Long Chain PUFAS Omega-3 Incorporation in Cell Membrane Microdomains of Breast Cancer Cells

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Long chain PUFAs are important molecules for membrane order and function; they can also modify inflammation-inducible cytokines production, regulation of eicosanoid production, TAG synthesis, blood pressure, and gene-expression.

Furthermore omega-3 have been hypothesized to influence colorectal carcinogenesis through many mechanisms (e.g. inhibition COX2, increasing apoptosis, reducing angiogenesis). In breast cancer, supplementation with DHA synergistically enhances taxane cytotoxicity, down regulate HER-2/neu (c-erbB-2) oncogene expression, modifies the production of the heparansulfate syndecan1, suggesting a gene-nutrient interaction of critical importance for mammary carcinogenesis and supporting the hypothesis that omega-3 can be used as modulators of cancer cell chemo-sensitivity.

Aim of the study was to evaluate the effects of supplementation of AA, EPA and DHA in two lines of human breast cancer cells characterized by different expression of ER receptor. Moreover we studied the fatty acid pattern in membrane phospholipids when LC PUFAs are incorporated with different specificity.

After treatments LC PUFAs are partially metabolized by both cell lines. In particular EPA is promptly converted to DPA; DHA is partially re-converted in EPA while the integrated AA is not further metabolized.

Both omega-3 fatty acids induced cell apoptosis, with different degree and sensitivity, while AA increased cell proliferation in both cell lines.

Finally we are investigating the role of membrane changes induced by omega-3 fatty acid incorporated in phospholipid. Ongoing researches regard the membrane micro domain (lipid raft) functions and the signal transduction related to cancer cell proliferation.

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