

Developments in Preventive Oncology

Part A

Editor

Herbert E. Nieburgs

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DEVELOPMENTS IN PREVENTIVE ONCOLOGY PART A

Selected Papers From the Sixth International Symposium on Prevention and
Detection of Cancer Held in Vienna, November 26–29, 1984

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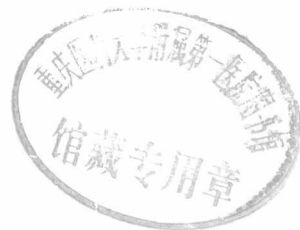
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INTRODUCTION

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Symposia and publications of the International Society for Preventive Oncology (ISPO) are designed to foster prevention of cancer morbidity and detection and management of cancer in its earliest curable stages. The 6th International Symposium on Prevention and Detection of Cancer in Vienna, Austria, November 26–29, 1984, was sponsored by ISPO and cosponsored by the World Health Organization and the Austrian Cancer Society-Cancer League. This current volume contains selected contributions updated subsequent to presentation and is offered for assessment and implementation of existing knowledge for the effective management of cancer.

The control of human oncogenesis is a multidisciplinary task. While tumor growth has a long latency period, the increased life expectancy through the control of health hazards and changing lifestyles has provided the additional number of years needed for tumor development. Improved methods of detection and diagnosis have also influenced the apparent rise in cancer incidence.

Cancer is a disease of great complexity with many inducing and promoting factors usually exerting their action in various combinations. Most neoplastic diseases are systemic with local tumor manifestations. Tumor growth depends upon the actions of multiple etiologic factors: rate of cell proliferation, cell survival time, immunocompetence of the host, and other influences. Because cancer is a multitude of diseases, tumors identified by the same terminology may differ in their response to therapy and from patient to patient at different stages of the disease.

The multifactorial aspects and multidisciplinary approach to the prevention of neoplastic diseases is presented in two major sections. The first section includes reports on oncodevelopmental factors such as geographic oncology, smoking hazards, genetic and dietary influences, xenobiotics, viral causes, immune dysfunctions, and hormones as well as designs and strategies of cancer control studies and the role of education, health organizations and professional societies. The second section is devoted to clinical oncology. It presents much useful information on risk assessment and prognosis, biological markers for detection and diagnosis, therapy-induced changes, and, specifically, the diagnosis and management of tumors in various sites.

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Contents

Contributors	xi
Introduction	
H.E. Nieburgs	xvii
EXPERIMENTAL CARCINOGENESIS, GENETICS, AND DIETARY INFLUENCES	
Prenatal and Childhood Exposure to Carcinogenic Factors	
N.P. Napalkov	1
Methylation and Expression of c-myc and c-abl Oncogenes in Human Leukemic K562 Cells Before and After Treatment With 5-Azacytidine	
Laura del Senno, Rafaella Barbieri, Francesca Amelotti, Francesco Bernardi, Daniele Buzzoni, Giovanna Marchetti, Patrizia Patracchini, Roberta Piva, Mariella Rossi, Francesco Conconi, and Roberto Gambari	9
The Effect of Experimental Carcinogenesis on Intestinal Diamine Oxidase, a Polyamine Deaminating Enzyme	
J. Kusche, J.R. Izbicki, R. Mennigen, A. Curt, and J.V. Parkin	17
Chromosome Changes in Cancer	
Felix Mitelman	31
Genetic and Familial Cancer: Opportunities for Prevention and Early Detection	
Frederick P. Li	41
Childhood and Recent Eating Patterns and Risk of Breast Cancer	
T. Gregory Hislop, Andrew J. Coldman, J. Mark Elwood, Gerald Brauer, and Lisa Kan	47
Benzo(α)pyrene Metabolism and DNA-Binding in Cultured Explants of Human Bronchus and in Monolayer Cultures of Human Bronchial Epithelial Cells Treated With Ellagic Acid	
Robert W. Teel, Gary D. Stoner, Merrill S. Babcock, Rakesh Dixit, and Kitai Kim	59
Immunological Enhancement by Fat-Soluble Vitamins, Minerals, and Trace Metals: A Factor in Cancer Prevention	
Ronald Ross Watson	67
SMOKING HAZARDS AND LUNG CANCER	
Correlation of Bronchial Epidermoid Metaplasia With Level of Tobacco Consumption in Heavy Smokers	
G. Mathé, G. Santelli, J. Gouveia, G. Lemaigre, J.L. Misset, F. Gros, J.P. Homasson, B. Kim, M.C. Sudre, and H. Gaget	79
Lung Cancer and Tobacco—A Global Problem	
Kenneth E. Stanley	83
Relevance of Gas and Particulate Phases of Tobacco Smoke for Lung Cancer Formation: An Experimental Study in Syrian Golden Hamsters	
W. Jens Zeller and Dietrich Schmähl	91

Legislation to Control Smoking: Leverage for Effective Policy	
Ruth Roemer	99
CANCER CONTROL STUDIES	
National Cancer Control Programs and Setting Priorities	
J. Stjernswärd, K. Stanley, D. Eddy, M. Tsechkovski, L. Sobin, I. Koza, and K.H. Notaney	113
Design of Cancer Prevention Studies	
Joseph W. Cullen	125
Scientific Basis of Screening in Early Detection	
Matti Hakama	139
Biochemical Markers of Tumor Diathesis and Early Cancer	
Run-Sheng Tan, Yu-Qing Chen, Zhen-Fu Fan, Shu-Zhong Liu, and You-Hui Zhang	145
Study of Benign Breast Disease in a Population Screened for Breast Cancer	
M. Deschamps, T.G. Hislop, P.R. Band, and A.J. Coldman	151
Reversibility of Bronchial Marked Atypia: Implication for Chemoprevention	
Pierre R. Band, Michael Feldstein, and Geno Saccomanno	157
Preventative Effect of Etretnate Therapy on Multiple Actinic Keratoses	
Alan B. Watson	161
Regression of Bronchial Epidermoid Metaplasia in Heavy Smokers With Etretnate Treatment	
J.L. Misset, G. Mathé, G. Santelli, J. Gouveia, J.P. Homasson, M.C. Sudre, and H. Gaget	167
GEOGRAPHIC ONCOLOGY, CULTURAL HABITS, AND LIFESTYLES	
Geographic Cancer Risk and Intracellular Potassium/Sodium Ratios	
Birger Jansson	171
Cancer in Bangladesh: A Model for Some Problems and Proposed Solutions in the Third World	
Brian I. Carr	195
Facts and Figures About Cancer in Bangladesh	
M.A. Rahim	203
Oral Cancer and Cultural Practices in Relation to Betel Quid and Tobacco Chewing and Smoking	
Kasturi Jayant and M.G. Deo	207
Oral Cancer in Saudi Arabia: The Role of Alqat and Alshammah	
Ezzeldin M. Ibrahim, Mohamed B. Satti, Hassan Y. Al Idrissi, Mohamed M. Higazi, Gadi M. Magbool, and Abdulaziz Al Quorain	215
Detection of Oral Cancer Using Basic Health Workers in an Area of High Oral Cancer Incidence in India	
Fali S. Mehta, Prakash C. Gupta, R.B. Bhonsle, P.R. Murti, D.K. Daftary, and Jens J. Pindborg	219
Primary Hepatocellular Carcinoma: Clinical, Ultrasonic, and Pathological Patterns and Correlations	
Sameh S. Shamaa, Ibrahim Yasseen, Ibrahim El-Desoky, Sabry A. El-Mogy, Tarek M. El-Diasty, Farag M. Farag, Gamal F. El-Wahidy, and Hanem M. Sakr . . .	227
Influence of Sexual Activity on Development of Cervical Intraepithelial Neoplasia (CIN)	
R.E. Harahap	237

ONCODEVELOPMENTAL FACTORS

Modulation of Carbohydrate Metabolism During Carcinogenesis Peter Bannasch	243
Influence of Hyperthermia and Acidosis on the Altered Red Blood Cell Osmotic Fragility in Mice With Ehrlich Ascites Tumor Winfried Krüger and Gabriele Binder	251
Carcinogenesis and the Central Nervous System Alexandra von Metzler and Cordula Nitsch	259
Induction of Neoplastic Lesions in the Livers of C₅₇BL × C₃HF₁ Mice by Chloral Hydrate Koshilya S. Rijhsinghani, Cyril Abrahams, Martin A. Swerdlow, K.V.N. Rao, and Tarunendu Ghose	279
Herpes-Related Polypeptides From a Human Cervical Carcinoma Cell Line Martha Suh and Eric Frost	289
Human Papillomavirus (HPV) Infection of Cervical Lesions Detected by Immunohistochemistry and In Situ Hybridization Ilsetraut Hoepfner and Thomas Löning	293
Association Between Prognosis and Hormone Receptors in Women With Breast Cancer Angelos E. Papatestas, Seth R. Miller, Demetrios Pertsemlidis, Richard Fagerstrom, Gerson Lesnick, and Arthur H. Aufses	303
Assessment of Host Immune Response in Breast Cancer Patients Minoru Akimoto, Hiroshi Ishii, Yoshimichi Nakajima, Hideyasu Iwasaki, Masaki Tan, Rikiya Abe, and Morio Kasai	311
Report of Two Cases of Male Breast Cancer After Prolonged Estrogen Treatment for Prostatic Carcinoma O.K. Schlappack, O. Braun, and U. Maier	319
Hormone Steroid Receptor Variation After Tamoxifen Administration in Endometrial Adenocarcinoma From Postmenopausal Patients Giovanni Di Fronzo, Enrico Ronchi, Vera Cappelletti, Luciano Luciani, Danila Coradini, Saro Oriana, Patrizia Miodini, and Salvatore Andreola	323
Preliminary Report on Postmenopausal Endometrial Hyperplasia Treatment With Danazol: Histological and Endocrinological Aspects V.M. Jasonni, S. Naldi, L. La Marca, C. Bulletti, P. Ciotti, V. Vignudelli, and C. Flamigni	331
Asbestos as an Air Pollutant and Synergism With Smoking Arthur L. Frank	337
Malignancy-Associated Cellular Markers (MAC) in Oral and Bronchial Epithelial Cells in Sputum Specimens: Possible Morphologic Marker for High-Risk Groups (Asbestos-Exposed Workers) A. Vetrani, L. Palombini, M. Marino, R. Boschi, F. Fulciniti, G. Marino, A. Zabatta, and P. Bianco	343
Immunological Reactivity of Mucinous and Serous Ovarian Adenocarcinomas Antonia Har/ozńska-Szmyrka, Barbara Ślesak, Roman Richter, Jerzy Rabczyński, and Mieczysław Cisło	347
Changes in Peripheral T-Cell Subsets and Natural-Killer Cytotoxicity in Relation to Colorectal Cancer Surgery Paul Ian Tartter, Giorgio Martinelli, Bryan Steinberg, and Debra Barron	359

Distribution of Surface Nonspecific Cross-Reacting Antigen and Influence of Proteolytic Enzymes on This Antigen in Myeloid Cell Series	
Anna Noworolska, Antonina Harjozińska-Szmyrka, and Roman Richter	365
Plasma "Cold-Insoluble Globulin" Protects Cytotoxic Lymphocytes From ATP Inhibition: 2. Immunization Against Viral Cell Surface Antigen Stimulates Cytotoxic Cells to Lyse Tumor Cells	
Anwar A. Hakim and Charles M. Siraki	373
Virus-Inhibiting Factor in Primary and Metastatic Carcinoma of the Liver	
Georgia Christodouloupoulou, Maria Havredaki, and John Christodouloupoulos .	385
Cancer in Renal Transplant Recipients	
G. Sakellariou, D. Memmos, E. Alexopoulos, T. Tsobanelis, Z. Sinakos, and M. Papadimitriou	389
Basic Principles for Utilizing Combination Differentiation Agents	
Samuel Waxman, William Scher, and Barbara M. Scher	395
EDUCATION, HEALTH ORGANIZATIONS, AND PROFESSIONAL SOCIETIES	
Role of Professional Societies in Prevention	
Sándor Eckhardt	409
Strategies for Prevention: Role of Voluntary and Community Organizations in Implementation	
Anders Englund	413
Education Programs on Smoking Prevention and Smoking Cessation for Students and Housestaff in U.S. Medical Schools	
John Horton	417
An Italian Program of Information and Education on Cancer Prevention and the Hazards of Smoking: A 3-Year Report	
C. Arciti and L. Santi	421
RISK ASSESSMENT	
Identification and Surveillance of Individuals at High Risk	
Arthur L. Frank	429
The Effect of Nass Use and Smoking on the Risk of Oral Leukoplakia	
David G. Zaridze, Maria Blettner, Eugene G. Matiakin, Boris P. Poljakov, Hans F. Stich, Miriam P. Rosin, Dietrich Hoffmann, and Klaus D. Brunnemann .	435
Breast Cancer Risk of Lobular-Based Hyperplasia After Biopsy: "Ductal" Pattern Lesions	
David L. Page, William D. Dupont, and Lowell W. Rogers	441
Determination of Discriminatory Power of Prognostic Factors for Recurrence of Breast Cancer	
Y. Murayama, Y. Mishima, and H. Ogimura	449
Familial Cancer: Consequences for the Oncological Practice	
Walter Weber, Andrej Genčik, and Hansjakob Müller	455
Human Leukocyte Antigens and Sister Chromatid Exchanges in Families With Multiple Adenomatosis Coli	
Maria Teresa Illeni, Caterina Agazzi, Roberto Doci, Claudia Lombardo, Eliana Mascheretti, and Riccardo A. Audisio	459
Immunohistochemical Study of Carcinoembryonic Antigen, Epithelial Membrane Antigen, and Secretory Immunoglobulin System in the Large Bowel Adenoma-Carcinoma Sequence	
Gabriella Lapertosa, Patrizia Baracchini, Ezio Fulcheri, and Rita Tanzi	469

Nuclear Steroid Receptors and Dysplasia in Adenomatous Polyps of the Colon as Markers of High Risk for Malignant Transformation	
G. Concolino, G. Arrabito, O. Buonomo, P. Paesani, C. Conti, and C. Picardi . . .	477
Antitumor Immune Response to Colorectal Cancer Antigen Detected by the Leukocyte Adherence Inhibition Test (LAI) in Groups at High Risk for Colorectal Cancer	
Adi Shani, Aharon Fink, David Bass, Felix Gottesfeld, Stewart Becker, Emilia Levy, Zvi Bentwich, Paul Rozen, Zvi Fireman, Aharon Hallak, and Tuvia Gilat	485
Clinicomorphological Manifestations of Primary Liver Carcinoma (PLC) in Liver Cirrhosis	
Vera Ferlan-Marolt and Saša Markovič	491
Tumor Markers for Cancer Detection. I.	
Eric P. Pluygers, Marc P. Beauduin, Paul E. Baldewyns, and Jocelyne A. Burion . .	495
Tumor Markers for Cancer Detection. II.	
Eric P. Pluygers, Marc P. Beauduin, Paul E. Baldewyns, and Jocelyne A. Burion . .	505
Blood Group Substances, CEA, and Lectins in Ovarian Tumors	
Manfred Dietel, Hartmut Arps, Fritz Hölzel, Giuseppe Viale, Patrizia Dell'Orto, Andrea Kröger, and Axel Niendorf	511
Monitoring the Cytotoxic Potential of a Sequential Polychemotherapy (Adriamycin/ Cisplatin—Vincristine/Cyclophosphamide—High Dose Methotrexate) in Patients With Advanced Ovarian Cancer With the Tumor Marker CA-125	
Paul Sevelde, Christian Dittich, Heinrich Salzer, Norbert Pateisky, and Jürgen Spona	521
Index	529
Contents of Developments in Preventive Oncology, Part B	545

Prenatal and Childhood Exposure to Carcinogenic Factors

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ABSTRACT Transplacental carcinogenic effects have been demonstrated for about 60 chemicals in eight animal species and even in the human. Many carcinogens are much more active in the fetus than in the adult animal. The stage specificity of transplacental carcinogenesis is characterized by the possibility of inducing tumors only at certain stages of embryogenesis (at the end of organogenesis and during the whole period of histogenesis). Risk of transplacental carcinogenesis is owing to the passage of carcinogens or their active metabolites into embryonic tissue and the possibility of metabolic activation of substances within the fetus. In this connection, four main pathways can be hypothesized for the carcinogenic effect of a substance on the fetus. Organotropism with transplacental carcinogenesis is determined by genetic predisposition, differentiation, and proliferative activity in the target tissues. For indirect carcinogens the level of metabolizing enzymes is also important. Teratogenesis and carcinogenesis can be either independent processes or pathogenetically related to each other (eg, DES action). Experimental data can readily be applied to the discussion of prophylaxis of prenatal tumors in the human.

Key words: transplacental carcinogenesis; stage specificity, passage, and metabolic activation of carcinogens in the fetus; organotropism; species and stain specificity; relationship between malformations and tumors; prenatal prophylaxis

The phenomenon of prenatally induced, transplacental carcinogenesis was first described by Larsen [1]. However, almost 20 years passed before an extensive exploration of this problem began in the mid-1960s [2-6]. Since that time, the transplacental carcinogenic effects of more than 60 substances and their different combinations have been demonstrated in animal experiments. It was revealed that virtually all site-specific tumors that could be induced in adult experimental animals were also observed following prenatal exposure to carcinogens. The most frequent findings were tumors of the nervous system, kidney, and lungs.

The possibility of tumor induction by transplacental application of carcinogenic chemicals has already been demonstrated in the following animal species: rat, mouse, hamster, rabbit, pig, guinea pig, dog, and monkey. Similarly, at about the same time, convincing epidemiologic evidence of the risk of transplacental carcinogenesis in the human was reported by Herbst et al [7].

The vast majority of chemicals selected for experiments in prenatal exposure were already known to be highly carcinogenic in adult animals of the same species. However, multiple experiments showed that the ability of these substances to induce tumors by transpla-

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