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Eric Gressen MD

Thomas Jefferson University

Ben W. Corn MD

Tel Aviv Sourasky Medical Center

Adam P Dicker

Department of Radiation Oncology, Kimmel Cancer Center, Jefferson Medical College of Thomas Jefferson University

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Radiation Oncology at Thomas Jefferson University: A Specialty Emerges as a Department Evolves

Eric L. Gressen, M.D.,¹ Benjamin W. Corn, M.D.,² Adam Dicker, M.D., PhD³

¹Department of Radiation Oncology, Thomas Jefferson University, Bodine Center for Cancer Treatment, Philadelphia, Pennsylvania 19107, 215-955-6700 (phone), 215-503-0013 (fax), eric.gressen@jeffersonhospital.org

²[Institute of Radiotherapy](#), Tel Aviv Sourasky Medical Center, Zelda St. 1 Ramot 06 Jerusalem 97261, Israel, 97225714122 (phone), 97225713829 (fax), bencorn@tasmc.health.gov.il

³Department of Radiation Oncology, Thomas Jefferson University, Bodine Center for Cancer Treatment, Philadelphia, Pennsylvania 19107, 215-955-6700 (phone), 215-503-0013 (fax), adam.dicker@jeffersonhospital.org

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Brief history of Jefferson Medical College and Diagnostic/Therapeutic Radiology

To fully appreciate the history of radiation oncology at Thomas Jefferson University (TJU), one needs to go back to the humble beginnings of the Jefferson Medical College (JMC) in Philadelphia. In 1824, George McClellan, a twenty-eight year-old surgeon from the University of Pennsylvania, the oldest medical school in the United States, challenged the convention that one medical school was sufficient for Philadelphia. Unable to obtain a separate charter for a second medical college due to fierce opposition by the University of Pennsylvania alumni, he negotiated for the establishment of the JMC of Philadelphia as the medical department of the Jefferson College at Canonsburg (now Washington & Jefferson College)¹. The Trustees at Canonsburg offered moral support only and former President of the United States, Thomas Jefferson, was busy creating a medical school of his own for the University of Virginia. Financial support to convert the Tivola Theatre on Prune Street into the JMC came from the new faculty. This institution awarded 29,891 degrees in medicine² and has more living graduates than any other private medical school in the United States.

In 1825, an infirmary department in JMC opened its doors for the treatment of indigent patients. It was precedent-setting for a medical college in the United States to understand that students could learn not only by didactic lectures but also by supervised clinical instruction under the direction of professional faculty¹. This revolutionary concept of hands on experience during medical school training spread to every medical school in the country. Overcoming adversity for the betterment of the future in medicine and creating innovative ways to improve upon the status quo permeate the history of TJU Radiation Oncology.

Several discoveries at the very end of the nineteenth century would revolutionize diagnostic and therapeutic medicine. German Physicist Wilhelm Conrad Roentgen discovered x-rays in 1895, winning the first Nobel Prize in physics in 1901. Henri Becquerel reported on radioactivity in 1896 and noted the biological effects of radium in 1901 after discovering a radium skin reaction along his abdomen from a sample left in his vest pocket. Physical chemist Marie Curie further expanded on radioactivity with the finding of radium and polonium in 1898, and won the Nobel Prize in physics along with Becquerel and Pierre Curie, her husband, in 1903. She became the first person to win the Noble Prize twice, winning a second time in chemistry in 1911, for her discovery and work with radium and polonium. In 1921, she would become the first honorary member of the American Radium Society (ARS); the world's oldest inter disciplinary oncology society, which was founded in 1916. Consequently, two future chairmen in Radiation Oncology at TJU would preside over the ARS, Dr Simon Kramer in 1981 and Dr Carl Mansfield in 1989. In the very next year of 1922, the value of radiation therapy as a therapeutic tool in the treatment of malignancy would be recognized at the International Congress of Oncology in Paris. Evidence was presented by Drs Coutard, Regaud, and Hautant of the curability of advanced laryngeal cancer with irradiation without catastrophic late sequelae marking the beginning of the field of clinical radiation oncology³. Dr Curie believed radioactivity posed more of a benefit than a detriment to mankind, although she would eventually pay the ultimate sacrifice for her life's work. Constant exposure to radium caused chronic radiation sickness and she succumbed to leukaemia in 1934. Notwithstanding, her work formed the basis for radiation therapy.

Early years of Therapeutic Radiology

JMC was never far behind the early therapeutic discoveries, utilizing x-ray radiation to treat cancer in 1901, forming a separate department of roentgenology in 1904 and commencing radium treatment in 1905. William S. Newcomet became the first director of the Lucy B. Henderson Foundation for Radium Therapy at Jefferson in 1915 and held the position until 1949. The Lucy B. Henderson trust fund remains in the radiation oncology department. Radiation treatment in the first half of the twentieth century consisted mainly of the use of radium which unlike roentgen therapy, was used solely for therapeutic purposes. Weekly instruction in Radium therapy began at JMC in 1932 and house calls for radium application continued until 1949. Dr. S. Reid Warren, Jr., an electrical engineer and member of the staff at University of Pennsylvania, served as the first medical physicist as a part-time consultant in the mid 1930's calibrating the radiation therapy machines. He would assist in the training of residents in the newly formed roentgenology program in 1938. Roentgen therapy was used indiscriminately by dermatologists for a multitude of conditions including eczema, ringworm, acne and boils. Due to the low energies emitted by early radiation tubes, late effects of ulceration, telangiectasias and cancer were common, making radiation therapy through external beam a less desirable treatment modality.

The department name was changed to radiology in 1946 and in that same year, Theodore Eberhard, a member of the Department of Radiology, became the first director of radiation therapy. He became the director of the Henderson Foundation as a radium therapist in 1949, combining the two radiation therapy disciplines. He would also become the first director of the division of nuclear medicine. James Bierly joined the department in 1952 as the first full-time physicist in the division of radiation therapy and nuclear medicine as well as the first assistant in radiobiology. He was the first physicist in the country primarily involved with nuclear medicine and built the first medical radioisotope laboratory in Philadelphia in the early 50's. He was a firm believer in the use of ionizing radiation clinically and experimentally. Dr Eberhard would train such notable physicians as Frank Hendrickson, Professor and Chairman of the Department of Therapeutic Radiology at Rush-Presbyterian St. Luke's Medical Centre in Chicago and Luther Brady, Professor and Chairman of Hahnemann University, Department of Therapeutic Radiology. In 1948, Dr Brady became the first intern accepted at Jefferson Hospital, Department of Radiology, that did not graduate from JMC and during his residency in radiology in 1954; he was in charge of nuclear medicine. Dr Brady would become a major leader and pioneer in radiation oncology in the United States.

At midnight on 30 June 1955, the Department of Radiology was thrown into turmoil. Disgruntled over the sudden departure earlier that month of the Chairman, Paul Swenson, due to philosophical and financial disagreements with hospital administration, the entire department including resident physicians left and took positions elsewhere in the country. Several months later, Russell Nichols was appointed Chairman to create an entirely new department. Out of crisis came an opportunity to hire a physician who would alter the landscape of radiation oncology forever through his leadership in major oncologic societies and committees, his pioneering studies, and his direction in a growing academic department, and to craft a career studded with gold medals.

Simon Kramer: Pioneer in Radiation Oncology

Background

Dr Kramer was born in Romania on 22 May 1919, during tumultuous times; he escaped with his immediate family to Poland and eventually to Great Britain where he received his education ⁴. Fluent in five languages: Romanian, French, German, Italian and English, he credited his facility with the English language to his daily movie watching in the early 1940s. He graduated from King's College and King's College Hospital Medical School of the University of London in 1943 and completed an internship at King's Hospital in London. During the Second World War he joined the British Army Medical Corps and climbed from the rank of general medical officer to captain. He learned Italian while stationed in Italy and demobilized after the war as a ranking British officer in Palestine where he organized an ambulance service prior to the British pullout ⁴. After his army service, Dr Kramer first trained in neurology before earning a diploma in radiology and radiation therapy in 1949. His radiation therapy training was at the Meyerstein Institute of Radiotherapy, Middlesex Hospital University of London and he was a fellow of the faculty of Radiology at Middlesex Hospital in 1952. He received his certification in radiation therapy in England in 1954 and became director of radiation therapy that same year at St. Boniface Hospital, Winnipeg, Manitoba, Canada. Just two years later he left Canada to join JMC in 1956 to form a new radiation therapy division. He convinced Dr Joseph Concannon to join him to become co-directors of radiation therapy in April of 1956. They integrated the Henderson Foundation for Radium Therapy into the Radiology department, organized and staffed a radioactive isotope lab in radiation therapy, recruited a new medical physicist, Dr. Ralph Worsnop from England and established a new division of radiation therapy in separate quarters. Dr Brady recalled that the facility prior to Kramer's arrival was sorely inadequate for a radiation centre, treating patients with only orthovoltage equipment, radium needles and gynaecologic applicators on the second floor of the annex at Jefferson Hospital ⁵. Together, Dr Concannon and Dr Kramer would help create a modern radiation therapy department with the first Cobalt unit installed in 1957 in the basement of the hospital surgical supply building. Dr Concannon left Jefferson to become director of radiation therapy at Allegheny General Hospital in Pittsburgh, leaving Dr Kramer as sole director in 1958.

Radiation Therapy in the Late 1950s

Times were very different for radiation therapy during the middle of the 20th century. The basic foundation of clinical radiation therapy was being laid out by pioneers in the field, most notably, Juan del Regato, Gilbert Fletcher and Henry Kaplan. At the time, Dr del Regato estimated there were no more than a hundred practicing radiation therapists in the United States ⁶. Dr Kramer was a rare breed of physician with few standards available to guide him in the management and treatment of cancer in his specialty. In fact, Dr Brady recollected that there were no clinical trials and the general consensus by the experts was that national trials were unnecessary ⁵. Irradiation was given either alone or in conjunction with surgical resection. Treatment machines consisted of either superficial or orthovoltage kV machines with few Cobalt 60 teletherapy or megavoltage machines available. For planning radiation therapy, physical examination was critical to define the location of the cancer in relation to normal tissue structures with little help from radiology. Malleable lead wires were directly placed on the patient to mark the disease on a radiograph or to contour the patient to be traced on paper for treatment planning. Estimations of the normal organs and the tumour volume location were drawn directly on the paper and beam angles were designed to best cover the area of interest. Several points were chosen on the sheet to calculate dose and template lead blocks in shapes such as squares and triangles were placed in the path of the radiation beam to best spare normal tissue ⁷. There were only a handful of chemotherapeutic agents available and not many physicians practiced medical oncology. Those practicing radiation therapy were called radiation therapists and present-day radiation therapists were called radiation technologists. Like Kramer the vast majority of radiation therapists in the United States received at least part of their training in medical school in Europe where many training programs regarded radiation therapy as its own specialty (e.g. dedicated wards and regular follow up visits). Those training in radiation therapy in the United States received a maximum of a year in radiation therapeutic training as part of a three year radiology residency. Treatment was based more on intuition and experience than on scientific basis. Radiation therapy journals did not exist and radiation therapy meetings occurred at either the Radiologic Society of North America (RSNA) or ARS annual conferences. The future American Society of Therapeutic Radiation Oncology (ASTRO), the American Club of Therapeutic Radiologist (ACTR), was just being formed.

Creating a Therapeutic Radiology Department

Philip Hodes left the University of Pennsylvania to become the fifth Chairman of Radiology at JMC after his predecessor resigned in 1958. Dr Hodes was supportive of his faculty and widely known for teaching and research. He received a Gold Medal from the ACR. He would help secure resources and faculty for continued advancement of the therapeutic radiology department with Dr Kramer as director, and his continued efforts culminated in the creation of a separate department for radiation therapy. During the early years, Dr Kramer was assisted by some outstanding physicians including Stanley Dische, who became director of a medical research unit at Mt. Vernon Hospital in London and Ruheri Perez-Tamayo, past Chairman of the Department of Radiation Therapy at Loyola University in Chicago. As director, Dr Kramer made several sweeping changes including the establishment of a residency program in 1962, and he was credited with the first independent academic program in radiation oncology in the United States in 1969⁸. He would play a major role in establishing criteria for training programs in the country. His first resident was future department chair, Dr Carl Mansfield, with over fifty resident physicians trained by him over the next two decades, many becoming academic department chairpersons. Starting in 1962, Dr Kramer secured an impressive twenty-one major funding awards from the National Cancer Institute (NCI) used for a variety of areas such as basic research, nuclear medicine, clinical studies and residency training⁹. A second Cobalt unit was installed in 1960. There was limited space in the basement of the surgical supply building at Jefferson Hospital, so Dr Kramer obtained an NCI grant for the planning and the construction of an expanded department, creating a corridor into the existing space and doubling its size in 1966 to house the treatment and planning facility.

Dr Kramer, in collaboration with the Picker Medical Corporation, developed and installed the first radiation therapy dose localizer (simulator) in the United States at Jefferson that same year¹⁰. The simulator allowed for real time evaluation of multiple radiographic views of an area of interest under fluoroscopy to better ascertain the location and size of the tumour volume and the surrounding normal structures. Patients could also be given contrast for studies such as barium swallow or intravenous pyelogram to better define structures to relate adjacent organs to the tumour. This new technology, helped best define the shape, size and angle of the treatment fields. He worked closely with the Director of Medical Physics, Robert Gorson, who was recruited from the University of Pennsylvania by Dr. Hodes to join Jefferson in 1959 and provided services for both diagnostic and therapeutic radiology but most of his technological advancements at JMC were through extensive interactions with his eventual Chief of Medical Physics, Nagalingam Suntharalingam. Dr Suntharalingam was an on-the-job trainee under Dr Gorson at JMC in 1962, certified by the ABR in 1964 and then returned to JMC in 1967 after completing graduate training at the University of Wisconsin. He made good use of his pioneering work in Thermoluminescence Dosimetry at Wisconsin by introducing TLD for in-vivo radiation dose measurements in 1967. Eventually, Dr Kramer was given an independent department by JMC and became the first chairman of radiation therapy and nuclear medicine in 1969, a combination considered most unusual. That same year he would also serve as president of the American Society for Therapeutic Radiology (ASTR), the forerunner of ASTRO. He created four divisions within the radiation department in 1970, designating Martha Southard to be in charge of the clinical aspects of the department, Carl Mansfield in control of nuclear medicine, Nagalingam Suntharalingam in charge of Medical physics and Dr Dennis Leeper as director of

experimental radiology. Dr Southard was considered the alter ego of Dr Kramer, responsible for the clinical practice and residency program when Kramer was away ¹¹. She became a Professor of Radiation Therapy and Nuclear Medicine at JMC in 1969 specializing in gynaecologic malignancies and lymphomas and was the first female in the history of JMC to be presented by her colleagues with a portrait to be hung in the university in 1979. This honour came just 17 years after the first female medical student matriculated at JMC.

With the support of Simon Kramer, Dr Suntharalingam would separate from the Department of Radiology in 1972, working solely in Radiation Oncology. That same year, a new Brown-Boveri 45 mV Betatron machine with the most penetrating beams available in the United States, and the first with electrons in Philadelphia, was purchased along with a 4mV Varian-Clinac linear accelerator to supplement two cobalt machines ¹. Dennis Leeper joined the department in 1970 establishing the Laboratory of Experimental Radiation Oncology. He pioneered basic and translational research in hyperthermia biology and thermoradiotherapy and received one of the first hyperthermia grants supported by the NCI in 1974. In the mid 1970's Dr Kramer further divided the department into disease site oriented "firms" with himself leading the brain and head and neck cancer specialty. His department would develop an international reputation through its well respected faculty. Mohammed Mohiuddin, initially appointed to the faculty in 1975, would develop the genitourinary and gastrointestinal program with Ralph Dobelbower and would become internationally known for his efforts. Dr Mohiuddin worked closely with renowned surgeon, Jerry Marks, to help set the standards for combined modality treatment of gastrointestinal malignancies. He served as Vice Chairman and Professor under Dr Mansfield from 1983 to 1993 and became Chairman of the Department of Radiation Medicine at the University of Kentucky in 2001 to 2004.

Dr Kramer was equally supportive of his residents with Sucha Asbell, past Chairman of the Department of Radiation Oncology of Albert Einstein Medical Centre, commenting that few if any programs would allow a pregnant resident to complete her training in the 1970's. Through his new department he was able to develop strong ties with medical oncology and surgery. Dr Kramer was ready to embark on his two most notable achievements that would forever alter the field of radiation oncology.

Development of the Radiation Therapy Oncology Group (RTOG)

The time was 1968 and fifty-nine institutions in the country offered training in straight radiation therapy and almost all physicians practicing radiation therapy trained in general radiology⁶. Only nineteen certificates were issued by the American Board of Radiology (ABR) in straight therapeutic radiology that year⁶ and there was no formal recognition of radiation oncology. CAT Scans and MRIs did not exist and fluoroscopic localization had been available for only three years. Cobalt units were mainly used for treatment and chemotherapeutic agents were limited. Most studies in radiation therapy consisted of individual institutional trials that were influenced by the personal beliefs of the treating physician, and the interest of the investigator. These studies were often biased by the pool of patients available for enrolment, which were typically in limited numbers. Dr Kramer understood the need for evidence based medicine supported by multicenter clinical trials with a centralized group to institute these time sensitive protocol in a national forum. He applied to the NCI for support of a cooperative group to initially conduct a phase three study he devised for treatment of advanced cancers of the aerodigestive tract with plans for other clinical trials and was awarded a grant for the JMC to create the Radiation Therapy Oncology Group (RTOG) in July of 1968, thus becoming its founding chairman.

The RTOG, a nation-wide organization of university departments and the first to be comprised of mainly radiation oncologists, was formed by the NCI's Committee for Radiation Therapy Studies (CRTS), created in the early 1960's under the advisement of Kenneth Endicott, MD, director of the NCI and initially chaired by Dr Gilbert Fletcher followed by Dr Simon Kramer. This committee was designed to advise the NCI on appropriate studies and research initiated in radiation oncology. The multicenter clinical trials supported by the RTOG allowed for a more diverse patient population, accounted for variables of physician performance, treatment biases, treatment equipment and techniques. The trials recruited larger numbers of patients over shorter periods of time than individual institutions to insure that statistically significant data was published in a timely fashion so as to enhance the relevancy of the results. The first trial was a milestone in interdisciplinary efforts in oncology, helping to answer queries regarding the benefit of chemoradiation versus radiation therapy alone for head and neck cancer. Dr Brady commented that Simon's insistence on rigorous quality control and having every principle investigator from an institution register each patient to allow for retrospective review of individual patients was among his finest contributions to the RTOG. The RTOG became a well respected organization, pursuing clinical research on a national basis. This group would go on to play a pivotal role in guiding patient treatment, by establishing the benefit of combination therapy for multiple cancer sites with the cooperation of virtually all major academic medical centres in the United States and Canada, as well as internationally with institutions in Israel, South Korea, Hong Kong, Australia and China. RTOG continues to evolve with quality clinical and translational research playing a crucial role in testing novel multimodality treatment for adult malignancies and incorporate translational links to its clinical trials, expediting benchmark laboratory research into routine patient care. There have been four chairmen to lead the RTOG, Simon Kramer (1971-1980), Luther Brady (1980-1987), James Cox (1987-1997) and Walter Curran (1997-present). Under their guidance the RTOG has initiated over 450 trials entering over 100 thousand patients into RTOG-related clinical trials¹². Following the success of the RTOG, the ACR imaging network (ACRIN)

incorporated the benefits of clinical trials into diagnostic imaging in 1999 under Bruce Hillman. This body was initially charged with conducting study comparisons of digital mammography versus conventional mammograms and of computerized tomography colonoscopy with conventional visual colonoscopy for the detection of polyps.

Creation of the Patterns of Care Study (PCS)

Appreciating the need for a companion program developed within the RTOG, Dr Kramer had one more juggernaut to establish within the radiation oncology community. The PCS, created in 1972 and funded by the NCI for a 10 year study would grow in importance and in directions few physicians could have imagined from its onset. When the PCS study began, there were few phase III trials to guide the practitioner and few avenues to help construct trials answering critical questions in radiation oncology care. This unique research initiative involved surveying practices across the country regarding the methods adopted for management of cancer. The survey was often constructed by residents in radiation therapy programs offering a unique learning opportunity and a taste of clinical research in radiation oncology. Cooper reminisced “We discovered alternative ways of successfully delivering radiation therapy that were not described in standard textbooks or discussed in residency training programs”¹³.

The challenge of persuading professionals and institutions to open their practices to external scrutiny was overshadowed by the dramatic impact the results had on contemporary practices, namely optimizing parameters in radiation treatment planning and execution, establishing tools to measure quality, creating procedures for on-site review of practices and identifying patient-based barriers to appropriate care while reporting and investigating these barriers to a national audience. At a time when diagnostic radiologists could practice after training in radiation therapy for as little as three months without a supervising body, these studies helped to develop the highest standards of radiation oncology care in the world while subtly upgrading practices behind the times and promoting conformity in overall patient management.

PCS continued to advise practices for twenty five years headed by its first leader, Simon Kramer, from 1974 to 1985 and later evolving into the Quality Research in Radiation Oncology (QRRO) under the direction of Frank Wilson. This new national process survey began in 1998. QRRO promotes the creation of benchmark data to allow radiation oncologists to assess quality of care by measuring quality indicators founded on evidence-based guidelines and develops emerging quality indicators utilizing new technologies. These surveys document the influence of clinical trials and practice guidelines and disseminate information to educate target audiences for each disease studied. Physicians are incentivized to participate in these surveys to fulfil requirements for recertification in the ACR maintenance of certification. Another logical extension of PCS, the Radiation Oncology Practice Accreditation Program was formed in 1986 to evaluate the work up and treatment approaches of radiation oncologists measured against normative data provided by the PCS national database and various standards.

The Many Accolades of Dr Kramer

During his career, Dr Kramer understood the critical interaction between the field of radiation oncology and the NCI. His uncanny ability to secure funding for projects like RTOG and PCS would in part stem from his continuous interaction with the NCI through committee involvement. He was one of the founders of the Committee for Radiation Therapy studies (CRTS), a committee dedicated to the advancement of radiation oncology. Through the CRTS, he chaired the subcommittee for the creation of the first of five *Blue Books*, a series of documents setting the standard for radiation therapy practice. The first document, *A Prospect for Radiation Therapy in the United States*, was published in 1968. This widely respected and utilized document set the organizational structure for radiation oncology staffing of faculty and resources for upcoming practices across the United States. Dr Brady noted that because of a certificate of need was common in many states; government and insurance agencies used the blue book to determine the necessity for radiation therapy facilities. He recalled that many of the initial proposals were based on the United Kingdom system of care for which the committee recommended three types of cancer centres, a university centre treating both definitive and palliative cases, a second level centre treating fewer definitive cases and a third level centre treating palliative cases only. This series of publications formed the backbone to quality assurance programs, establishing the criteria for the proper delivery of radiation therapy. CRTS later would be named the Committee on Radiation Oncology Studies (CROS) with Dr Kramer as chair from 1971-1976, allowing him to serve as advisor to the NCI director. The CROS would develop and publish the text, *Radiation Research Plans for Radiation Oncology*, in 1976, edited by Dr Kramer. He would also serve on the Cancer Research Centre Development Committee.

An extraordinary man with great insight in oncology, by the end of his career Dr Kramer authored countless publications and book chapters, and received numerous awards and honours. He was awarded gold medals by the Chicago Radiological Society in 1975, the Gilbert Fletcher Society in 1979, the ASTRO in 1980 and the ACR in 1986. He was also an ACR fellow and helped found the American College of Radiation Oncology (ACRO). His efforts at Jefferson were considered so substantial that he was awarded the first Distinguished Professorship in any discipline, clinical or scientific, at JMC on November 4, 1983. This date would mark the first annual Simon Kramer lecture and symposium, highlighted by lectures by the brightest minds in oncology with the first lecture by Dr Vincent DeVita. A portrait of Dr Kramer was also presented that day and is displayed in the Bodine Centre for Cancer Treatment, a centre conceived by Dr Kramer and Dr Mansfield and built in 1986, the same year he retired. The main conference room in this centre was dedicated to Dr Kramer on October, 19, 1989. In keeping with the traditions set by Dr Kramer, the Simon Kramer Conference Room remains the principal location for resident and staff lectures, weekly quality assurance reviews, multi disciplinary conferences and research and protocol meetings.

To continue his tradition of education and mentorship, the Simon Kramer Society was formed by his associates and trainees in 1983 and it has hosted a variety of lectures and instituted an annual meeting. The society sponsors an externship providing a unique opportunity for medical students to obtain a six-week experience in Radiation Oncology. His former trainee, David Moylan, would bestow another honour on Dr Kramer in 1998 by establishing the Simon Kramer Institute of Therapeutic Oncology in New Philadelphia, Pennsylvania and continues to serve as medical director. 'It was my way of

honouring this outstanding individual in the field of cancer medicine', Dr Moylan said.¹⁴ The institute hosts an annual lectureship dedicated to the memory of Simon Kramer's lifelong companion and loving wife, Margaret, who succumbed to metastatic cancer in 1996. Dr Moylan along with another residency graduate, Lawrence Coia, would collaborate on the publication of several additions of the Introduction of Clinical Radiation Oncology through the 1990's, offering succinct explanations of the concepts behind radiation therapy and the management of various malignancies and including decision trees from the Patterns of Care Study in its 3rd edition.

Dr Kramer passed away on June 17, 2002 in Providence, Rhode Island at the age of 83 but his influence continues through his trainees, many of whom have gone on to become chairmen at major academic institutions as well as his countless contributions in oncology including the RTOG and PCS. For over thirty years Dr Kramer was a mentor to his students, staff, fellow colleagues and medical community. Regardless of stature or position, he welcomed all those interested in oncologic care; Dr Mansfield described Simon's interaction with others as 'always a gentlemen, always brilliant, always tolerant'⁷. His patients adored, particularly his excellence at easing their fears. His daughter, Naomi Kramer would comment 'I think it was this mix of his intelligence, his humour, his knowledge of the arts, the wisdom of literature, and perhaps the events he had lived through, with this incredible drive to make the practice of medicine, radiation therapy, better that enabled him to be successful, to get other people to see how important these ideas were, to make things happen.'¹⁵

Dr Mansfield worked alongside Dr Kramer longer than any other physician in the department and eventually was given the responsibility to carry on Kramer's traditions while further enhancing an already stellar department.

Carl Mansfield: Jefferson's second Chairman of Radiation Oncology

Background

Dr Mansfield was born and raised in Philadelphia, arriving in the world just prior to the Great Depression on 24 December 1928. At the time, African Americans were systematically excluded from mainstream medicine and medical societies with fewer than 15 in radiology in the United States and none accepted into the ACR¹¹. He was raised in a single parent household with his brother and sister. The financial hardships of raising a family on a housekeeper's salary caused his mother to send him to live with his grandparents in Virginia from 1932-1938. He later returned to Pennsylvania and eventually graduated from West Philadelphia High School in 1946.

Faced with the knowledge that few colleges were accepting African Americans and having limited funds, Dr Mansfield was able to procure a senatorial tuition scholarship from 1947 to 1951 to attend Lincoln University in Oxford, PA. He majored in chemistry with a minor in mathematics. In 1990, the university would bestow upon him an Honorary Doctorate of Science. After graduation, he attempted to get into Howard University, one of only two medical schools admitting African Americans. He remarked 'I didn't get into medical school the first year I finished because I couldn't demonstrate to the dean that I could pay my bills'¹⁶. For a year, he saved his income as a chemist working for the quartermasters of the military and then studied at Temple University, Department of Education.

He was admitted to Howard University after re-petitioning the dean and supported himself by working in the library until he graduated in 1956. Fortunately, by the time Dr Mansfield commenced his medical education and early academic career, there was a gradual improvement in the acceptance of African Americans into the medical profession due in part to the civil rights movement but also because of the great availability of internships and residency positions compared to medical school graduates¹¹. At Episcopal Hospital, an affiliate of JMC, he completed his Internship and began a residency in radiology before being drafted as a captain in Omaha, Nebraska at the Strategic Air Command Head Quarters, regarded as a primary target of the Russians in the cold war. While Simon Kramer was directing the use of radioactive material for medicinal purposes at Jefferson, Dr Mansfield was stationed at a hospital faced with the constant threat of a nuclear strike with US military planes loaded with nuclear warheads en route to Russia at all times under Air Command direction in case of such an attack. He would earn a year's credit in Radiology after heading the Department of Radiology at the air force base hospital located six stories underground.

He returned to Episcopal Hospital in 1960. Although a three month residency rotation was the norm and readily available for therapeutic radiology, he chose to train without pay under the direction of Dr Kramer, who required a full year rotation. Dr Mansfield stated that 'Simon had the best reputation'. Dr Kramer emphasized just one requirement to pass his rotation, competency in performing indirect laryngoscopy. Due to Dr Kramer's training in England, his resident not only dealt with radiation therapy in the outpatient setting but also admitted patients to the hospital and carried their own service. After appreciating the curative potential of radiation therapy coupled with the practice of medicine, Dr Mansfield dedicated himself to therapeutic irradiation. He completed his residency at Episcopal, passed his radiology boards and returned to Jefferson as a fellow in 1962. Jefferson was one of a few centres recognized for radiation oncology in the

country. Dr Mansfield recalled that at the time therapeutic radiology was mainly practiced by radiologist who read films in the morning and referenced text books to guide therapeutic irradiation in the afternoon ¹⁷.

Overcoming Prejudice to Become Professor and Chairman

Despite his excellent training, he was still faced with significant barriers due to race. He commented on a response to his letter for application for a job position. 'I see you are very well qualified, but my patients would not want to have, in most cases, a Negro seeing them. So, I'm sorry I can't offer you the job.'¹⁷. This common response during his job search in his early career was contrary to his treatment by colleagues and staff at JMC, where he experienced only a handful of patients who refused his care. Dr Kramer would help secure a one year NIH fellowship for Mansfield in 1963 to train at his alma mater, Middlesex Hospital, with Sir Brian Wendyer in Great Britain. Upon his return, Dr Mansfield was appointed Chief of the Nuclear Medicine Division at Jefferson in 1964 while completing his training in paediatric radiation oncology. He became a Diplomat of the American Board of Nuclear Medicine in 1972.

Through the years he became an expert in breast cancer developing an innovative technique of radioactive seed implantation in the breast tumour bed. He would return to England for a one year sabbatical at the Myerestein Institute of Radiotherapy, Middlesex Hospital and Medical School in 1973 and became the first African American full professor at JMC upon his return in 1974. In 1975 he became a fellow of the ACR. Upon a recommendation by Malcolm Bagshaw at Stanford University, Dr Mansfield was recruited to the University of Kansas as Professor and Chairman of the Department of Radiation Oncology. He was the first African American chair of a department at the university. As part of his agreement, he insisted on a brand new state of the art department with four linear accelerators. He resided in Kansas City, Kansas from 1976 to 1983, further pioneering the use of iridium-192 perioperative implants for early stage breast cancer. Through his work with breast surgeon Dr William Jewell, he was able to promote breast conservation treatment at the university with his own patients successfully petitioning the Kansas legislature to pass a law requiring surgeons to inform their patients of all of the options, including conservative surgery, for the treatment of early stage breast cancer. He also developed the state's first school of radiation oncology technicians and radiation oncology residency.

Building a Bigger and Better Cancer Centre

In the early 1980's, ailing health caused Dr Kramer to play a less active role in the department. After a thorough search, the administration entrusted the department to Kramer's first radiation therapy resident, Dr Carl Mansfield. Dr Mansfield agreed to return to Jefferson as Chairman with one major stipulation, a bigger and better centre for cancer treatment that to this day has been the cornerstone of Jefferson Radiation Oncology. The transition in leadership appeared seamless with Dr Mansfield interacting with many of the same dedicated staff he had worked with in the sixties and seventies. With the help of Dr Kramer and his staff and with the support of Dr Bluemle, the University President, Dr Mansfield put together a first rate cancer centre. The Bodine Centre for Cancer Treatment was dedicated on March 25, 1987 and named in honour of William Bodine, past president of JMC from 1959 to 1966 and Chairman of the University Board of Trustees from 1970 to 1977. This three floor, 57,000 square foot building, cost seventeen million dollars to build and expanded facilities for clinical oncology, radiobiology and radiation physics research. The centre would house four linear accelerators, two with high energy 25MV photons with electrons and two with 6MV photons, two simulators as well as facilities for hyperthermia, intraoperative radiation therapy (IORT) and a dedicated CT scanner for treatment planning and new treatment planning computer systems. To further optimize care, a day hospital was designed for combined modality therapy. The Bodine Centre for Cancer Treatment was rated as one of *America's Top 100 Cancer Treatment Centres*, in *Coping: Living with Cancer Magazine*, in 1992.

Dr Mansfield would help develop one of the biggest breast cancer practices in Philadelphia. He would work closely with Dr Lydia Komarnicky, who completed her residency at Jefferson in 1986 and stayed on as faculty. They worked closely as experts in breast carcinoma with a strong multidisciplinary practice with surgeons, Anne Rosenberg and Gordon Schwartz.

Awareness of Injustice with Opportunities for All

Dr Mansfield would go on to publish more than 100 articles and monographs and obtain two NIH grants for his research. He did innovative research on continuous monitoring of the temperature patterns of breast cancer and the use of nuclear medicine scanning in determining prognosis of liver metastases. In 1976 Dr Mansfield published a monograph, *Early Breast Cancer: Its History and Results of Treatment*¹⁸. According to Dr Brady this unique document was one of the most complete historical perspectives of breast cancer management from its very beginnings, offering great insight into the thoroughness of Mansfield's research and his strong appreciation for the pioneers that have made major contributions to medical science. Among his many accomplishments, he strived to raise awareness of African American accomplishments in Radiation Oncology and Radiology as well as to educate the community in the prevalence and incidence of cancers in African American populations using lectures, book chapters and publications. He received the Bronze Medal, the highest national tribute awarded by the ACS for public service, in recognition of his efforts to stop marketing of a new brand of cigarettes to the African-American community in Philadelphia. He extended his cause to level the playing field for all races, creeds and religions and also for underserved residents in the community. He worked tirelessly with the help of the ACS to educate the general public regarding the much higher incidence and death rates from cancer in underprivileged populations than the general populace, attributing this disparity to the failure to recognize the early signs of cancer and to poor access to proper medical care. The Philadelphia Division of the American Cancer Society offers The Carl Mansfield Award to the group or program of the American Cancer Society demonstrating 'unique and successful outreaches to underserved community.' He obtained a grant for *Special Populations Networks for Cancer Awareness Research and Training* in order to continue his efforts into the 21st century. He commented that his department looked like the United Nations judging each individual by their potential and qualifications¹⁷. He was the recipient of the distinguished alumnus award from Lincoln University, National Association of Equal Opportunity in Higher Education.

He would serve as President of the American Radium Society in 1989 becoming the first African American to head a national radiologic society¹¹. That same year, he led the American Cancer Society, Philadelphia Division.

After stepping down as chairman in 1994, he became Associate Director of the division of cancer treatment for the NCI serving on several committees including the cancer clinical investigation review committee and clinical trials contract review committee.

Several years after Dr Mansfield's departure, Nagalingam Suntharalingam would retire as well ending a career at Jefferson spanning a third of a century. Dr Suntharalingam secured funding through the NCI to start the post doctoral training program in physics in the department in 1972, training over twenty physicists. He demanded not only excellence in physics but insured that physicists played an integral part in clinical medicine, often called into patient examination rooms and simulation rooms to assist in designing the radiation treatment. Dr Curran found Dr Suntharalingam's depth of experience invaluable as a department chair¹⁹. A renowned leader both nationally and internationally, he contributed significantly to clinical medical physics in high energy photon/electron beam dosimetry, clinical applicators of high energy beams, intra-operative radiotherapy, quality control and clinical trials. He has served as President of the American Association of Physicists in Medicine, Chairman of the Board of Chancellors of the American College of Medical Physics, Chairman of the

American Board of Medical Physics and led multiple committees in the ACR and RTOG. He is a fellow of the ACR, AAPM (American Association of Physicists in Medicine) and the ACMP (American College of Medical Physics) and has received many awards including the highest award of the AAPM, the Coolidge Gold Medal Award and the Marvin D. Williams Professional Achievement Award of the ACMP. He is also an Emeritus Professor of the JMC. In 1998, through the generous support of his family, friends and colleagues, the Nagalingam Suntharalingam annual lecture began in his honour with James Purdy as the first lecturer.

He would be recruited once more to the position of Chairman of the Department of Radiation Oncology at the University of Maryland in Baltimore on June 1, 1997 under the stipulation that he would serve no more than five years. In that time period he helped revive a residency program and guide junior attendings including Nagalingam's son, Mohan Suntharalingam, to strengthen the department. Dr William Regine, a past resident physician of Dr Mansfield, would be recruited for the chairmanship with Mohan serving as Vice Chairman. Dr Mansfield would help train over forty residents during his stay at Jefferson. Dr Komarnicky completed her residency and remained at Jefferson during Dr Mansfield's years of leadership, continuing his legacy of excellence in patient care and breast cancer management. She published numerous articles on cancer and co-wrote a patient education book with Dr Anne Rosenberg, entitled *What to Do If You Get Breast Cancer*. She was a well-respected mentor to the residents serving to improve their clinical schools and introduced a holistic medical approach to cancer management. She served as residency director under Dr Curran. Dr Komarnicky is acting Professor and Chairman of the Department of Radiation Oncology at Drexel University College of Medicine and Director of Drexel University College of Medicine's Cancer Program. In 2006, Dr Mansfield would become an Emeritus Professor of JMC, recognizing his dedication to JMC for over a quarter of a century. Throughout his life, Dr Mansfield always seemed to return to his native city, Philadelphia, living within walking distance of JMC.

His planned departure from JMC was met with another extensive search. Dr Curran was well aware of the tremendous opportunity the department offered in growth and research, having worked in Philadelphia for eight years and having great respect for Dr Kramer and Dr Mansfield for putting together a top rate radiation oncology program. He was encouraged by his interactions with Carlo Croce, founding director of the Kimmel Cancer Centre, 1991-2004 and former Dean of JMC, Joseph Gonnella, 1985-1999, to apply for the position. Walter J. Curran, Jr. accepted the chairmanship and started his tenure in late August 1994.

Walter J. Curran, Jr.: Jefferson's third Chairman of Radiation Oncology

Background

Walter J. Curran, Jr. was born in Beverly, Massachusetts on 24 April 1951. For as long as he can remember he worked in some capacity as an educator, seeking summer employment as a camp counsellor and as a teacher during his high school and college years. Unlike most young adults starting their post-secondary education, he entered college with two career aspirations, first as an educator and second as a physician, intertwining both fields throughout his career. With no relatives or peers going into these areas and since he was the first member of his family to graduate college, he had little guidance in charting his career path. In 1973, he graduated from Dartmouth College in New Hampshire receiving a Bachelor of Arts degree and completing all the prerequisite classes for medical school. He taught in three different states, Connecticut, Georgia and Massachusetts over five years, first teaching in a Catholic school before joining a public junior high school in rural Georgia to teach science and coach track. He took great pride in his profession believing a poor performance by his students was a personal failure in his ability to teach. He would comment that understanding how to be an effective teacher and gain the attention and respect of adolescents would serve him well when faced with discussions about complicated cancer issues and trials with his patients. Upon entering the Medical College of Georgia, he already knew that he desired a career in oncology having an appreciation for the specialty's broad base which offered numerous opportunities. He remarked that the outstanding clinical experience in his third and fourth year helped him hone his skills. During his rotation at the Joint Centre for Radiotherapy at Harvard in August 1981, he decided to specialize in radiation oncology with his closest mentor, Chris Rose, future ASTRO president, encouraging him to go into the profession. He graduated in 1982, interned at Presbyterian and University of Pennsylvania and completed his residency in radiation oncology at the University of Pennsylvania in 1986.

He joined Gerald Hanks, Chairman at Fox Chase Cancer Centre, remaining on staff for eight years while carrying academic appointments at University of Pennsylvania until 1992, and then Medical College of Pennsylvania until 1994. As an attending physician at Fox Chase Cancer Centre, he not only functioned as a clinician but he continued to expand his gift as an educator and researcher. He received a teaching award from Fox Chase Cancer Centre in 1989 and lectured extensively on a variety of cancer related topics throughout the country with a special focus on lung and central nervous system (CNS) malignancies. He became chairman of the brain tumour committee of the RTOG in 1990 and deputy group chairman of the same organization in 1992. He developed an international reputation in the treatment of CNS and lung malignancies. In 1993 he published a seminal paper on a recursive partitioning analysis (RPA) for malignant gliomas, which continues to be a major stratification for new protocols and assists oncologists in determining the prognosis for patients with this malignancy.

From the onset of his career, he was devoted to leading clinical protocols both in house and nationally through the RTOG and Paediatric Oncology Group (POG). He wrote extensively with over fifty publications in his first eight years of practice. His leadership in oncology, particularly oncologic research was reflected in his committee memberships in the RTOG, ACR, POG and ASTRO. Not surprisingly, Dr Curran's

résumé and reputation propelled him to become the next Chairman of the Department of Radiation Oncology at JMC in 1994.

Carrying On a Tradition of Excellence

Dr Curran was aggressive with his approach as chairman. In just three years, he not only led the department of radiation oncology but chaired the cancer committee and became clinical director of the Kimmel Cancer Centre at Jefferson. He planned to create a regional system of facilities to optimize cancer care and to conduct research through the metropolitan area. As medical director of the Jefferson Cancer Network, he expanded the network to twenty-three institutional members. He aimed to strengthen and broaden research clinically and in the laboratory. With his spirited approach to national clinical trials, RTOG protocol enrolment grew rapidly and Jefferson became a full member of the RTOG and one of the leaders in patient registration on RTOG trials in the United States in less than two years from his arrival. Not unlike his predecessors, he participated in multiple committees for the NCI and chaired a P-01 Program Project. He was an expert in securing federal, state and private foundation funds especially for RTOG protocols and led by example accruing the most patients to cancer clinical trials at Jefferson.

Through his leadership he hired faculty and developed resources to enhance multidisciplinary care in cancer management particularly in the management of CNS, lung and prostate malignancies. Prior to arriving at Jefferson, Dr Curran kept in close contact with the new leaders in the neuroscience department, Drs. David Andrews, Warren Goldman and Robert Rosenwasser with plans to bring radiosurgery for treatment of benign and malignant diseases of the CNS by mid October 1994. He directed the brain tumour centre at JMC and recruited Dr Benjamin Corn as Vice Chairman and department leader of stereotactic irradiation program. Jefferson was one of only a few centres in the country to offer SRS treatment via linear accelerator or gamma knife. The collaboration of radiation oncology with the neurosurgical department helped Jefferson become the premier centre and the largest program in Philadelphia for the management of benign and malignant tumours of the CNS. Dr Corn would become a national leader in the management of CNS lymphomas, SRS for benign lesions and skull based tumours and follow Dr Curran as the leader of the brain tumour committee for the RTOG. Although his stay at Jefferson would be short, leaving Jefferson in 1998, he was a highly productive member of the faculty mentoring junior faculty and residents in research while serving as residency director and clinical director in the department. Dr Corn presently is Director of the Institute of Radiotherapy, Tel Aviv Sourasky Medical Centre in Israel.

Dr Curran would recruit Mitchell Machtay as the next Vice Chairman in 1999. He led the department in clinical research and head and neck cancer translational research. He would become an international figure for head and neck malignancy research and serve as Deputy Director of the RTOG. Dr Machtay would leave to become Chairman of Radiation Oncology at University Hospitals Case Medical Centre and Case Western Reserve University School of Medicine in 2009.

Leading the RTOG into the 21st Century

From the onset of his career, Dr Curran was involved in the RTOG. He served on several committees since 1989 and led a landmark trial for the treatment of locally advanced lung carcinoma; RTOG 94-10, a phase III three arm randomised trial which established concurrent chemoradiation as the standard treatment of Stage III lung carcinomas. Dr Curran was elected as chairman to the RTOG in 1997, carrying the torch lit by Simon Kramer from the very same institution. Like Dr Kramer, he was anxious to recruit a whole new generation of outstanding leaders. He set to modernize the multidisciplinary clinical cancer research group, engaging radiation oncologists, medical oncologists and surgeons with pathologists and scientists involved in benchmark and translational research. New treatments with molecular targeting are being introduced including the addition of Bevacizumab to radiation therapy and Temozolomide in the treatment of glioblastoma multiforme with the continued use of the RPA class for stratification. Dr Curran remarked with great pride on the incremental leverage the RTOG gained over time leading the world in trials in brain, head and neck and prostate malignancies and becoming a leading group in other diseases¹⁹.

Major medical journals continue to publish ground breaking results from the RTOG including stereotactic radiation therapy for lung cancer, stereotactic radiosurgery for brain metastases for which Dr Curran was a senior author and revolutionary head and neck trials including HPV status to better define prognosis and treatment strategies. Appreciating the need to modernize funding for national trials, the RTOG foundation enhanced the relationship with private industry to secure financial support for trials of mutual common interest. At present, funding in the RTOG remains strong, with support well balanced between the private and the public sector including the NCI. The RTOG continues to open new and innovative trials with the largest number of trials opened ever open for accrual in one year, 52, since the onset of the group²⁰. Even greater focus is placed on international membership to further enhance inventive ideas for cancer treatment and optimize accrual to new trials. In June of 2010, Dr Curran would be re-elected as group chair by the principal investigators of the RTOG, extending his leadership longer than his three predecessors²¹.

He remarked on the well-earned leadership positions within the RTOG obtained by Jefferson faculty. Dr Dicker chairs the translational research committee, Dr Werner-Wasik chairs the publications committee and Dr Galvin served as physicist chair. Richard Valicenti, Maria Werner-Wasik and Rani Anne all served as principal investigators or co-investigators on RTOG studies. Outside the radiation department, Dr Gomella, Chairman of the Urology Department became the representative leader in Urology and Dr Andrews was a principle investigator on a major CNS trial.

Future of JMC Department of Radiation Oncology

With the retirement of Dr Suntharalingam, Dr Curran would look to an old friend with whom he had performed research as a resident, James Galvin. Galvin departed his position as Chief of Medical Physics at New York University to lead the physics department at JMC in 1997. Dr Galvin is a tremendous educator and national leader, studying innovative physics approaches in radiation oncology; He chaired the Treatment Delivery Subcommittee of the Therapy Physics Committee of ASTRO. He was a leader of the physics subcommittee for the Children's Cancer Study Group (CCSF) and the RTOG and is a fellow of ASTRO and AAPM. Dr Curran commented that the physicists in the department have left a proud legacy to the department. Drs. Suntharalingam, Galvin and Huq would play major roles in managing the rapid changing technology and credentialing of new tools and technologic breakthroughs in the field. Saiful Huq would take his expertise and become divisional chief of the cancer centre at the University of Pittsburgh Medical Centre, one of the largest radiation practices in the world. Dr Jay Reiff joined Dr Komarnicky as Professor and Chief of Physics of Radiation Oncology at Drexel University College of Medicine. Toward the end of Dr Curran's tenure, he would look to recruit a top physicist and outstanding researcher to continue the legacy of excellence in the department. Dr Yan Yu joined Jefferson as Professor and Associate Director of medical physics in 2006 with the intent of becoming director upon Dr Galvin's decision to step down as director but remain part-time at Jefferson in 2008. This would mark the second stop at Jefferson for Dr Yu during his career. In 1993, he would perform dosimetric characterization of a first-generation multi-leaf collimator during a one year clinical physics fellowship under Dr Suntharalingam prior to his steady rise to full professor at University of Rochester. He is a prolific writer publishing nearly 100 peer reviewed articles and securing numerous grants, both private and public. In 1998, he earned an M.B.A and has since obtained three patents for his work with treatment planning for prostate brachytherapy.

With strong leadership in the department under Dr Curran including the chiefs of physics and biology, research and protocol enrolment would continue to grow with multiple oral and poster presentations given at major medical meetings by staff and residents. Dr Curran would also take great pride in educating his residents. In total, he mentored twenty-seven radiation oncology residents, to whom he lectured frequently with special emphasis on clinical trials and research. Many of these residents went on to become leaders of major academic radiation practices or medical societies including Dr Dwight Heron, Chairman of University of Pittsburgh Medical Centre Shadyside Radiation Oncology, Director of Radiation Services and Professor of Radiation Oncology and Otolaryngology. He is Vice Chair of Membership Committee, Chair of Special Populations and Member of Executive Committee of the RTOG. Dr Richard Hudes is Chairman of the Carrier Advisory Committee for the ACR and is on multiple committees within the ACR and ASTRO.

Dr Curran was proud of the high quality of his junior faculty, many becoming full professors at the institution. Curran recalled that Richard Valicenti helped to build the genitourinary multidisciplinary centre and became one of the first investigators studying innovative approaches to advanced technology for prostate cancer management with CT simulation (Curran, 2010). Dr Valicenti would leave Jefferson to become Chairman of the Department of Radiation Oncology at UC Davis in 2009. Dr Maria Werner-Wasik, Professor and Residency Program Director since 2002, has published numerous articles

on the management of brain and lung cancer. She also has led the Stereotactic Radiosurgery Program since 2004. Dr Rani Anne, Associate Professor and Clinical Director of the department, serves as the Director of the Upper Gastrointestinal Working Group at Jefferson. Finally, Dr Curran praised highly future chairman of the department, Dr Adam Dicker. He became the first physician scientist on the faculty to apply benchmark laboratory research in the development for future irradiation strategies. Upon Dr Curran's departure, Dr Dicker would serve as Interim Chair starting in January 2008 and became the permanent Chairman in April 2010.

Adam Dicker: fourth Chairman of Department of Radiation Oncology

Background

Adam Dicker was born in Wilmett, Illinois, a suburb of Chicago on 8 June 1961. After 10 years, his family moved to Great Neck, New York and remained in New York for the rest of his education including residency. His interest in medicine began in the eighth grade when he participated in science programs and he volunteered and worked in hospitals while in high school. His participation in research projects for the department of nuclear medicine at Mt. Sinai hospital lead to an authorship in his last year of high school. In 1984 he graduated from Columbia College with a double major in Chemistry and Religion. Already interested in the field of cancer research, he entered the Cornell University Medical College MD/PhD program where he was mentored by his thesis advisor, Dr Joseph Bertino, a world-renowned clinical and translational research medical oncologist who has served as past president of ASCO and the AACR. Dr Dicker would improve his skills in data collection and chart review during his post graduate education and he chose Radiation Oncology as his profession after a spring vacation rotation with Dr Zvi Fuks at Memorial Sloan Kettering. Upon the completion of his post graduate education in 1992, he joined Dr Fuks' residency program followed by a one year American Cancer Society Clinical Oncology fellowship. Dr Curran recruited Dr Dicker in August of 1996 to create the prostate brachytherapy program with physicist, Dr Frank Waterman. This partnership lead to the publication of more than a dozen articles related to seed implantation over the next five years. With Dr Curran's support, Dr Dicker developed a laboratory focused on translational research. With a focus on molecular targeting agents, a phase I trial design with novel compounds was designed with an infrastructure to test in the lab and in a clinical setting. His research impressed Dr Curran and he was made the Director of the Division of Experimental Radiation Oncology in 2002. Dr Dicker commented on the value of this experience in developing managerial skills and in leading preclinical publications with a staff of thirty and a yearly budget of three million dollars²². Like his predecessors, Dr Dicker was able to secure funding from public and private institutions for a multitude of projects including translational research. He was also involved in the RTOG, becoming Chairman of the Translational Research Program Committee in 2006. This position afforded him an excellent learning opportunity and leadership experience on a national level while raising the awareness of translational research onto a national platform. The committee acted as a liaison to other committees driving biomarker development for therapeutic trials and the stratification of patients by biomarkers. The talents Dr Dicker developed at Jefferson made him an ideal candidate for Chairman of the department.

Future direction of Radiation Oncology at Jefferson

Taking into account the various skills he developed both in the laboratory and clinic, Dr Dicker created a vision for the future of the department with plans to enhance departmental faculty, visibility and reputation. Strategic planning is ongoing with the other oncologic disciplines to further solidify long-range goals and ambitions for the department and the Kimmel Cancer Centre. An even greater focus on advancing the frontiers of Radiation Oncology will be pursued through combining clinical, translational, and basic research with areas in medical physics, radiation therapy and oncology nursing. This forward thinking is intended to establish Jefferson Radiation Oncology as a top cancer centre in the country with the development of 'breakthrough' drug research capability through the Division of Molecular Radiobiology and the Jefferson Centre for Advanced Targeted Therapy. A strong interdisciplinary program of preclinical drug development will create rational, hypothesis-driven clinical trails with incorporated translational endpoints to further expand the Jefferson phase I/II clinical trials program and eventually to lead to incorporation into national protocols through major oncology groups such as the RTOG. The department also intends to recruit patients to Jefferson trials internationally through agreements being formalized with Sheba Medical Centre in Tel Aviv, Israel, and colleagues from Shanghai, China. Another growing field within the medical community, bioinformatics—the application of statistics and computer science into the field of molecular biology—will be incorporated into the department; it holds great promise for utilizing the massive amount of data obtained by modern techniques in molecular research to gain a better understanding of biologic processes. Dr Dicker intends to collaborate with the NCI and the RTOG to investigate genomic and proteomic biomarkers in tissue in correlation with response and toxicity from radiation therapy.

Understanding the need to modernize the cancer centre and to remain on the cutting edge of the field, as did his predecessors, renovations are planned to alter the space and install equipment to further develop a patient-centric facility. Site specific specialization in the department will be further enhanced with the creation of a nurse-led Radiation Oncology Care Teams comprised of nurses, dosimetrists, physicists, and translational researchers to optimize coordination of patient care and research within the department. Continuing in the tradition of a strong residency program based on education, research and patient care, set forth by Dr Kramer, a master's program is in development representing a new Clinical Investigator Training Enhancement Program for all oncology house staff.

Jefferson Radiation Oncology has maintained over fifty years of excellence led by only four chairmen. Dr Kramer led the department into the modern megavoltage era while creating the first independent academic radiation oncology department in the country. He was well-respected nationally as a leader and advocate for the specialty and he mastered the execution of progressive ideas that have raised the standard for the profession. The creation of the RTOG was critical in developing trials to expand the management and treatment of malignancy. The PCS educated the masses on providing optimal care to patients by comparing strategies for the management and treatment of carcinoma through surveys across the United States. Dr Mansfield expanded his mentor's vision and together they developed the Bodine Centre for Cancer Treatment, a new state-of-the-art building for cancer treatment. He helped to dispel common misconceptions, thus raising the social consciousness for managing and treating the underserved community. Dr Curran grew the RTOG to new levels in trial development, funding, and respect both domestically and internationally. He helped develop new technology in the department and markedly expanded the Jefferson Cancer Network. Finally, Dr Dicker set a new course for the department with biologically-driven radiation therapy keeping Jefferson at the forefront of new technology for the diagnosis and treatment of malignancy.

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