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Ken Endicott, Who Led NCI During "Golden Years," Dies; Helped Establish Chemotherapy, Virology

Kenneth Endicott, who guided NCI through what many regard as the Institute's golden years and helped launch the research that led to development of effective cancer chemotherapy, virology and immunology, died July 16 of cardiopulmonary arrest and sepsis following surgery at

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In Brief

Potter Resigns As Director Of Lombardi Cancer Center; Search Committee To Look For Successor

JOHN POTTER, director of Vincent Lombardi Cancer Research Center at Georgetown Univ., resigned that position earlier this month. Potter is the first and only director the center has had. It was founded 15 years ago, named after the late football coach who died of cancer at the university's medical center. Under Potter's leadership, the center achieved recognition from NCI, in collaboration with the Howard Univ. Cancer Center, as a comprehensive cancer center. The university's new vice president for health sciences, John Griffith, announced three interim appointments to serve until a new director has been found: Anatoly Dritschilo, for radiation therapy; Gregorio Delgado, gynecologic oncology; and Gary Pearson, basic science. Milton Corn, dean of the school of medicine, is organizing a search committee. Those interested in the position or in recommending others may phone him at 202/625-7633. . . . **JOHN RUCKDESCHEL** has succeeded **John Horton** as head of the Albany Medical Center's Div. of Medical Oncology. Horton will remain as professor of oncology at the medical center. Ruckdeschel is executive officer of the Lung Cancer Study Group. . . . . **LANCE LIOTTA,** who has achieved international recognition for his work in the molecular biology of cancer, will received the American Assn. for Clinical Chemistry's National Lectureship Award at the association's 39th annual meeting this week in San Francisco. Liotta is chief of the Laboratory of Pathology in NCI's Div. of Cancer Biology & Diagnosis. . . . **AMERICAN CANCER** Society's annual awards (in addition to the Medal of Honor to Rose Kushner reported in **The Cancer Letter** July 10) will be made to **Paul Carbone,** Clinical Research Award; **Jesse Summers,** basic reserch; **Genevieve Foley, Alfred Gellhorn** and **Everett Koop,** distinguished service awards; and **Oliver Beahrs** and **Margaret Wiesenthal,** volunteer leadership awards.

Endicott, "Creative, Innovative," Had "Major Impact" On Progress

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Washington, DC, Hospital Center. He was 71. Endicott served as director of NCI from 1960-69, the second longest tenure of NCI's nine directors.

Before becoming director, Endicott was chief of the Cancer Chemotherapy National Service Center, from 1955-58. For two years, he was associate director of NIH, then returned as NCI director in 1960.

During those years, Endicott helped recruit a galaxy of brilliant young scientists and gave them the freedom and resources to develop anticancer chemotherapy, which as the "Washington Post" said "revolutionized cancer treatment throughout the world," and virus research programs, which formed the basis for much of the stunning advances in the last 10-15 years. He also encouraged extramural research efforts, with the clinical cooperative groups reaching maturity during his regime, and support for cancer centers initiated. Many of the current leading figures in cancer research around the country, including the present director of NCI, either were recruited by Endicott or encouraged by his leadership.

A strong case can be made that the present time constitute's NCI's "golden years," but if that is so, they were brought about to a large extent by the work of Endicott and his colleagues in the 1955-70 era.

"Ken Endicott was a remarkably creative and innovative man," NCI Director Vincent DeVita said. "First, he didn't shy away from difficult problems. When he identified problems on a job that had to be done, he tried to solve the problems and do the job in the most expeditious way. This often involved using approaches and instruments that were not traditional but just effective. We can thank him for introducing the contract mechanism to NIH during that period. However controversial contracts remain, they were used to start the successful viral cancer program and now the AIDS research programs. He played instrumental roles in many programs which have had a major impact on progress against cancer."

Endicott was born in Colorado in 1916 and received his medical degree at the Univ. of Colorado in Denver. He was commissioned as a surgeon in the U. S. Public Health Service in 1940, and was promoted through the ranks to assistant surgeon general, retiring in 1977.

He served a residency in pathology at NIH from 1942-46 and was named a diplomate of the American Board of Pathology in 1946. He served in the Div. of Pathology and as scientific director of the Div. of Research Grants at NIH before being appointed chief of the Cancer Chemotherapy National Service Center in 1955.

Only John (Rob) Heller, who was director of NCI from 1948-60, served longer than Endicott in that position. DeVita, director

Kenneth M. Endicott
. . . Introduced contracts to NIH

since 1980, is third in longevity among the nine who have held that job in NCI's 50 years of existence.

After leaving NCI in 1969, Endicott served as director of the Bureau of Health Professions Education & Manpower Training at NIH. From 1973-77, he was administrator of the Health Resources Administration, responsible for supervision of four bureaus, including Health Manpower, Health Planning, National Center for Health Statistics and National Center for Health Services Research. He also served for a time as acting director of the Lister Hill National Center for Biomedical Communications at the National Library of Medicine.

After his retirement in 1977, he was a partner in the Washington representation firm of Grupenhoff and Endicott, until his retire-

ment from that organization in 1986. Also from 1977 he served as executive officer for the American Assn. of Pathologists. At the same time he served as executive officer of the Universities Associated for Research and Education in Pathology, a consortium of 16 universities organized to strengthen the education and research facilities of public and private agencies concerned with pathology education and research.

Endicott was actively involved in research projects at UAREP including potential carcinogenicity of nitrates in foods, health aspects relating to the disposal of toxic chemicals, and the health effects of artificial sweeteners.

A memorial service will be held Saturday, July 25, at Wilson Hall on the NIH campus, at 2 p.m.

The family requested that memorial contributions may be made in lieu of flowers to the NIH Patient Emergency Fund.

Basic Research Group Asks Budget Of $7.9 Billion For NIH In FY 1988

The Delegation for Basic Biomedical Research, a group of scientists with impressive credentials including seven Nobel Prizes amongst them, has called on Congress and the Administration to provide NIH with a $7.9 billion budget for the 1988 fiscal year. That is about $3 billion more than requested by the White House and almost $2 billion more than NIH is spending this year.

The Delegation's suggestions by institute include $1.717 billion for NCI, close to the NCI bypass budget request.

The Delegation said in a statement accompanying its recommendations that that amount is necessary "to preserve American leadership in biomedical research." The statement also asked the White House and Congress "to focus on where the biomedical research enterprise should be by the year 2000."

The Delegation's budget "continues the FY 1987 current services level dictated by that year's appropriation and makes additions where need or opportunity are obvious," the statement says.

"The White House Science Council's Panel on the Health of U.S. Colleges and Universities (the Packard-Bromley Report), the President's Commission on Industrial Competitiveness and the director of the National Science Foundation have all recently called for a doubling of the federal government's share in support of basic research. In determining the budgets for science and technology, is our national leadership going to follow the advice of its own panels or is it going to continue to listen to the Office of Management & Budget? OMB has demonstrated over the years that it does not understand the central importance of science and technology to the nation's future. Adequately supported biomedical research is needed not only for the continuous improvement in the health of the nation, but also for the nation's ability to remain competitive in the rapidly growing field of biotechnology based industries.

BRS Slated For Elimination

"Biomedical research and manpower development have not been appropriately funded since the mid-sixties. Experienced investigators have been systematically discouraged. The proportion of grants funded to grant applications approved has been falling year after year at both NIH and the Alcohol, Drug Abuse & Mental Health Administration. The proportion of physicians involved in research has drastically declined. Additional research career development awards could easily be made each year to excellent scholars, if funding were only available. The purchasing power of the only discretionary institutional support left, the Biomedical Research Support Program, which is used mostly to recruit young faculty, has shrunk enormously over the years. The President's FY 1988 budget once again slates the BRS program for elimination. Fewer National Research Service Awards and research training positions than those required are being made available. The Medical Scientist Training Program, which leads to MD-PhD degress, has never attained the 725 person enrollment recommended due to insufficient funding. These signals are not being lost on our young people. The number of candidates seeking advanced degrees in the natural sciences is declining at a time when more are needed.

"The U.S. needs to preserve the nation's critical mass of prepared, creative investigators. The budget recommended by the Delegation for FY 1988 would do it. It provides for:

*A modest increase in the number of grants to explore new opportunities.

*Additional funds for AIDS research.

*The restoration of some of the purchasing power of the BRS program by an addition of $60 million to it.

*Additional funds for the RCDA, NRSA and MST programs.

*Additional funds for NIH programs which, in the past, have been cannibalized to stabilize the number of research project grants. Thus, some new clinical trials would also receive funding. Some of the additional funds allocated to research project grants, centers and contracts are recommended for a new trans-NIH program focusing on human gene mapping. A National Center for Biotechnology Information needs to be established at the National Library of Medicine. Also more attention has to be paid to the international activities NIH is involved in, mainly through the Fogarty International Center. The budget recommended provides some semblance of program balance.

"Much of the biomedical research instrumentation is obsolete. In 1984 dollars (the inflation factor for sophisticated instrumentation is 12 percent per year), $80 million per year was needed at NIH, over and above what was available, to replace outdated scientific equipment. Much of it is in the $10,000 to $75,000 range. The $80 million figure does not take into account the need to equip new investigators or to encourage the development of new technologies.

"Thus, the Delegation recommends an additional $125 million for scientific instrumentation and its upkeep for FY 1988 and successive years. Some additional research instrumentation would also be provided through the funding improvement of the BRS and training grants mechanisms.

"Academic facilities in the U.S. show a $40 billion deficit. Biomedical research facilities are at least $4 billion behind and animal care facilities need in excess of $1 billion to meet AAALAC's accreditation standards. Therefore we recommend for 1988 downpayments of $100 million and $25 million respectively for matching grants for the construction and renovation of research and animal facilities. The amounts will have to be increased substantially in the near future until the deficits have been corrected."

Rep. William Natcher's House Labor-HHS Appropriations Subcommittee has completed its markup of the appropriations bill. As usual, the markup was in closed session and the figures will not be released until the full Appropriations Committee acts on the measure, probably before the end of this month. The Senate's bill also will probably be ready to go to the floor by then.

Minnesota Study Aimed At Finding Final Answer On Hemoccult Screening

Does detection of early cancer of the bowel through hemoccult screening result in decrease in mortality from that disease?

The answer to that question is of more than a little interest to the 150,000 Americans destined to be diagnosed with colon and rectal cancer each year. Although the maxim that most cancers are more curable if treated early seems to apply to bowel cancer (Dukes A five year survival, up to 95%; Dukes C, less than 50%), no one has been able to verify that the only feasible (so far) mass screening technique to detect early bowel cancer does reduce mortality.

NCI's Div. of Cancer Biology & Diagnosis has been supporting a study conducted by the Univ. of Minnesota since 1975 designed to find out whether or not the hemoccult screening technique does have an impact on mortality. Victor Gilbertsen is the principal investigator. The division's Board of Scientific Councelors last month gave concept approval to noncompetitive renewal of the contract for another five years, to extend through 1993. The study so far has cost $6.8 million, and DCBD staff estimated the additional five years will cost $8.6 million.

Sheila Taube, chief of DCBD's Diagnosis Branch and project officer for the study, presented a summary of the work to date and proposal for its continuation:

The study was designed as a randomized controlled trial to determine whether periodic screening for occult blood in the stool would detect early cancer of the bowel. Within the first year of the original contract, a number of refinements in the study design were agreed to so that a decrease in mortality as a result of screening would be the outcome measured.

During the first three years, a cohort of over 45,000 volunteers in Minnesota over the age of 50 with no history of familial polyposis, chronic ulcerative colitis or neoplasms of the large intestine were enrolled and randomized based on age, sex and geographic region of the state. Three groups of about 15,000 participants each were formed. One group was screened for occult blood every other year, the second group was screened annually and the third group was not screened at all and served as the control. Screened participants with a positive hemoccult were encouraged to come in for a workup

at the Univ. of Minnesota Hospitals. The diagnostic protocol included a thorough examination to determine the source of the blood in the stool. All participants received an annual questionnaire to determine vital status, general health and whether bowel cancer had been diagnosed since the last contact.

The original contract was let for five years but called for five years of screening (three screens for participants in the first group and five screens for those in the second group) and an additional five years of followup. The contract was extended in 1981 for seven years. The initial five years of screening was completed in January, 1983 and screening was stopped.

In 1984, following recommendations of a site visit team, an advisory group designated the Policy & Data Monitoring Group (PDMG) was formed. Thomas Chalmers of Boston is the chairman. The group strongly recommended that occult blood screening be resumed to assure that there would be sufficient statistical power to reliably detect a reduction in mortality. The DCBD BSC approved the concept for that continuation, a new contract was signed and screening resumed in February, 1986. That contract will extend through Dec. 31, 1988, and the Board's action will extend it for an additional five years.

The current workscope includes:

1. Occult blood screening. All participants originally enrolled in the study have retained the group identification they have had over the term of the study and are being screened according to that group's protocol--group 1 is screened every other year, group 2 annually and group 3 the unscreened control.

All participants who have positive hemoccult tests are urged to have diagnostiic workups at the Univ. of Minnesota Hospitals to determine the source bo blood in the stool. The diagnostic protocol implemented when screening was resumed was simplified, reflecting the experience during the original screening period. In most cases, the procedures now take one to two days rather than the three to five days required for the earlier protocol and are tolerated better by the participants.

2. Followup. This part of the study comprises the solicitation (mainly through the annual questionnaire) and processing of information for incidence of malignancy with verification of histologic diagnosis and primary site for all gastrointestinal malignancies reported. In addition, all deaths are ascertained and certified and the necessary documentation collected in order for a deaths review committee to be able to determine the relationship of cancer of the colon or rectum to the death.

3. Analyses. A variety of statistical analyses are performed to measure compliance with the various aspects of the study, to determine death rates from colorectal cancer and other causes, to determine incidence rates and ultimately to determine the effect of occult blood screening on mortality from colorectal cancer.

All of the above activities will be continued for the new five year period. The PDMG has been monitoring data collection and analysis and progress since 1984. At the most recent meeting, last March, methods were accepted for projecting deaths in the control group. Thus, for the first time, study duration can be more reliably estimated and guidelines can be developed for stopping the study. Basically, the PDMG has recommended that screening and followup continue until the number of events required to achieve an appropriate statistical power is reached. If the data indicate that it would be unlikely that such a point would ever be reached, then the plans would be adjusted to continue only those activities expected to yield important information. The data would be critically evaluated to determine what recommendations could be made concerning the use of occult blood testing for detection of cancer of the colon or rectum.

When this study began, an important program objective was to assess whether earlier detection of colorectal cancer would decrease mortality from the disease. The study is now 12 years old and represents the only true randomized controlled study in this country assessing the effect of occult blood screening on colorectal cancer mortality. The few similar studies in Europe were begun more recently so that definitive results are not expected from them for many more years.

The results of this study are critical to the evaluation of screening programs for colorectal cancer The current study is well designed, has achieved excellent compliance, has collected important data and currently is being monitored carefully by a panel of experts in the fields of epidemiology, statistics, clinical trials and gastroenterology. In addition, a great deal of important information concerning the conduct of large

screening trials is being collected and this study will serve as a model for future studies.

Ihor Masnyk, DCBD deputy director, and Philip Prorok, chief of the Screening Section in the Div. of Cancer Prevention & Control, are assistant project officers.

Taube added that followup of positive hemoccult tests is imposing "a burden on the health care community" because guidelines are not clear. Proctoscopy, colonoscopy and barium enema all involve risks "and are not benign," she said.

Compliance is very high in the study, with contact being maintained with over 97 percent of the 48,000 now enrolled in the study, Taube noted.

Board member George Bell asked if any results from the study are available. Taube answered that "premature peeks at the data are discouraged," but did say that 600 cancers have been found in the study groups.

Prorok said that expected impact on mortality reduction ranges from "zero to 50 percent."

Masnyk pointed out that the study had been initiated using a "15 year ago design," but that screening studies are now designed "to get the answer in five years."

Board member Ray Wu asked if it might be necessary to continue the study for five more years to get a definitive answer. "Not necessarily," Prorok answered. "If there is a real but moderate effect, it could take longer. But if there is little or none, or if it is very strong, we should know it in five years."

"We will stop it if we see an effect before five years," Taube said. "Someone has to get an answer. People are being exposed to procedures which may or may not be benefitting them."

"How much of the problem is due to the hemoccult test itself?" Board member Robert Perlman asked.

"There is another occult blood stool test, although there is no data to indicate it has any significant improvement over hemoccult," Taube said. "If a better blood stool test is found, it will not be necessary to do the whole study over."

Board member Joseph McGuire said his "cheap streak comes out" in looking at the estimated $15 million total cost of the study. "It should be renewed, but there should be some language to stop it" if definitive answers are determined early, or if it can be seen that no answers will be found.

Charles Fafard, section chief in the Research Contracts Branch, pointed out that every government contract includes a clause that it can be terminated for the convenience of the government.

DCBD Director Alan Rabson suggested that the Board could take another look at the study in two or three years. "We could drag Prorok back here, take another look at it and stop it at that point."

Brian Kimes, director of DCBD's Extramural Research Program, said he is "convinced that we can come to a conclusion. I'm enthusiastic about this."

Taube insisted that the study is being "closely watched and is being carried out in an exemplary way." Statistical support had been the "one weak point, because we didn't have a statistician on board. Now we have superb statistical support."

"I still think it would be valuable to come back in two years," Rabson said.

The concept was approved unanimously.

Three Research Programs Offered By Massachusetts Div. of ACS

The Massachusetts Div. of the American Cancer Society supports three research programs for young scientists. Limited either to those with appointments at recognized academic or clinical institutions in Massachusetts or (in the case of Cancer Research Scholar Awards) those nominated by a Massachusetts institution, they are:

<>Postdoctoral/Postresidency Research Fellowships--Offered to those who have received doctorates within last five years. Stipends of $18,500 per year for two years, plus up to $1,500 for materials and supplies. Deadline for applications, Oct. 1.

<>Research Grants--Offered to investigators "in the formative stages of their careers." Proposals are evaluated for their scientific merit. Also available to senior investigators interested in pursuing new lines of research with high cancer relevance. One year grants up to $25,000. Deadline for applications, March 1 and Sept. 1

<>Cancer Research Scholar Awards--New junior faculty, instructors or research assistant professors. Stipends up to $20,000 per year for three years.

Contact Research Committee, ACS Mass. Div., 247 Commonwealth Ave., Boston 02116.

NIH Cancer Nurse Turnover Down To 10 Percent From 45

Nursing turnover in the Cancer Nursing Service at the NIH Clinical Center is down to 10 percent, Cancer Nursing Chief Kathy Thaney has told **The Cancer Letter**.

The service has averaged a 10 percent turnover rate since last fall, down substantially from a 45 percent rate the year before. A turnover rate of 20 percent is considered "acceptable" in the Washington metropolitan area, she said.

Thaney attributes the improved retention of nurses in the cancer service to a variety of factors, including staffing stabilization; the development of a clinical ladder program so that all nurses can move forward; and the numerous educational opportunities offered nurses at NIH.

The most critical factor has been the completion of the leadership team for the nursing service, she said. All head nurse positions are currently filled, as are the majority of clinical nurse specialist and educator positions.

Recent salary changes implemented to make NIH more competitive with area hospitals "certainly have helped in recruitment and in keeping people here," she said. Across the board salary increases ranged between $2,500 and $5,500 per year for nurses at the center, with new graduates receiving a significant increase in salary, she said.

Last summer, the Dept. of Health & Human Services agreed to permit NIH to recruit nurses for the Clinical Center into Public Health Service Commissioned Corps, which offers better pay and benefits than regular government service.

About the same time, Congress passed legislation directing HHS to place NIH nurses on the same salary scale as those in the Veterans Administration.

The changes to help recruit and retain more nurses at the Clinical Center have been implemented in two phases, the first of which increased weekend and overtime pay.

The second phase, which includes the salary increases, began implementation in May.

A total of 35 nurses have been hired by the service since the beginning of the year. The cancer nursing service currently has 22 full time equivalent openings, some of which are already filled by persons who are not yet on board, Thaney said. A dozen new graduates will begin work between now and September.

Currently, all but 11 beds in the service are in operation. "Only one unit is not adequately staffed," and will not reopen until staffing is complete and new nurses have undergone orientation. Thaney is optimistic, however, because the service is "hiring at a reasonable rate." In addition, morale on the units "is quite good, and people are excited."

The service opened six beds for 16 hour care this spring. Another 22 beds are operating 24 hours a day under the cancer service.

Thaney said that the nursing service has been able to implement new protocols for NCI clinical trials, and has not had to stop any protocols.

NIH's Cancer Nursing Service is also looking at ways to encourage the certification of oncology nurses.

New Graduate Training

The Clinical Center's new graduate orientation program and cancer training programs have been very helpful in recruiting new graduates, she said.

The Cancer Nursing Service has just revamped its new graduate orientation program. The program provides a one month NIH and cancer nursing service orientation, with a two month or longer preceptorship program. New graduates may also take certification programs in chemotherapy and other areas of cancer nursing.

NCI's special nine month cancer training program for new BSN graduates will continue this year with 14 nurses. Started in 1985 for a trial period of two years, NCI decided to continue the training program, and is considering expanding the program.

Jean Jenkins, a clinical coordinator of the Cancer Nurse Training Program told **The Cancer Letter** that she believes the program is the only one of its type that provides both education and clinical experience.

Classes are based on requirements for oncology nurse certification.

Although the nurses are not required to remain at NIH after completion of the program, eight of the 14 nurses who completed last year's program decided to remain at NIH. During their enrollment in the program, the nurses receive a monthly stipend.

This year, the program will be restructured somewhat to provide more of an emphasis on immunology and future trends of oncologic treatment, Jenkins said.

RFPs Available

Requests for proposals described here pertain to contracts planned for award by the National Cancer Institute unless otherwise noted. NCI listings will show the phone number of the Contracting Officer or Contract Specialist who will respond to questions. Address requests for NCI RFPs, citing the RFP number, to the individual named, the Blair building room number shown, National Cancer Institute, NIH, Bethesda MD 20892. Proposals may be hand delivered to the Blair building, 8300 Colesville Rd., Silver Spring MD, but the U.S. Postal Service will not deliver there. RFP announcements from other agencies will include the complete mailing address at the end of each.

RFP NCI-CM-87236-68

Title: Production and testing of human lymphokine activated killer (LAK) cells
Deadline: Approximately Sept. 5

The Surgery Branch of the Div. of Cancer Treatment's Clinical Oncology Program is seeking an organization qualified to provide human lymphokine activated killer (LAK) cells for intramural clinical immunotherapy trials.

The major objective of this contract is to generate human LAK cells from patients' peripheral blood lymphocytes by incubation in interleukin-2. These cells are administered back to the same patients for treatment. Production of human LAK cells are to be performed for three to four patients per week. The contractor must be able to provide a PhD level principal investigator with experience in the task objectives of this contract. The contractor must also be able to deliver freshly prepared cells to the NIH campus in Bethesda within one hour after harvest.

It is anticipated that a cost reimbursement incrementally funded type contract will be awarded for a period of 36 months, beginning March 1, 1988. This RFP represents recompetition of a contract with Bionetics Research Inc.

The concept from which this RFP was developed was approved by the DCT Board of Scientific Counselors at its winter meeting and reported in the March 6 issue of **The Cancer Letter**.

Contract Specialist: Karlene Ruddy
RCB Blair Bldg Rm 212
301/427-8737

RFP NCI-CP-85601-56

Title: Support services for retrovirus epidemiology and natural history in hemophiliacs and their sexual partners
Deadline: Approximately Sept. 5

The Environmental Epidemiology Branch of the Div. of Cancer Etiology's Epidemiology & Biostatistics Program is seeking a contractor who will support the EEB by conducting epidemiologic and natural history studies of hemophiliacs (and persons with related disorders) and their sexual partners and familiy members, by the maintenance, acquisition and use of epidemiologic data bases, by providing support for collecting and handling biologic specimens and laboratory data, by statistical analysis of the data as directed by the project officer or his designee, and by responding quickly to requests from the project officer involving certain priorities.

The contractor shall support three major projects: (1) Followup of a cohort of hemophiliacs; (2) recruitment and followup of wives or steady female sexual partners of hemophiliacs; and (3) other special epidemiologic studies. The types of activities needed to conduct these studies are divided into eight tasks.

It is anticipated that an incrementally funded, cost reimbursement, completion type contract will be awarded for a five year period.

The concept from which this RFP was developed was approved by the DCE Board of Scientific Counselors at its last meeting and was reported in the July 17 issue of **The Cancer Letter**.

Contract Specialist: Donna Winters
RCB Blair Bldg Rm 114
301/427-8888

NCI CONTRACT AWARDS

Title: Tracing through motor vehicle bureaus to determine the vital status and current address of patients treated for hyperthyroidism
Contractor: Hooper Holmes Inc., $93,572

Title: Synthesis of radiosensitizing agents
Contractor: SRI International, $1,499,323

Title: Architectural/engineering services for an indefinite delivery design review contract for laboratory, clinical and animal care space renovations and construction
Contractor: Joseph P. Vaghi AIA & Associates, $445,940

Title: Operation of an animal virological laboratory
Contractor: Microbiological Associates Inc., $682,999

Title: Radioimmunoassay and enzyme linked immunoassay
Contractor: Hazleton Biotechnologies Co., $1,480,010

Title: Chemical synthesis of radiolabeled antitumor agents
Contractor: Moravek Biochemicals Inc., $248,107

Title: Epidemiology of T-cell leukemia/lymphoma virus in Panama
Contractor: Gorgas Memorial Institute of Tropical & Preventive Medicine Inc., $597,236

Title: Encapsulation of soft gelatin capsules
Contractor: Banner Gelatin Products Corp., $91,727
Title: In vitro antineoplastic drug toxicology characterization of anti-AIDS agents
Contractor: Hipple Cancer Research Corp., $499,465

Title: Evaluation of the PDQ system
Contractor: Univ. of Illinois, $114,429

Title: Study of the clinical pharmacokinetics of anticancer drugs
Contractor: Ohio State Univ., $790,119

Title: Shelf life evaluation of clinical drugs
Contractor: Univ. of Georgia Research Foundation Inc., $1,416,831

Title: Small Business Innovative Research (SBIR) awards, Phase 2
Contractors: Medical Laser Research & Development Corp., $447,808; Doty Scientific Inc., $474,746; Cheung Laboratories Inc., $500,000; Luxtron Corp., $444,414; Thermal Technologies Inc., $500,000; and Radiation Monitoring Devices Inc., $497,556.

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