

## Antioxidants and Cancer Therapy

This issue represents a milestone of sorts for *Integrative Cancer Therapies*. It represents the completion of our third year of publication. This also represents the first time we are presenting a “special theme” issue. And a special theme it is. In this issue, we have invited several prominent researchers and clinicians to tackle head-on one of the most controversial issues in current integrative cancer care: the role of antioxidants in cancer therapy. The controversy behind this topic rests on the observation that both chemotherapy and radiation involve the generation of free radicals that contribute to their cytotoxic effects. Most conventional oncologists, and not a few alternative practitioners, have therefore assumed that use of antioxidants, which quenches the activity of free radicals, would counteract the effects of these therapies. Therefore, they discourage the use or consumption of antioxidants until the therapy has concluded. This concern for treatment interference is commonly referred to as “tumor protection” and is a relevant question in the evaluation of some conventional cytoprotectants, such as amifostine (Ethyol). The group favoring antioxidant use suggests the main problem is one of therapeutic index: while some degree of tumor protection may occur with antioxidants, it is felt to be of less relevance than the possibility of protection of normal tissue. This might diminish side effects and reduce treatment delays, delivering an overall better result for the patient’s health and long-term prognosis. And still others who favor antioxidant use feel that there are particular antioxidants, at specific dosages, that may in fact improve the effectiveness of conventional therapy.

The roster of contributors for this special issue is indeed distinguished. Our initial article is by Homer S. Black, PhD, of the Department of Dermatology, Baylor College of Medicine. Dr Black has been contributing to the research on antioxidants, diet, and cancer prevention for three decades. He is particularly well known for his work on the role of fatty acids in photocarcinogenesis and led a clinical trial in which he showed a reduction of the incidence of actinic keratoses in patients randomized to a low-fat diet intervention. Dr Black presents a reassessment of the theory of free radical causation of carcinogenesis, concentrating on work involving  $\beta$ -carotene and the food additive BHT.

Kenneth Conklin, MD, PhD, is a clinical professor in the Department of Anesthesiology, David Geffen

School of Medicine, University of California, Los Angeles. He has been an active participant in the debate on the usefulness of antioxidants with cancer chemotherapy and has also written on the topic of fatty acids in cancer. Dr Conklin’s article in this issue sets out an intriguing hypothesis, reviewing the literature on the chemistry of chemotherapy drugs, aldehyde production, oxidative stress, and apoptosis and concluding that rather than diminishing the effectiveness of chemotherapy, antioxidants may actually enhance its effectiveness.

Kara Kelly, MD, is with the Division of Pediatric Oncology at Columbia University, where she is the medical director of the Integrative Therapies Program for Children With Cancer. She has previously published articles on the effect of level of dietary intake of antioxidants on chemotherapy-related toxicity in children, milk thistle as an adjunctive treatment to hepatotoxic chemotherapies, and the use of complementary and alternative medicine by children with cancer. Her clinical study in this issue examines the question of whether intake of antioxidants affects the levels of oxidized DNA damage in children being treated for leukemia.

Kedar Prasad, PhD, heads the Center for Vitamin and Cancer Research in the Department of Radiology, University of Colorado Health Sciences Center. Dr Prasad is well known as a researcher in the field of antioxidants and cancer chemotherapy and has long been a participant in discussions of this area. He reviews the research studies that his group has been conducting, as well as some preliminary clinical trials in this field. His approach stresses the role of high doses of multiple, rather than single, dietary antioxidants administered as an adjunct to conventional treatment and the role this may play in both decreasing toxicity and improving response to therapy.

Dr Ganesh Chandra Jagetia, of the Department of Radiobiology of the Kasturba Medical College in Manipal, India, is a respected basic science researcher in the area of radiation protection by herbal medicines and supplements. Together with his colleagues Ponemone Venkatesh and Manjeshwar Baliga, Jagetia presents a thorough investigation of the radioprotective properties of the bael tree, *Agle marmelos*, an herbal medicine of India. Dr Jagetia has been working in the area of radioprotection since the 1980s and has previously published on radioprotective properties of a variety of plant substances including curcumin, vitamin C, citrus flavonoids, and the botanicals *Syzygium*

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*cumini* (Java plum), *Alstonia scholaris* (dita bark), and *Ageratum conyzoides* (goatweed).

Carmia Borek, PhD, with the Nutrition and Infectious Diseases Unit at Tufts University, has published widely on nutritional topics related to cancer and aging and has been a respected and longtime researcher evaluating the impact of free radicals on multistage carcinogenesis. She has also published reviews on a broad range of topics of nutritional and botanical interest, including the antioxidant effects of garlic and the impact of omega-3 fatty acids in cancer. Her review of the role of dietary antioxidants in cancer is wide ranging and highlights many interesting studies, with a particular emphasis on the role of antioxidants in radiation therapy.

Following these articles, I have provided an overview reflecting on the contributions, debate, and clinical implications that have been raised by these ideas. It is our sincere hope that these articles will further advance the discussion of this important topic and encourage important study and future discussion.

Finally, this issue also includes a review article by Mark McCarty of NutriGuard Research that surveys a large number of molecular pathways that are potentially useful in suppressing the growth of prostate

cancers. His article explores how such an approach may increase the therapeutic effect in combating malignant disease.

As we have previously pointed out,<sup>1</sup> integrative care, by drawing together the multiple therapeutic modalities of diet, exercise, mind-body medicine, and supplementation, is inherently multifocal. Providing a comprehensive support regimen for patients, while assisting them in launching a strategic and multitargeted attack on their cancer, is at the heart of integrative medicine.

### Reference

1. Block KI. Multiple molecular targets in oncology and integrative care. *Integr Cancer Ther.* 2003;2:209-211.

*Keith I. Block, MD*

Editor-in-chief

*Integrative Cancer Therapies*

Block Center for Integrative Cancer Care

Evanston, Illinois

College of Medicine

University of Illinois at Chicago

Chicago, Illinois