Cytosine Deaminase: A Pyrimidine Base Salvage Enzyme Vital to the Effectiveness of a Substrate Mediated Enzyme Prodrug Chemotherapy

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Abstract

The pyrimidine salvage enzyme cytosine deaminase occupies an important function in the effectiveness of substrate mediated enzyme prodrug chemotherapy. The basis of this chemotherapeutic approach is that cytosine deaminase can catalyze the deamination of 5-fluorocytosine to 5-fluorouracil.The resultant 5-fluorouracil formed is a radiosensitizer agent that enhances the radiological targetting of a variety of cancer cells in humans for elimination.

Keywords: Cytosine deaminase; Pyrimidine salvage; 5-Fluorocytosine; Prodrug; Cancer chemotherapy

Editorial

The pyrimidine salvage pathway enzyme cytosine deaminase (EC 3.5.4.1) catalyzes the deamination of cytosine to uracil [1,2]. The resultant uracil is converted to the ribonucleotide uridine 5'-monophosphate by the enzyme uracil phosphoribosyltransferase. Cytosine deaminase has been detected in a variety of prokaryotic and eukaryotic organisms [1-7]. The importance of cytosine deaminase to chemotherapy is related to its ability to catalyze the deamination of the pyrimidine base analogue 5-fluorocytosine to 5-fluorouracil. The use of cytosine deaminase is one of the substrate mediated enzyme prodrug therapies that is used to treat various forms of cancer [8,9]. The pyrimidine analogue 5-fluorocytosine is considered a prodrug because it is non-toxic [8,9]. The 5-fluorouracil produced by cytosine deaminase has been shown to be a strong radiosensitizer that improves the efficacy of radiation treatment [10]. The bacterial gene for cytosine deaminase has been placed in an adenoviral vector under the control of a viral promoter. In the presence of this viral vector, low dose

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