

## Book Review

**Genes, Cancer and Ethics in the Work Environment**  
*edited by Sheldon W. Samuels and Arthur C. Upton,*  
*MD. 1998. OEM Press, Beverly Farms, MA. 184 pages.*  
*\$49.00. ISBN 1-883595-18-5.*

This book is a unique historical record and reflection on the scientific agenda of Irving Selikoff in the last phase of his life. It contains a selection of 17 papers from two conferences he planned, neither of which he would attend: "The Workplace and the Human Genome" (May 20-21, 1992) and "The Molecular Origins of Cancer" (April 9-14, 1995). Dr. Selikoff died May 20, 1992, just as the first conference was getting underway. This book contains glimpses of the vision that he had for the future to utilize the abundance of discoveries about how cancer develops at the molecular and genetic level for prevention and control of cancer in the workplace.

The book could be subtitled, in the words of Selikoff, "Molecular Biology of the Latent Period." He realized that the incubation or latent period of occupational cancers has been largely a "black box," that if opened could lead to interventions for high-risk groups, groups heretofore defined only by exposure, morbidity, and mortality variables. New molecular biological insights might lead to appropriate approaches to interrupt the seemingly inexorable process between exposure and cancer. This book tracks some of the hopes, opportunities, and issues that accompany the use of new technologies in the service of workers. It is one of the few books where the issues of genetics, cancer, and work are brought together.

The book begins with a dedication to Selikoff's legacy, *Research and Protection for Workers*, by Sigurd Lucassen of the United Brotherhood of Carpenters, and a description of the Selikoff Fund for Occupational and Environmental Cancer Research. This dedication reviews some of the efforts by Selikoff and others to forge a partnership between science and labor. Next, the broad historical dimensions of the Selikoff agenda were aptly measured by Sheldon Samuels, who also participated in forming and implementing that agenda. He traces Selikoff's efforts from the early 1970s to the present volume to develop protective interventions among workers at high risk of occupational disease. The "high-risk management" concept involves extending to workers the basic public health practice of notification, cessation or reduction of exposure, early detection and routine medical surveillance, and intervention. At the same time, Samuels identifies the issues surrounding multistage

disease, multifactor causality, and the role of genetic as well as environmental factors in occupational cancer. Finally, he traces Selikoff's understanding of the paramount importance of the ethical, legal, and social aspects of scientific knowledge and technologies that promise intervention breakthroughs. This is also illustrated in the first five chapters that comprise Section One, "The Workplace and the Human Genome: Ethical, Legal and Social Constraints."

In Chapter One, Samuels, while more fully describing Selikoff's notion of high-risk management, focuses on his concern that of all the issues of occupational health research, none seemed to him as being "an approach with much mistaken regard . . . as are the rights of subjects of research." While Samuels excoriates the practice of obtaining informed consent as neither truly informed nor truly consenting, he finally calls for balancing conflicting rights in a code for participants. Alan Gewirth addresses genetic testing in the workplace and asserts that the moral issues of genetic testing bear on the fundamental interests of workers, of employers, and of the general public and these interests constitute the objects of human rights. Although this is a seminal chapter, the author does not distinguish exploratory research on genetic factors from genetic screening (using a validated marker). The chapter focuses on the ethical issues of the latter. Gewirth concludes that genetic screening and monitoring are recommended as morally justified procedures, but which entail correlative duties of employers and government. Gert focuses on research subjects and asserts that ". . . it is morally unacceptable not to make a good faith effort to make sure that those who consent to research understand fully what risks they are taking including not merely medical risks but social and financial as well." Maltby looks at the "dark side of scientific progress" in the form of workplace discrimination. He calls for better laws to ensure that the results of cancer research are not misused. In particular, he suggests that the Americans with Disabilities Act (ADA) be amended to restrict all employers' medical inquiries to conditions that are legally relevant, and to clarify that asymptomatic individuals, at risk for diseases covered by the ADA, are protected. Wambach and Beliczky preface the next chapter, which are summaries of panel discussions on policy issues, with the conclusion that molecular genetics is now so advanced that its commercial and preventive health applications should soon demand a national public policy to control misuses and protect human rights from abuse and discrimination.

In the second section, on the molecular origins of cancer, the focus is on opportunities for intervention among populations at high risk of occupational and environmental cancer. Fittingly, it starts with a chapter based on Selikoff's notes from 1991 on opportunities for intervention among asbestos-exposed workers. He clearly observes that early diagnoses can be early clinically but are not early biologically. Until diagnoses can be early biologically, interventions will be limited.

In the next chapter, Knudson, whose two-hit model carcinogenesis strongly influenced Selikoff, reviewed his earlier conceptualizations on the hereditary and environmental causes of cancer, noting the interaction between the two. Freireich reviews recent developments in cancer therapy and states that two requirements are a treatment of proven value for advanced disease and a technique for recognition of an early disease. In the next chapter, Massaro-Giordano and colleagues describe in exquisite detail the retinoblastoma gene family which was the basis for Knudson's two-hit hypothesis for carcinogenesis, that is, the requirement for two mutational events, or loss of function in the same locus. The following chapters—Perera et al., Straif et al., Gut, Riback et al., and Schulte et al.—describe molecular epidemiological and clinical biomarkers studies in Eastern Europe, Israel, and the US. All of these efforts attempt to break open the black box between exposure to known carcinogens and disease by integrating biological markers into epidemiologic and clinical studies. The work by Perera and colleagues demonstrates how various biomarkers can be used as valid early warning indicators of environmentally induced disease. In the next two chapters, Rom and Balti et al. look at the cellular, molecular, and genetic mechanisms of asbestos-related diseases. Finally, Howard et al. assess the

role of a biological agent, the SV40 monkey polyomavirus, as a risk factor for cancer. Acknowledging the role of asbestos in mesothelioma, they hypothesize that the increase in human mesothelioma and the 30% increase in human brain tumors in the past 20 years may be linked to the inoculation of SV40 into the human population.

This book is a rich tapestry of the forward view of Irving Selikoff and the scientists and representatives of labor, academia, government, and workers who collaborated with him. It presents the hope that understanding the molecular events following exposure to carcinogens will lead to early intervention opportunities and reversal or remediation of the process. While this book identifies opportunities for intervention, it does not demonstrate that the interventions will be successful. It is clearly not an argument for reducing primary prevention efforts, but rather an effort to address the plight of those already exposed to carcinogens. Identifying the continuum between exposure and cancer provides the potential for better understanding of the mechanism of cancer. In this way, various intervention strategies, ranging from exposure control and chemoprevention to screening, early detection, and possibly gene therapy, can be considered. Additionally, by assessing the susceptibility factors, there is potential for better identification of effect modification in epidemiologic research and for targeting intervention efforts. Selikoff gave us the challenge to explore this potential for the betterment of working people. This book illustrates that challenge.

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