Nearly 400 people attended the annual International Research Conference on Food, Nutrition, and Cancer sponsored by the American Institute for Cancer Research/World Cancer Research Fund International (AICR/WCRF), held July 13–14, 2006 in Washington, DC. Kathryn Ward, Senior Vice President of AICR, opened the conference by announcing that the 2007 annual conference would be held on November 1–2 of that year, to coincide with the launch of the second WCRF/AICR Expert Report Food, Nutrition, Physical Activity and the Prevention of Cancer: A Global Perspective. Later, at a luncheon, a video on the process behind the second Expert Report was shown. Evidence linking food, nutrition, and physical activity to the risk of developing cancer has been obtained from systematic literature reviews (SLRs) of >20 cancer sites and of cancer survivor research as well as of the causes of obesity (an important cancer risk factor). The Expert Panel will meet twice more to discuss the evidence, finalize conclusions, and draw up recommendations. The second Expert Report is scheduled for publication on November 1, 2007. A policy report will follow in early 2008.

The Conference's first plenary session began with an overview of recent randomized clinical trials studying the effect of physical activity and dietary interventions on cancer risk. The speaker discussed trials that have found beneficial effects of exercise on serum hormone levels, colon crypt cell proliferation, hyperinsulinemia, and other biomarkers of cancer risk. Another presentation reviewed the laboratory and epidemiologic data linking status of vitamin D and its analogs with risk for breast, prostate, and other cancers. The speaker noted a proposed mechanism whereby the active form of vitamin D [1,25(OH)2D3] displays antiproliferative effects in many cancer cell lines. Another presentation reviewed evidence linking obesity and cancer risk. The presenter listed potential mechanisms for individual cancers and quoted estimates that current U.S. obesity patterns are responsible for 14% of cancer deaths in men and 20% of cancer deaths in women. The next presenter reviewed intervention research involving changes to dietary fat and fiber intake. The effect of these changes on serum hormone concentrations and ultimately breast cancer risk are being investigated at different life stages among different ethnic groups. The plenary session concluded with a presentation proposing a novel mechanism linking diet and colon cancer. The speaker presented data showing that diets high in meat and fat cause certain gut flora to outcompete others; the resulting bacterial populations produce a colonic milieu marked by a chronic inflammatory state that could promote the cancer process.

The link between chronic inflammation and cancer was also the featured topic of an afternoon split session. The first presentation reviewed the mechanisms linking inflammation to gene mutation, modifications of cancer-related proteins, and the expression of cancer genes. The next presenter discussed a new model of human prostate carcinogenesis, implicating the interaction of inflammation and the charred meat carcinogen PhIP in genome damage leading to invasive carcinoma. Another speaker outlined his research on single nucleotide polymorphisms (SNPs) in a variety of genes associated with production of cytokines, which play a role in immune responses such as inflammation. The session’s final speaker elucidated a mechanism whereby dietary (n-3) polyunsaturated fatty acids found in fish oil alter the balance of subpopulations of immune cells that mediate inflammatory effects.

The second split session highlighted the interaction of micronutrient intakes and a variety of specific lifestyle factors. The first presenter detailed ongoing research that is seeking to understand why the effects of β-carotene noted in observational studies differ so markedly from effects observed in clinical trials. β-Carotene is a potent antioxidant in low, dietary doses but seems to exert potentially procarcinogenic behavior at higher,
isolated doses such as those utilized in some trials. The researcher is examining biological data from one such trial to elucidate molecular mechanisms to explain this paradox. The next speaker presented data detailing how the combination of tobacco smoke and alcohol consumption disrupts retinoid metabolism and signaling. By using combined nutritional agents, it may be possible to restore normal retinoid functioning and protect against cancer in high-risk populations. The potential protective role played by the active form of vitamin D in combination with genistein was the subject of the next presentation. Genistein co-treatment appears to prolong the life of calcitriol, increase its concentration in cells, and thus enhance its ability to inhibit prostate cancer carcinogenesis in vitro. The next speaker explored a similar hypothesis in regard to colon cancer using a mouse model. Results show that low dietary calcium intake increases COX-2 expression and that this and similar effects can be attenuated by genistein. This suggests that dietary calcium intake and intake of phytoestrogens may interact to alter colon cancer risk. The final presentation of the session focused on the interaction among diet, human papillomavirus (HPV), and cancer. Because only a fraction of women infected with HPV develop cervical cancer, researchers are now investigating if and how nutrient status and dietary intake may influence HPV persistence and progression to cancer.

During the morning of the second day of the conference, a split session focused on epigenetic research and how diet and other environmental factors could have an impact on lifetime cancer risk. The session’s first speaker discussed in vitro and in vivo models that show that even mild maternal protein under-nutrition during a specific stage of embryonic development in rats and mice can produce a variety of changes in development linked to higher cancer risk. The next speaker discussed a rodent liver cancer model in which methyl-deficient diets seem to induce liver cancer by altering histone structure in liver tissue. Another speaker also presented data on the importance of DNA methylation and maternal nutrition. In the yellow Agouti mouse, supplementation with methyl-donating substances such as folic acid during pregnancy reduced the risk that offspring would develop obesity, diabetes, and cancer. Notably, this was accomplished by increasing methylation of the transposable gene element at CpG sites (regions of DNA at which cytosine and guanine are separated by phosphate), not via gene mutation. Next, a presenter reviewed the many potential mechanisms whereby plant polyphenols could influence DNA methylation. Finally, a speaker described a study in mice that ultimately aims to determine whether dietary antioxidants can reduce oxidative stress in the cells of patients suffering from ataxia telangiectasia (AT), an inherited disorder linked to cancer in humans.

In another morning split session, presenters reported on ongoing trials involving cancer survivors. The first speaker discussed the influence of dietary fat on breast cancer outcomes, which is being investigated by two randomized trials, the Women’s Intervention Nutrition Study (WINS) and the Women’s Health Initiative Dietary Modification (WHI-DM) trial. The next speaker noted that trials with breast cancer survivors are finally beginning to focus on diet, examining potential links to recurrence and survival time. WINS and the Women’s Healthy Eating and Living (WHEL) Study were singled out. A new study (the Pathways Study) began recruitment in February 2006 and is unique because it enrolls women as soon after diagnosis as is practical instead of waiting until completion of therapy. The next speaker described the aims and design of the WHEL Study in detail. WHEL is testing whether change in diet can influence risk for recurrence and increase survival time among 3088 breast cancer survivors; results are expected by 2008. Another presentation focused on the development of interventions that best suit the needs of survivors such as home-based programs that rely on telephone counseling and mailed or computer-assisted materials. The session concluded with a presentation on using biomarkers to stage disease, predict prognosis, and target interventions in the survivor community.

The final plenary session of the conference involved techniques and technologies on the frontiers of diet-cancer science. The first presentation of the session offered putative mechanisms to explain how SNPs in a range of genes influence the diet-cancer link. Next, a presenter offered an overview of methods of extracting meaningful information from the data floods that occur in the “postgenomic” study of cancer genetics, with the new “omics” technologies. This presentation was followed by a discussion of the gap that exists between laboratory evidence linking polyphenols to lower cancer risk and inconsistent evidence from human trials involving these compounds. It was suggested that this gap may be explained, at least in part, because mechanistic studies often involve non-physiologically relevant concentrations of test agents and because most human studies involve parent compounds, not the active metabolites that display anticancer activity. The final presentation of the session, and of the conference itself, dealt with nutritional genomics. Whether scientific understanding of nutrient-gene interactions will ultimately provide a set of dietary recommendations that can be tailored to individuals is an open question.

AICR is a member of the WCRF global network, which provides a wide range of educational programs to help people make changes for lower cancer risk and supports innovative research in prevention and treatment worldwide.

In Memoriam
We at the American Institute for Cancer Research are saddened to report the passing of Dr. Helen Norman. Helen edited these proceedings for 5 years. She was a friend to many at AICR. Her dedication to cancer research inspired everyone who knew her. She will long be remembered.