

The YEAR BOOK of

Cancer

1982

CLARK, CUMLEY, HICKEY



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Cancer

1982

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Introduction

Once again, the information presented in this 1982 YEAR BOOK OF CANCER represents, in the opinion of our 147-member editorial board, the very best of the oncologic literature from the past year. From an ever-increasing bibliography, these editors have chosen those articles that cover the most important topics about the causes, detection, prevention, and treatment of cancer. Possibly the strongest testament to the progress being made on all fronts in the battle against this disease is the fact that so many excellent articles could not be abstracted for this volume simply due to lack of space.

One trend reflected in the literature presented here is the strong emphasis being placed on cancer etiology and prevention. However, no weapon as yet has proved as effective against this disease as have early detection and treatment. The authors of one article, for example, report on the usefulness of breast self-examination for the early detection of cancer. Data from myriad sources continue to reveal the multifaceted value of computerized axial tomography for cancer diagnosis, staging, therapy planning, and follow-up. In one report, the authors investigate the use of this technique to evaluate possible hepatic masses and conclude that, at present, it is the single best non-invasive method to determine the presence, nature, and extent of such lesions. It may, in addition, also be specific for the diagnosis of the most common benign liver tumor, cavernous hemangioma. The authors of another study propose that computerized axial tomography be used routinely before surgery or radiation therapy for patients who have esophageal carcinoma, asserting that this roentgenographic method can provide accurate staging information heretofore only available by surgical exploration. Another article concerns an exciting development in the area of diagnostic immunology—the radioimmunolocalization of tumors by external scintigraphy after administration of ^{131}I antibody to human chorionic gonadotropin. Still another study focuses on what promises to be an important technique in a difficult area of diagnosis—the scintigraphic localization of pheochromocytoma.

Progress also has been made in the development of new surgical techniques and refinements of existing ones. Several abstracts in this volume describe such innovations or refinements for specific surgical procedures. In particular, reconstructive surgery is undergoing imaginative technical developments. The authors of one article detail the useful application of hair-bearing scalp flaps to repair defects of the head and neck in the male patient. Another team of authors reviews the new trends in skeletal reconstruction after resection of tumors of the chest wall. One report concerns the controversial practice of im-

mediate breast reconstruction after modified mastectomy for carcinoma of the breast and addresses many issues that surgeons raise about this practice.

As evidence of the focus on etiology and cancer prevention, the literature continues to abound with epidemiologic studies that investigate such topics as the possible link between cancer mortality and air pollution and the link between cancer and diet. One such report cited in these pages discusses the relationship between coffee consumption and the development of pancreatic cancer. The authors of several studies point out that DNA and chromosomal gene alterations in various forms are increasingly prevalent in carcinogenesis initiation and promotion. Another group of authors postulates that genetic transformation is more likely to be the cause of cancer than conventional mutagens are.

There also have been promising developments in the field of immunology. The availability of large quantities of antibodies to specific antigens has resulted in an explosion of knowledge about the immune system. In one article, the authors describe how the identification of specific T cell subsets allows their functional status to be better defined and the interaction of various components of the immune system to be determined.

Several articles in this year's volume report on what is perhaps a true milestone in virology by establishing that a retrovirus is the cause of a specific cancer—cutaneous T cell lymphoma—in human beings and that its transmission is of a nongenetic nature. There are also a number of noteworthy articles that have biologic or biochemical significance. One article describes a mammalian protein that was made efficiently in yeast by the fusion of its coding sequence to a yeast promoter and transcription terminator within a yeast plasmid vector. This technique may allow the genetic engineering of yeast to produce many types of proteins that are not normal yeast proteins. The author of another review describes the general monoclonal antibody methodology and newer techniques that facilitate the production and use of monoclonal antibodies and illustrates, with specific examples, successful applications of the technique to many areas of biochemical research and cellular biology. Another study raises the question of whether mitochondria may be the site of action of carcinogens. The authors of this article found that for both carcinogenic alkylating agents and polycyclic aromatic compounds, the binding to mitochondrial DNA is increased dramatically over that to the nuclear DNA.

This volume of the YEAR BOOK also includes a special article, "American-Soviet Publications in the Biomedical Sciences," which discusses some publications coauthored by American and Soviet scientists and relates how these joint efforts came into being and how they help the international exchange of information on cancer research.

We have attempted here to touch on the progress being made in cancer research and the improvements in diagnostic procedures, staging, and treatment, and, while these achievements are impressive,

their value can best be gauged by the results they yield: patients with cancer are now living longer than ever before, with less pain and with an overall better quality of life. These are our real achievements, each one bringing us closer to the understanding of the cancer process that is necessary for our control and prevention of this disease in the future.

R.L.C., R.W.C., and R.C.H.

Acknowledgments

We are once again most grateful to the dedicated men and women throughout the world who gave their time and expertise to help us make this 26th volume of the YEAR BOOK OF CANCER an accurate, timely, and authoritative publication. This year there were 147 physicians and scientists from 11 countries who made the outstanding selections for the 32 chapters. These experts in the various areas of cancer research review the literature for their respective specialties and select those significant articles that eventually make up the YEAR BOOK. The authors of the chosen articles are invited to prepare abstracts, provide illustrations, and, when necessary, prepare addenda to update their information.

Members of the staff of The University of Texas System Cancer Center provide critical support throughout all phases of the project. The bibliography from which most of the selections are chosen is compiled by the staff of the Research Medical Library from 1100 journals and produced by the Department of Biomathematics as "Current Articles on Neoplasia." The manuscript is prepared for publication in the Department of Scientific Publications. This year, the managing editor of the volume is Diane Rivera; key assistance was provided by the manuscript editors—Douglas Rowlett, Walter Pagel, and Barbara Reschke.

Special thanks go to Dorothy Kisling, who supervised the crucial and voluminous correspondence; Mary Deiss, who was to a large extent responsible for producing an accurately typed manuscript; and Betty Knauls, who also provided assistance with the typing. These people furnished the necessary support that is the backbone of every accurate publication.

All those who contributed their efforts have duties other than those associated with the publication of this book; nevertheless, they willingly complied with our demanding schedule so that we can continue to bring physicians important information about cancer treatment and research. Without the assistance of these persons, who helped make a formidable task much easier, this book would have been impossible to compile, and we extend to them our sincere admiration for a job well done and our heartfelt gratitude. As in the past, we also acknowledge the support of the William Heuermann Fund, which makes this annual publication possible.

R.L.C., R.W.C., and R.C.H.

1. Brain and Nervous System

1-1 **Long-Term Results of Surgical Treatment of 129 Intramedullary Spinal Gliomas.** Beniamino Guidetti, Sandro Mercuri, and Roberto Vagnozzi (Univ. of Rome) report results of their surgical treatment of 129 intramedullary gliomas (48 ependymomas, 53 astrocytomas, 13 spongioblastomas, 5 glioblastomas, 1 oligodendroglioma, and 9 others) with follow-up periods ranging from 1 to 27 years.

Operative mortality, which includes all deaths that occurred during the hospital stay, ranged from a few days to 3 months after surgery and was 5.4%. In recent years (1967-1978), due to experience gained, improvements in anesthesiologic practice, and introduction of the operating microscope into neurosurgery, the authors report no operative deaths, that the number of radical tumor removals has increased, and that functional results are better.

The authors believe the aim of surgery in cases of intramedullary gliomas should be radical removal, although this is possible only when there is a plane of cleavage. This is usually found in cases of ependymoma, and here, radical removal should be the rule. Experience indicates this procedure is followed by good functional recovery. Total removal is rarely possible in cases of astrocytoma, which, even when viewed with the aid of an operating microscope, rarely present a clear plane of cleavage. In these cases, the authors advise performing a posterior myelotomy that extends the full length of the tumor, removing the tumor tissue clearly demarcated from the healthy tissue, and leaving the dura mater open. Experience indicates the results of this surgical procedure are fairly satisfactory.

Approximately the same approach is called for in cases of polar spongioblastoma. The percentage of radical removal of these tumors is higher because of the presence of a plane of cleavage, and the functional results are better than in cases of astrocytoma. The prognosis in cases of glioblastoma multiforme, however, is poor whatever procedure is used. These cases should be treated by posterior myelotomy and removal of as much tumor tissue as possible, with the dura mater left wide open.

Finally, there is the problem of whether to institute postoperative radiotherapy. The authors believe it is useful in cases of partial tumor removal, provided that the posterior longitudinal myelotomy extends the full length of the tumor and provided the dura is left open. However, it is very difficult to achieve a statistically valid comparison

(1-1) J. Neurosurg. 54:323-330, March 1981.

of the functional results obtained in irradiated and nonirradiated patients.

► [This excellent report on a large series updates a previous report (*Acta Neurochir. [Wien.]* 17:7-23, 1967) on the use of modern surgical techniques.] ◀

- 1-2 **Computerized Three-Dimensional Stereotactic Removal of Small Central Nervous System Lesions in Patients.** Skip Jacques, C. Hunter Shelden, Gilbert D. McCann, Donald B. Freshwater, and Robert Rand explain that improvements in computerized tomographic (CT) software and hardware have enabled neurosurgeons to identify lesions of much smaller size than was heretofore possible. The authors recently reported a technique, based on this technology, to identify, remove, and adjuvantly treat small central nervous system (CNS) lesions with a newly designed surgical system (Shelden-Jacques microstereotactic neurosurgical system) that is relatively innocuous to brain.

A major advantage of this technique is its minimal disturbance of brain structure and function, and its ability to afford access to remote lesion sites. The system's extreme degree of accuracy offers the hope of near total removal of a small primary glioma or secondary metastasis while the tumor burden is still small. Although other CT-based stereotactic techniques have been described, none is as accurate in the Z-axis as this one, nor has any other system been mated to a micromanipulator "resectoscope" apparatus with a CO₂ laser.

This system, for the first time, allows the neurosurgeon a technique involving enhancement of CT scans by algorithms for magnification, color coding, volume analysis, and three-dimensional reconstruction which is, in turn, mated to a precise system for stereotactic coordinate calculation, lesion removal apparatus, and the possible means of administering localized adjuvant therapy (chemotherapy, brachytherapy, immunotherapy, and hematoporphyrin derivative). The neurosurgeon can locate to within <1 mm the three-dimensional location of CNS lesions and visualize their exact shape and volume before stereotactic surgical exploration. Multiple sophisticated computer programs now being tested will in the future not only give surgeons the Cartesian coordinates of a lesion but will also dictate the most efficacious and safe angle of approach.

Instruments have been developed that are mounted on a micromanipulator system and used for guidance at the operative site (Fig 1-1). The system of these instruments includes binocular stereoendoscopes with fiberoptic illumination, a tissue expander which exposes the operative area for surgical exploration and lesion removal, a rotary extractor and other small dissecting instruments for performance of biopsy and removal of CNS pathology, and a CO₂ laser and other laser systems mounted to the resectoscope or fiberoptic system, or both. A micromanipulator that guides these instruments is, in turn, mounted to a modified stereotactic frame that accurately defines all the areas of the cranium by three-dimensional coordinates. Additional com-