Fatty Acids in Foods and Their Health Implications

edited by

Ching Kuang Chow

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University of Kentucky
Lexington, Kentucky

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Preface

Fatty acids constitute over 90% of total edible fats and oils. There are many naturally occurring fatty acids with very different chemical and physical characteristics. Also, unsaturated fatty acids, particularly those with more than one double bond, are susceptible to changes and alterations caused by chemical and physical factors. Oxidation and isomeric products of fatty acids can be formed during processing, refining, storage, and cooking.

In addition to being a concentrated source of energy, fatty acids and substances derived from them such as prostaglandins and leukotrienes carry out many important physiological functions. However, dietary fatty acids, when in excess, can have undesirable consequences. Also, oxidized and isomeric fatty acids, when consumed, may exert different biological effects from those of fatty acids that occur naturally.

In recent years there has been expansion in our knowledge of dietary fats and oils in general, and polyunsaturated fatty acids in particular. The possible roles of fats and oils in health and disease have received considerable public attention. Increasing evidence indicates that types and levels of fats and oils consumed have a significant influence on the well-being of the general population. Dietary lipids have been found to play a significant role in the pathogenesis of cardiovascular diseases, cancer, and other disorders. The mechanisms by which dietary lipids are involved in the etiology of these disorders, however, have yet to be elucidated.

Considerable information concerning various aspects of fats and oils has been accumulated during the past decades. Publications dealing primarily with the chemistry and composition of fatty acids in foods are available. There are also books specifically addressing the biological and health effects of fats and oils. This volume is unique because it covers both the chemistry and composition of fatty acids in foods and their biological and health effects. It provides readers with comprehensive in-depth knowledge of fatty acids in foods as they are consumed, as well as their possible health implications. It is not, however, the

intention of this volume to make dietary recommendations or set guidelines for fatty acids. Also, since the precise roles of fatty acids in cellular functions and the development of injury and disease states have yet to be delineated, no attempt was made to present these subject areas with a unified view.

The nomenclature of fatty acids, especially unsaturated ones, has been a source of confusion for many. Among the nomenclature systems suggested, ω (omega) and n systems are used by most investigators today. Recently the term omega-3 fatty acids has been used by the media and lay publications to represent polyunsaturated fatty acids, eicosapentaenoic acid, and docosahexaenoic acid, found in ocean fish. The ω and n systems are very similar in that they refer to the position of the first double bond from the terminal methyl carbon irrespective of the carbon length and are almost completely interchangeable. Detailed information regarding nomenclature and classification of fatty acids is given in Chapter 1.

I am very grateful to all the authors for their excellent contributions and cooperation. Without their participation this project would not have been possible. I also would like to thank Ms. Deborah J. Hope and Ms. Deirdre Griese of Marcel Dekker, Inc., for their assistance and cooperation. It has been a pleasure working with both of them. Ms. Hope made the initial contact and provided me with the opportunity to prepare this volume. While I initially accepted the offer with some skepticism due to time constraints, it turned out to be a great learning experience. Finally, I would like to dedicate this work to my wife, Lily Shukwei Chow, for her understanding, patience, and support over the past quarter century.

Ching Kuang Chow

Contributors

Robert G. Ackman Canadian Institute of Fisheries Technology, Technical University of Nova Scotia, Halifax, Nova Scotia, Canada

Sharyn G. Armstrong Department of Science, University of Western Sydney, Hawkesbury, Richmond, New South Wales, Australia

Robert Becker Western Regional Research Center, Agricultural Research Service, United States Department of Agriculture, Albany, California

Carolyn D. Berdanier Department of Foods and Nutrition, University of Georgia, Athens, Georgia

James G. Bergan Department of Food Science and Technology, University of Western Sydney, Hawkesbury, Richmond, New South Wales, Australia

Hemmige N. Bhagavan Department of Clinical Nutrition, Hoffmann-La Roche Inc., Nutley, New Jersey

Sam J. Bhathena Carbohydrate Nutrition Laboratory, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland

Gilbert A. Boissonneault Department of Clinical Sciences, University of Kentucky, Lexington, Kentucky

Jürgen T. Borlakoglu* Department of Biochemistry and Physiology, University of Reading, Whiteknights, Reading, England

Geza Bruckner Department of Clinical Sciences, University of Kentucky, Lexington, Kentucky

Austin H. Cantor Department of Animal Sciences, University of Kentucky, Lexington, Kentucky

Robert S. Chapkin Department of Animal Science, and Graduate Faculty of Nutrition, Texas A&M University, College Station, Texas

Ching Kuang Chow Department of Nutrition and Food Science, University of Kentucky, Lexington, Kentucky

Margaret C. Craig-Schmidt Department of Nutrition and Foods, Auburn University, Auburn, Alabama

Eric A. Decker Department of Animal Sciences, University of Kentucky, Lexington, Kentucky

John M. deMan Department of Food Science, University of Guelph, Guelph, Ontario, Canada

Howard P. Glauert Department of Nutrition and Food Science, University of Kentucky, Lexington, Kentucky

Earl G. Hammond Food Science and Human Nutrition Department and Center for Crops Utilization Research, Iowa State University, Ames, Iowa

Michael G. Hayek United States Department of Agriculture Human Nutrition Center on Aging, Tufts University, Boston, Massachusetts

J. Edward Hunter Food and Beverage Sector, Research and Development Department, The Procter & Gamble Company, Cincinnati, Ohio

Daniel Hwang Pennington Biomedical Research Center, Louisiana State University, Baton Rouge, Louisiana

Ronald J. Jandacek Food and Beverage Technology Division, The Procter & Gamble Company, Miami Valley Laboratories, Cincinnati, Ohio

Robert G. Jensen Department of Nutritional Sciences, University of Connecticut, Storrs, Connecticut

Phyllis E. Johnson Nutrition, Biochemistry and Metabolism Unit, Human Nutrition and Research Center, Agricultural Research Service, United States Department of Agriculture, Grand Forks, North Dakota

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Current Affiliation:

*Department of Clinical Biochemistry and Drug Metabolism, Marion Merrell Dow Research Institute, Strasbourg, France

Yukio Kakuda Department of Food Science, University of Guelph, Guelph, Ontario, Canada

Basil S. Kamel Atkemix Inc., Brantford, Ontario, Canada

Kelly Lobb Department of Biochemistry and Biophysics, Texas A&M University, College Station, Texas

Henry C. Lukaski Nutrition, Physiology and Behavior Unit, Human Nutrition Research Center, Agricultural Research Service, United States Department of Agriculture, Grand Forks, North Dakota

Padmanabhan P. Nair Lipid Nutrition Lab, Human Nutrition Research Center, BARC East, United States Department of Agriculture, Beltsville, and Department of International Health, Center for Human Nutrition, The Johns Hopkins University, Baltimore, Maryland

Gary J. Nelson Biochemistry Research Unit, Western Human Nutrition Research Center, Agricultural Research Service, United States Department of Agriculture, San Francisco, California

Andrew C. Peng Department of Horticulture, The Ohio State University, Columbus, Ohio

Ki Soon Rhee Department of Animal Science, Texas A&M University, College Station, Texas

Béla Szepesi Carbohydrate Nutrition Laboratory, Beltsville Human Nutrition Research Center, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland

Vickie Tatum Graduate Center for Toxicology, University of Kentucky, Lexington, Kentucky

Paul Trayhurn Division of Biochemical Sciences, Rowett Research Institute, Bucksburn, Aberdeen, Scotland

Stuart K. Ware Department of Clinical Sciences, University of Kentucky, Lexington, Kentucky

Vernon A. Welch* Department of Biochemistry and Physiology, University of Reading, Whiteknights, Reading, England

Pamela J. White Food Science and Human Nutrition Department and Center for Crops Utilization Research, Iowa State University, Ames, Iowa

Randall Wood Department of Biochemistry and Biophysics, Texas A&M University, College Station, Texas

---

Current Affiliation:

*Food Science and Human Nutrition Department and Center for Crops Utilization Research, Iowa State University, Ames, Iowa

Jeffrey K. Yao Department of Psychiatry, School of Medicine, University of Pittsburgh, and Laboratory Service, Department of Veterans Affairs Medical Center, Pittsburgh, Pennsylvania

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