

**NATIONAL CANCER
PROGRAM, 1983-1984,
DIRECTOR'S REPORT AND
ANNUAL PLAN FY 1986-1990**

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Various

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FY 1986-1990

**U.S.
DEPARTMENT
OF HEALTH
AND HUMAN
SERVICES**

**Public
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of Health**

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Prepared by
The Office of Program Planning and Analysis
in cooperation with
the operating Divisions of NCI

FOREWORD

In accordance with Section 404(a)(9) of the Public Health Service Act (as amended in 1978), the Director, National Cancer Institute (NCI), must prepare, annually, a report summarizing activities, progress, and accomplishments for the preceding year of operations and a plan, including budget projections, for the ensuing 5-year period.

The program activities, accomplishments, and plans (including budget projections) contained in this Director's Report and Annual Plan have been reviewed by the National Cancer Advisory Board and its Subcommittee on Planning and Budget.

Based on these reviews, the National Cancer Advisory Board endorses the 1983-1984 Director's Report and Annual Plan and recommends that the Director, NCI, submit the Plan to the Secretary, HHS, for simultaneous transmittal to the President and the Congress.



David Korn, M.D.
Chairman
National Cancer Advisory Board

PREFACE

The NCI is placing great emphasis on biochemical epidemiology, a new area of cancer research. This exciting field opens up new opportunities in cancer prevention because it may enable us to predict cancer risk in individuals rather than in populations.

Scientific opportunities generally arise when two or more research areas converge and/or when methodologic advances are effected. Recent research in the laboratory has provided us with both critical information on mechanism(s) of carcinogenesis and new technological advancements, including those in molecular biology.

The methods of classical epidemiology have been used effectively in demonstrating the importance of environmental, occupational, and lifestyle factors in disease causation. The utility of these traditional approaches in studying chronic diseases can now be enhanced by integrating them with laboratory methods. The discipline created by the union of these two approaches has been designated as biochemical or molecular epidemiology.

The primary goal of biochemical or molecular epidemiology is to identify individuals at high cancer risk by obtaining evidence of biological abnormalities indicating (1) high exposure of target cells to carcinogens and/or (2) increased susceptibility due to inherited or acquired host factors.

To accomplish this, available biochemical techniques are incorporated into epidemiologic investigations, and efforts are made to translate experimental findings into methods and materials whose use will extend the scope of molecular epidemiology.

Biochemical techniques currently available allow scientists to better characterize exposure to carcinogens, to identify intermediate points on the path to malignancy, to develop ways to halt or reverse this process, and to investigate the mechanisms of human carcinogenesis.

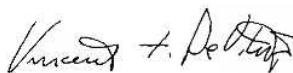
These methods include: (1) techniques to assess specific host susceptibility factors, such as immunologic status, endocrine factors, efficiency of DNA repair, and susceptibility to cell transformation; (2) assays that detect carcinogens in human tissues, cells, and fluids; (3) cellular assays to measure pathobiological evidence of exposure to carcinogens; and (4) methods to measure early biochemical and molecular responses to carcinogens. For example, scientists can measure the presence and extent of the chemical products formed when carcinogens and DNA combine (carcinogen-DNA adducts) in cells and explanted tissue from humans exposed to known or suspected carcinogens. This measurement is based on a new technique that uses ultrasensitive enzyme radioimmunoassay to measure carcinogen-DNA adducts. The covalent binding of the activated form of a carcinogen to DNA may be viewed both as an indicator of environmental exposure to a carcinogen and as a predictor of an

individual's metabolic balance between carcinogen activation and deactivation and his capacity for DNA repair. Ultrasensitive enzyme radioimmunoassays to measure carcinogen-DNA adducts are 100-fold more sensitive than radioimmunoassays and are now being used in pilot laboratory-epidemiology studies.

Examples of such investigations include: (1) efforts to evaluate body burden of chemical carcinogens in studies of occupational and general environmental cancer risk factors; (2) sophisticated analyses of air, water, and biologic specimens for carcinogenic and mutagenic substances in conjunction with specific analytic studies; (3) investigation of the relationship between micronutrients, such as beta-carotene, and a variety of epithelial cancers; (4) determination of the relationship between macronutrients, including dietary fat and subsequent hormonal changes, to subsequent risk of breast, endometrial, and, perhaps, colon cancer; (5) search for evidence of viral infection, including viral segments or oncogenes in the DNA of individuals at high risk of cancer, that may be associated with infectious agents or heritable states; and (6) evaluation of disturbances in immune function as they may relate to malignancies, particularly those of the hematopoietic system.

A wide variation in the extent of genotoxic damage has been found in high risk groups due to occupation (e.g., foundry workers and asphalt workers) or personal habits (e.g., tobacco smoking). Based on the data base from studies in experimental carcinogenesis, individuals with high levels of carcinogen-DNA adducts may be at increased cancer risk.

The potential of biochemical and molecular epidemiology to predict cancer risk on an individual basis, instead of a population level, and prior to the onset of clinically evident cancer provides an exciting new opportunity in cancer research and cancer prevention. A more detailed description of our current and planned efforts in biochemical epidemiology can be found in Chapter III, Scientific Opportunities.



Vincent T. DeVita, Jr., M.D.
Director
National Cancer Institute
National Cancer Program

SPECIAL NOTE

Over the years, the NCI Director's Report and Annual Plan (DR/AP) has gradually evolved from being the principal planning document for the National Cancer Program (NCP), in which only future programs and budgets were described, to a more generalized document containing both plans and also descriptions of management and administrative functions. Since 1980, the management and administrative aspects of NCI operations have been the subjects of specific reports and papers,¹ and continued inclusion in the DR/AP would be duplicative.

Beginning with this issue, the DR/AP will again assume the role of the principal planning document for the NCP. The perspective is futuristic with past accomplishments and current programs described only sufficiently to provide a base for discussions of future planned programs and activities. Emphasis will be on research and cancer control opportunities; their importance for the improved prevention, detection, and treatment of cancer; and how the Institute plans to exploit fully these opportunities from a program standpoint, including estimates of the resources required for their implementation.

Of particular importance in this issue is the description of the Institute's Cancer Control initiative to reduce cancer mortality by 50 percent by the year 2000.

¹See last reference in the Selected Bibliography.