Abstracts

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Biochemistry and nutrition

INFLUENCE OF AN ATHEROGENIC DIET ON THE STRUCTURE OF SWINE LOW DENSITY LIPOPROTEINS. H.J. Pownall, R.L. Jackson, R.I. Roth, A.M. Gotto, J.R. Patsch and F.A. Kummerow (Baylor College of Med. and The Methodist Hosp., Houston, TX 77030) *J. Lipid Res.* 21, 1108–15 (1980). Five groups of three swine each were fed a basal diet supplemented with 15% tallow and either 0.0, 1.0, 1.5, 2.0%, or 2.5% cholesterol. The animals were studied over a period of 9 weeks to observe changes in plasma lipids and low density lipoproteins (LDL). At the end of the study period, LDL was analyzed by rate zonal ultracentrifugation, characterized chemically, and examined by differential scanning calorimetry. After diets containing 1.5, 2.0, and 2.5% dietary cholesterol, there was an increase in the mean flotation rate of total LDL which shifted to a lower density. Since LDL triglyceride and cholesteryl esters are predicted to coexist in a common phase in the LDL core, the different thermal behavior of the LDL obtained after diets with different cholesterol contents is due to differences in triglyceride content which are a secondary effect of cholesterol-feeding. From these data we conclude that dietary cholesterol increases plasma LDL content, decreases LDL triglyceride content, and alters the particle structure. These changes in lipoprotein structure may contribute to the known development of atherosclerosis in cholesterol-fed swine.

INFLUENCE OF LIPOPROTEIN CONCENTRATION ON THE EXCHANGES OF TRIACYLGLYCEROL BETWEEN RABBIT PLASMA LOW DENSITY AND HIGH DENSITY LIPOPROTEINS. O.V. Rajaram and P.J. Barter (Unit of Clinical Biochem., Schl. of Med., Flinders Univ. of S. Australia, Bedford Park, S. Australia 5042, Australia) *Biochim. Biophys. Acta* 620, 483–8 (1980). Molecular exchanges of triacylglycerol between rabbit serum low density lipoproteins (LDL) and high density lipoproteins (HDL) have been studied in 37° C incubations performed in the presence of rabbit lipoprotein-free serum as a source of the triacylglycerol transfer protein. The molar rate of exchange of triacylglycerol between the two fractions increased with increasing incubation concentrations of LDL but was decreased as the HDL concentration was increased. When the concentration of both LDL and HDL was increased in parallel there was an increase in the molar rate of triacylglycerol exchange between the two fractions which flattened at higher concentrations, suggesting that the process was saturable. The results of the kinetic studies have been interpreted in terms of a binding of the triacylglycerol transfer protein to HDL, but not to LDL.

ADIPOSE TISSUE AND PLASMA-FREE FATTY ACID AND GLYCEROL CONCENTRATIONS DURING BURN SHOCK IN GUINEA PIGS. K.M. Robinson and H.I. Miller (Dept. of Physiology, Louisiana State University Medical Center, New Orleans, Louisiana 70112) *Proc. Soc. Exp. Biol. Med.* 165, 375–9 (1980). We have previously demonstrated a rapid decrease in the rate of free fatty acid (FFA) release from adipose tissue following burn shock in the guinea pig. A decreased release of FFA could be due to (a) decreased lipolysis, (b) increased reesterification, (c) impaired transport, or (d) any combination of the above. The purpose of this study was to investigate which of these mechanisms might actually be involved in the decreased release of FFA. This was done by measuring adipose tissue and plasma concentrations of FFA and glycerol. No accumulation of FFA within adipose tissue was detected suggesting that impaired FFA transport was not involved in the decreased release of FFA. The plasma glycerol concentration was increased from 0.17 ± 0.01 mM to 0.23 ± 0.01 mM ($P < 0.01$) 2 hr postburn when the plasma FFA concentration was decreased from $0.84 \pm .06$ mM to 0.56 ± 0.05 mM ($P < 0.01$) resulting in a highly significant change in the FFA:glycerol ratio. We conclude that alterations in lipolysis and reesterification are a major factor contributing to the decreased release of FFA from adipose tissue. Glycerol kinetic measurements need to be done to determine if the increased plasma glycerol concentration accurately reflects increased lipolysis during burn shock.

LONG CHAIN NONESTERIFIED FATTY ACID PATTERNS IN PLASMA OF HEALTHY CHILDREN AND YOUNG ADULTS IN RELATION TO AGE AND SEX. V. Rogiers (Dept. of Biochemistry (VUB) and Dept. of Pediatrics (ULB), Vrije Universiteit Brussels, Laarbeeklaan 103, B-1090 Brussels, Belgium) *J. Lipid Res.* 22, 1–6 (1981). In a large group of healthy Belgian children and young adults, the absolute and relative concentrations of nonesterified fatty acid patterns were determined by an appropriate gas-liquid chromatographic technique. The statistical analysis of the results showed that concentrations were dependent on age and sex. The absolute concentration of each fatty acid and the total nonesterified fatty acid concentration decreased exponentially with age and were significantly higher for girls than for boys. In addition, it was found that variation of relative concentrations with age was rather small. Furthermore, the concentration of monounsaturated fatty acids was significantly higher and that of saturated acid significantly lower for girls than for boys.

VITAMIN A AND ZINC METABOLISM IN ALCOHOLISM. R.M. Russel (VA Med. Center (151), 3900 Loch Raven Blvd., Baltimore, MD 21218) *Am. J. Clin. Nutr.* 33, 2741–9 (1980). Vitamin A and zinc metabolism are affected both by ethanol and by hepatic cirrhosis. Ethanol causes abnormal dark adaptation by acting as a competitive inhibitor with retinol for alcohol dehydrogenase in the eye. In animals oral ethanol intake results in increased losses of zinc by the urinary and fecal routes. Vitamin A malnutrition in cirrhotics may be caused by poor diet, malabsorption, decreased hepatic vitamin A uptake, and decreased hepatic storage capacity for vitamin A. In some cirrhotic patients zinc deficiency and or protein deficiency may limit the ability to respond to vitamin A. Combined vitamin A and zinc deficiencies are common in cirrhotics and either may result in abnormal dark adaptation or impaired taste and smell. The interaction of these two micro-nutrients must be kept in mind by the clinician caring for alcoholic or alcoholic cirrhotic patients.

QUANTIFICATION OF SURFACTANT PHOSPHOLIPIDS IN THE DOG LUNG. S.F. Ryan, S.A. Hashim, G. Cernansky, C.R. Barrett, Jr., A.L.L. Bell, Jr., and D.F. Liau (Pulmonary Res. Group, St. Luke's Hospital Center and Columbia Univ. College of Physicians and Surgeons, New York, NY 10025) *J. of Lipid Res.* 21, 1004–14 (1980). We quantified total phospholipid (PL), total and disaturated phosphatidylcholine (PC and DSPC), phosphatidylglycerol (PG), and total protein in alveolar washings and lung tissue in 22 dog lungs. Quantitative recovery of alveolar material and assessment of its possible contamination by blood lipids were important determinants of methodology. To remove blood, the vessels of half the lungs were perfused with a fluorocarbon emulsion before lavage. Washings of unperfused lungs contained means of 21% more PL and 24% more PC than those of perfused lungs. Although this excess could be accounted for by the PL and PC in pulmonary blood, the hemoglobin and total protein content of washings and their PC fatty acid patterns indicated that blood lipids were not a major source of the excess lipid in washings of unperfused lungs. Using more recent morphometric estimates rather than the indirect ones previously used by others, the quantity of alveolar DSPC (1 mg/g lung) is calculated to be 1.8 times the amount necessary to form a packed monolayer on the internal surface of the lung at functional residual capacity.

THE METABOLISM OF NATIVE AND MALONDIALDEHYDE-ALTERED LOW DENSITY LIPOPROTEINS BY HUMAN MONOCYTE-MACROPHAGES. I. Schechter, A.M. Fogelman, M.E. Haberland, J. Seager, M. Hokom and P.A. Edwards (Division of Cardiology, Dept. of Medicine, University of California at Los Angeles, School of

Medicine, Los Angeles, CA 90024) *J. Lipid Res.* 22, 63–71 (1981). We have recently shown that cultured human monocyte-macrophages degraded ^{125}I-labeled low density lipoprotein (^{125}I-native-LDL) by a saturable high-affinity process with maximal velocity at 25–50 μg protein/ml. We now describe studies of the binding of ^{125}I-native-LDL at 4° C and the effects of chloroquine, Ca^{2+} concentration, and reductive methylation on high-affinity ^{125}I-native-LDL degradation that indicate that native-LDL is processed by the monocyte-macrophages via the classic LDL receptor pathway. The high-affinity degradation of ^{125}I-native-LDL increased substantially when monocyte-macrophages were exposed to the lipoprotein deficient-fraction of serum (LPDS) for periods as brief as 4 hours, and was 25-fold greater than that of lymphocytes. Freshly isolated monocytes that had never been exposed to LPDS also demonstrated high-affinity degradation of ^{125}I-native-LDL. When these monocytes were cultured for 7 days in a medium containing native-LDL at a concentration (186 μg protein/ml) greatly in excess of that apparently needed to saturate the high-affinity process, there was more than a 10-fold increase in ^{125}I-native-LDL high-affinity degradation. LDL modified by treatment with malondialdehyde was processed by a second high-affinity cell surface receptor.

INTERSTITIAL PNEUMONITIS INDUCED BY INGESTION OF PALMITOYL GLYCEROL. R. Schnitzer-Polokoff, R.E. Kanich and S.B. Tove (Depts. of Biochem. and Micro., North Carolina State Univ., Raleigh, NC 27650 and Dept. of Path., Rex Hospital, Raleigh, NC 27603) *J. Nutr.* 110, 2396–408 (1980). Weanling male mice fed *rac*-1(3)-palmitoyl glycerol at levels of 30 mmoles/100 g of diet or higher develop, within a few days, a severe pulmonary inflammation characterized by marked infiltration of the interstitium by macrophages and a few polymorphonuclear leukocytes. This results in severe vascular stasis, alveoler collapse and death of the animal. Adult mice and weanling rats also show the syndrome, but only at higher levels of palmitoyl glycerol. Neither the position of palmitate on the glycerol nor the level of myo-inositol in the diet affects the toxicity of palmitoyl glycerol. Supplementation of the diet with small amounts of linoleate or oleate prevents the toxicity although oleate is less effective than linoleate. There are no differences between mice fed linoleate and those that were not in the rate of absorption of palmitoyl glycerol, oxidative phosphorylation by liver or heart mitochondria, excretion of carbon dioxide and tissue distribution of radioactivity following gavage of *rac*-1(3)-[1-^{14}C]palmitoyl glycerol.

LATERAL DIFFUSION OF M-13 COAT PROTEIN IN MIXTURES OF PHOSPHATIDYLCHOLINE AND CHOLESTEROL. L.M. Smith, J.L.R. Rubenstein, J.W. Parce, and H.M. McConnell (John Stauffer Laboratory for Physical Chemistry, Stanford University, Stanford, California 94305) *Biochem.* 19, 5907–11 (1980). The translational diffusion of fluorescent-labeled M-13 phage coat protein (FITC-M-13) has been measured in mixtures of phosphatidylcholines and cholesterol, using a pattern photobleaching technique. At temperatures below the chain-melting transition temperature of dimyristoylphosphatidylcholine (DMPC) (23.8° C), the lateral diffusion coefficient of M-13 shows a marked increase when the cholesterol concentration is increased above 20 mol%. A similar marked increase in the lateral diffusion coefficient of a fluorescent phospholipid is also observed. At temperatures above the chain-melting transition temperature of DMPC, a minimum is observed in the lateral diffusion coefficient of FITC-M-13 for cholesterol concentrations in the vicinity of 25 mol %. No such minimum is observed for the lateral diffusion coefficient of the fluorescent lipid. The lateral diffusion coefficient of FITC-M-13 is large ($>10^{-9}$ cm^2/s) at all cholesterol concentrations for temperatures above the chain-melting transition temperature of the phosphatidylcholine. A number of proteins of this type will show similar diffusional behavior, in particular exhibiting rapid diffusion throughout a wide range of lipid composition.

LIPOPROTEIN REGULATION OF 3-HYDROXY-3-METHYLGLUTARYL COENZYME A REDUCTASE IN CULTURED INTESTINAL MUCOSA. E.F. Stange, M. Alavi, A. Schneider, G. Preclik and H. Ditschuneit (Div. of Metabolism, Nutr. and Gastroent., Dept. of Internal Med., Univ. of Ulm, Ulm, F.R.G.) *Biochim. Biophys. Acta* 620, 520–7 (1980). In vitro regulation of the key enzyme of cholesterol synthesis, 3-hydroxy-3-methylglutaryl-CoA reductase (EC 1.1.1.34), was studied in 24-h organ culture of rabbit ileum. Preincubation of mucosal homogenate in phosphate buffer increased apparent reductase activity more than 5-fold. The activation was blocked in the presence of 150 mM NaF, suggesting interconversion of latent reductase by dephosphorylation. No significant further activation was achieved by potato phosphatase treatment. During culture total reductase activity was stimulated by 125% in lipoprotein-free medium. It is concluded that lipoproteins are potent regulators of cholesterol synthesis in cultured intestine.

INFLUENCE OF DIETARY CHOLESTEROL, SATURATED AND UNSATURATED LIPID ON 3-HYDROXY-3-METHYLGLUTARYL CoA REDUCTASE ACTIVITY IN RABBIT INTESTINE AND LIVER. E.F. Stange, M. Alavi, A. Schneider, H. Ditschuneit, and J.R. Poley (Depts. of Internal Med. and Pediatrics, Divisions of Metabolism, Gastroenterology, and Nutrition, University of Ulm, Ulm, Federal Republic of Germany) *J. Lipid Res.* 22, 47–56 (1981). We studied the kinetic properties and the influence of dietary lipid on intestinal and hepatic HMG-CoA reductase activity in the rabbit. In intestinal crypt and villous cells isolated by a dual buffer technique, the K_M value was 4.2 and 4.6 μM, respectively for DL-HMG-CoA. The specific activity of HMG-CoA reductase in the jejunum was evenly distributed between crypt and villous cells. By contrast, reductase activity was considerably lower in the ileum. Liver microsomes had a K_M value of 3.0 μM, while the reductase activity averaged 2 nmol/mg per hr. An unexpected finding was the uneven distribution of HMG-CoA reductase in the various lobes of the liver in the single animal. The addition of 1% cholesterol to the diet for 48 hours was followed by an average decline of 73% ($P < 0.005$) of HMG-CoA reductase activity in villous and crypt cells of the jejunum. The addition of 5% coconut oil to 1% cholesterol caused further decrease of HMG-CoA reductase in jejunum and ileum ($P < 0.05$). Both 5% corn oil or 5% coconut oil, in addition to 1% cholesterol, further suppressed hepatic reductase activity. The weight of the experimental evidence presented in these studies suggests that cholesterol has a major regulatory effect on both intestinal and hepatic reductase in the rabbit.

THE CONTRIBUTION OF SERUM PHOSPHATIDYLCHOLINE AND LYSOPHOSPHATIDYLCHOLINE TO LYMPH PHOSPHATIDYLCHOLINE. M. Steere and C.M. Mansbach (Veterans Admin. Med. Center, Div. of Gastroenterology, Dept. of Med., Duke Univ. Med. Center, Durham, NC 27705) *Biochim. Biophys. Acta* 620, 462–71 (1980). The contribution of serum phosphatidylcholine and 1-acyl lysophosphatidylcholine to chylomicron and mesenteric lymph lipoproteins of heavier buoyant density was studied in rats with catheters placed in the jugular vein, duodenum, common bile duct and mesenteric lymph duct. The effect of including 10 mM phosphatidylcholine in the triolein emulsion infused into the duodenum was also studied. The intravenous infusion of phosphatidylcholine did not affect delivery of phosphatidylcholine into the lymph when phosphatidylcholine was included in the duodenal infusion. However, on intravenous lysophosphatidylcholine infusion, phosphatidylcholine transport into the lymph was increased both in chylomicrons and the other lipoproteins found in the lymph when phosphatidylcholine was included in the duodenal infusion. It is concluded that serum phosphatidylcholine is a poor precursor of chylomicron phosphatidylcholine and that while lysophosphatidylcholine is a somewhat better precursor, its contribution to chylomicron phosphatidylcholine is limited by its serum concentration.

MODULATION OF CYTOPLASMIC CHOLESTERYL ESTER OF SMOOTH MUSCLE CELLS IN CULTURE DERIVED FROM RAT, RABBIT AND BOVINE AORTA. O. Stein, G.A. Coetzee and Y. Stein (Dept. of Experimental Med. and Cancer Res., Hebrew Univ.-Hadassah Med. Schl. and Lipid Res. Lab., Dept. of Med. B, Hadassah Univ. Hospital, Jerusalem, Israel) *Biochim. Biophys. Acta* 620, 538–49 (1980). Esterification of cholesterol in smooth muscle cells, isolated from rat, rabbit and bovine aorta, was achieved by incubation with cholesterol enriched medium containing [7(n)-^{3}H]cholesterol. The newly formed cholesteryl ester was readily hydrolyzed when the cells were post incubated with medium containing lipoprotein deficient serum. The rate of loss of labeled cholesteryl ester was not inhibited by the presence of 100 μM chloroquine. Addition of LDL to the post-incubation medium retarded the decrease in labeled cellular cholesteryl ester in rat smooth muscle cells and this effect of LDL was abolished by chloroquine. The findings indicate that the catabolism of cytoplasmic cholesteryl ester in aortic smooth muscle cells is catalyzed by extrasomal enzymes. The cytoplasmic cholesteryl ester hydrolase is apparently not activated by cyclic AMP. The intracellular availability of unesterified cholesterol, which can be modulated by plasma lipoproteins, may determine the residence time of cellular cholesteryl ester. Thus under pathological conditions an increase in

extracellular LDL accompanied by a reduction in HDL would prolong the residence time of cholesteryl esters and thus promote their intracellular accretion.

PROTEIN AND FAT METABOLISM IN RATS DURING REPLETION WITH TOTAL PARENTERAL NUTRITION (TPN). T.P. Stein, G.P. Buzby, M.J. Leskiw, A.R. Giandomenico and J.L. Mullen (Surgical Res. Laboratories, Graduate Hospital, and Dept. of Surgery, University of Pennsylvania, Philadelphia, PA 19146) *J. Nutr.* 111, 154–65 (1981). We investigated the effect of non-protein calorie source on the repletion by total parenteral nutrition (TPN) of protein-depleted rats. Rats were depleted by feeding them a protein free diet for 4 weeks. Control (non-depleted) and depleted rats were given one of three isocaloric, isonitrogenous TPN regimens for 6 days. They differed in the proportion of non-protein calories given as glucose and fat: diet 1, 100% glucose; diet 2, 75 % glucose, 25% fat; and diet 3, 100% fat. The liver, skeletal muscle and whole body protein synthesis and breakdown rates were measured by using [^{15}N]glycine as a tracer. The fatty acid distribution in the liver was measured by gas chromatography-mass spectrometry. Results: (a) Omission of fat leads to a decrease in the fraction of linoleate in the liver. (b) Giving all the non-protein calories as a fat emulsion causes fatty acid accumulation in the liver and a significant increase in the liver protein fractional synthesis rate in the control rats and killed about half the depleted rats. (c) For TPN regimens 1 and 2 both the muscle and whole body synthesis rates were increased during repletion. (d) Of the three TPN regimens, the second one which contained both fat and glucose was superior to the other two.

ADIPOSITY, LIPIDS, ALCOHOL CONSUMPTION, SMOKING, AND GENDER. W.H.F. Sutherland, W.A. Temple, E.R. Nye, and G.P. Herbison (Depts. of Medicine and Preventive Medicine, University of Otaga, Dunedin, New Zealand) *Amer. J. Clin. Nutr.* 33, 2581–7 (1980). Indices of obesity, plasma lipids, and lipoprotein levels, plasma cholesteryl ester fatty acid composition, reported alcohol consumption and smoking habits were measured in 88 men and 87 women, ages over 15 years, randomly selected. Most indices of obesity were related to plasma triglycerides and high-density lipoprotein levels in both sexes; to very low-density lipoprotein levels in men only; and to plasma cholesteryl ester fatty acid linoleic acid proportions in women only. The correlations with high-density lipoprotein cholesterol levels were dependent on very low-density lipoprotein triglyceride levels in men but not in women. Indices of obesity were significantly higher in nonsmoking women and reported alcohol consumption correlated with Quetelet's index in men. Smoking habits influenced correlations between indices of obesity and plasma triglycerides and very low-density lipoprotein triglyceride levels in men. Lower very low-density lipoprotein levels, higher skinfold measurements, higher cholesteryl ester fatty acid linoleic acid proportions and lower alcohol intake in women than in men may be responsible. The data suggested that in women, altered diet composition may be linked with obesity.

SELECTIVE REDUCTION OF PHOSPHATIDYLGLYCEROL AND PHOSPHATIDYLCHOLINE IN PULMONARY SURFACTANT BY 4-AMINOPYRAZOLO(3,4d)PYRIMIDINE IN THE RAT. Y. Suzuki and R. Tabata (Dept. of Pathology, Chest Disease Research Institute, Kyoto Univ., Sakyo-ku, Kyoto 606, Japan) *J. Lipid Res.* 21, 1090–6 (1980). Effects of 4-aminopyrazolo(3,4d)pyrimidine on pulmonary surface-active material and its surface activity were investigated in the rat. A rapid decrease in serum cholesterol was observed in rats treated with this drug and these effects continued during the entire period of treatment. Phosphatidylglycerol content in surface-active material and in the residual lung decreased significantly during three days of treatment and phosphatidylcholine content in surface-active material also decreased on the third day of the treatment. There were no changes in the contents of other phospholipids and cholesterol. The surface-active material from treated rats showed a larger surface compressibility, an elevated minimum surface tension, and a low stability index, as compared to control rats. These results show that alteration of lipid constituents significantly affects the surface properties of pulmonary surface-active material and that 4-aminopyrazolopyrimidine is a drug which can be effectively utilized to investigate lipid metabolism of the lung.

BIOSYNTHESIS OF BILE ACIDS IN MAN. AN *in vivo* EVALUATION OF THE CONVERSION OF R AND S 3α,7α-TRIHYDROXY-5β-CHOLESTANOIC AND 3α,7α,12α-24ξ-TETRAHYDROXY-5β-CHOLESTANOIC ACIDS TO CHOLIC ACID. L. Swell, J. Gustafsson, H. Danielsson, C.C. Schwartz, and Z.R. Vlahcevic (Division of Gastroenterology, Dept. of Medicine, Veterans Administration Medical Center, and the Medical College of Virginia, Richmond, Virginia 23249) *J. Biol. Chem.* 256, 912–6 (1981). *In vivo* studies were carried out on three bile fistula patients to further elucidate the side chain pathways from C-27 bile acids to cholic acid in man. Two patients each received (25-R)- and (25-S)-3α,7α,-12α-trihydroxy-5β-[7β-^{3}H]cholestanoic acid (THCA) on consecutive days and three patients were administered 3α,7α,12α,24ξ-tetrahydroxy-5β-[7β-^{3}H]cholestanoic acid (varanic acid). The patients efficiently (84 to 97%) converted both (R)- and (S)-THCA to cholic acid. The rate of conversion of (R)-THCA, (S)-THCA, and varanic acid was extremely rapid in all three patients with a $t_{1/2}$ of 35 to 74 min. The findings suggest that (a) the stereospecific configuration at C-25 of THCA has no significant effect on the efficiency of side chain oxidation to cholic acid; and (b) side chain cleavage pathways may exist which do not pass through varanic acid, or the oxidation of varanic acid in man is highly stereospecific with respect to the hydroxyl group at C-24. To prove the latter, it will be necessary to compare the metabolism of the 24α and 24β isomers of varanic acid.

THE EFFECT OF A HIGH CHOLESTEROL AND SATURATED FAT DIET ON SERUM HIGH-DENSITY LIPOPROTEIN-CHOLESTEROL, APOPROTEIN A-I, AND APOPROTEIN E LEVELS IN NORMOLIPIDEMIC HUMANS. M.H. Tan, M.A. Dickinson, J.J. Albers, R.J. Havel, M.C. Cheung, and J.L. Vigne (Dept. of Medicine, Dalhousie University, 5849 University Avenue, Halifax, Nova Scotia, Canada B3H 4H7) *Amer. J. Clin. Nutr.* 33, 2559–65 (1980). The effects of a high cholesterol, high saturated fat diet on serum high density lipoprotein cholesterol, apo A-I, and apo E levels were studied in six normolipidemic subjects. The study was done on an outpatient basis and mixed natural foods normally consumed by humans were used. When compared with a low cholesterol (98 mg/day) high polyunsaturated fat (P/S ratio 1.6) diet, the high cholesterol (1021 mg/day), high saturated fat (P/S ratio 0.4) diet increased serum cholesterol (23%) by raising the cholesterol concentration in very low-density lipoproteins (59%), low-density lipoproteins (15%), and high-density lipoproteins (30%). The low-density lipoprotein-cholesterol/high-density lipoprotein-cholesterol ratio fell significantly from 1.78 to 1.58. The increased high density lipoprotein-cholesterol was associated with an elevation of serum apo A-I but not apo E. Serum triglycerides did not change significantly.

EFFECT OF CARNITINE ON LIVER FAT AND NITROGEN BALANCE IN INTRAVENOUSLY FED GROWING RATS. R.C. Tao, G.K. Peck and N.N. Yoshimura (American McGaw, 2525 McGaw Ave., Irvine, CA 92714) *J. Nutr.* 111, 171–7 (1981). In the present experiment, nitrogen balance, hepatic fat deposition and serum and tissue carnitine were determined in rats receiving a hypercaloric Total Parenteral Nitrogen regimen containing 0, 10, 50, and 100 mg DL-carnitine per 100 g body weight for 14 days. Rats fed a stock diet served as controls. Increased nitrogen balance was observed in TPN rats receiving the highest dose of carnitine supplementation. Hepatic fat deposition induced by the hypercaloric infusion was ameliorated but not eliminated by infusing carnitine. Serum, liver and skeletal muscle carnitine concentrations were maintained, whereas that of heart decreased in TPN rats without carnitine supplementation. Between 90 and 100% of the administered L-carnitine was excreted. It is suggested that the observed effects of carnitine on nitrogen balance and hepatic fat deposition are due to as yet undefined pharmacological properties. The significant decrease of carnitine in cardiac muscle resulting from TPN in a patient population already stressed and traumatized and the metabolic and physiological effects of this decrease deserve further exploration.

SEX DIFFERENCES IN THE RELATIONSHIPS BETWEEN OBESITY, ALCOHOL CONSUMPTION AND CIGARETTE SMOKING AND SERUM LIPID AND APOLIPOPROTEIN CONCENTRATIONS IN A NORMAL POPULATION. K.G. Taylor, T.J. Carter, A.J. Valente, A.D. Wright, J.H. Smith and K.A. Matthews (Gen. Hosp., Birmingham, U.K.) *Atherosclerosis* 38, 11–8 (1981). In this study of a normal population from a Midland factory, obesity showed a direct relationship to serum triglyceride and cholesterol levels in males but not in females. High-density lipoprotein (HDL) cholesterol and apolipoprotein A_1 levels were not related to obesity in either sex. Alcohol consumption was associated with increased serum triglyceride levels in males but not in females

and serum HDL cholesterol levels were also higher in male drinkers only. Cigarette smoking was associated with increased serum triglyceride levels in both sexes but HDL cholesterol levels were reduced only in female smokers. Apolipoprotein A_1 levels were not related to smoking in females.

INFLUENCE OF SITE AND UNSTIRRED LAYERS ON THE RATE OF UPTAKE OF CHOLESTEROL AND FATTY ACIDS INTO RABBIT INTESTINE. A.B.R. Thomson (Division of Gastroenterology, Dept. of Medicine, 8-104 Clinical Sciences Bldg., Univ. of Alberta, Edmonton, Canada T6G 2G3) *J. Lipid Res.* 21, 1097-107 (1980). Passive permeation into the intestine is influenced by resistance of the unstirred water layer (UWL) and the microvillus membrane. Failure to account for UWL leads to gross underestimation of apparent passive permeability coefficients, and to qualitative errors in the interpretation of the nature of absorptive processes. A previously validated in vitro technique was used 1) to determine the permeability characteristics of the rabbit jejunum (J) and ileum (I) towards a homologous series of saturated fatty acids; 2) to measure UWL in jejunum and ileum under conditions of variable effective resistance of the UWL; and 3) to estimate the preferential site of absorption of cholesterol in the intestine. The results suggest that i) cholesterol uptake in the J and I occurs from an aqueous monomolecular phase into the microvillus membrane; and ii) reported variations in the J_d of cholesterol along the intestine are likely due to differences in UWL, Sm, or availability of substrate and not to differences in the permeability properties of the intestine.

EFFECTS OF 6-KETO-PROSTAGLANDIN E_1 ON PERINATAL PULMONARY VASCULAR RESISTANCE. M.L. Tod and S. Cassin (Dept. of Physiology, College of Medicine, University of Florida, Gainesville, Florida 32610) *Proc. Soc. Exp. Biol. Med.* 166, 148-52 (1981). The effects of a biologically active metabolite of PGI_2, 6-keto-PGE_1, were evaluated in fetal goats and newborn lambs using an *in situ*, constant-flow, isolated lower left lobe preparation. Intrapulmonary injections of 6-keto-PGE_1 (0.074- 4.41 $\mu g/kg$) produced dose-dependent decreases in pulmonary vascular resistance, mean systemic arterial pressure, and heart rate in fetal goats. Fetal systemic responses to 6-keto-PGE_1 were significantly less following left atrial injections than after intrapulmonary injections. Newborn lambs also responded to intrapulmonary infusions of 6-keto-PGE_1 (0.078- 5.15 $\mu g/kg \cdot min$) with dose-dependent reductions of pulmonary vascular resistance and systemic arterial pressure. A possible role for 6-keto-PGE_1 in the modulation of perinatal pulmonary vascular resistance is discussed.

COORDINATE SUPPRESSION OF LIVER ACETYL-CoA CARBOXYLASE AND FATTY ACID SYNTHETASE BY POLYUNSATURATED FAT. M.J. Toussant, M.D. Wilson and S.D. Clarke (Dept. of Food Science and Nutrition, The Ohio State University, Columbus, OH 43210) *J. Nutr.* 111, 146-53 (1981). Polyunsaturated fats (PUFA) suppressed hepatic fatty acid synthesis and the activities of lipogenic enzymes more effectively than did saturated fats. The activity of glycolytic enzymes—glucokinase, phosphofructokinase and pyruvate kinase—were not affected by PUFA. The absolute rate of liver fatty acid synthesis after meal ingestion was very similar to the maximal activities of acetyl-CoA carboxylase and fatty acid synthetase. When PUFA was supplemented to a fat-free diet, the activities of carboxylase and synthetase decreased similarly over 3 days. During the 3 days, the concentration of liver malonyl-CoA (after meal ingestion) did not significantly differ between the fat-free and PUFA dietary treatments. Apparently PUFA feeding caused a coordinate decrease in the utilization and production of malonyl-CoA which resulted in no net change in malonyl-CoA pool size. Thus the mechanism by which PUFA suppressed fatty acid synthesis appears to be by coordinately and specifically reducing the amount of carboxylase and fatty acid synthetase.

DIETARY FIBERS. VI: BINDING OF FATTY ACIDS AND MONOLEIN FROM MIXED MICELLES CONTAINING BILE SALTS AND LECITHIN. G.V. Vahouny, R. Tombes, M.M. Cassidy, D. Kritchevsky, and L.L. Gallo (Department of Biochemistry, The George Washington University School of Medicine and Health Sciences, Washington, D.C. 20037) *Proc. Soc. Exp. Biol. Med.* 166, 12-6 (1981). Mixed micelles were prepared containing sodium taurocholate, monolein dioleyl lecithin, cholesterol, and an equimolar mixture of palmitic, oleic, and linoleic acids. These were incubated with commercial bile acid-sequestering resins, cholestyramine and DEAE-Sephadex, or various dietary fibers and fiber components including wheat bran, cellulose, alfalfa, lignin, and two viscosity grades of guar gum. Binding of monolein and fatty acids was determined as the difference between the radioactivity of the added micellar component, and that recovered in the centrifugal supernatant after incubation. In general, the extent of monoglyceride or fatty acid sequestration was characteristic and reproducible for each binding Cholestyramine and DEAE-Sephadex essentially quantitatively bound monoglycerides and all three fatty acids from micellar medium. Low- and high-viscosity grades of guar gum sequestered 15-23% of the monolein and 32-33% of the fatty acids, showing a significant preference for linoleic acid in each case. These data on resin and fiber sequestration of micellar fatty acids and monoglycerides compare favorably with the binding of other micellar components including phospholipid, bile salt, and cholesterol.

CYCLOOXYGENASE PRODUCTS OF ARACHIDONIC ACID METABOLISM BY MOUSE BONE IN ORGAN CULTURE. E.F. Voelkel, A.H. Tashjian, Jr. and L. Levine (Lab. of Toxicology, Harvard Med. Schl., Boston, MA 02115) *Biochim. Biophys. Acta* 620, 418-28 (1980). The products of endogenous and exogenous arachidonic acid metabolism via the cyclooxygenase pathway in mouse bone in organ culture were identified and quantitated by the use of high performance liquid chromatography and radioimmunoassay. Production of prostaglandins E_2, $F_{2\alpha}$, and I_2 from endogenous substrate was stimulated by incubation of bone with epidermal growth factor and the tumor promoter 12-*O*-tetradecanoyl-phorbol-13-acetate. Formation of cyclooxygenase products of endogenous and exogenous arachidonic acid metabolism (both basal and stimulated) and bone resorption were inhibited by indomethacin. Bone as a tissue responded biochemically not only to exogenous prostaglandins and agents that enhance endogenous prostaglandin production but also to exogenous arachidonic acid by biosynthesis of prostaglandins, prostacyclin and thromboxane. Furthermore, bone metabolized these cyclooxygenase products to their more stable metabolites.

THE EFFECT OF PANCREATIC DIVERSION ON LYMPHATIC ABSORPTION AND ESTERIFICATION OF CHOLESTEROL IN THE RAT. S.M. Watt and W.J. Simonds (Dept. of Physiology, Univ. of Western Australia, Nedlands, Western Australia, 6009) *J. Lipid Res.* 22, 157-65 (1981). Lymph fistula rats with either biliary fistula or pancreaticobiliary fistula were used to measure coenzyme A-independent mucosal cholesterol esterifying activity in the presence and absence of pancreatic exocrine secretion. The synthetic activity of cholesteryl ester hydrolase (E.C. 3.1.1.13) was measured directly in mucosal homogenates. Indirect evidence for mucosal esterifying activity was obtained from hourly cholesteryl ester output into lymph when other factors known to affect cholesterol absorption were controlled. Rats infused intraduodenally at a constant rate with different concentrations of bile salts, polar lipid, and [^{3}H]cholesterol showed that the infused [^{3}H]cholesterol was absorbed and esterified with equal efficiency in the presence and absence of pancreatic flow. Total lymph output of free and esterified endogenous cholesterol was slightly less efficient in the pancreaticobiliary fistula group, but percent esterification was the same for both groups. Infusion of lipid-free micellar bile salts separately from other bile components produced a highly significant increase in absorption and esterification of lymph cholesterol for both groups. The present study suggests an alternative enzyme dependent directly or indirectly on the presence of micellar bile salts in the lumen to explain intestinal cholesterol esterifying activity during absorption.

AGE DEPENDENCY AND TRACKING OF SERUM LIPIDS AND LIPOPROTEINS IN HEALTHY CHILDREN AGED 11 TO 14 YEARS. K. Widhalm, W. Strobl and G. Westphal (Dept. of Pediatrics and Inst. for Med. Statistics, Univ. of Vienna, Med. Schl., Vienna, Austria) *Atherosclerosis* 38, 189-96 (1981). In order to determine if tracking and age dependency of serum-lipids and -lipoproteins (LP) occur in childhood, a 4-year longitudinal study in 109 children (54 boys, 55 girls) aged 11-14 years was carried out. Tracking of serum LP was followed up for 3-year period. For exclusion of diseased states a routine clinical chemistry profile was performed. Venous blood was drawn in May 1976, '77, '78 and '79 after an overnight fast. Cholesterol (C) and triglycerides (TG) were determined using full enzymatic methods. HDL-C and LDL-C were estimated by means of the LRC-Method, NIH. By calculating the prevalence of remaining in the upper quartile (C, TG, LDL-C) and in the lowest quartile (HDL-C) a high persistence could be shown for C and LDL-C over a 3-year period. Furthermore, calculation of correlation coefficients revealed significant relationships ($P < 0.001$) between the values for C and LDL-C

during 4 and 3 years. Our data strongly suggest that C and LDL-C track well during the period between 11 and 14 years of age in both boys and girls. Therefore early identification of children at risk for later ischaemic heart disease by estimation of serum LP would seem to be possible. For this purpose, age-specific reference values for the population examined are required.

EFFECTS OF PROLONGED STARVATION ON PLASMA FREE FATTY ACID LEVELS AND FATTY ACID COMPOSITION OF MYOCARDIAL TOTAL LIPIDS IN THE RAT. S. Yaffe, A. Gold, and J. Sampugna (Dept. of Physio. and Biophys., Haward Univ. College of Medicine, Wash., D.C. 20059 and Dept. of Chem., Univ. of Maryland, College Park, MD 20740) *The J. of Nutr.* 110, 2490–6 (1980). Experiments were carried out on male rats fed ad libitum or starved for a period of 7 days. Plasma levels of free fatty acids (FFA) and the quantity and composition of fatty acids in total lipids of heart ventricular tissue in vivo were analyzed by gas liquid chromatography (GLC). In addition, FFA extraction ratios and uptake rates were determined in isolated perfused hearts using the classical Langendorff technique. After 7 days of starvation, distribution and concentrations obtained for total lipid fatty acids from heart ventricles of starved animals were substantially different from those of controls. In particular, 20:5 and 22:6 carbon polyunsaturated fatty acids were significantly elevated. Also, total plasma FFA level was elevated and FFA extraction ratios were increased as a result of prolonged starvation. Accumulation of 20- and 22-carbon polyunsaturated fatty acids observed in ventricles of starved rats may have resulted from increased availability and extraction of FFA.

CHOLESTERYL ESTER HYDROLASE ACTIVITY IN HUMAN SYMPTOMATIC ATHEROSCLEROSIS. F.M. Yatsu, F.C. Hagemenas, L.C. Manaugh and T. Galambos (Comprehensive Stroke Center of Oregon, Univ. of Oregon Health Sciences Center, Dept. of Neurology, 3181 S.W. Sam Jackson Park Rd., Portland, OR 97201) *Lipids* 15, 1019–22 (1980). Acid cholesteryl ester hydrolase (CEH) activity was assayed in mononuclear cells of patients with symptomatic atherosclerosis (transient ischemic attacks, TIA) and in age-matched controls showing no evidence of atherosclerosis. The acid CEH level of TIA patients was significantly lower than that of controls (1074 ± 128 vs 2113 ± 255 pmol/mg P/hr, mean ± SE). Neither mononuclear cell nor plasma cholesterol and cholesteryl ester concentrations differed significantly between atherosclerotic and control groups. TIA women had lower mononuclear cell concentrations of free cholesterol than men.

CYCLOPROPENOID FATTY ACIDS IN SOME MALAYSIAN EDIBLE SEEDS AND NUTS. Shiv K. Berry (Department of Food Science and Technology, Faculty of Agriculture, University of Agriculture, Malaysia, Serdang, Selangor, Malaysia) *J. Food Sci. & Tech. (India)*, 17, 224 (1980). The presence of cyclopropenoid fatty acids (CPFA), which cause numerous physiological disorders in experimental animals, in some Malaysian edible seed oils was established by the Halphen test and infrared spectroscopy. Employing gas chromatography and *Sterculia foetida* seed oil as a reference standard to identify and quantitate sterculic and malvalic acids, oils from the seeds of durian *(Durio zibethinus)*, kapok *(Ceiba pentandra)*, China-chestnut *(Sterculia monosperma)* and gnemon *(Gnetum gnemon)* were found to contain 65.4%, 10.1%, 18.7% and 51.6% of CPFA respectively. Cooking had no appreciable effect on the CPFA content, and it would therefore, seem extremely unwise to consume these seeds or products thereof.

A BUTYROMETRIC METHOD FOR RAPID DETERMINATION OF THE OIL CONTENT OF GROUNDNUT SEEDS. G.B. Shukla, A.N. Brahmachari, C.K. Sharma and T. Nataraja Murthi (National Dairy Development Board, Anand-338 001) *J. Food Sci. & Tech. (India)* 17, 242 (1980). The butyrometric method was adapted to the rapid determination of oil content in groundnut kernels. One gram of seed sample and one ml of amyl alcohol were found optimum for the test. A chart was prepared relating the butyrometric reading to the oil content as determined by soxhlet extraction. The accuracy of the chart was found to be 3% from the standard method.

LARGE SCALE PURIFICATION AND STRUCTURAL CHARACTERIZATION OF SQUALENE AND STEROL CARRIER PROTEIN. M.E. Dempsey, K. E. McCoy, H. N. Baker, A. Dimitriadou-Vafiadou, T. Lorsbach and J. B. Howard (Dept. of Biochem., Univ. of Minnesota, Minneapolis, MN 55455) *J. Biol. Chem. 256* (4):1867-1873 (1981). A new large scale purification procedure was developed for isolation from rat liver of the protein originally called squalene and sterol carrier protein (SCP). Homogeneous SCP was obtained by gel filtration of the liver soluble proteins on Sephadex G-75 followed by ion exchange chromatography on DEAE-cellulose at pH 9.0. A striking finding was that SCP represents at least 8% of the soluble proteins in the liver extract. SCP functional activity was determined by a new spectroscopic assay, measuring activation of membrane-bound Δ^7-sterol Δ^5-dehydrogenase. Structural studies indicated that SCP is a single polypeptide chain. SCP has one free sulfhydryl group, partially buried in the native protein. No NH_2-terminal residue was detected by Edman degradation, dansylvation, or by Edman degradation after digestion of SCP by pyroglutaminase. Native SCP contains 2 mol of associated fatty acids; 0.5 mol each of palmitic and stearic acids is tightly or covalently attached, while similar levels of these acids are noncovalently bound. This finding plus structural characteristics suggest SCP is the fatty acid binding protein isolated by several groups. A second protein was present in the SCP pool from the gel filtration step. This protein was separated from SCP and purified to homogeneity by the ion exchange chromatography step. The second protein is a single polypeptide chain containing one free sulfhydryl group partially buried in the native protein. The abundance of SCP in liver, its ubiquitous occurrence, and broad functions indicate SCP is capable of playing a major role in regulation of lipid metabolism.

PLASMA MEMBRANE ATPASE OF YEAST: ACTIVATION AND INTERACTION WITH DIMYRISTOYLPHOSPHATIDYLCHOLINE VESICLES. J.-P. Dufour and T.Y. Tsong (Dept. of Physiological Chem., The Johns Hopkins Univ., Schl. of Med., Baltimore, MD 21205) *J. Biol. Chem. 256* (4):1801–1808 (1981). The plasma membrane ATPase of the yeast *Schizosaccharomyces pombe* solubilized by egg lysophosphatidylcholine and purified by centrifugation through a sucrose gradient is in an essentially inactive polymeric form. However, the ATPase so purified is reactivated by mixing the enzyme with dimyristoylphosphatidylcholine microvesicles. The binding of the purified ATPase to lipid vesicles has been assessed by flotation gradient, using ^{35}S-protein as the radioactive marker of the purified ATPase. Reactivation curve of the enzyme parallels the binding curve, indicating that formation of a lipoproteic complex is required for the reactivation of the enzyme. Fusion of the phospholipid microvesicles into larger unilamellar macrovesicle (100 nm) is triggered by the purified plasma membrane ATPase when incubated below the phase transition temperature of the phospholipid. The rate of fusion exhibits a maximum at 8°C and is second order to vesicle concentration indicating that the rate-limiting step is the collision between the microvesicles. Arrhenius plots of the enzyme activity in the microvesicles and in the fused vesicles show a break, respectively, at 18.4 and 23.2°C. The activation energy is around 170 kJ/mol at temperature below and 100 kJ/mol at temperature above the midpoints of the phase transition. The physical state of lipid bilayers significantly affect the activation process of the enzyme-substrate interaction.

CARDIOLIPIN REQUIREMENT FOR ELECTRON TRANSFER IN COMPLEX I AND III OF THE MITOCHONDRIAL RESPIRATORY CHAIN. M. Fry and D. E. Green (Inst. of Enzyme Res., Univ. of Wisconsin-Madison, Madison, WI 53706) *J. Biol. Chem. 256* (4):1874-1880 (1981). Almost complete phospholipid depletion has been achieved for Complex I and III of the mitochondrial respiratory chain using a technique that involves elution of Sephadex LH-20 in the presence of Triton X-100. Enzymic activity may be regenerated by replenishment with phospholipid. However, restoration of enzymic activity in phospholipid-depleted Complex I and III has been shown to require the presence of cardiolipin. These results are, therefore, similar to findings on the absolute catalytic requirement of cardiolipin for cytochrome oxidase activity. At least two roles for phospholipid involvement in electron transfer processes are proposed, a catalytic role provided specifically by cardiolipin and a dispersive role that may be provided by various phospholipids or detergents. The absolute requirement of enzymic activity for cardiolipin suggests that this phospholipid plays a crucial role in the couples electron transfer process.

DIETARY PATTERN AND SERUM CHOLESTEROL LEVELS OF SELECTED TAMILIAN AND GUJARATHI WOMEN. Rajammal P. Devadas, V. Anuradha and Sheela Ramachandran *(Sri Avinashilingam Home Science College for Women, Coimbatore-641 043)* IND. J. Nutr. and Dietet. Vol. 17: 159, 1980. The correlation of diet with serum cholesterol levels in premenopausal women doing sedentary work, belonging to the affluent society was investigated. Gujarathis exhibited a higher mean serum cholesterol level than the Tamilian vegetarians and the difference was significant at five per cent level. There was a general trend in subjects having high serum cholesterol levels, when hypertension was present as a personal or familial factor. Such a trend was prevalent more among the Gujarathis than among the Tamilians.

FATTY ACID CONTENT AND COMPOSITION OF INFANT FORMULAS AND CEREALS. Julie M. Hanson and John E. Kinsella, *Institute of Food Science, Cornell University, Ithaca, New York.* J. Am. Dietet. Assn. Vol. 78: p. 250, 1981. The lipid content and fatty acid composition of commercial infant formulas and cereals were determined. The lipid content of formulas ranged from 3 to 7 percent by weight and provided from 30 to 47 percent of the total calories supplied by the formula. The fatty acid distribution in several formulas was similar to that of fat in human milk. Linoleic acid, ranging from 13 to 53 percent, supplied from 5.7 to 24 percent of total calories. The infants' requirements for lineolic acid (2.7 percent of total calories) would be adequately satisfied by any of the commercial formulas. No significant level of *trans* fatty acid isomers was found in any commercial formula. Infant cereals had low levels of fat, with 21 to 49 percent of the fatty acids being linoleic acid.

INFLUENCE OF DIETARY FAT AND CHOLESTEROL ON MILK LIPIDS AND ON CHOLESTEROL METABOLISM IN THE RAT. M. H. Green, E.L. Döhner, and J.B. Green (Nutrition Program, The Pennsylvania State University, University Park, PA 16802) *J. Nutr. 111* (2):276-286 (1981). The experimental basis for a hypothesis of Reiser and Sidelman that cholesterol intake early in life is inversely related to an animal's subsequent hypercholesterolemic response to dietary cholesterol was tested. Female rats (seven per group) were fed either a stock diet (group 1), a semisynthetic diet with 15% lard (group 2) or the semisynthetic diet with 15% lard and 1.5% cholesterol (group 3) from day 18 of gestation and during lactation. Plasma cholesterol concentration during lactation was significantly higher in group 3 dams, but there were no significant effects of maternal diet on milk cholesterol or triglyceride concentration. Pups had access to the dams' diets until weaning at 30 days of age. Plasma and liver cholesterol concentrations at weaning were significantly higher in pups from group 3 dams than in those from the other groups. All pups were fed a semisynthetic diet containing 10% lard and 0.5% cholesterol from 60 to 161 days of age. Plasma cholesterol concentration during this time was significantly lower in male pups from group 1 dams than in those from other dams. Plasma cholesterol concentration in female pups showed a similar trend and was, on the average, significantly higher in females than males. Pup liver cholesterol concentration after weaning was not significantly influenced by maternal diet. Thus, these data do not support the hypothesis that cholesterol intake in early life is inversely correlated with subsequent response to dietary induced hypercholesterolemia.

OCCURRENCE OF VITAMIN D SULFATE IN HUMAN MILK WHEY. B.W. Hollis, B.A. Roos, H. H. Draper, and P.W. Lambert (Endocrinology and Mineral Metabolism, VA Medical Center and School of Medicine, Case Western Reserve Univ., Cleveland OH 44106) *J. Nutr. 111* (2):384-390 (1981). Following reports that vitamin D sulfate is the major source of vitamin D activity in human milk, we investigated the presence of this compound in milk whey using a modification of techniques for the determination of vitamin D metabolites in plasma. Synthetic cholecalciferol sulfate, ergocalciferol sulfate and (^{3}H)cholecalciferol sulfate were prepared by reacting radioactive cholecalciferol or nonradioactive cholecalciferol or ergocalciferol with sulfamic acid in pyridine. The products were purified sequentially by Sephadex LH-20 and high pressure liquid chromatography. The purified products were chromatographically homogenous, exhibited an ultraviolet absorption spectrum identical to that of standard cholecalciferol, demonstrated a sulfonate ester linkage and upon saponification yielded the parent vitamin. Milk whey was extracted with methanol:methylene chloride (1:2, v/v) using (^{3}H)cholecalciferol sulfate to estimate recovery of the compound. The extract was purified by chromatography on silica cartridges and reverse phase high pressure liquid chromatography and was quantitated by ultraviolet absorption (UV). Although added cholecalciferol sulfate was readily detected in human milk whey samples, no endogenous vitamin D sulfate was found (detection limit 1 ng/ml). The results indicate that vitamin D sulfate is not a major source of vitamin D activity in human milk.

ASPIRIN PREVENTION OF CHOLESTEROL GALLSTONE FORMATION IN PRAIRIE DOGS. S.P. Lee, M.C. Carey and J.T. LaMont (Dept. of Med., Harvard Med. Schl., Boston, MA 02115) *Science 211* (4489):1429-4131 (1981). When prairie dogs *(Cynomys ludovicianous)* are fed a diet containing cholesterol, a marked increase in gallbladder mucin secretion parallels the evolution of cholesterol supersaturated bile. Gelatin of mucin precedes the precipitation of cholesterol liquid and solid crystals and the development of gallstones. Aspirin given to prairie dogs inhibited mucin hypersecretion and gel accumulation and prevented gallstone formation without influencing the cholesterol content of supersaturated bile. This suggests that gallbladder mucin is a nucleation matrix for cholesterol gallstones.

NUCLEAR UPTAKE OF SEX STEROID HORMONES IN THE CARDIOVASCULAR SYSTEM OF THE BABOON. H.C. McGill, Jr., and P. J. Sheridan (Depts. of Pathology and Anatomy, Univ. of Texas Health Science Center, San Antonio, Texas) *Cir. Res. 48* (2): 238-244 (1981). Cardiac and arterial tissues of six male and six female adult baboons were examined for nuclear uptake of tritiated 5-α-dihydrotestosterone (^{3}H-DHT) or tritiated estradiol-17β (^{3}H-E_2) by autoradiography. ^{3}H-DHT uptake occurred in nuclei of most atrial and ventricular myocardial fibers, no cardiac interstitial tissues, some arterial endothelial cells, most smooth muscle cells of the intima and inner arterial media, and a few smooth muscle cells of the outer arterial media. ^{3}H-E_2 uptake occurred in nuclei of a few atrial and ventricular myocardial fibers, many cardiac interstitial cells, occasional arterial endothelial cells, a few smooth muscle cells of the intima and inner arterial media, smooth muscle cells of the outer arterial media, and nearly all adventitial cells. These observations are consistent with other autoradiographic and biochemical findings which indicate that the heart and major arteries of several mammalian species contain androgen and estrogen receptors in distinctive patterns of distribution among muscle and connective tissue cells.

INFLUENCE OF WEED SEED OIL CONTAMINATION ON THE NUTRITIONAL QUALITY OF DIETS CONTAINING LOW ERUCIC ACID RAPESEED (*BRASSICA NAPUS*, TOWER CULTIVAR) OIL WHEN FED TO RATS. S.P. Rose, J.M. Bell, I.W.Wilkie, and H.B. Schiefer (Dept. of Animal and Poultry Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0) *J. Nutr. 111* (2):355-364 (1981). Oils from three samples of rapeseed screenings and a sample of stinkweed seeds *(Thlaspi arvense)* were added to Tower rapeseed oil at three levels (5, 10, and 15%). The contaminated Tower oils were fed at 20% (w/w) of a purified diet to male weanling Sprague-Dawley rats for 16 weeks. The screenings oils caused no increase in the focal myocardial lesion index or lipidosis of the rat hearts. Stinkweed oil gave a significant increase in myocardial lipidosis and a nonsignificant increase of the myocarditis index. These were attributed to an imbalance in the fatty acid composition of the Tower oil for the specific requirements of the growing rat. Screenings oil contamination had no significant effects on the feed intake or growth of the animals. The growth of rats fed stinkweed oil-contaminated diets was significantly lower than other treatments when it was adjusted for feed intake by analysis of covariance. No treatment effects on body organ weights nor on blood lipid parameters were observed. The presence of weed seed oils, at the highest levels likely to be encountered in low erucic acid rapeseed oil, was concluded to have no significant influence on its nutritional value.

THE TURNOVER OF PLASMA GLUCOSE AND FREE FATTY ACIDS *IN VIVO* AFTER PORTACAVAL ANASTOMOSIS AND CHRONIC UNDERFEEDING IN THE RAT. G. S. Sarna, V.J. Cunningham, S. Tucker and J.E. Cremer (MRC Toxicology Unit, MRC Laboratories, Carshalton, Surrey, U.K.) *Clinical Science 60* (1): 87-93 (1981). The metabolic status of rats after end-to-side portacaval anastomosis and the extent to which this differs from sham-operated pair-fed rats consistently matched the weights of animals with a portacaval anastomosis at different times after the operation, whereas liver weights were significantly reduced in anastomosed animals as compared with the other groups. Plasma glucose, insulin and the irreversible disposal rates for plasma glucose were similarly and significantly reduced for animals with a portacaval anastomosis and sham-operated pair-fed animals as compared with sham-operated fed control rats. In contrast, plasma free fatty acid levels were significantly higher in animals with a portacaval anastomosis as compared with both sham-operated fed control and sham-operated pair-fed groups of animals. Plasma β-hydroxybutyrate levels were similar in sham-operated fed control rats and animals with a portacaval anastomosis. Pair-fed values were three to four times greater than sham-operated fed control values and after portacaval anastomosis. The rat with an end-to-side portacaval anastomosis may be characterized to be in a metabolic state equivalent to a chronically underfed animal in terms of reduced glucose turnover and plasma insulin concentrations but differs in respect to plasma free fatty acid turnover and plasma β-hydroxybutyrate concentrations.

EFFECT OF A LONG-TERM FAT-MODIFIED DIET ON SERUM LIPOPROTEIN LEVELS OF CHOLESTEROL AND TRIGLYCERIDE IN PATIENTS ON HOME HAEMODIALYSIS. V.J. Wass, R.J. Jarrett, V. Meilton, M. K. Start, M. Mattock, C.S. Ogg and J.S. Cameron (Departments of Nephrology, Metabolic Medicine and Dietetics, Guy's Hospital, London SE1 9RT) *Clinical Science 60* (1):81-86 (1981). Changes in serum total and lipoprotein fraction triglyceride and cholesterol levels were studied in 24 adults on home haemodialysis. Half the patients were randomly allocated to a low cholesterol (mean 200 mg/day), fat-modified diet (mean polyunsaturated/saturated fat ratio of 1.0 with a mean of 43% of the total energy

content derived from fat). Before dietary manipulation, triglyceride levels in all lipoprotein fractions were significantly higher than in a control group of age and sex matched normal subjects. Total cholesterol, very-low-density-lipoprotein (VLDL) and low-density lipoprotein (LDL) cholesterol were also significantly raised, but high-density-lipoprotein (HDL) cholesterol was normal. In the patients on a fat-modified diet triglyceride levels did not alter in any of the lipoprotein fractions. Total cholesterol and LDL cholesterol levels fell significantly into the normal range but VLDL and HDL cholesterol levels did not change. Hypertriglyceridaemia is the most common lipid abnormality in patients with renal failure and a long-term fat-modified diet is, therefore, of limited therapeutic importance in these patients unless there is a low HDL/LDL cholesterol ratio.

Fats and oils

LATIN AMERICAN SOILS AND OIL PALM GROWING. A. Lauzeral, *Oléagineux*, 1980, 35, N° 11, p. 477-490. The oil palm can be grown in Latin American from the South of Mexico to the North of Paraguay. Inside this vast zone there are many soil types; the author has concentrated on describing the main ones, which bear or are apt to bear oil palms. Of course each soil type has specific characteristics which call, before and after planting, for various improvement work (draining, irrigation, methods of cultivation, road networks). Some physical particularities of the soil are indicated, as well as their main chemical compositions on which manuring depends. Given the close connection between water deficit and yield, the author has drawn up a graph for oil palm performance on the main types of soil under study.

THE WORLD COCONUT SITUATION AND OUTLOOK. *Oléagineux* 1980, 35, N° 11, p. 495-505 F.A.O. The world produces some 35 million tons of coconuts a year, mostly in Asia. In all producing countries, coconuts form an important part of the diet in addition to being—for several of them—an important source of export earnings. After having stagnated during the 1960's, world corpora production has trended upwards and is currently in the region of 4.9 million tons. But with this increase came a higher degree of instability mainly because, with time, a growing share of world production has become concentrated in the Philippines where—more than in other countries—output is periodically affected by droughts and typhoons. The production uptrend will continue, especially in the Philippines where the coconut acreage increased rapidly. World copra output is projected by F.A.O. at 6 million tons in 1985. With growing output, world trade in copra/coconut oil/copra cake has also risen, and its traditional instability has become more accentuated. The Philippines has increased its share in this trade considerably since the 1960's, and is expected to rise it further. Trade could become more unstable unless special policy measures are taken. Coconut oil remains one of the most important single products among the many fats and oils, and the long-term outlook is for it to maintain its relative importance in world output of all oils. Copra cake plays a less important part in total oilmeal supplies. Developed countries—particularly Western Europe and the United States—account for the bulk of world imports of copra, coconut oil and copra cake. Indonesia—a former major exporter—has recently turned into a sizeable importer of copra. Coconut oil is vulnerable to substitution for most edible and inedible uses. However, its special qualities enable it to retain a distinct advantage for certain end-uses. Consumers are prepared to pay a premium for these purposes, although, if prices remain high for a long period, substitutes will be sought. But if available supplies exceed a certain quantity, prices for coconut oil, relative to other fats and oils, become low. The amount required for special « premium-paying » uses is probably increasing not only because of the natural long-term increase in demand but also because sharply escalating petroleum prices appear to be making more attractive the use of natural oils, instead of petroleum, for the manufacture of a number of products. This would contribute to support prices of coconut oil and other vegetable oils.

EFFECT OF CALCIUM AND SULPHUR AND CERTAIN MINOR NUTRIENT ELEMENTS ON THE GROWTH, YIELD AND QUALITY OF GROUNDNUT (ARACHIS HYPOGAEA L.) S. Chandra Sekhara Reddy and S. V. Patil. *Oléagineux* 1980, 35, N° 11, p. 507-510. In addition to major nutrients, N, P, K, the effect of secondary elements calcium and sulphur and also the minor nutrients, Fe, Zn, B and Mo were tested on the Spanish improved groundnut variety. The treatments, addition of 100 kg elemental sulphur and 1 kg ammonium molybdate per hectare to the soil enhanced not only the general vigour of the plant but also the final pod and kernel yields. Sulphur also enhanced the oil yield per hectare. Though the soils were rich in calcium content, response to top dressing of gypsum (1000 kg/ha) at 30 days age of the crop was remarkable. The elements Fe and Zn showed little positive response while the effect of boron was negative. The reasons underlying these results are briefly discussed in this paper.

AGING IN RELATION TO LIPIDS: LIPOPEROXIDE, ESSENTIAL FATTY ACIDS, VITAMIN E. . . .K. Fukuzumi. *Oléagineux* 1980, 35, N° 11, p. 511-514. In the papers on lipoperoxides and geriatric diseases published in 1965 and 1969, the author described the phenomena of aging. The author recently proposed « lipoperoxide theory » to be able to elucidate reasonable almost all phenomena of aging, and now presents a possible mechanism for the coloring of lipofuscin, a kind of senile pigments. Lipoperoxide, essential fatty acids, vitamin E, etc. are stated, from the viewpoint of retarding aging. To inhibit aging, antioxidants, such as vitamin E: synergists, such as vitamin C and nucleic acids; radical scavengers; and destroyers of lipoperoxides, such as glutathione peroxidase; should be taken in accordance with « lipoperoxide theory ».

SOME THINKINGS ABOUT THE PRIVATE RESEARCH IN FRENCH AGRICULTURAL AND FOOD INDUSTRY. J.-P. Helme. Rev. Franc. Corps Gras, vol. 28, n° 1, 1981. p. 3-7. french. RFCG 81-01. The research in french agricultural and food industry is triple: fundamental, applied, for development. It is directed to several objects: new processes, new products, analytical research, mechanization and automatization of manufactures. Examples of industrial realizations are given; a collaboration between the private and public research is wished.

INFLUENCE OF ORIGIN AND CONSERVATION STATE ON THE TRITERPENE DIALCOHOLS RELATIVE CONTENT OF UNTREATED OLIVE OILS. II. PRESSED OILS FROM TUNISIA. V. Paganuzzi. Rev. Franc. Corps Gras, vol. 28, n° 1, 1981, p. 9-12, french, RFCG 81-02. The triterpene dialcohols (erythrodiol and uvaol) relative content of 211 Tunisian pressure olive oils has been determined and statistically analyzed versus three different parameters—acidity, K_{270} and ΔK connected with the conservation degree of the oil. The main results are : all the oils examined comply with the 5% forensic limit provided for by official Italian standards; the erythrodiol and the uvaol relative contents show a generally significant trend to rise as the oil conservation state gets worse; the mentioned contents in Tunisian oils are generally lower than in Spanish ones.

STUDY ON THE CRYSTALLIZATION OF PLASTIC FATS. VI. INFLUENCE OF PARTIAL GLYCERIDES AND PHOSPHATIDES IN ABSENCE AND IN PRESENCE OF WATER. B. CASE OF SOYBEAN LECITHINS. E. Sambuc, Z. Dirik, G. Reymond and M. Naudet. Rev. Franc. Crops Gras, vol. 28, n° 1, 1981, p. 13—19, french, RFCG 81-03. The influence of soybean lecithins on the spontaneous solidification of different model fats (hydrogenated sunflower oil, palm oil, coconut butter, with shaking, has been studied in absence and in presence of water. The lecithins added to a dry fat don't affect the crystallization, but, in presence of water, delay it clearly. Not only the crystallization begins latest, but particularly the surfusion phenomena are exalted.

COMPUTER EXPLOITATION OF SCIENTIFIC AND TECHNICAL DATEBASES BY TERMINAL IN FAT AND OIL FIELD. F. Joly. Rev. Franc. Corps Gras, vol. 28, n° 1, 1981, p. 21-25, french, RFCG 81-04. The use of computer to exploit bibliographic databases is becoming very important. After a general review of information retrieval systems, two pratical examples are given in fat and oil field. These search systems are not very expensive. Advantages and disadvantages of these systems are presented.

MOLECULAR STRUCTURE AND INTERACTION OF DIPALMITOYL PHOSPHATIDYLCHOLINE IN MULTI-LAYERS. Comparative study with phosphatidylethanolamine. H. Akutsu, M. Ikematsu, and Y. Kyogoku (Institute for Protein Research, Osaka University, Suita Osaka 565, Japan) *Chem. Physics Lipids* 28 (2):149-158 (1981). As a model of phospholipid bilayers in solid an oriented multilayer film (built-up film) of L-α-dipalmitoyl phosphatidylcholine (DPPC) was prepared from the monolayer of the dipping method. Structural analysis has been carried out by measuring infrared dichroism of the built-up film. The results were compared with those of the built-up film of L-α-dipalmitoyl phosphatidylethanolamine (DPPE). The tilting of the hydrocarbon chains is larger for DPPC than for DPPE. The orientation of the bisector of the two non-esterified P-O bonds is closer to the film plane for DPPC than for DPPE. The strong hydrogen bonding interaction between the polar head groups was shown for DPPE, but not for DPPC. These features resemble the structural differences between dilauroyl phosphatidylethanolamine (DLPE) and dimyristoryl phosphatidylcholine (DMPC) in crystals. The hydrogen bonding interaction of DPPE found in solid remains even in the presence of water, namely, in the gel state. More closed packing of the hydrocarbon chains of solid DPPE than DPPC in solid was concluded on the basis

of infrared and Raman spectra.

DIMORPHISM IN BILE SALT/LECITHIN MIXED MICELLES. W.J. Claffey and R. T. Holzbach (GI Res. Unit, Cleveland Clin. Fnd., Cleveland, OH 44106) *Biochemistry 20* (2):415-418 (1981). We investigated the dependence of certain properties of bile salt/lecithin mixed micelles on the molar ratio of the two components. UV absorption suggested that the micellar system is fundamentally altered on passing through a bile salt:lecithin molar ratio of 1.8:1. Differential scanning calorimetry confirmed this transition ratio; in addition, it indicated a bilayer arrangement of lecithin, in support of the mixed-disk model of micellar structure, but only for micelles having a molar ratio less than 1.8:1. For micelles having larger ratios, which are those of physiological interest, calorimetry was inconsistent with the mixed-disk model. These observations support the X-ray structure analysis of Müller.

SYNTHETIC CATION TRANSPORT PEPTIDES: CALCIUM TRANSPORT ACROSS PHOSPHOLIPID MEMBRANES. C. M. Deber, M.E.M. Young, and J. Tom-Kun (Research Institute, Hospital for Sick Children, Toronto M5G 1X8, Ontario, Canada) *Biochemistry 19* (26):6194-6198 (1980). Molecular aspects of peptide-mediated calcium transport are examined through the study of the cation transport properties of a series of synthetic cyclic octapeptides. These peptides contain central binding cavities of geometry and dimensions similar to calcium-binding sites in proteins. Transport in Pressman cells ("thick liquid membranes") demonstrated the ionophorous activity of the synthetic peptides. Cation competition studies further showed that cyclo[Glu(OBz)-Sar-Gly-(N-cyclohexyl)Gly]$_4$ (CYCLEX-2E) is essentially a calcium-specific transport peptide whenever calcium is present. When the CYCLEX-2E peptide was added to a suspension of $^{45}Ca^{2+}$-loaded sonicated phosphatidylcholine (PC) vesicles in a dialysis sac, the vesicles were completely emptied of internal calcium. Controls using [^{14}C] sucrose established that CYCLEX-2E caused no nonspecific membrane damage. Calcium efflux experiments using several salts of calcium (including $^{36}Cl^-$, [^{14}C] acetate, [^{14}C] succinate, and $^{35}SO_4^{2-}$) suggested that these anions do not specifically accompany the Ca^{2+}-peptide active transporting species across the phospholipid membrane. However, when $^{45}Ca^{2+}$-loaded PC vesicles were suspended in metal-free buffer and treated with CYCLEX-2E peptide, calcium efflux did not occur until calcium or sodium chloride was added to the external medium.

COMPARATIVE LATERAL DIFFUSION OF FLUORESCENT LIPID ANALOGUES IN PHOSPHOLIPID MULTIBILAYERS. Z. Derzko and K. Jacobson (Dept. of Experimental Pathology, Roswell Park Memorial Institute, Buffalo, New York 14263) *Biochemistry 19* (26):6050-6057 (1980). The method of fluorescence recovery after photoblasting (FRAP) has been used to measure the lateral diffusion coefficient (D) of the following fluorescent lipid probes in lipid multibilayers: carbocyanine dyes with fatty acid chains varying from 6 to 18 carbon atoms; fluorescently labeled phosphatidylcholine, phosphatidylethanolamine, and lysophosphatidylethanolamine; and fluorescently labeled fatty acid derivatives. Measurements were made in dimyristolyphosphatidylcholine (DMPC), dipalmitoylphosphatidylcholine (DPPC), brain phosphatidylserin (PS), and egg phosphatidylcholine (EPC) multibilayers. Significant differences in the lateral diffusion of analogues were found when bilayers of different composition were compared at the same reduced temperature. Diffusion in longer chain natural phospholipid (EPC, PS) bilayers was significantly slower than in shorter chain saturates (DMPC, DPPC). On the other hand, diffusion in DPPC bilayers was faster than in DMPC membranes which correlates with the greater lateral expansion of DPPC compared to DMPC bilayers above their respective transitions. Below the transition temperature of DMPC and PS multibilayers, the FRAP kinetics are generally best fitted by two diffusion coefficients. The slow component may be true bulk gel-phase lateral diffusion while the fast component may be associated with transport along numerous defects apparent in the gel phase.

LIPIDS OF SYNAPTIC VESICLES: RELEVANCE TO THE MECHANISM OF MEMBRANE FUSION. J. W. Deutsch and R. B. Kelly (Dept. of Biochem. and Biophys., Univ. of California, San Francisco, California 94143) *Biochemistry 20* (2):378-385 (1981). Synaptic vesicles from the electric organ of the marine ray *Narcine brasiliensis*, purified to at least 90% homogeneity, were analyzed for the lipid and fatty acid content of their membranes. The major lipids (mol%) were phosphatidylcholine (32.3%), phosphatidylethanolamine (20.5%), phosphatidylserine (6.1%), sphingomyelin (3.0%), and cholesterol (33.3%), a composition which did not differ greatly from that of the parent electric organ. While the number of double bonds per fatty acid molecule was similar for both synaptic vesicle and whole electric organ phospholipids, the vesicles were highly enriched in docoahexenoic acid (22:6). Reaction with the amine labeling reagents isethionylacetimidate and trinitrobenzensulfonic acid indicated that 40% of the phosphatidylserine and 60% of the phosphatidylethanolamine are present on the external (cytoplasmic) surface of the synaptic vesicle. These data on a natural fusing membrane have relevance to models of membrane fusion, which have been based largely on studies of in vitro fusion using synthetic membranes.

A DENSITOMETRIC STUDY OF THE EFFECTS OF FREE FATTY ACIDS ON THE PHASE TRANSITION OF DIMYRISTOYLPHOSPHATIDYLCHOLINE BILAYERS. D. Folor and R.M. Epand (Department of Biochemistry, McMaster University, Hamilton, Ontario L8N 3Z5, Canada) *Chem. Physics Lipids 28* (2):159-164 (1981). The technique of scanning densitometry was applied to a study of the effect of fatty acids on the packing and phase transition properties of dimyristolyphosphaticylcholine (DMPC). It was observed that the three fatty acids studies, i.e. palmitic, palmitoleic and behenic, had the effect of broadening the phase transition and increasing the extent of the change in volume which occurs at the phase transition. Palmitic and behenic acids broaden the phase transition toward higher temperatures while palmitoleic broadens it towards lower temperatures.

RAMAN SPECTROSCOPIC STUDY OF THE INTERACTIONS OF DIMYRISTOYL- AND 1-PALMITOYL-2-OLEOYLPHOSPHATIDYLCHOLINE LIPOSOMES WITH MYELIN PROTEOLIPID APOPROTEIN. F. Lavialle and I. W. Levin (Lab. of Chemical Physics, National Institute of Arthritis, Metabolism and Digestive Diseases, National Institutes of Health, Bethesda, Maryland 20205) *Biochemistry 19* (26):6044-6050 (1980). Recombinants of dimyristoylphosphatidylcholine (DMPC) and 1-palmitoyl-2-oleoylphosphatidylcholine (POPC) with myelin proteolipid apoprotein prepared in an aqueous medium were investigated by vibrational Raman spectroscopy. On completion of the phase transition at 15°C, the intramolecular chain disorder is substantially greater compared to that of the pure bilayer form. In addition, no further development of gauche conformers along the chain is apparent as the temperature increases. For the temperature profile derived from the C-H stretching region parameters of DMPC, the phase transition temperature is shifted from 23 to 11°C. The intermolecular disorder in both the gel and liquid-crystalline states is significantly greater in the recombinant systems in comparison to that in the pure liposomes. Temperature profiles obtained from recombinants prepared with unsaturated phospholipid bilayers (POPC) indicate that the apoprotein only slightly perturbs the inter- and intramolecular parameters describing the lipid matrix. The increased intermolecular disorder exhibited by the pure and reconstituted DMPC systems is discussed in terms of the diffusion properties exhibited by saturated and unsaturated lipid matrices. Within the precision of the Raman experiment, no evidence on the vibrational time scale exists for a boundary lipid.

FATTY ACIDS, PART 22: INFRARED AND RAMAN STUDIES OF ALL POSITIONAL ISOMERS OF FURNA-CONTAINING C_{18} FATTY ESTERS. M.S.F. Lie Ken Jie, C.H. Lam, and S.C. Wong (Department of Chemistry, University of Hong Kong, Pokfulam Road, Hong Kong) *Chem. Physics Lipids 28* (2):189–196 (1981). The infrared and Raman spectra of all 2,5-disubstituted C_{18} furanoid fatty esters were studied. Where the furan system was located at the end of the alkyl chain or conjugated to the carbomethoxy group, such positional isomers could be readily identified through their unique absorption features in the infrared and Raman spectra. Other positional isomers of the series gave less differentiating spectral absorption characteristics.

SYNTHESIS OF C_{19}-FUNCTIONALIZED 7-DEHYDROCHOLESTERYL DERIVATIVES. PHOTOCHEMICAL TRANSFORMATION TO VITAMIN D_3 ANALOGUES. R. M. Moriarty and H.E. Paaren (Department of Chemistry, University of Illinois at Chicago Circle, Chicago, Illinois 60680) *J. Org. Chem. 46* (5):970-977 (1981). A series of C_{19}-substituted 7-dehydrocholesterol derivatives has been prepared in which the C_{19} substituent is hydroxyl, acetoxyl, methoxyl, or aldehydo. These compounds are cholesta-5,7-diene-3β,19-diol (4), cholesta-5,7-diene-3β,19-diol diacetate (3), cholesta-5,7-diene-3β,19-diol 3-acetate 19-methyl ether (19) and 3β-methoxycholesta-5,7-dien-19-al (10). In each case the synthesis proceeded from a Δ^5 system. Then the derived tosylhydrazone was decomposed with lithium hydride to introduce the $\Delta^{7,8}$ double bond to complete the ring-B diene synthesis. Irradiation of 3 followed by thermally induced hydrogen migration yields the vitamin D_3 analogue with E stereochemistry at the C_{19} position. Likewise, photochemical ring-opening of 19 followed by the thermal hydrogen transfer yielded purely the C_{19} E isomer. This stereoselectivity is discussed. Irradiation of 4 proceeded with loss of the C_{19} functionality to yield 19-norcholesta-5(10),7-dien-3β-ol. The chiroptical effects of the homoannular cisoid dienes occurring in this study are

discussed in terms of the diene quadrant rule.

A KINETIC AND STRUCTURAL STUDY OF TWO-STEP AGGREGATION AND FUSION OF NEUTRAL PHOSPHOLIPID VESICLES PROMOTED BY SERUM ALBUMIN AT LOW PH. S. Schenkman, P. Soares De Araujo, A. Sesso, F. H. Quina, and H. Chaimovich (Group for Interfacial Studies, Dept. de Bioquimica, Instituto de Quimica, Universidade de Sao Paulo, Caixa Postal 20.780, Sao Paulo,

DETERMINATION OF THE TRANS-ISOMERS IN THE FATS BY THE METHOD OF LIQUID FILMS. Ts. F. Paper et al. *Pishtchevaya Technol.* 1979 (6), 111-3. (Rev. Franc. Corps Gras)

Drying oils and paints

A SURFACE COATING BASED ON DEHYDRATED CASTOR OIL. PART 2: DIELECTRIC PROPERTIES. B.M. Badran, I.M. El-Anwar and M.S. Ibrahim (National Research Centre, Dokki, Cairo, Egypt) *J. Oil & Color Chemists Assn.* 63, 427 (1980). The dielectric constant and dielectric loss of styrenated dehydrated castor oil (styrenated DCO) (5, 10, 15, and 30 per cent styrene, by weight of oil) were measured within the frequency band 10^5 to 10^7 Hz and at a temperature in the range 10 to 50° C. Two styrenated DCO adducts (10 and 30 per cent styrene) were chosen as a base for the preparation of varnish films because of their lower power factors. The two styrenated DCO's were epoxidised *in situ* and it was found that the vibration of the epoxide groups plays an important role in the relaxation process, where the relaxation times increase and the activation enthalpies decrease. Varnish films were prepared and the values of their power factors found to vary in the range 0.02 to 0.04 throughout the whole range of frequency and temperatures.

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