



## BONE CANCER RESPONDS TO MICRONUTRIENT SYNERGY



Osteosarcoma is the most common type of bone cancer frequently occurring in children and young adults between the ages of 10 and 30. People over 60 are also at an increased risk. In the US, almost 800 new cases of osteosarcoma are diagnosed every year and more than 400 are in children and teens younger than 20. Initial symptoms of osteosarcoma, such as pain, bone or joint swelling, and decreased joint motion can be misleading and frequently occur in children due to sports and other injuries. In older adults, the symptoms can be misdiagnosed as arthritis.

The most common location of osteosarcoma is in the long bones of the legs or arms. These bones undergo phases of increased metabolic activity such as bone deposition in young children and bone dissolution in older adults. Both of these processes require increased secretion of collagen digesting enzymes, matrix metalloproteinases (MMP), therefore increasing the risk of cancer development in these age groups. In addition, certain genetic mutations or prior radiation treatments also increase the risk of developing osteosarcoma.

All cancers spread by increasing the production of MMP enzymes, which destroy the surrounding connective tissue. Destruction of the connective tissue allows the cancer cells to move freely and spread. We studied the effects of collagen supporting natural micronutrients, e.g., vitamin C, lysine, proline, green tea extract, and others, on cellular characteristics of osteosarcoma cells and on the induced tumors in mice. The results showed that the micronutrient-supplemented mice developed tumors 53% smaller than the tumors in the control group of mice<sup>1</sup>. Moreover, the micronutrients also suppressed cancer cell growth, MMP secretion, and specific blood vessel growth factors thereby reducing blood supply to the tumors and potential to spread.

The micronutrients vitamin C, lysine, proline, and others are essential for a strong connective tissue meshwork required to limit the spread of

cancer. Therefore, in another study, we also evaluated the effects of the micronutrient mixture for its connective tissue strengthening properties and limiting the invasion of osteosarcoma cells<sup>2</sup>. Our results showed that the micronutrients not only inhibited the growth of osteosarcoma cells up to 70%, but they also inhibited the invasive potential of these cells limiting their spread. Additionally, the connective tissue matrix produced by the cells supplemented with the micronutrient mixture was much stronger, and therefore was able to resist the destruction by MMP.

Osteosarcoma has a very high potential to spread and it is difficult to treat once it has metastasized to other organs. Almost 20%-25% of cases are diagnosed when the cancer has already spread to the lungs and other bones. Once it metastasizes, the expected 5-year survival of osteosarcoma patients is only 15%-30% despite aggressive treatments such as amputation, high dose chemotherapy, and post-operative radiotherapy. On this background, our research results could help in reducing the spread of osteosarcoma and save more lives.

1. MW Roomi, et al., Medical Oncology 2006, 23(3): 411-417
2. V. Ivanov, et al., Medical Oncology 2007, 24(2): 209-217

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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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