Abstract
The B vitamins are water-soluble vitamins required as coenzymes for enzymes essential for cell function. This review focuses on their essential role in maintaining mitochondrial function and on how mitochondria are compromised by a deficiency of any B vitamin. Thiamin (B1) is essential for the oxidative decarboxylation of the multienzyme branched-chain ketoacid dehydrogenase complexes of the citric acid cycle. Riboflavin (B2) is required for the flavoenzymes of the respiratory chain, while NADH is synthesized from niacin (B3) and is required to supply protons for oxidative phosphorylation. Pantothenic acid (B5) is required for coenzyme A formation and is also essential for alpha-ketoglutarate and pyruvate dehydrogenase complexes as well as fatty acid oxidation. Biotin (B7) is the coenzyme of decarboxylases required for gluconeogenesis and fatty acid oxidation. Pyridoxal (B6), folate and cobalamin (B12) properties are reviewed elsewhere in this issue. The experimental animal and clinical evidence that vitamin B therapy alleviates B deficiency symptoms and prevents mitochondrial toxicity is also reviewed. The effectiveness of B vitamins as antioxidants preventing oxidative stress toxicity is also reviewed.