Preface

In this volume in the *Molecular Nutrition Series*, the authors focus on *Carbohydrates*. Carbohydrates can be classified into three forms: monosaccharides, disaccharides, and polysaccharides, with storage of sugars as either glycogen, starch, or cellulose. Derived from these complex sugars is the simple sugar glucose, which can also be obtained from sucrose; other simple/monosaccharide sugars include fructose. While carbohydrates are an important contribution to the diet, the role of simple sugars is an area of much debate in relation to diabetes and liver diseases. Sugars are known to act via the gut-brain axis promoting food intake. A high-sugar diet increases the risk of developing type 2 diabetes, with subsequent increased risk for cardiovascular disease; whereas independently fatty liver disease arises from a high-carbohydrate diet leading to nonalcoholic fatty liver disease, a leading cause of liver cirrhosis. Furthermore, a diet high in fructose can also lead to fat deposition in the liver and ischemic damage in a variety of organs.

Sugars also play a significant role in the development and progression of cancer, due to the increase in glycolysis and the TCA cycle. Contributing to cancer development is an upregulation of carbohydrate response element-binding protein which further promotes lipogenesis and tumor growth. This has also led to research investigating the inhibition of GLUT1 glucose transporters as a mechanism to inhibit glucose uptake and tumor growth. Despite the negative effects of glucose in certain conditions, glucose is essential for CD4 and CD8 T-cell functions, regulating a normal immune response.

The book *Molecular Nutrition: Carbohydrates* contains three sections. *Part 1* covers the general aspects of carbohydrate metabolism, carbohydrates in the diet and insulin resistance, dietary sugars, lipoproteins, glucose transporters, fats, and glycoproteins. In *Part 2* the topics covered are fructose and insulin signaling, carbohydrate-responsive element-binding protein, metabolic syndrome, glucose metabolism in T cells, effects of D-galactose, sugars and sweet taste receptors, peroxisome proliferator-activated receptors, and the beneficial effects of glucosamine. *Part 3* includes genetic machinery and its function, and provides coverage of nutrigenomics, glucose and DNA methylation, GALT gene, OLR1 and IL17A genes, and glucose metabolism.

The Editor