

## **Effects of nutrients on matrix metalloproteinases in human T-lymphotropic virus type 1 positive and negative malignant T-lymphocytes.**

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Leukemia is the cancer of bone marrow resulting in excessive number of leukocytes (white blood cells). It is the most common cancer diagnosed in children in the US. The spread of malignant leukocytes throughout the body is achieved by collagen digestion with the help of MMP enzymes. MMP activity is markedly elevated in patients with leukemia. What makes fighting leukemia a difficult task is that the same MMP enzymes are also active during normal functioning of the WBCs and play an important role in fighting infection.

In our previous studies on leukemia, we have studied the effects of individual nutrients, such as vitamin C, lysine, and green tea extract, on various aspects of human T-lymphotropic virus (HTLV-1) dependent leukemia cells.

The latest study compared the effects of vitamin C and green tea extract (EGCG) used individually and in a specific combination with other micronutrients on inhibition of MMPs in various metabolic stages in HTLV dependent leukemia cells. We studied the production of MMP enzymes at the DNA and RNA levels and their final activity using different doses of vitamin C, EGCG and the nutrient mixture.

The results showed that the micronutrient combination was markedly more effective than EGCG used alone in reducing the MMP activity. Vitamin C was somewhat effective, but only at maximum doses. On the other hand, the micronutrient mixture showed its inhibitory effect on the MMPs at key cellular levels, starting at the lowest doses and the inhibition of MMP enzymes reached almost 100% at maximum concentration of the micronutrient mixture. This detailed study provides further scientific support for incorporation of this micronutrient mixture in developing effective approaches to leukemia.