A REPORT TO THE PHYSICIANS OF TEXAS

newsletter

THE UNIVERSITY OF TEXAS SYSTEM CANCER CENTER

January-February, 1980 M. D. Anderson Hospital and Tumor Institute Volume 25, Number 1

Vitamin E and Adriamycin Cardiotoxicity

Y. M. Wang, PhD*, F. F. Madanat, MD*, J. C. Kimball, MD*, C. A. Gleiser, VMD†, M. K. Ali, MD, PhD°, M. W. Kaufman, MD‡, and J. van Eys, MD, PhD*

Adriamycin is an anthracycline antibiotic possessing excellent activity against a variety of human cancers. However, the therapeutic usefulness of this agent is limited by its unique cardiotoxicity. Because of the prominent role played by Adriamycin in the control of human cancers, several agents have been investigated in an attempt to reduce its toxicity. Among these is vitamin E. Vitamin E does not obviously interfere with the effectiveness of Adriamycin as an antitumor agent in laboratory animals, and we found evidence that vitamin E protects rabbits against Adriamycin-induced acute cardiotoxicity.

In our study of this effect, young adult male New Zealand White rabbits weighing about 3 kg were used. They were given Adriamycin intravenously at 1, 3, 5, 7, 10, and 15 mg/kg as a single dose, although in a preliminary study, the minimal lethal dosage was found to be 7 mg/kg. Thus, 7 mg Adriamycin per kg body weight in a single intravenous injection was adopted as the dose for the experiment.

Rabbits were divided into Adriamycin control and vitamin E-supplemented groups. Vitamin E at a dosage of 200 mg daily was injected intramuscularly into the hind legs for one to 14 days. The dose of vitamin E was based on acceptable human doses, which have been cited to be 2 g per adult (surface area: 1.73 m^2) per day. Adverse effects have been reported with daily vitamin E doses of 4 g in humans.

Blood samples were taken for determinations of plasma vitamin E levels, malonaldehyde levels, erythrocytic reduced glutathione (GSH) levels, and Adriamycin clearance at various times up to the fifth day after Adriamycin injection. Electrocardiography (ECG) was performed at varying time intervals after Adriamycin injection. A number of rabbits were killed within a week after Adriamycin administration for determination of tissue glutathione peroxidase activities and GSH, and malonaldehyde levels. Heart tissue was submitted for light and electron microscopic examinations.

Ten control rabbits died within a week after receiving a single intravenous dose of Adriamycin of 7 mg/kg. Two rabbits, who received an augmented dose of 15 mg/kg, died within 48 hr. Prior vitamin E treatment by a day or two did not prevent toxicity. However, 17 animals treated with consecutive daily vitamin E for 4 days or more survived substantially longer than those not given vitamin E prior to Adriamycin. The eight surviving rabbits were observed for more than 3 months. The other nine rabbits (receiving more than four doses of vitamin E) died between the seventh and eleventh days. Autopsy revealed that massive pulmonary hermorrhage or infection, or both, were the causes of death. Fourteen days of vitamin E treatment prior to the Adriamycin injection did not prevent the decrease of white blood cells and platelets. Of the 17 rabbits, four were given 14 days of prior vitamin E doses; these four survived throughout the lethal challenge of Adriamycin, and white blood cell (WBC) counts dropped from 40,000 to 28,000/mm^3 by the fifth day and the platelet count decreased from 300,000 to 29,000. Two animals who died of Adriamycin toxicity after four prior daily vitamin E injections had nondetectable WBC and platelet counts 8 days after the drug injection.

Cardiac toxicity was the major cause of death in the rabbits receiving only Adriamycin, whereas rabbits receiving both Adriamycin and vitamin E showed no indication of cardiac toxicity. A two- to threefold increase of creatinephosphokinase (CPK) could be demonstrated in the animals given both vitamin E and Adriamycin. CPK isoenzymes were also monitored and vitamin E similarly prevented elevation in the cardiac band.

Continued on page 2

Notice

A recently passed bill of the Texas State Legislature requires that all recipients of publications from state agencies reaffirm, in writing, their interest in continuing to receive the publications. Since the *Newsletter* falls within the definitions of the bill, you must return the enclosed postage-paid postcard to continue receiving the *Newsletter*.

Please peel your address label from the back of this *Newsletter* and affix it to the enclosed card. Sign the card, detach it from the *Newsletter*, and mail it. In this way, you will continue to receive current information on cancer from The University of Texas System Cancer Center.

A REPORT TO THE PHYSICIANS OF TEXAS
newsletter

Vitamin E . . .

Continued from page 1

By the ECGs performed on a number of animals, a variety of supraventricular arrhythmias, including sinus and junctional tachycardia, premature atrial contractions, and bigeminy were observed in two thirds of the rabbits receiving Adriamycin only. These changes were usually demonstrated by the third day. No significant ECG changes were demonstrated at any time in rabbits who received supplements of vitamin E for 4 days or more.

Hematoxylin and eosin stained sections of heart tissue from rabbits receiving Adriamycin only revealed early toxic changes. These consisted of vacuolization of myocytes, excessive widening of spaces between myocardial fibers, focal subepicardial and myocardial petechial hemorrhages, degenerative changes of individual fibers, and loss of cytoplasmic details. These changes were subtle, since only individual fibers were affected. There were no areas of necrosis. No significant lesions were seen in H and E stained sections of heart tissue from rabbits receiving both Adriamycin and vitamin E. In fact, as seen by electron microscopy, there was a definite reduction in the degree of myofilament degeneration, vacuolar change, and intracellular edema in these rabbits.

Vitamin E in excessive doses was found to be effective in ameliorating Adriamycin-induced cardiac toxicity in mice without affecting the antitumor activity. We have found that vitamin E at a dose of 200 mg/rabbit (3 kg) daily for 4 days prior to the drug injection appears to offer some protection against Adriamycin-induced toxicity. A single 200-mg injection of vitamin E prior to drug administration was not protective. Furthermore, continued administration of vitamin E for 3 days after the Adriamycin injection was not necessary. Light and electron microscopic observations of the pathologic changes induced by chronic Adriamycin administration indicate that vitamin E at the dose and schedule used in our experiments ameliorates the cardiotoxic effects of Adriamycin.

It has been long known that antibiotics such as streptonigrin, a paraquinone, can generate superoxides in the presence of oxygen. Adriamycin stimulates superoxide formation in submitochondrial particles of bovine heart and decreases GSH levels in hearts of Swiss mice. Our results indicated that GSH oxidation is not caused through the inhibition of glutathione-metabolizing enzymes, nor by the direct interaction of Adriamycin and GSH molecules. The results indicated the dose-dependent reduction of rabbit erythrocytic GSH by Adriamycin *in vitro* and *in vivo*. Though the dose dependency of GSH oxidation in cardiac tissues has yet to be established in rabbits, the significant decrease of GSH level in heart tissue can be demonstrated after a single injection of Adriamycin (7 mg/kg). Whether there is a linear correlation between the GSH oxidation in heart and blood tissues has yet to be discovered. Thus, the usefulness of GSH levels in erythrocytes as a marker for Adriamycin toxicity has yet to be determined, although our results in humans showed similar GSH oxidation in erythrocytes by Adriamycin *in vitro* or *in vivo*. Cardiac glutathione peroxidase and catalase activities were not inhibited by acute Adriamycin toxicity in rabbits, although decreased glutathione peroxidase activities through selenium depletion (or oxidation) have been reported after chronic injections of Adriamycin. Low catalase activities in animal cardiac tissues have been recognized previously. Our results, along with others, suggested that the comparative low level of glutathione perioxidase and catalase activities could be one of the reasons for an increased susceptibility to cardiac toxicity induced by Adriamycin. Similarly, pronounced GSH oxidation by Adriamycin injection is also due to the low enzyme activities of glutathione-metabolizing enzymes.

Since the method employed for GSH determination is nonspecific, the decrease of GSH concentration may reflect the state of intracellular sulfhydryl group(s) oxidation. Whether the sulfhydryl oxidation in cardiac tissue leads to ultimate organ failure through sequential biochemical events is a hypothesis that is yet to be tested. It appears that Adriamycin indeed has a tissue specificity toward GSH oxidation and gluthathione peroxidase inhibition in animal cardiac tissues.

Vitamin E is an intracellular free radical scavenger and is relatively innocuous. It has been given to humans in amounts up to 40 g per day. In most reports, the vitamin was administered by injection with gonadal degeneration being the most common complication recorded. We think that the results and observations from our investigation warrant a thorough study of vitamin E and its possible role in protection against Adriamycin-induced cardiomyopathy. Different schedules and dosages should be tried clinically.

Departments of *Pediatrics,† Veterinary Medicine and Surgery, °Medicine, and ‡ Pathology, MDAH. (Physicians requiring further information should contact the authors—ED.)

Head, Department of Scientific Publications: Dorothy M. Beane. Editor: Marcia K. McBurney. Assistant Editor: Beth W. Allen. Art and Photography: Department of Medical Communication.

Editorial Board: R. Lee Clark, MD; Robert C. Hickey, MD; C. Stratton Hill, Jr, MD; Clifton D. Howe, MD; Glenn R. Knotts, PhD; Charles A. LeMaistre, MD; Robert D. Moreton, MD; Joseph T. Painter, MD.

Published bimonthly by the Department of Scientific Publications, The University of Texas System Cancer Center M. D. Anderson Hospital and Tumor Institute, Houston, Texas 77030. Made possible by a gift from Mrs Harry C. Wiess.

Radiation Biology Volume Examines Theories

Radiation Biology in Cancer Research (Raven Press,* 1980, $49.50, 665 pp.), edited by Raymond E. Meyn, PhD, and H. Rodney Withers, MD, PhD, reviews developments in radiation biology in relation to radiation carcinogenesis and to treatment for cancer by radiation. The monograph contains the papers presented at the 32nd Annual Symposium on Fundamental Cancer Research held February 27–March 2, 1979, at the Shamrock Hilton Hotel in Houston.

The initial chapters of the volume review various theories about the basic mechanisms of radiation injury. Pioneers in the field, such as Tikvah Alper (the keynote speaker), Mortimer Elkind (the Bertner Award winner), Cornelius A. Tobias, and Harald H. Rossi, discuss the theories they and their colleagues promulgated years ago and present recent experimental evidence that supports these theories or their refinements. Linear-quadratic models, repair-misrepair models, and exponential survival curve models are among those that undergo critical examination. Chapters discussing experimental evidence derived from work on many species are interspersed.

These initial chapters are followed by a series of chapters on responses of various cells to radiations of various kinds. Low-dose and low-dose-rate responses, the core of current controversy about environmental and iatrogenic carcinogenesis, are discussed in seven chapters. Three authors present variation in different kinds of radiation responses among various experimental tumors, human tumor cells, and tumor subpopulations. The next four chapters, which discuss the kinetic changes that follow irradiation, are introduced by John F. R. Kerr, who presents in words and pictures a lucid explanation of his theory of apoptosis, a process of active self-destruction very unlike classical necrotic events in cell death. The last seven chapters of this portion of the book present early and late radiation responses of various tissues, including normal tissues, spinal cord, and lung.

Potential therapeutic applications are the focus of the final chapters of the book. Among the applications discussed are hypoxic cell radiosensitizers, charged-particle and fast-neutron beams, hyperthermia, and ultrasound. These modalities, alone or in combination with conventional radiotherapy, are discussed in light of the theoretical and experimental aspects of radiobiology presented in the earlier chapters of the book. These new applications bring to therapeutic irradiation a new excitement, one well conveyed in these chapters.

Radiation Biology in Cancer Research would be a valuable addition to the library of any radiation biologist, physicist, or radiotherapist, as well as of any scientist interested in the theoretical underpinnings of radiobiology.

*Raven Press, 1140 Avenue of the Americas, New York, New York 10036.

UICC Sets Cancer Congress in USA

Seattle, Washington, has been selected as the site of the 13th International Cancer Congress scheduled for September 8–15, 1982.

Held under the auspices of the International Union Against Cancer (UICC), the Congress is headed by William B. Hutchinson, MD, of the Fred Hutchinson Cancer Research Center in Seattle. Serving as Congress secretary-general is Edwin A. Mirand, PhD, of Roswell Park Memorial Institute.

Tentatively scheduled scientific events include symposia, multidisciplinary panels, postgraduate courses, and special sessions for nurses and allied health professionals.

Send inquiries about the Congress to Dr Mirand, Roswell Park Memorial Institute, 666 Elm Street, Buffalo, New York 14203.

Erratum: On page 7 of the November-December 1979 *Newsletter,* the administrative title of Richard H. Jesse, MD, should have been "head, Department of Head and Neck Surgery in the Division of Surgical Services."

Cooperative Education Program with Texas A&M

A cooperative education exchange program with Texas A&M University is being tested at MDAH. Qualified undergraduate students who have expressed an interest in biomedical careers alternate semesters of employment here in basic science research laboratories with semesters of regular course work. Yaal Silberberg, Dr PH, Office of Education, MDAH, explained the arrangement as an unusual opportunity for a student to see if his chosen career path is a viable one after he has been exposed to a realistic research work setting.

Junior or senior students with a 2.5 or higher grade-point average who are interested in the program apply through their college and express fields of interest. The applications are forwarded to researchers in basic science at MDAH, and an attempt is made to match each student with an employment opportunity in a lab. The candidates are interviewed by prospective sponsoring researchers and if a good match can be made between student interest and MDAH needs, the student is employed. It is hoped that the student will then participate in a sequence of two or three alternating semesters here and at A&M. An evaluation of the student is carried out by his research mentor, and the student evaluates the program. Four students are participating in the current semester.

There are no postgraduate employment requirements on the part of either the student or MDAH. It is hoped, however, that there will be a mutual desire to continue the relationship after the student graduates.

A REPORT TO THE PHYSICIANS OF TEXAS
newsletter

Regents Appoint Hsu to Chair

T. C. Hsu, PhD, chief of the section of cell biology, MDAH, has been appointed by The University of Texas Board of Regents to the Olga Keith Wiess Chair for Cancer Research. Mrs Wiess, widow of Harry Carothers Wiess, the founder of Humble Oil Company, was a benefactor of MDAH for many years. The new chair was established in her honor after her death in 1978. It is a companion chair to the Harry Carothers Wiess Chair for Cancer Research, established in 1964.

Dr Hsu is an internationally known scientist whose discoveries have formed the foundation of international research in cytogenetics. Dr Hsu's first dramatic discovery came in 1952, while he was the Damon Runyon Memorial Fund Research Fellow at UT's Medica Branch in Galveston. Dr Hsu noticed that pretreatment of human and other mammalian cells with a hypotonic solution caused the chromosomes to swell and separate. This finding allowed researchers to count and characterize chromosomes accurately for the first time; in 1955 J. H. Tjio and Albert Levan used the technique to identify the number of human chromosomes as 46 rather than 48, as was previously assumed.

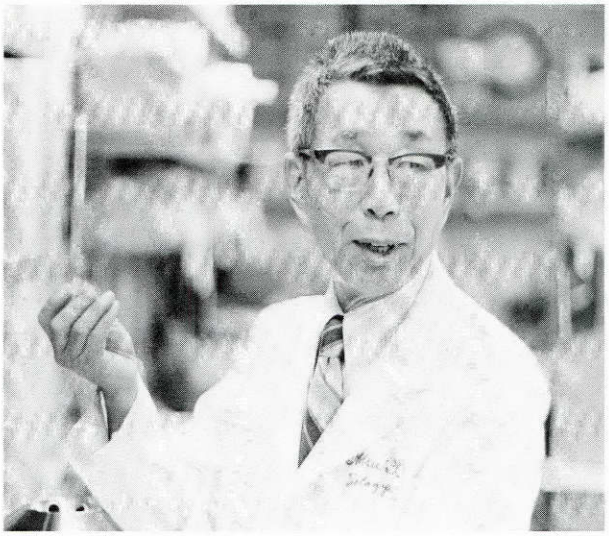
In 1971, Dr Hsu and MDAH cell biologist Frances Arrighi, PhD, discovered the C-banding technique of staining that allows identification of specific chromosome segments. This technique has made it possible to determine that some chromosome abnormalities are characteristics of specific cancers. The staining techniques are widely used throughout the world in genetic research.

Charles A. LeMaistre, MD, president of the University Cancer Center, characterized Dr Hsu's laboratory at MDAH as an international focal point of research and education in cytology and cytogenetics. "His contributions broaden understanding throughout the entire field of cell biology," he said. "His career has been remarkably full of significant contributions in many specific areas of science and medicine."

Dr Hsu was born in China and his interest in genetics was excited by his studies of entomology at the National Chekiang University. In 1948, Dr Hsu came to The University of Texas at Austin to work with its large collection of fruit flies. After the Korean War broke out and prevented Dr Hsu from returning to China, he took a provisional job studying human cells at the UT Medical Branch at Galveston, where his famous "rediscovery" of the neglected hypotonic method changed his career course.

In 1955, Dr Hsu came to MDAH to begin the new section of experimental cytology. In 1965 he was appointed chief of the section of cell biology. Since that time he has made major discoveries in RNA synthesis, the biophysical properties of DNA, and the organization and function of chromosomes.

Among his numerous scientific publications is the recently published *Human and Mammalian Cytogenetics: An Historical Perspective* (Springer-Verlag, New York, 186 pp.), which is a nonscholastic treatment of the "story behind the story" of many achievements and discoveries in the field of cytogenetics. "Too often," Dr Hsu says, "histories of science lost touch with the fallible humans who made the advances. I didn't want to do that. I had fun writing the book, and I hope readers will have a good time reading it."



33rd Annual Symposium on Fundamental Cancer Research

Genes, Chromosomes, and Neoplasia

Frances E. Arrighi, PhD, Potu N. Rao, PhD, and Elton Stubblefield, PhD, cochairpersons

Sponsored by The University of Texas System Cancer Center M. D. Anderson Hospital and Tumor Institute. Cosponsored by the National Cancer Institute and The American Cancer Society, Texas Division, Inc. In cooperation with The University of Texas Health Science Center Graduate School of Biomedical Sciences.

Shamrock Hilton Hotel, Houston, Texas
March 4–7, 1980

As an organization accredited for continuing medical education, The University of Texas System Cancer Center M. D. Anderson Hospital and Tumor Institute certifies that this medical education offering meets the criteria for 16 credit hours in Category I of the Physician's Recognition Award of the American Medical Association

For further information, contact Frances E. Arrighi, PhD, Department of Biology, M. D. Anderson Hospital and Tumor Institute, 6723 Bertner Ave., Houston, Texas 77030.

Risk Factors and Prophylaxis for CNS Relapse of Malignant Lymphoma

Joseph P. Litam, MD*, Fernando Cabanillas, MD*, Terry L. Smith, BS†, Gerald P. Bodey, MD*, and Emil J Freireich, MD*

The frequency of central nervous system (CNS) relapse in patients with malignant lymphoma other than Hodgkin's disease previously has been reported as ranging from 5% to 29%. This rate appears to have increased since the development of effective combination chemotherapy for these disorders and has been associated uniformly with a poor prognosis. Although prophylactic CNS treatment such as whole-brain irradiation has been recommended for patients with malignant lymphoma, it has not been clear which patients should be considered as candidates for this approach. Furthermore, it has not been clear which therapeutic modalities should be used for prophylaxis. We have attempted to identify pretreatment variables that could predict a high risk of CNS relapse and to determine which approach to prevention of the disorder would be most desirable.

Our study group consisted of 292 consecutive patients with malignant lymphoma who were treated at MDAH from 1967 to 1977 with four different protocols: COP (cyclophosphamide, vincristine, and prednisone), CHOP-HOP (cyclophosphamide, Adriamycin, vincristine, and prednisone), CHOP-Bleo (CHOP plus bleomycin), and CHOP-Bleo-levamisole (CHOP, bleomycin, and levamisole hydrochloride). CNS disease was established by any one of the following: 1) presence of lymphoma cells in the cerebrospinal fluid (CSF), 2) histologic proof of CNS disease by biopsy or surgery, 3) radiologic evidence based on use of myelogram, brain scan, or computerized tomogram (CT), or 4) postmortem histologic diagnosis of CNS lymphoma. Complete remission (CR) was defined as a disappearance of all signs of symptoms of disease. Partial remission (PR) was defined as greater than 50% but less than 100% reduction in the sum of maximum diameters of all measurable lesions. All other patterns of response, including mixed response, stable disease, and progressive disease, were classified as failures.

The treatment of CNS relapse usually consisted of intrathecal therapy (cytosine arabinoside 100 mg or methotrexate 20 mg) given twice weekly until the CSF was cleared of lymphoma cells. Maintenance therapy was then given once a week or every other week for 3 mo. Radiotherapy of 2500 to 3000 rads to the brain was also used. In the case of cord compression, radiotherapy to the cord and/or laminectomy was used.

Among the 292 patients, 31 (11%) developed CNS lymphoma. One hundred and eighty-five patients achieved CR after systemic chemotherapy, of whom 12 had the CNS as the first site of relapse, a frequency of 6.5%. The median time from onset of CR to CNS relapse was 7 mo (range, 1.5 to 13 mo). Eight of the 12 subsequently developed lymphomatous involvement of other organs, and two experienced bone or bone marrow recurrence simultaneously with the onset of CNS disease.

The median survival time for patients who developed CNS relapse was 10 mo, and the median survival for patients without CNS relapse was 36 mo; approximately half the patients in the latter group remain alive. The difference in the two survival curves is highly significant ($p < 0.01$).

Patients with diffuse lymphoma had a much higher frequency of CNS recurrence than did patients with nodular lymphoma (3% vs. 16%; $p < 0.01$). Since 60% of the patients in this study had diffuse lymphoma and the higher incidence of CNS relapse was associated with this histologic type, further study of pretreatment variables relating to CNS relapse was confined to this subgroup. CNS relapse rates of greater than 30% were noted for patients who had received prior chemotherapy, those under the age of 35, those with diffuse poorly differentiated lymphoma and diffuse undifferentiated lymphoma, and those with bone marrow involvement. A somewhat higher frequency of CNS relapse was

Continued on page 6

Table
Probability of CNS Relapse Related to Risk Factors

I. Low-risk group (0%-10% probability CNS relapse)
  A. No unfavorable factors
  B. Only 1 of the following unfavorable factors
    1. Age < 35
    2. Extranodal (other than marrow) disease
    3. Unfavorable histologic type (DUL or DPDL)

II. Intermediate-risk group (11%-29% probability)
  A. Prior chemotherapy
  B. Bone marrow disease
  C. Any of the following combinations
    1. Unfavorable histologic type + age < 35
    2. Unfavorable histologic type + extranodal disease
    3. Age < 35 + extranodal disease

III. High-risk group (>30% probability)
  A. More than 2 unfavorable characteristics
  B. Bone marrow + age < 35
  C. Bone marrow + extranodal (other than marrow disease) involvement
  D. Unfavorable histologic type + marrow disease
  E. Prior chemotherapy + any other unfavorable characteristics

DUL–diffuse undifferentiated lymphoma
DPDL–diffuse poorly differentiated lymphoma

A REPORT TO THE PHYSICIANS OF TEXAS
newsletter

Risk Factors . . .

Continued from page 5

also associated with stage IV disease and with involvement at extranodal sites other than bone marrow.

Using information on each patient's pretreatment characteristics, a regression model was fitted, and the following factors were determined to be significantly related to development of CNS disease: histologic status, prior chemotherapy, marrow involvement, age, and other extranodal involvement. The equation was solved to obtain a probability of CNS relapse for each patient in the study, patients were grouped according to these predictions, and observed rates of CNS relapse were compared. Within every category, the observed rates of relapse were within the predicted range.

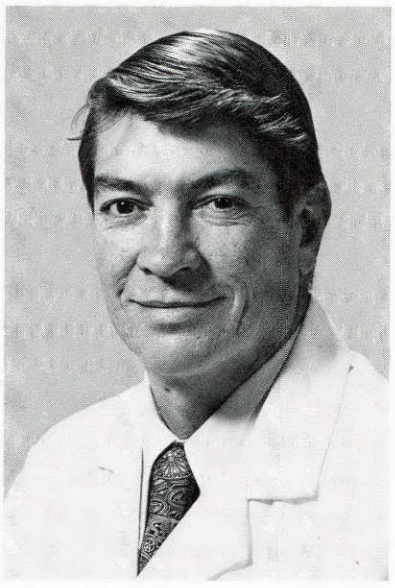
The model could be similarly applied to estimate prospectively the probabilities of CNS relapse for a group of new patients. Since there is a limited number of possible combinations of favorable and unfavorable characteristics, it is possible to list these combinations and divide them into risk groups of CNS relapse, as has been done in the table. Given information on prognostic characteristics for a particular patient, it would be possible to assign him to one of three risk groups by referring to this table.

Patients with diffuse lymphomas should be judged for treatment according to these individual risk factors. Based on the results of this study, we recommend CNS prophylaxis for patients with diffuse lymphomas who fall into the intermediate- and high-risk groups. Those in the low-risk group who have at least one unfavorable characteristic should be followed closely through periodic spinal taps. If any abnormality, such as an unexplained elevation of the CNS protein content, is detected, prophylaxis should be considered. We believe, however, that radiotherapy to the brain plus intrathecal chemotherapy should not be the only prophylactic treatment, since most patients with CNS relapse eventually develop systemic disease, as pointed out above. One study using high-dose methotrexate with citrovorum factor rescue has already shown encouraging preliminary results in reducing the incidence of CNS relapse in patients with diffuse histologic lymphoma. This systemic approach offers the additional advantage of adequate penetration of the drugs into other areas of the body that could conceivably act as sanctuaries for lymphoma cells.

The vast majority of patients with CNS lymphoma (81%) developed their CNS relapse 5 mo or more after the beginning of treatment. Thus, CNS prophylaxis should be initiated soon after diagnosis is made, and preferably within the first 3 mo of systemic therapy.

This is a summary of an article fully published in **Blood** 54(6), December 1979, used by permission.

Departments of *Developmental Therapeutics and† Biomathematics, MDAH. (Physicians requiring further information should contact the authors.—ED.)



Thomas Daly Dies

Thomas E. Daly, DDS, department of Dental Oncology, MDAH, died suddenly November 6, 1979, at the age of 44. Dr Daly was a professor of dental oncology at MDAH and an associate professor of restorative dentistry at The University of Texas Dental Branch in Houston.

Dr Daly was widely known for his work in controlling and preventing tooth decay and mandibular necrosis in patients receiving radiotherapy for oral cancers. One technique that he developed involved the use of a plastic mouthguard filled with neutral fluoride gel to safeguard against harmful radiation effects. Joe B. Drane, DDS, head of the Department of Dental Oncology, said that prior to Dr Daly's research, tooth decay and tissue necrosis were thought to be unavoidable results of radiation therapy.

Dr Daly graduated from Texas Wesleyan College in 1957 and took his dental degree from Baylor University College of Dentistry in 1962. After three years of private practice in Fort Worth, he joined the staff at MDAH. He was a member of the American, Texas, and Houston District Dental Associations.

New Book Published

The Physics of Medical Imaging: Recording System Measurements and Techniques, edited by Arthur G. Haus, Departments of Diagnostic Radiology and Physics, MDAH, contains the proceedings of the 1979 American Association of Physicists in Medicine (AAPM) Summer School held at the University of North Carolina, Chapel Hill from July 22–28. Written by experts in medicine and industry, the volume includes charts and graphs and question-and-answer discussions on medical imaging.

Discussed in depth are the basic characteristics of medical imaging systems, established methods and measures for evaluation, and the selection and use of diagnostic imaging procedures. Other topics include photographic processes (latent image formation), recording systems, film processing, image evaluation, image quality factors and recording systems, and recording system measurements.

The 613-page book was published by the American Institute of Physics, 335 East 45th Street, New York, NY 10017. The price is $35.00 ($25.00 for AAPM members).

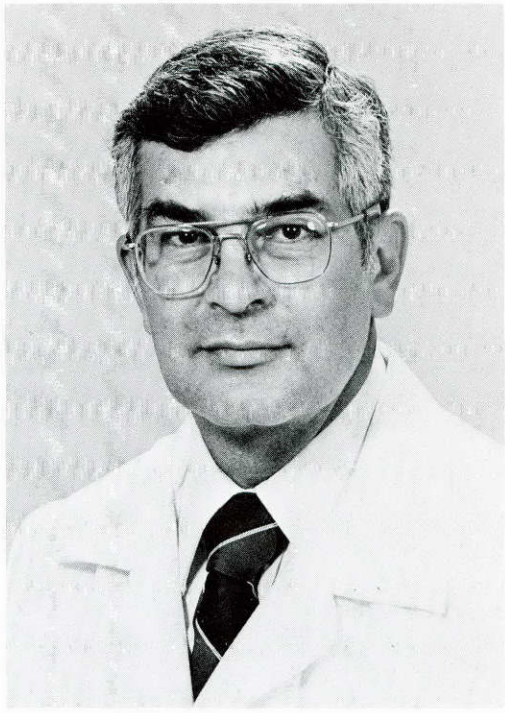
Vice President for Patient Care Appointed

Fred G. Conrad, MD, has been appointed vice president for Patient Care. He assumed his new post on February 1, 1980. Dr Conrad joined the staff at MDAH in 1978 as an internist and associate professor of medicine in the Department of Medicine. He received his bachelor's degree from Seton Hall University in 1951, his medical degree from the University of Rochester (NY) Medical School in 1955, and a master's degree in Medical Science from Ohio State University in 1958.

From 1960 until 1972 Dr Conrad served in the U.S. Air Force as Chief of Hematology, Director of the Armed Forces Central Medical Register, and Director of Clinical Research at Wilford Hall Medical Center in San Antonio. Prior to joining the staff at MDAH, Dr Conrad served as commander of the U.S. Air Force hospitals in Dover, Delaware; Riverside, California; and Anchorage, Alaska.

Dr Conrad has received the U.S. Air Force Award for Scientific Achievement, the U.S. Air Force Annual Research and Development Award, and the John Shaw Billings Award from the Association of Military Surgeons.

Charles A. Le Maistre, MD, president of the Cancer Center, in announcing the appointment said, "Since coming here, Dr Conrad has initiated a program of training for fellows and residents that has had a positive influence on the excellence of our patient care mission. He has made a remarkable impression, demonstrating that he is a compassionate and thorough physician, an excellent teacher, and a superb administrator."



1979 Year Book of Cancer Reviews Studies, Progress

The 1979 Year Book of Cancer (Year Book Medical Publishers, Inc.,* 1979, $28.95, 496 pp.), compiled and edited by R. Lee Clark, MD, Russell W. Cumley, PhD, and Robert C. Hickey, MD, is now available from the publisher. As in previous editions, this latest one brings the reader comprehensive abstracts, with illustrations, of 300 of the most significant articles written about the causes, prevention, detection, and treatment of cancer during the past year.

Once again, the representative literature cites early detection as the best defense against cancer mortality, but progress in such areas as scintigraphy, ultrasonography, mammography, and estrogen receptor concentration identification continues to clarify the application of such screening techniques. Among other areas of interest are studies of molecular genetic factors and their significance, progress in immunotherapy (two articles report on interferon, an immunotherapeutic agent that holds great promise for cancer treatment), pediatric oncology, and carcinogenesis. A chapter devoted to this last topic appears for the first time in this year's volume, reflecting the growing concern of oncologists and other physicians about the impact of environmental carcinogens on exposed populations.

*Year Book Medical Publishers, Inc., 35 East Wacker Drive, Chicago, Illinois 10601.

newsletter

Department of Scientific Publications, PR-1814
The University of Texas System Cancer Center
M. D. Anderson Hospital and Tumor Institute
Houston, Texas 77030

Address Correction Requested

Nonprofit Org.
U.S. Postage
PAID
Permit No. 614
Austin, Texas

Noteworthy

E. Lynn Baldwin, head of the Department of Medical Communication, received the James Hampson Memorial Award for outstanding contributions to the field of photography. The award was presented by the Society of Photographers in Industry. The SPI is an organization of photographers in industry, medicine, and commerce in the Houston area, and is an affiliate of the Professional Photographers of America.

Benjamin Drewinkc, MD, PhD, Department of Laboratory Medicine, has been elected president of the Cell Kinetics Society. He will serve as president of the 500-member international organization from March 1980 to March 1981.

John H. Freeman is the first recipient of the University Cancer Foundation Board of Visitors Award, which recognizes the ideals upon which the Cancer Center was founded. Mr Freeman was one of the men responsible for the creation of the Texas Medical Center in Houston during the 1940s. He is currently vice-president of the M. D. Anderson Foundation and is a member and legal counsel for the board of directors of the Texas Medical Center, Inc. The crystal award bears the Latin inscription *Aliquis alios curat,* "one who cares for others."

Herbert A. Fritsche, Jr., PhD, Department of Laboratory Medicine, has been named Outstanding Clinical Chemist for 1979 by the Texas section of the American Association for Clinical Chemistry.

Charles A. LeMaistre, MD, president of The University of Texas System Cancer Center has been elected to a one-year term as the president of the Damon Runyon-Walter Winchell Cancer Fund. The fund was founded in 1946 by Walter Winchell in memory of his colleague Damon Runyon. Since then it has contributed over $43 million to cancer research and currently supports more than 160 cancer research projects throughout the world.

Stephen C. Stuyck, MA, head of the Department of Public Information and Education, was named Business Associate of the Year for 1979 by Houston's River Oaks Chapter of the American Business and Professional Women's Association. Mr Stuyck is the first recipient of the award to be given annually for professional accomplishment, educational achievement, community involvement, and support of staff advancement.

Consultation Service Nurse-to-Nurse

A new toll-free telephone service has been instituted by clinical nurse specialists and clinicians at MDAH to aid in disseminating of information about specialized care of oncology patients. A diversified group of nursing specialists have pooled their resources of education and practical experience to offer a nurse-to-nurse consultation service. The 24-hr service is available throughout the continental United States.

The program has been established in coordination with the Dial Access system. The nurse requesting information may be referred to an existing Dial Access tape that addresses the specific problem, or may be personally contacted by an oncology nursing specialist on the staff at MDAH. According to Doreen Levitt, MSN, coordinator of the program, the service is equipped to handle questions on a wide variety of topics; some of the more common areas of consultation are chemotherapy for in- and outpatients, infusion therapy, and patient education and training. The toll-free number is 1-800-392-3917 in Texas and 1-800-231-6970 elsewhere in the continental United States.