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Cancer & Nutrition: Prevention and Treatment

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The Relationship between Nutrition and Cancer: An Emerging Science

Cancer, which has long been the second most common cause of mortality in industrialized nations, is assuming an even more prominent role as the rate of cardiovascular disease continues to decline. The development of several of the most common cancers is clearly the result of an intimate, but poorly understood, interaction between endogenous and environmental factors; the most notable of these environmental factors is diet. Estimates suggest that approximately 35% of cancers are a consequence of suboptimal diet. The prototype in this regard is colorectal cancer, where as many as 90% of cases are thought to be a consequence of inappropriate dietary habits [1]. Mere recognition of this fact was a critical step forward since it diverted our energies towards understanding how alterations in diet might be used in the prevention of cancer. Epidemiologic observations have been very helpful in defining the general profile of a diet which is protective: one which is low in red animal meat and animal fat, modest in calories and alcohol, and high in fresh fruit, vegetables, and fiber is generally agreed to be a cancer prevention diet. However, coming to a detailed understanding of the particular dietary components which are protective has been considerably more elusive. For instance, it is quite clear that a diet high in fresh fruits and vegetables is highly protective against colorectal cancer [2]; nevertheless, it remains very unclear whether the protective effect is largely conveyed by a vitamin, a mineral, a phytochemical, the relative paucity of red meat and calories in such a diet, or some combination of the above. Pursuing such a reductionist understanding of diet in the prevention of cancer is not just an exercise in satisfying our scientific curiosity: elucidating those components which are specifically protective will greatly improve our public health efforts in waging the war against cancer.
Applying principles of nutrition towards the treatment of existing cancers is, unfortunately, an even more elusive pursuit than using such nutritional principles in the prevention of cancer. This is true even though it is quite clear that protein-calorie malnutrition of a clinically significant degree is common among cancer patients and certainly makes a major contribution to morbidity and mortality. Aside from causing death solely from progressive cachexia, malnutrition in the setting of cancer leads to diminished cardiac performance, an increased susceptibility to infection, as well as a diminished response to chemotherapy [3]. Considerable progress has been made in understanding the factors involved in producing cancer cachexia: aside from psychological factors and the mass effect of the tumor, both of which can diminish the ability to consume sufficient nutrition, are the proinflammatory cytokines [4] as well as less well-characterized factors such as proteolysis-inducing factor [5]. Reversing, or even attenuating, the cachexia associated with cancer is an extremely problematic issue although some promising preliminary results have been obtained with the use of ω–3 fatty acids [6]. Although it is clear that, in clinical situations where nutrition is applied concomitantly with anticancer treatments, nutritional support provides more anabolic benefit to the patient than to the tumor, a multitude of unanswered but critically important questions repeatedly confront the clinician trying to treat a patient with cancer: what is the appropriate timing for initiating aggressive nutritional support in regard to surgery, radiotherapy, chemotherapy, and bone marrow transplantation? Is enteral nutrition more rational and less costly than parenteral nutrition? Is supplementation with specific nutrients such as glutamine, arginine or ω–3 fatty acids truly of benefit [7]? What is the role of anabolic agents? Those of us who treat such patients frequently know that we are making important clinical decisions regarding the nutritional support of cancer patients in a relative vacuum of knowledge and therefore in a dangerously arbitrary manner.

Such are the frustrations of our present state of knowledge regarding nutrition and cancer. The acknowledgement that nutrition is important in both prevention and treatment is there, but sufficient knowledge to apply such recognition in an intelligent and comprehensive manner is lacking. However, this should not be construed as a defeat, rather it needs to be perceived as an exciting challenge to both scientists and clinicians alike to expand our knowledge in the new decade so that we might finally tackle these important issues.

In November 1999, a group of scientists and clinicians of highly varied backgrounds and nationalities, as well as representatives from Nestlé, came together for three days at a beautiful spot overlooking the Straits of Malacca to discuss our knowledge on this topic. State-of-the-art presentations were made by internationally recognized experts on a variety of topics pertaining to cancer prevention and cancer treatment. More important than the presentations themselves, however, were the extended discussions which followed each presentation. These enabled all the participants and invited guests to express their opinions on controversies, to exchange ideas, and, in many instances, to initiate new collaborations which
promise to provide important new knowledge in the future. It was an exciting three days because the conference brought together epidemiologists, basic scientists and clinicians alike, and many of us had never met one another before. Yet, by the end of the conference, there was a strong consensus that the highly varied backgrounds of the participants proved not to be a hindrance, but were instead complementary and that an insightful new synthesis of the field had been achieved. This book, unfortunately, cannot transmit the sense of excitement that we all had at the conference; a feature that could only be experienced by being there.

The purpose of this book, which reflects the proceedings of the conference, is to summarize current knowledge as it relates to selected aspects of nutrition and cancer. We were delighted to have shared this challenge with many leaders in this field, whose substantial efforts and collaboration have resulted in this valuable contribution to the field of nutrition and cancer. Clearly, “nutritional oncology” must now be regarded as part of oncology, and should now be integrated with genetics and molecular biology in the care of the cancer patient.

Joel B. Mason, Gérard Nitenberg

References

Foreword

Oncology is a rapidly growing sector in preventive and curative medicine. Epidemiologic studies and controlled experiments already indicate that certain nutrients can be influential either in the inhibition or promotion of malignancy development. However, at present we are a long way from nutritional recommendations which might help to prevent cancer. In addition, we have to study further the interactions between nutrients and the influence of their natural carriers – our daily food.

Clinical oncology focuses on the treatment of cancer mainly through surgery, radiotherapy, and chemotherapy. Those therapies are often associated with severe adverse reactions, including disturbances in nutritional intake, digestion, absorption, and utilization of nutrients. Inadequate nutritional support during that period might result in the development of malnutrition. Progressive malnutrition is associated with increased therapy toxicity, including impaired gut-associated lymphoid tissue and systemic immune responses, abnormalities of pharmacokinetic and pharmacodynamic aspects of drug metabolism, deficiencies in micronutrients protective of nontumor cells, and loss of lean body mass with consequent increased fatigue and complications associated with prolonged inactivity or bed rest. Nutritional support to prevent malnutrition or early nutritional intervention during incipient malnutrition is only possible if the therapeutic team is competent in the field of nutrition. At the same time the availability of parenteral and enteral therapeutic nutritional interventions works to make a number of successes possible, thus making progress in the field of oncology.

The purpose of the 4th Nestlé Nutrition Workshop on Clinical Nutrition in Kuala Lumpur, Malaysia, was to further establish and intensify the dialogue between basic scientists and clinicians working in the fields of oncology and nutrition. The two chairmen of the meeting pointed out that there is still a big problem
to convince oncologists that supportive nutritional therapy is really beneficial and concluded that the greatest obstacle to new discovery in the field of cancer and nutrition is not ignorance, but the illusion to knowledge.

Dr. Steenhout, who coordinated this Nestlé Clinical Nutrition Workshop, and I would like to thank Prof. Mason and Prof. Nitenberg for chairing the meeting and putting the program together. All speakers and the invited experts contributed to make the meeting a success. Furthermore, we would like to thank Mr. Lopez and his team from Nestlé Malaysia for their hospitality and all their logistic support.

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