Lipid binders in old oil paintings


A high-performance liquid chromatography (HPLC)-fluorescence method has been applied to the identification of binding media or protective film used in conservation and restoration of paintings. Derivatization of fatty acids released by hydrolysis of structural drying oils was made with 4-(bromomethyl)-7-methoxy-coumarin with 18-crown-6 as catalyst. Separation of the derivatives was made by HPLC and detection by fluorometry within 25 min. Good resolution, linearity and sensitivity were obtained. Fatty acid derivative peak ratios, especially stearic acid:palmitic acid, are useful in the identification of drying oils.

**Direct analysis of PE and lysoPE**


Brief treatment of lipid extracts of biological samples with fluorenyl-methoxycarbonyl chloride converted phosphatidylethanolamine (PE) and lysophosphatidylethanolamine (lysoPE) into their corresponding carbamate derivatives. The reaction solution was infused into the ion source of an electron impact mass spectrometer. Both PE and lysoPE could be analyzed at a detection limit of attomoles per microliter. Molecular species identification and quantitation could be made. The method is claimed to be simple and applicable to other lipid classes or other cellular metabolites by appropriate adjustments of the derivatization conditions.

**Analysis of rumenic acid metabolites**

Destaillats, F., J.-L. Sébédo, O. Berdeaux, P. Juancéa, and P. Angers, Gas Chromatography-Mass Spectrometry Determination of Metabolites of Conjugated cis-9,trans-11,cis-15 acid (rumenic acid) were separated and identified by gas chromatography-mass spectrometry of the 4,4-dimethyloxazoline (DMOX) and methyl ester derivatives. Specific fragmentation of the methyl ester derivatives revealed some similarity with their corresponding DMOX derivatives. Intense ion fragments at m/z=M+ -69, corresponding to a cleavage at the center of a bis-methylene interrupted double bond system were found for all identified metabolites. Allylic cleavage of the n-12 double bonds for the C20:5, C22:5 and C22:6 metabolites was deduced from intense ion fragments at m/z=M+ -136. A total of four long-chain polyunsaturated fatty acids arising from rumenic acid metabolism in rat liver were identified.

**Atomic-scale resolution of fatty acid bilayers**


The structure and dynamics of a biological model bilayer deposited as a Langmuir-Blodgett structure were studied by atomic-scale resolution using ultrafast electron crystallography. The 2D assembly was determined. Structural dynamics were measured from diffraction frames taken every 1 picosecond after a femtosecond temperature jump. The observed motions, with sub-Å resolution and monolayer sensitivity, revealed the coherent anisotropic expansion of the bilayer solely along the aliphatic chains. The observed motion is indicative of a nonlinear behavior among the anharmonically coupled bonds on the ultrafast time scale. Further information on macromolecular dynamical structures is projected from use of ultrafast electron crystallography.

**Fat bloom migration on chocolate**


Potential predictors of migration fat bloom based on evaluations made shortly after chocolate production have been examined. Chocolate batches varying in tempering methods, tempering degree and amount of added butter oil were evaluated at times 0, 1 and 4 hours after production by DSC, pNMR and textural analysis. Discriminant analysis and principal component analysis were combined to investigate the potential toward prediction. The batches were classified according to the time of initial appearance of white spots. The evaluation procedures gave 100% correct classifications, 100% using cross-validation for chocolate storage times. The tempering method was found to have no significant effect in visual fat bloom development, but undertempered chocolate bloomed more quickly than well-tempered product while overtempering delayed the appearance of bloom. Addition of butter oil promoted at 6% level bloom; absence or lower levels showed no significant effect.

**Predominant polymorphic form of mango almond fat**


The thermal profile, the solid fat content (SFC) and the predominant polymorphism of mango almond fat samples were analyzed by differential scanning calorimetry and X-ray diffraction techniques, and the results compared with previous chemical studies. A relatively simple fusion/crystallization behavior was observed. Stabilized samples showed a simple SFC profile, and the occurrence of at least four polymorphs was found. The non-stabilized samples corresponded mainly to the formation of the crystalline α form. The stabilized samples showed the formation of two other unstable polymorphs formed during α to β polymorphic transition. The presence of the less and more stable polymorphs was found. Mango almond fat was concluded to be a β-stable fat similar to cocoa butter.

**Fatty acid epoxidation analysis**


Application of high-performance liquid chromatography with evaporative light scattering detection provides a more rapid and descriptive analysis than conventional
methods of titrimetry and gas chromatography for monitoring the epoxidation of unsaturated fatty acids. Chemo-enzymatic epoxidation of oleic, linoleic and linolenic acids was studied. Simultaneous determination of fatty acids and epoxides differing from each other in the number of epoxide rings, the degree of unsaturation and the position of the epoxide rings and double bonds could be determined, and epoxide structures identified. The method is believed to be a powerful complement to conventional methods for monitoring epoxidation of fatty acids.

**AMPK activation may be PUFA-independent**


Examination of the possible mechanism for AMP-activated protein kinase (AMPK) activation in stearoyl-CoA desaturase 1 (SCD1) deficiency was studied in SCD1-/- mice. A diet containing fish oil (5% fat) was fed for 14 days. The n-3 unsaturated fatty acid contents of the tissues examined were all increased. Hepatic mRNA levels of fatty acid synthase decreased (associated with lipid synthesis) and acetyl-CoA oxidase increased (associated with fatty acid oxidation), but no changes in AMPK phosphorylation and protein contents of liver, skeletal muscle and heart were found. The findings suggest that polysaturated fatty acids (PUFA) are not involved in AMPK activation. The increased activity of AMPK in SCD1-/- mice is probably PUFA-independent.

**Role on n-3 acids, COX-2 in brain cancer**


Tumor necrosis factor-α was found to upregulate the expression of cyclooxygenase-2 (COX-2) mRNA expression and prostaglandin E2α (PGE2α) production. In addition, both n-3 and n-6 polysaturated fatty acids (PUFA) regulated COX-2 mRNA expression and PGE2α production. Whereas arachidonic acid (AA) increased COX-2 mRNA expression and prostaglandin production in n-6-stimulated brain-metastatic melanoma cells, n-3 acids, represented by EPA and DHA, increased Cox-2 mRNA expression. Increased invasiveness was found on cell incubation with either AA or PGE2α, but not with EPA or DHA. Downregulation of both COX-2 mRNA and protein expression occurred on incubation with EPA or DHA, and was accompanied by decreased invasion. N-3 PUFA appeared to downregulate COX-2 mediated invasion in brain-metastatic melanoma.

**LPA3 signaling role in embryo implantation**


Targeted deletion of the lysophosphatic acid (LPA) receptor LPA3 in mice resulted in significantly reduced litter size attributable to delayed implantation and altered embryo spacing. Cyclooxygenase-2, known to influence implantation, was found to be downregulated in LPA3-deficient uteri during pre-implantation and was accompanied by reduced levels of prostaglandins E2α and I2α (PGE2α and PGI2α), thus having a negative impact on implantation. Exogenous administration of PGE2α or an analog of PGI2α into LPA3-deficient female mice rescued delayed implantation but not defects in embryo spacing. LPA3 receptor-mediated signaling has an influence on implantation, and indicates a connection with prostaglandin biosynthesis.

**Gene expression profiling in plants**


Global gene analysis has benefited from the availability of RNA technologies and commercial oligonucleotide microarrays for *Arabidopsis* and rice. Spotted microarrays with expressed sequence tags (EST) clones are broadly available. Improvements in RNA amplification techniques allow the analysis of small amounts of mRNA using either polymerase chain reaction (PCR) amplification or linear amplification through *in vitro* transcription on cDNA. The desired approach of studying single plant cells has involved three general technologies of micropipetting, laser-capture microdissection and protoplast sorting. All three techniques have advantages and disadvantages in the provision of target cells. RNA purification and analysis by microarray, PCR, or sequence-based methods can be applied to target cells independent of the method of their preparation.