Novel Introduction of Recipe Engineered Omega-3 Food Lipids in Cosmetic Formulations for Better and Safer Health

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Keywords: "Leave your drugs in the Chemist's pot. If you can heal the patient with food" – *Hippocrates, the Father of Medicine*

Abstract

The heart, the brain and the skin are the three major organs, which should be kept in the best of health. The skin is the largest remarkable organ of the human body performing several important functions. Each square centimetre of skin has 6 million cells of which each cell has a plasma membrane composed of phospholipids. Dietary lipids are capable of influencing the fatty acid composition of these membrane phospholipids and therefore can play a major role in the different mechanisms within the body like the immune response.

Tracing back to the historical volume 82 of the Journal of Biological Chemistry, clearly revealed two opposing views developed by McAmis and co-workers and Dr and Mrs Burr, in which essentiality of omega-6 and omega-3 fatty acids were discussed. The high impact of linoleic acid, so-called omega-6 essential fatty acid, saw blatant growth in the minds of scientists and technologists leading to over consumption of linoleic acid containing products. Not much attention was paid to the findings of McAmis and co-workers.

The nomenclature omega 6 or n-6 and omega 3 or n-3 fatty acids is related to the position of the first unsaturation in the fatty acid chain relative to the methyl end. In case of linoleic acid, it lies at the sixth carbon atom and as regards linolenic acid it lies at the third carbon atom from the methyl end of the molecule. Thus linoleic acid is termed omega 6 (or n-6) and linolenic acid is called omega 3 (or n-3) fatty acid. In fact, any fatty acid with similar positioning of the first double bond (6th or 3rd carbon) is termed accordingly (n-6 or n-3).

Oils rich in polyunsaturated fatty acids (PUFAs) have been acknowledged to have great health benefits. For the last three decades, human nutrition research has been heavily focused on establishing the beneficial aspects of PUFA oils on human physiological functions and huge volumes have been written.

The essential PUFAs of the omega-3 and omega-6 families are the precursors of prostanoids and eicosanoids of a variety of structures and functions. Fish oils and other marine oils are rich in long chain polyunsaturated omega-3 fatty acids (LCPUFA) such as eicosapentanoic acid (EPA) and docosahexanoic acid (DHA) and have antiatherosclerotic and hypotriglyceridemic effects. It has been stated that omega-3 fatty acids have a direct effect on the heart muscle itself, increase the blood flow, decrease in arrhythmias, improve arterial compliance and influence other cellular processes that are associated with heart functions. Marine oils may also retard atherogenesis through their effects on platelet function and platelet-endothelial interactions.

Linoleic acid and a-linolenic acid (ALA) are converted to other long chain omega-6 and omega-3 fatty acids by metabolic pathways in mammals through enzymatic catalysis as shown opposite (Figure 1).

Yet mammals cannot synthesise these essential fatty acids in vivo and are thus dependant on external sources. a-linolenic acid is found in plants, phytoplankton, zooplankton and many marine species. In plants, a-linolenic acid is found in glycolipids in leaves while oils from seeds like flax, blackcurrant, rape, perilla and chia contain moderate to high amounts of a-linolenic acid (Figure 2). Soybeans, navy beans and walnuts are also sources of a-linolenic acid. Some sources of essential fatty acids in vegetables are shown in Table 1.

In modern western society, human diet is basically made up of wheat, maize, rice and a variety of pre-cooked or industrially fried food leading to relative deficiency of omega-3 polyunsaturated fatty acids compared with those of omega-6 ones. Coupled with lack of exercise, the huge intake of hydrogenated oils (and trans fatty acids therefrom) from various sources also significantly contributes to deterioration of human health. This imbalance of essential fatty acids, is worsened by consumption of meat from