

Effects of Cations on the Metabolism of Nucleic Acid Bases

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The use of pyrimidine and purine biomolecules instead of synthetically developed compounds is of great interest to those hoping to treat inflammatory disorders to cancer. Synthetically developed pharmaceutical therapeutic agents may have multiple sites of action causing adverse side effects.

Purine and pyrimidine nucleotides are naturally synthesized in the cell and can act as inhibitors to deoxyribonucleic acid (DNA) or ribonucleic acid (RNA) synthesis, making these pathways vital for the synthesis and degradation of nucleic acids. It is well known that cancerous cells function similarly to somatic cells but proliferate freely. Previous studies have shown elevated concentrations of trace metals can be utilized as indicators for particular types and stages of cancers (Diez et al., 1989; Schwartz, 1975; Rizk et al., 1984). These trace metals are known to play role in numerous biological processes and mechanism as activators, inhibitors, and cofactors for genes and proteins. It can be assumed that these trace metals may also play a direct or indirect role on carcinogenic processes and mechanisms as well.

In this project, we plan to investigate the effects on the metabolism of pyrimidine or purine nucleotide pathway reactions while varying the metal concentrations. The results could demonstrate that at the level of transcription or translation various metal concentrations could control cancer cell growth.

The results of this investigation should provide evidence how the metal concentrations affect the metabolism of nucleic acids. In addition, the information gathered may lead to non-toxic levels of therapy that could substitute for aggressive chemotherapy treatment.