

Characterization of unexplored amidohydrolase enzyme—pterin deaminase

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Received: 4 February 2016 / Revised: 28 March 2016 / Accepted: 30 March 2016
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Abstract Pterin deaminase is an amidohydrolase enzyme hydrolyzing pteridines to form lumazine derivatives and ammonia. The enzyme captured the attention of scientists as early as 1959 and had been patented for its application as an anticancer agent. It is ubiquitously present in prokaryotes and has been reported in some eukaryotes such as honey bee, silkworm and rats. The enzyme has been observed to have a spectrum of substrates with the formation of respective lumazines. The role of the substrates of the enzyme in various metabolic pathways warrants a significant role in the biological activity of both prokaryotes and eukaryotes. Even though the functions of the enzyme have been explored in prokaryotes, their niche in the eukaryotic system is not clear. There is very few information on the structural and functional properties of the enzyme. This review has been congregated to emphasize the significance of pterin deaminase and analyzes the lacunae in understanding the biological characters of the enzyme.

Keywords Deamination · Amidohydrolase · Anticancer agent · Lumazine · Pterin deaminase · Pteridine

Introduction

Amidohydrolases is a part of metal-dependent hydrolase superfamily. Among the clade of amidohydrolases, deaminases form a family of proteins. Even though the existence of several deaminase enzymes irreversibly deaminating aminopurines and aminopyrimidines has been divulged (Levenberg and Hayaishi 1959), an enzyme which has not been properly documented is pterin deaminase. Pteridines are heterocyclic fused ring systems which have a myriad of biological functions both in eukaryotes and prokaryotes (Rembold 1983). Owing to the biological significance of pteridines, the enzymes involved in the regulation and metabolism of pteridines also warrant significance in biological systems. In that context, pterin deaminase is an important enzyme involved in the metabolism of pteridines which has been less explored so far.

Pterin deaminase is an amidohydrolase, which has been assigned the EC number of 3.5.4.11. This enzyme falls under the family of hydrolases as it acts on carbon-nitrogen bonds other than peptide bonds, mainly in cyclic amidines. As early as 1959, Levenberg and Hayaishi, had conceptualized the occurrence of pterin deaminase in his review on bacterial pterin deaminase. The enzyme has been designated with a systemic name of 2-amino-4-hydroxypteridine aminohydrolase and is also called acrasinase. Despite the designation of gene ontology number as GO: 0050228, the gene sequence and protein sequence of the enzyme is still not clear. This review is aimed at disseminating the information on pterin deaminase to understand the characteristics and biological significance of the enzyme in both prokaryotes and eukaryotes.

Pterin deaminase with its undiscovered biochemical properties is a potential topic of interest for both neurologist and developmental biologists. Owing to its several biological activities such as its role in purine and pyrimidine metabolism

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