Abstracts

Fats and oils

AUTOXIDATION OF POLYUNSATURATE LIPIDS. FACTORS CONTROLLING THE STEROCHEMISTRY OF PRODUCT HYDROPEROXIDES. N.A. Porter, B.A. Weber, H. Weenen, and J.A. Khan. (Paul M. Gross Chemical Laboratories, Duke University, Durhan, NC 27706) *J. Am. Chem. Soc. 102*(17), 5597-601 (1980). The mechanism of the autoxidation of linoleic acid and phospholipid esters of this acid was investigated. The products of autoxidation were analyzed by LC after reduction to the corresponding hydroxy fatty acids. The ratio of *trans,cis/trans,trans* products formed during the initial stages of oxidation was dependent on temperature and the concentration of linoleic acid. This *trans,cis/trans,trans* ratio varied from 4.2 to 0.23. Mixtures of linoleic acid and *p*-methoxyphenol give *trans,cis/trans,trans* product ratios dependent on the concentration of added phenol. A kinetic scheme consistent with these observations is presented.

ANALYSIS OF AUTOXIDIZED FATS BY GAS CHROMATOGRAPHY-MASS SPECTROMETRY: VI. METHYL 9,15- AND 12,15-OCTADECADIENOATE. E.N. Frankel, E.J. Dufek and W.E. Neff (NRRC, AR, SEA, USDA, Peoria, IL 61604) *Lipids 15*(9), 661-7 (1980). The gas chromatography-mass spectrometry (GC-MS) method developed in preceding papers was extended to the structural analysis of autoxidation products of methyl *cis*-9,*cis*-15-octadecadienoate and of an 87% concentrate of *cis*-12,*cis*-15-octadecadienoate. Eight isomeric hydroxydienes with one allylic and one isolated double bond were identified from oxidized 9,15-diene and 2 conjugated hydroxydienes from oxidized 12,15-diene, after reduction of the hydroperoxides. The proportions of 16- (15%) and 17-hydroperoxides (22%) from 9,15-diene were significantly higher than that of the other isomers (8-12% each: 8-, 9-, 10-, 11-, 14- and 15-OOH). Similarly, the amount of 16-hydroperoxide from 12,15-diene was larger (42%) than the 12-hydroperoxide (31%). Substantial amounts of dihydroxy esters with one OH substituent on carbons -8, -9, -10, or -11 and the other OH on carbons 14, -16 or -17, were identified after hydrogenation in highly oxidized 9,15-diene. The implications of these hydroperoxide analyses are discussed in relationship to the precursors of flavor deterioration of oils and partially hydrogenated oils containing an ω-3 double bond.

IONIC PROPERTIES OF PHOSPHOLIPIDS AT THE OIL/WATER INTERFACE. M. Hayashi, T. Kobayashi, T. Seimiya, T. Muramatsu and I. Hara (Lab. of Chem., College of Arts and Sciences, Chiba University, Yoyoicho, Chiba, Japan) *Chem. Phys. Lipids 27*(1), 1-8 (1980). Surface pressures and surface viscosities of dipalmitoylphosphatidylethanolamine and its polar group analogues were measured at the hexane/water interface as a function of bulk pH. The monolayers expanded as the bulk pH was shifted from neutral to alkaline and give rise to an increase in surface pressure at a constant area, and the surface viscosity was simultaneously reduced at high pH. For the increase in surface pressure, theoretical values were calculated using the Gouy-Chapman equation for the electrical double layers produced by shifting pH, and good agreements were obtained with the measured ones from which a simple mechanism was deduced for the increase in pressure. The ionic dissociation characteristics of amino groups of the lipids were discussed taking pK_a values given in the above calculations into account. The reduction of the surface viscosity was thought to be attributable to disintegration of zwitter ionic structure in the condensed monolayers.

ROUTINE ASSAY FOR DETERMINATION OF α-TOCOPHEROL IN LIVER. A.W. Kormann (Hoffmann-LaRoche & Co. Ltd., Central Res. Units, 4002 Basle, Switzerland) *J. Lipid Res. 21*(6), 780-3 (1980). A rapid and accurate procedure for determination of α-tocopherol in liver has been developed. Extracts of saponified liver homogenates were purified by a simple and efficient chromatography step on Kieselgel. α-Tocopherol content of the purified extracts was determined by an automated gas-liquid chromatographic assay of the trimethylsilyl derivatives. Mean recovery for α-tocopherol added in vitro was 95.4 ± 1.2% (SEM, 149 estimations). The lower assay limit was ca. 0.5 μg α-tocopherol/g liver. An experienced analyst was able to process at least 12 chick, rat, or guinea pig livers per day.

FORMATION OF CARBONYL COMPOUNDS FROM β-CAROTENE DURING PALM OIL DEODORIZATION. J.V. Ouyand, H. Daun, S.S. Chang and C.-T. Ho (Food Science Dept., Box 231, Cook College-Ruthers Univ., New Brunswick, NJ 08903) *J. Food Sci. 45*(5), 1214-7 (1980). Decomposition products of β-carotene formed during a simulated commercial deodorization of palm oil were separated from unsaponifiable portion into six fractions by liquid chromatography. Fraction two containing slightly polar substances was further separated using thin-layer chromatography and high performance liquid chromatography. In this fraction, β-13-apo-carotenone, β-15-spo-carotenal, and β-14'-apo-carotenal were identified by infrared spectrometry and mass spectrometry.

INDIVIDUAL LIPIDS AND PROXIMATE ANALYSIS OF VARIOUS FOODS. 5. CANDY BARS. T.S. Rusolf, A.J. Sheppard, D.R. Newkirk, and W.D. Hubbard (Div. of Nutr., Food and Drug Admin., Washington, DC 20204) *J. Agric. Food Chem. 28*(5), 889-91 (1980). Candy bars of various types, purchased in the Washington, DC, area, were analyzed for fatty acids, sterols, *cis,cis*-methylene interrupted polyunsaturated triglycerides, water, protein, ash, and total fat. The data show a wide range in the amount of the same fatty acid found in similar type candy bars, indicating that mixtures of different oils were used in the manufacture of the candy bars. There is also considerable variation among candy bars for any one particular component, such as water, which ranged from 1.9 to 17.6 g/100 g, and protein, which ranged from 1.4 to 14.2 g/100 g. The data suggest that hydrogenated fats and oils are widely used, as indicated by *cis,cis*-polyunsaturated trilinolein values, which are generally considerably lower than the total polyunsaturated fatty acid values.

FUSION OF DIPALMITOYLPHOSPHATIDYLCHOLINE VESICLES. S.E. Schullery, C.F. Schmidt, P. Felgner, T.W. Tillack, and T.E. Thompson (Depts. of Biochem. and Path., Univ. of Virginia Schl. of Med., Charlottesville, VA 22908) *Biochemistry 19* (17), 3919-23 (1980). Small unilamellar dipalmitoylphosphatidylcholine vesicles formed by sonication are shown to fuse spontaneously below the phase transition temperature. The ultimate fusion products are unilamellar vesicles about 700 Å in diameter, which are stable and provide an intact ionic permeation barrier either above or below the phase transition. The fused vesicles have been characterized by gel chromatography, trapped volume, ^{31}P nuclear magnetic resonance, and negative stain and freeze-fracture electron microscopy.

BUTYLATED HYDROXYANISOLE (BHA) INDUCED CHANGES IN THE SYNTHESIS OF POLAR LIPIDS AND IN THE MOLAR RATIO OF TETRAHYMANOL TO POLAR LIPIDS IN TETRAHYMENA PYRIFORMIS. J.G. Surak and R.G. Singh (Pesticide Res. Lab., Food Sci. and Human Nutr. Dept., Univ. of Florida, Gainesville, FL 32611) *J. Food Sci. 45*(5), 1251-5 (1980). When butylated hydroxyanisole (BHA) was added to cultures of *Tetrahymena pyriformis* at concentrations up to 12.5 μg/ml, an inhibition in the synthesis of polar lipids was observed. Increasing concentrations of BHA decreased the percentage of Na-2-[^{14}C]-acetate incorporated into lysophosphatidylcholine, 2-aminoethylphosphonolipids, and unknown polar lipid I while increasing the incorporation of radiolabel into phosphatidylethanolamine and unknown polar lipid II. BHA increased the cellular level of tetrahymanol and increased the molar ratio of tetrahymanol to lipid phosphorus. These data suggest the *T. pyriformis* alters its cellular lipid composition in response to perturbations caused by BHA.

MECHANISM OF PROTEIN-LIPID INTERACTION: ASSOCIATION OF APOLIPOPROTEINS A-I AND A-II WITH BINARY PHOSPHOLIPID MIXTURES. J.B. Swaney (Depts. of Biochem. and Med., Albert Einstein College of Med., Bronx, NY 10461) *J. Biol. Chem. 255*(18), 8791-7 (1980). Studies of the recombination of apo A-I and apo A-II, the major protein components of human high density lipoprotein, with binary mixtures of dimyristoyl phosphatidylcholine (DMPC) and distearoyl phosphatidylcholine (DSPC) were performed. Recombination was observed to occur only near the lower bound temperature of the phase transition for each mixture. Similar experiments using binary mixtures of

DMPC and 1-palmitoyl-2-oleoyl phosphatidylcholine (POPC) demonstrated that recombination occurs in a temperature range which is believed to approximate the lower bound of the phase transition for this mixture as well. The reactivity of both types of mixtures toward recombination with apolipoproteins was found to decrease with decreasing proportions of DMPC, even though the effect of DMPC was to decrease the transition temperature in DMPC/POPC mixtures and to increase the transition temperature in DMPC/DSPC mixtures. A mechanism for insertion of apolipoproteins into lipid bilayers is proposed in which the protein gains entry to the interior of the bilayer through a defect resulting from equilibrium fluctuations of state at the onset temperature of acyl chain melting.

THE MARGARINE. STORAGE AND DELIVERY PROBLEMS. L. Faur, Rev. Fr. Corps Gras. *27*, 371-5 (1980). The margarines are sensitive to different alteration factors which can influence the shelf-life of product: oxygen, microorganisms, heat, mechanical effect. The low temperature (15 C) storage is the chief condition for a good preservation. It is necessary to use suitably equipped and isolated means of transport. The margarines must be controlled regularly and watchfully during the manufacture to give them a good shelf-life.

ON THE REFINABILITY OF OILS. II. PRINCIPLES OF THE STATISTICAL INTERPRETATION OF RESULTS. E. Sambuc and M. Naudet, Rev. Fr. Corps. Gras. *27*, 377-85 (1980). The analytical results given by technological experiments described in the first paper are too numerous to be directly studied. The correlation coefficient can only give qualitative or semi quantitative information. Only a factorial analysis is able to resolve this problem. This analysis has been carried out according to the centroid method, the principle of which is recalled and the meaning of obtained results is specified. Calcul methods leading to an a priori immediate or at term evaluation of tasting marks are also necessary: the principle of the used method is described.

CATALYSIS BY PRECIOUS METALS IN LIPID CHEMISTRY. II. HYDROGENATION OF THE NEW RAPESEED OIL CATALYSED BY SUPPORTED PRECIOUS METALS. G. Cecchi, J. Castano and E. Ucciani, Rev. Fr. Corps Gras. *27*, 387-92 (1980). Supported precious metals (Ru, Rh, Pd, Pt on alumina or carbon) were compared to nickel in the hydrogenation of the new rapeseed oil. At 180 C specific activities are ordered as follows, according to the support: alumina Pd > Pt > Rh > Ni > Ru; carbon Pd > Pt > Rh > Ru > Ni. The S3,1 selectivity of these catalysts remains at a low level. Except Rh, they induce the formation of stearic acid, when the amount of linolenic acid is lowered to 1%. As for the S3,2 selectivity the mean value is ca. 2 in every case. Hydrogenation products display a high monoene- and a low diene content. Precious metals exhibit a pronounced trend to make trans isomers, which is decreasing as follows: alumina Rh > Ru, Ni, Pd > Pt; carbon Rh > Ru, Pd > Ni > Pt. However the most interesting catalyst seem to be Pd/C. When used at lower temperature (100 C) it becomes less isomerising. Then the hydrogenated oil contains 47% oleic acid, but only 5% linoleic acid. Improvement of such catalyst and optimisation of conditions should allow to obtain new monoenic liquid oils.

VARIABILITY IN FATTY ACID COMPOSITION IN SEMI-SPREADING PEANUT TYPES. K.S. Sekhon, S.K. Gupta, K.L. Ahuja and S.V. Jaswal, *Oléagimeax 35*, 311-22 (1980). Oil content and fatty acid composition of the 50 semi-spreading types have been reported. The oil content showed little variation (49.83 ± 1.70) and of the major component acids; oleic acid revealed considerable variation (57.34 ± 9.37) than that of bunch and spreading groups. As in spreading and bunch groups, significant negative correlation of oleic acid with linoleic acid existed in this group also.

NON-FOOD USES FOR PALM OIL. M.K. Schwitzer, *Oléagineux, 35*, 261-7 (1980). Estimated world production of oils and fats is around 51 million tons of which some 4.5 million tons are palm oil. Malaysia supplies nearly half of the worl dproduction of aplm oil. Nearly all of this is used for edible purposes. However, as more and more of it is being refined there is an increasing amount of refining residues or acid oils available, which are a suitable source for a wide variety of uses other than for human consumption. The use of palm oil in soaps is well established. Both palm oil and acid oil are also used in animal feeds. Palm oil can also replace tallow as a source for most of the uses in the oleochemicals industry, because of the similarity of their fatty acid compositions. Nearly all the uses for oleochemicals are in the form of fatty acids. Hence the fat splitting process can be regarded as the gate for further processing of the fatty acids. This process also provides glycerol which is a highly valued product. Whether palm oil or palm acid oil will actually be used as a (partial) replacement of tallow depends on their relative prices on the world market and not on the technical suitability of palm oil. The paper describes briefly the fat splitting process and some of the principal processes involving fatty acids such as cold separation to produce stearic and oleic acids, and hydrogenation of fatty acids. Some of the principal uses of fatty acids such as for metal stearates, fatty amines, esters and fatty alcohols are outlined. The latter process could be of particular interest in the event of further increases in the price of petro-oil, which is now the principal source for the manufacture of synthetic detergents. The paper ends with an economical evaluation of the uses of inedible palm oil and makes specific recommendations for a fatty acid industry in Malaysia.

OIL PLANTS NATIVE TO MADAGASCAR. I. —STUDY OF THE FATTY ACID AND STEROL COMPOSITION OF SOME PALM SPECIES. E.M. Gaydou, J.P. Bianchini, I. Rabarisoa and G. Ravelojaona, *Oléagineux, 35* 413-5 (1980). The fatty acid and sterol compositions of 3 species of native Madagascar palms (*Raphia ruffia, Hyphaene shaltan* and *Medemia nobilis*) have been determined. Among the fatty acids identified by gas chromatography on capillary column impregnated with Carbowax, the most important are lauric, myristic, palmitic and oleic acids in the case of *H. shatan* and *M. nobilis*; for *R. ruffia* it is palmitic, oleic and linoleic acids. The analysis of the sterol fraction on OV 17 enabled separation and titring of six sterols, the most important of which are β-sitosterol, stigmasterol and campesterol.

FATTY ACID COMPOSITION OF SOME OILS FROM SENEGALESE SEEDS. J. Miralles and Y. Pares (Rev. Fr. Corps Gras.) *27*, (8-9) 393-6 (1980). The fatty acid composition of Senegalese oil thirty varieties is described. The first results of a study on the antibiotic or stimulating effect of a few oils on a leprous mycobacterium detected in Dakar are reviewed.

SYNTHESIS AND SPECTRAL STUDIES OF 2-ALKOXYSTEARIC ACIDS—I. A.A. Ansari and H. Egge (Inst. of Physiological Chem., Univ. of Bonn, Nussallee 11, 5300 Bonn F.R.G.) *Chem. Phys. Lipids 27*(3),191-8 (1980). A series of 2-alkoxystearic acids was synthesized during dehydrohalogenation of the 2-iodostearic acid with potassium hydroxide in different alcohols. Besides the formation of *trans*-2-enoic- and 2-hydroxyacids, the reaction provides a convenient method for the preparation of long-chain 2-alkoxyacids in high yield. With (−)-2-butanol and (−)-2-methyl-butanol the formation of mixtures of diastereoisomeric 2,1'-methylpropoxy-and 2,2'-methyl-butoxystearic acids is evident by gas chromatographic analysis of their methyl esters. The preparation of 2-alkoxystearic acids (I–XI), their separation by column chromatography and structure determination by elementary analysis, thin-layer chromatography (TLC), infrared (IR) and proton magnetic resonance spectroscopy as well as gas chromatography/mass spectrometry are described.

DILATOMETRY OF DIPALMITOYLLECITHIN-CHOLESTEROL BILAYERS. D.L. Melcior, F.J. Scavitto, and J.M. Steim (Dept. of Chem., Brown Univ., Providence, RI 02912) *Biochemistry 19*(21), 4828-34 (1980). The interactions of cholesterol and dipalmitoylphosphatidylcholine in bilayers were investigated by differential scanning dilatometry and related techniques. Dipalmitoylphosphatidylcholine bilayers ranging from 0 to 50 mol % cholesterol were studied over a temperature range of 0–50°C. These investigations allowed construction of a three-dimensional surface with dimensions of mole fraction of cholesterol, temperature, and apparent partial specific volume. Much of the phenomenology reported for dipalmitoylphosphatidylcholine and dipalmitoylphosphatidylcholine-cholesterol bilayers appears and can be interrelated on this surface. In addition to the thermotropic events associated with the system, two cholesterol-induced events at 17.5–20 and 29 mol % cholesterol are particularly in evidence.

ANTIOXIDANT ACTIVITY OF CYSTEINE AND PROTEIN SULFHYDRYLS IN A LINOLEATE EMULSION OXIDIZED BY HEMOGLOBIN. M.J. Taylor and T. Richardson (Dept. of Food Science, Univ. of Wisconsin, Madison, WI 53706) *J. Food Sci. 45* (5),1223–7 (1980). Fifteen amino acids were evaluated for antioxidant activity in a linoleate emulsion oxidized by hemoglobin. Cysteine was the only amino acid with significant antioxidant activity, which was as great as butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), or α-tocopherol. Ten proteins containing free or latent sulfhydryl groups were evaluated for antioxidant activity in both native and reduced states. Native proteins, containing few or no measureable sulfhydryl groups, had little or no antioxidant activity. Proteins treated with $NaBH_4$ had greatly increased sulfhydryl groups and antioxidant activity. Treatment of reduced proteins or cysteine with iodoacetic acid (IAA) eliminated both sulfhydryl groups and antioxidant activity. Cysteine and reduced bovine serum albumin had optimum antioxidant activity at pH 8.6.

A COLORIMETRIC MICRODETERMINATION OF PEROXIDE VALUES UTILIZING ALUMINUM CHLORIDE AS THE CATALYST. T. Asakawa and S. Matsushita (Res. Inst. for Food Sci., Kyoto Univ., Uji, Kyoto, 611, Japan) *Lipids* **15**, 965–7 (1980). A colorimetric microassay is described for the determination of lipid hydroperoxides. Hydroperoxides are reacted with potassium iodide in the presence of an acid catalyst and liberated iodine is measured. Aluminum chloride, an alcohol-soluble Lewis acid, is used as catalyst. Liberated iodine is measured colorimetrically at 560 nm after addition of starch in 0.01 N hydrochloric acid. The range of the measurement was 0.05–0.5 μmol of hydroperoxides.

EFFECTS OF CONSTITUENT FATTY ACIDS ON THE BINDING OF LYSOPHOSPHATIDYLCHOLINES BY SERUM ALBUMIN. W.M. Barlow and W.E. Klopfenstein (Dept. of Biochem., Kansas St. Univ., Manhattan, KS 66506) *Biochim. Biophys. Acta* **620**, 18–23 (1980). The binding of lysophosphatidylcholines containing 10–18 carbons and, with 18 carbon series, up to three double bonds, to serum albumin was studied by heat-burst microcalorimetry. The heats of reaction resulting from binding the lipids and proteins in various ratios were plotted. From the plots we determined the reaction stoichiometries, then calculated the thermodynamic parameters for the reactions. We found that short-chained and unsaturated lysophosphatidylcholines are bound to albumin in a stoichiometry of 2:1. With longer-chained compounds the ratio becomes 1:1 except for the stearoyl derivative, which is anomalous and bound at a ratio of 3:1. One explanation for this anomalous behavior is that the stearoyl lysophosphatidylcholine was bound at a temperature below its transition temperature, so it was in the gel state, while the binding of all other compounds took place above their transition temperatures when they were in a more fluid state.

FATTY ACID AND STEROL COMPOSITION OF UNGERMINATED SPORES OF THE VESICULAR-ARBUSCULAR MYCORRHIZAL FUNGUS, *Acaulospora laevis*. J.P. Beilby (Dept. of Soil Science and Plant Nutr., Univ. of Western Australia, Nedlands, Western Australia 6009) *Lipids* **15**, 949–52 (1980). The fatty acids and sterols of ungerminated chlamydospores of the vesicular-arbuscular (VA) endophyte *Acaulospora laevis* were examined by gas chromatography and mass spectrometry. The total lipid content of the spores was 45.5% of the spore dry weight. Predominant fatty acids were palmitoleic (52.5%), palmitic (25.5%) and oleic (7.4%). Minor fatty acids consisted of a range of (n-3) and (n-6) polyunsaturated acids. The occurrence of (n-3) polyunsaturated fatty acids is rare in fungi of the order Mucorales. Three sterols were identified as 24-ethylcholesterol (79.9%), cholesterol (11.0%) and 24-methylcholesterol (9.2%). No ergosterol was detected. Lipids of the chlamydospores of *A. laevis* are compared with those of *Glomus caledonius*.

PROSTAGLANDINS AND CONGENERS. 28. SYNTHESIS OF 2-(ω-CARBALKOXYALKYL)CYCLOPENT-2-EN-1-ONES, INTERMEDIATES FOR PROSTAGLANDIN SYNTHESES. K.F. Bernady, J.F. Poletto, J. Nocera, P. Mirando, R.E. Schaub, and M.J. Weiss (Pharmaceutical Process Research Dept., American Cyanamid Co., Bound Brook, NJ 08805) *J. Org. Chem.* **45**, 4702–15 (1980). A methodology is described for the synthesis of the 2-substituted cyclopentenone precursors required for the preparation of 11-deoxyprostaglandins by the conjugate addition procedure. Among the cyclopentenones so prepared were some with features designed to inhibit or prevent fatty acid β-oxidative metabolism of the ultimate prostaglandin analogue. These features include methyl, ethyl, phenyl, and fluorine substituents at the α position of the fatty acid side chain and replacement of the β-methylene group with oxygen, sulfur or *gem*-dimethylmethylene moieties. Cyclopentenones with side chains varying in length from two to nine carbon atoms were also prepared.

DETERMINATION OF THE TRIGLYCERIDE COMPOSITION OF OLIVE OIL BY A MULTISTEP PROCEDURE. P. Damiani and G. Burini (Istituto di Chimica Bromatologica, Facolta di Farmacia, Universita degli Studi, 06100 Perugia, Italy) *J. Agric. Food Chem.* **28**, 1232–6 (1980). Olive oil was analyzed by separating the total triglycerides into fractions, different in the number of double bonds per mole, by means of Ag^+TLC. The fatty acid composition—overall and at the β position—was then determined both of total triglycerides and of single fractions; moreover, each fraction was oxidized and the products were separated by means of TLC into classes, each containing molecules having the same number of azelaic acid residues (A_3; A_2S; AS_2). The acids contained in each class were then quantitated by means of GLC. From the obtained data, the triglyceride composition of olive oil was determined (21 molecular species = 92.5% of total triglycerides), without the many assumptions usually conceived by other methods.

NITRIC-OXIDE MYOGLOBIN AS AN INHIBITOR OF LIPID OXIDATION. J. Kanner, I. Ben-Gera and S. Berman (Div. of Food Tech., Inst. for Tech. and Storage of Agr. Products, Agr. Res. Org., Volcani Center, PO Box 6, Bet Dagan 50–100, Israel) *Lipids* **15**, 944–8 (1980). The effect of nitric-oxide myoglobin (MbNO) on lipid oxidation was studied in linoleate and β-carotene-linoleate aqueous model systems and compared with that of metmyoglobin (MMb) and oxymyoglobin (MbO_2) in short- and long-term reactions. While MMb and MbO_2 had clear prooxidative effects, MbNO, under the same conditions, acted as an antioxidant. The specific antioxidative activity of MbNO was maintained even in the presence of prooxidants such as hemeproteins. The significance of the conversion of MbO_2 and MMb into an antioxidant during the curing process is discussed.

FATTY ACID ANALYSIS ON SHORT GLASS CAPILLARY COLUMNS. E. Lanza, J. Zyren, and H.T. Slover (U.S. Dept. of Agr., Science and Ed. Admin., Human Nutr., Beltsville Human Nutr. Center, Nutrient Composition Lab., Beltsville, MD 20705) *J. Agr. Food Chem.* **28**, 1182–6 (1980). Analyses of fatty acid methyl esters (FAME) were compared on 100-, 10-, and 2-m glass capillary columns coated with SP2340. The accuracy and precision for the analysis of FAME standards were comparable for all three columns. When actual food samples were chromatographed, the 100-m column gave superior resolution of the many positional and geometric isomers in hydrogenated vegetable oils and ruminant animal fats; however, analysis times were 90–135 min/sample. The 10-m column was adequate for quantitation of major fatty acids, but some minor acids were not detected. Analysis time ranged from 5 to 30 min depending on the sample and the chromatographic conditions. Low resolution made the 2-m column undesirable, even though the major fatty acids could be separated in less than 3.5 min. Quantitative data from the analysis of peanut oil, rapeseed oil, shortening, cod liver oil, pork, beef, and beef liver samples on 100- and 10-m columns are compared, and the characteristics of the three columns are discussed.

ROLES OF PHOSPHOLIPID AND DETERGENT IN SOLUBLE PROTEIN ACTIVATION OF SQUALENE EPOXIDASE. L.-F. H. Lin (James Bryant Conant Lab., Harvard Univ., Cambridge, MA 02138) *Biochemistry* **19**, 5135–40 (1980). "Soluble protein factor" (SPF) from hog liver stimulates hepatic microsome-associated squalene epoxidase in the presence of phosphatidylglycerol or phosphatidylserine. When SPF and phosphatidylglycerol are preincubated for 30 min at 37 °C before addition to the epoxidase system, this stimulation is abolished. On Sephadex chromatography of the protein-phospholipid mixture, both components appear in the void volume, whereas SPF alone is retarded on the column. These results suggest formation of a SPF-phosphatidylglycerol complex. Treatment of the complex with Tween 80 restores the stimulatory effects of SPF on squalene epoxidase. The stimulation of microsomal squalene epoxidase by SPF was abolished by pretreatment of the membrane with low concentrations of deoxycholate or by solubilizing the enzyme with Triton X-100, implying that an intact membrane system is required for SPF sensitivity. SPF has been purified 1200-fold from hog liver.

PHTHALIC ESTER, AN ARTIFACTUAL CONTAMINANT IN DIAZOMETHANE PREPARED FROM N-METHYL-N-NITROSO-*p*-TOLUENESULFONAMIDE FOR THE DERIVATIZATION OF PROSTAGLANDINS. J. Mai, J.E. Kinsella and J.S. Chou (Inst. of Food Sci. and Dept. of Chem., Cornell Univ., Ithaca, NY 14853) *Lipids* **15**, 968–71 (1980). During analyses of prostaglandin (PG) methoxime methyl trimethylsilyl (MO-ME-TMS) ether derivatives by gas chromatography, we consistently observed a contaminant peak which we identified as di-2-ethylhexyl phthalate (DEHP). The diazomethane prepared from N-methyl-N-nitroso-*p*-toluenesulfonamide (MNTSA) using the Diazald kit was the major source of DEHP. Several other materials also were significant sources. The concentrations of DEHP in these materials were quantified by gas chromatography-mass spectrometry.

EFFECTS OF MICROWAVE COOKING ON FOOD FATTY ACIDS: NO EVIDENCE OF CHEMICAL ALTERATION OR ISOMERIZATION. J. Mai, C.H. Tsai, G. Armbruster, P. Chu, and J.E. Kinsella (Inst. of Food Sci., Cornell Univ., Ithaca, NY 14853) *J. Food Sci.* **45**, 1753–5 (1980). Because of the current interest in the potential physiological effects of trans fatty acids and a brief report that microwave cooking causes isomerization of unsaturated

fatty acids, we examined the effects of microwave treatments on the fatty acid composition of several food lipids, i.e., chicken fat, beef tallow, bacon fat, rainbow trout, peanut oil, and potato lipids. The data indicate that microwave cooking per se does not change the fatty acid pattern of these lipids nor cause isomerization of the unsaturated fatty acids.

ANTIOXIDANT ACTIVITY OF METHANOLIC EXTRACTS OF VARIOUS OILSEED PROTEIN INGREDIENTS. K.S. Rhee, Y.A. Ziprin and K.C. Rhee (Dept. of Animal Science, Texas Agricultural Experiment Station, Texas A & M Univ., College Station, TX 77843) *J. Food Sci.* **46**, 75–7 (1981). Antioxidant activity (AA) of methanolic extracts of defatted flours, concentrates, and isolates produced from glandless cottonseed, peanut, and soybean was determined against linoleate oxidation catalyzed by metmyoglobin (MetMb), Fe^{++}-EDTA (1:1 molar ratio) and fresh beef homogenates and against autoxidation of safflower oil. Total phenolic content of the extracts were also determined. Methanolic extracts of glandless cottonseed protein ingredients showed uniquely and consistently higher AA than those of peanut and soy protein ingredients. Total phenolic content was also markedly higher for the cottonseed protein extracts. Methanol-souble AA was significantly correlated with total phenolic content for the extracts of defatted flours and concentrates but not for the extracts of isolates. The comparative methanol-soluble AA values of these oilseed protein ingredients were indicative of their antioxidation potential in cooked meat products.

LIPIDS IN FAST FOODS. H.T. Slover, E. Lanza and R.H. Thompson, Jr. (The Nutrient Composition Lab., Nutrition Inst., Human Nutrition, USDA-SEA, Beltsville, MD 20705) *J. Food Sci.* **45**, 1583–91 (1980). The lipid composition of food items from three hamburger-type fast food chains has been determined. Samples obtained over-the-counter were extracted with chloroform/methanol and analyzed for total fat, fatty acids, cholesterol, plant sterols, and tocopherols. Fatty acids were determined by an internally standardized gas chromatographic procedure on glass capillary columns coated with SP2340. Cholesterol, tocopherols and plant sterols were also determined by gas chromatography as trimethylsilyl ether derivatives. Condiments were analyzed separately. Limited data on the variability of French fries and plain hamburgers is also given.

VINYL MONOMERS FROM 12-HYDROXYSTEARIC ACID. N. Krishnamurti, *Pig. Resin Tech.* **9**, 15–7 (1980). The synthesis of vinyl monomers from ricinoleic acid is reported. Preparation of pure ricinoleic acid and of 12-hydroxystearic acid, from which 16 (meth)acrylic and allyl esters were derived, is detailed. Some physico-chemical characteristics of these monomers are tabulated. (World Surface Coatings Abs. No. 458)

USE OF OILS IN PAINTS AND RELATED PRODUCTS. II. A Poluzzi. *La Rivista Italiana Delle Sostanze Grasse* **56**, 316-24 (1979). The use of oils in alkyds and polyurethanes is reviewed. (World Surface Coatings Abs. No. 461)

EPOXIDISED SOYABEAN OIL: ALTERNATIVE PLASTICISER? Anon. *Plast. Technol.* **1979**, 25–9. The cost and performance of epoxidised soyabean oil are compared with those of other primary plasticisers for polyvinyl chloride. (World Surface Coatings Abs. No. 458)

URETHANE COATINGS FROM PROPOXYLATED FATTY ACIDS AND EPOXIDISED TALLOW. M. Zubillaga and E. Saggese. *J. Coatings Tech.* **52**, (No. 661), 63–8 (1980). The feasibility of fat-based intermediate polyols for protective urethane coatings was demonstrated. Polyether polyols were obtained by reacting threo- and erythro-9,10-dihydroxystearic acid and azelaic acid with propylene oxide. Other films were prepared with the fatty polyols derived from the propoxylated products from the reaction of epoxidised tallow with sorbitol and lactitol. The potential use of these fat-based derivatives as resin components in coatings is indicated. (World Surface Coatings Abs. No. 461)

PREPARATION OF SYNTHETIC DRYING OIL. V.S. Aliev et al. *U.S.S.R. 690,027. Soviet Invent. Ill.* **1980**, Vol C No. 22, Gp G, 1. The process comprises the free radical co-oligomerisation of aryl alkenes and conjugated dienes, using an alkadiene and cyclodiene condensate as MW regulator The addition of maleic anhydride improves the quality of the oil. (World Surface Coatings Abs. No. 461)

PURENESS AND POSSIBLE CONTAMINATIONS OF THE MARGARINE. J. Castang and J. Estienne, *Rev. Franc. Corps Gras*, **27**, 437–41 (1980), French, RFCG 80–32. Legislation and regulations in force concerning the margarine are reviewed. The analytical control is considered with respect to the following determinations: water and non fatty matter, fat, tracer, diacetyl, fatty acids, sterols, colours, and preservatives. The special case of vegetable margarines is studied. Concerning the possible contaminants, the different methods for detecting the residual technology auxiliaries and monomer traces from some packs are reviewed.

COMPARISON OF SOME CATALYSTS IN THE SELECTIVE HYDROGENATION OF THE NEW RAPESEED OIL. G. Cecchi, J. Castano and E. Ucciani, *Rev. Franc. Corps Gras*, **27**, 443–7, (1980), french, RFCG 80–33. Four heterogeneous catalysts (Pd, Rh, Ni, Cu-Cr) and one homogeneous catalyst (Ni-Fe Ziegler) have been compared in the selective hydrogenation of the new rapeseed oil. In order to appraise poisoning of such catalysts by the sulfur compounds, the same oil has been hydrogenated in the crude state, after neutralization and bleaching and after deodorization. An original approach permitting measurement of the amounts of deactivated metals led to a scale of specific activity which is the same as that of thioresistance, the oil being crude or refined : Pd > Rh > Ni-Fe > Ni >> Cu-Cr. Selectivity and cis-trans isomerization are not modified in the same way according to the catalyst and the refining state of the oil. Any treatment of a crude oil under heat and vacuum is beneficial for the catalysts. Nevertheless, using the most efficient catalysts (Pd/C and Ni-Fe Ziegler), the most simple process should consist in hydrogenating a neutralized-bleached oil. With respect to a refined oil the amount of metal to be used must be doubled, but the selectivity is satisfactory and the extent of cis-trans isomerization is lowered.

EFFECTS OF THE TECHNOLOGY ON THE AMINOACID COMPOSITION AND THE NUTRITIONAL VALUE OF OLEAGINOUS PROTEINS; ABSORPTION OF DEGRADATION PRODUCTS. H. Fabry, *Rev. Franc. Corps Gras*, **27**, 449–56 (1980), french., RFCG 80–34. The different industrial processes of oleaginous seeds are reviewed. Their effects depend on the conditions. They are sometimes beneficial in destroying or inactivating the antinutritional factors, but can be harmful for the amino acid composition, solubility, digestibility and biological value of proteins. In some cases, they cause changes in the protein structure and give unusual compounds. Metabolism of these is studied.

STUDY OF OIL PALM HEIGHT GROWTH IN THE IVORY COAST. PRACTICAL APPLICATION TO THE REPLANTING PROBLEM. C. de Berchoux and P. Quencez, *Oléagineux*, **35**, 431–8 (1980). The knowledge of the height growth rate of the oil palm is essential as it makes it possible to foresee the moment at which a certain percentage of the crowns will grow out of reach of the harvesters, leading to a steadily increasing amount of lost yield. The study of growth is intended to lead to the appraisal of the probable extent of the useful life of a plantation and of the date when replanting will start, the supply of bunches to the oil mills during the period in which the old crops are being replaced depending on this. The simple method described in the article has brought out the relationships with various parameters such as the ecology, the soils and the age and uniformity of the palm populations. It is an effective tool for planning.

RECENT PROGRESS IN RESEARCH ON ESSENTIAL FATTY ACIDS. J. Williams, *Oléagineux*, **35**, 457–9 (1980). The biological importance of essential fatty acids is stressed, notably that of γ-linolenic acid. Oil of Evening Primrose is particularly rich in this acid. Current research on essential fatty acids allows a promising future to be foreseen for the development of a natural product such as oil of Evening Primrose for the treatment and prevention of coronary and cerebral thromboses.

TOLERANCE OF THE HYBRID COCONUT LOCAL × RENNELL TO NEW HEBRIDES DISEASE. C. Calvez, J.L. Renard and G. Marty, *Oléagineux*, **35**, 443–51 (1980). A coconut wilt of unknown etiology exists in the New Hebrides on different types of introduced coconuts. Comparative tests on hybrids planted in 1969 showed the immunity of the New Hebrides Tall and the almost total resistance of the New Hebrides Tall × Rennell tested over 10 years, whereas the other hybrids or cultivars are sensitive. Although the NHT × RLT hybrid is not as precocious as the Dwarf × Tall cross, it represents a good practical result as regards improvement of coconut productivity in the New Hebrides by producing 30 p. 100 more copra/ha than the improved local NHT variety. It also has good resistance to cyclones. This example shows the advantage of introductions and crosses between varieties when a phytosanitary problem offers an obstacle to the improvement of coconut production.

At present, the behaviour in the face of the disease of 42 Dwarf × Tall and Tall × Tall hybrids is being studied; some Dwarf × Tall crosses are promising.

GENETICS OF NON-NODULATION IN GROUNDNUTS (*Arachis hypogaea* L.). S.N. Nigam, V. Arunachalam, R.W. Gibbons, A. Bandyopadhyay and P.T.C. Nambiar, *Oléagineux*, 35, 453–5 (1980). Non-nodulating groundnut plants were identified in the crosses of a rust resistant Peruvian cultivar, PI259947, with two Virginia cultivars, NC 17 and NC Ac 2731. Segregation in the F_2 and F_3 progeny rows of the cross PI 259747 × NC 17 indicated that a pair of independent duplicate genes controls nodulation. The genetic constitution of the non-nodulating plant could be inferred to be $n_1 n_2 n_1 n_2$.

Biochemistry and nutrition

LIPOPROTEINS AND CHOLESTEROL ESTERIFICATION RATE IN PLASMA DURING A 10-DAY MODIFIED FAST IN MAN. L. Wallentin and L. Skoldstam (Dept. of Internal Medicine, Linkoping Univ., Linkoping, Sweden) *Am. J. Clin. Nutr. 33*(9), 1925-31 (1980). The influence of a 10-day modified fast on the concentrations of lipids and lipoproteins and the rate of cholesterol esterification in plasma was studied in 12 subjects with rheumatoid arthritis. After 10 days of fasting the concentrations of cholesterol and phosphlipids in plasma were reduced by a mean of 21 and 11%, respectively, based on a 27% mean reduction of these lipids in the low density lipoprotein fraction. In all fasting subjects but one there was a reduction of the triglyceride concentration in the very low density lipoprotein fraction. The high density lipoprotein fraction was unchanged. The molar and fractional cholesterol esterification rates in plasma were reduced by a mean of 27 and 8.5%, respectively, after 10 days of fasting compared to the prefasting levels. The rate of cholesterol esterification in plasma is believed to reflect the turnover of cholesteryl esters in plasma, which therefore seemed to be reduced during fasting. The present finding might be explained by deprivation of specific nutrients or by a generally reduced metabolic rate during energy deprivation.

ALPHA-LIPOPROTEIN CHOLESTEROL CONCENTRATION IN RELATION TO SUBSEQUENT MYOCARDIAL INFARCTION IN HYPERCHOLESTEROLEMIC MEN. O. Wiklund, L. Wilhelmsen, D. Elmfeldt, H. Wedel, J. Valek and A. Gustafson (Dept. of Medicine I, Sahlgren's Hosp., Univ. of Goteborg, Dept. of Med., Ostra Sjukhuset, Goteborg, Sweden) *Atherosclerosis 37*(1), 47-53 (1980). In a prospective study, α-lipoprotein (α-Lp) cholesterol concentration was studied in relation to subsequent myocardial infarction. Serum lipids including α-Lp cholesterol were studied in a hyper cholesterolemic subsample of a random population sample. A group of 450 males (47-54 years old) was examined. Eighteen cases of myocardial infarction developed during the follow-up period. Controls were selected from the same subsample and controls were matched to patients with respect to age, serum cholesterol and triglyceride levels. Three controls were matched to each patient. There was no difference between patients and controls in α-Lp cholesterol concentartion. Groups were also similar in both systolic and diastolic blood pressure and body weight. The only difference between patients and controls was a higher frequency of tobacco smokers among patients ($P<0.05$). The results suggest that α-Lp cholesterol level is not a risk factor for myocardial infarction in hypercholesterolemic subjects.

FEEDING CHOLESTEROL AND TALLOW IN LIQUID DIETS TO VEAL CALVES. T.R. Wrenn, J. Bitman, F.E. McDonough, J.R. Weyant, and D.L. Wood (AR, SEA, USDA, Beltsville Agricultural Res. Center, Beltsville, MD 20705) *J. Dairy Sci. 63*(9), 1403-11 (1980). Thirty-six Holstein bull calves were raised to 16 wk on five liquid diets containing skim milk plus either 3.5% milk fat, 3.5% tallow, 3.5% tallow and .2% cholesterol, 7.0% tallow, or 7.0% tallow and .2% cholesterol. Diets were fed at 10% of body weight by nipple pail to preserve the esophageal groove reflex. Intakes of dry matter, gains of body weight, and feed refusals were greater for calves fed 7.0% tallow. Concentrations of lipid and cholesterol in blood plasma increased markedly (2 to 3 times) in calves fed cholesterol. Thyroxine and triiodothyronine concentrations in plasma were highest in calves showing the most growth response. Weight of liver was elevated both by feeding high tallow and by feeding cholesterol. Liver fat was elevated more by feeding .2% cholesterol than by doubling dietary fat. Yield of trimmed veal was 14% greater when diets included cholesterol and 7.0% tallow or 7.0% tallow than when they were 3.5% tallow or milk fat. Feeding liquid tallow can be successful in veal production when ingredient costs are advantageous. Economics of ingredient selection is discussed. Further research utilizing different concentrations of tallow and higher intake is needed.

FATTY ACID POLYENES IN THE COATING INDUSTRY. R. Poisson. *Rev. Fr. Corps Gras 25*, 539 (1978). Polyenic acids, in the presence of oxygen, undergo very complex autoxypolymerisation reactions resulting in polymer formation. The industry has for a long time used these natural products or their derivatives, empirically. Their special drying properties enable them to be used in chemical combination with many different chemicals. The products are cross-linked very easily, after application to a surface, by reaction with the atmosphere. (World Surface Coatings Abs. No. 456)

SPECTROPHOTOMETRIC DETERMINATION OF SUCROSE ESTERS OF HIGHER FATTY ACIDS. L.A. Tsareva, E.K. Pomerantseva and L.M. Bobinova. *Zavod. Lab. 44*(11), 1321-2 (1978). The sample is shaken with 30 to 40 ml. of water until the sucrose has dissolved, then the solution is diluted to 50 ml. with water and filtered. To 1 ml. of filtrate are added 0.1 ml. of a 3% solution of cysteine hydrochloride monohydrate and 5 ml. of freshly prepared 86% sulphuric acid and the mixture is warmed at 62 to 64 C for several minutes to develop max. colour, then cooled. The absorbance is measured against a blank containing 1 ml. of water and the sucrose conc. is found from a calibration graph prepared with pure sucrose. (World Surface Coatings Abs. No. 456)

UTILIZATION OF NON-EDIBLE OILSEEDS—RECENT TRENDS. O.P. Vimal and K.T. Naphade (Division of Soil Science and Agricultural Chemistry, Indian Agricultural Research Institute, New Delhi 110012, India). *J. Sci. Ind. Res. 39*, 197-211 (1980). Better and fuller utilization of non-edible oilseeds is essential for meeting a variety of shortages facing the country today. The presence of bitter principles limits their utilization for edible purposes as well as for commercial purposes. The conventional oil technology is of little value in the case of non-edible oilseeds. A synoptic view is presented of the significant recent developments and problems in the utilization of these tree borne waste resources. An integrated approach is proposed which aims at utilizing not only the fat and protein portions of the seed, but also ensuring the exploitation of the lipid associates by the organic chemical processing industry.

SERUM HIGH DENSITY LIPOPROTEIN CHOLESTEROL IN PATIENTS WITH ABNORMAL CORONARY ARTERIES. M.H. Tan, W. Macintosh, K.L. Weldon, A. Kapoor, B.M. Chandler, and T.J. Hindmarsh (Depts. of Med., Path., and Preventive Med., Dalhousie Univ., Halifax, N.S., Canada) *Atherosclerosis 37*(2),187–98 (1980). Previous studies showing the inverse relationship between high density lipoprotein cholesterol (HDL-C) and coronary artery disease were based on myocardial infarction survivors and presumably normal subjects. To determine whether a similar relationship exists between patients with abnormal coronary arteries (ACA) and those with normal coronary arteries (NCA), the serum HDL-C and other lipoproteins of these patients and those of a group of presumably healthy control subjects (CTL) were determined. The ACA males had lower HDL-C and % HDL-C but higher TG, VLDL-TG, LDL-C/HDL-C and VLDL-C/HDL-C than the NCA and CTL males. Adjustment of HDL-C for serum TG eliminated the difference in HDL-C between the ACA and NCA groups but that between ACA and CTL groups remained. The ACA females had lower % HDL-C than the NCA and CTL females. They also had lower HDL-C but higher LDL-C/HDL-C and VLDL-C/HDL-C than the CTL females. The NCA and CTL groups did not differ in any of the lipid variables, although the NCA group values were intermediate to those of the ACA and CTL groups. Using various lipoprotein profiles, it was possible to classify the patients into the 3 groups.

EFFECTS OF HIGH-PROTEIN, LOW-CARBOHYDRATE DIETING ON PLASMA LIPOPROTEINS AND BODY WEIGHT. C. Larosa, A. Gordon Fry, R. Muesing, and D.R. Rosing, (Lipid Research Clinic and Laboratory, George Washington University Medical Center, Washington, D.C., and National Heart, Lung, and Blood Institute, National Institutes of Health, Bethesda, MD) J. Am. Diet. Assoc. 77,264. (1980). Twenty-four obese but otherwise normal men and women were followed for: Two weeks on their usual food intake; eight weeks on a high protein, low-carbohydrate diet; and then again for two weeks on their usual diet. During this time, several metabolic parameters were measured bimonthly. The high-protein, low-carbohydrate dieting resulted in substantial weight loss, probably due to a combination of salt and water loss, as well as caloric restriction. Plasma triglycerides fell as well. Significant increases occurred in LDL-cholesterol, uric acid, and free fatty acid levels. HDL-cholesterol levels failed to rise despite significant weight loss, indicating that the previously reported relationship between HDL-cholesterol and weight may be dependent, in part, on the composition of the diet.

THE DEUTERIUM ISOTOPE EFFECT UPON THE REACTION OF FATTY ACYL-CoA DEHYDROGENASE AND BUTYRYL-CoA. J. Reinsch, A. Katz, J. Wean, G. Aprahamian, and J.T. McFarland (Dept. of Chem., The Univ. of Wisconsin-Milwaukee, WI 53201) *J. Biol. Chem. 255*(19),9093-7 (1980). Reduction of the oxidized FAD at the active site of porcine liver fatty acyl-CoA dehydrogenase by butyryl-CoA results in bleaching of 30 to 60% of the 450 nm absorbance of flavin and in the production of a new absorbance band at 565 nm. The wavelength of the maximum absorbance of this new band (λ_{max}) is dependent on the chemical nature of the substrate, e.g. this band occurs at 645 nm when β-2-furylpropionyl-CoA (a pseudosubstrate) reacts with enzyme. The deuterium isotope effect measured on each step of the biphasic time course of the 450 nm reaction is very large, in the range $k_H/k_D = 30$ to 50. The rate profile at 565 nm for perdeuterobutyryl-CoA in that it is biphasic. It appears that two rate processes have been separated by virtue of different isotope effects; the first process shows $k_H/k_D = 2$ while the second shows $k_H/k_D = 50$. The data are interpreted in terms of a mechanism involving an obligatory charge transfer complex.

THE EFFECT OF CHRONIC CHOLESTEROL FEEDING ON INTESTINAL LIPOPROTEINS IN THE RAT. J.W. Riley, R.M. Glickman, P.H.R. Green and A.R. Tall (Gastrointestinal Unit, Columbia Univ., College of Physicians and Surgeons, 630 West 16th Street, New York, NY 10032) *J. Lipid Res. 21*(20),942-52 (1980). Chronic cholesterol feeding has been shown to produce abnormal plasma lipoproteins in a variety of experimental animals and man. In order to explore the role of the intestine in the production of these abnormal lipoproteins, rats were chronically fed a diet containing 1% cholesterol and 10% olive oil and were compared to control animals, fed either normal chow or normal chow containing 10% olive oil. Mesenteric lymph lipoproteins from fasting lymph and from lymph obtained after acutely infusing cholesterol and olive oil were examined and compared to plasma lipoproteins from these animals. Analysis of individual lymph lipoproteins from chronically cholesterol-fed animals revealed that significantly less apoA-I and cholesterol was carried in d $<$ 1.006 g/ml lipoproteins than in controls. There was however, both a relative and absolute increase in the cholesterol and apoA-I content of intermediate and low density lymph subfractions. Particularly prominent in lymph from chronically cholesterol-fed animals was a lipoprotein (d 1.006-1.030 g/ml) which was inconsistently found in controls. These results demonstrate that chronic cholesterol feeding in the rat results in altered mesenteric lymph lipoproteins which may contribute to the abnormalities found in plasma.

SELECTIVITY IN INCORPORATION, UTILIZATION AND RETENTION OF OLEIC AND LINOLEIC ACIDS BY HUMAN SKIN FIBROBLASTS. M.D. Rosenthal (Dept. of Biochem., Eastern Virginia Med. Schl., Norfolk, VA 23501) *Lipids 15*(10),838-48 (1980). Fetal human fibroblasts were grown in culture medium containing 10% fetal bovine serum supplemented with [1-^{14}C] linoleate or [1-^{14}C] oleate. At all concentrations of exogenous fatty acids, the incorporation of oleate was greater than that of linoleate. Incorporation of oleate into phospholipids was also higher than that of linoleate from exogenous fatty acid mixtures which were 80% saturated. It is suggested that normal human fibroblasts have adapted to the low levels of exogenous polyunsaturated fatty acids in culture media by increased use of oleate in phospholipid. Even when the cells are supplemented with linoleate, the preferential use of oleate in phospholipid groups is retained.

MICROBIOLOGICAL STUDIES INVESTIGATING MUTAGENICITY OF DEEP FRYING FAT FRACTIONS AND SOME OF THEIR COMPONENTS. M. Scheutwinkel-Reich, G. Ingerowski and H.J. Stan (Institu fur Lebensmittelchemie der Technischen Universitat Berlin, Muller-Breslau-Str. 10, 1000 Berlin 12, Germany) *Lipids 15*(10),849-52 (1980). In this study, the Salmonella/ microsome mutagenicity test according to Ames et al. was performed in order to detect possible mutagenicity of oxidized deep frying fat fractions. Furthermore, the mono-, di-, tri- and tetrahydroxyoctadecanoic acids and the hydroperoxide of linoleic acid were investigated as model test substances. The Ames assay was carried out with and without metabolic activation including preincubation and liquid culture procedures as described by Mitchell. The results show no mutagenic effects for the oxidized fractions of deep frying fats nor for the model test substances. At higher concentrations, however, limited test reliability resulted from direct toxic effects on bacterial growth.

LOW DENSITY LIPOPROTEIN-ACTIVATED LYSOLECITHIN ACYLATION BY HUMAN PLASMA LECITHIN-CHOLESTEROL ACYLTRANSFERASE. IDENTITY OF LYSOLECITHIN ACYLTRANSFERASE AND LECITHIN-CHOLESTEROL ACYLTRANSFERASE. P.V. Subbaiah, J.J. Albers, C.H. Chen, and J.D. Bagdade (Dept. of Med., Univ. of Washington, Providence Med. Center, and Harborview Med. Center, Seattle, WA 98124) *J. Biol. Chem. 255*(19),9275-80 (1980). There is in normal plasma an enzyme activity which converts labeled lysolecithin to lecithin by an energy-independent low density lipoprotein-activated pathway. Studies were undertaken to compare the identity of this enzyme with lecithin-cholesterol acyltransferase. During purification of the enzyme by ultracentrifugation and by chromatography on high density lipoprotein affinity column, DEAE-Sepharose column, and hydroxylapatite column, both the lysolecithin acyl-transferase activity and the lecithin-cholesterol acyl-transferase activity were found in the same fractions and were enriched to the same extent at each step. The results indicate that a single enzyme carries out both lecithin-cholesterol acyltransferase and lysolecithin acyltransferase activities. The purified enzyme required apolipoprotein A-I for lecithin-cholesterol acyltransferase activity, but required low density lipoprotein for lysolecithin acyltransferase activity.

DIETARY FIBERS. III. EFFECTS OF CHRONIC INTAKE ON CHOLESTEROL ABSORPTION AND METABOLISM IN THE RAT. G.V. Vahouny, T. Roy, L.L. Gallo, J.A. Story, D. Kritchevsky, and M. Cassidy (Depts. of Biochem. and Phys., The George Washington Univ. Schl. of Med. and Health Sciences, Washington, D.C.) *Am. J. Clin. Nutr. 33*(10),2182-91 (1980). Of the various test materials studied, cholestyramine, pectin, alfalfa, and cellulose feeding all resulted in significant reduction of lymphatic absorption of both cholesterol and triglycerides, while the effect of wheat bran was marginal and the yeast glycan was without effect. Only wheat bran and cellulose diets significantly reduced transit times, and neither dietary component was effective in bile acid sequestration. In contrast, cholestyramine and alfalfa showed bile acid binding activity but no effects on transit time. Since the basic diet did not induce elevations in plasma lipids, none of the test materials had significant effects on either plasma cholesterol or triglycerides. However those test materials that were effective in interfering with intestinal lipid absorption also resulted in significant depressions of hepatic triglycerides and increases in hepatic phospholipids. The present results suggest a direct effect of certain dietary fibers or fiber components on intestinal absorption of lipids by mechanisms involving either binding of intraluminal bile salts or by interference in bulk phase diffusion of the lipids.

THE EFFECT OF CHOLESTEROL AND OTHER INTERCALATED AMPHIPATHS ON THE CONTOUR AND STABILITY OF THE ISOLATED RED CELL MEMBRANE. Y. Lange, H.B. Cutler and T.L. Steck (Biophys. Section, Boston Univ. Schl. of Med., Boston, MA 02118) *J. Biol. Chem. 255*(19),9331-7 (1980). Three membrane properties were strikingly affected when the cholesterol of human erythrocytes, normally ~0.8 mol/mol of phospholipid (i.e. C/P ~ 0.8), was altered by equilibration with phospholipid dispersions of an appropriate cholesterol content. 1) While the sterol in intact red cell membranes of C/P $\leqslant$ 0.8 was resistant to cholesterol oxidase digestion, enrichment to C/P $\geqslant$ 0.9 rendered the entire cholesterol pool sensitive to enzyme attack. Susceptibility to oxidation was reversed by removal of the excess cholesterol. Our data suggest that cholesterol may act physiologically both to stabilize the red cell membrane and to constrain its contour against invagination, and that red cell membrane cholesterol is maintained in vivo just below a critical level at which important organizational changes can occur.

CHOLESTEROL AND BILE ACID METABOLISM IN OBESITY. B. Leijd (Dept. of Med., Karolinska Institutet at Huddinge Univ. Hosp., Stockholm, Sweden) *Clin. Sci. 59*(3), 203-6 (1980). The present study was undertaken to determine the influence of obesity on bile acid kinetics and cholesterol balance in man. Fourteen obese and normolipidaemic patients (160 $\pm$ 6% of ideal body weight, mean $\pm$ SEM) were studied under standardized dietary conditions. Bile acid kinetics were determined with the aid of ^{14}C-labelled cholic acid and chenodeoxycholic acid. Cholesterol balance was calculated as the sum of bile acid synthesis plus daily faecal excretion of neutral C_{27} steroids minus dietary intake of cholesterol. The results obtained were compared with previously published data on control subjects (n = 13). The cholesterol balance was higher in the obese patients (2.61 $\pm$ 0.27 mmol/day) than in the control subjects (1.78 $\pm$ 0.22 mmol/day), owing to a higher excretion of neutral steroids. When expressed per kg of body weight the cholesterol balance was quite normal in the obese patients.

PROPERTIES OF ACYL-CoA: CHOLESTEROL ACYLTRANSFERASE IN RAT LIVER MICROSOMES. TOPOLOGICAL LOCALIZATION AND EFFECTS OF DETERGENTS, ALBUMIN, AND POLAR STEROIDS. A.H. Lichtenstein and P. Brecher (Depts. of Biochem. and Med., Boston Univ. Schl. of Med., Boston, MA 02118) *J. Biol. Chem. 255*(19),9098-104 (1980). The characteristics of an in vitro assay system for acyl-CoA (coenzyme A):cholesterol acyltransferase in rat liver microsomes were established, and the influence of detergents and several steroids on the enzyme were examined. Enzymatic activity was determined by measuring the

incorporation of [1-^{14}C] oleoyl-CoA into cholesteryl [1-^{14}C] oleate. To determine the topological localization of acyl-CoA:cholesterol acyltransferase, the effects of deoxycholate and trypsin on acyl-CoA:cholesterol acyltransferase activity were determined and the results compared with those obtained under similar conditions on mannose-6-phosphatase, an enzyme known to be localized on the luminal (inner) surface of microsomal vesicles. These results show that acyl-CoA:cholesterol acyl-transferase is localized on the cytoplasmic (outer) surface of rat liver microsomal vesicles and suggest that acyl-CoA:cholesterol acyltransferase activity may be regulated by steroids or oleoyl-CoA.

CALCIUM MODULATES THE LIPID DYNAMICS OF RAT HEPATOCYTE PLASMA MEMBRANES BY DIRECT AND INDIRECT MECHANISMS. C.J. Linvingstone and D. Schachter (Dept. of Phys., Columbia Univ. Col. of Physicians and Surgeons, New York, NY 10032) *Biochemistry 19*(21),4923-7 (1980). Calcium ion decreases the motional freedom of lipid molecules in isolated rat hepatocyte plasma membranes and in sonicated dispersions (liposomes) of the membrane lipid. The decrease in lipid fluidity was monitored by estimation of the fluorescence polarization of 1,6-diphenyl-1,3,5-hexatriene. At least two processes are involved in the mode of action of the cation. The first is direct, i.e., observed on addition of calcium to the liposomes, relatively rapid, with a half-time of 10-15 min at 37°C, proportional to the calcium concentration in the range 0-4 mM, and readily reversed on addition of excess EDTA. The second mechanism is indirect and requires the presence of the membrane proteins. It occurs relatively slowly, with a half-time of 75 min at 37°C, tends to plateau, with a calcium half-saturation concentration of approximately 1 mM, is of greater magnitude than the direct effect, and cannot be reversed on chelation of calcium by EDTA. Moreover the indirect effect is specific for Ca^{2+} as compared to other divalent cations and it results in changes in the lipid composition. The effects of calcium on the membrane lipid fluidity may underly certain of its regulatory actions on membrane functions.

ORIGINS OF THE CHOLESTEROL IN MILK. C.A. Long, S. Patton and R.D. McCarthy (Dept. of Food Sci., The Pennsylvania St. Univ., University Park, PA 16802) *Lipids 15*(10), 853-7 (1980). Studies were conducted to investigate the origin of milk cholesterol in the ruminant. In the first experiment, [1-^{14}C] sodium acetate was infused into one side of the udder of a lactating goat via the teat canal whereas in the second, [1,2-^{3}H] cholesterol was injected intravenously and concurrently with a [^{14}C] acetate intramammary infusion. In both experiments, blood and milk samples were collected at intervals for 6 days postinjection. Maximum unesterified cholesterol specific activity (sp act) in whole milk appeared at 78 hr after intravenous injections of ^{3}H cholesterol and within 3-7 hr after infusion of [^{14}C] acetate. Virtually all the tritium in milk was associated with unesterified cholesterol. The sp act of ^{14}C-labeled cholesterol was only 20% of gland-synthesized decanoic acid. Decanoic acid is known to be completely synthesized in the mammary gland, and, like cholesterol, acetate is its precursor. The results indicate that, although some milk cholesterol is synthesized in the mammary gland, it is derived principally from serum cholesterol. The data show also that serum cholesterol equilibrates with membrane cholesterol of the lactating cell prior to its secretion in milk.

THE INTRACELLULAR DISTRIBUTION OF HIGH DENSITY LIPOPROTEINS TAKEN UP BY ISOLATED RAT HYPATOCYTES. L. Ose, T. Ose, K.R. Norum and T. Berg (Inst. for Nutr. Res., School of Med., Univ. of Oslo, Blindern, P.O. Box 1046, Oslo 3 (Norway)) *Biochim. Biophys. Acta 620*(1),120-32 (1980). The subcellular distribution of ^{125}I-labelled HDL taken up by rat hepatocytes in vivo and in vitro has been studied with subcellular fractionation techniques: differential centrifugation and isopycnic centrifugation in sucrose gradients. ^{125}I-labelled HDL bind to plasma membranes both in vivo and in vitro and part of the membrane-bound ^{125}I-labelled HDL can be dissociated by the addition of unlabelled HDL. The hepatocytes also internalize ^{125}I-labelled HDL. The subcellular distribution of radioactivity taken up in vivo was changed to lower density by incubating the cells with chloroquine, a drug known to render the lysosomes more boyant. Chloroquine had no effect on the distribution of ^{125}I-labelled HDL taken up by hepatocytes in vitro.

DISTRIBUTION OF DEUTERIUM-LABELED *CIS-* AND *TRANS-*12-OCTADECENOIC ACIDS IN HUMAN PLASMA AND LIPOPROTEIN LIPIDS. E.A. Emken, H.J. Dutton, W.K. Rohwedder, H. Rakoff and R.O. Adlof (Northern Regional Res. Center, Agricultural Res. Sci. and Ed. Admin., U.S. Dept. of Agr., Peoria, IL 61604) *Lipids 15*(10),864-71 (1980). Triglycerides containing *cis-* and *trans-*12-octadecenoic acid (12*c*-18:1 and 12*t*-18:1) and *cis-*9-octadecenoic acid (9*c*-18:1) labeled with deuterium were fed to 2 young adult male subjects. These fatty isomers each contained a different number of deuterium labels, which allowed mass spectrometric analysis to distinguish among them after they were fed as a mixture. This approach results in a direct comparison of the absorption and distribution of these 3 monoenoic acids into blood plasma and lipoprotein lipids. Chylomicron lipid analyses indicated that all isomers were well absorbed. Variation was observed in the relative distribution of 12*c*-18:1, 12*t*-18:1 and 9*c*-18:1 between the very low density, low density and high density lipoprotein lipid classes. No desaturation of 12*c*-18:1 to linoleic acid was detected.

CHARACTERIZATION OF PLASMA LIPOPROTEINS IN SWINE WITH DIFFERENT PROPENSITIES FOR OBESITY. T.D. Etherton and P.M. Kris-Etherton (Pennsylvania St. Univ., University Park, PA 16802) *Lipids 15*(10),823-9 (1980). Yorkshire (lean) and Ossabaw (obese) swine ca. one year of age were used to characterize the quantity and composition of plasma lipoproteins in animals with markedly different adiposity. Fasting plasma triacylglycerol (tg) and cholesterol (CH) levels were elevated in obese swine. VLDL from obese swine were 2-fold larger than VLDL from lean swine. There was a positive correlation between adiposity and HDL CH as well as VLDL-Tg and HDL-CH. These data indicate that (a) there are marked alterations in swine plasma lipoprotein composition between lean and obese swine; (b) that swine plasma lipoprotein levels may be useful parameters in estimating body composition, and (c) that HDL-CH is positively correlated with adiposity in swine.

SOURCES OF ERROR IN ISOTOPIC CHOLESTEROL BALANCE METHOD IN AFRICAN GREEN MONKEYS CONSUMING A CHOLESTEROL-FREE DIET. G.R. Henderson and R.W. St. Clair (Arteriosclerosis Res. Center and the Dept. of Path., Bowman Gray Schl. of Med. of Wake Forest Univ., Winston-Salem, NC 27103) *J. Lipid Res. 21*(7),854-61 (1980). Six African green monkeys were labeled intravenously with [1,2-^{3}H] cholesterol while consuming a cholesterol-free liquid formula diet. The plasma cholesterol specific activity was compared with the specific activity of the biliary cholesterol and bile acids and with the fecal neutral steroids in order to determine whether the traditional isotopic balance method was valid for the calculation of endogenous cholesterol excretion. The traditional isotopic balance procedure (DPM fecal neutral steroids + bile acids/specific activity [DPM/mg] plasma cholesterol) can be used for calculation of endogenous cholesterol excretion in cholesterol-fed animals during the nonsteady state when plasma cholesterol concentrations are rapidly increasing, as well as after a new steady state has been achieved.

FAT AREAS AS ESTIMATES OF TOTAL BODY FAT. J.H. Himes, A.F. Roche and P. Webb. (Abt Associates, 55 Wheeler Street, Cambridge, MA 02138) *Am. J. Clin. Nutr. 33*(10),2093-100 (1980). The efficacy of cross-sectional fat areas in estimating total body fat was investigated in a sample of white American children and adults. Body density and total fat weight (kg) in the body were determined by hydrostatic weighing. Fat areas were calculated for the arm and calf using the appropriate limb circumferences and skinfolds measured at the triceps, biceps, and calf sites; also, a fat area was calculated using the average of triceps and biceps sites and arm circumference. Cross-sectional fat areas do not estimate body density (and percentage fat) any better than the corresponding skinfolds. In estimating weight of fat in the body, however, fat areas are systematically better estimators than corresponding skinfold thicknesses.

LIPOGENESIS IN MAN. PROPERTIES AND ORGAN DISTRIBUTION OF ATP CITRATE (*PRO-3S*)-LYASE. G.E. Hoffmann, H. Andres, L. Weiss, C. Kreisel and R. Sander (Klinisch-chemisches Institut, and Medizinische Abteilung, Krankenhaus Harlaching, Sanatoriumplatz 2, D-8000 Munchen 90 FRG) *Biochim Biophys. Acta* 620(1),151-8 (1980). 1. The lipogenic enzyme ATP citrate lyase (ATP: citrate oxaloacetate-lyase (*pro-3S*-$CH_2COO^{\rightarrow}$acetyl-CoA; ATP-dephosphorylating), EC 4.1.3.8) is partially purified from human liver by ammonium sulfate fractionation and anion-exchange chromatography. 2. K_m values for the substrates are $1.1 \cdot 10^{-5}$, $1.3 \cdot 10^{-3}$, and $1.2 \cdot 10^{-4}$ M for CoASH, ATP and citrate, respectively. The hypolipidemic drug L(−)-hydroxycitrate is a competitive inhibitor with respect to citrate ($K_i = 3 \cdot 10^{-4}$ M). 3. Specific activities measured in liver, adipose tissue and intestinal mucosa (autopsic and biopsic material) are in the range of 1 mU/mg protein suggesting that the citrate pathway does not significantly contribute to human lipogenesis. No stimulation is found after a 3-day carbohydrate-rich diet. 4. Specific activities of other key-enzymes of the acetyl-CoA production from carbohydrates (pyruvate dehydrogenase, cytosolic acetyl-CoA synthetase) are of the same low magnitude.

COMPARISON IN INDUCING EFFECT ON VITAMIN E DEFICIENCY SYMPTOMS IN CHICKS BETWEEN DILAURYL SUCCINATE AND UNSATURATED FATTY ACIDS. H. Ikumo (Dept. of Animal Nutr., Nat. Inst. of Animal Industry, Tsukuba Norin

Danchi P.O. Box-5, Ibaraki 305, Japan) *J. Nutr. 110*(10), 2045–50 (1980). Dilauryl succinate (DLS) and unsaturated fatty acids (UFA) were compared for the effects of inducing vitamin E deficiency symptoms in chicks. Experimental diets containing DLS, UFA and DLS + UFA, respectively, were given to 1-day-old chicks for 28 days. The diet containing DLS but not UFA showed far less increase in peroxide value than those containing UFA or DLS + UFA when left in a battery brooder of 30°. Vitamin E deficiency symptoms in chicks given DLS + UFA were more severe than those in chicks fed either DLS or UFA. No significant difference in vitamin E deficiency symptoms except incidence of encephalomalacia was observed between the chicks given DLS and UFA. Extracting UFA from the diet containing DLS + UFA resulted in the reduction of vitamin E deficiency induction to the same degree as the diet containing DLS. Synthetic antioxidants were effective in alleviating the vitamin E deficiency symptoms in the chicks fed UFA and DLS + UFA, while only slightly effective in those given DLS. It was found that the effects of DLS and UFA can be separated and combined technically and it was suggested that they have different mechanism in inducing vitamin E deficiency.

EFFECT OF A HIGH-FAT DIET ON RAT VERY LOW DENSITY LIPOPROTEIN SECRETION. A.-D. Kalopissis, S. Griglio, M.-I. Malewiak and R. Rozen (Groupe de Recherches sur la Physiopatholgie de la Nutrition, INSERM U. 177, Institut Biomedical des Cordeliers, 15,21 rue de l'Ecole de Medecine, 75270 Paris, France) *Biochim. Biophys. Acta 620*(1),111–9 (1980). Very low density lipoprotein (VLDL) secretion rates were studied on rats adapted to a high-fat diet (71% calories as lard) for 3–4– weeks, compared to control (starch-fed) rats. Experiments were performed at 14.00 h, at which time all animals had the same circulating free fatty acids. Fat-fed rats presented an apparent liver steatosis, a high post-Triton chylomicron secretion, but a 40% decreased VLDL secretion. Injection of [1-^{14}C] palmitic acid showed that the tracer was incorporated less in liver triacylglycerols of the fat-fed rats, presumably because of an enhanced ketogenesis. It appears that in fat-fed rats circulating free fatty acids do not stimulate VLDL secretion as expected. It is suggested that the decreased VLDL secretion with the high-fat diet may result from inhibition of hepatic lipogenesis.

THE ROLE OF MEMBRANE FATTY ACIDS IN MAMALIAN HIBERNATION. R.C. Aloia (Dept. of Anesthesiology, Loma Linda Univ. Schl. of Med., Loma Linda, CA 92350) *Fed. Proc. 39*(12), 2974–9 (1980). During mamalian hibernation, cellular membranes continue to function at temperatures approaching 0 C. The molecular mechanisms that confer this capacity to the membranes are unknown but may be related to the fluidity of the membrane and to the level of unsaturated fatty acids. The basic tenets of membrane fluidity and the contribution of cholesterol, polar head groups, and fatty acids toward maintaining a fluid membrane in a liquid-crystalline state are examined in this review. It is shown that although unsaturated fatty acids can enhance membrane fluidity at low temperatures, there does not appear to be a consistent trend toward increased levels of unsaturated fatty acids during hibernation in all tissues of hibernators. Consequently, there may be some other role for the alterations in the composition of membrane fatty acids found during the hibernating cycle other than increasing membrane fluidity to permit continued activity at reduced temperatures.

INHIBITION OF ION PERMEABILITY CONTROL PROPERTIES OF ACETYLCHOLINE RECEPTOR FROM TORPEDO CALIFORNICA BY LONG-CHAIN FATTY ACIDS. T.J. Andreasen and M.G. McNamee (Dept. of Biochem, and Biophys., Univ. of California, Davis, CA 95616) *Biochemistry 19*(20),4719–26 (1980). The characteristics of fatty acid inhibition of acetylcholine receptor function were examined in membrane vesicles prepared from *Torpedo californica* electroplax. Inhibition of the carbamylcholine-induced increase in sodium ion permeability was correlated with the bulk melting point of exogenously incorporated fatty acids. Above its melting temperature, a fatty acid could inhibit the large increase in cation permeability normally elicited by agonist binding to receptor. Below its melting temperature, a fatty acid was ineffective. None of the fatty acids altered any of the ligand binding properties of the receptor. Inhibitory fatty acids did not induce changes in membrane fluidity, as determined by electron paramagnetic resonance using spin-labeled fatty acids. The spin-labeled fatty acids also acted as inhibitors, and the extent of inhibition depended largely on the position of the nitroxide group along the fatty acid chain. Addition of noninhibitory fatty acid to the vesicle membranes did not protect the receptor from inhibition by spin-labeled fatty acids. The effects of free fatty acids on acetylcholine receptor function are attributed to the disruptions of protein-lipid interactions.

β-CAROTENE AS A PROBE OF LIPID DOMAINS OF RECONSTITUTED HUMAN PLASMA LOW-DENSITY LIPOPROTEIN: INDUCED CIRCULAR DICHROISM. G.C. Chen, M. Krieger, J.P. Kane, C.-S. C. Wu, M.S. Brown, and J.L. Goldstein (Specialized Center of Res. in Atherosclerosis of the Cardiovascular Res. Inst. and The Dept. of Med., Univ. of California, San Francisco, CA 94143) *Biochemistry 19*(20),4706–12 (1980). Mixtures of neutral lipids containing cholesteryl esters and β-carotene were used to reconstitute the lipid core of heptane-extracted low-density lipoproteins (LDL). The current data indicate that the organization of the core of neutral lipids in reconstituted LDL resembles that of native LDL with respect to environmental constraint on the β-carotene molecule and that the helicity of the protein moiety resembles that of native LDL. In addition, the data are consistent with the possibility that the core cholesteryl esters of reconstituted LDL undergo phase transitions similar to their transitions in the free state.

BARRIER CHARACTERISTICS OF MEMBRANE MODEL SYSTEMS CONTAINING UNSATURATED PHOSPHATIDYLETHANOLAMINES. P.C. Noordam, C.J.A. van Echteld, B. de Kruijff, A.J. Verkleij and J. de Gier (Dept. of Biochem. and Dept. of Molecular Biol., St. Univ. of Utrecht, Padualaan 8, NL-3584 CH Utrecht, The Netherlands) *Chem. Phys. Lipids 27*(3),221–32 (1980). The barrier characteristics of membrane model systems containing unsaturated phosphatidylethnolamines have been investigated. At increasing temperatures $18{:}1_c/18{:}1_c$-phosphatidylethanolamine liposomes lose their permeability barrier for K^+ as the consequence of the transition from a lamellar to a hexagonal orientation as detected by ^{31}P-NMR and freeze-fracturing electron microscopy. Introduction of $18{:}1_c/18{:}1_c$-phosphatidylcholine in the $18{:}1_c/18{:}1_c$-phosphatidylethanolamine lipid system stabilizes the bilayer structure and the permeability barrier for K^+ and glucose while cholesterol destabilizes. Upon heating of the investigated $18{:}1_c/18{:}1_c$-phosphatidylcholine-$18{:}1_c/18{:}1_c$-phosphatidylethanolamine-(cholesterol) mixtures, structures are formed which give rise to isotropic ^{31}P-NMR signals and which on the basis of freeze-fracture pictures are interpreted as sponge-like structures. Lowering the temperature results in restoration of the barrier function of the lipid structures.

RELATIONSHIP BETWEEN TRIGLYCERIDE-RICH LIPOPROTEIN (CHYLOMICRONS AND VLDL) AND HDL_2 AND HDL_3 IN THE POST-PRANDIAL PHASE IN HUMANS. G. Baggio, R. Fellin, M.R. Baiocchi, S. Martini, G. Baldo, E. Manzato and G. Crepaldi (Univ. of Int. Med., Div of Gerontology and Metabolic Diseases, Univ. of Padua, I-35100 Padua, Italy) *Atherosclerosis 37*(2),271–6 (1980). In order to evaluate the relationship between triglyceride-rich lipoproteins (chylomicrons and VLDL) and HDL during alimentary lipaemia, 12 healthy volunteers, 6 male and 6 female (aged 20–40 yrs), were studied. Cholesterol, phospholipid, triglyceride and protein were evaluated in whole serum, VLDL, LDL and HDL (successively subfractionated in HDL_2 and HDL_3). Blood samples were collected in a fasting state, 4.5 and 9 h after a 1500 calorie meal (20% protein, 40% carbohydrate, 40% fat). A striking increase in triglyceride-rich lipoproteins after 4.5 h was observed in both sexes, but was more pronounced in males. An increase in phospholipid and triglyceride as well as a slight reduction in cholesterol was evident in HDL after 4.5 h. At the same time both lipids and proteins were decreased in HDL_3 and increased in HDL_2. This phenomenon is more evident in females, who showed a significantly higher basal HDL_2 level. These results suggest a possible metabolic relationship in the post-prandial phase between triglyceride-rich lipoproteins and HDL, and an inverse correlation between HDL_2 and HDL_3.

INFLUENCE OF CHOLESTEROL AND FAT FEEDING ON HEPATIC LYSOSOMAL ENZYMES IN GUINEA PIGS. B.I. Beck and C.A. Drevon (Inst. for Nutr. Res., Schol. of Med., Univ. of Oslo, Blindern, Oslo, Norway) *J. Nutr. 110*(10),1935–9 (1980). The activity of four lysosomal enzymes have been examined in liver sytoplasmic extract from guinea pigs fed three different diets: a) an ordinary diet, low in fat, high in carbohydrates; b) a semi-synthetic diet containing 10% cottonseed oil (by weight) without and c) with 1% cholesterol. The cholesterol content in the liver was similar in control-fed and fat-fed animals, while there was a 10-fold increase in cholesterol + fat-fed animals, and most of this cholesterol was present as ester. We observed increased activity of β-glucuronidase, β-acetyl-glucosaminidase and cathepsin D during fat cholesterol feeding (diet c) while the activity of acid phosphatase decreased compared to control-fed animals. These findings probably mirror the increased hepatic accumulation of lipids and lipoproteins observed in cholesterol + fat-fed guinea pigs.

INTERACTION OF LIPOPROTEIN LIPASE WITH NATIVE AND MODIFIED HEPARIN-LIKE POLYSACCHARIDES. G. Bengtsson, T. Olivectrona, M. Hook, J. Riesenfeld and U. Lindahl (Dept. of Chem., Section on Physiological Chem., Univ. of Umea, S-901 87 Umea, Sweden) *Biochem J. 189*(3),625–33 (1980). Lipoprotein lipase (EC 3.1.1.34), which was previously shown to bind to immobilized heparin, was now found to bind also to heparan sulphate

and dermatan sulphate and to some extent to chondroitin sulphate. The relative binding affinities were compared by determining (a) the concentration of NaCl required to release the enzyme from polysaccharide-substituted Sepharose; (b) the concentration of free polysaccharides required to displace the enzyme from immobilized polysaccharides; and (c) the total amounts of enzyme bound after saturation of immobilized polysaccharides. By each of these criteria heparin bound the enzyme most efficiently, followed by heparan sulphate and dermatan sulphate, which were more efficient than chondroitin sulphate. Studies with hepatic lipase (purified from rat post-heparin plasma) gave results similar to those obtained with milk lipoprotein lipase. However, the interaction between the hepatic liapse and the glycosaminoglycans was weaker and was abolished at lower concentrations of NaCl. The ability of the polysaccharides to release lipoprotein lipase to the circulating blood after intravenous injection into rats essentially conformed to their affinity for the enzyme as evaluated by the experiments *in vitro*.

PARENTERAL LINOLEIC AND γ-LINOLENIC ACIDS AMELIORATE THE GROSS EFFECTS OF ZINC DEFICIENCY. S.C. Cunnane and D.F. Horrobin (Clinical Res. Inst., 110 Pine Avenue West, Montreal H2W 1R7, Canada) *Proc. Soc. Exp. Bio. Med. 164*(4), 583–8 (1980). Male Wistar rats were maintained on a zinc deficient diet for 5 weeks and supplemented daily with one of three oils containing different concentrations of essential fatty acids: olive oil (mainly oleic acid), safflower oil (mainly linoleic acid), or evening primrose oil (mainly linoleic and γ-linolenic acids). The olive oil treated rats did not benefit from this treatment in any respect. Dermal lesions were actually worse in this group than in the untreated zinc deficient rats. Safflower oil supplementation significantly inhibited the development of dermal lesions but was of only marginal benefit with respect to growth. Evening primrose oil supplementation also blocked the development of dermal lesions and restored growth to 50% of control. It is suggested that a primary defect of zinc deficiency is to inhibit essential fatty acid metabolism to prostaglandins either by blocking linoleic acid desaturation to γ-linolenic acid or by inhibiting mobilization of dihomo-γ-linolenic acid from tissue membrane stores.

REGULATION OF CHOLESTEROL ESTERIFICATION AND BIOSYNTHESIS IN MONOLAYER CULTURES OF NORMAL ADULT RAT HEPATOCYTES. C.A. Drevon, D.B. Weinstein, and D. Steinberg (Div. of Metabolic Disease, Dept. of Med., Univ. of California, San Diego, Schl. of Med., La Jolla, CA 92093) *J. Biol. Chem. 255*(19), 9128–37 (1980). Adult rat parenchymal liver cells were isolated and cultured in monolayers. Cholesterol esterification in the intact cultured cells was determined by measuring incorporation of tritiated oleic acid into cell cholesterol ester. Addition of 10 μg/ml of 25-hydroxycholesterol to the medium gave a 3- to 6-fold increase in cholesterol esterification, while the incorporation of oleic acid into phospholipids and triglycerides remained unaltered. The stimulatory effect of 25-hydroxycholesterol was maximal after only 15-min incubation and was independent of protein synthesis. After 4 to 6 h of incubation with 25-hydroxycholesterol, its stimulatory effect was reduced significantly, and after 18 h of incubation no stimulation was observed. The liver cells in some fashion adapt to the continuing presence of 25-hydroxycholesterol. Isolated microsomes prepared from cells previously incubated with 25-hydroxycholesterol showed acyl-CoA:cholesterol acyltransferase activity 2-fold.

THE INFLUENCE OF LINOLEIC ACID INTAKE ON MEMBRANE-BOUND RESPIRATORY ACTIVITIES. N.M. Abuirmeileh and C.E. Elson (Dept. of Nutritional Sciences, Univ. of Wisconsin, Madison, WI 53706) *Lipids* 15, 918–24 (1980). The fatty acid composition of subcellular membranes, like that of depot fats, can be altered by dietary manipulation. Most attention has been directed toward the effects of feeding an essential-fatty-acid-free diet. We chose to examine some responses generated by the feeding of a dietary fat containing a disproportionately high level of an essential fatty acid. Rats were fed diets formulated with beef tallow (BT) to provide 4% (P/S, 0.2) or safflower oil (SO) to provide 24% (P/S, 7.6) of total energy as linoleic acid. Lipids isolated from hepatic mitochondria of rats fed the SO diet contained, in relative terms, 85% more unsaturated bonds. Mitochondria isolated from livers of rats fed either diet were tightly coupled. When all aspects of oxidative metabolism examined in this report are considered, mitochondria of SO group origin exhibited greater oxidative activities but lower ADP/O ratios than BT mitochondria. Our hypothesis is that the perturbed state of the membrane-bound phospholipids initiates a remodeling-response through which an intramitochondria source of ADP is generated to support state-3 respiratory activity.

ILLEAL UPTAKE OF OLEIC ACID: EVIDENCE FOR ADAPTIVE RESPONSE TO HIGH FAT FEEDING. J.A. Balint, M.B. Fried, and C. Imai (Div. of Gastroenterology, Dept. of Med., the Neil Hellman Medical Research Building, Albany, NY 12208) *Am. J. Clin Nutr.* 33, 2276–80 (1980). When 1-^{14}C oleic acid at 120 μEq/hr was infused into the duodenum in normal rats in a micellar solution with mono-olein (60 μmoles/hr) in 15mM taurocholate over 6 hr uptake was nearly complete (97%). However, when this same solution was infused into the mid small bowel in control animals uptake was incomplete (88.9 ± 2.6%, mean ± SEM, $P < 0.01$). After 4 weeks on a high fat diet, containing 45% vegetable oil by weight, oleic acid uptake increased to 98.1 ± 0.1% ($P < 0.01$ compared to controls). The improved uptake of oleic acid was associated with increased dry weight of mucosa in the proximal half of the ileum from 109 ± 8.8/20 cm. in controls to 135.6 ± 7.3 mg/20 cm in high fat diet fed rats ($P < 0.05$), while protein increased from 107.4 ± 6.5 to 124.9 ± 4.8 mg/20 cm ($P < 0.05$). There was no increase in DNA expressed as mg/g wet weight of mucosa or in number of cells per villus. Lipid content of the mucosa and degree of esterification of absorbed oleic acid also were unaltered. These results indicate that the mucosa of the proximal ileum responds to high fat feeding by hypertrophy and that this change is associated with more complete uptake of oleic acid reaching this part of the small bowel.

FATTY ACID DESATURATION IN LUNG: INHIBITION BY UNSATURATED FATTY ACIDS. J.A. Balint, E.C. Kyriakides, and D.A. Beeler (Depts. of Med. and Biochem., Neil Hellman Med. Res. Build., Albany Med. College, Albany, NY 12208) *J. Lipid Res.* 21, 869–73 (1980). The activity of the enzyme system involved in desaturation of palmitic and stearic acid has been examined in lungs of rats fed fat-free diets supplemented either with 4% safflower oil (controls) or 4% tripalmitin (essential fatty acid (EFA) deficient) both in vivo and in vitro in lung slices. Desaturation, as measured by appearance of ^{14}C-labeled monounsaturated fatty acid in pulmonary total lipid and phospholipids, was significantly greater in vivo and in vitro in lung tissue from EFA-deficient rats. In vitro preincubation of lung slices for 1 to 4 hr with 1 mM oleic, linoleic, or linolenic acid reduced the extent of desaturation of [1-^{14}C]-stearic acid significantly in both dietary groups, but the effect was greater in EFA-deficient tissues. The effect of linoleic acid was always greater than that of oleic acid. Preincubation with palmitic acid and 16,16-dimethyl PGE_2 was without effect. Thus: 1) EFA deficiency has been shown to enhance desaturation of palmitic and stearic acid in lung; 2) in vitro addition of linoleic or linolenic acid inhibited desaturation significantly; and 3) oleic acid was inhibitory but to a lesser and more variable extent. Palmitic acid was not inhibitory.

EFFECTS OF COCONUT OIL ON HEART LIPIDS AND ON FATTY ACID UTILIZATION IN RAPESEED OIL. J.F. Bellenand, G. Baloutch, N. Ong and J. Lecerf (Laboratoire de Physiologie Animale et de la Nutrition, Faculte des sciences Mirande, B.P. 138–21004 Dijon Cedex, France) *Lipids* 15, 938–45 (1980). Male adult Sprague-Dawley rats were fed diets containing 15% by weight of sunflower oil, coconut oil, rapeseed oil or combinations of these oils for 5 or 60 days. The digestibility of erucic acid (22:1), lauric acid (12:0) and linoleic acid (18:2) was measured and found to be decreased for erucic acid at both time intervals, and for lauric acid after 60 days when coconut oil and rapeseed oil were blended. The cardiac lipodosis was proportional to the content of erucic acid in the diet. At 60 days, the high level of 22:6 in the cardiac phospholipids of rats fed rapeseed oil was reduced by the addition of sunflower oil but not by coconut oil. Thus, the blending of rapeseed oil with coconut oil apparently is less desirable than that of rapeseed oil and sunflower oil.

HORMONAL REGULATION OF MEDIUM CHAIN FATTY ACID SYNTHESIS BY MOUSE MAMMARY GLAND EXPLANTS. D.W. Borst (Dept. of Zoology and Cancer Res. Lab., Univ. of California, Berkeley, CA 94720) *Lipids* 15, 913–7 (1980). Explants of pregnant mouse mammary tissue were cultured in media supplemented with various hormones. During the last few hours of culture, explants were labeled with [^{14}C]acetate. Fatty acid synthesis by the tissue was analyzed using reverse phase thin layer chromatography, and incorporation of radioactivity into the medium chain fatty acid (MCFA) fraction was calculated as total MCFA per mg tissue fresh weight and as a percentage of the total fatty acid radioactivity (%MCFA). After 48 hr of culture, explants had an elevated %MCFA synthesis only when exposed to media containing insulin, cortisol and pro-

lactin, confirming previous reports. The specificity of the explant response to prolactin was tested with other hormones: FSH and calcitonin had no effect, whereas bovine growth hormone showed activity only at high concentrations. Progesterone and 17β-estradiol also had no effect. The analysis of MCFA synthesis provides another means of (a) assessing hormonal action upon mammary tissue, and (b) evaluating the biological activity of prolactin.

INTERFACIAL TENSIONS IN HEALTHY AND ATHEROSCLEROTIC RABBIT AORTAE. HIGHER VALUES ON LESION SURFACES. J.F. Boyce, S. Schürch and D.J.L. McIver (Depts. of Biophysics, Med. and Pharmacology, Health Sci. Centre, The Univ. of Western Ontario, London, Ontario N6A 5C1, Canada) *Atherosclerosis* 37, 361–70 (1980). Interfacial tensions at the saline/arterial wall interface were determined by measuring contact angles between various test fluid droplets and the walls of rabbit aortae immersed in physiological saline. These contact angles and the interfacial tensions of the test fluid/bathing fluid interface (measured by the Du Noüy ring method) were converted to saline/arterial wall interfacial tensions by applying Neumann's equation of state. Four diseased animals, fed an atherogenic diet for 6–8 weeks and 6 controls formed the experimental group. A significantly higher interfacial tension ($P < 0.001$), was determined for lesion surfaces in atherosclerotic arteries (0.36 ± 0.08 (SEM) $mN \cdot m^{-1}$, $n = 13$) compared to both the surrounding undisturbed regions (0.035 ± 0.01 $mN \cdot m^{-1}$, $n = 14$) and the intact surface of control vessels (0.060 ± 0.01 $mN \cdot m^{-1}$, $n = 48$). This increase may reflect a change in the strength of hydrophilic interactions associated with the lesion surface in atherogenesis.

EFFECTS OF BIOTIN, WITH OR WITHOUT SODIUM NITRITE, ON WEIGHT, FOOD AND FLUID INTAKE, AND ON METHEMOGLOBIN, LACTATE AND LIPIDS IN THE BLOOD OF RATS. H.B. Britton, V.A. Washington and M.W. Marshall (U.S. Department of Agriculture, Human Nutrition Center, Lipid Nutrition Laboratory, Beltsville, MD 20705) *Artery* 7, 246–61 (1980). The effects of biotin deprivation on various plasma constituents were studied in male Sprague-Dawley rats, some of which were also treated with sodium nitrite, extra niacin or linoleate. A Basal diet containing 15% pork fat (lard), 30% egg white and sucrose, was fed for 7 weeks, with or without a weekly supplement of 150 μg biotin and the other substances mentioned. Biotin-deprived rats ate significantly less food, gained less weight and had lower food efficiency ratios than biotin-supplemented rats. Rats given $NaNO_2$ in the drinking water had significantly higher levels of methemoglobin than those without it; values were highest when extra niacin or linoleate was added to the diet. Further studies were needed to define the role of biotin in oxidation-reduction reactions and in regulation of lipid metabolism.

EFFECT OF GEMFIBROZIL ON SERUM LIPID LEVELS. G. Dahlén, T. Gillnäs, A. Børresen, K. Berg and C. Ericson (Depts. of Clinical Chem. and Med., Central Hospital, Boden, Sweden) *Artery* 7, 224–31 (1980). A short term investigation of the effect of Gemfibrozil in 1200 mg daily doses has been carried out in a group of 20 Swedish males, 9 Lp(a+) and 11 Lp(a−). The effect of 8 weeks of treatment upon serum lipids resembled those found in previous trials, with a significant decrease in serum total cholesterol. In this series, even VLDL cholesterol and apoB levels decreased significantly. With the apparent exception of HDL cholesterol, there was no suggestion that Lp(a+) individuals responded less well to treatment than did Lp(a−) individuals.

UPTAKE AND METABOLISM OF FATTY ACIDS BY DISPERSED ADULT RAT HEART MYOCYTES. I. KINETICS OF HOMOLOGOUS FATTY ACIDS. R.F. DeGrella and R.J. Light (Dept. of Chem., Florida St. Univ., Tallahassee, FL 32306) *J. Biol. Chem.* 255, 9731–8 (1980). An adult rat heart myocyte preparation was used to study the uptake and metabolism of the 1-^{14}C-labeled free fatty acids decanoate, laurate, myristate, palmitate, and oleate at 37°C in the absence of serum albumin. The rate of total uptake consisted of both a non-saturable and a saturable component. The relative product distribution did vary with chain length, however, ranging from primarily carbon dioxide for decanoate to approximately equal quantities of carbon dioxide, triglyceride, and polar lipid for palmitate. Two internal pools of free fatty acid are postulated: a minor pool that equilibrates rapidly with external fatty acid and serves as the precursor for fatty acid activation, and a major pool containing most of the accumulated free acid. The data support a simple diffusion of membrane-partitioning process for the accumulation of fatty acid in the second pool. The data presented in this paper are not sufficient to distinguish between a simple diffusion or a carrier-mediated process for uptake into the first pool. Evidence of toxicity at a higher concentration of the longer chain fatty acids limits the concentration range that can be studied in the absence of albumin. Decanoate did not appear to be toxic at concentrations up to 300 μM, but laurate at 10 μM and myristate at 5 μM appeared to uncouple respiratory control.

EFFECTS OF GROWTH AT DIFFERENT TEMPERATURES ON THE PHYSICAL STATE OF LIPIDS IN NATIVE MICROSOMAL MEMBRANES FROM *Tetrahymena*. B.F. Dickens and G.A. Thompson, Jr. (Dept. of Botany, The Univ. of Texas, Austin, TX 78712) *Biochemistry* 19, 5029–37 (1980). Fluorescence measurements of the probe 1,6-diphenyl-1,3,5-hexatriene in native *Tetrahymena pyriformis* microsomal membranes revealed characteristic "break points" in curves of polarization vs. temperature. In the 5–35 °C range, membranes from cells grown at 39 °C exhibited two break points, one at 11.6 ± 0.6 °C and another at 23.1 ± 1.6 °C. Membranes from 15 °C grown cells also showed two break points, one at 8.0 ± 1.7 °C and another at 17.7 ± 1.7 °C. Complementary measurements of turbidity (absorbance at 360 nm) vs. temperature revealed break points at approximately the same temperatures as observed with the fluorescent probe, thus strengthening the likelihood that the break points signify the onset or termination of lipid phase separations or some other significant structural alteration of lipids. In general, break points measured in the native membrane samples occurred at slightly lower temperatures than did break points in lipids extracted from comparable membranes. This suggests two possible types of protein-lipid interaction. First, there may be a selective withdrawal of relatively highly saturated phospholipid molecular species from the bulk lipid phase and into the protein annulus regions. Alternatively, the configuration of the hydrophobic core of certain key membrane proteins may be such that non-specific interactions with the lipids stabilize the liquid-crystalline phase.

STATUS OF VITAMIN E AS AN ERYTHROPOIETIC FACTOR. J.F. Drake, and C.D. Fitch (Dept. of Internal Medicine, St. Louis Univ. Schl. of Med., St. Louis, MO 63104) *Am. J. Clin. Nutr.* 33, 2386–93 (1980). There is now convincing evidence that vitamin E is a specific erythropoietic factor for nonhuman primates and swine. There is no evidence, however, that vitamin E is normally required as an erythropoietic factor for humans and many species of animals. We propose that the lack of a requirement for vitamin E in erythropoiesis in humans is due to a metabolic adaptation that circumvents the need for the role that the vitamin otherwise would serve. There is reason to believe that this metabolic adaptation is deranged in patients with protein-calorie malnutrition. These patients respond with reticulocytosis and a limited increase in hemoglobin concentration when vitamin E is given before their metabolic derangement is reversed by correcting their other nutritional deficiencies. Given this information, we may predict that other acquired or congenital abnormalities of metabolism could impair the adaptation that circumvents the role of vitamin E in erythropoiesis. Therefore, vitamin E should be viewed as a potential erythropoietic factor for humans, and it should receive further carefully controlled therapeutic trials in patients with anemia of obscure etiology, particularly in those with erythroid hyperplasia and unexplained ineffective erythropoiesis.

AORTIC COLLAGEN, ELASTIN AND NON-FIBROUS PROTEIN SYNTHESIS IN RABBITS FED CHOLESTEROL AND PEANUT OIL. L.A. Ehrhart and D. Holderbaum (Dept. of Atherosclerosis and Thrombosis, Res. Div., The Cleveland Clinic Fd., Cleveland, OH 44106) *Atherosclerosis* 37, 423–32 (1980). Alteration of the fatty acid composition of atherogenic test diets has been a widely recognized method for influencing the character and severity of atherosclerotic lesions. The addition of peanut oil or coconut oil to cholesterol-supplemented diets has been shown to produce lesions of a fibrous nature in several species. In the present study, addition of 8% peanut oil to a 2% cholesterol diet accelerated the formation of atherosclerotic lesions which were more fibrous after only 90 days than those previously seen in rabbits even after 6 months on a diet supplemented with cholesterol alone. Collagen, elastin and non-fibrous protein synthesis were all increased over control values, as previously seen in aortas from rabbits given cholesterol supplementation alone. While a portion of the increased synthetic rates may be a direct result of aortic hyperplasia, the proportionally greater increase in collagen synthesis in these lesions is attributable to the addition of peanut oil to the atherogenic diet.

Although the lesions produced in this experiment lacked the overt fibrosis seen in man and in some forms of experimentally induced atherosclerosis, the relative synthetic rates of collagen, elastin and non-fibrous protein described here suggest that even a small preferential increase in collagen synthesis compared with non-collagen protein synthesis may gradually lead to a more fibrous lesion.

ALTERED FATTY ACID DESATURATION AND MICROSOMAL FATTY ACID COMPOSITION IN THE STREPTOZOTOCIN DIABETIC RAT. F.H. Faas and W.J. Carter (Veterans Admin. Med. Center and Univ. of Arkansas for Med. Sciences, Little Rock, AR 72206) *Lipids* 15, 953–61 (1980). Streptozotocin diabetes in the rat diminishes the synthesis of both monounsaturated and polyunsaturated fatty acids. Rat liver microsomal fatty acid composition and fatty acid desaturation were studied in the streptozotocin diabetic rat. The major alterations in fatty acid composition found in the diabetic rat were decreased proportions of palmitoleic, oleic and arachidonic acids and an increased proportion of linoleic and docosahexaenoic acids. These findings, other than the increased docosahexaeneoic acid, probably result from the diminished liver microsomal Δ9 and Δ6 desaturase activities found in these animals. These findings strongly suggest that most of the changes in fatty acid composition in the diabetic rat are indeed caused by the diminished fatty acid desaturase activities.

ACTIVITY OF MYOCARTIAL LIPASE USING NATURAL EDIBLE OILS AS SUBSTRATES. A. Vajreswari and P.G. Tulpule (National Inst. of Nutr., Indian Council of Medical Res., Hyderabad-500007, A.P., India) *Lipids* 15, 962–4 (1980). Rat heart homogenates were tested for their lipolytic activity toward synthetic and natural substrates such as edible oils. Triolein was hydrolyzed very efficiently by myocardial lipase whereas trierucin was not cleaved by the enzyme. Among the natural substrates, safflower oil, which has the highest degree of unsaturation, was hydrolyzed to a greater extent than the other oils. Mustard oil rich in erucic acid formed a poor substrate for the myocardial lipase.

PUBLICATIONS ABSTRACTED

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