Novel Quality Descriptors of Olive Oil as MAC Functional Food by *cis*-positional-monoenoic Phyto Fatty Acids

C. Oliviero Rossi, L. Filippelli, N. Uccella, Rende, Italy

Long-chain fatty acids, essentially a benign dietary material, can, for instance, markedly increase the dopamine content of dopaminergic phenotype neurons, providing an interesting approach to Parkinson's disease treatment (4).

Cis, trans and positional isomeric monoenoic lipids, from Mediterranean olives and olive oil, i.e. the phytomolecules oleic, elaidic, vaccenic acids and its *cis*-isomer, have been evaluated for their effects on the fluidity of cellular membranes, exploiting DSC (5) and NMR(6,7) experiments for the understanding of model bilayer structure and dynamics.

The rationalization, concerning tail packing in model bilayer, has been derived by DSC method, while ^{2}H-NMR measured the order parameters for chain framework in model membranes. Experimental results revealed membrane lipid bilayers manifesting, under temperature dynamic control, a reversible change of state from a *disordered* fluid to an *ordered* nonfluid array of fatty acyl chains. The order-disorder transition temperature (8,9,10) depends on membrane lipid composition and, under cholesterol deficiency, mainly relays on fatty acid ratios in membrane lipids. The membrane fluidity of model biological tissues, i.e. olives and neurons, is highly influenced by the π-bond position and configuration in the long chain isomers of phyto-fatty acids, and then transferred into olive oil, the mystique of MAC.

The biomimetic experiments, thus performed, give a clear rational to the different fatty acid ratios found in olive oil, obtained from olives harvested in orchards grown under severely different pedoclimatic environments, i. e. hill or plan fields (11). When the growth temperature is lowered, isomeric phyto-fatty acids are competitively biosynthesized by olive cells. This mechanism allows olive tissues to regulate membrane fluidity, thus optimizing its function at the variable growth temperature.