

# International Symposium on Lycopene and Tomato Products in Disease Prevention: An Introduction

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On March 3, 1997, a Symposium under the title listed above was organized in the facilities of the American Health Foundation in New York City. The event was sponsored by the American Health Foundation and the Tomato Research Council, which also provided financial support for the Symposium and publication of these Proceedings. The Council included the Campbell Soup Company (Camden, NJ); the H.J. Heinz Company (Pittsburgh, PA); and the Hunt-Wesson Company, Inc. (Fullerton, CA). The Program Committee consisted of Dr. Gary R. Beecher of the Food Composition Laboratory, US Department of Agriculture, Beltsville, MD; Dr. John W. Erdman, Department of Food Science, University of Illinois, Chicago, IL; Dr. Robert M. Russell, USDA Human Nutrition Research Center on the Aging, Tufts University, Boston, MA; and this writer. We are indebted to Aronow and Pollock, New York City, for their excellent support in facilitating and coordinating this event.

The goal of this symposium was stated as follows:

“This multidisciplinary symposium offers a comprehensive review of new research findings related to the health benefits of lycopene and tomato products. The scientists and health professional who have been invited to present at the symposium hold international recognition in the field of carotenoid research. Numerous studies now show that lycopene is a powerful antioxidant which may help in the prevention of prostate, breast, and digestive cancer (including colon, rectum, and stomach). The goal of the symposium is to provide a professional forum where the research community can share its new findings and stimulate further thought on the role of lycopene and tomato products in disease prevention.”

This symposium was timely. Indeed, medical research sponsored mainly by the NIH and professional groups, such as the American Cancer Society and the American Heart Association, for the last 30 years has provided an impressive

data base indicating that most chronic diseases anywhere in the world stem from the locally prevailing lifestyles. In 1950, when Wynder (1) first described tobacco use and cigarette smoking as a major risk factor for lung cancer, extended in the United Kingdom by Doll (2), about 68% of American males were smokers. It was shown that this habit was not only associated with lung cancer but with the occurrence of coronary heart disease. With the accumulation of additional data and successive reports by the Surgeons General, the American people slowly but certainly decreased the cigarette habit. The explosive increase in lung cancer that had developed since the 1930s stopped about 1975, and since 1985 a decreased incidence of lung cancer has been found in males. In parallel, the rate of fatal heart attacks in males has declined, beginning about 1980. Clearly, emphasis on eliminating cigarette smoking as a risk factor has had the fortunate consequence of a declining incidence of the associated diseases. Regrettably, this sequence of events has not been seen until very recently in women, whose traditional concern has been breast cancer. Yet, beginning about 1980, more women died from lung cancer than from breast cancer. In women, the increasing rate of lung cancer, for the most part an incurable disease, has not yet stabilized and begun to decrease, as it has in men, and the rate of fatal heart attacks is increasing in women smokers. Also, in other countries, the tobacco habit in men and women continues, especially in Africa. Thus, much work remains to be done to eliminate a harmful habit demonstrated to cause a number of types of cancer and heart disease.

One important type of cancer in the world is stomach cancer. One risk factor, a recently discovered bacterial element (*Helicobacter pylori*) in the gastric mucosa, seems to stimulate cell damage, cell duplication rates, and cell repair. These factors serve to augment the carcinogenicity of other factors of a chemical nature associated with salting and pickling, a process that generates novel types of specified carcinogens for the stomach. With the invention of commercial and home food refrigeration, the need to salt and pickle for food preservation has decreased. Thus, in countries like the United States, gastric cancer has declined sharply over the last 60 years and is a cancer of relatively

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minor importance, seen mainly in immigrants from countries that are still at higher risk and in some of the lower socioeconomic groups. The introduction of refrigeration to preserve food anywhere in the world has led to lower risk of gastric cancer.

Another major element associated with the availability of refrigerated food storage in the colder hemispheres of the world is the yearlong availability of fresh fruits and vegetables. These desirable parts of the food chain, which grow year-round in the warmer climates, can be refrigerated and transported to other areas where the public can have access to them regularly. This is important because these types of foods provide not only essential vitamins but important other antioxidants such as quercetin or lycopene in tomatoes and pink watermelons. In particular, it has been shown through epidemiological approaches and also laboratory studies that regular intake of tomatoes lowers the risk of major types of cancer, and possibly also heart disease. The active antioxidant in tomatoes is lycopene, a fairly stable chemical that remains intact during cooking, and in fact, is released from the tomato membrane and fiber. Thus, more lycopene is available from cooked tomatoes, an interesting finding since fresh, uncooked fruits and vegetables are thought to be more nutritious. At the same time, people in areas of the world like the Mediterranean countries cook with olive oil since olives have been harvested in that area

for thousands of years. Laboratory research in models of breast and colon cancer has shown that olive oil, which is monounsaturated, is not a cancer-promoting type of fat. Epidemiological studies have demonstrated that populations that use olive oil have a lower risk of heart disease and nutritionally linked cancers.

The Proceedings of the Symposium recorded in this volume present a number of specific mechanisms by which foods rich in lycopene, particularly cooked tomatoes, promote health. These mechanisms relate to effects on the production of reactive metabolites through the inhibition of active oxygen or radical formation. Lycopene can also protect against adverse actions in the developmental and growth-promoting actions of foci of abnormal cells.

Disease prevention is one of the key goals of medical research and a particular aim of this Symposium. Healthy people make fewer demands on the high cost of medical care, and it is our hope that translation of the findings in this Symposium will not only keep people healthy, but at the same time, help to decrease medical care costs.

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1. Wynder EL, Graham EA. Tobacco smoking as a possible etiological factor in bronchiogenic carcinoma. *JAMA* **143**:329–336, 1950.
  2. Doll R, Hill AB. Smoking and cancer of lung: preliminary report. *BMJ* **2**:739–748, 1950.