Introduction

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The pace of acquisition of knowledge in the areas of molecular biology, inborn errors and nutrition of biotin has increased substantially in the last decade. These advances build upon elegant and highly reproducible studies of scientists studying various aspects of biotin biochemistry and nutrition. Over the last 30 years, one of the preeminent scientists among these is Donald B. McCormick, the individual to whom this symposium is dedicated.

The symposium papers offer what I believe to be unusually clear insights into biotin vitaminology. The first paper, Molecular Biology of Biotin Attachment to Proteins (Anne Chapman-Smith and John Cronan, Jr.), provides a lucid summary of the complex yet beautiful mechanisms by which prokaryote cells respond to the need for biotin-dependent carboxylases (and related enzyme activities) by supplying biotin and apoenzymes. For mammals, the coordination involves balancing carboxylase needs against the external supply of biotin.

In the second paper in this symposium, a new and potentially highly significant property of biotinidase is presented. In their paper, Human Biotinidase Isn’t Just for Recycling Biotin, Jeanne Hymes and Barry Wolf build on their previous pioneering recognition of the inborn error of biotinidase deficiency to describe a recently discovered biotinylating capability of biotinidase and demonstrate that this biotinylation appears to selectively use histones as substrates.

The third paper in this series, Cellular Uptake of Biotin: Mechanisms and Regulation (Hamid Said), offers a review of the substantial advances in understanding of biotin transport in the small intestine—particularly as it relates to the absorption of dietary protein—and biotin transport in the large intestine—particularly as it potentially relates to the absorption of biotin synthesized by enteric bacteria. These studies (many of which were conducted by Dr. Said) go to the heart of some of the most essential questions relating to human nutrition of biotin.

In the fourth study, Advanced Analysis of Biotin Metabolites in Body Fluids Allows a More Accurate Measurement of Biotin Bioavailability and Metabolism in Humans (Janos Zempleni and myself), studies are presented that suggest that dietary free biotin is ~100% bioavailable. Such studies are now possible because of the relatively recent development of HPLC/avidin binding assays that permit the separation and individual quantitation of many of the major biotin metabolites in physiologic fluids such as urine.

In the fifth paper, Biotin Status: Which are Valid Indicators and How Do We Know? (Donald M. Mock), I review the background studies validating certain indicators of biotin nutrition status and present evidence that marginal, asymptomatic degrees of biotin deficiency may be common during both early and late human gestation.