Dr. Rath Health Alliance – International Webinar

Recent Developments in Cancer Research

Presented by John Cha, May 9, 2012

Linus Pauling, Dr. Rath, and Modulation of Cancer Progression with Vitamin C and Nutrition

As you are all well aware, Dr. Rath is one of the pioneers in the research of the biochemical connection between nutrition and various disorders and diseases. One of the research focus areas has been in cancer. He worked closely with Dr. Linus Pauling in developing a theory of how cancer destroys the human physiology using a biochemical mechanism common to all types of cancer. Together they found that the same enzymatic systems used to cleave and cut through the "extracellular matrix" or "ECM" in normal remodeling by the body cells are used by cancer cells to destroy their local environment. This "extracellular matrix" or "ECM" is the collagen cables, ground substances, and adhesive molecules that are the structural scaffolding that organize cells into discrete structures, which then in turn make up larger organs. Unlike normal cells which regulate and control their expression of these cutting enzymes and depolymerizing enzymes, cancer cells abnormally secrete these in high quantities. Like molecular pruning sheers, these enzymes demolish the local mechanical barrier allowing the cells to spread rather than stay confined and functionally organized. Without an ECM scaffold to organize cells, their functional organization and structural context is lost. Just as a heart muscle cell outside the heart has lost its functional bearing and context, a cancerous liver cell in the lung has lost its functional context. Even worse, when the wrong cell takes residence in the wrong organ and begins to grow, it also deranges and destroys the functional capability of the host organ. This is metastasis, the deadly phenomenon that kills so many people afflicted by cancer, which is dependent on MMP cleavage of the ECM to proceed.

There are over 20 MMP isoforms involved in normal and abnormal processes, with two of the most important being MMP-2, and MMP-9 which degrade the collagen basement membranes that give boundaries to tissues and organs. Tumors secrete these enzymes in large quantity in their vicinity, causing the local environment to be demolished by cutting apart the collagen cables that enmesh them. Dr. Rath was one of the first to propose the use of Lysine and Lysine analogues against cancer cell MMPs in his 1992 publication, **"Plasmin-induced Proteolysis and the Role of Apoprotein(a), Lysine, and Synthetic Lysine Analogs"** in the Journal of Orthomolecular Medicine Vol. 7, No. 1, 1992. L-Lysine in the human physiology is an essential amino acid that the body cannot produce and must be taken through the diet. L-Lysine is an essential nutrient necessary to human life through food but not created by the body, not a synthetic pharmaceutical drug, yet can be applied against one of the most important mechanisms of cancer cell spread. The discoveries based upon the halting of plasmin liberated collagen destroying enzymes called collagenases inspired and revealed other natural food derived inhibitors of MMP-2, and MMP-9 such as green tea polyphenols. While these elements are not essential to human life, they are essential in the sense that the human body does not produce them like L-Lysine or ascorbate. There was a wealth of science generated in this regard, and it was found that various nutritional components could serve together, or "synergistically," to halt these matrix metalloproteases, also known as MMP. For this reason these natural products have been intensely studied as a potential cancer therapeutic by our laboratory and independent laboratories in synergistic nutrient mixes. Often times, the bioavailability and potency of these nutrients would be limited unless combined together, when they would act synergistically to raise the activities of one another in a real physiological situation. Using several nutritional items rather than singular natural molecules was found to be a far superior approach in our research for strengthening ECM and halting MMPs. This generated the rationale to use nutrients and natural products in synergy together against cancer cell MMPs.

Simple in concept, yet still impossible to defeat by pharmaceutical drugs and modern synthetic medicine in 2012, this mechanism of cancer spread was so well-understood and recognized by

academic and pharmaceutical groups that a massive academic and industrial effort was mobilized to find synthetic Matrix Metallo Protease Inhibitor drugs, or MMP inhibitors. Several were generated and all possessed the usual set of pharmaceutical drug toxicities and side effects. The search for the holy grail of a prescription MMP inhibitor for preventing the spread of cancer was a failure, but it did reveal an enormous amount about the essential involvement of MMPs in metastasis. A report from 1998 examines the discontinuation or toxicity of contemporary MMP inhibitors at the time.

Before this, Linus Pauling and his colleagues had put together a theory on the mechanisms by which Vitamin C alone prevents cancer. This hypothesis was set forward in the paper, "Ascorbic Acid and Cancer: A Review" in volume 39, pages 663-681 of the March 1979 edition of the journal "Cancer Research." While we all know that humans do not generate their own vitamin C, little do people know that this is a genetic defect that is not shared by many other mammals, and that in these mammals it is generated in such large quantities that it would be better classified as a metabolite rather than a vitamin, whose classic essential doses are much smaller. We all carry non-functioning pieces of what was once the functional Vitamin C synthesis gene. Here is a graphic showing the biochemical pathway that creates Vitamin C in most mammals but not primates, guinea pigs, and humans who lost the working gene approximately 34-35 million years ago.

Pauling and colleagues postulated that a vitamin C deficiency would encourage cancer and its spread through several mechanisms. The pillars of the essential role of Vitamin C in combating active disease were stated to be 1) maintaining the host resistance necessary for organized tissues via the extracellular matrix, which is made of collagen and the ground substance which includes hyaluronan 2) being part of a "physiological hyaluronidase inhibitor," PHI, probably a glycosaminoglycan with a glucuronic acid replaced with an ascorbate which stopped particular ground substance depolymerizing enzymes of cancer cells, and 3) enhancing host immune response to cancer cells. Cameron, Pauling, and Leibovitz also touched upon the phenomenon that older individuals mounted a stronger tumor encapsulation response than young people,

presumably due to a hormonal difference that allowed the collagen production to be enhanced around tumors.

In regards to preventing cancer, Pauling stated that Vitamin C is anti-viral thus preventing viral carcinogenesis, it is heavily involved in helping to detoxify carcinogens, it quenches free radicals that cause DNA damage, and it assists enzymes that detoxify carcinogens. There was some evidence at the time that ascorbic acid was selectively cytotoxic to cancer cells.

Today, all these things hold true as well as new discoveries in its involvement in interfering with cancer cell hypoxia survival pathways, and fairly recent discoveries regarding its direct cytotoxicity to cancer cells in high pharmacological doses.

Recent Discoveries at Dr. Rath Research Institute

We wanted to demonstrate these theories in vivo. Together with Dr. Roomi, we have found that removal of ascorbate or ascorbic acid from mice that do not generate their own vitamin C sets the stage for these mammals to have greatly accelerated metastasis, increased tumor burden, less tumor encapsulation, higher inflammation, and higher VEGF synthesis. Previously, Dr. Roomi and our group demonstrated that removal of vitamin C from these mice cause greater tumor burden and increased metastasis of melanoma, reiterating the theory of Cameron, Pauling, and Leibovitz in a live demonstration as well as confirming the rationale of clinical studies of pharmacological levels of vitamin C in the treatment of cancer. Tumors extracted from vitamin C deficient animals were more often fragile and crumbly, and more often lacked a confining capsule that is seen as a white colored coating without magnification, and as a mesh of collagen cables under magnification. Tumors extracted from Vitamin C supplemented animals were more often dense, solid, and covered with a fibrous collagen capsule.

To expand on this scientific notion of oral vitamin C in reducing the size of melanoma tumors in mice that cannot generate vitamin C, we asked two new questions. The first was what effect does the lack or presence of orally bioavailable but not pharmacological levels of vitamin C have

on metastasis, the killing mechanism of all types of cancer? The other question was what effect vitamin C supplementation or absence has upon tumor volume of a different type. To this end, we used an "instantaneous metastasis" model of melanoma in these vitamin C defective mice and a breast cancer cell line.

In regards to metastasis, the absence of vitamin C greatly accelerated and worsened metastasis, while its mere presence abrogated metastasis greatly. While the tumor burden was not zero, the results were impressive, in some cases keeping primary tumor confined to its original inoculation area without any secondary metastases. All in all, we found a statistically significant 60-72% decrease in metastasis by the mere supplementation of Vitamin C in the food and water of mice that cannot produce Vitamin C. Looked at the opposite way, there was a statistically significant 250% increase in metastasis without vitamin c in food and water. Of course, these results matched nicely with the levels of Vitamin C that we measured in their bloodstream. For those mice that were made scorbutic, a few mice prematurely died with the inner organs so destroyed that it matched the description of James Lind in the 18th century in a description of scurvy victims internal organs as "…all parts were so mixed up and blended together to form one mass or lump that individual organs could not be identified," A very poor outcome, the melanoma cells spread throughout the entire abdominal cavity, fused and depolymerized with the abdominal organs, creating a singular amorphous, gelatinous mass in the absence of vitamin C.

Last time, we spoke about the very recent gold rush into Angiogenesis and anti-VEGF prescription drugs. These are not without its problems, with side effects ranging to quote-unquote "forming new tunnels between body parts." At least in our metastasis study, a simpler more immediate association between greatly increased VEGF and metastasis is low vitamin C levels. We saw a very strong correlation between the absence of vitamin C and higher VEGF levels as well as the presence of vitamin C and lower VEGF levels.

Lastly, we saw the same trend of lower tumor burden in a variation of the first experiment, in which the 4T1 cancer cell line was inoculated in the mammary pad of vitamin C defective mice.

Those that were given vitamin C showed a trend towards smaller tumors, and those without vitamin C showed a trend towards bigger tumors. Three demonstrations of this phenomenon show that the protection by Vitamin C against accelerated tumorigenesis and metastasis is not a fluke or anomaly, but the phenomenon reported by clinicians who have utilized high dose Vitamin C in clinic.

Confirms the Vitamin C-Cancer Connection in Live Systems: So indeed, at least in this setting, Cameron, Pauling, and Leibovitz are correct in their assertion that scurvy accelerates and worsens cancer.

Victory Over Cancer

In a struggle against an entire industry based on extorting people of their money for medicines that have proven not to work, we all hope to help usher in change in the understanding and approach to a devastating disease that shouldn't be used as a business but treated compassionately as a universal human vulnerability in our efforts toward social and individual evolution. With this in mind, Dr. Rath and Dr. Niedzwiecki have created a book that reveals the crimes and disasters of pharmaceutical medicine in regards to cancer and the hope that natural non-patentable medicine provides for the end of a human disease and an institutional menace to civilization across the planet. So then Dr. Rath and Dr. Niedzwiecki state that "This book does not claim that we have already reached the goal of victory over cancer, but paves the way to turn cancer into a manageable disease." You can find this book at http://www.victory-over-cancer.org and I hope that everyone who can read it does read it and passes it along to everyone they know.