Abstracts

Fats and oils

CHARACTERIZATION OF GM_1 GANGLIOSIDE BY DIRECT INLET CHEMICAL IONIZATION MASS SPECTROMETRY. T. Ariga, R.K. Yu, M. Suzuki, S. Ando, and T. Miyatake (Dept. of Biochemistry and Metabolism, The Tokyo Metropolitan Institute of Medical Science, Honkomagome, Bunkyo-Ku, Tokyo 113) *J. Lipid Res. 23* (3):437-442 (1982). Intact permethylated and permethylated-reduced ($LiAlH_4$) derivatives of GM_1 ganglioside were analyzed by direct inlet ammonia chemical ionization (CI) mass spectrometry. In addition, the trimethylsilylated derivative of the permethylated-reduced sample of this ganglioside was similarly analyzed. CI mass spectrometry proves to be a highly satisfactory method for structural studies of GM_1 ganglioside because of the sample fragmentation pattern and the presence of prominent molecular ions and fragment ions in the high mass region. Complete information on the carbohydrate sequence and kipophilic compoisition can be easily obtained.

THE HYDROPHOBIC-HYDROPHILIC BALANCE OF BILE SALTS. INVERSE CORRELATION BETWEEN REVERSE-PHASE HIGH PERFORMANCE LIQUID CHROMATOGRAPHIC MOBILITIES AND MICELLAR CHOLESTEROL-SOLUBILIZING CAPACITIES. M.J. Armstrong, and M.C. Carey (Dept. of Med., Harvard Med. School, Div. of Gastroenterology, Brigham and Women's Hospital, Boston, MA 02115) *J. Lipid Res. 23*:70-80 (1982). To examine quantitatively the hydrophobic-hydrophilic properties of bile salts, we determined the reverse-phase high performance liquid chromatographic (HPLC) mobilities of monomeric bile salt solutions and the equilibrium cholesterol-solubilizing capacities of 100 mM micellar solutions. Studies with common bile salts demonstrated that HPLC mobility, which correlates with hydrophilicity, was markedly influenced by both position and orientation, in addition to number, of hydroxyl functions, in that mobility decreased in the order UDC>C>CDC>DC. Conjugation of the bile salt was also important, in that the HPLC mobility of the taurine (T)-conjugates was greater than the glycine (G)-conjugates which in turn was greater than that of the free bile salts. Equilibrium micellar cholesterol solubilities were also influenced by bile salt structure and correlated inversely with hydrophilicity, in that solubility decreased in the order DC>CDC>C>UDC with free bile salts>G-conjugates>T conjugates. For each bile salt series, double logarithmic plots of the cholesterol-solubilizing capacities expressed in mole fraction units versus the HPLC retention factors gave linear relationships. Linear regression equations were employed to predict the equilibrium cholesterol-solubilizing capacities of a number of less common bile salts from their HPLC retention factors. Each theoretical value agreed closely with that derived entirely by experiment. A comparison of the HPLC mobilities of the less common bile salts with the more common species revealed that not only were sulfate and oxo substituents more hydrophilic than α-oriented hydroxyl functions, but, in the dihydroxy species.

STUDIES ON THE MARINATING OF CHICKEN PARTS FOR DEEP-FAT FRYING. T.C. Chen (MAFES, Poultry Sci. Dept., Mississippi State Univ., Mississippi State, MS 39762) *J. Food Sci. 47*(5): 1016-1018 (1982). Eight-piece-cut broiler parts were either still-marinated or marinated in a hexagonal shaped drum rotated at 31.5 rpm. The marinated parts were coated and deep-fat fried at 168 C for 12 minutes. The marinating process increased frying yields of fried parts. Although the longer rotary-marinating time resulted in higher marinade absorption as compared to the still-marinated ones, the frying yields were about the same. The variance of marinade penetration between part types was smaller for those still-marinated than for those rotary-marinated. Except for the drumsticks, marinade penetration from 4 hrs. of still-marinating can be accomplished by rotary-marinating the parts for 10 min.

THE STABILITY AND STRUCTURE OF CHOLESTEROL-RICH CODISPERSIONS OF CHOLESTEROL AND PHOSPHATIDYLCHOLINE. J.J. Collins and M.C. Phillips (Dept. of Physiology and Biochem., The Med. College of Penn., 3300 Henry Ave., Philadelphia, PA 19129). *J. Lipid Research 23*(2):291-298 (1982). In order to investigate the structure and stability of cholesterol-enriched dispersions of phosphatidylcholine (PC), cholesterol/dipalmitoyl phosphatidylcholine (DPPC) mixtures with molar ratios of 4 ± 0.5/1 to 1/1 were dispersed in water by sonication. These dispersions comprise liposomes and unilamellar vesicles with diameters in the range 200-1800 A. The bilayers which have a repeat distance of 66 A in thse particles at 20 C can contain up to 4 mol cholesterol/ mol PC when DPPC is used and about half this ratio with egg PC. These dispersions are metastable in that storage at either 4 or 20 C leads to aggregation and precipitation of vesicles; in addition, there is a decrease in the cholesterol/PC molar ratio in the particles and formation of cholesterol monohydrate crystals. Cholesterol is released slowly and PC dispersions containing more than equimolar amounts of cholesterol can be stable for several months. The maximum solubility of cholesterol in DPPC bilayers is 1.0 ± 0.1 mol/mol PC when the mixture initially contains less than about 3 mol cholesterol/mol DPPC. This is consistent with published equilibrium phase diagrams which show that equimolar PC/cholesterol bilayers are stable in water.

THE INFLUENCE OF THE SIDE CHAIN ON STEROL SIDE-CHAIN CLEAVAGE IN RAT ADRENAL GLANDS. Iain F. Craig, J. Ian Mason, Keith E. Suckling and George S. Boyd (Dept. of Biochem., Univ. of Edinburgh Med. Schl., Edinburgh, EH8 9XD, U.K.) *Biochim. Biophys. Acta 712*:123-127 (1982). The cholesterol side-chain cleavage enzyme system of rat adrenal cortex, the enzyme catalyzing a rate-limiting step of adrenal steroidogenesis, was shown to metabolize a series of cholesterol analogues to pregnenolone. In the presence of Ca^{2+}, rat adrenocortical mitochondria converted the analogue with two less methylene groups (C_{25}) than cholesterol into pregnenolone at a faster rate than cholesterol. The analogues with one or three less methylene groups (C_{26} or C_{24}) were metabolized at a similar rate to cholesterol. Lengthening the non-polar side chain produced analogues that did not appear to be metabolized. Studies of the metabolism of these analogues in isolated rat adrenocortical carcinoma cells showed that the C_{24} and C_{25} analogues were converted into pregnenolone much more efficiently than was cholesterol or the C_{26} sterol. The experimental findings are explained in terms of the differing ability of each exogenously added sterol to gain access to the active site of the sterol side-chain cleavage enzyme by passage through the membranes of the adrenal cell.

A METHOD FOR THE ACCURATE MEASUREMENT OF ISOTOPE RATIOS OF CHENODEOXYCHOLIC AND CHOLIC ACIDS IN SERUM. B.R. DeMark, G.T. Everson, P.D. Klein, R.B. Showalter, and F. Kern, Jr. (Div. of Biol. and Med. Research, Argonne Natl. Lab., Argonne, IL 60439) *J. Lipid Res. 23*(1):204-210 (1982). A method for the extraction of bile acids from serum is described that enables the stable isotopic content of chenodeoxycholic acid and cholic acid to be determined accurately to levels as low as the natural ^{13}C abundance. The method uses Sep-Pak C_{18} reverse phase cartridges both for extraction and purification procedures. Free bile acids, bile acid conjugates, and 3-monosulfated bile acid conjugates are recovered in high yield from the Sep-Pak in methanol-water 75:25 after first removing impurities with hexane and methanol-water 40:60 washes. Other important features of the method include the use of enzymatic rather than alkaline hydrolysis of bile acid conjugates, the use of ammonia as the reagent gas for chemical ionization mass spectrometric measurement of isotopic ratios, and the exclusion of all extraneous components in the final sample from the ion source. This method should be applicable to kinetic studies of bile acids using bile acids labeled with stable isotopes and serum measurements, and provides an alternative sampling point in the enterohepatic circulation to conventional duodenal bile samples requiring intubation.

DISCRIMINATIVE VALUE OF LIPIDS AND APOPROTEINS IN CORONARY HEART DISEASE. G. DeBacker, M. Rosseneu, and

J.P. Deslypere (Nat'l Fund for Sci. Res., Dept. of Cardiology and Dept. of Endocrinology, Academisch Ziekenhuis, Gent; and Algemeen Ziekenhuis St. Jan, Belgium) *Atherosclerosis*, 42:197-203 (1982). Serum cholesterol, HDL cholesterol (HDL-C), and apoproteins, A1, A2 and B were determined in 70 male survivors of myocardial infarction and in an equal number of healthy controls, matched for age, sex and body mass index. In univariate analyses, the Apo B/Apo A1 ratio discriminated the best between cases and controls, giving a 72% exact classification. In a multivariate analysis, the Apo B/Apo A1 ratio, HDL-C and the Apo A2/Apo A1 ratio contributed independently to the discrimination of cases from controls while the overall exact classification was 82%. These promising results were comparable in younger and older subgroups. Thus, the determination of apoproteins yielded complementary information in this cross-sectional survey and warrants further study in a prospective setting.

ISOLATION, PURIFICATION, AND CHARACTERIZATION OF A LIPOPROTEIN CONTAINING APO B FROM THE HUMAN AORTA. H.F. Hoff and J.W. Gaubatz (Dept. of Medicine, Baylor College of Medicine, Houston, TX 77030) *Atherosclerosis 42*(2,3): 273-297 (1982). LDL-like lipoproteins were extracted from a buffer-soluble fraction of homogenates of both grossly normal intima and fatty-fibrous plaques from the human aorta. A low-speed supernate of such homogenates was subjected to differential ultracentrifugation to isolate a d 1.006-1.063 density fraction which was further purified by gel filtration on agarose columns, or by affinity chromatography of low-speed supernatants of aortic homogenates on immunoabsorbents (anti-apo B). The results from this study suggested that the lipoproteins extracted from the human aorta may represent either the preferential retention of a subclass of plasma LDL with slightly different characteristics from the average but with greater affinity for intimal material, or the products of modification of normal plasma LDL following retention by extracellular components of the aortic intima. This modification may be due to complex formation of LDL with such components.

STRUCTURE OF THE SIDE CHAIN OF THE C_{29} DICARBOXYLIC BILE ACID OCCURRING IN INFANTS WITH COPROSTANIC ACIDEMIA. G. Janssen, S. Toppet, G. Parmentier (Rega Inst. and Dept. of Chem., Univ. of Leuven, Belgium) *J. Lipid Res. 23*:456-465 (1982). The structure of the side chain of the 3α,7α,12α-trihydroxy-5β-C_{29} dicarboxylic bile acid occurring in body fluids of infants with coprostanic acidemia was investigated by means of mass spectrometry and nuclear magnetic resonance spectroscopy. The findings identified this bile acid as 3α,7α,12α-trihydroxy-27a,27b-dihomo-5β-cholestane-26,27b-dioic acid (3α,7α,12α-trihydroxy-27-carboxymethyl-5β-cholestan-26-oic acid).

ISOLATION AND CHARACTERIZATION OF AN ETHER-LINKED HOMOSERINE LIPID FROM THE THYLAKOID MEMBRANE OF *CHLAMYDOMONAS REINHARDTII 137*$^+$. D.R. Janero and R. Barrnett (Section of Cell Biol., Yale Univ. Sch. of Med., New Haven, CT 06510) *J. Lipid Res. 23*(2):307-316 (1982). A polar diacylglycerolipid isolated from the phototrophic green alga *Chlamydomonas reinhardtii* 137$^+$ (wild-type) displays chromatographic and chemical identity with the ether-linked homoserine lipid 1(3),2-diacylglyceryl-(3)-0-4'(N,N,N-trimethyl) homoserine (DGTS) of the golden alga *Ochromonas danica*. Subcellularly, DGTS is a constituent of a fraction of thylakoid membranes purified from *Chlamydomonas* whole-cell homogenates. The proportion of DGTS in the photosynthetic lamellae is ~40% of the total found in the alga. Cellular and thylakoid-membrane DGTS both have an unsaturated:saturated ratio of about 1.8 and contain predominantly hexadecanoic and octadecanoic fatty acids. Quantitatively, the fatty acid complement of thylakoid DGTS is distinct from the cellular DGTS fatty acid profile. The results provide the first demonstrations that DGTS is a bona fide membrane lipid and, specifically, that ether-linked homoserine lipid is a component of the thylakoid membrane of a phototrophic green-plant cell.

EFFECT OF HEATING TEMPERATURE AND TIME ON THE VOLATILE OXIDATIVE DECOMPOSITION OF LINOLENATE. S.S. Lomanno and W.W. Nawar (Dept. of Food Sci. and Nutr., Univ. of Mass., Amherst, MA 01003) *J. Food Sci. 47*(3):744-746 (1982). Ethyl linolenate, was thermally oxidized at 70 C, 180 C, 250 C in a closed system in the presence of atmospheric oxygen. On the basis of the peroxide curve obtained at each of the three temperatures, three heating times were chosen for the analysis of the volatile decomposition products. These products were identified by gas chromatography-mass spectrometry. The qualitative pattern of the volatile decomposition products was the same for all treatments. Nine of the products were consistent with compounds predicted from cleavage of the conjugated linolenate hydroperoxides, with the C9 oxo-ester and the C8 ethyl ester produced in the largest amounts. Other predicted products were not detected and were hypothesized to undergo further degradations. Although the major effect of temperature was found to be a quantitative one, it was difficult to relate the amounts of oxidation products directly to a temperature-dependent preferential hydroperoxide scission.

INTERACTION OF α-TOCOPHEROL WITH DIPHENYLPICRYL HYDRAZYL. A MEANS TO DETERMINE THE POLARITY OF THE ENVIRONMENT AROUND α TOCOPHEROL AND ITS BINDING WITH LIPIDS. A. Muralikrishna Rao, U. Chandra Singh and C.N.R. Rao (Solid State and Structural Chem. Unit, Indian Institute of Science, Bangalore-560012, India) *Biochim. Biophys. Acta 711*:134-137 (1982). α-Tocopherol is found to interact with the stable free radical DPPH orders of magnitude faster than ordinary phenols. It is suggested that the high reactivity arises from the coplanarity of the C-O-C framework with the aromatic ring. The rate constant of the reaction of α-tocopherol with DPPH increases progressively with solvent polarity and can be quantitatively related to Kosower's *Z* parameter. Fatty acid derivatives slow down the reaction with DPPH due to binding with α-tocopherol.

DYNAMICS OF PRECIPITIN REACTION: EFFECT OF THE CHOLESTEROL AND SURFACE DENSITY OF GANGLIOSIDE, GM_1, ON THE RATE OF REACTION BETWEEN LECTIN FROM *RICINUS COMMUNIS* AND LIPOSOME CONTAINING GM_1. S.K. Podder, A. Surolia and B.K. Bachhawat (Dept. of Biochem., Indian Inst. of Sci., Bangalore 560 012) *Indian J. Biochem. Biophysics* 18 (5):322-325 (1981). The interaction between a galactose-specific lectin, RCA_1, from *Ricinus communis* and liposomes containing monosialoganglioside (GM_1) resembles cell-agglutination and has therefore been studied at pH 7.0 as a function of phospholipid composition and cholesterol content of liposomes, and the ratio (R) of phospholipid to GM_1. The incorporated gangliosides are recognised through the nonreducing terminal galactose moiety, resulting in a time-dependent change in turbidity. The kinetics of the precipitin reaction is quite complex. For runs having RCA_1 in excess the pseudo first order rate constant calculated from initial changes in absorbance and $t_{1/2}$ (i.e. time for 50% change in absorbance) are dependent on the *R* values and cholesterol content of liposomes. The effect of cholesterol is however small compared to that brought about by changes in *R* values. Thus the importance of membrane fluidity and topological distribution in understanding rates and mechanism of lectin-induced agglutination reactions is stressed.

THE BINDING OF CA^{2+} TO TAURINE- AND GLYCINE-CONJUGATED BILE SALT MICELLES. Natarajan Rajagopalan and Siegfried Lindenbaum (Pharmaceutical Chemistry Dept., School of Pharmacy, The University of Kansas, Lawrence, KS 66045 (U.S.A.)) *Biochim. Biophys. Acta 711*:66-74 (1982). The binding of Ca^{2+} to micelles of glycine and taurine bile acid conjugates was studied using a Ca^{2+}-specific electrode. An investigation of the effect of buffer concentration, pH, added electrolyte and lecithin was also carried out. The observed results indicate that the binding of Ca^{2+} to bile salt micelles is dependent on both the number of hydroxyl groups on the steroid nucleus as well as on the nature of the head conjugating group, viz. glycine or taurine. It is speculated that the binding of Ca^{2+} to bile salt micelles may act as one of the mechanisms to lower Ca^{2+} activity in bile and thus reduce its tendency to precipitate as insoluble calcium salts and further growth into gallstones.

QUANTITATIVE ASPECTS OF THE INTERACTION OF BILE ACIDS WITH HUMAN SERUM ALBUMIN. A. Roda, G. Cappelleri, R. Aldini, E. Roda, L. Barbara (Instituto di Scienze Chimiche, Facolta di Farmacia, and Clinica Medica III, Universita di Bologna, Italy) *J. Lipid Res. 23*: 490-495 (1982). The interaction of human serum albumin with twelve bile acids (ba) has been studied by equilibrium dialysis technique using ^3H- and ^{14}C-labeled bile acids. The physiological bile acids studied were: cholic, chenodeoxycholic, deoxycholic, lithocholic, ursodeoxycholic, and 7-ketolithocholic acids, all in the free and conjugated (with glycine and taurine) forms. For each bile acid studied, the interaction was characterized by two classes of binding sites, the first consisting of 2-4 sites and the second of 8-30. K_1 values (liter/mol) for the different bile acids were: cholic acid, 0.3×10^4; chenodeoxycholic acid, 5.5×10^4; deoxycholic acid, 4.0×10^4; ursodeoxycholic acid, 3.8×10^4; 7-ketolithocholic acid, 1.9×10^4; lithocholic acid, 20×10^4. The affinity constant of a bile acid for albumin decreases with an increase in the number of hydroxy groups and also with the replacement of 7-hydroxy by 7-keto groups. The affinity constant is similar for glycine and taurine conjugated bile acids, but is slightly higher for unconjugated than conjugated forms.

EFFECTS OF BEZAFIBRATE ON THE COMPOSITION OF VERY

LOW DENSITY LIPOPROTEINS IN TYPE IV HYPERLIPOPROTEINEMIA. P. Schwandt, P. Weisweiler, M. Drosner, P. Janetschek (Med. Dept. II, Klinikum Grosshadern, Univ. of Munich, Marchioninstr. 15, D-8000 Munich 70 (F.R. G.)) *Atherosclerosis*, 42:245-249. (1982). As compared to normolipoproteinemic controls 10 male subjects with primary type IV hyperlipoproteinemia had higher apolipoprotein E and lower apolipoprotein C-II concentrations in the very low density lipoprotein (VLDL) fraction. After 8 weeks of treatment with 0.6 g/day bezafibrate, cholesterol and triglyceride in the serum and VLDL were significantly lower. The decrease of VLDL lipids was accompanied by a significant decrease of the apolipoproteins and of the lipid/protein ratio in VLDL. The analysis of the soluble VLDL apolipoproteins revealed a decrease of apo E and an increase of apo C1 and apo C2, resulting in a decrease of the apoE/apoC ratio.

LACK OF TRANSBILAYER COUPLING IN PHASE TRANSTIONS OF PHOSPHATIDYLCHOLINE VESICLES. Laurel O. Sillerud and Ronald E. Barnett (Dept. of Molecular Biophysics and Biochem., Yale Univ., New Haven, CT 06511) *Biochemistry 21*(8): 1756-1760 (1982). Praseodymium and ytterbium chlorides were used as nuclear magnetic resonance shift reagents to resolve the inner and outer choline methyl resonances of single-walled dimyristoylphosphatidylcholine bilayer vesicles. The gel to liquid-crystalline phase transition of these vesicles was monitored by observing the proton and carbon-13 nuclear magnetic resonance line widths of the choline methyl group nuclei. In the absence of ions the transition occurred at 21.5 C in both halves of the bilayer. With Pr^{3+} or Yb^{3+} added to the outside of the vesicles, the phase transition temperature of the outer half of the bilayer was raised several degrees, while the transition temperature of the inner half was unchanged. In vesicles containing 20 mol% cholesterol the phase transition of the outer monolayer was considerably broadened, while the inner half still melted sharply at 21.6 C. By use of dipalmitoylphosphatidylcholine vesicles with UO_2^{2+} added to the outside, phase transitions at 41.5 and 44 C were detected by electron spin resonance with the spin-label 2,2,6,6-tetramethylpiperidinyl-1-oxy. These results imply that the two halves of the bilayer in phospholipid vesicles are so weakly coupled that they can undergo the gel to liquid-crystalline phase transition independently.

PREPARATION OF RETINOIC ACID ESTERS OF PHORBOL DERIVATIVES. B. Sorg, G. Fürstenberger, D.L. Berry, E. Hecker, and F. Marks. (Institute of Biochemistry, German Cancer Research Center, D-6900 Heidlberg, Federal Republic of Germany) *J. Lipid Res. 23*(3):443-447 (1982). The synthesis of 12-O-retinoylphorbol-13 acetate (RPA), an incomplete tumor promoter (second stage promotor) is described. The preparation starts with phorbol-13-acetate-20-tritylether which is acylated by a carbodiimide method to yield its 12-retinoate. The latter is detritylated by acidic methanol to give RPA. Following an analogous procedure, the 4-methyl-ether of RPA is prepared from 4-O-methylphorbol-13-acetate-20-tritylether.

TISSUE CULTURE OF COCOA BEANS (*THEOBROMA CACAO L.*) INCORPORATION OF ACETATE AND LAURATE INTO LIPIDS OF CULTURED CELLS. C.H. Tsai, J.E. Kinsella (Inst. of Food Sci., Cornell Univ., Ithaca, NY 14853) *Lipids* 17:367-371 (1982). Suspension cultures of cocoa bean tissue readily incorporated exogenous acetate into lipids. The distribution of radioactivity from acetate in individual lipid classes after 48 hr was 20, 5, 1, 15, 25, and 35% in triglycerides, diglycerides, free fatty acids, sterol esters, sterols and polar lipids, respectively. The labeled acetate was rapidly incorporated into various fatty acids within 2 hr. The [1-^{14}C] saturated fatty acids declined slightly after 4 hr, whereas [1-^{14}C] oleate declined significantly after 2 hr. There was a concomitant increase in [1-^{14}C] linoleate. The radioactivity associated with linolenate was relatively high up to 4 hr, declined by 24 hr, and then increased again. The kinetics of fatty acid labeling suggested that biosynthesis of linolenic acid in cocoa bean suspension culture may occur via the desaturation of linoleic acid and the chain elongation of dodecatrienoic acid. The patterns of fatty acid radiolabeling following incubation of cells with [1-^{14}C] laurate was consistent with this mechanism.

COCOBEAN TISSUE CULTURE: LIPID COMPOSITION AND FATTY ACID METABOLISM. C.H. Tsai, M.C. Wen, and J.E. Kinsella (Inst. of Food Sci., Cornell Univ., Ithaca, NY 14853) *J. Food Sci. 47*(3):768-773 (1982). Cocoabean callus cultures were established and grew satisfactorily on an agar medium for more than 2 yr. Cell suspension cultures were initiated from the callus. The fresh weight of cells increased over 20-fold in 14 days. The lipid content of callus and cells was 5.3 and 6.5%, respectively. The fatty acid composition of cocoa callus and cell suspension cultures resembled that of immature cocoabeans since they contained high amounts of linoleic acid. Stereo-specific distribution of fatty acids in triglycerides from cocoa callus and cells was similar to that of ripe cocoabeans. Exogenous acetate and fatty acids were readily incorporated into lipids by cocoa cell suspension cultures. Exogenous stearic acid increased triglyceride content twofold but did not change fatty acid composition of triglycerides. Coconut water alone or in combination with sucrose also increased triglyceride content with a concomitant increase in oleic acid from 10% to 33% and a decrease in linoleic acid from 37% to 19%.

PURIFICATION AND PROPERTIES OF LIPOPROTEIN LIPASE IN GUINEA PIG MILK. Lars Wallinder, Guinilla Bengtsson and Thomas Olivecrona (Dept. of Physiological Chem., Univ. of Umea, S-901 87 Umea, Sweden) *Biochim. Biophys. Acta 711*:107-113 (1982). Lipoprotein lipase was purified from guinea pig milk by chromatography on heparin-Sepharose followed by chromatography on an immobilized preparation of heparin that had been *N*-desulphated and then acetylated. This second step was necessary to separate a plasma protein, presumably antithrombin, from the lipase. The guinea pig enzyme turned out to be quite similar to lipoprotein lipase from bovine milk with respect to composition and molecular size. Furthermore, the specific activities and the dose-response relations for activation by apolipoprotein C-11 were quite similar for the two enzymes. Antibodies raised against the guinea pig milk enzyme inhibited not only this enzyme but also the lipoprotein lipase activity in post-heparin plasma and in homogenates from adipose tissue and heart.

ISOLATION OF AN INHIBITOR OF HEPATIC CHOLESTEROLGENESIS FROM HUMAN MILK. P.C. Ward, R.D. McCarthy, and A. Kilara (Dept. of Food Sci., The Penn. State Univ., Univ. Park, PA 16802) *Atherosclerosis, 41*:185-192 (1982). Two preparations active in reducing hepatic cholesterolgenesis in vitro were demonstrated in human milk. These appear to affect the cholesterol synthetic pathway at different loci. One inhibits the synthesis before the formation of mevalonic acid and has been isolated and subsequently identified as uric acid. The other inhibitor has yet to be identified. The apparent paradox of the active component being uric acid, of which high levels are known to cause gout, is discussed.

RAPID METHOD FOR DETERMINING CHOLESTERYL ESTER TRANSITIONS OF APOB-CONTAINING LIPOPROTEINS. D.A. Waugh and D.M. Small (Biophys. Inst., Boston Univ. Schl. of Med., Boston, MA 02118) *J. Lipid Res. 23*(1):201-204 (1982). A wide variety of cholesteryl ester-rich apoB-containing lipoproteins undergo an order-disorder transition in the cholesteryl ester core at approximately normal body temperature. The transition occurs over several °C with the mid-point being as high as 57 C in some cholesterol-fed animals. The transition mid-point of normal human low density lipoprotein (LDL) appears to vary from as low as 26 C to about body temperature. However, to screen a large population of patients at risk for atheroscerlotic cardiovascular disease (ACD), a rapid method for determining the transition temperature of LDL is needed. Since apoB-containing lipoproteins (VLDL and LDL) are readily precipitated from plasma by dextran sulfate and magnesium sulfate, we have studied the thermal properties of this precipitate using differential scanning calorimetry (DSC). The VLDL-LDL precipitate undergoes a reversible thermal transition similar in transition temperature and enthalpy to the cholesterol ester transition of isolated pure LDL. The transition is seen with the precipitate from VLDL-free plasma, but no transition is seen when VLDL and LDL have been removed. Cholesterol ester-rich apoB containing lipoproteins were isolated from a variety of sources and their transition temperatures compared with the apoB-containing lipoprotein precipitates from the same source. The mid-point of individual transitions varied over a wide range (17-57 C) and the plasma precipitate was strong.

THE EFFECT OF VITAMIN E DEFICIENCY ON SOME PLATELET MEMBRANE PROPERTIES. J.C. Whitin, R.K. Gordon, L.M. Corwin, and E.R. Simons (Dept's of Biochem. and Microbiol., Boston Univ. Schl. of Med., Boston, MA 02118.) *J. Lipid Res. 23*(2):276-282 (1982). The effects of α-tocopherol (vitamin E) deficiency on membrane properties of platelets were studied to determine if vitamin E has a measurable stabilizing role in biological membranes. Three groups of rats and three of mice were studied: two groups consisted of Fisher strain rats and one of Sprague-Dawley rats fed a Draper corn oil diet with and without high levels of supplementary vitamin E. The mice were two groups of BALB/c animals maintained on a 8% hydrogenated coconut oil diet, and one group of CBA/J mice on a 8% lard diet, in each case either deficient in of supplemented with vitamin E. The relative content of fatty acids obtained from both rat platelets and erythrocytes was unchanged by vitamin E deficiency. Depletion of vitamin E had no effect on the degree of

fluorescence polarization of 1,6-diphenyl-1,3,5,-hexatriene-labeled rat platelets. No changes in hematocrit values were seen in any of the studies. The platelet count of only the vitamin E-deficient Sprague-Dawley rats was elevated with respect to vitamin E-supplemented counterparts; the other remained constant. Platelet reactivities, as measured by ADP- and thrombin-induced platelet aggregation and by the thrombin-induced changes in platelet transmembrane potential, were unaffected by vitamin E deficiency in all three groups of rats.

FRACTIONATION OF SYNTHETIC FATTY ACIDS. R.B. Mandel, S.A. Maiorova, and T.A. Ermilova. *Lakokras. Mat. 1981. No. 2*:36-7. GLC may be used to determine the properties of automotive paints containing melamine-formaldehyde oligomers and alkyd oligomers modified with synthetic fatty acids by studying the chain length distribution of the acids. (World Surface Coatings Abs. No. 472).

ANALYSIS OF CASTOR OIL FATTY ACIDS. G. Weissmann. *Seifen-Ole-Fette-Wachse 106*:455-7 (1980). The conjugated diene acid content of dehydrated castor oil fatty acids is determined by GLC using capillary column coated with diethylene glycol succinate polyester at 180 deg. The *cis-cis, trans-trans* and *cis-trans* isomers are separated. Results are compared with those obtained by UV absorption at 232-233 nm. (World Surface Coatings Abs. No. 472).

SURVEY OF USES OF FATTY MATERIALS IN THE COATINGS AND RELATED FIELDS. A. Poluzzi. *Ind. Vernice 35 No. 6*:3-22 (1981). This general review describes the various fatty oils of vegetable and animal origin, modified oils, fatty acid methyl esters, synthetic fatty acids, vinyl monomers for fatty acids, etc. and their use in the coating and related fields. (World Surface Coatings Abs. No. 473).

EFFECT OF WATER ACTIVITY ON STORAGE CHANGES IN TOTAL CAROTENOIDS AND LIPIDS IN BENGALGRAM (*CICER ARIETINUM*) DHAL AND FLOUR. S.S. Arya (Defence Food Research Laboratory, Mysore-10) *J. Food Sci. & Tech. (India)* Vol. 18, pp. 139, 1981. Bengalgram flour and dhal were equilibrated to 2.0, 8.0, 10.8 and 13.9% moisture at 0.0, 0.33, 0.57 and 0.73 water activity (a_w) respectively. Storage below 0.57 a_w does not cause perceptible changes in flavor for 24-52 weeks but on storage at 0.73 a_w became moldy and developed musty odor in 8 weeks storage. Below 0.57 a_w, changes in total carotenoids, TBA value, free and bound lipids and their composition were not significant except slight hydrolysis of triglycerides and a concomitant increase in fat acidity. Both free and bound lipids and carotenoids were degraded during storage at 0.73 a_w. Proportions of neutral, glyco and phospholipids in Bengalgram flour are 93, 3 and 4% in free lipids and 15.8, 16.9 and 66.9% in bound lipids respectively. Proportion of phospholipids in bound lipids decreased while neutral lipids increased during storage at 0.73 a_w due to mold infection.

PACKAGING AND STORAGE STUDIES OF DEEP-FAT FRIED NENDRAN BANANA CHIPS. Satyavati Krishnankutty*, A. George Varkey*, and A.V. Bhat* (Central Food Technological Research Institute, Mysore, India) and S. Dhanaraj and Shanthi Narasimhan (Central Food Technological Research Institute, Mysore, India) *Journal of Food Sci. & Tech. (India)* Vol. 18, pp. 104, 1981. Suitability of flexible packages and inert gas packing in sealed tins for the storage of fried "Nendran" banana chips was investigated. It was found that for banana chips fried in fresh coconut oil, 300 gauge high density polyethylene and 400 gauge low density polyethylene bag packing are satisfactory up to two months while packing in tins under CO_2 is satisfactory up to six months at room temperature (28-32 C). The "Nendran" banana chips fried in "marvo" oil, a hydrogenated vegetable oil containing 0.02% BHA and packed in sealed tins under CO_2 were quite good up to 6 months whereas the chips fried in groundnut oil and packed under similar conditions were inferior in quality. Addition of turmeric powder as a natural colorant at 0.10 to 0.15% level during frying was found to enhance the color of the chips which was stable up to six months in sealed tins under inert gas packing.

EFFECT OF DIETARY FAT ON DEPOSITION OF FAT AND FATTY ACID COMPOSITION OF TILAPIA (*TILAPIA MOSSAMBICA*). K.G. Ramachandran Nair and K. Gopakumar (Central Institute of Fisheries Technology, Cochin-682 029, India). *J. Food Sci. & Tech. (India)* Vol. 18, pp. 108, 1982. The effect of dietary fats on the visceral and body fat of the fish tilapia (*Tilapia mossambica*) was studied. Residual oil in groundnut cake, coconut oil, mustard oil and sardine oil were the sources of fatty acids in the experimental diets used. Feed containing coconut oil induced deposition of maximum amount of saturated fatty acids and lower fatty acids (C_6, C_8, C_{10}, C_{12}, C_{14}) in the visceral and body fat of fishes. Mustard oil induced deposition of maximum amount of polyunsaturated fatty acids followed by sardine oil. Deposition of $C_{22:1}$ acid in body as well as viscera was very significant in the case of fish fed on feed containing mustard oil. It is observed that dietary fatty acid pattern has got significant effect on the fatty acid composition of the fish.

TOTAL FAT AND FATTY ACID COMPOSITION OF COMMERCIALLY AVAILABLE CHOCOLATE CANDIES. P.C. Ahn, N. Kassim, R.D., and P.V.J. Hegarty, Ph. D. (Department of Food Science and Nutrition, University of Minnesota, St. Paul, and Nutrition Coding Center, Minneapolis, MN). *J. Am. Dietetic Assn.* Vol. 79, pp. 552, 1981. Forty different brands of chocolate candies were purchased in a supermarket. The wrappers were removed and coded, and the candy was re-wrapped in aluminum foil until analyzed. More than 60 percent of the samples had a polyunsaturated/saturated (P/S) ratio of less than 0.10. Although the candies examined had a higher carbohydrate than fat content, fat frequently contributed more calories in the candies containing more than 25 percent fat (15 of the 40 brands studied).

INFANT FATNESS AND FEEDING PRACTICES: A LONGITUDINAL ASSESSMENT. D.L. Yeung, Ph.D., M.D. Pennell, M. Leung, R.P.DT., and J. Hall, R.P.DT. (Department of Food Research and Development, H.J. Heinz Company of Canada Ltd., Toronto, Ontario, Canada). *J. Am. Dietetic Assn.* Vol. 79, pp. 531, 1981. In recent years, bottle feeding and the early introduction of solid foods in infants' diets have been proposed as factors contributing to overweight in infancy that might continue into childhood. These hypotheses were examined in a longitudinal survey of 403 infants from birth to 18 months of age. Results from this survey do not support either (a) a relationship between type of milk feeding or time of introduction of solid food and fatness at 6 months of age or (b) the hypothesis that fat infants remain fat.

SEDIMENTATION EQUILIBRIUM OF HUMAN LOW DENSITY LIPOPROTEIN SUBFRACTIONS. T.S. Kahlon, G.L. Adamson, M.M.S. Shen, F.T. Lindgren (Donner Lab., Lawrence Berkeley Lab., Univ. of California, Berkeley, CA 94720) *Lipids 17*(5):323-330 (1982). The molecular weights of low density lipoprotein (LDL) subfractions were determined precisely by meniscus depletion sedimentation equilibrium. Equilibrium speeds ranged from 9743 to 5896 rpm. Higher molecular weights of fractions 2 and 5 compared to their adjacent fractions 1 and 4 by sedimentation equilibrium are of great interest. The calculated frictional ratio f/f° from sedimentation equilibrium and flotation velocity data ranges from 1.10 to 1.31, suggesting complexity and asymmetry of LDL subfraction molecules. There is also evidence that compressibility of LDL molecules may be different than that for the salt solution under high g-force. Assuming that redistributed LDL molecules at equilibrium under low g-force are spherical, it is possible that the shape of LDL molecules undergoing flotation velocity determinations may be distorted in high g-force conditions. Such distortion may be consistent with high f/f° values obtained and may also be a basis for structural rearrangement and/or lipoprotein degradation with prolonged preparative ultracentrifugation at high g-force and pressure.

CHOLESTEROL AND FATTY ACID CONTENT IN THREE SPECIES OF CRAB FOUND IN THE NORTHWEST ATLANTIC. J. Krzynowek, K. Wiggin, and P. Donahue (Nat'l Marine Fisheries Service, Northeast Fisheries Center, Gloucester Lab., Emerson Ave., Gloucester, MA 01930) *J. Food Sci. 47*(3):1-25-1026 (1982). Three species of crab, deep-sea crab, *Geryon quinquedens*, rock crab, *Cancer irroratus*, and Jonah crab, *Cancer borealis*, were examined for sterol and fatty acid content in the cooked muscle. Cholesterol was the major sterol in all three species. The 20:5w3 was the predominant poly-unsaturated fatty acid for all the crabs.

POLAR LIPIDS OF AN EXTREMELY HALOPHILIC BACTERIAL STRAIN (R-4) ISOLATED FROM SALT PONDS IN SPAIN. S.C. Kushwaha, M. Kates, G. Juez, F. Rodriguez-Valera and D.J. Kushner (Dept. of Biochemistry and Biology, Univ. of Ottawa, Ottawa, KIN 9B4 (Canada) and Departmento de Microbiologia, Centro de Estudios Universitarios, Alicant (Spain)). *Biochim. Biophys. Acta 711*: 19-25 (1982). The lipids of an extremely halophilic bacterium, strain R-4, isolated from the salt ponds in Spain at Alicante, were found to contain 93% polar lipids and 7% non-polar lipids. Four major polar lipids were detected, all derivatives of 2,3-di-*O*-phytanyl-*sn*-glycerol: (i) a novel glycolipid sulfate, 2,3-di-*O*-phytanyl-1-*O*-[α-D-mannopyranosyl-6'-sulfate-(1'→2')-*O*-α-D-glucopyranosyl]-*sn*-glycerol, (ii) phosphatidylglycerol, (iii) phosphatidylglycerophosphate, (iv) a glycolipid, 2,3-di-*O*-phytanyl-1-*O*-[α-D-mannopyranosyl-(1'→2')-*O*-α-D-glucopyranosyl[-*sn*-glycerol. Traces of four other phos-

pholipids and one glycolipid were also detected.

LIGHTLY HYDROGENATED SOY OIL VERSUS OTHER VEGETABLE OILS AS A LIPID-LOWERING DIETARY CONSTITUENT. D.C. Laine, C.M. Snodgrass, E.A. Dawson, M.A. Ener, K. Kuba, I.C. Frantz (Depts. of Medicine and Biochemistry, Univ. of Minnesota, Minneapolis, MN 55455) *Am. J. Clin. Nutr. 35*(4):683-690 (1982). Fully refined, bleached, deodorized corn oil and soy oil, and lightly hydrogenated winterized soy oil were compared for effectiveness in lowering plasma cholesterol. Twenty-four, healthy, young college students were the subjects for the 10-wk studies. At the 300 cal level, the corn oil and unhydrogenated soy oil diets contained approximately 53 g of polyunsaturated and 26 g of saturated fat. The hydrogenated soy oil diet contained 42 and 25 g, respectively. All diets contained approximately 700 mg of cholesterol. Corn oil and unhydrogenated soy oil were equally effective in lowering both total and low density lipoprotein cholesterol. Lightly hydrogenated soy oil was also quite effective, but less so that the more unsaturated oils. Triglycerides were also lowered, but very low density lipoproteins, were scarcely affected. All of the polyunsaturated fat diets produced small but statistically significant reductions in the cholesterol to protein ratio of all three lipoproteins.

POLYMERIZATION AND DENATURATION OF LYSOZYME EXPOSED TO PEROXIDIZING LIPIDS. L. Leake and M. Karel (Dept. of Nutr. and Food Sci., MIT, Cambridge, MA 02139) *J. Good Sci. 47*(3):737-739 (1982). Proteins in contact with peroxidizing lipids undergo various degradative reactions, including polymerization. Reaction of lysozyme with peroxidizing methy linoleate at a water activity of 0.75 causes polymerization and partial denaturation of the protein. Polymerization occurs by addition of monomers, both native and denatured. The partial denaturation is probably due to the opening of a disulfide bond and occurs independently of polymerization. This denatured fraction as well as dimer and trimer fractions was isolated and characterized with respect to enzymatic activity, tryptophan content, molecular weight, hydrodynamic volume and circular dichroism.

A QUICK AND LARGE-SCALE DENSITY GRADIENT SUBFRACTIONATION METHOD FOR LOW DENSITY LIPOPROTEINS. D.M. Lee and D. Downs (Lab. of Lipid and Lipoprotein Studies, Oklahoma Med. Fd, Univ. of OK, Oklahoma City, OK 73104) *J. Lipid Res. 23*:14-27 (1982). A quick density gradient-banding subfractionation method has been developed for d<1.063 g/ml lipoproteins. Up to 324 ml of plasma can be resolved into 5 distinct layers by a single ultracentrifugation. The separation was achieved with a discontinuous density gradient formed between plasma and a layer of NaCl solution of d 1.080 g/ml in an anglehead rotor during centrifugation at 45,000 rpm for 26 hr at 5 C. VLDL and LDL_1 were at the top. Layer 2, layer 3, and layer 4 were subfractions of normal LDL_2. Layer 5 contained HDL and plasma proteins. A 2nd step centrifugation separates VLDL from LDL_1. When opaque tubes are used, additional centrifugation is needed to separate layer 4 from layer 5. The subfractionation method was reproducible and was verified by analytical ultracentrifugation, chemical analysis, agarose electrophoresis, and electron microscopy. This method has been applied to plasma of normal males and females of the same age group. The chemical composition of a given subfraction from subjects of the same category was constant. Compositional differences were found between normal males and females. The triglyceride content was higher in layer 2 and the cholesteryl ester content was lower in layer 4 for normal females than for males. Quantitatively, cholesterol concentration was significantly higher in layer 2 for normal males than for females. Layer 4 and 5 were the only fractions containing Lp(a). Applicability of the subfractionation method to studies of dyslipoproteinemia was demonstrated with plasma from patients with type III and type IV hyperlipoproteinemias. Marked differences were found in VLDL and LDL_1, between the 2 types of patients and between the type III patient and normal subjects. A primarily quantitative difference was found in VLDL between the type IV patient and normal subjects.

Biochemistry and nutrition

EFFECT OF DIETARY LIPIDS ON SALIVA COMPOSITION. S.Q. Alam, B.S. Alam (Dept. of Biochem., Louisana State Med. Center, 1100 Florida Ave., New Orleans, LA 70119) *J. Nutr. 112*(5):990-996 (1982). The effects of feeding two different dietary fats on saliva composition were studied in monkeys. Two groups of adult monkeys (*M. fascicularis*) were fed diets containing 10% corn oil (CO) or 10% hydrogenated coconut oil (HCO). Pilocarpine-stimulated parotid and submandibular saliva samples were obtained at 0, 17, 26, and 29 weeks. These, along with blood plasma, were extracted for lipids, and the fatty acid composition of total lipids was determined by gas chromatography. The levels of linoleic acid in saliva were significantly lower in monkeys fed a diet containing HCO as compared to the other group. Total protein and α-amylase activity of saliva showed no difference between the two groups. The results show that nature of the dietary fats can affect the fatty acid composition of parotid and submandibular saliva.

CHEMICAL FINGERPRINTING OF GLYCOSPHINGOLIPIDS IN MECONIUM OF A HUMAN BLOOD GROUP O $Le(a^-b^+)$ SECRETOR. J. Angstrom, K. Falk, K. Karlsson, G. Larson (Dept. of Biochem., Univ. of Goteborg and Chalmers Inst. of Tech., S-412 96 Goteborg, Sweden) *Biochim. Biophys. Acta 710*:428-436 (1982). Studying blood group polymorphism, as expressed in intestinal tissue of single individuals, total non-acid glycosphingolipids of meconium of individual human newborns have been prepared. Silicic acid column chromatography of the acetylated derivatives were used for a stepwise separation into four groups of glycolipids from each individual meconium. By the combined use of mass spectrometry and NMR spectroscopy of permethylated and $LiAlH_4$-reduced, permethylated derivatives and by immunology of the native fractions all the major glycolipids were identified, although in mixtures. The interest was focused on fucolipids known to be strictly regulated by the *ABO, H, Le* and *Se* genes. The fucosylated glycolipids of an O $Le(a^-b^+)$ secretor child were dominated by blood group H-active and Lewis-active mono- and difucosyl compounds with 5-6 sugar residues and having a core lactotetraosyl structure. The lipophilic part was dominated by 2-hydroxy fatty acids with 16 and 20-24 carbon atoms bound to either sphingosine or phytosphingosine.

DIMETHYL SULFOXIDE AS A CHOLESTEROL-LOWERING AGENT IN CULTURED FIBROBLASTS EXPOSED TO LOW DENSITY LIPOPROTEINS. S.S. Alam, D.L. Layman (Dept. of Anatomy, Schl. of Med., Univ. of Oregon Health Sci. Center, Portland, OR 97201) *Biochim. Biophys. Acta 710*:306-313 (1982). Confluent cultures of human skin fibroblasts were exposed to medium containing high levels of low density lipoproteins (LDL-cholesterol equivalent to 400 μ g per ml) and 0 or 2% dimethyl sulfoxide (DMSO). The uptake and accumulation of cellular cholesterol from LDL were reduced significantly (30%) in the DMSO-treated cells as compared to the controls. The reduction in cellular sterol was due almost exclusively to a significant decrease (50%) in cholesterol ester accumulation. Incubation of cells with ^{125}I-labelled LDL showed clearly tht DMSO did not act by increasing the secretion of cholesterol from the cell, but rather by significantly decreasing the binding, internalization and degradation of exogenous LDL. De novo synthesis of cholesterol from [^{14}C] acetate was measured and found to correlate inversely with cellular sterol levels in either control or DMSO-treated cells.

EFFECT OF EXOGENOUS ESTRADIOL AND PROGESTERONE UPON LIPASE ACTIVITY AND SPONTANEOUS LIPOLYSIS IN BOVINE MILK. K.C. Bachman (Dairy Sci. Dept., Inst. of Food and Agric. Sci., Univ. of Florida, Gainesville, FL 32611) *J. Dairy Sci. 65*(6):907-914 (1982). Three of six lactating Jersey cows received estradiol-17β and progesterone (.10 and .25 mg/kg body weight per day subcutaneously for 7 consecutive days. Lipase activity and acid degree were determined for morning milk samples stored 24 h at 4 C. Whole milk lipase activity did not increase over control milk ssamples; however, lipase activity of cream fraction and percent whole milk lipase activity in cream fraction increased 200 and 100%. Increases in acid degree occurred also and were closely correlated (.8 to .8) with lipase activity of cream fraction and percent whole milk lipase activity in cream fraction. Cooling was not required to effect association of lipase with cream fraction. Two treated cows developed mastitis-like symptoms after elevation in lipase activity of cream fraction and acid degree. Estradiol alone evoked similar responses.

FORMATION OF LYSOPHOSPHATIDYLINOSITOL IN PLATELETS STIMULATED WITH THROMBIN OR IONOPHOR A_{23187}. M.M. Billah, E.G. Lapetina (Dept. of Molecular Biol., Wellcome Res. Labs., Burroughs Wellcome Co., Res. Triangle Park, NC 27709) *J. Biol. Chem. 257*(9):5196-5200 (1982). In stimulated platelets phos-

phatidylinositol is degraded by a phosphatidylinositol-specific phospholipase C to 1,2-diacylglycerol which is then phosphorylated to phosphatidic acid. Thrombin stimulation of horse and human platelets prelabeled with [^{32}P] orthophosphate induces the formation of [^{32}P] lysophosphatidylinositol, suggesting that phosphatidylinositol is also degraded by a phospholipase of A type activity. Stimulation of platelets prelabeled with ^{32}P or with ^{32}P plus [^{3}H] inositol produces a lysophosphatidylinositol which has a ^{32}P-specific activity and a ^{3}H/^{32}P ratio identical with those of phosphatidylinositol. These results suggest that the lysophosphatidylinositol derives from phosphatidylinositol. Thrombin stimulation of platelets double label with ^{32}P and [^{3}H] arachidonate induces loss of [^{3}H] arachidonate from phosphatidylinositol and formation of [^{32}P] lysophosphatidylinositol, suggesting the involvement of a phospholipase A_2 activity. Ionophore A_{23187} also induces the formation of lysophosphatidylinositol in horse and human platelets. [^{32}P] lysophosphatidylinositol appears within seconds after stimulation and parallels the loss of [^{3}H] arachidonic acid from phosphatidylinositol. The lysophosphatidylinositol produced by thrombin or by ionophore A_{23187} represents 40% of the degraded phosphatidylinositol as assessed by lipid phosphorus. Quinacrine inhibits the liberation of arachidonic acid from phospholipids and blocks the formation of lysophosphatidylinositol. This indicates that phosphatidylinositol is degraded by both phospholipases, C and A_2, in stimulated platelets.

STUDIES ON DIFFERENTIATING EPITHELIAL CELLS OF RAT SMALL INTESTINE. ALTERATIONS IN THE LIPOPHILIC PART OF GLYCOSPHINGOLIPIDS DURING CELL MIGRATION FROM CRYPT TO VILLUS TIP. M.E. Breimer, G.C. Hansson, K. Karlsson, H. Leffler (Dept. of Med. Biochem., Univ. of Goteborg, Box 33031, S-400 33 Goteborg, Sweden) *Biochim. Biophys. Acta 710*:415-427 (1982). Epithelial cells of rat small intestine have been separated into three intervals of different maturity correlated to cell migration from the crypt to the villus tip. The total acid and non-acid glycosphingolipids were isolated and analysed by thin-layer chromatography. The amount of glucosylceramide and *N*-glycoloylneuraminosyllactosylceramide was higher, while the amount of globotriaosylceramide and tetrahexosylceramide was lower in villus tip cells (more differentiated) compared to crypt cells (less differentiated). In addition to these alterations the lipophilic composition changed, as shown by a comparison by mass spectrometry of permethylated and $LiAlH_4$-reduced, permethylated derivatives of two of the non-acid glycolipid mixtures (crypt cells and villus tip cells). The components of ceramide were mainly trihydroxy 18:0 long-chain base (phytosphingosine) and hydroxy and non-hydroxy fatty acids. The only significant change concerned the fatty acids. In the crypt cell glycolipids the most abundant fatty acid was 20:0 non-hydroxy fatty acid. In the villus tip cells there was a relative increase of hydroxy fatty acids, with the 24:0 species in dominance. This change occurred for most glycolipids, but the fatty acids of glucosylceramide were villus tip-like already in the crypt cells. The blood group A-active tetraglycosylceramide, and probable the hematoside, did not show any alteration in the lipophilic part. The results indicate that the turnover of some glycolipids (or only their lipophilic part) is more rapid than the epithelial cell turnover.

EFFECT OF VITAMIN E DEFICIENCY ON RABBIT INTRAMUSCULAR COLLAGEN[1,2]. R. Chizzolini, P. Bracchi, E. Cabassi, E. Maggi (Instituto di Anatomia Patologica Veterinaria, Via del Taglio, Cornocchio, 43100 Parma, Italy) *Am. J. Clin. Nutr., 35*:1018-1022 (1982). The effect of a vitamin E-deficient diet on muscular collagen was studied in young rabbits. Intramuscular collagen content was found to increase in vitamin E-deficient rabbits, both in absolute and relative values, while no changes in urinary hydroxyproline excretion were observed. The overall solubility of intramuscular collagen was higher and the collagen soluble in guanidine hydrocholoride was richer in α-chains. Such findings would suggest that avitaminosis E induces the production of new intramuscular collagen.

ARACHIDONIC ACID METABOLISM BY CULTURED MESOTHELIAL CELLS. DIFFERENT TRANSFORMATIONS OF EXOGENOUSLY ADDED AND ENDOGENOUSLY RELEASED SUBSTRATE. M. Coene, C. Van Hove, M. Claeys, A.G. Herman (Faculty of Med., Div. of Pharmacology, Univ. of Antwerp, Universiteitsplein 1, B-2610 Wilrijk, Belgium) *Biochim. Biophys. Acta 710*: 437-445 (1982). The capacity of cultured mesothelial cells to produce prostaglandins from both exogenous and endogenous arachidonic acid has been investigated. Incubations with labelled [1-^{14}C] arachidonic acid and [1-^{14}C] prostaglandin endoperoxide H_2 indicated the formation of prostacyclin and prostaglandin E_2. Evaluation of the transformation of endogenously released arachidonic acid, however, could only confirm the production of prostacyclin.

THE EFFEXTS OF AGE, BODY WEIGHT AND FAMILY RELATIONSHIPS ON PLASMA LIPOPROTEINS AND LIPIDS IN MEN, WOMEN, AND CHILDREN OF RANDOMLY SELECTED FAMILIES. S.L. Connor, W.E. Connor, G. Sexton, L. Calvin, and S. Bacon (Section of Clinical Nutr. and Lipid Metabolism, Dept. of Med., Oregon Health Sci. Univ., Portland, and the Survey Res. Center, Dept. of Biostatistics, Oregon State Univ., Corvallis, OR) *Circulation 65*(7):1290-1298 (1982). Two hundred thirty-three families were randomly selected from a designated population base. Data from 619 persons ages 6-65 years had distributions of lipid and anthropometric values typical for the U.S. population. The typical rise in plasma cholesterol and triglyceride with age was also demonstrated. The plasma cholesterol and low-density lipoprotein (LDL) correlated more strongly with age than body weight, whereas the plasma triglyceride was more related to body weight than to age. High-density lipoprotein (HDL) was inversely correlated with weight and plasma triglyceride. Family membership accounted for approximately 20% of the variability in cholesterol, LDL, HDL and weight. Related family members (father-child, mother-child and siblings) had strong correlations for plasma cholesterol, LDL and HDL. These measurements did not correlate in the spouse pairs. The plasma triglyceride did not correlate for the family as a whole nor for the individual family members. This study indicates the importance of both chronic environmental factors and genetic family relationships on plasma lipids and lipoproteins.

IN VITRO MODULATION OF THE DISTRIBUTION OF NORMAL HUMAN PLASMA HIGH DENSITY LIPOPROTEIN SUBFRACTIONS THROUGH THE LECITHIN:CHOLESTEROL ACYLTRANSFERASE REACTION. W.H. Daerr, H. Greten (Medizinische Kernklinik und Poliklinik, Universitäts-Krankenhaus Eppendorf, 2000 Hamburg 20, F.R.G.) *Biochim. Biophys. Acta 710*(2): 128-133 (1982). The effect of the lecithin:cholesterol acyltransferase reaction on the chemical composition, morphology and distribution of normal human plasma high density lipoprotein (HDL) subclasses was studied in vitro. Incubation of plasma in the presence of polyenephosphatidylcholine (PPC) resulted in a 45±11% (n=6) decrease in unesterified cholesterol after 20 h. This effect was abolished by prior heating of the plasma at 56 C or by the addition of diisopropyl fluorophosphate (DIFP). Plasma triacylglycerol levels were constant. Analysis of the plasma lipoproteins by zonal ultracentrifugation and isopycnic equilibrium banding revealed a bimodal distribution of the HDL of native plasma and both heat-inactivated or DIFP-treated samples. Following the lecithin:cholesterol acyltransferase reaction essentially all of the HDL material had flotation characteristics typica of HDL_2. There were no apparent changes in the distribution of the lipoproteins of $d<1.063$ g/ml. The newly formed HDL were poor in PC and unesterified cholesterol but rich in cholesteryl ester, sphingomyelin and lyso-PC. The HDL apolipoprotein pattern was unaltered. HDL morphology was not affected by the lecithin:cholesterol acyltransferase reaction. Similar results were obtained in the absence of PPC. However, under these conditions the total phospholipid content of the HDL was reduced and lyso-PC was not demonstrable as a product of the lecithin:cholesterol acyltransferase reaction after 20 h.

TRANSFER PROPERTIES OF THE BOVINE BRAIN PHOSPHOLIPID TRANSFER PROTEIN SPECIFICITY TOWARDS PHOSPHATIDYLCHOLINE ANALOGS AND THE INHIBITORY EFFECT OF SPHINGOMYELIN. R.A. Demel, B.G.M. Van Bergen, A.L.G. Van Den Eeden, J. Zborowski, and L.H.K. Defize (Laboratory of Biochem., State Univ. of Utrecht, Padualaan 8, NL-3584 CH Utrecht (The Netherlands)) *Biochim. Biophys. Acta 710*(3):264-270 (1982). A coupled transport of phosphatidylinositol from the monolayer to phosphatidylcholine vesicles, and a phosphatidylcholine transport in the reverse direction in the presence of bovine brain transfer protein is demonstrated. No significant amounts of protein accumulate at the interface during the transfer reaction. The transfer protein from bovine brain shows a lower specificity for phosphatidylcholine than does the transfer protein from bovine liver. Relative to egg phosphatidylcholine a low transfer rate is found for derivatives with a chain length of 14 carbon atoms and a distance between phosphorus and nitrogen of 6 carbon atoms. The gel state of phosphatidylcholine does not reduce the transfer reaction as catalyzed by the bovine brain protein. The transfer of phosphatidylinositol is inhibited by sphingomyelin. The presence of 200 mM K^+ or 1 mM Ca^{2+} does not affect the transfer activity of the bovine brain protein. Divalent ions at concentrations higher than 5 mM cause a fusion of vesicles with monlayers. The pH optimum of the phosphatidylinositol transfer reaction is 8.

A FLUORESCENCE STUDY OF APOLIPOPROTEIN LOCALIZA-

FATE OF MILK ^{125}I-LABELED LIPOPROTEIN LIPASE IN CELLS IN CULTURE. COMPARISON OF LIPOPROTEIN LIPASE AND NON-LIPOPROTEIN LIPASE-SYNTHESIZING CELLS. G. Friedman, T. Chajek-Shaul, T. Olivecrona, O. Stein, Y. Stein (Lipid Res. Lab., Dept. of Med. B, Hadassah Univ. Hospital, Jerusalem, Israel) *Biochim. Biophys. Acta 711*(1):114-122 (1982). Radioiodinated lipoprotein lipase, isolated from bovine milk (^{125}I-labeled milk lipoprotein lipase) was shown to retain full hydrolytic acitvity towards its native substrate, i.e., chylomicron triacylglycerol. The ^{125}I-labeled enzyme interacted with various cells in culture by being bound to the cellular surface, internalized and degraded. Cellular binding of the labeled enzyme occurred in the presence or absence of substrate and was related to enzyme concentration. Heparin reduced cellular binding by 50% but inhibited uptake and degradation more extensively. Cellular uptake was not affected by chloroquine or NH_4 Cl, but degradation of the labeled enzyme was blocked. Uptake and degradation were not inhibited by mannose 6-phosphate. The interaction between the exogenous enzyme and cells which do not synthesize lipoprotein lipase, i.e., fibroblasts and endothelial cells, resulted in a high ratio of surface binding to degradation. In heart cell cultures and preadipocyte cultures, which produce lipoprotein lipase, the ratio of enzyme catabolized to that bound was high at all time points examined. Since in the intact organism lipoprotein lipase acts at the luminal surface of vascular endothelium, it seems expedient that these cells are able to bind the enzyme, but will catabolize it only slowly. The rapid and extensive degradation of the ^{125}I-labeled lipoprotein lipase in heart cells and preadipocytes may be related to the metabolism of the endogenously produced lipoprotein lipase.

CRADLE-TO-GRAVE ATHEROSCLEROSIS: HIGH DENSITY LIPOPROTEIN CHOLESTEROL. C.J. Glueck (Lipid Res. Clinic, General Clinical Res. Center, and CLINFO Center, Lipid Res. Div., College of Med., Univ. of Cincinnati, Cincinnati, OH 45200) *J. Amer. Col. Nutr. 1*(1):41-48 (1982). This presentation reviews environmental and genetic factors that relate to high density lipoprotein cholesterol, the most potent independent lipoprotein risk factor for coronary heart disease. Although at least three decades of work have focused upon the primary atherogenic lipoprotein, low density lipoprotein cholesterol (C-LDL), which has a strong positive association with coronary heart disease (CHD), it has only been in the past decade that detailed epidemiologic and biochemical studies have revealed that high density lipoprotein cholesterol (C-HDL) is the most potent lipoprotein cholesterol related to coronary heart disease; this relationship is, however, inverse.

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