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Medicinal Fatty Acids in Inflammation

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Preface

This volume of *Progress in Inflammation Research* is a unique compilation of work performed by a wide spectrum of investigators from different medical disciplines. It is fascinating that dietary alterations of fatty acid intake can result in a range of salutary changes in a great variety of medical conditions. Most of the good scientific work which has led to these observations has been performed over just the last two decades. This is of course not a very long time in the context of the history of the human species. Recently performed analysis of fat intake from paleolithic times has indicated that our hunter-gatherer ancestors consumed as much cholesterol as modern Western man, but strikingly less saturated fatty acid and more polyunsaturates, including *n*-3 fatty acids. Wild game has the terrestrial source of *n*-3 incorporated in its fat since browsing animals derive 18:3*n*-3 (alpha-linolenic acid) naturally from leafy plants.

There is, however, little opportunity for modern Western man to get *n*-3 fatty acids from the diet if one does not consume fish. Modern agribusiness provides animal feeds high in *n*-6 fatty acids, mostly derived from linoleic acid (18:2*n*-6) in corn feed. Therefore, grazing animals have no access to alternative fatty acids in either feed or grasses, the latter containing little or none of these potentially beneficial highly polyunsaturated fatty acids. We have, as a species, passed the overwhelming majority of our time evolving with foods containing *n*-3 fatty acids only to have them removed in the last 200 years. Some have speculated that the prevalence of inflammatory diseases has increased during this same time interval as a direct result of the change in our dietary intake of fatty acids. This is a controversial premise which is difficult, if not impossible, to prove. The evidence is circumstantial at best. There are certainly many other dietary and environmental changes which have occurred in the Western World over the same time interval.

However, only the lipid content of the diet is reflected in the basic structure of the cell. The phospholipid component of the lipid bilayer of the plasma membrane is determined by dietary fatty acid intake. Thus diets rich in *n*-3 or *n*-6 fatty acids including gammalinoleic acid (GLA) will result in the incorporation of these fatty acids into the plasma membrane. There they serve as alternative substrates to arichi-

donate for oxidative pathways leading to eicosanoid production. This is reviewed in several chapters in this volume. In addition, a host of other cellular changes may occur which result in modifications of immune function. The emerging evidence on the mechanisms of these dietarily induced alterations is found elsewhere in this volume.

We have as a species rounded a scientific corner with this new information. Inflammatory diseases must be added to atherosclerosis and malignancy in an expanding listing of medical conditions which can unequivocally be affected by diet. These advances are the natural outgrowth of both a worldwide heightened interest and awareness of nutrition and the increasingly sophisticated scientific techniques, including those of molecular biology, which have been utilized to explore the mechanism of action of dietary alterations in fatty acids.

As in most new developments which lead to a fundamental alteration in the way people view their world, universal acceptance is often slow to come forth. It is sometimes easier to be a skeptic in the face of new information which alters our view of the natural order of things than to give ourselves over to a new world view. Nevertheless, with the passage of time, the validity of new ideas and observations become accepted with resultant behavioral modifications. This will surely be the case with the description of the effects of fatty acids on inflammation which are found in this volume.

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