

Regiospecificity of Several Fats and Oils Potentially PUFA Sources

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PUFA deficiency in the human diet has been related to a wide number of pathologies such as cardiovascular disease, inflammatory processes, viral infections, several types of cancers and immune disorders. Alpha-linolenic (ALA; 18:3 n -3) and linoleic acids (LA, 18:2 n -6) are considered as essential FAs, acting as precursors of longer-chain PUFAs of the n -3 and n -6 series, respectively. Arachidonic (AA; 20:4 n -6) and docosahexaenoic acids (DHA; 22:6 n -3) play important roles as components of structural lipids in cell membranes and in the synthesis of eicosanoids, protectins and resolvins.

The n -6/ n -3 PUFA ratio in the Western diet is currently estimated to be about 20:1, differing significantly from the recommended 4:1 ratio; thus a higher intake of n -3 PUFAs might be desirable in order to balance this ratio. So that, a wide number of nutritional supplements have been marketed in the last years, most of them natural oils-based.

Natural oils are composed mainly by triacylglycerols (TAGs) and PUFA bioavailability depends on their position in the glycerol backbone. PUFAs located at sn -2 position are readily absorbed as 2-monoacylglycerols when TAGs are hydrolyzed by lipases during the digestion process. Thus, regiospecific analyses must be carried out in order to evaluate the nutritional quality of PUFA-containing oils.

In this work, in order to evaluate their suitability as sources of bioavailable PUFAs, the FA and sn -2 profiles of several natural fats and oils have been determined: linseed (*Linum usitatissimum*), soybean (*Glycine max*); viper's bugloss (*Echium plantagineum*) and related (*E. parviflorum* and *E. gentianoides*); sweet briar (*Rosa rubiginosa*), evening primrose (*Oenothera biennis*), borage (*Borago officinalis*); Atlantic salmon (*Salmo salar*); cod liver oil (*Gadus morhua*); fishery by-products; subcutaneous fat of wild Galician Horse (*Equus ferus caballus*); and several microalgae. Pancreatic lipase method was applied to determine the regiospecificity of 18C (carbon number) oils, while ethanolysis by *Candida antarctica* lipase was employed to oils containing 20C FAs or longer.

The results of this study indicate that the best sources of bioavailable PUFAs are not used commercially.