



## SUPERIORITY OF MICRONUTRIENT SYNERGY IN LEUKEMIA

Leukemia is a cancer of the bone marrow, which produces blood cells. Patients with leukemia experience an excessive production of white blood cells (WBCs) or leukocytes. It is the tenth most commonly diagnosed cancer in the US and is the most common cancer in children. In the US, approximately 52,380 people are expected to be diagnosed with leukemia in 2014. The numbers are equally staggering in Europe with 82,329 cases; and Asia reported 167,448 cases of leukemia in 2012. Leukemias are largely divided into acute (rapidly progressing), chronic (slower progression), myeloid, and lymphoid types depending on the type of affected cells (AML, ALL, CML, CLL). The most common type of leukemia in children is ALL, and in adults, it is AML, CML, and CLL.

The possible causes for leukemia are: exposure to ionizing radiation (medical radiation through X-rays, CT scans, radiotherapy and environmental exposure), viruses such as human T-lymphotrophic virus (HTLV-1) and HIV, exposure to benzene (through tobacco smoke and automobile pollution), exposure to chemicals in hair dyes, chemotherapy drugs used in prior cancer treatments and some genetic abnormalities such as Down's syndrome.

Despite a number of treatment options available and depending on the type of leukemia, the average 5-year survival rate is only 50-60%. More than 90% of cancer deaths are due to the spread of the cancer. Leukemia patients die from the failure of various "filter" organs such as the spleen and liver. This organ failure results from excessive production of collagen digesting enzymes - matrix metalloproteinases (MMPs) - by leukemia cells that literally "digest" these organs from within.

We studied the effects of different individual micronutrients as well as their specific combination on HTLV-1 dependent leukemia cells. We demonstrated that vitamin C alone was able to reduce the cancerous cell growth and induce cell death by modifying activity of cancer promoting specific genes<sup>1</sup>. Lysine was able to reduce the secretion and activity of



MMP enzymes in HTLV-1 induced leukemia cells<sup>2</sup>. Similarly, green tea extract could trigger cell death and reduce the destructive actions of MMP enzymes<sup>3</sup>.

In our latest study<sup>4</sup>, we tested a combination of vitamin C, lysine, proline, green tea extract, arginine, and other micronutrients in leukemia. This combination was markedly more effective than its individual ingredients and, already at its lowest used concentration it showed its inhibitory effect on the MMPs at key cellular levels: their production, secretion, and activity. The inhibition of MMP enzymes reached almost 100% at maximum micronutrient concentration.

Currently more than 30 drugs are available for the treatment of leukemia. Since November 2013, the FDA has approved three anti-leukemic drugs, yet, approximately every 10 minutes one person in the US dies from a blood cancer. Our research proves that this combination of safe and effective micronutrients is successful in modifying all aspects of leukemia and should be considered by the blood cancer patients worldwide.

1. Harakeh S, et al, *Anticancer Res.* 2007 Jan-Feb;27(1A):289-98.
2. Harakeh S, et al, *Chem Biol Interact.* 2006 Dec 1;164(1-2):102-14.
3. Harakeh S, et al, *Asian Pac J Cancer Prev.* 2014;15(3):1219-25.
4. Harakeh S, et al, *Int J Oncol.* 2014 Nov;45(5):2159-66. Epub 2014 Sep 3.

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The ground-breaking nature of this research poses a threat to the multi-billion dollar pharmaceutical "business with disease". It is no surprise that over the years the drug lobby has attacked Dr. Rath and his research team in an attempt to silence this message. To no avail. During this battle, Dr. Rath has become an internationally renowned advocate for natural health. Says he: "Never in the history of medicine have researchers been so ferociously attacked for their discoveries. It reminds us that health is not given to us voluntarily, but we need to fight for it."

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