

Preface

In this book *Molecular Nutrition: Vitamins* we focus on *Vitamins*. In total there are 13 vitamins which are essential constituents of the diet. Vitamins are classified as either fat soluble (A, D, E, and K) or water soluble (B₁, B₂, B₃, B₅, B₆, B₇, B₉, B₁₂, and C) and are termed as micronutrients due to the low quantities required in the diet. The majority of vitamins, except for vitamin D and small amounts of B₃, need to be obtained from the diet, and thus inadequate intake can lead to deficiencies. The most common deficiencies in the United States are of vitamin B₆, vitamin B₁₂, vitamin C, folic acid, and vitamin D, with the deficiency subject to variation depending on the ethnic group, gender, and age of the person. Furthermore, the quantity of vitamin required from the diet varies quite significantly between vitamins from micrograms to milligrams.

Vitamins are an important field to study within Molecular Nutrition as vitamins are pivotal to numerous biochemical and genetic pathways. For example, vitamin B₁₂, also known as cobalamin, is important for DNA synthesis, nerve health, amino acids, and fatty acids metabolism, and together with vitamin B₉ (folate), is central to red blood cell maturation. Vitamin B₃ (niacin) is a precursor of the coenzymes nicotinamide adenine dinucleotide and nicotinamide adenine dinucleotide phosphate, which are key to metabolic pathways. Similarly, vitamin B₂ (riboflavin) is a component of flavin nucleotides that are essential for respiration.

There are many conditions that develop due to inadequate vitamin intake from the diet. For example, thiamine deficiency (vitamin B₁) can lead to memory loss, as seen in Wernicke/Korsakoff syndrome and in chronic alcoholics; acute and chronic pancreatitis and chronic liver disease leads to a disruption in fat absorption, which affects the absorption of fat-soluble vitamins; the lack of folate can lead to anemia and during pregnancy developmental disorders in newborns. More recently vitamins have been studied due to their therapeutic properties as highlighted throughout this book. Thus this text is relevant to nutritionists and nutrition researchers as vitamins are integral to human health and metabolic pathways, are components of enzymes, and can aid in the treatment of a wide range of conditions.

This book, *Molecular Nutrition: Vitamins*, contains three sections. In *Part 1* there is coverage of nutrition and vitamins in terms of general aspects,

and their contribution to the diet. In *Part 2* there is coverage on vitamin B₂ and mitochondrial energy; the use of folate in liver disease; vitamin K and treatment of prostate cancer; the preventive properties of vitamin B₆ in inflammation; niacin and hyperlipidemia; molecular and nutritional aspects of vitamin E; vitamins in chronic kidney disease; vitamin B₁₂ malabsorption; vitamin D and diabetes mellitus; and vitamin C and Alzheimer disease. *Part 3* covers the epigenetics of vitamins; gene expression; and the role of vitamins in transcriptional and transcriptome regulation.

The Editor