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5-Azacytidine

Product Number **A2385**
Storage Temperature -20 °C

Product Description

Molecular Formula: $C_8H_{12}N_4O_5$
Molecular Weight: 244.2
CAS Number: 320-67-2

This product is a nucleoside analog, which can selectively activate eukaryotic gene expression and in some cases alter the differentiated state of some eukaryotic cells.[1] It is a pyrimidine ring analog of cytidine. Its incorporation into RNA alters RNA synthesis and processing, and results in inhibition of protein synthesis.[2]

It is also thought to act by inhibiting enzymes that methylate cytosine residues in eukaryotic DNA.[3,4] It activates genes by changing their methylation status, but may also act as a cytotoxin. It has been used as a cancer chemotherapeutic agent.[1] This product is a powerful bacteriostatic, antitumor, and mutagenic agent;[5] it also exhibits immunosuppressive, antimitotic, radioprotective, and virostatic effects.[6] The cytostatic effect of this product has been directed against leukemia[7] and it has been used in the treatment of solid tumors.[8] It is reported that this product induces marked changes in the differentiated state of cultured mouse embryo cells[9] and also inhibits the methylation of newly synthesized DNA.[1]

This product has also been used in cell cycle-specific reactivation of an inactive X-Chromosome locus[10] and to study changes in phenotypic expression in embryonic and adult cells[11] as well as in 10T1/2 and 3T3 cell lines.[12]

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

This product is soluble in acetic acid:water (1:1 v/v) (5 mg/ml). It is also soluble in tissue culture medium (1.2 mg/10 ml). Once dissolved, this stock solution can then be diluted further in aqueous medium.

Storage/Stability

Azacitidine is very unstable in aqueous solutions, with a 10% loss of the product in 2 to 3 hours at room temperature in lactated Ringer's solution.[13] Degradation is complex, with an initial reversible formation of an intermediate formyl product, which then undergoes slower irreversible change to produce further degradation products. Loss of azacytidine is rapid initially, but as the intermediate accumulates, reversal of the first reaction slows down the apparent loss of azacytidine. Misunderstanding of the kinetics has led to erroneously long (90%) stability times being quoted in the literature.[14,15] The half-life of the compound in phosphate buffered saline, pH 7.4, when heated to 50 °C is 90 minutes. The stock solution, when kept at this temperature for 20 hours, lost the ability to cause cytotoxicity and multinucleation. Stock solutions should be prepared fresh for each experiment, sterilized by filtration, and kept at 0 °C until needed.[5]

References

1. Jones, P.A., Altering gene expression with 5-azacytidine. Cell, **40(3)**, 485-486 (1985).
2. Glover, A.B. and Leyland-Jones, B., Biochemistry of azacitidine: a review. Cancer Treatment Reports, **71(10)**, 959-964 (1987).
3. Taylor. S.M. et al., 5-Azacytidine, DNA methylation, and differentiation. Current Topics in Microbiology and Immunology, **108**, 115-127 (1984).

4. Jones, P.A. at al., Inhibition of DNA methylation by 5-azacytidine. Recent Results in Cancer Research, **84**, 202-211 (1983).
5. Constantinides, P.G. at al., Function striated muscle cells from non-myoblast precursors following 5-azacytidine treatment. Nature, **267(5609)**, 364-366 (1977).
6. Cihak, A., Biological effects of 5-azacytidine in eukaryotes. Oncology, **30(5)**, 405-422 (1974).
7. Karon, M. et al., 5-Azacyctidine: a new active agent for the treatment of acute leukemia. Blood, **42(3)**, 359-365 (1973).
8. Weiss, A.J., et al., Cancer Chem., Rep. **56**, 413-419 (1972).
9. Constantinides, P.G. et al., Phenotypic conversion of cultured mouse embryo cells by aza pyrimidine nucleosides. Developmental Biology, **66(1)**, 57-71 (1978).
10. Jones, P.A. et al., Cell cycle-specific reactivation of an inactive X-chromosome locus by 5-azadeoxycytidine. PNAS, **79(4)**, 1215-1219 (1982).
11. Taylor, S.M., and Jones, P.A., Changes in phenotypic expression in embryonic and adult cells treated with 5-azacyctidine. J. Cellular Physiology, **111(2**), 187-194 (1982).
12. Taylor, S.M., and Jones, P.A., Multiple new phenotypes induced in 10T1/2 and 3T3 cells treated with 5-azacytidine. Cell, **17(4)**, 771-779 (1979).
13. Martindale The Extra Pharmacopoeia, 29th ed., Reynolds, J. E. F., ed., The Pharmaceutical Press (London, England: 1989), p. 599
14. Chatterji, D.C., Stability of azacytidine in infusion solutions: clarification of conflicting literature data. Am. J. Hosp. Pharm., **39(10)**, 1638, 1640 (1982).
15. Chatterji, D.C. and Gallelli, J.F., Stabilization of 5-azacytidine by nucleophilic addition of bisulfite ion. J. Pharm. Sci., **68(7)**, 822-826 (1979).

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