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Vitamin B₆

10.1 INTRODUCTION

In 1934 György observed the appearance of a scaly dermatitis (acrodynia) in rats fed on diets free from the whole vitamin B complex and supplemented with thiamin and riboflavin. This observation led to the establishment of a 'rat acrodynia-preventative factor' and its designation as vitamin B₆. The isolation of the pure crystalline vitamin was first reported by Lepkovsky in 1938, and the synthesis of pyridoxine was accomplished by Harris and Folkers in the following year. Discovery of the existence of pyridoxal and pyridoxamine and the recognition of their phosphorylated forms as coenzymes is largely credited to Esmond E. Snell during 1944–1948.

Vitamin B₆ functions as a coenzyme for many enzymes involved in amino acid metabolism, including the biosynthesis of niacin from tryptophan. It is also the essential coenzyme for glycogen phosphorylase, the enzyme responsible for the utilization of muscle and liver glycogen.
reserves. Biogenic amines such as dopamine, serotonin, histamine and \( \gamma \)-aminobutyric acid, which are implicated as neurotransmitters, are either synthesized or metabolized with the aid of vitamin B\(_6\)-dependent enzyme reactions. Vitamin B\(_6\) is involved in the synthesis of sphingosine, and a deficiency of the vitamin leads to impaired development of brain lipids and incomplete myelination of nerve fibres in the central nervous system (Dakshinamurti, Paulose and Siow, 1985).

10.2 CHEMICAL STRUCTURE AND NOMENCLATURE

Vitamin B\(_6\) is the generic descriptor for all 3-hydroxy-2-methylpyridine derivatives which exhibit qualitatively in rats the biological activity of pyridoxine (Snell, 1986). Six B\(_6\) vitamers are known, namely pyridoxine or pyridoxol (PN), pyridoxal (PL) and pyridoxamine (PM), which possess, respectively, alcohol, aldehyde and amine groups in the 4-position; their 5'-phosphate esters are designated as PNP, PLP and PMP (Figure 10.1). Pyridoxine is systematically named as 3-hydroxy-4,5-bis(hydroxymethyl)-2-methylpyridine and is available commercially as its hydrochloride salt, PN.HCl (C\(_8\)H\(_{11}\)O\(_3\) N.HCl; MW = 205.65). PN.HCl is the only form of vitamin B\(_6\) used in the fortification of foods.

In its role as a coenzyme, PLP is bound tightly to the apoenzyme by a Schiff base (aldimine) linkage formed through condensation of the

![Figure 10.1](image)

**Figure 10.1** Structures of vitamin B\(_6\) compounds showing (a) nonphosphorylated and (b) phosphorylated forms.