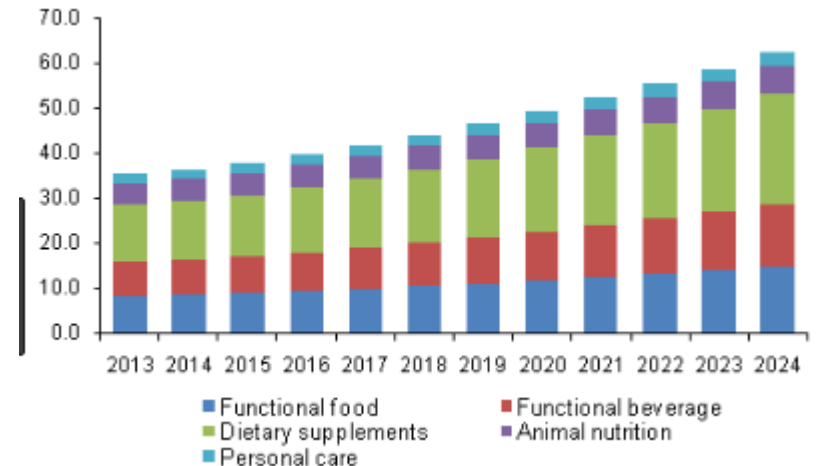
- i) Probiotics Fortified Foods, **Omega Fatty Acid Fortified Food**, Branded Ionized Salts,
- ii) Branded Wheat Flour Market, Other Functional Food);
- iii) Functional Beverages: Fruits and Vegetable Juices & Drinks, Dairy & Dairy Alternative Drinks, Yogurt, Non-Carbonated Drinks (Bottled water, Tea, and Coffee, and Others (Herbal tea, Sports drinks, Energy drinks);
- iv) Dietary Supplements (Proteins & Peptides, Vitamins & Minerals, Herbs (Ayurveda extracts, plant extracts, algal extracts, phytochemicals), and Others unsaturated Fatty acids, Fiber and Personal Care

Trend in the global nutraceutical market:

around USD 383.06 billion revenue in 2017, expected to reach USD 561.38 billion by 2023, at a CAGR of 6.8% from 2018 to 2023.

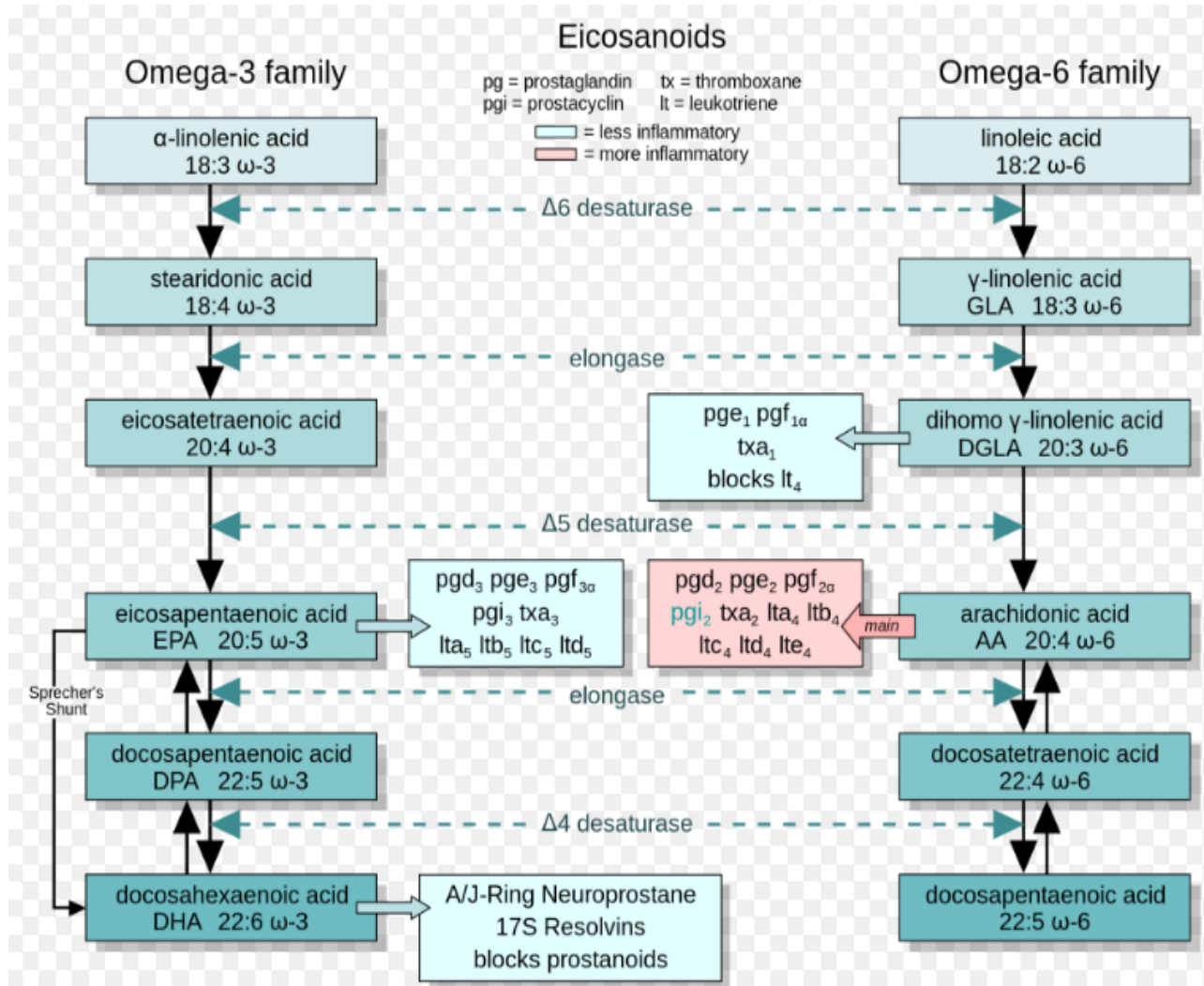
Nutraceuticals Market Segmentation

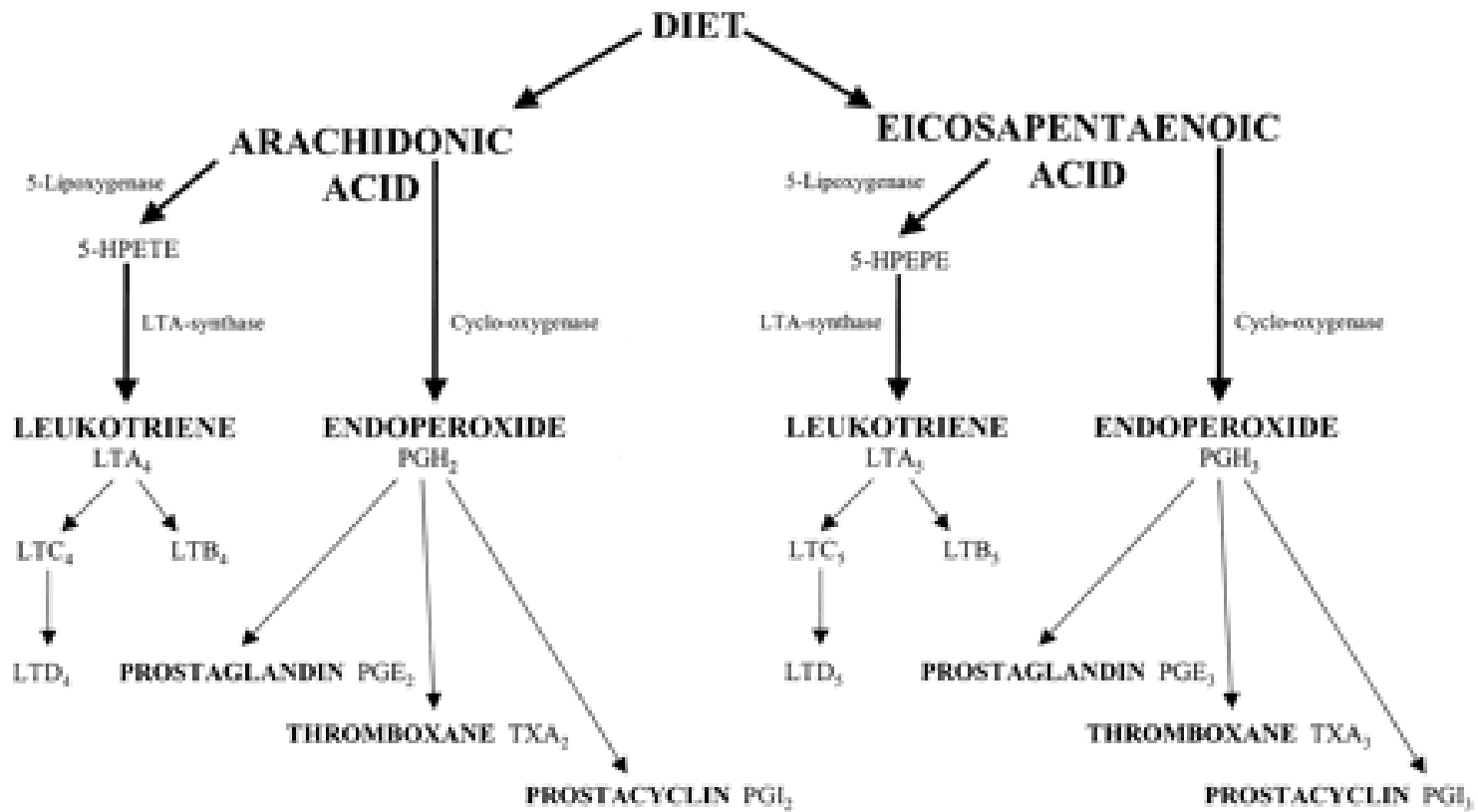
Consumer preference are changing from synthetic ingredients to natural and organic ingredients and foods obtained from non-GMO (Genetically Modified Organism) extracts. Developing nutrients based on an individual's genetics and lifestyle changes would help in developing customized functional foods and beverages, based on the genetic segment drugs.



- 1 – Definition: a food is functional when it can satisfactorily demonstrated to procure benefits one or more target functions in the body, (claim) beyond adequate nutritional effects, in a way that is relevant to either improved stage of health and well-being and/or reduction of disease. (Diplock et al, 1999)
- 2 – Method: ¹ using advanced genomic-technique to create new sunflower oil breed with uniform and stable bioactive components as:
 - i) higher amount of MUFA;
 - ii) higher amount of LC-PUFA and better LC-PUFAs ratio between:
 - 1) ALA (Alpha-linolenic acid) metabolized in EPA – eicosa-pentaenoic acid) and DHA (docosahexaenoic acid), the ω 3 precursors;
 - 2) LA (Linoleic acid the ω 6 precursor) metabolized in DPA (docosa-pentaenoic acid,
 - 3) higher amount of tocopherol (vit E) with anti-oxidative properties;
- 4- Health proof: Elaborate a protocol for testing the functional properties of modified higher PUFA sunflower oil on a sample of consumers (resp. Francescato)
- 5 – Market proof: product acceptance: testing the consumers' perceptions of the sunflower functional oil with EM model (resp Rosa and others);
- 6 – Scale up the industrial process (resp. Eurochem)

EICOSANOID Pathway





Higher PUFA chemical stability

Oxidative deterioration

free radical chain reaction between unsaturated fats and oxygen

Rancidity both from Hydrolytic and oxidation (formation of polar compounds)
decrease the shelf life
Destruction of vitamins

Remedy: rectification, hydrogenation

Antioxidant: synthetics butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA), ascorbyl palmitate, the tocopherol homologs, and carnosol and carnosic acid, which are found in rosemary

Thermal degradation

(normal frying temperature around 170-190° C)

Normal smoke point 230° C

Higher PUFA: TG to hydrolyze to FFA and glycerol producing acrolein

lower smoke point < 170 not suitable for frying

Remedy: refinement

The pathway of Sunflower oil PUFA acids can be modified with genomic techniques to empower nutritional and nutraceutical benefits.

Expected results:

- i) identifying the functions of genes FADS1 ($\Delta 5$ desaturase) and FADS2 ($\Delta 6$ desaturase) locate on the chromosome 11 q 12.2 responsible of activation of eicosanoid metabolic pathway.
- ii) testing the benefits of these bioactive components;
- iii) Scale up the industrial process and increase the modified Sunflower oil.

https://www.researchgate.net/publication/263340213_Nutritional_and_therapeutic_potential_of_sunflower_seeds_A_review [accessed Sep 20 2018].