abstracts

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ABSTRACTORS: N. E. Bednarcyk, J. E. Covey, J. C. Harris, S. F. Herb, F. A. Kummerow, T. Mares, B. Matijasevic, E. G. Perkins, and R. W. Walker

• Fats and Oils

SECONDARY PRODUCTS FROM THE RADIOLYSIS OF TRICAPROIN. P.R. LeTellier and W.W. Nawar (Dept. of Food Sci. and Nutr., Univ. of Mass., Amherst, Mass. 01002). *J. Agr. Food Chem.* 22, 693-6 (1974). Tricaproin has been used as a model system to study the radiolysis of simple triglycerides. In addition to the primary radiolytic fragments and the recombination products reported earlier, certain compounds believed to result from more than one cleavage in the same parent molecule, or from the decomposition of some primary intermediates, were classified as "secondary radiolytic products." In the present report, the identification and mode of formation of these compounds are discussed.

INOSITOL PHOSPHORYLCERAMIDE, A NOVEL SUBSTANCE AND THE CHIEF MEMBER OF A MAJOR GROUP OF YEAST SPHINGOLIPIDS CONTAINING A SINGLE INOSITOL PHOSPHATE. S.W. Smith, and R.L. Lester (Dept. of Biochem. College of Med., Univ. of Ky., Lexington, Ky. 40506). *J. Biol. Chem.* 249, 3395-405 (1974). About one-third of the nondeacylatable phospholipids in *Saccharomyces cerevisiae* have been shown to be a group of sphingolipids with a single phosphoinositol moiety. This group of lipids was obtained richly concentrated in high yield by several simple steps involving differential solubility. Four components of this group were further purified by liquid chromatography on base-treated porous silica beads. The major component of this group proved to be the novel substance, inositol phosphorylceramide, the ceramide consisting of hydroxysphinganine and a hydroxy C-26 fatty acid. Two other inositol phosphorylceramides were purified which differed from the major component in their ceramide moieties. Data obtained with cells uniformly labeled with [^{3}H]-inositol suggest that all significant (>1% lipid ^{3}H) inositol-containing lipids in yeast have now been chemically characterized.

A RAPID TECHNIQUE FOR EXTRACTION OF YOLK CHOLESTEROL. K.W. Washburn and D.F. Nix (Dept. of Poultry Sci., Univ. of Ga., Athens, Ga. 30602). *Poultry Sci.* 53, 1118-22 (1974). Modifications were made in the Folch (1956) procedure of extraction of cholesterol to obtain a simpler, more rapid extraction of egg yolk cholesterol with no loss of accuracy and repeatability. In the modified extraction procedure 15 ml. of 2:1 chloroform-methanol was added to 1 gm. egg yolk, the sample shaken by hand, 5 ml. of H_2O added and the sample again shaken by hand. After centrifugation, the removal of the aqueous-methanol layer and filtration of the chloroform layer, the cholesterol content of samples was determined. The amount of cholesterol extracted and recovered by the modified technique was significantly higher than when the original extraction procedure was used. The increased extraction was due both to the smaller volume of chloroform-methanol used in emulsification and to the method of shaking. Substitution of KCL solution for water, or addition of sodium sulfate appeared to have no effect on the cholesterol extracted. The coefficient of variability for extractions obtained by the modified method was 9.8% compared to 29.0% for extraction obtained by the original procedure.

COMPOSITION OF LECITHIN AND POSSIBILITIES OF ITS USE IN COSMETIC PREPARATIONS. H. Rebmann. *Seifen-Öle-Fette-Wachse* 100(14), 343-6 (1974). The chemical properties, cosmetic effect and applications of lecithin are dealt with, and examples with recommended formulas are given.

• Edible Proteins

PROTEIN FIBER FORMING. R.A. Hoer (Ralston Purina Co.). *U.S. 3,821,453.* Tender textured protein structures are continuously formed from an aqueous slurry of a proteinaceous material containing up to 35% solids by heating the slurry under pressure and then cooling it. The texture of the protein structures can be controlled by the process conditions, starting material or reagents used in the process.

PREPARATION OF EDIBLE PROTEIN FROM LEAFY GREEN CROPS. E.M. Bickoff and G.O. Kohler (U.S. Secy. of Agr.). *U.S. 3,823,128.* Juice obtained from alfalfa or other leafy green crops is treated to isolate a protein fraction useful for supplementing low protein foods. A feature of the process is the application of treatments to remove a highly pigmented chloroplastic protein fraction and then to precipitate a protein fraction free from chlorophyll and other pigments.

• Biochemistry and Nutrition

SERUM LIPIDS OF YOUNG SHOW RACER AND WHITE CARNEAU PIGEONS FED A SEMIPURIFIED DIET WITH OR WITHOUT CHOLESTEROL. F. Young (Dept. of Food and Nutr. Sci., Univ. of Hawaii, Honolulu, Hawaii 96822). *J. Nutr.* 104, 719-25 (1974). Six-week-old Show Racer (SR) and White Carneau (WC) pigeons were fed a semipurified diet with or without cholesterol. The birds were autopsied after 0, 6, 12, 18, and 24 weeks of feeding. The aortas were examined and graded for atherosclerotic lesions. Serum concentrations of cholesterol, tryglyceride, and phospholipid were determined. Aorta atherosclerotic lesions were observed only in WC fed the cholesterol-containing diet for 12 to 24 weeks. In contrast to earlier reports by others, significant differences in serum cholesterol, triglyceride, and phospholipid levels were observed between SR and WC fed basal diet without cholesterol. Such differences occurred only after 6 and/or 12 weeks of experimental feeding with the SR exhibiting lower levels of all three classes of lipids. The aortas of the SR, even under hypercholesteremic condition, were normal. It could be concluded from this study that differences in lipid metabolism exist between these two breeds of pigeons. In these experiments hypercholesteremia proved to be a necessary but not sufficient pathogenic factor in atherogenesis. The additional "sufficient factor" in this context was the genetic background.

EFFECT OF DIETARY FATS AND FATTY ACIDS ON THE LIVER LIPID ACCUMULATION INDUCED BY FEEDING A PROTEIN-REPLETION DIET CONTAINING FRUCTOSE TO PROTEIN-DEPLETED RATS. Yoritaka Aoyama, Akira Yoshida and Kiyoshi Ashida (Lab. of Nutr. Biochem., Dept. of Agr. Chem., Nagoya Univ., Furo-cho, Chikusa, Nagoya, Japan). *J. Nutr.* 104, 741-6 (1974). After consuming a protein-free diet for 14 days, rats fed a protein-repletion diet containing 35% fractose and 34.9% glucose as the carbohydrate sources and 0.1% corn oil accumulated liver lipids, but rats fed a diet containing 69.9% glucose as the sole carbohydrate source did not accumulate liver lipids. The fatty liver induced by feeding the protein-repletion diet was prevented by the addition of corn oil (9.9%), safflower oil (9.9%), or lard (19.9%). In the next experiments, the effects of various fatty acids on the liver lipid content of rats fed the protein-repletion diet containing 35% fractose and 34.9% glucose were studied. It was found that only linoleic acid (3%) was effective in preventing the liver lipid accumulation, whereas capric acid (3%), lauric acid (3%), myristic acid (3%), palmitic acid (3%), stearic acid (3% or 10%), oleic acid (3% or 10%), elaidic acid (3%) or arachidic acid (3%) had no effect on the fatty liver induced by fructose feeding. Thus, a possible explanation of these data concerning the formation of fatty liver induced by fructose-feeding following protein-depletion is that the fructose stimulated fatty acid synthesis.

EFFECT OF DIETARY FAT ON THE RELEASE RATE OF CHOLESTEROL FROM SWINE ERYTHROCYTES. Shu-Jen Chang Yeh, T. Mizuguchi and F.A. Kummerow (Burnsides Res. Lab., Univ. of Ill., Urbana, Ill. 61801). *Proc. Soc. Exp. Biol. Med.* 146, 236-40 (1974). Three groups of swine were fed for 8 mo. the basal ration; the basal ration plus 17% corn oil or the basal ration plus 17% hydrogenated fat which contained 50% *trans* fatty acids (margarine base stock). The cholesterol content in the

plasma was higher in those fed hydrogenated fat diet as compared to those fed the basal or corn oil. However, the cholesterol content in the erythrocytes appeared to be constant regardless of dietary fat. Different dietary fats resulted in considerable differences in the total fatty acid patterns of the plasma and erythrocyte lipids. The release rate of cholesterol from the erythrocytes obtained from swine fed the different dietary fats was compared from cholesterol specific activity changes vs time. The results indicate that the time required to reach 50% equilibration for the erythrocytes and plasma from those fed corn oil, basal diet, and hydrogenated fat was: 1.24, 1.32, and 1.98 hr; respectively. A possible explanation for the slower release rate of cholesterol in those fed hydrogenated fat was given.

NEW CYCLOPENTENYL FATTY ACIDS IN FLACOURTIACEAE. STRAIGHT-CHAIN FATTY ACIDS AND CYCLIC FATTY ACIDS IN LIPIDS DURING MATURATION OF THE SEEDS. F. Spener and H.K. Mangold (Bundesanstalt für Fettforschung, Inst. für Technologie und Biochem., Germany). *Biochemistry* 13, 2241–8 (1974). In the course of a study on the biosynthesis and metabolism of cyclopentenyl fatty acids in Flacourtiaceae the structures of the unsaturated straight-chain fatty acids occurring in the seed lipids of *Caloncoba echinata* and *Hydnocarpus anthelminthica* were determined. The monounsaturated straight-chain fatty acids were found to be mixtures of positional isomers whereas the polyunsaturated straight-chain fatty acids were almost exclusively linoleic and α-linolenic acids. A structural relationship between unsaturated straight-chain and cyclopentenyl fatty acids could not be recognized. Oxygenated fatty acids were not detected. Several new cyclopentenyl fatty acids were isolated and their structures were elucidated. In *C. echinata*, *H. anthelminthica*, and *H. wightiana*, 15-(2-cyclopenten-1-yl)pentadecanoic acid, "hormelic acid," and 15-(2-cyclopenten-1-yl)-8-pentadecenoic acid, "oncobic acid," were detected in addition to 13-(2-cyclopenten-1-yl)-9-tridecenoic acid, an isomer of gorlic acid. In *C. echinata* only, 11-(2-cyclopenten-1-yl)-6-undecenoic acid, "manoaic acid," and the Δ^4 and Δ^9 isomers of this acid were found. Cyclopentenyl fatty acids were predominantly found in triacylglycerols; however, they occurred also in the phospholipids and glycolipids.

EFFECTS OF COLD EXPOSURE ON HEART CLEARING FACTOR LIPASE AND TRIGLYCERIDE UTILIZATION IN THE RAT. M.P. Rogers and D.S. Robinson (Dept. of Biochem., Univ. of Leeds, England). *J. Lipid Res.* 15, 263–72 (1974). The clearing factor lipase activity of the rat heart was measured in animals kept at 4C for several hours and was compared with that in control animals kept at 25C. The total activity of the enzyme in the heart increased markedly on exposure to the low temperature, whether the animals were in a fed or a fasted state. The activities of both the heparin-releasable and the heparin-nonreleasable enzyme fractions were usually raised. However, only increases in the former could be correlated satisfactorily with corresponding increases in the capacity of the heart to utilize chylomicron triglyceride fatty acids perfused through it. Cold exposure also raised the plasma clearing factor lipase activity and reduced the plasma triglyceride concentration. These changes may have been due, at least in part, to the alterations in the activity of the tissue enzyme.

TRANSFORMATION OF 5α-CHOLEST-7-EN-3β-OL TO CHOLESTEROL AND CHOLESTANOL IN CEREBROTENDINOUS XANTHOMATOSIS. G.S. Tint and G. Salen (Gastroenterology Sections, Veterans Admin. Hosp., New York 10010). *J. Lipid Res.* 15, 256–62 (1974). The metabolism of Δ^7-cholestenol, cholesterol, and cholestanol was examined in a patient with cerebrotendinous xanthomatosis after intravenous pulse-labeling with a mixture of DL-[2-^{14}C] mevalonate and stereospecific 3S,4S,3R,4R-[4-^{3}H]-mevalonate. Silver nitrate and reversed-phase thin-layer chromatography were used to purify the sterols isolated from the feces, and their identities were confirmed by gas-liquid chromatography-mass spectrometry. The specific activities were determined and plotted as a function of time. Isotope ratio measurements and specific activity decay curves showed that sterol synthesis proceeded in the following sequence: mevalonate, squalene, lanosterol, Δ^7-cholestenol, cholesterol and cholestanol. Labeled cholesterol precursors might be advantageously used to measure changes in cholesterol synthesis because they appear to equilibrate rapidly and have very short turnover times.

STERYL ESTERS AND THEIR RELATIONSHIP TO NORMAL AND DISEASED HUMAN CENTRAL NERVOUS SYSTEM. R.B. Ramsey and A.N. Davison (Dept. of Neurochem., Inst. of Neurology, Natl. Hosp., Queen Square, London WC1N3BG, England). *J. Lipid Res.* 15, 249–55 (1974). The composition and distribution and steryl esters in human diseased or developing brain tissue has been studied. The abnormal brain conditions included sudanophilic leukodystrophy, multiple sclerosis plaque, subacute sclerosing panencephalitis, and an old cerebral infarction and two types or brain-derived tumors. In addition to the above abnormal tissue, steryl esters were also examined in developing and normal adult human brain. It was found upon subcellular fractionation that the steryl ester was localized mainly in the soluble nonparticulate material. A cholesteryl ester-rich fraction, floating on top of distilled water after centrifugation, was recovered only in the developing brain or in instances where there was myelin damage. The sterol portion of the steryl ester was largely cholesterol. The fatty acid moiety was mainly composed of C_{16}, C_{18} and C_{20} fatty acids. The dominant fatty acid was oleic acid, and the proportion of this fatty acid increased in demyelination. Although there were great differences in the quantities of steryl ester found, the fatty acid profiles of normal developing and adult brain were quite similar. As has been noted by others, the fatty acid composition of brain steryl esters most closely resembles that of brain phosphatidylcholine.

CHEMICAL COMPOSITION OF UROPYGIAL GLAND SECRETIONS OF OWLS. J. Jacob and J. Poltz (Biochemisches Inst. fur Umweltcarcinogene, Ahrensburg/Holstein, West Germany). *J. Lipid Res.* 15, 243–48 (1974). The compositions of the uropygial gland secretions of the long-eared owl, eagle owl, and barn owl have been determined. The waxes of the first two owls, which are closely related, are composed of 2-alkyl-substituted fatty acids and *n*- or monomethyl-branched alcohols with even-numbered branching positions. In addition, some dimethyl-substituted alkanols were observed. In contrast to these waxes, the secretion of the barn owl is composed of 3-methyl- and 3,5-, 3,7-, 3,9-, 3,11-, 3,13- and 3,15-dimethyl-branched fatty acids and *n*-, as well as monomethyl-substituted alkanols branched at positions 2, 3 and 4. The mass spectra of esters of 2-alkyl-substituted fatty acids are discussed.

HIGH PERFORMANCE LIQUID CHROMATOGRAPHY OF CERAMIDES: APPLICATION TO ANALYSIS IN HUMAN TISSUES AND DEMONSTRATION OF CERAMIDE EXCESS IN FARBER'S DISEASE. M. Sugita, M. Iwamori, J. Evans, R.H. McCluer, J.T. Dulaney and H.W. Moser (E. K. Shriver Center, W. E. Fernald St. Schl., Waltham, Mass. 02154). *J. Lipid Res.* 15, 223–6 (1974). Conditions have been determined for the benzoylation of ceramides containing nonhydroxy and hydroxy fatty acids, and a high performance liquid chromatography system for the separation and measurement of these derivatives has been devised that is capable of good resolution and high sensitivity. These methods have been used to determine quantitatively the levels of ceramides in human tissues, and in serum and urine, and to demonstrate elevated amounts of ceramide in Farber's disease urine and tissues.

STRUCTURE AND COMPOSITION OF SULFATIDES ISOLATED FROM LIVERS OF PATIENTS WITH METACHROMATIC LEUKODYSTROPHY: GALACTOSYL SULFATIDE AND LACTOSYL SULFATIDE. M. Sugita, J.T. Dulaney and H.W. Moser (E. K. Shriver Center, W. E. Fernald St. Schl., Waltham, Mass. 02154). *J. Lipid Res.* 15, 227–33 1974). The livers of four patients with metachromatic leukodystrophy contained galactosyl sulfatide and lactosyl sulfatide, whereas these substances were undetectable in normal human liver. On the basis of methanolysis and permethylation studies, both sulfatides were shown to be substituted with sulfate at the C-3 position of the galactose moiety. Examination of the fatty acid compositions of these sulfatides showed that $C_{22:0}$ and higher 2-hydroxy and nonhydroxy fatty acids predominated in both. Both sulfatides contained the same long-chain bases, predominantly sphingosine, dihydrosphingosine, and phytosphingosine. Using as criteria the proportion of lactosyl sulfatide to galactosyl sulfatide, and the fatty acid and long-chain base compositions, the liver sulfatides from subjects with metachromatic leukodystrophy closely resemble those in the kidney and differ from those in brain and peripheral nerve.

INHIBITION OF FREE FATTY ACID MOBILIZATION BY COLCHICINE. R.J. Schimmel (Dept. of Physio., Univ. of Pittsburgh Schl. of Med., Pittsburgh, Pa. 15261). *J. Lipid Res.* 15, 206–10 (1974). Segments of epididymal adipose tissue from normal male rats were incubated with micromolar concentrations of colchicine for different periods of time up to 4 hr, and the mobilization of free fatty acids (FFA) was measured during a subsequent reincubation. Although pretreatment with colchicine did not alter basal unstimulated FFA release, mobilization of FFA

in the presence of epinephrine or theophylline was reduced. However, neither lipolysis, as judged by glycerol production, nor cyclic AMP accumulation was impaired under the same conditions. To assess the possibility that colchicine might limit production of fatty acids by accelerating the entry and metabolism of glucose into adipocytes, the metabolism of glucose by adipose tissue was studied. Pretreatment with colchicine did not affect uptake of glucose nor its oxidation to CO_2, although colchicine-treated tissues did have slightly more [^{14}C]glucose incorporated into the glyceride moiety of triglyceride. When adipose tissues pretreated with colchicine were incubated in an albumin-free medium, no reduction in FFA production by colchicine was observed. Because no FFA release occurs in albumin-free media, this experinment suggests that colchicine-induced inhibition of FFA mobilization results from impaired extrusion of FFA from adipose cells.

METABOLISM OF ISOLATED FAT CELLS FROM VARIOUS TISSUE SITES IN THE RAT: INFLUENCE OF HEMORRHAGIC HYPOTENSION. R. Storck and J.A. Spitzer (Dept. of Physiol. and Biophysics, Hahnemann Med. Coll., Philadelphia, Pa. 19102). *J. Lipid Res.* 15, 200–5 (1974). The in vitro lipolytic response to norepinephrine by rat adipocytes from epididymal, subcutaneous, perirenal, mesenteric, and omental tissue sites was studied in control and hypotensive animals. Lipolysis per millimole of triglyceride was found to be three to four times higher in mesenteric and omental fat cells than in adipocytes of the other sites sampled. The high lipolytic activity of mesenteric and omental adipocytes was partly attributable to their smaller cell size; however, lipolysis per cell was also higher. Hemorrhagic hypotension caused a 50–60% decrease in lipolytic activity at four of the five sites studied. Adipocytes of omental origin maintained their lipolytic activity at the prehypotensive level, however, indicating that the metabolic adjustments brought about by hemorrhagic hypotension are not uniform at all adipose tissue sites.

GLYCOSPHINGOLIPIDS FROM RABBIT AORTA, PLASMA AND RED BLOOD CELLS: EFFECTS OF HIGH CHOLESTEROL-HIGH FAT DIETS ON FATTY ACID DISTRIBUTION AND QUANTITY OF GLYCOSPHINGOLIPIDS. E. Coles and J.L. Foote (Dept. of Chem., Western Michigan Univ., Kalamazoo, Mich. 49001). *J. Lipid Res.* 15, 192–9 (1974). Four glycosphingolipids were isolated from rabbit aorta, plasma and red blood cells. They were identified by thin-layer chromatography and by quantitative analysis of hexose and fatty acid, as cerebroside, diglycosyl ceramide, triglycosyl ceramide, and globoside. The rabbits had been maintained on a normal diet or on one of three high cholesterol diets for 180 days. The quantities of the glycosphingolipids and their fatty acid distributions were determined, and comparisons were made between the control and experimental animals. Aorta and plasma glycosphingolipids were more affected by the high cholesterol diets than were those from red blood cells. The effects on aorta and plasma glycosphingolipids were similar. The amount of cerebroside was increased in aorta and plasma in all animals in the experimental groups. The amount was also increased in red blood cells in rabbits from two of the experimental groups. The average fatty acid chain length was greater in the lipids from the experimental animals than in those from the control animals for all measured glycosphingolipids from aorta. The average chain length was also greater in cerebrosides from the experimental animals from all three tissues. Probably the most notable differences in the experimental animals were the increased 24:1/24:0 ratios and the increased concentrations of 24:2.

3-HYDROXY-3-METHYLGLUTARYL CoA REDUCTASE AND MEVALONATE KINASE OF NEUROSPORA CRASSA. R.L. Imblum and V.W. Rodwell (Dept. of Biochem., Purdue Univ., Lafayette, Ind. 47907). *J. Lipid Res.* 15, 211–22 (1974). Two enzymes of polyisoprenoid synthesis, 3-hydroxy-3-methylglutaryl coenzyme A (HMG CoA) reductase (mevalonate:NADP oxidoreductase [acylating CoA], EC 1.1.1.34) and mevalonate kinase (ATP:mevalonate 5-phosphotransferase, EC 2.7.1.36), are present in the microsomal and soluble fractions of *Neurospora crassa*, respectively. HMG CoA reductase specifically uses NADPH as reductant and has a K_m for DL-HMG CoA of 30 μM. The activities of HMG CoA reductase and mevalonate kinase are low in conidia and increase threefold during the first 12 hr of stationary growth. Maximum specific activities of both enzymes occur when aerial hyphae and conidia first appear (2 days), but total activities peak later (3–4 days). Addition to the growth media of ergosterol or β-carotene, alone or in combination, does not affect the specific or total activity of either enzyme. The mevalonate kinase of *N. crassa*, purified 200-fold to a specific activity of 5 μmoles/min/mg, is free from HMG CoA reductase, phosphomevalonate kinase, ATPase, adenylate, kinase, and NADH oxidase activities. Mevalonate kinase specifically requires ATP as cosubstrate and exhibits a marked preference for Mg^{2+} over Mn^{2+}, especially at high ratios of divalent metal ion to ATP. Kinase activity is inhibited by p-hydroxymercuribenzoate, and this inhibition is partially prevented by mevalonate or MgATP. Optimum activity occurs at pH 8.0–8.5 and at about 55C.

PRODUCTION OF PLASMA ESTERIFIED CHOLESTEROL IN LEAN, NORMOTRIGLYCERIDEMIC HUMANS. P.J. Barter (Dept. of Internal Med. and Clinical Res. Center, Univ. of Iowa, Iowa City, Iowa 52242). *J. Lipid Res.* 15, 234–42 (1974). The rate of production of plasma esterified cholesterol was measured both in vivo and in vitro in seven subjects and in vivo alone in eight subjects. All subjects were lean, clinically healthy and had triglyceride concentrations less than 1.5 μmoles/ml. In vivo production was calculated from the labeling of free and esterified cholesterol in plasma samples collected at 1-hr intervals for 8 hr after an intravenous injection of [^{3}H] mevalonic acid, on the assumption that plasma free cholesterol was the sole immediate precursor of esterified cholesterol. In vitro production was measured in serum samples collected 1 hr after the injection of [^{3}H]mevalonic acid (when radioactivity in esterified cholesterol was very low relative to that in free cholesterol); these samples were incubated for 1 hr at 37°C. The rates measured in vivo and in vitro were very similar in the seven subjects, strengthening the confidence in the techniques. In vivo production was measured during the postabsorptive state in all 15 subjects and in 5 of them also during the last 8 hr of a 32-56-hr period when all calories were taken in three hourly meals of an 80% carbohydrate, fat-free formula. In the postabsorptive state there was no apparent relationship between the production of esterified cholesterol and the concentration of either free or esterified cholesterol. Rather, despite a wide range of cholesterol concentrations, esterified cholesterol production was similar in all subjects.

STUDIES ON ACYL DONORS FOR PLASMA CHOLESTEROL ESTERIFICATION TRIGLYCERIDE FATTY ACIDS IN RATS IN VIVO. M. Sugano (Lab. of Nutr. Chem., Dept. of Food Science and Tech., Kyushu Univ. Schl. of Agric., Fukuoka). *J. Biochem.* 75, 619–25 (1974). The rate of utilization of triglyceride fatty acids in cholesterol esterification in rat plasma was studied in vivo using glyceryl tri[1-^{14}C]palmitate, oleate and linoleate under conditions where the initial rate of utilization could be measured. Labelled triglycerides coated on Celite 545 were shaken with rat serum at 0–2C for 22–24 hr and the centrifugal supernatant was injected intravenously into rats. Blood was collected at timed intervals from 15 to 240 min after the dose. These triglyceride fatty acids were apparently utilized for the esterification in vivo, the extent of which was considerably greater with unsaturated triglycerides than saturated. The major route for the utilization of triglyceride fatty acids as acyl donors for esterification in vivo appeared to proceed via intermolecular transfer of the fatty acids from triglyceride to phospholipids, possibly to the 2-position of lecithin. The possible significance of other lipid component(s) as a donor of palmitic acid for the reaction was suggested.

LIPOGENESIS IN RAT AND GUINEA-PIG ISOLATED EPIDIDYMAL FAT-CELLS. E.D. Saggerson (Dept. of Biochem., Univ. College London, Gower St. London WC1E6BT, U.K.). *Biochem. J.* 140, 211–24 (1974). Fat-cells were prepared from rat and guinea-pig epididymal adipose tissue and compared on the basis of the intracellular distributions and activities of enzymes and with respect to their utilization of various U-^{14}C-labelled substrates for lipogenesis. Compared with the rat, guinea-pig extramitochondrial enzyme activities differed in that aconitate hydratase, alanine aminotransferase, ATP-citrate lyase, lactate dehydrogenase, NAD-malate dehydrogenase, NADP-malate dehydrogenase and phosphoenolpyruvate carboxykinase activities were appreciably lower, whereas aspartate aminotransferase, glucose 6-phosphate dehydrogenase, NADP-isocitrate dehydrogenase and 6-phosphogluconate dehydrogenase activities were appreciably higher. Mitochondrial activities of citrate synthase, NADP-isocitrate dehydrogenase and pyruvate carboxylase were appreciably lower, whereas mitochondrial activities of aspartate aminotransferase, glutamate dehydrogenase, NAD-malate dehydrogenase and phosphoenolpyruvate carboxykinase were higher in the guinea pig compared with the rat. In rat fat-cells under the same conditions, hexose monophosphate-pathway NADPH provision was not sufficient to meet the requirements of lipogenesis. These results are

discussed, particularly in relationship to the disposition of cytosolic reducing equivalents in the cells.

PATHWAYS OF GLYCERIDE GLYCEROL SYNTHESIS. R. Rognstad, D.G. Clark and J. Katz (Cedars-Sinai Med. Res. Inst., 4751 Fountain Ave., Los Angeles, Calif. 90029). *Biochem. J.* **140**, 249–51 (1974). Isolated rat liver parenchymal cells were incubated for various periods with [U-^{14}C, 2-^{3}H] glycerol and the radioisotopic yields in the major products were determined, as well as the $^{3}H/^{14}C$ ratios in glyceride glycerol and intracellular glycerol phosphate. Under the conditions used (0.1 mM-glycerol + 10mM-L-lactate or 10mM-glycerol as substrates), only small differences were found between these $^{3}H/^{14}C$ ratios. The results suggest a minor role for a pathway of glyceride glycerol synthesis involving reduction of acylated dihydroxyacetone phosphate, under these experimental conditions.

THE INTERACTION OF POLYPEPTIDE COMPONENTS OF HUMAN HIGH DENSITY LIPOPROTEIN WITH SODIUM DODECYL SULFATE. J.A. Reynolds and R.H. Simon (Dept. of Biochem., Duke Univ. Med. Center, Durham, N.C. 27710). *J. Biol. Chem.* **249**, 3937–40 (1974). The anionic detergent sodium dodecyl sulfate interacts with three to four binding sites on the surface of each of the individual polypeptide components (AI and AII) of human serum high density lipoprotein. The association constants for this process are the same for both AI and the disulfide-bonded dimer of AII, namely 2×10^4 liters per mole. AI and AII are relatively compact, ordered structures over this range of detergent binding, and cooperative interaction occurs only at much higher free concentrations of ligand ($> 1.5 \times 10^{-4}$ M). The detergent binding sites are probably exposed rather than clefts in the protein surface, since these same sites are involved in protein-protein interactions between the polypeptide components of high density lipoprotein.

FATTY ACID COMPOSITION OF CHICKS FED FULL-FAT SOYBEANS. P.J. Porter and W.M. Britton (Dept. of Poultry Sci., Uni. of Ga., Athens, Ga. 30602). *Poultry Sci.* **53**, 1137–41 (1974). Male broiler chicks were fed a diet made with full-fat soybean (FFSB) or a diet isonitrogenous and isocaloric made with soybean meal and beef tallow (SMBT) for four weeks. Body weight was significantly reduced ($P < 0.05$) in chicks fed the FFSB diet. Percent lipid in the carcass was not different after four weeks of feeding the two diets. Fatty acid composition of the carcass and adipose tissue lipid changed to reflect the fatty acid composition of the diet. The chicks fed the FFSB diet had significantly lower lipid contents of myristic, palmitic and stearic acid (saturated), and palmitoleic and oleic acid (monounsaturated). Linoleic and linolenic acid (polyunsaturates) were significantly increased in the lipid of the chicks fed the FFSB diet.

INFLUENCE OF DIETARY PROTEIN ON 6- AND 9-DESATURATION OF FATTY ACIDS IN RATS OF DIFFERENT AGES AND IN DIFFERENT SEASONS. R.O. Peluffo and R.R. Brenner (Catedra de Bioquimica, Inst. de Fisiologia, Facultad de Ciencias Medicas, U.N.L.P., Calle 60 y 120, La Plata, Argentina). *J. Nutr.* **104**, 894–900 (1974). The effect of casein diets on the activity of linoleic acid desaturation to γ-linolenic acid by rat liver microsomes was studied. An increase in the enzymatic activity was shown to be produced when either linoleoyl-CoA or free acid were incubated with ATP, CoA, and NADH. The amount of protein needed to enhance the desaturation of linoleic acid must be of the order of 35% or higher. Protein-rich diets modified the V_{max} of the reaction but not the K_m. The 6-desaturation of linoleic acid and α-linolenic acid decreased, but the 9-desaturation of stearic acid increased with age of the animal. Besides, the response to dietary protein was higher in old rats than in young ones. A seasonal change was also found. In summer, the 6- and 9-desaturations were significantly reduced and the activating effect of protein was also reduced.

MEMBRANE FUSION AND MOLECULAR SEGREGATION IN PHOSPHOLIPID VESICLES. D. Papahadjopoulos, G. Poste, B.E. Schaeffer and W.J. Vail (Dept. of Expt. Pathol., Roswell Park Memorial Inst., Buffalo, N.Y. 14203). *Biochim. Biophys. Acta* **352**, 10–28 (1974). Fusion between vesicles prepared from individual or mixed phospholipid species was demonstrated by ultracentrifugation and gel-filtration techniques, electron microscopy and differential scanning calorimetry. Variation of the chemical composition of the vesicles permitted evaluation of the effect of surface charge, Ca^{2+}, fluidity and the presence of cholesterol on the fusion reaction and the segregation of lipid species within fused vesicles. Extensive fusion occurred between negatively charged phosphatidylserine vesicles incubated in the presence of $CaCl_2$ (>1mM) and in vesicles prepared from greater than 50% phosphatidylserine in phosphatidylcholine in the presence of $CaCl_2$ (>4mM) and albumin (0.1 mg/ml). Neutral phosphatidylcholine vesicles showed only a limited capacity to fuse. Vesicles containing lipids that were in a liquid-crystalline state were more susceptible to fusion than vesicles composed of lipids that were in the solid phase at experimental temperatures. Incorporation of equimolar amounts of cholesterol into vesicles composed of lipids in a liquid-crystalline state suppressed their ability to fuse. ■

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