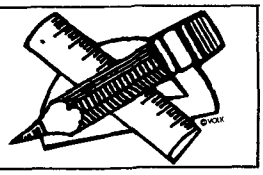
Abstracts



• Edible Proteins

PERFORMANCE OF DEFATTED PEANUT, SOYBEAN AND FIELD PEA MEALS AS EXTENDERS IN GROUND BEEF PATTIES. Kay H. McWatters (Dept. of Food Sci., Univ. of Georgia College of Agr. Experiment Stations) *J. Food Sci.* 42, 1492–5 (1977). Defatted and steam-heated peanut, soybean and field pea meals were used to replace 5, 10 and 15% of the meat in ground beef patties. Extended patties were compared to all-beef control patties for differences in cooking losses, water and fat retention, protein content, specific volume, compression, shear, color, and sensory quality attributes. Extended patties had lower cooking losses and higher cooked yields than all-beef patties. They had high water-retention properties but were variable in fat retention. Protein content of peanut and soybean-extended patties was significantly higher and field pea patties lower than all-beef controls in the uncooked products. Extended patties had similar specific volumes to all-beef controls but required less force to compress and shear. Field pea meal used at 10 and 15% replacement levels produced the most significant color changes in cooked patties. Sensory qualities were influenced to a greater degree by meal concentration than type of meal. In general, meals at levels higher than 5% caused adverse changes in sensory quality.

• Drying Oils and Paints

FAT AND OIL PRODUCTS IN URETHANE POLYMERS. M. Nagakura. *Progr. Org. Coatings* 5(1), 35–78 (1977). The use of fatty oil derivatives in polyurethanes for various types of coating, adhesive, etc, is reviewed. The materials discussed include natural oils (castor oil), hydroxylated oils, maleinised oils, epoxidised oils, hydroxyaryl fatty acids, aldehyde oils, hydroformylated oils, alcohol amides, uralkyds and isocyanates derived from fatty acids. 94 refs. (World Surface Coatings Abs. No. 425)

PRODUCTION OF POLYMERS FROM SEED OIL OF CRAMBE ABYSSINICA. II. PLASTICISERS BASED ON TRIDECANEDIOIC ACID (BRASSYLIC ACID). K. Gidanian and G.J. Howard. *J. Macromol. Sci.* A10(7), 1399–414 (1976). Brassylic acid from crambe oil was polycondensed with 1,2-propanediol and 1,3-butanediol and the resulting polyesters were assessed as plasticisers for polyvinyl chloride. (World Surface Coatings Abs. No. 425)

POLYESTERAMIDES FROM LINSEED AND SOYABEAN OILS FOR PROTECTIVE COATINGS: SCANNING ELECTRON MICROSCOPE AND DURABILITY STUDIES. L.E. Gast, W.J. Schneider and F.L. Baker. *J. Coatings Tech.* 49(624), 57–62 (1977). Cedar panels coated with polyesteramides derived from soyabean and linseed oils were evaluated for general appearance, gloss, colour, chalking, cracking and blistering by artificial weathering and 2 years' natural weathering. Films containing phthalic anhydride and low levels of toluene diisocyanate were the most durable. The films were periodically examined by SEM, it being found that surface changes related to weathering and durability of films and could be detected long before they became detectable by visual observation or chalking tests. (World Surface Coatings Abs. No. 425)

INHIBITION OF YELLOWING IN LINSEED OIL PAINT. H. Rakoff, F.L. Thomas and L.E. Gast. *J. Coatings Tech.* 49(628), 48–50 (1977). Ozonised commercial monoolein and acetoacetic ester were evaluated in several concns. as potential yellowing inhibitors for a linseed oil paint. The acetoacetic ester, in which the methylene hydrogen are alpha to two carbonyl groups, was less effective than the ozonised monoolein in which methylene hydrogens are alpha to only one carbonyl group. (World Surface Coatings Abs. No. 425)

ALKYD RESINS AND OIL-MODIFIED BINDERS. W. Brushwell. *Farbe Lack* 84(3), 160–1 (1978). Thanks to its versatility, the alkyd resin has remained one of the most important binders, although it has needed some modification, for instance in order to make products water compatible, or just to increase their functionality. The number of possible combinations during manufacture or processing of alkyd resins has increased correspondingly. Similarly, development has continued of various oil-modified binders, which are still important for a range of special applications.

LINSEED OIL-METAL ACETYLACETONATE SYSTEMS. IV. THERMOGRAVIMETRY. N. Indictor, C.J. Shahani, N.S. Baer and M.J.D. Low (N.Y. Univ). *J. Coatings Technol.* 50(638), 54–61 (1978). Thermogravimetric data are presented for linseed oil containing small quantities (10^{-3} molar) of 15 metal acetylacetonates in temperature range 20–100 C in air. Inhibition period, rate of increase in weight, maximum weight achieved and subsequent weight decrease are reported. Temperature parameters are presented. Results are discussed in terms of oil drying mechanisms which have appeared in the literature.

• Fats and Oils

EVALUATION OF SOME NATURAL AND SYNTHETIC PHENOLIC ANTIOXIDANTS IN LINOLEIC ACID MONOLAYERS ON SILICA. W.L. Porter, L.A. Levasseur and A.S. Henick (Food Sci. Lab., U.S. Army Natick Res. & Development Command, Natick, MA) *J. Food Sci.* 42, 1533–5 (1977). Some naturally occurring and synthetic phenolic antioxidants have been evaluated in a dry model system simulating the exposure of lipids in freeze-dried membranes of whole tissue foods. The system is a linoleic acid monolayer on activated silica gel autoxidized at 80 C in dry air. The system is dry and porous and the demonstrated monolayer adsorption and restricted translational mobility of the lipid present a plausible model of freeze-dried membrane characteristics. Although relative effectiveness of the common antioxidants in this system has some similarities to the reported order in other dry systems, there are notable exceptions. For example, butylated hydroxyanisole is by far the most effective antioxidant in the silica system whereas it is reported to be much less effective than propyl gallate in bulk oils and some other dry systems. Thus, special conditions appear to modify antioxidant effectiveness in the lipid monolayer on silica.

A NEW SIMPLE METHOD OF DETERMINING THE OXIRANE OXYGEN CONTENT OF VEGETABLE OILS. B.M. Badran (Laboratory of Polymers and Pigments, National Research Centre, Dokki, Cairo, Egypt) *J Oil Color Chem. Assoc.* 61, 52–4 (1978). The oxirane oxygen content of epoxidised linseed and epoxidised dehydrated castor oil has been determined by the N.M.R. technique. The method is especially suitable for oxirane values higher than 1.5 per cent. The suitable conditions for determination are: 0.1 g epoxy oil sample, 0.5 ml solvent (deuterated chloroform) and two drops of tetramethylsilane (T.M.S.). The method is simple, sensitive and reproducible. It depends principally on the accuracy of weighing of the oil sample (to be determined), the volume of solvent ($CDCl_3$) and T.M.S.

DIMETHYL POLYSILOXANES IN BAKING AND FRYING FATS AND OILS. K. Lorenz (Dept. of Food Science and Nutrition, Colorado State University, Fort Collins, CO) *Bakers Dig* 52, 36 (1978). Dimethyl polysiloxanes affect the quality characteristics of white-, yellow-, and sponge cakes. Batter specific gravities increase and viscosities decrease with increasing amounts of the compounds. Cake volumes decrease and grains become more compact. Cookie spread factors decrease and the characteristic sugar cookie type top grain is lost due to dimethyl polysiloxane addition. Doughnuts and rosettes show higher fat absorption attributable to silicone fluids in fats and oils. The effect of these compounds is independent of the viscosity of the silicone fluids. The level of addition determines the extent of change in quality of baked and fried products.

• Biochemistry and Nutrition

PHYSICOCHEMICAL PROPERTIES OF RAT TESTIS Ca^{2+}-DEPENDENT REGULATOR PROTEIN OF CYCLIC NUCLEOTIDE PHOSPHODIESTERASE: RELATIONSHIP OF Ca^{2+}-BINDING, CONFORMATIONAL CHANGES, AND PHOSPHODIESTERASE ACTIVITY. J.R. Dedman, J.D. Potters, R.L. Jackson, J.D. Johnson, and A.R. Means (From the Dept. of Cell Biol. and Cell Biophys., Baylor College of Med., Houston, Texas) *J. Biol. Chem.* **252**, 8415–22 (1977). The Ca^{2+}-dependent regulator (CDR) of cyclic nucleotide phosphodiesterase has been purified from the rat testis. The procedure included heat treatment (5 min at 85–90°) and conventional column chromatography. Purification recoveries ranged between 55 and 75% with yields of 70 to 130 mg/kg of frozen testes. Rat testis CDR was compared with rabbit skeletal muscle troponin-C, the Ca^{2+}-binding component of troponin. The proteins had nearly identical sedimentation constants (1.9 S), yet would separate during gel filtration and sodium dodecyl sulfate-polyacrylamide gel electrophoresis. The molecular weight has been approximated from sedimentation-diffusion, sodium dodecyl sulfate-gel electrophoresis, and amino acid composition data to be a monomer of 17,000 to 19,000.

P-CHLOROPHENOXYISOBUTYRATE ENHANCED RETENTION OF HOMOLOGOUS LIPOPROTEINS BY HUMAN AORTIC SMOOTH MUSCLE CELLS. I. Filipovic and E. Buddecke (Inst. of Phys. Chem., Univ. of Munster, D 4400 Munster, Waldeyerstr, 15, F.R.G.) *Lipids* **12**, 1069–77 (1977). Human aortic smooth muscle cells (SMC) specifically bind and take up indiscriminately both the lipid and protein moieties of homologous ^{125}I-very low density lipoproteins (VLDL) and ^{125}I-low density lipoproteins (LDL). Sixty-five to 80% of absorbed lipids are incorporated into the cell lipids, preferentially into the phospholipid fraction. Twenty to 35% of the lipid bound and the protein moiety are eliminated from the cells. Half of the eliminated protein label is recovered as TCA soluble products. Five mM of p-chlorophenoxyisobutyrate (CPIB) raise the level of intracellular radioactivity derived from the lipid moieties of VLDL and LDL by about 40% via a reduced elimination. The CPIB-enhanced retention of the lipid-derived lipoprotein radioactivity is interpreted as a compensatory mechanism providing cellular fatty acids which are deficient as a result of the CPIB inhibited synthetic processes.

COMPARISON OF THE METABOLISM OF CHYLOMICRONS AND CHYLOMICRON REMNANTS BY THE PERFUSED LIVER. R.S. Gardner and P.A. Mayes (Dept. of Physiology and Biochem., Royal Veterinary College, London NW1 OTU, U.K.) *Biochem. J.* **170**, 47–55 (1978). The hepatic metabolism of chylomicrons and chylomicron remnants was compared after adding approximately equal numbers of each lipoprotein particle to the perfusate of isolated livers. At least 40% of the added remnants were metabolized by the liver, compared with less than 3% for chylomicrons. There was significantly more net removal of labelled remnants than of chylomicrons by the liver. A greater proportion of labelled cholesterol than of labelled triacylglycerol fatty acids was transferred to the liver from each lipoprotein. Cholesteryl esters of remnants were hydrolysed and triacylglycerol fatty acids of remnants were oxidized to CO_2 more extensively than those of chylomicrons. There was greater oxidation of remnant glycerolipid [1-^{14}C]oleate than of glycerolipid [1-^{14}C]-palmitate. A large fraction of the fatty acids of remnants, but not of chylomicrons, was transferred to phospholipids, which were released by the liver in a lipoprotein of relative density < 1.006. Label from remnants, but not from chylomicrons, was found in lipoproteins of relative density > 1.006, which were not released during perfusion but could be flushed out from the liver at the end of perfusion.

FATTY ACID SYNTHESIS IN THE REGENERATING LIVER OF THE RAT. C.D. Gove and D.A. Hems (Dept. of Biochem., Imperial College of Sci. and Technology, London SW7 2AZ, U.K.) *Biochem. J.* **170**, 1–8 (1978). Synthesis *de novo* of fatty acids in the rat liver, measured per g wet wt. of tissue, was increased by a factor of about two, between 1 and 4 days after partial hepatectomy, compared with rates in sham-operated control rat livers. There were no associated changes in the rates of liver cholesterol synthesis or of adipose-tissue fatty acid synthesis in rats after partial hepatectomy, compared with rates in sham-operated rats. In regenerating livers, perfused under three different conditions, there was no alteration in the capacity for fatty acid synthesis compared with that of control rats. The increased synthesis of fatty acids in regenerating liver was associated with insignificant increases in plasma concentrations of triacylglycerols and free fatty acids, with a decrease in content of liver glycogen, and with no change in hepatic activity of acetyl-CoA carboxylase. The accelerated rate of synthesis of fatty acids in regenerating liver appears not to be due to any intrinsic alteration in hepatic capacity for fatty acid synthesis, but it may be caused by the continuous action on liver of unidentified circulating factors.

FATTY ACID BIOSYNTHESIS BY A PARTICULATE PREPARATION FROM GERMINATING PEA. P. Bolton and J.L. Harwood (Dept. of Biochem., Univ. College, P.O. Box 78, Cardiff CF1 1XL, Wales, U.K.) *Biochem. J.* **168**, 261–9 (1977). Fatty acid synthesis was studied in microsomal preparations from germinating pea (*pisum sativum*). The preparations synthesized a mixture of saturated fatty acids up to a chain length of C_{24} from [^{14}C]malonyl-CoA. Whereas hexadecanoic acid was made *de novo*, octadecanoic acid and icosanoic acid were synthesized by elongation. The products formed during [^{14}C]malonyl-CoA incubation were analysed, and unesterified fatty acids and polar lipids were found to be major products. [^{14}C]Palmitic acid represented a high percentage of the acyl-carrier protein esters, whereas ^{14}C-labelled very-long-chain fatty acids were mainly present as unesterified fatty acids. CoA esters were minor products. The addition of exogenous lipids to the incubation system usually resulted in stimulation of [^{14}C]malonyl-CoA incorporation into fatty acids. The greatest stimulation was obtained with dipalmitoyl phosphatidylcholine. Both exogenous palmitic acid and dipalmitoyl phosphatidylcholine increased the amount of [^{14}C]stearic acid synthesized, relative to [^{14}C]palmitic acid. Addition of stearic acid increased the amount of [^{14}C]eicosanoic acid formed.

THE LABELING AND BIOLOGICAL HALF-LIFE OF PHOSPHATIDYLCHOLINE IN SUBCELLULAR FRACTIONS OF RABBIT LUNG. A. Jobe (Dept. of Pediatrics, Univ. of California, San Diego, La Jolla, Calif.) *Biochim. Biophys. Acta* **489**, 440–53 (1977). Rabbits were given [^{14}C]palmitic acid, [^{3}H]choline and ortho [^{32}P]phosphate to label lung phosphatidylcholine. The rabbit lungs were lavaged to obtain an alveolar wash phosphatidylcholine sample, and subsequently samples of phosphatidylcholine were obtained from the lung parenchyma, and from microsomal and lamellar body fractions. The specific activity of the phosphatidylcholine in each fraction was determined. The labeling of phosphatidylcholine and the biological half life values for the labeled phosphatidylcholine in each lung fraction are presented. Phosphatidylcholine labeled with palmitic acid or choline reached a maximal specific activity rapidly in microsomal fractions. Maximal specific activity of lamellar body phosphatidylcholine and alveolar phosphatidylcholine was achieved by 2 h and 6 h, respectively. The labeling of phosphatidylcholine in subcellular lung fractions indicated that the precursors did not cleanly pulse label the phosphatidylcholine of the lamella bodies and alveolar wash. The labeling patterns of the subcellular fractions were consistent with previous anatomical descriptions of surfactant synthesis and secretion.

INHIBITION OF LIPASE ADSORPTION AT INTERFACES. ROLE OF BILE SALT MICELLES AND COLIPASE. D. Lairon, G. Nalbone, H. Lafont, J. Leonardi, N. Domingo, J.C. Hauton and R. Verger (Groupe de Recherches sur le Transport des Lipides, Inst. National de la Sante et de la Recherche Med. (U 130), 46, Bd de la Gaye, 13009 Marseille, France) *Biochemistry* **17**, 205–8 (1978). The effects of bile salts and colipase on the adsorption of lipase at an interface were studied by hydrophobic affinity chromatography on phenyl- and octyl-Sepharose. In the absence of bile salts, lipase or colipase binds separately to the gel. This is unchanged in the presence of adsorbed bile salts, when one bile salt molecule is associated per hydrophobic ligand. The same data are obtained in the presence of monomeric bile salt solutions. In contrast, lipase adsorption is totally prevented in a micellar bile salt solution. These results favor the idea that the formation of a lipase-bile salt complex in solution is responsible for the lack of interfacial lipase adsorption.

TRANSBILAYER MOVEMENT OF CHOLESTEROL IN PHOSPHOLIPID VESICLES UNDER EQUILIBRIUM AND NON-EQUILIBRIUM CONDITIONS. M.J. Poznansky and Y. Lange (Dept. of Physiology, Univ. of Alberta, Edmonton, Alberta T6G 2H7, Canada) *Biochim. Biophys. Acta* **506**, 256–64 (1978). The exchange of [^{3}H] cholesterol between phospholipid:cholesterol vesicles and an excess of red cell ghosts is examined. Using a number of

different phosphatidylcholines, only the cholesterol thought to be associated with the outer half of the bilayer (about 70%) is available for exchange, suggesting that at least at equilibrium the transbilayer movement of cholesterol or "flip-flop," occurs very slowly, if it occurs at all. The rate of exchange of cholesterol between the vesicles and the ghosts is dependent on the nature of the fatty acid chain of the phospholipids, being a function of both the fatty acid chain length and the degree of unsaturation. Under non-equilibrium conditions, when cholesterol is being both exchanged and depleted from the lipid vesicles to red cell ghosts, the previously non-exchangeable vesicle cholesterol becomes available for exchange, suggesting that under these conditions "flip-flop" can occur.

LIPID COMPOSITION AND ERUCIC IN RAT LIVER CELLS IN CULTURE. C.G. Rogers (Res. Lab., Health Protection Branch, Health and Welfare Canada, Ottawa, K1A 0L2, Canada) *Lipids* 12, 1043–9 (1977). Erucic acid (Δ^{13}-docosenoic acid) was added to fetal calf serum, then fed to rat liver epithelial cells in culture, and uptake measured at intervals over 24 hr. During the first 6 hr. of incubation, uptake of the docosenoic acid was 21 nmoles/hr/mg protein in 7-day cells, and 15 nmoles/hr/mg protein in 14-day cells. Triglycerides and cholesteryl esters accumulated in the cells during incubation with erucic acid. Among phospholipids separated by thin layer chromatography, 75% of ^{14}C activity was in lecithin (PC), 10% in phosphatidylethanolamine (PE), 5% in sphingomyelin (SPH), and 1% or less in cardiolipin (DPG). The highest specific activity (SA) was in PC, followed by SPH and PE. Incubation with erucic acid altered fatty acid composition of PC, PE, and SPH, although amounts of phospholipids were unaffected. Gas liquid chromatography analyses detected 18% erucic acid in PC, 2% in PE, and 4–5% in SPH.

THE TRANSPOSITION OF MOLECULAR CLASSES OF PHOSPHATIDYLCHOLINE ACROSS THE RAT ERYTHROCYTE MEMBRANE AND THEIR EXCHANGE BETWEEN THE RED CELL MEMBRANE AND PLASMA LIPOPROTEINS. W. Renooij and L.M.G. Van Golde (Lab. of Vet. Biochem., State Univ. of Utrecht, Biltstraat 172, Utrecht, The Netherlands) *Biochim. Biophys. Acta* 470, 465–74 (1977). The molecular composition of phosphatidylcholine is similar in the inner and the outer layer of the rat erythrocyte membrane. The rate of exchange of the various molecular classes of phosphatidylcholine between rat plasma and the red cell membrane does not depend on the degree of unsaturation of the different classes. The transposition of the molecular classes of phosphatidylcholine between the inner and the outer layer of the rat erythrocyte membrane is more pronounced for the more unsaturated classes.

ALVEOLAR LAVAGE AND LAVAGED LUNG TISSUE PHOSPHATIDYLCHOLINE COMPOSITION DURING FETAL RABBIT DEVELOPMENT. S.A. Rooney and L.I. Gobran (Dept. of Pediatrics, Yale Univ. Schl. of Med., New Haven, CT) *Lipids* 12, 1050–4 (1977). Pulmonary surfactant, the major surface-active component of which in the adult is dipalmitoylglycerophosphocholine, can be obtained by lavaging lungs with physiological saline. We have previously shown that there is an increase in the amount of phosphatidylcholine in fetal rabbit lung lavage during the latter part of gestation. We have now measured the amount of disaturated phosphatidylcholine as well as the fatty acid composition of phosphatidylcholine in lung lavage from fetal rabbits during the period 27 days' gestation to full term (31 days). There was no developmental change in the amount of disaturated phosphatidylcholine during the period examined.

PHOSPHOLIPID ASYMMETRY IN LM CELL PLASMA MEMBRANE DERIVATIVES: POLAR HEAD GROUP AND ACYL CHAIN DISTRIBUTIONS. A. Sandra and R.E. Pagano (Dept. of Embryol., Carnegie Inst. of Washington, Baltimore, MD) *Biochemistry* 17, 332–8 (1978). The transbilayer distribution of the major phospholipids in mouse LM cell plasma membrane derivatives was studied. Cells were grown on various radiolabeled phospholipid percursors and subsequently allowed to phagocytose latex spheres (0.5–2 μm diameter). The resulting phagosomes, assumed to be inside-out plasma membrane derivatives, were isolated and purified from cell homogenates, and subsequently characterized with respect to lipid composition and plasma membrane markers. The distribution of phosphatidylcholine (PC) in the isolated phagosomes was determined by use of purified beef liver PC-specific exchange protein. The exchange protein catalyzed PC exchange from the radiolabeled latex phagosomes to either unilamellar PC vesicles or unlabeled phagosomes, present in excess. The kinetics of this process are consistent with two exchangeable PC pools, with ~52% being readily exchangeable. Phosphatidylethanolamine (PE) distribution was determined by trinitrobenzenesulfonic acid (TNBS) labeling. TNBS labeling of isolated phagosomes rapidly converted approximately 70% of PE to the Tnp derivative. In contrast, when TNBS labeling of intact cells was carried out, followed by feeding of latex beads and isolation of the phagosomes, only about 24% of the PE was derivatized.

INHIBITION OF STEROL BIOSYNTHESIS IN L CELLS AND MOUSE LIVER CELLS BY 15-OXYGENATED STEROLS. G.J. Schroepfer, Jr., E.J. Parish, H.W. Chen, and A.A. Kandutsch (From the Jackson Lab., Bar Harbor, Maine 04609) *J. Biol. Chem.* 252, 8975–80 (1977). Described herein are the chemical syntheses of 5α-cholest-8(14)-en-3β-01-15-one, 14α-methyl-5α-cholest-7-en-3β-ol-15-one, 3β-methoxy-14α-methyl-5α-cholest-7-en-15-one, 3β-methoxy-14α-methyl-5α-cholest-7-en-15β-ol, 3β-methoxy-14α-methyl-5α-cholest-7-en-15α-ol, and 5α-cholest-8(14)-en-3β, 7ξ,15ξ-trio. The effects of these compounds and of 5α-cholest-8(14)-en-3β, 15β-diol, 5α-cholest-8(14)-en-3β, 15α-diol, 5α,14β-cholest-7-en-3β, 15β-diol, 5α,14β-cholest-7-en-3β, 15α-diol, 14α-methyl-5α-cholest-7-en-3β, 15β-diol, and 14α-methyl-5α-cholest-7-en-3β, 15β-diol on sterol synthesis in L cells and primary cultures of fetal mouse liver cells grown in serum-free media have been studied. With the exception of 3β-methoxy-5α-cholest-7-en-15-one, all of the compounds were found to be potent inhibitors of sterol synthesis. With a few exceptions, the concentrations required to cause a 50% reduction in sterol synthesis were similar to those required to cause a 50% reduction in the level of HMG-CoA reductase activity.

SURFACE LIPID COMPOSITION IN CHILDREN WITH PROTEIN-CALORIE MALNUTRITION. J.S. Strauss, J.J. Vitale, D.T. Downing, and D. Franco, (The Evans Memorial Dept. of Clinical Res., Univ. Hospital and the Dept. of Dermatology, Boston Univ. Schl. of Med., Boston) *Am. J. Clin. Nutr.* 31, 237–40 (1978). The composition of skin surface lipid has been measured in a group of 21 children with the diagnosis of marasmic-kwashiorkor. When compared to the values for healthy children of comparable age, the squalene content was significantly decreased ($3.1\% \pm 3.2\%$ versus $9.8\% \pm 3.6\%$) and the squalene/wax ester ratio was also significantly decreased (0.57 ± 0.55 versus 2.13 ± 0.91). Measurements of skin surface lipid also were made in five of these children after treatment. The altered values reverted towards normal. Since changes in the squalene content and the squalene/wax ester ration of skin surface lipid can be correlated with other biochemical changes of protein-calorie malnutrition, the analysis of surface lipid, a procedure that is both convenient and non-invasive, can be of use in determining the nutritional status in field studies of malnourished subjects.

THE EFFECT OF CARBON MONOXIDE ON CHOLESTEROL IN THE AORTIC WALL OF RABBITS. S. Stender, P. Astrup and K. Kjeldsen (Dept. of Clinica Chem., Rigshospitalet, Blegdamsuej 9, DK-2100 Copenhagen, Denmark) *Atherosclerosis* 28, 357–67 (1977). Uniform serum cholesterol concentrations at a high level were maintained for 6 weeks—by individual cholesterol feeding—in 3 groups of 10 rabbits each. Two of the groups were exposed for 6 weeks to 200 parts/million (ppm) carbon monoxide (CO) in atmospheric air, the first group continuously, the second group for 12 h each day; the third group was non-exposed. In addition, 2 normocholesterolemic groups of 12 rabbits each were exposed continuously to 200 ppm CO for 6 weeks in the first group and non-exposed in the second. The mean values for concentrations of free and esterified cholesterol in the inner layer of the aortic wall were the same in the 3 hypercholesterolemic groups, whereas the CO-exposed normocholesterolemic group had a higher concentration of cholesterol in the aortic arch than the non-exposed group. There was no difference between the latter two groups in the cholesterol concentration of the remaining thoracic aorta.

INTERACTION OF PLASMA HIGH DENSITY LIPOPROTEINS WITH DIMYRISTOYLLECITHIN MULTILAMELLAR LIPOSOMES. A.R. Tall, V. Hogan, L. Askinazi and D.M. Small (Biophys. Section, Dept. of Med., Boston Univ. School of Med., Boston, MA) *Biochemistry* 17, 322–6 (1978). Studies of incubated mixtures of lecithin multilamellar liposomes and plasma high density lipoproteins (HDL) have suggested that apoprotein can dissociate from the HDL and solubilize phospholipid by forming discoidal complexes of phospholipid and apoprotein. Mixtures

of HDL incubated with dimyristoyllecithin (DML) have been examined by ultracentrifugal techniques in an attempt to separate phospholipid apoprotein complexes from HDL. Equilibrated mixtures of ^{14}C-labeled DML and HDL_2 (density 1.063 to 1.125 g/mL) or HDL_3 (density 1.125 to 1.21 g/mL) were subjected to preparative and equilibrium density gradient ultracentrifugation, and the various fractions were analyzed for lipid and apoprotein content and examined by negative stain electron microscopy.

AN ULTRACENTRIFUGAL STUDY OF THE SELF-ASSOCIATION OF CANINE APOLIPOPROTEIN A-I IN SOLUTION. T.L. Teng, C. Edelstein, D.L. Barbeau, and A.M. Scanu (From the Dept. of Med. and Biochem., The Univ. of Chicago Pritzker Schl. of Med., Chicago, Ill) *J. Biol. Chem.* 252, 8634–8 (1977). The sedimentation behavior of canine apolipoprotein (apo) A-I in 0.02 M EDTA, pH 8.6, was studied as a function of protein concentration by the techniques of sedimentation velocity and sedimantation equilibrium in the analytical ultracentrifuge. At concentrations of less than 1 g/liter, apo-A-I exhibited a monomodal sedimentation pattern, with apparent sedimentation coefficients which varied from 2.3 to 3.5 S with increasing protein concentrations. Above 1.5 g/liter, apo-A-I had two well resolved peaks with $s_{20\omega}$ values of 4.15 S and 5.75 S. The proportion of the 5.75 S component increased with increasing apo-A-I concentrations, with a concomitant decrease of the 4.15 S component. By sedimentation equilibrium ultracentrifugation with both the conventional and meniscus-depletion methods, the apparent weight-average molecular weight of apo-A-I was found to be concentration-dependent.

RELATIONSHIP BETWEEN TOCOPHEROLS AND SERUM LIPID LEVELS IN CHILDREN WITH β-THALASSEMIA MAJOR. L. Zannos-Mariolea, M. Papagregoriou-Theodoridou, N. Costantzas, and N. Matsaniotis (The A. Dept. of Pediatries, Athens Univ. St. Sophie's Children's Hospt., Goudi, Athens, Greece) *Am. J. Clin. Nutr.* 31, 259–63 (1978). Serum tocopherol levels were found to be below normal (< 0.5 mg/100 ml) in nine (50%) of 18 children with β-thalassemia major receiving inadequate treatment with blood transfusions. The mean tocopherol levels were significantly lower in the children with β-thalassemia (0.57 mg/100 ml ± 0.20) than in the controls (1.08 mg/100 ml ± 0.24). Serum total lipid levels were found to be low in children with β-thalassemia. The difference between the mean total lipid level in the β-thalassemic patients (365 mg/100 ml ± 75) as compared to that of the controls (581 mg/100 ml ± 94) was highly significant ($P < 0.01$). The ratio of serum tocopherol to 1 g total lipids was lower in children with β-thalassemia (1.41 mg/100 ml ± 0.43) than in the controls (1.88 mg/100 ml ± 0.46) and the difference was significant. Yet, only three out of the 18 children with β-thalassemia showed a ration of less than 0.8 mg/100 ml tocopherol per 1g total lipid which may be considered indicative of tocopherol deficiency.

INFLUENCE OF DIET ON TRANS FATTY ACIDS IN HUMAN MILK. J.M. Aitchison, W.L. Dunkley, N.L. Canolty, and L.M. Smith (Dept. of Food Sci. and Technology, and Nutr., Univ. of California, Davis, Cal.) *Am. J. Clin. Nutr.* 30, 2006–15 (1977). In two experiments on relations between diet and milk lipids, subjects recorded food intake for 1 week and saved duplicate portions of foods consumed on 3 days. Diet collections were analyzed for selected nutrients and percent fatty acids. In the first experiment, for 1 week five subjects took morning and evening milk samples for fatty acid analysis. Significant differences were found in percentages of *trans*- 18:1 and total *trans* fatty acids between subjects' milks but not between morning and evening samples. In the second experiment six additional subjects collected milk samples in the morning only. Subjects were significantly different in the percentages of *trans*- 18:1 and total *trans* acids in their milks. In nine of the 11 subjects the fluctuation of percent total *trans* acids in the milk appeared to follow dietary *trans* changes, after a 12 to 36 hr lag period. A significant correlation was found for diet and evening milk of the same day. Polyunsaturated/saturated ratios of the fatty acids in the diet lipids were related to those for milk lipids from the same evening and the next morning. Although other factors are involved, diet lipids influence *trans* fatty acids and polyunsaturated/saturated ratios of the fatty acids in human milk.

ORGANOMETALLIC FATTY ACID AND PHOSPHOLIPID ANALOGS SYNTHESIS AND INCORPORATION AND DETECTION IN MODEL MEMBRANES AND BIOMEMBRANES. S.B. Andrews, J.W. Faller, R.J. Barrnett and V. Mizuhira (Sec. of Cytology, Yale Univ. School of Med., Yale Univ., New Haven, Conn.) *Biochim. Biophys. Acta* 506, 1–17 (1978). To examine the potential of organometallic compounds as ultrastructural probes for the lipid organization of biomembranes, an organotin analog of palmitic acid, 12,12-dimethyl-12-stannahexadecanoic acid, was chemically synthesized. Subsequently, in vitro coupling of this synthetic fatty acid to egg lysophosphatidylcholine yielded an organotin analog of phosphatidylcholine. This phospholipid was physically characterized by vesicle formation, nuclear magnetic resonance, agarose gel filtration, X-ray diffraction and differential scanning calorimetry, and the results were compared to the known properties of native egg phosphatidylcholine. The native and synthetic lipids were substantially similar regarding such fundamental properties as bilayer structure and dynamics and cation permeability. However, the unilaminar vesicle population of the organotin lipid assumed a larger mean diameter (390 Å) and width than did the comparable population of native lipid vesicles (230 Å).

INTRAVENOUS FEEDING OF THE RAT WITH SHORT CHAIN FATTY ACID ESTERS: 1. GLYCEROL MONOBUTYRATE. R.H. Birkhahn, R.H. McMenamy, and J.R. Border (Dept. of Surgery and Biochem., State Univ. of New York, Buffalo, NY) *Am. J. Clin. Nutr.* 30, 2078–82 (1977). Intravenous nutrition was investigated using butyric acid because it is oxidized independent of carnitine transport into the cell mitochondria. This carnitine independent fatty acid, in the form of water soluble

monobutyrin, was continuously infused into rats for seven days at 27 g monobutyrin per kilogram of body weight per day and provided half the daily energy requirement. All experimental animals survived the alimentation in good health and were free of detectable physiological and behavioral abnormalities. The intravenous infusion depressed the test animals spontaneous food intake to half their preinfusion level. These experimental rats still demonstrated continuous weight gain in contrast to weight loss by pair-fed controls. At decapitation, the monobutyrin infused rats had hepatic glycogen levels three times that of the controls, along with lower soluble hepatic protein, and normal lipid and water content. The plasma acetoacetate was also elevated in experimental rats. It was inferred from these results that monobutyrin was hydrolyzed, and the metabolites were oxidized by the rat. It is concluded from these observations that monobutyrin produces no obvious toxic affects during short infusion periods and provides calories for the rat when given intravenously.

EFFECT OF AUTOCLAVING OF A LACTOSE-CONTAINING DIET ON CHOLESTEROL AND BILE ACID METABOLISM OF CONVENTIONAL AND GERM-FREE RATS. B.S. Wostmann, M. Beaver, L. Chang, and D. Madsen (Lobund Lab., Dept. of Microbiol., Univ. of Notre Dame, Notre Dame, Indiana) *Am. J. Clin. Nutr.* 30, 1999–2005 (1977). Feeding of lactose in amounts comparable to the adult human intake in developed countries (6% of diet, and in later studies 10%) had no major effect on cholesterol and bile acid metabolism of germ-free and conventional rats. However, when lactose-containing casein-starch diet were sterilized by autoclaving, changes in intestinal and/or fecal bile acids were found. Both germ-free and conventional rats demonstrated some increase in intestinal β-muticholic acid concentrations ascribable to the mere presence of lactose in the diet. Autoclaving of the diet produced additional changes, especially in the fecal bile acid pattern of conventional rats. Here the ration between the β-muricholic-derived secondary bile acids hyodeoxycholic and ω-muricholic acids changed from the usual 5:3 to approximately 1:10, with ω-muricholic acid becoming the major fecal bile acid. These changes point to a notable effect of lactose-derived products, formed during steam-sterilization, on the microbial modification of intestinal bile acids in the lower gut. Similar changes have been observed after oral administration of aureomycin and other, unrelated antibiotics that inhibit growth of gram positive organisms. ●

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