Book reviews


Youth Renewed is a book of a physician's observations and personal experiences, combined with scientific information on fats, oils, and components and how they affect health. It is proposed as a "roadway to living your life in a sane, rational, healthy way." It is not a medical journal, but is an easy-to-understand guide to the benefits of a healthful diet.

The book begins with a chapter on understanding fats, oils, and fatty acids, including isomers, processing effects, and biochemical effects through to biological outcomes. "Bad" and "good" fats, diets, and disease process discussions are followed by recommendations on diet, exercise, and weight control. Even a revised food guide pyramid is proposed.

The final third of the book is devoted to emu oil. This flightless bird, one of the oldest species outside the ocean, contains fat in pads across its back. The oil is recovered during slaughter and refined using standard techniques.

Emu oil's major commercial application is as a cosmetic ingredient. Practitioners of alternative medicine are major users. Applications include treating soft tissue injuries, burns, wounds, herpes infections, acne, and arthritis. An appendix with testimonials, references, and glossary is included for the interested reader.

This book will be of most interest to those pursuing alternative medicine and to those simply wanting advice on diet and lipids.

Frank Orthoefer  
ACH Food Companies Inc.  
Bartlett, Tennessee

Extracts and distillates

Extraction


Use of ethanol modifier with supercritical carbon dioxide was not necessary for efficient fat extraction, but it did increase the co-extraction of water leading to overestimation of gravimetric fat. Oven drying of collected fat extracts decreased the value of fat determined by gas chromatographic fatty acid methyl ester (GC–FAME). Micro-wave-drying of collection vials containing fat effectively removed co-extracted water. Supercritical carbon dioxide extraction can be used to provide accurate gravimetric determination of fat as well as providing material for specific fatty acid composition analysis by GC–FAME.

Adipose tissue content


Fat tissue was deproteinized with ethanol and extracted with n-hexane. Normal-phase high-performance liquid chromatography was performed in a Lichrosorb Si60 column with a gradient of n-hexane-2-propanol. Detection was made with a diode array system (for
retinol and β-carotene) in series with a fluorescence detector (α-tocopherol). The method had a sensitivity to allow for the detection of the compounds in 1.6 mg of adipose tissue. The mean contents of retinol, β-carotene and α-tocopherol were determined to be 0.43, 0.84, 240.3 mg/g, respectively, in a total of 140 subjects.

**Role of GPAT**

The mitochondrial isoform of glycerol-3-phosphate acyltransferase (GPAT) associated with the first step in triacylglycerol synthesis was overexpressed in Chinese hamster ovary (CHO) cells. Compared to control cells, overexpression of GPAT resulted in increased triacylglycerol (TAG) and incorporation of oleate equally into phospholipid and TAG. Oleate incorporation into control cells favored phospholipids over TAG by a factor of approximately 5. Studies indicated that overexpressed mitochondrial GPAT primarily directs incorporation of exogenous fatty acid into TAG rather than phospholipid, and further implied that a separate pool of lysophosphatidic acid and phosphatidic acid is produced distinct from that involved in phospholipid biosynthesis for use in the endoplasmic reticulum in TAG synthesis.

**Heart disease**

The cardiovascular risk associated with various electrophoretic characteristics of low-density lipoprotein (LDL) particles was assessed in a cohort of 2,034 men initially free of ischemic heart disease (IHD). Investigation of LDL characteristics by polyacrylamide gradient gel electrophoresis revealed that the cholesterol concentration in LDL particles with a diameter smaller than 255 Å showed the strongest association with risk of IHD. This IDH risk was independent of all nonlipid risk factors and of LDL cholesterol, high-density lipoprotein cholesterol, triglyceride, and lipoprotein(a) levels. Further electrophoretic characterization of LDL particles may improve the ability to predict IDH events in men.

**Lipoprotein lipase**

The LPL gene was determined to be a direct target of the oxysterol liver X receptor, LXRa. Mice fed diets containing high cholesterol or an LXR-selective agonist exhibited a significant increase in lipoprotein lipase (LPL) expression in the liver and macrophages, but not in other tissues. Studies on lxr-deficient mice confirmed that this response reflected more the presence of LXRa than LXRb. The findings support a growing body of evidence that LXRs function as key regulators of lipid metabolism and are antiatherogenic.

**ABCA1 mediation**

The secretion of α-tocopherol from cultured cells was found to be mediated in part by ABCA1, an ATP-binding cassette protein that transports cellular cholesterol and phospholipids to lipoprotein(a)-rich high-density lipoprotein (HDL) apolipoproteins such as apoA-1. Induction of ABCA1 expression enhanced apoA-1 mediated α-tocopherol efflux. HDL promoted α-tocopherol efflux by both ABCA1-dependent and -independent processes. ABCA1 mediates secretion of cellular α-tocopherol into the HDL metabolic pathway and may facilitate vitamin transport between tissues and influence lipid oxidation.

**Elongation**

Expression of the Bn-FAE1.1 and Bn-FAE1.2 genes that encode 3-ketoacyl-CoA synthase, a component of the elongation complex responsible for the synthesis of very long chain monounsaturated fatty acids, was studied during seed development using two different cultivars of B. napus. Both genes were transcribed in high erucic acid rapeseed (LEAR) and low erucic acid rapeseed (HEAR) cultivars, and were found to be coordinately regulated. The Bn-FAE1.1 gene was quantitatively the major isoform expressed in only HEAR seed and, it encoded a protein of 57kDa responsible for 3-ketoacyl-CoA synthase activity. Both LEAR and HEAR cultivars showed similar activity for 3-hydroxy dehydratase, a further component of the elongase complex.

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Sterols

The importance of sterols in plant-fungal interactions has been demonstrated in a study of the sterol fraction of soybean (Glycine max) and their effect on the cultured growth of a soybean phytopathogen (Phytophthora sojae). Soybeans were found to contain 13 major sterols that differed markedly in composition between seeds and shoots. Typically C4-desmethyl D5-sterols occur mainly in shoots, whereas C4-methyl sterol intermediates accumulate in seeds. All D5-sterols supported growth of P. sojae, but sterols native to the host plant containing a C4-methyl group did not. The possibility of bio-engineering the phytosterol pathway of soybeans for resistance to phytopathogens is considered.

Synthesis of novel macrolactone

Immobilized lipase from Candida antarctica was used to convert a hydroxy-fatty acid, (+)-coriolic acid to the macrolactone, 13S-octadeca-(9Z,11E)-dienolide. The reaction involved an alcohol group on an internal position on the carbon chain of the substrate. The system employed was the most effective catalyst offering a high reaction yield. Di-isopropyl ether was the favored solvent at an optimal reaction temperature of 35°C. The chemical structure of the purified reaction product was confirmed by nuclear magnetic resonance spectroscopy, mass spectrometry, and infrared spectroscopy.

Surfactant

Surfactants of linear- or Y-type structure were obtained in reasonable yields and purities. Ring opening of ω-epoxy fatty acid methyl esters with N'-methyl glucamine or glucamine gave products that were hydrolyzed by enzymatic catalysis or by conversion with sodium hydroxide leading to amphoteric surfactants. Different surface-active properties were observed depending on the chain length of the epoxides used, the structure of the derived sugar-based surfactant, and the pH-values. Several of the products were capable of reducing the surface tension of aqueous solutions down to 26-40 mH/m. Foaming properties ranged from poor to good foamers.

New books
Biochemistry and Molecu lar Biology of Plants, edited by B. Buchanan, W. Gruissem, and R.L. Jones, American Society of Plant Physiologists, P.O. Box 753, Waldorf, M D 20604-0753, 1,367 pages, $149.95 (hardbound), $99.95 (softbound), $49.95 (300 dot-per-inch resolution CD-ROM), $29.95 (150 dot-per-inch resolution CD-ROM), 2000.

2002 Soy and Oilseed Bluebook, Soyatech Inc., 27 Pleasant St., P.O. Box 84, Bar Harbor, M E 05609, 444 pages, $60, 2001.


Management of Research and Development for Food Industries, by J.H. Hulse, Central Food Technological Research Institute, Mysore 570 013, India, 26 pages, $12, 2001.


