Almost 1.3 million American men and women are expected to develop cancer during 2002, and more than 550,000 will die from the disease in the same year (5). There are approximately 9 million Americans living with cancer, according to the National Cancer Institute (7). Some of these individuals have been cured of cancer, whereas others are undergoing treatment or are still considerably ill from their disease. Although some cancers are more common in the Western world, cancer affects populations throughout the world, and as countries become more developed, they take on the cancer rates of developed countries. The rising incidence of several common cancers in the last century in the United States has paralleled large changes in American lifestyle and environment. Particular lifestyle changes that could account for increasing incidence of cancer include tobacco use; increase in sedentary behavior; increased overweight and obesity; increase in dietary intake of calories, fat, and refined sugar; and reproductive pattern changes.

A sedentary lifestyle has been observed over the past 20 yr to be associated with increased risk for several common cancers, especially colon and breast cancer (9,10). Overweight and obesity, products in part from a sedentary lifestyle, are associated with increased risk for cancers of the colon, breast (postmenopausal), endometrium, esophagus (adenocarcinoma), gallbladder, pancreas, and kidney (1). The American Cancer Society estimates that one third of the cancer deaths that occur in the United States each year can be attributed to diet and physical activity habits (1). It recommends that individuals exercise at moderate or higher intensities at least 30 min per day 5 d·wk⁻¹. For children and adolescents, it recommends exercise at moderate or higher intensities at least 60 min·d⁻¹ 5 d·wk⁻¹. It further recommends that individuals keep their body weight at healthy levels, less than a body mass index of 25.0, for optimum protection against various cancers.

The International Agency for Research on Cancer of the World Health Organization estimates that, taken together, excess body weight and physical inactivity account for approximately one fourth to one third of breast cancer, and cancers of the colon, endometrium, and kidney (renal cell) and esophagus (adenocarcinoma) (4). It goes on to say that adiposity and inactivity appear to be the most important avoidable causes of postmenopausal breast cancer, endometrial cancer, renal cell cancer, and adenocarcinoma of the esophagus, and among the most important avoidable causes of colon cancer. Its recommendations are similar to those of the American Cancer Society, e.g., that individuals maintain a body mass index between 18.5 and 25.0, avoid weight gain during adult life, and exercise at on most days at moderate to intense levels for up to an hour per day in order to avoid overweight and obesity.

The purpose of this symposium was to bring together experts in the newly emerging field of research on exercise and cancer, to present the current state of knowledge, and to outline future research needs.

Dr. I-Min Lee of Harvard University in Boston, Massachusetts, presented the available epidemiologic evidence linking physical activity to risk of various cancers, highlighting both areas where there is strong evidence linking increased physical activity to reduced risk of cancer, and also pointing out the cancers for which there is insufficient evidence to determine if there is any relationship with physical activity levels (6). Dr. Laurie Hoffman-Goetz of the University of Waterloo in Ontario, Canada, reviewed the types of animal and tumor models used in carcinogenesis studies with respect to their utility in studies of exercise and cancer (3). Dr. Kim Westerlund of the AMC Cancer Research Center, Denver, Colorado, presented the potential mechanisms through which physical activity and...
exercise might be related to cancer development and promotion, citing evidence from animal and human studies (11). Dr. Anne McTiernan of the Fred Hutchinson Cancer Research Center in Seattle, Washington, described the emerging field of human exercise intervention research in the cancer etiology field, highlighting two ongoing randomized controlled clinical trials (8). Finally, Dr. Kerry Courneya of the University of Alberta, Canada, presented the role of physical activity and exercise in rehabilitation and recovery for persons with new and chronic cancer diagnoses (2).

In summary, this symposium on exercise and cancer was hopefully the beginning of a trend toward increasing education of exercise scientists on the role of exercise in cancer development and prognosis, so that more exercise researchers will bring their skills and expertise to this emerging field of research. It was also hopefully the start of increasing education for exercise practitioners, who are working with persons with cancer and at-risk persons, so that they can bring this knowledge to their daily practice.

REFERENCES