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Department of Radiology-Annual Report-July 1, 1986 to June 30, 1987

David C. Levin
Thomas Jefferson University

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Thomas
Jefferson
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Jefferson
Medical
College

DEPARTMENT OF RADIOLOGY

ANNUAL REPORT

JULY 1, 1986 - JUNE 30, 1987

DAVID C. LEVIN, M.D.
PROFESSOR AND CHAIRMAN

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DEPARTMENT OF RADIOLOGY

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DEPARTMENT FACULTY

PROFESSORS

David C. Levin, M.D., Chairman
Stephen A. Feig, M.D.
Benjamin Galkin, M.S.
Erby S. Gullone, M.D.
Carlos Gonzalez, M.D.
Robert O. Gorson, M.S.
Esmond M. Mapp, M.D.
Matthew Rifkin, M.D.

DEPARTMENT OF RADIOLOGY

David C. Levin, M.D.
Professor and Chairman

ASSOCIATE PROFESSORS

Richard J. Wechsler, M.D.
Vijay M. Rao, M.D.
Geoffrey A. Gardiner, M.D.
Philip S. ...

DEPARTMENT DIVISIONS AND CHIEFS

- | | |
|---|--------------------------------|
| General Diagnostic Radiology | - Robert M. Steiner, M.D. |
| | - Esmond M. Mapp, M.D. |
| Mammography/Ambulatory Radiology | - Stephen A. Feig, M.D. |
| Body CT Radiology | - Richard J. Wechsler, M.D. |
| Neuroradiology/ENT Radiology | - Carlos Gonzalez, M.D. |
| | - Vijay M. Rao, M.D. |
| Cardiovascular/Interventional Radiology | - Geoffrey A. Gardiner, M.D. |
| Ultrasound | - Barry B. Goldberg, M.D. |
| Magnetic Resonance Imaging | - Matthew D. Rifkin, M.D. |
| Pediatric Radiology | - George W. Gross, M.D. |
| Radiation Biology | - Robert L. Brent, M.D., Ph.D. |
| Medical Physics | - Robert O. Gorson, M.S. |
| Office of Radiation Safety | - Benjamin Galkin, M.S. |

* * * * *

DEPARTMENT FACULTY

PROFESSORS

David C. Levin, M.D., Chairman
Stephen A. Feig, M.D.
Benjamin Galkin, M.S.
Barry G. Goldberg, M.D.
Carlos Gonzalez, M.D.
Robert O. Gorson, M.S.
Alfred B. Kurtz, M.D.
Esmond M. Mapp, M.D.
Matthew Rifkin, M.D.
Robert M. Steiner, M.D.
Yen Wang, M.D., D.Sc.(Med.)

RESEARCH PROFESSOR

Gary S. Shaber, M.D.

CLINICAL PROFESSOR

Mark M. Mishkin, M.D.

PROFESSORS EMERITI

Jack Edeiken, M.D.
Philip J. Hodes, M.D.

HONORARY PROFESSOR

A. Edward O'Hara, M.D.

ASSOCIATE PROFESSORS

Peter Burns, Ph.D.
David Karasick, M.D.
Stephen Karasick, M.D.
Vijay M. Rao, M.D.
Richard J. Wechsler, M.D.

RESEARCH ASSOCIATE PROFESSOR

Simon Vinitzki, Ph.D.

ASSISTANT PROFESSORS

Oksana Baltarowich, M.D.
John Boone, Ph.D.
D. Lawrence Burk, Jr., M.D.
Wolfgang Danhert, M.D.
Geoffrey A. Gardiner, Jr., M.D.
George W. Gross, M.D.
Philip A. Katz, Ph.D.
David W. Levy, M.D.
Cynthia L. Miller, M.D.
Donald Mitchell, M.D.
Laurence A. Needleman, M.D.
Rebecca Pennell, M.D.
Kevin L. Sullivan, M.D.

INSTRUCTORS

Ashokkumar Babaria, M.D.
Joseph Bonn, M.D.
Harry Cooperman, M.D.
Huyhn T. Doan, M.D.
Marcelle Shapiro, M.D.
Maria Vilaro, M.D.
Elaine Wolk, M.D.

FACULTY WITH SECONDARY APPOINTMENTS IN RADIOLOGY

CLINICAL PROFESSORS

Demetrius H. Bagley, M.D., Associate Professor of Urology [primary]
Associate Professor of Radiology [secondary]

Horace C. Wardlaw, M.D. (Graduate Hospital)

Robert L. Brent, M.D., Professor of Pediatrics [primary]
Professor of Radiology (Radiation Biology) [secondary]
Professor of Anatomy [secondary]

HONORARY CLINICAL PROFESSOR

Ralph A. Carabasi, M.D., Associate Professor of Surgery [primary]
Associate Professor of Radiology [secondary]

Ronald J. Jensch, Ph.D., Professor of Anatomy [primary]
Professor of Radiology [secondary]

Donald Myers, M.D., Clinical Assistant Professor of Neurosurgery [primary]
Instructor in Radiology [secondary]

Vernon L. ... M.D. (Graduate Hospital)

Chan Hee Park, M.D., Professor of Radiation Therapy and Nuclear
Medicine [primary]
Professor of Radiology [secondary]

ASSOCIATE PROFESSORS

Joel S. Raichlen, M.D., Clinical Assistant Professor of Medicine [primary]
Clinical Assistant Professor of Radiology [secondary]

Matthew E. ... M.D. (Mercy Catholic Medical Center)

Stanton N. Smullens, M.D., Associate Professor of Surgery [primary]
Associate Professor of Radiology [secondary]

Nagalingam Suntharalingam, Ph.D., Professor of Radiation Therapy and
Nuclear Medicine (Medical Physics) [primary]

Albert A. ... M.D. (Mercy Catholic Medical Center)

William J. ... M.D. (Mercy Catholic Medical Center)

Jerome J. Vernick, M.D., Clinical Professor of Surgery [primary]
Clinical Associate Professor of Radiology [secondary]

Charles E. ... M.D. (Lankenau Hospital)

Paul Walinsky, M.D., Professor of Medicine [primary]
Professor of Radiology [secondary]

Gordon S. ... M.D. (Reading Hospital and Medical Center)

Ronald J. Wapner, M.D., Associate Professor of Obstetrics and
Gynecology [primary]

Donald H. ... M.D. (Reading Hospital and Medical Center)

Harvey Seltzer, M.D. (Mercy Catholic Medical Center)

Harry S. Steinmeyer, M.D. (Bryn Mawr Hospital)

Robert L. Thompson, M.D. (Bryn Mawr Hospital)

Alan H. ... M.D. (Lehigh Valley Hospital Center)

HONORARY CLINICAL ASSOCIATE PROFESSORS

Edward S. ... M.D.

John P. ... M.D.

VOLUNTEER AND AFFILIATED FACULTY

CLINICAL PROFESSORS

Morton G. Murdock, M.D. (Graduate Hospital)
David J. Ritchie, M.D. (Mercy Catholic Medical Center)

HONORARY CLINICAL PROFESSOR

Mortimer B. Hermel, M.D.

ADJUNCT PROFESSORS

Dov Jaron, Ph.D. (Drexel University)
Vernon L. Newhouse, Ph.D. (Drexel University)
John Mitchell Reid, M.D. (Drexel University)
Joseph L. Rose, Ph.D. (Drexel University)

ASSOCIATE PROFESSORS

Richard P. Cancelmo, M.D. (Bryn Mawr Hospital)
Matthew E. Pasto, M.D. (Mercy Catholic Medical Center)
John Wills, M.D. (Wilmington Medical Center)

CLINICAL ASSOCIATE PROFESSORS

Albert Arouh, M.D. (Lankenau Hospital)
William J. Elwell, M.D. (Mercy Catholic Medical Center)
Geraldine E. Hamilton, M.D. (Mercy Catholic Medical Center)
Chul Kyun Kwak, M.D. (Our Lady of Lourdes Hospital)
Milton Margulies, M.D. (Lankenau Hospital)
James E. McGrath, M.D. (Our Lady of Lourdes Hospital)
Herbert C. Perlman, M.D. (Carlisle Hospital)
Gordon S. Perlmutter, M.D. (Reading Hospital and Medical Center)
Stephen Pripstein, M.D. (Abington Hospital)
Hugo R. Rodriguez, M.D. (Lankenau Hospital)
Daniel M. Scotti, M.D. (Methodist Hospital)
Gustav Seliger, M.D. (Mercy Catholic Medical Center)
Harry N. Steinmeyer, M.D. (Bryn Mawr Hospital)
Noble L. Thompson, Jr., M.D. (Bryn Mawr Hospital)
Alan H. Wolson, M.D. (Lehigh Valley Hospital Center)

HONORARY CLINICAL ASSOCIATE PROFESSORS

Leonard S. Ellenbogen, M.D.
John L. McClenahan, M.D.

ADJUNCT ASSOCIATE PROFESSOR RADIOLOGY RESIDENTS

Henrietta Kotlus Rosenberg, M.D. (Childrens Hospital of Pennsylvania)

ASSISTANT PROFESSOR

Carl S. Rubin, D.O. (Frankford Hospital)

CLINICAL ASSISTANT PROFESSORS

Olin S. Allen, II, M.D. (Medical Center of Delaware)
Wahib Bichara, M.D. (Mercy Catholic Medical Center)
Virginia D. Bolmarcich, M.D. (Mercy Catholic Medical Center)
John Breckenridge, M.D. (Abington Hospital)
Raphael Caccese, M.D. (Our Lady of Lourdes Hospital)
Joel I. Cossrow, M.D. (Pittsburgh)
David M. Danoff, M.D. (Bryn Mawr Hospital)
Simplicio E. Evangelista, M.D. (Bryn Mawr Hospital)
Arnold H. Levine, M.D. (private practice)
Arthur J. Press, M.D. (Lankenau Hospital)
Harry E. Morgan, M.D. (private practice)
Joseph T. Murphy, M.D. (Bryn Mawr Hospital)
Hayler H. Osborn, M.D. (Bryn Mawr Hospital)
Donald E. Red, M.D. (Lankenau Hospital)

ADJUNCT ASSISTANT PROFESSORS Radiology

Paul A. Dubbins, M.S.S.B., F.R.C.R. (Plymouth, England)
Stephanie B. Flicker, M.D. (Deborah Heart Hospital)
Peder C. Pedersen, Ph.D. (Drexel University)
Harry Zegel, M.D. (St. Agnes Hospital)

INSTRUCTORS Ultrasound/CT/MRI

Joseph H. Becker, M.D. (Methodist Hospital)
John H. Garafola, M.D. (Lancaster)
Arthur S. Haber, M.D. (Mercy Catholic Medical Center)
Helen Leibowitz, M.D. (Mercy Catholic Medical Center)
Anthony J. Limberakis, M.D. (private practice)
Gerald A. Nissenbaum, M.D. (Our Lady of Lourdes Hospital)
Emanuel M. Renzi, M.D. (Wilmington Medical Center)
David Weiss, M.D. (Chestnut Hill Hospital)

CLINICAL INSTRUCTORS

Mark Cooper, M.D. (Methodist Hospital)
Yen-Zen Kuo, M.D. (Veterans Administration Medical Center, Wilmington)
Anthony M. Renzi, M.D. (Methodist Hospital)
Lillian H. Stern, M.D. (Methodist Hospital)

Advisory Committee

Chairman: Stephen Feig, M.D.
Members: Alfred Kutz, M.D.

RADIOLOGY RESIDENTS

Ilan Kinori, M.D., Chief Resident
Paul Davis, M.D., Chief Resident

FIRST YEAR RESIDENTS

Mark O. Cosentino, M.D.
Valerie T. Greco-Hunt, M.D.
Deborah Rubin, M.D.

SECOND YEAR RESIDENTS

Thomas S. Chang, M.D.
Mark DeLaurentis, M.D.
Flavius Guglielmo, M.D.
Michael E. Harned, M.D.

THIRD YEAR RESIDENTS

Paul Davis, M.D.
Pamela Hendricks, M.D.
Ilan Kinori, M.D.
David March, M.D.
Richard Shlansky, M.D.
Robert Traflet, M.D.

FOURTH YEAR RESIDENTS

Bradley W. Dick, M.D.
Catherine Piccoli, M.D.
Irene P. Rasis, M.D.
Horatio Yeung, M.D.

RADIOLOGY FELLOWS

Cardiovascular/Interventional Radiology

Arthur Freedman, M.D.
Harry E. Pinkus, M.D.
Dennis Priolo, M.D.

Neuroradiology

Adam E. Flanders, M.D.
Edward M. Podgorski, M.D.

Ultrasound/CT/MRI Fellowship

John H. Bair, M.D.
Rick I. Feld, M.D.
Mindy A. Goldfischer, M.D.
Steven D. Herman, M.D.
Vartan N. Igidbashian, D.O.
Jehangir J. Patel, M.D.
Lyris A. Schonholz, M.D.
Sharon Segal, D.O.

* * * * *

DEPARTMENTAL COMMITTEES AND MEMBERSHIPS

Advisory Committee

Chairman: Stephen Feig, M.D.
Members: Alfred Kurtz, M.D.
Esmond Mapp, M.D.
George McArdle
Mark Mishkin, M.D.
Betty Rehmann
Matthew Rifkin, M.D.
Gary Shaber, M.D.

Education Committee

Chairman: Vijay Rao, M.D.
Members: Oksana Baltarowich, M.D.
Stephen Feig, M.D.
Geoffrey Gardiner, Jr., M.D.
Barry Goldberg, M.D.
David Karasick, M.D.
Esmond Mapp, M.D.
Cynthia Miller, M.D.
Robert Steiner, M.D.
Richard Wechsler, M.D.

Research Committee

Chairman: Matthew Rifkin, M.D.
Members: John M. Boone, Ph.D.
Stephen Feig, M.D.
Benjamin Galkin, M.S.
Barry Goldberg, M.D.
Mark Mishkin, M.D.
Donald Mitchell, M.D.
Laurence Needleman, M.D.
Gary Shaber, M.D.
Simon Vinitzki, M.D.
Richard Wechsler, M.D.

Residency Selection
Committee

Chairman: Alfred Kurtz, M.D.
Members: Stephen Feig, M.D.
George Gross, M.D.
David Karasick, M.D.
Stephen Karasick, M.D.
Esmond Mapp, M.D.
Cynthia Miller, M.D.
Mark Mishkin, M.D.
Donald Mitchell, M.D.
Vijay Rao, M.D.
Matthew Rifkin, M.D.

**Support Services
Committee**

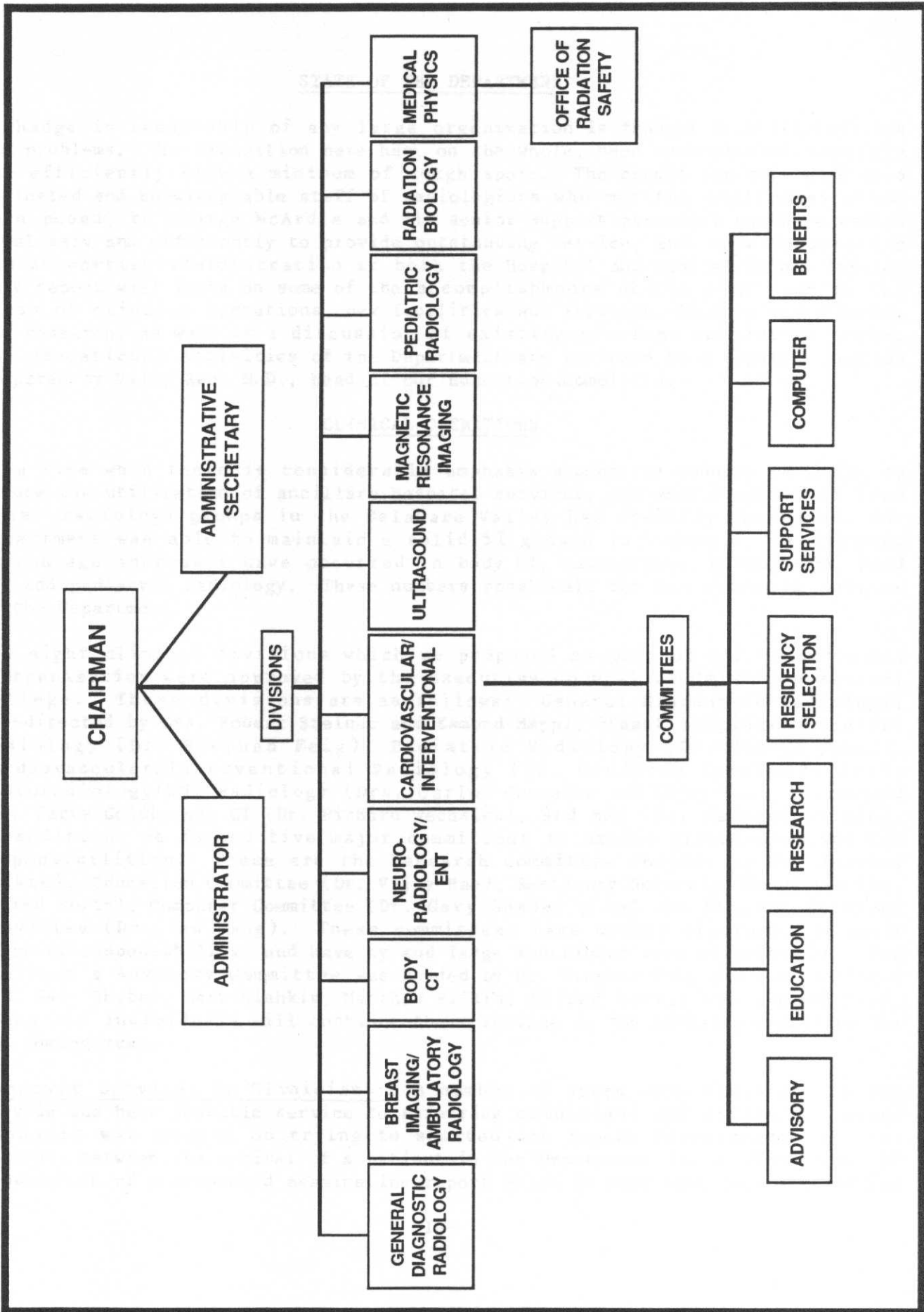
Chairman: Yen Wang, M.D.
Members: Carlos Gonzalez, M.D.
David Karasick, M.D.
Esmond Mapp, M.D.
George McArdle
Cynthia Miller, M.D.
Rebecca Pennell, M.D.
Gary Shaber, M.D.
Robert Steiner, M.D.

Computer Committee

Chairman: Gary Shaber, M.D.
Members: John M. Boone, Ph.D.
Geoffrey Gardiner, Jr., M.D.
Robert Gorson
Charles Lockard
George McArdle
Mark Mishkin, M.D.
Laurence Needleman, M.D.
Yen Wang, M.D.

Benefits Committee

Chairman: Robert Steiner, M.D.
Members: Ashokkumar Babaria, M.D.
Harry Cooperman, M.D.
Huynh Doan, M.D.
Geoffrey Gardiner, Jr., M.D.
Barry Goldberg, M.D.
Carlos Gonzalez, M.D.
George McArdle
Laurence Needleman, M.D.
Richard Wechsler, M.D.



STATE OF THE DEPARTMENT

A change in leadership of any large organization is fraught with difficulties and problems. The transition here has, on the whole, been accomplished smoothly and efficiently with a minimum of rough spots. The credit for this goes to a dedicated and knowledgeable staff of radiologists who met the challenges which were posed, to George McArdle and his senior support personnel who have worked tirelessly and efficiently to provide outstanding service, and to a cooperative and supportive administration at both the Hospital and Medical School levels. This report will focus on some of the accomplishments of the past year in the areas of clinical operations, new facilities and services, faculty recruitment, and research, as well as a discussion of existing problems and future goals. The educational activities of the Department are reviewed in a separate section prepared by Vijay Rao, M.D., head of our Education Committee.

CLINICAL OPERATIONS

At a time when there is considerable emphasis around the country on trying to reduce the utilization of ancillary hospital services, and when competition from other radiology groups in the Delaware Valley has steadily increased, our Department was able to maintain a solid 5% growth in volume. The largest percentage increases have occurred in body CT, mammography, myelography, head CT, and pediatric radiology. These numbers speak well for the economic outlook of the Department.

The eight clinical divisions which we proposed as part of our Departmental reorganization were approved by the Executive Council of Jefferson Medical College. These divisions are as follows: General Diagnostic Radiology, (co-directed by Drs. Robert Steiner and Esmond Mapp), Breast Imaging/Ambulatory Radiology (Dr. Stephen Feig), Pediatric Radiology (Dr. George Gross), Cardiovascular/Interventional Radiology (Dr. Geoffrey Gardiner, Jr.), Neuroradiology/ENT Radiology (Drs. Carlos Gonzalez and Vijay Rao), Ultrasound (Dr. Barry Goldberg), CT (Dr. Richard Wechsler), and MRI (Dr. Matthew Rifkin). In addition, we formed five major committees to handle global departmental responsibilities. These are the Research Committee (headed by Dr. Matthew Rifkin), Education Committee (Dr. Vijay Rao), Residency Selection Committee (Dr. Alfred Kurtz), Computer Committee (Dr. Gary Shaber), and the Support Services Committee (Dr. Yen Wang). These committees have worked vigorously in their areas of responsibility, and have by and large functioned very effectively. The Chairman's Advisory Committee was headed by Dr. Stephen Feig and also included Drs. Gary Shaber, Mark Mishkin, Matthew Rifkin, Alfred Kurtz, and Esmond Mapp. These six individuals will continue their service on the Advisory Committee for the coming year.

Improved Services to Clinicians: A number of steps were taken to try and provide the best possible service to referring clinicians and patients. Great emphasis was placed on trying to shorten the report turnaround time (the interval between the arrival of a patient in the Department for a study and the production of a completed examination report which is then sent to the referring

clinician). As a result of strenuous effort by virtually everyone on the staff, we were able to reduce this turnaround time from an average of 75.5 hours in April 1986 to 51.8 hours in February 1987. Our Departmental computerized management system will continue to track this important parameter for the department as a whole, as well as for individual radiologists, and we will continue our efforts to reduce this interval even further. We have instituted a system of daily hand delivery of x-ray reports to all nursing stations and referring physician offices in TJUH and the surrounding Jefferson campus. Our film library (formerly called the file room) remains under the capable leadership of Ellen Blank. She and her colleagues have instituted procedures for better retrieval of old films, tracking signed out or missing films, and staffing the more widely dispersed file areas such as the one on Main 10. Chaired by Mr. Max Goodman, a Radiology Users Committee has been organized, consisting of a number of key personnel from Radiology and representatives from every clinical department in the Hospital that sends us significant numbers of patients. This Committee has met several times during the year and has been an effective forum for bringing some of the problems and suggestions of referring clinicians to our attention. We have changed certain scheduling procedures to better accommodate requests for urgent studies and reduce the "hassle" of scheduling such studies. We have attempted to reduce our backlogs in certain key areas by going to extended working hours. For example, our MRI is operating five days a week from 8:00 a.m.-11:00 p.m. Our two CT scanners on Main 10 are operating Monday-Friday from 8:00 a.m.-11:00 p.m., as well as on Saturdays and Sundays from 8:00 a.m.-5:00 p.m. This makes us perhaps the only department in the Hospital, outside of the Emergency Room, conducting regularly scheduled clinical services seven days per week. We have made a number of changes in the way residents and staff radiologists cover the "Ballroom" and Core 1. These changes seem to have resulted in increased efficiency in both these areas. Arrangements have been made with the Nursing Service to provide much more effective care on the floors for patients with indwelling catheters in the biliary or urinary tract or vascular system. Dictating procedures have been improved and speeded up.

Financial Management: We began a complete revision of our billing codes, starting with the Cardiovascular/Interventional Radiology Division. It was determined that some procedures were being inadequately coded or billed, while others were not being billed at all, even though they were legitimate services for which professional fees were justified. This effort will be continued and applied to other divisions. A complete reclassification of billing codes was also undertaken, so that in the future it will be possible to more accurately track the procedure volume data of each division. The entire budget process for the Department has been computerized. We negotiated the purchase of a number of pieces of major imaging equipment (discussed later) on terms highly favorable to the Hospital. We also negotiated a new x-ray film contract at a substantial cost saving to the Hospital.

Support Staff: The provision of adequate clinical services obviously requires an optimal number and distribution of support personnel. Achieving this is particularly difficult in a department like ours, which is geographically dispersed. As a result of careful study and documentation by Mr. McArdle, we

were able to add the following positions to our support staff: three film librarians, one secretary, two sonographers, one ultrasound aide, one receptionist, five CT technologists and three MRI technologists. The additional CT technologists allow us to meet the Hospital's commitment to provide CT availability 24 hours per day, seven days per week as part of Jefferson's designation as a Level I Trauma Center. In addition, the Departmental research fund supported two new positions - one ultrasound technologist and one MRI technologist - who will provide support for research activities in these areas.

Computer Operations: The Departmental computerized management program continues to expand. The success of this program is a direct tribute to Charles Lockard, George McArdle and Dr. Gary Shaber. It functions extremely well, in my opinion, and has proven to be considerably more effective and far less expensive than some commercially available software for Radiology management. A PDP 11-84 computer is now being installed which will greatly increase the speed and capacity of the system. Once the new computer comes on line, we will implement patient tracking through the Department; this will allow us to determine the waiting time and exam time for each patient, as well as to document the utilization of examining rooms. We also plan to develop computerized scheduling. This is already done to some extent for both head and body CT and will be incorporated in the future for breast imaging studies, MRI, and ultrasound. Within the past year, we have begun computerized after-hours confirmation of examinations, computerized upgrading of on-call schedules, and computerized echocardiography reporting.

Marketing and Planning: In today's competitive environment, proper marketing strategies are crucial in helping to insure the success of new ventures and the expansion of our patient referral base. Jefferson is fortunate to have a highly effective Division of Planning and Marketing and we have worked with that group to plan both physician and patient brochures publicizing a number of clinical services we are providing. We have also worked with Events Services to sponsor Open Houses celebrating the opening of the new Ultrasound Division on Main 7 and 8 and Thompson 7, the Breast Imaging Center in the Medical Office Building, and the Neurosciences Imaging Center and MRI Center on Main 10. Questionnaires are distributed at frequent intervals to patients who come here for their studies; these allow us to get direct input from our patients regarding things they either like or dislike about our clinical services. As with any large department, we occasionally receive letters or phone calls expressing complaints, and I have made it a policy to either personally respond to such complaints or to ask the appropriate division head to do so promptly. This has generally produced positive feedback, and it is clear that we must continue to listen carefully to what our referring physicians and patients tell us.

NEW FACILITIES AND NEW SERVICES

A number of developments occurred during the past year, in terms of either large new facilities which have been opened or new clinical services which have been offered to Jefferson patients. (1) Magnetic Resonance Imaging (MRI) - the installation of our long-awaited MRI unit was completed in the spring of 1987 and the unit is now fully operational on Main 10. As predicted, clinical demand

has already exceeded available patient slots and it is clear that a second MRI is needed quickly. Drs. Matthew Rifkin and Simon Vinitzki and their colleagues have planned an ambitious program combining clinical service and innovative research. (2) Breast Imaging Center - this facility, located in the Medical Office Building, also represents a response by the Hospital and the Department to a major clinical need - the development of greater capacity for breast imaging. The recent publicizing of the American Cancer Society Guidelines for mammography has led to a marked increase in demand and the BIC should help us to meet that. A number of knowledgeable outside people who have visited have told us that without a doubt our facility is the finest they have seen anywhere in the Delaware Valley. Dr. Stephen Feig did an outstanding job in working with Hospital Administration to design this facility and steer it through its opening phase. The Center is now studying approximately 50 patients per day and we hope to achieve a 50% increase during the next year. In addition to mammography, the Center provides breast ultrasound and plain film studies. (3) Neurosciences Imaging Center - this Center opened along with the MRI in the spring of 1987. It integrates in one area all of the imaging studies required to evaluate patients with suspected brain, spine, or ENT disease. The Center contains two modern CT scanners (one of which is a new GE 9800 Quick unit), a new Toshiba myelography unit, the MRI on the same floor, and it will shortly receive both new angiography equipment with digital subtraction capability and a general radiographic room. The concentration of state-of-the-art neurosciences imaging equipment in one area of the Hospital will not only be a great convenience to patients and referring physicians, but also to our own Neuroradiology/ENT Division which for years has been forced to operate widely dispersed facilities. (4) Ultrasound - the new ultrasound area opened in June 1986 and is therefore completing its first full year of operation. It is probably the largest and best facility of its kind anywhere in the world. It combines general, obstetric, cardiac, vascular, interventional, Doppler, and endosonography in one facility. Many new programs have been introduced, including color Doppler evaluation of a variety of vascular beds, evaluation of blood flow in renal and hepatic transplants, and both endorectal and endovaginal ultrasound. The development of this ultrasound center is a direct tribute to Drs. Barry Goldberg, Alfred Kurtz, Matthew Rifkin, and their associates, who as a group have established a world-renowned reputation in the field. (5) New fluoroscopy equipment - upgrading of our gastrointestinal radiology facilities was badly needed. A new Siemens Siregraph B was installed in Room B on New Hospital 3 in the summer of 1986, and a new Siemens Sireskop pediatric fluoroscopy unit was installed in the spring of 1987. (6) Laser angioplasty - innovative new interventional radiology techniques seem to be developing almost monthly. An exciting procedure introduced this past year by Dr. Geoffrey Gardiner and his colleagues in the Cardiovascular/ Interventional Radiology Division is laser angioplasty using the Trimedyn laser thermal probe. The initial results have been promising. This procedure will allow radiologists to dilate vessels which are totally occluded and through which guidewires often could not be passed using standard angioplasty techniques.

FACILITIES CURRENTLY UNDER CONSTRUCTION OR IN THE PLANNING STAGES

(1) Cardiovascular/Interventional Radiology suite - two new Philips A/U angiographic units with XRE digital subtraction systems will be installed on New Hospital 5 during the coming year. These will replace two very outdated angiographic units, and will greatly improve our ability to do not only general diagnostic angiography, but also interventional procedures and out-patient angiography. The entire cardiovascular area on the 5th floor will be redesigned. (2) Body CT - construction of the new dedicated Body CT area on the 11th Street side of the Department on New Hospital 3 has been completed and a new GE 9800 Quick CT scanner is being installed. With the addition of this unit and the other new GE CT on Main 10, the Department will have almost doubled its capacity to do CT scans. Satisfying the clinical demand for CT has been a major problem for several years, and this will greatly help alleviate it. Our GE CT scanners will have the capability for such new techniques as 3-dimensional reconstruction, vertebral mineral content analysis, and determination of cerebral blood flow using cold xenon. (3) Fluoroscopy equipment - additional new Siemens Siregraph B fluoroscopy units will be placed in Rooms A and D in Core 3. At that point, we will have modern and well-functioning equipment in all of our fluoroscopy rooms. (4) Computer system - a PDP 11-84 computer is presently being installed which will run our Departmental management operation. We have been hampered recently by the slow pace of the old system, particularly in editing reports electronically, and in its limited capacity to bring up new management functions. The new computer should help solve these problems. (5) Orthopaedic radiology - a 2-room radiographic facility is planned for the 8th floor of the New Hospital adjacent to the new office suite of the Department of Orthopaedic Surgery. (6) Ultrasound - the Division of Diagnostic Ultrasound is developing several new programs in conjunction with other clinical departments. A new Antenatal Evaluation Center is being planned in conjunction with the Department of Obstetrics and Gynecology. A Prostate Diagnostic Center is being developed in conjunction with the Department of Urology. The Hospital has installed a new Technomed kidney stone lithotripter and our ultrasound group will collaborate with the Department of Urology in treating patients with this device. (7) Emergency Room Radiology - a temporary Emergency Room will be built this year on the ground floor of the Foerderer Pavilion. Radiology will have one examining room there, which will contain new equipment (not yet chosen). When the permanent new Emergency Room is built, we will occupy two radiographic rooms. (8) New research laboratory facilities - an experimental angiographic/radiographic laboratory is being built on Curtis 12. An image processing laboratory is being developed on Thompson 8, which will be under the direction of Dr. John Boone. Similarly, an MRI laboratory is being developed on Main 10, under the direction of Dr. Simon Vinitzki. (9) Other architectural changes - several other changes are in the planning stage at the present time. These will result in redesigning Core 4, the Radiology Library, the administrative area of the Department, and the Ballroom. The purpose of these alterations is to improve consultative services and our internal administrative functions.

NEW FACULTY RECRUITMENTS

During the 1986-87 academic year, six new faculty members joined the department. In addition to myself, Dr. Geoffrey A. Gardiner, Jr. came with me from the Brigham and Women's Hospital to become director of the Cardiovascular/Interventional Radiology Division. Dr. Don Mitchell joined us from a fellowship at the Hospital of the University of Pennsylvania to work in both the Ultrasound and MRI Divisions. Dr. George Gross came from the staff at Milton S. Hershey Medical Center to replace Dr. A. Edward O'Hara as Director of Pediatric Radiology. Dr. Maria Vilaro assumed a faculty position in the Division of Ultrasound, after completing her fellowship here. Simon Vinitzki, Ph.D. came here from the University of New Mexico to become head of MRI Physics.

Nine additional individuals were recruited to our faculty to start during the 1987-88 academic year. Dr. Joseph Bonn and Dr. Marcelle Shapiro both joined our Cardiovascular/Interventional Radiology Division after completing fellowships at the Hospital of the University of Pennsylvania. Dr. Wolfgang Dahnert joined our Ultrasound Division after completion of a CT/US fellowship and a year on the staff at the Johns Hopkins Hospital. Dr. David Levy joined the Ultrasound Division after completing a fellowship at the Hospital of the University of Pennsylvania; he will also work part of the time in MRI. Dr. Lawrence Burk came to us after completing a year on the staff at the Pittsburgh NMR Institute, followed by an Orthopedic and MRI Radiology fellowship at the Hospital of the University of Pennsylvania. He will be a member of both the General Diagnostic and MRI divisions. John Boone, Ph.D. was recruited from the University of Missouri and will be our Director of Radiological Imaging Physics. Dr. Elaine Wolk is joining the staff of the Breast Imaging Division on a part-time basis, after several years in private practice and a preceptorship with Dr. Feig. She was formerly a faculty member at SUNY Buffalo. Two other people will be joining us later in the academic year. Dr. Kevin Sullivan, an alumnus of our Radiology residency, completed a fellowship in Cardiovascular/Interventional Radiology at the Johns Hopkins Hospital and will be joining that Division here in September, 1987. Peter Burns, Ph.D. will be coming to us from Yale University as Head of Ultrasound Physics in November.

Thus, within the space of less than 1 1/2 years, 15 new faculty members will have been added to this Department. Every one of them has an excellent educational background and outstanding potential for an academic career. The addition of these people to the core of excellent faculty who were already here will give us a group that, in my opinion, can move Jefferson into the forefront of academic departments of Radiology in this country.

RESEARCH

One of our major goals has been to increase research productivity of the Department. Excellent progress has been made toward achieving this. A good example was the Department's performance at the March 1987 meeting of the Association of University Radiologists. This national meeting emphasizes research by residents, fellows, and young staff members. Our Department alone accounted for 8% of all presentations made there - truly a remarkable

achievement. No other university hospital in the entire Northeast came anywhere near us.

Many factors have contributed to the increased research activity throughout the Department. A Research Committee was set up last summer, headed by Dr. Matthew Rifkin. This committee has played a significant role in stimulating research interest in a variety of ways. It reviewed applications for seed grants from a number of people, and provided funding for projects by Drs. Teitelbaum, Wechsler, Pennell, Mishkin, Vinitzki, Goldberg, Baltarowich, and Gardiner. A bi-weekly Research Conference was started in the fall of 1986 and has been quite successful. The presentations made at this conference during the past year are noted in the section on education of this report. A broad spectrum of interesting projects was discussed, and the conferences helped people in the Department learn something of what their colleagues were working on. The intellectual stimulation of these conferences undoubtedly has helped generate ideas and interest among our trainees and younger faculty members.

Efforts at securing outside research funding have proceeded along several different lines. Grant proposals totaling \$2,649,543 (direct costs) were submitted by Drs. Barry Goldberg (3 grants), Dr. Matthew Rifkin (2 grants), Dr. Laurence Needleman, Dr. Yen Wang, and Dr. Gary Shaber. Other proposals were submitted by principal investigators from other departments with our staff radiologists as co-investigators. We also collaborated with the Biomedical Engineering and Science Institute of Drexel University to submit a grant proposal for the establishment of a Center of Excellence in Biomedical Imaging under the "Centers of Excellence" program of the Ben Franklin Partnership of the Commonwealth of Pennsylvania. The proposed Center would bridge the biomedical engineering resources at Drexel with the medical and clinical resources of our Department in the area of diagnostic medical imaging. If funded, it will have far-reaching implications for this Department and will represent an important University-industry consortium. It has received considerable equipment support from a number of our major equipment manufacturers. In addition to this support, we were successful in obtaining unrestricted research funding from several equipment suppliers, as well as funding for salaries of research scientists in the Department (I might point out here that in addition to these benefits, we were able to secure deep discounts for the Hospital on imaging equipment through good old-fashioned hard bargaining).

Productive research obviously requires support facilities and equipment. The Medical College is presently constructing an experimental angiographic laboratory on Curtis 12 for us. An image processing laboratory is being developed on Main 8 and an MRI research lab is being developed adjacent to the magnet area on Main 10. The Departmental research fund has supported the hiring of five new individuals who will greatly assist in Departmental research - research analyst Sandy Ehrlich, research coordinator Theresa Matteucci, computer programmer Arthur D'Adamo, and research technologists in MRI and ultrasound who will work on clinically oriented imaging research in those two areas. Good photographic support is necessary in any Radiology research program, and we have upgraded our photographic equipment with the acquisition of a slidemaker and renovation of a Log E photo enhancement unit.

Divisional Research Programs: A number of ambitious research programs, of both a basic and clinical nature, are planned by the various Departmental divisions. There is of course tremendous interest in MRI. Some of the planned basic studies of MR imaging technology to be carried out by Dr. Simon Vinitzki include use of variable flip angles to image tissues with differing magnetic susceptibilities, development of both hardware and software for non-invasive MRI angiography, effect of an inhomogeneous magnetic field on image contrast, lesion detection at different field strengths, quantification of flow using GRASS and FLASH techniques, effect of multi-echo imaging on signal and contrast, and water fat subtraction techniques. Some of the planned clinically oriented MRI studies include the use of GRASS technique to study deep venous thrombosis of the lower extremities, cine MRI techniques to study a variety of cardiac diseases, comparison of MRI with both CT and endorectal ultrasound for the diagnosis and staging of prostate and rectal cancer, comparison of MRI with CT and ultrasound in the detection of liver metastases, comparison of MRI with ultrasound and CT for detecting thyroid and parathyroid lesions as well as other neck masses. Research in the Division of Diagnostic Ultrasound will focus on the development of ultrasound contrast agents, ultrasound characterization of atherosclerotic plaques, ultrasound bio-effects, measurement of normal ovarian volumes, use of ultrasound in detecting rotator cuff tears, further extension of the use of color Doppler, use of ultrasound in determining patency of dialysis shunts, Doppler evaluation of renal transplants, Doppler evaluation of pregnancy-induced hypertension, Doppler studies in portal hypertension, a double blind comparison of endovaginal versus transabdominal ultrasound evaluation of first trimester pregnancies, and a continuation of some of the pioneering work by this group on prostate imaging. The Division of Body Computed Tomography will study both the role and methods of 3-dimensional reconstruction of CT images, particularly in skeletal and soft tissue disorders. This is a relatively new technology which is presently undergoing intensive development. They will evaluate axillary lymph nodes in patients with breast cancer, and study the role of CT in liver transplant rejection. The Division of Neuroradiology/ENT will work closely with the Departments of Neurology and Neurosurgery and will study the use of intraventricular instillation of oxygenated fluorocarbons in the treatment of stroke. They will investigate the metabolic changes occurring after stroke production in experimental animals, using magnetic resonance spectroscopy. Other areas of interest include the development of non-invasive MRI angiography to study carotid blood flow and regional cerebral blood flow, a comparison of MRI with arthrography and arthroscopy in patients with temporo-mandibular joint disorders, use of fluorocarbons as paramagnetic contrast media for MRI of the CNS, correlation of MRI with EMG and neurologic signs and symptoms in brachial plexus lesions, and the use of MRI to study central cord injury in both animal models and clinical cases. The Division of Cardiovascular/Interventional Radiology will emphasize the development of new interventional vascular techniques. Jefferson has been named by a large drug manufacturer as a clinical test site for the use of tissue plasminogen activator for intra-arterial thrombolysis in patients with occlusions of peripheral arteries and peripheral bypass grafts. We have also been designated a test site for a trial of newly-developed intravascular stents to be used after balloon angioplasty. This is part of an attempt to reduce the incidence of restenosis following

angioplasty. The Division will continue to expand upon its initial experiences with laser thermal angioplasty, using the Trimedyne laser thermal probe. They will also begin studies of the use of fibrin sealant as an embolic agent for transcatheter vascular occlusion. The Division of General Diagnostic Radiology will utilize our recently acquired digital radiography system to enhance and process radiographic images in a variety of different areas. Efficacy of plain film and digital assessment of pulmonary nodules, bone density, and portable films will be compared. A large clinical-radiographic study of sarcoid will continue. Members of the Division will also attempt to correlate plain film findings with MRI in certain diseases. Further evaluation of the indications and efficacy of defecography will be pursued. The Division of Breast Imaging/Ambulatory Radiology will continue its comparative study of the technical quality of mammograms in Delaware Valley hospitals, and will continue working on the chemical analysis of breast microcalcifications. The Division of Pediatric Radiology will review the applications of digital radiography in plain film studies of neonates and in the general pediatric population. The role of digitization of portable pediatric films will also be studied. A final project will evaluate the clinical significance of inter-hemispheric fissure widening in neonatal heads. Much of the proposed research of the Division of Radiological Physics has been included above in the discussions of breast imaging, digital radiography, and MRI research. In addition, certain basic aspects of digital radiography will be explored by Dr. John Boone - such as measurements of its characteristic response, signal-to-noise ratio, resolution characteristics, and removal of scattered radiation. A new procedure for processing and displaying information obtained with dual energy digital image acquisition (referred to as dual energy spectroscopy) will be explored. The Division of Developmental Biology and Teratology will study the cytokinetic effects of prenatal radiation in the rat, nutritional role of the placenta in maldevelopment, and the mechanisms of achondroplasia.

The above obviously represents a lengthy list of projects. However, most of them are currently in progress or in the planning stages. They provide a good indication of the broad scope of research interests that currently exists in the Department.

GOALS

In the clinical sphere, we need to constantly strive to provide excellent service to referring clinicians and patients. We have made considerable progress in this area during the past year, but further improvement is always beneficial. As indicated earlier, we are in a very competitive environment and cannot afford to be complacent, even though we seem to be in a healthy growth phase. We have to look for possible avenues of future expansion - the areas that come immediately to mind are breast imaging, MRI, CT, interventional, neuroradiology and ultrasound. Radiology and other hospital departments are in the midst of negotiations with a number of managed health care plans (HMO's and PPO's). Concluding these negotiations successfully is proving to be a difficult challenge and obviously an important one, since these plans represent significant potential for future growth. The reduction of backlogs in scheduling cases for CT, breast imaging studies, and MRI is a major goal. As

discussed above, we are moving ahead with plans to try and minimize these backlogs. Aside from expansion of our referral base for those imaging studies we already provide, we must actively develop expertise in some of the newer and more recently popularized studies - such as double contrast upper GI studies, enteroclysis, both laser and balloon angioplasty, inferior vena cava filter placement, abscess drainage, embolization of cerebral vascular malformations and aneurysms, endosonography, color Doppler studies, 3-dimensional reconstruction of images, analysis of vertebral mineral content, cerebral blood flow determination using cold xenon, cardiac cine MRI, vascular MRI, and kidney and gallstone lithotripsy. In addition to increasing our activities in these areas, we must also stay abreast of complex new technologies which are sure to arrive in the future, and in doing so we must be careful to concentrate our efforts only on those that show real promise. A final goal in the clinical area is to obtain the radiology contract for the Wills Eye Hospital. The fact that a Jefferson-related institution like Wills still has its radiology services provided by the Hospital of the University of Pennsylvania is a peculiar anomaly. We have tremendous expertise in our Department in orbital, cerebral, and head and neck imaging, and I believe we can do an outstanding job for patients and physicians at Wills. Negotiations are continuing and a decision will hopefully be forthcoming this winter.

In the teaching sphere, we have made great strides this past year, as detailed in Dr. Rao's report on the Departmental educational programs. We must continue to improve our medical student teaching and give consideration to eventually making diagnostic Radiology a required four-week course. We must also continue to improve our three fellowship programs - US/CT/MRI, Cardiovascular/Interventional, and Neuroradiology/ENT. Fellowship training following completion of a residency has become almost mandatory for young radiologists and we need to respond to this with excellence in these three programs (and perhaps others in the future). Continuing medical education is another area for possible expansion of our educational activities. Aside from the Division of Ultrasound, the Department has not been involved in this activity at all. Because of the tremendous profusion of CME courses all around the country in recent years, there is a distinct possibility that this "market" is currently saturated. In any event, careful study of the feasibility of CME courses in other areas is warranted.

In the research sphere, we need to broaden our funding support. Federal grants must be sought, based obviously on constructive and innovative research ideas. Collaboration with industry must be further explored. We have made progress in this particular area during the past year in that we have been able to obtain research funding from several manufacturing firms and have submitted a proposal for university-industry collaboration in a Center of Excellence in Biomedical Imaging in conjunction with Drexel. Another important goal in terms of research is to have effective and well equipped research laboratories. We are currently in the process of developing an experimental angiographic laboratory, an image processing laboratory, an MRI laboratory, and a digital radiography research facility.

TEACHING PROGRAMS

CONCLUSION

The past year has been one of significant change and progress on a variety of fronts. The Department has shown steady growth in its patient referrals and professional income. We have significantly expanded our facilities and introduced important new programs. Plans have been made for further such additions during the next two years. We have taken steps to improve the logistics of our patient care and consultative roles. The reorganization of the Department along divisional lines has led to a more cohesive chain of responsibility. A large group of outstanding new faculty members has been recruited. The residency and fellowship programs have been strengthened in a variety of ways. Both research interest and research productivity have markedly increased. Perhaps the most important of all these developments is an intangible one - a spirit of cooperation, dedication, goal orientation, and pride that has been evident among people at all levels of the Department. This perception does not just reflect wishful thinking on my part; it has been commented upon by virtually every senior officer at Jefferson as well as by numerous clinicians in other departments. I feel we now have the raw materials - people, attitude, space, equipment, and the support of the Hospital and Medical College Administrations - to have a major impact on Jefferson's reputation both as a provider of outstanding clinical care and as a center of excellence in research and teaching.

David C. Levin

David C. Levin, M.D.
Professor and Chairman

Radiology Students RAD 401-01. This course is directed by Dr. Tracy M. Rad, M.D. It is a structured course designed to accommodate the special needs of any particular student. The course was revised and restructured this year with the following objectives:

1. To teach the basic elements involved in the radiology examination. This includes radiology of tissues, acute abdomen and chest, as well as pneumothorax, pleural effusions, pulmonary, etc.
2. To teach the principles of x-rays, fluoroscopy, computerized tomography, ultrasound, nuclear medicine and magnetic resonance imaging. The students will better understand the factors affecting the patient cooperation, and the sequence in which diagnosis is performed.
3. To teach the effective use of the Radiology Department. The use of new techniques is emphasized.

The maximum number of students accepted per block is 20. The students are divided into small groups of 3 to 4 students. Each student is assigned to different areas, such as general diagnostic radiology, nuclear medicine, gastrointestinal and genitourinary radiology, neuroradiology, body CT, and interventional radiology. Student evaluations are performed at the end of each block.

TEACHING PROGRAMS

Introduction

The Department of Radiology is highly active in the teaching of medical students, radiology residents, fellows, and the clinical house staff. In addition to several continuing medical education (CME) courses traditionally offered by the Department of Radiology, a variety of new teaching programs have been introduced this year. They include Radiology Grand Rounds, Research Conferences, Radiology-Pathology Correlation Conferences, a Cardiac Radiology Board Review Course for residents, and a radiologic anatomy course for the freshman medical students.

A. Teaching Programs for Medical Students

Freshman Medical Students: Under the direction of Vijay M. Rao, M.D., a new course in Radiological Anatomy was introduced this year for first year students. The course emphasizes cross-sectional anatomy as it relates to the newer imaging modalities, namely computed tomography and magnetic resonance imaging. Designed in conjunction with Dr. Edward Masters from the Department of Anatomy, the Anatomy course allows a departmental radiologist who may be either a faculty member, fellow or senior resident, to be available as a consultant in the dissection laboratory for two hours per week throughout the length of the course. The radiologist conducts small group sessions and emphasizes radiologic anatomy by plain film, computed tomography, and magnetic resonance imaging. The Anatomy course is unique in that a radiologist is physically present in the dissection lab. This course was well received by the students and will continue next year. Courses in freshman biochemical techniques were conducted for the medical students by the Division of Radiation Biology.

Medical Students Elective RAD 401-01: This elective is also under the direction of Vijay M. Rao, M.D. It is a structured course but has the flexibility of accommodating the special needs of any particular student. The course was revised and reorganized this year with the following objectives in mind:

1. To teach the basic elements involved in the radiology of emergency care. This includes radiology of trauma, acute abdomen and common chest diseases as pneumothorax, pleural effusions, pneumonia, etc.
2. To teach the principles of X-rays, fluoroscopy, computed tomography, ultrasound, nuclear medicine and magnetic resonance imaging. This enables the students to better understand the factors affecting patient preparation, patient cooperation, and the sequence in which diagnostic tests should be performed.
3. To teach the effective use of the Radiology Department. The appropriate use of new technologies is emphasized.

The maximum number of students accepted per block is 12. These students are divided into small groups of 3 to 4 students. At any given time, they are assigned to different areas such as general diagnostic radiology (which includes thoracic, skeletal, genitourinary, and gastrointestinal radiology), neuroradiology, body CT, ultrasound, nuclear medicine, and cardiovascular/interventional radiology. Students have the opportunity to

interact on a one-to-one basis with faculty members, fellows and residents. While rotating through the various areas, the students participate in evaluation and interpretation of the radiologic studies. During the General Diagnostic Division rotation, they observe special procedures such as upper and lower gastrointestinal series, hysterosalpingography, arthrography, and intravenous urography. During rotation through the Neuroradiology Division, they observe myelography and cerebral arteriography. In Cardiovascular/Interventional Radiology, the students become familiar with abdominal arteriography and various diagnostic and therapeutic interventional procedures. They have the opportunity not only to observe computed tomography, magnetic resonance imaging, and nuclear scans of the brain, chest, liver, spleen and bone, but also to participate in the film reading sessions. In Ultrasound, Oksana Baltarowich, M.D. conducts formal courses for students. Lectures, case reviews and examinations on the materials presented, coupled with exposure to the latest techniques in diagnostic ultrasound, help prepare students for the clinical use of this modality.

Each day there are between 1 and 1-1/2 hours of teaching conferences for the students. Students participate in case analysis and discussion, radiographic findings and differential diagnosis. In addition, the students are encouraged to attend the two resident teaching conferences held daily. A large collection of audiovisual teaching aids, text material and film teaching files encompassing a wide variety of disorders is available to the students in the Radiology Library. The film teaching file which has been collected over the years incorporates the teaching file compiled by the American College of Radiology.

The radiology elective was taken by approximately 188 junior and senior class members of Jefferson Medical College. Of these, 148 completed the RAD 401-01 elective at Thomas Jefferson University Hospital and the remaining 40 at affiliated hospitals or outside institutions. Students enrolled in RAD 401-01 have rated this course as one of the most enjoyable learning experiences of their senior year, with many commenting that it should be a requirement for all medical students. The 23 House Staff officers from the Department of Medicine who have taken this elective have also found it a fruitful and worthwhile experience.

Interdepartmental Radiology Conference for Junior and Senior Medical Students:
During rotation on clinical services, the junior and senior medical students receive frequent exposure to radiology through a number of interdepartmental conferences:

- i) Weekly combined neurology/neurosurgery/radiology conferences,
- ii) Weekly lectures in radiology for junior students in medicine,
- iii) Bi-weekly conferences in orthopedic radiology for students on orthopedics,
- iv) Bi-weekly conferences in otolaryngology-radiology,
- v) Lectures to students on Emergency Room rotation,
- vi) Weekly combined Pulmonary Department, Radiology Department, and Pathology Department conferences.

Unknown Case of the Week for Medical Students and non-Radiology House Staff:
Radiology residents present imaging studies accompanied by clinical information for medical students and non-radiology house staff. The purpose of this weekly case conference is to introduce and teach interpretation of radiographic findings, given a minimal knowledge of a patient's history.

B. Training Program for Fellows

The Department of Radiology offers 1, 1-1/2, and 2 year fellowships in each of the following areas: Cardiovascular/Interventional Radiology, Neuroradiology/ENT, and Ultrasound/CT/MRI. Candidates must be board certified or in the certification process.

Cardiovascular/Interventional Fellowship: The Cardiovascular/Interventional Fellowship has been extended to three fellowship positions offered yearly for a one or two year period. This fellowship is under the direction of Geoffrey Gardiner, M.D. The first year consists of four months in cardiac angiography and eight months on the combined vascular/interventional service. On cardiac rotation, the fellow works in the Cardiac Catheterization Laboratory performing cardiac catheterization and coronary angiography. Radiographic interpretation of cardiac studies is enhanced by combined conference with the cardiologists. An eight-month rotation through the vascular/interventional service exposes the fellow to a wide variety of vascular and non-vascular interventional and diagnostic procedures. Daily ward rounds and morning work conferences are held, during which time all cases are reviewed. There are weekly conferences with the vascular surgeons. Resident teaching conferences are presented by the staff. Both the teaching file and computerized patient database are carefully maintained and updated. Since the two-year program is intended for fellows with academic interests, ample research time is allotted during the second year with additional experience offered in vascular and non-vascular procedures and in cardiac imaging (using digital technique, echocardiography and MRI).

Neuroradiology/ENT Fellowship: The Neuroradiology/ENT fellowship consists of a two-year program. This fellowship is under the direction of Carlos Gonzalez, M.D. Two fellows (one per year) receive extensive training in regular neuro-angiography and interventional procedures, CT, and MRI of the head, brain, neck and spine. Teaching in the related neurosciences such as neurology, neuropathology and neurosurgery is emphasized and research is encouraged.

Ultrasound/CT/MRI Fellowship: The Ultrasound/CT/MRI fellows participate in one of two programs: 1) a one-year program consisting of seven months of ultrasound, and two-and-a-half months each of Body CT and MRI, and 2) a 1-1/2 year program consisting of 9 months of ultrasound, 7 months of Body CT and MRI, and 2 months of research. The Ultrasound portion of this program offers training in adult and pediatric abdomen and pelvis, neonatal brain, obstetrics and gynecology, small parts (including testes, neck and breast), peripheral vascular, echocardiography, endosonography, intra-operative ultrasound, and aspiration-biopsy and abscess drainage techniques. In Body CT, training is given in chest, abdomen and extremities. Aspiration-biopsy and abscess drainage techniques are taught during the Body CT rotation. MRI training consists of all aspects of this modality, including brain, spine, body and extremity studies, and the physics involved with image production. Morning conferences are held daily in the Ultrasound, CT, and MRI divisions during which time interesting cases from the previous day are reviewed. Monthly research meetings and specialty conferences with the perinatologists, neonatologists, and the Division of Nuclear Medicine (Department of Radiation Therapy and Nuclear Medicine) are held. Research is encouraged.

Training Program for Research and Clinical Fellows

Division of Radiation Biology: Under the direction of Robert Brent, M.D., Ph.D., this training program provides the opportunity to obtain research training in experimental embryology, radiation biology, teratology, developmental immunology, genetics and developmental biochemistry. The training program is conducted by a multidisciplinary research team. Trainees in both the basic medical and clinical sciences are accepted into the program and are expected to function in the basic science or the clinical departments as developmental biologists. Developmental biological input in the fields of pharmacology, biochemistry, physiology, anatomy, microbiology, obstetrics and pediatrics is important for education, the discovery of new information, and in providing special expertise in obstetrics, pediatrics and genetic counseling. Individuals with this background can also be expected to be of value in the pharmaceutical industry and in government regulatory agencies. The trainees receive broad enough training to prepare them for a position in teaching and/or research in a basic science or clinical department, or to function in industry or government as a specialist in these fields.

The training program includes: 1) assignment of all trainees to a preceptor; 2) exposure of all trainees to a basic spectrum of techniques and tools necessary to run a developmental biology laboratory--from animal handling to biochemical and physiological procedures; 3) weekly research work conferences, seminars and journal clubs; 4) exposure to the developmental biological aspects of drug testing and the multiple aspects of meeting the legal and moral commitments to provide drugs that can be used during pregnancy and the social and legal complications of human malformations; 5) courses in teratology, embryology, radiation biology that are available to all trainees, plus 24 related elective courses available for the trainees. The training program is personalized with extensive contact between supervisors and trainees. A collegial relationship is developed that persists long after the trainee leaves the program.

In addition to the postdoctoral training, the staff at the Stein Research Center, Radiation Biology Division, provides training to medical students who are supported by NIH Grant HL-07497, "Short Term Research Training," for which Dr. Robert L. Brent is the Principal Investigator. High school and college students are also accepted during the year for short-term training programs in research. Each year a fellowship from the National Foundation March of Dimes for one medical researcher in the Division of Radiation Biology is available.

Dr. Brent is a member of the faculty that teaches the course in teratology to the graduate and medical students who select this elective. Each of the three Postdoctoral Fellows listed herein are supported by NIH-HD-07075 for a fellowship: Janine Polifka, 3 years; James Hyland, 1 year; and Debra Epstein, 3 years.

C. Residents in Radiology: Restructured Residency Program

The American Board of Radiology requires four years of training in diagnostic radiology, regardless of prior post-graduate training. Because of the increasing demand for sub-specialization among radiology trainees, the residency training program has recently undergone a major restructuring. One addition was the introduction of elective time in the fourth year. Under the restructured program, there is a core curriculum of 3 years. During that time, all residents

are assigned 3 months in each of the following areas: thoracic radiology, skeletal radiology, genitourinary radiology, gastrointestinal radiology, body CT, cardiovascular/interventional radiology, neuroradiology/ENT, mammography, outpatient radiology and pediatric radiology. The residents spend 2 months in magnetic resonance imaging and 4 months in nuclear medicine. In the fourth year, they have the option of taking additional electives in one or several of these areas.

During the first year, residents learn the basic concepts and interpretation of diagnostic studies as applicable to each subspecialty. In addition to mastering the principles of the various imaging modalities, they also learn the technical aspects of the various diagnostic and therapeutic procedures performed in the Department, especially in the cardiovascular/interventional, neuroradiology, ultrasound and body computed tomography areas.

During the second and third years, the residents again spend one month each year in each of these areas, thus enabling them to refresh their knowledge and polish their technical skills. Having achieved basic competence in diagnostic and interventional procedures, residents are prepared to tackle more difficult and challenging procedures. Furthermore, the continued exposure each year to every area helps prepare them better for the written board examinations in Radiology, taken at the beginning of the fourth year. Residents are encouraged to participate in ongoing research activities within the department.

The fourth year residency is largely an elective year. The residents can spend a block of time in one or more areas of radiology. This gives them an opportunity to acquire additional expertise in the subspecialty of their interest. Our residency program aims at producing radiologists well-trained in all aspects of diagnostic imaging who will feel comfortable in either an academic or a private practice environment.

For the year 1986-1987, the number of residents at each level within our department was as follows:

Fourth year residents	- 2
Third year residents	- 4
Second year residents	- 6
First year residents	- 4

During the past year, the residency training program maintained its tradition of academic excellence. Our two graduating residents passed the written and oral board examinations given by the American Board of Radiology and have obtained excellent fellowship or staff positions for the year beginning July 1, 1987. S. Bruce Greenberg, M.D. will be a fellow in Pediatric Radiology at St. Christopher's Hospital for Children in Philadelphia. Randi Kauffman, M.D. will be joining the staff at Veteran's Administration Hospital in Baltimore and also will have a faculty appointment at the University of Maryland. It is gratifying to note that four out of eight graduating residents and fellows have been accepted into academic positions.

The radiology residency program at Jefferson is much sought after. Over 300 applications were received last year, from which 10% were selected for interviews. Nearly all selected candidates are in the top 25% in their medical school class and over half have been elected to Alpha Omega Alpha (AOA). First

year residents are chosen from this group. Our three new residents for July 1, 1987 are listed with their respective medical schools:

Mark Cosentino, M.D. - University of Medicine and Dentistry,
New Jersey Medical School, AOA

Valerie Greco-Hunt, M.D.- Jefferson Medical College, AOA

Deborah Rubin, M.D. - Temple University School of Medicine, AOA

Resident Teaching and Conferences: Throughout the four years of residency, our residents attend 2 hours of conferences in diagnostic interpretation given daily by attending staff. The conferences include lectures in each of the major subspecialties. These conferences are a mixture of didactic lectures and case presentation conferences where residents have the opportunity to discuss the radiographic findings and differential diagnosis.

The second year of a two-year lecture course (RAD 521) on Radiological Physics was presented to the radiology residents, including the residents from Pennsylvania Hospital. The course, consisting of lectures and review sessions, was presented by the staff of the Division of Radiological Physics (formerly, the Division of Medical Physics). Prof. Benjamin Galkin of the Office of Radiation Safety also conducted a 20 hour physics review course for radiology residents preparing to take the American Board of Radiology examination.

A distinctive feature of our residency program is that during each work day, all studies are reviewed by the resident and staff together prior to dictation. Thus, each case becomes a teaching exercise. This type of review demands additional effort from radiology staff physicians but is worthwhile for good residency training and patient care.

NEW TEACHING PROGRAMS

Research Conferences: Another major feature this year was the introduction of bi-weekly Radiology Research Conferences, under the direction of Matthew Rifkin, M.D. This allowed everyone in the department the opportunity to present the results of their research activities. Residents are encouraged to become involved in research projects, to write abstracts and papers, and to present their work at local and national meetings. A listing of the research conference topics and their presentors is included at the end of this section.

Radiology-Pathology Conference: Interdepartmental radiologic-pathologic correlation conferences were introduced this year. Moderated by Vijay M. Rao, M.D., interesting cases are discussed by the senior residents, followed by final pathologic diagnoses presented by the pathologist.

Postgraduate Review Course for Radiology Residents: A citywide bi-annual refresher course in cardiac radiology was presented to the residents by Drs. Levin and Steiner. The course was held for 2-hour nightly sessions, one per week for 8 weeks, and was attended by approximately 75 residents.

Pediatric Case of the Week for Radiology Residents: Under the direction of George Gross, M.D., various imaging studies of children accompanied by clinical

information and one or more questions are presented weekly for the radiology residents. A diagnosis, explanation, and discussion of findings are then provided for teaching purposes.

CONTINUING MEDICAL EDUCATION (CME) PROGRAMS

Radiology Grand Rounds: During Grand Rounds in Radiology, which was introduced this year, weekly topics of interest in all radiology subspecialties were covered. Twenty-one Grand Rounds sessions were given during the year; 11 were presented by invited speakers and 10 by the department faculty. A listing of the speakers and their topics is presented at the end of this section.

Seventh Annual Leading Edge in Diagnostic Ultrasound course: The Ultrasound division's seventh annual Leading Edge in Diagnostic Ultrasound, held in Atlantic City, was a major success. This year's meeting featured a pre-conference tutorial on cerebrovascular imaging and Doppler. The whole program was approved for 7.5 to 24.5 CME Category I hours, depending on dates of attendance. In addition to approximately 100 biomedical engineers, scientists, nurses, administrators, business managers and sales representatives, 400 course participants qualified for CME hours.

During this academic year, the Division of Ultrasound also offered 41 two- to five-day courses in ultrasound applications for the abdomen, obstetrics and gynecology, non-invasive vascular diagnosis, urologic ultrasound, neonatal brain, ultrasound in surgery, sonomammography, physics and instrumentation, cross-sectional anatomy, echocardiography, and real-time Doppler. These courses are approved for 1.5 to 31 AMA Category I hours.

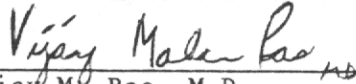
LIBRARY FACILITIES AND AUDIOVISUAL SERVICES

Our radiology library, located within the Department, is one of the finest teaching resources of any department throughout the country. It contains 600 radiology textbooks and issues of 28 medical journals. Supervised by a full-time radiology librarian, the library has an extensive teaching file of over 1,600 representative cases written up with the radiographic findings and clinical presentations, including the entire American College of Radiology teaching file. There are 350 hours of audiovisual cassettes and slides on specific topics in radiology.

HONORS AND AWARDS

The A. EDWARD O'HARA TEACHING AWARD was instituted to be given by the residents to a faculty member for outstanding teaching. Dr. Richard Wechsler was awarded this honor.

Our residents have actively participated in national radiology meetings and conferences. Bradley Dick, M.D., participated in the Resident Panel, Home Talent Night, sponsored by the Philadelphia Roentgen Ray Society. S. Bruce Greenberg, M.D., won the award in the citywide unknown case contest held by the Philadelphia Roentgen Ray Society.



Vijay M. Rao, M.D.
Chairman, Education Committee

RADIOLOGY GRAND ROUNDS

Sept. 8, 1986	CT of the Solitary Pulmonary Nodule	Frederick Stitik, M.D. Norfolk, Virginia
Sept. 15, 1986	Imaging in Colon Cancer	Esmond Mapp, M.D.
Sept. 29, 1986	Renal Inflammatory Disease	Marc P. Banner, M.D. Hospital Univ of Penna
Oct. 6, 1986	Advances in Limb Salvage of Malignant Bone Tumors	Richard Lackman, M.D.
Oct. 27, 1986	Breast Cancer Screening	Stephen A. Feig, M.D.
Nov. 3, 1986	CT of the Systemic Veins	Richard J. Wechsler, M.D.
Nov. 10, 1986	Doppler Ultrasound of the Abdomen and Pelvis	Barry B. Goldberg, M.D.
Nov. 24, 1986	Current Controversies and Future Directions in Diagnostic Imaging of the Pulmonary Vasculature	Dr. Philip O. Alderson Columbia University New York
Dec. 8, 1986	Current Status of Renal Angioplasty	David C. Levin, M.D.
Jan. 5, 1987	Magnetic Resonance Imaging of Hemorrhagic Conditions of the Nervous System	Robert I. Grossman, M.D. Hospital Univ of Penna
Jan. 12, 1987	Use of MRI in the Pediatric Patient	George W. Gross, M.D.
Jan. 26, 1987	Current Status of MRI of the Heart	Robert M. Steiner, M.D.
Feb. 2, 1987	Esophageal Manifestations of Systemic Disease	Esmond Mapp, M.D.
Feb. 9, 1987	Radiology Revenue under CMPs (Competitive Medical Programs)	Mr. John Thomas Professional Management Services
Feb. 23, 1987	Magnetic Resonance Imaging of Extracranial Hemorrhage	Herbert Y. Kressel, M.D. Hospital Univ of Penna
Mar. 2, 1987	Liver, Biliary Tree and Pancreas: Comparison of MRI to CT	Arnold Friedman, M.D. Temple Univ Hospital
Mar. 9, 1987	Interventional GI Radiology	Gordon McLean, M.D. Hospital Univ of Penna

RADIOLOGY RESEARCH CONFERENCE

Mar. 30, 1987	Temporomandibular Joint Arthroscopy	Anthony Farole, D.M.D.
Sept. 11, 1986	Neurocarbons in Neuroradiology	Carlo J....
Apr. 6, 1987	Imaging of the Parapharyngeal Space and Upper Neck by Computed Tomography and Magnetic Resonance Imaging	Peter Som, M.D. Mt. Sinai Hospital NY
May 4, 1987	Advances in Obstetrical Ultrasound Measurements	Peter Doubilet, M.D. Brigham & Women's Hospital Boston MA
Oct. 21, 1986	Grant Writing	
May 11, 1987	Surface Coils in MRI	J. Bruce Kneeland, M.D. Medical College of Wisconsin
Oct. 11, 1986	Writing a Journal and How to Write a Scientific Paper	
Jan. 8, 1987	Observation on Sickle Cell Anemia: A. Effects of Tonic and Non-tonic Contrast Media on Marrow Patterns of Magnetic Resonance Imaging at 1.5 T	Vijay M....
Feb. 12, 1987	Prenatal Doppler	Laure...
Feb. 26, 1987	Renal Growth with Myelodysplasia	George...
Mar. 12, 1987	CT of Liver Transplants	Michael...
Mar. 26, 1987	Ultrasound/Surgical/Pathologic Correlation of Ovarian Fibroids	John...
Apr. 9, 1987	Prolonged Intrarterial Infusion Therapy	Robert...
Apr. 23, 1987	Endovaginal Ultrasound	Merlin...
May 14, 1987	CT of the Hip	David...
May 28, 1987	Optimization of Fast Gradient Refocusing Techniques	Edward...

RADIOLOGY RESEARCH CONFERENCE

Sept. 11, 1986	The Use of Fluorocarbons in Neuroradiology	Carlos Gonzalez, M.D.
Sept. 25, 1986	Coronary Stenosis Morphology: Histologic and Clinical Manifestations	David C. Levin, M.D.
Oct. 9, 1986	Fetal Skeletal Dysplasia	Alfred B. Kurtz, M.D.
Oct. 23, 1986	Grant Writing	Alan Berson, Ph.D. (NIH)
Nov. 15, 1986	Thrombolysis of Femoral Grafts	Geoffrey Gardiner, M.D.
Dec. 11, 1986	Editing a Journal and How to Get a Scientific Paper Accepted	Stanley Siegelman, M.D.
Jan. 8, 1987	Observation on Sickle Cell Anemia: A. Effects of Ionic and Non-ionic Contrast Media. B. Marrow Patterns by Magnetic Resonance Imaging at 1.5T	Vijay M. Rao, M.D.
Feb. 12, 1987	Placental Doppler	Laurence Needleman, M.D.
Feb. 26, 1987	Renal Growth with Myelodysplasia	George Gross, M.D.
Mar. 12, 1987	CT of Liver Transplantation	Richard Wechsler, M.D.
Mar. 26, 1987	Ultrasound/Surgical/Pathologic Correlation of Carotid Plaque	Barry B. Goldberg, M.D. Stanton Smullens, M.D. Hong Choi, M.D.
Apr. 9, 1987	Prolonged Intra-arterial Infusion Therapy	George Teitelbaum, M.D.
Apr. 23, 1987	Endovaginal Ultrasound	Maria Vilaro, M.D. Rebecca Pennell, M.D.
May 14, 1987	MRI of the Hip	Donald Mitchell, M.D.
May 28, 1987	Optimization of Fast Gradient Refocusing Techniques	Simon Vinitzki, Ph.D.

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RESEARCH PROGRAMS AND GRANTS - 1986-1987

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Coronary Stenosis Morphology: A New Way of Looking at the Coronary Arteriogram	D. Levin, M.D.// G. Gardiner, Jr., M.D. S. Goldberg, M.D.	(non-funded)	Ongoing Clinical Research
Survey of Radiological Practice Patterns in University Hospitals	D. Levin, M.D.//	in conjunction with the Society of Chairmen of Academic Radiology Departments (SCARD) (non-funded)	Ongoing Research
Normal Ovarian Volumes in Parous Women	O. Baltarowich, M.D.// J. Rakow, M.D.	Radiology Research Fund (\$4,000)	June 1986 to June 1987
Correlation of Carotid Artery Disease by Clinical Doppler Examination and Cerebral Angiograms	R. Bell, M.D.// A. Babaria, M.D.	(non-funded)	Ongoing Clinical Research
Measurement of Cerebral Vascular Flow with Use of Xenon	R. Schwartzman, M.D. R. Bell, M.D.// A. Babaria, M.D. M. Mishkin, M.D. C. Gonzalez, M.D.	(non-funded)	Ongoing Clinical Research
MRI Angiography: Development of New Techniques	A. Babaria, M.D.// S. Vinitzki, Ph.D.	(non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Correlation with Oblique MRI of Lower C-spine and Brachial Plexus with EMG and Neurology Signs and Symptoms	A. Babaria, M.D.// V. Rao, M.D. R. Schwartzman, M.D.	(non-funded)	Ongoing Clinical Research
Developmental Biology Training Program	R. Brent, M.D., Ph.D.// R. Jensch, Ph.D.	National Institutes of Health- NIH-HD-07075-10 (\$66,640)	July 1986 to June 1987
Short-term Training: Students in Pro- fessional Schools	R. Brent, M.D., Ph.D.// A. Erslev, M.D.	National Institutes of Health- NIH-HL-07497-07 (\$43,481)	May 1986 to Apr. 1987
Cytokinetic Effects of Prenatal Radiation in the Rat	R. Brent, M.D., Ph.D.// T. Koszalka, Ph.D. M. Jensen	National Institutes of Health- NIH-HD-19165-02 (\$82,505)	July 1986 to June 1987
Nutritional Role of the Placentae in Maldevelopment	R. Brent, M.D., Ph.D.// T. Koszalka, Ph.D. M. Jensen	National Institutes of Health- NIH-HD-18396-02 (\$88,264)	Sept. 1986 to Aug. 1987
Protein Metabolism in Rat Embryo and Yolk Sac	D. Beckman, Ph.D.// T. Koszalka, Ph.D. M. Jensen R. Brent, M.D., Ph.D.	National Institutes of Health- NIH-HD-18167-03 (\$54,176)	Apr. 1986 to Mar. 1987
Proposed Study of Achondroplasia	R. Brent, M.D., Ph.D.// T. Koszalka, Ph.D. D. Beckman, Ph.D.	Foerderer Foundation (\$70,000)	Feb. 1987 to Jan. 1988

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Fat Back Syndrome	H. Doan, M.D.// J. Osterholm, M.D. A. Witte, M.D.	(non-funded)	Ongoing Clinical Research
Iohexol Cervical Myelogram versus Metrizamide	H. Doan, M.D.// J. Bertoni, M.D.	(non-funded)	Ongoing Clinical Research
Correlation between EMG and Diagnostic Evaluation of the Spinal Neural Foramina	H. Doan, M.D.//	(non-funded)	Ongoing Clinical Research
Evaluation of Carotid MRI Arteriography: A Comparison Study with Conventional Arteriog- raphy and Ultrasound	H. Doan, M.D.// H. Bell, M.D. R. Carabasi, M.D. B. Northrup, M.D. B. Goldberg, M.D. C. Gonzalez, M.D.	Jefferson Stroke Center (non-funded)	Ongoing Clinical Research
Back Muscle Atrophy Due to Denervation	H. Doan, M.D.// C. Gonzalez, M.D. J. Osterholm, M.D.	(non-funded)	Ongoing Clinical Research
Highly Magnified Images of Breast Microcalcifications: Diagnostic Sensitivity and Specificity	S. Feig, M.D.// B. Galkin, M.S. M. Moskowitz, M.D. E. Sickles, M.D.	(non-funded)	Ongoing Clinical Research
Evaluation of Prototype Mammographic Tube	B. Galkin, M.S.// S. Feig, M.D.	Thompson CGR Corp. (equipment - \$41,459)	Sept. 1985 to June 1987

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Technical Quality of Mammography in Centers Participating in a Breast Cancer Awareness Program	B. Galkin, M.S.// S. Feig, M.D. H. Muir	Radiology Research Fund (\$4,500)	Ongoing Clinical Research
Elemental Composition of Breast Calcifications	B. Galkin, M.S.// S. Feig, M.D. A. Patchefsky, M.D. H. Muir	National Institutes of Health (\$21,350)	Sept. 1986 to Sept. 1987
Clinical Trial of Tissue Plasminogen Activator for Treatment of Venous Thrombosis and Pulmonary Embolism	G. Merli, M.D.// G. Gardiner, Jr., M.D.	Burrughs/Wellcome (funds as needed)	Ongoing Clinical Research
Natural History of Complex Plaques in the Peripheral Arterial Circulation	G. Gardiner, Jr., M.D.// D. Levin, M.D.	(non-funded)	Ongoing Clinical Research
Palmez Intravascular Stent in the Treatment of Vascular Stenosis or Occlusion	G. Gardiner, Jr., M.D.// D. Levin, M.D.	Ethicon Corporation (funds as needed)	Ongoing Clinical Research
Transcatheter Vascular Occlusion using Fibrin Sealant	G. Gardiner, Jr., M.D.// D. Levin, M.D.	(non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Molecular Mechanisms of Thrombolysis	G. Gardiner, Jr., M.D.// J. Schilling, M.D.	(non-funded)	Ongoing Clinical Research
Assessment of Ultra- sonic B-Scan Imaging for Detection and Quantification of Atherosclerotic Lesions in Human Carotid and Ilio- femoral Arteries and in Arteries of Animals	B. Goldberg, M.D.// A. Kurtz, M.D. M. Rifkin, M.D. S. Smullens, M.D. C. Gonzalez, M.D.	National Institutes of Health - NOHV-12913 (\$295,000)	Apr. 1981 to Nov. 1987
Techniques for Characterization of Atherosclerotic Plaque	B. Goldberg, M.D. M. Rifkin, M.D. H. Choi, M.D.	National Institutes of Health - ROI-HL34986-01 (\$98,742)	Jan. 1986 to Dec. 1988
Diagnostic Ultra- sonography in Hepatic and Urinary Schistosomiasis (A Hospital and Community Based Study)	Prof. M.F. Abdel Wahab (of Cairo, Egypt)// B. Goldberg, M.D. (U.S. Medical Advisor)	Foreign Relations Coordination Unit Grant (\$38,000)	July 1985 to June 1987
Ultrasonic Scattering Studies in Tissue Characterization	J. Reid, Ph.D. (Drexel)// B. Goldberg, M.D.	National Institutes of Health - ROI-HL-30045-04 (\$209,563)	Oct. 1985 to Nov. 1986

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Ultrasound Doppler/ B-Mode Breast Scanner	P. Pederson, Ph.D.(Drexel) B. Goldberg, M.D.	Ben Franklin Partnership Program/Daltex Medical Sciences, Inc.(\$48,644)	Sept. 1985 to Aug. 1986
Minimally Invasive Techniques for Charac- terization of Athero- sclerotic Plaque	J. Reid, Ph.D.(Drexel) B. Goldberg, M.D.// V. Newhouse, Ph.D. P. Pederson, Ph.D.	National Institutes of Health - R01-HL-34986-02 (\$464,011)	Jan. 1986 to Dec. 1987
Effects of Prenatal Ultrasound on Post- natal Development	B. Goldberg, M.D.// R. Jensh, Ph.D. C. Owen, Ph.D. S. Duckett, M.D. R. Brent, M.D.,Ph.D. L. Graziani, M.D.	National Institutes of Health - R01-HD-21678-02 (\$449,800)	Apr. 1986 to Mar. 1989
Evaluation of an Ultrasound Contrast Agent	B. Goldberg, M.D.// A. Carabasi, M.D. J. Raichlen, M.D. P. Lewin, Ph.D. H. Ortega, M.D.	Berlex Laboratories (supply contrast agent) Radiology Research Funds (\$7,180)	June 1987 to Apr. 1988
The Use of Fluoro- carbon Emulsion as a Contrast Media in the Central Nervous System	C. Gonzalez, M.D.// J. Osterholm, M.D. A. Triolo, M.D. R. Bell, M.D. R. Menghetti, M.D.	Johnson & Johnson Cerebral Ischemia Study (sub-project) with TJUH Department of Neurosurgery (non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
NMR Studies of Cerebral Metabolites	A. McLaughlin, Ph.D.// C. Gonzalez, M.D. R. Schwartzman, M.D. J. Osterholm, M.D. B. Northrup, M.D.	The Council for Tobacco Research - USA NIH-S10-RR0-2879.1 (\$65,761)	Dec. 1985 to Nov. 1988
Cerebral Ischemia in Cats Using NMR	A. McLaughlin, Ph.D.// C. Gonzalez, M.D. R. Schwartzman, M.D. G. Alexander, M.D. J. Haselgrove, Ph.D.	Dept. Biochem/Biophysics Univ. of Penna. (non-funded)	Ongoing Clinical Research
Clinical Studies in Stroke Patients Using NMR	R. Schwartzman, M.D.// C. Gonzalez, M.D. G. Alexander, M.D. A. McLaughlin, M.D. J. Haselgrove, M.D.	National Institutes of Health - RR-02305 (\$2,700,000)	Dec. 1984 to Nov. 1989
Regional Cerebral Blood Flow Utilizing MRI	M. Mishkin, M.D.// S. Vinitzki, Ph.D. J. Osterholm, M.D.	Radiology Research Fund (\$5,650)	Apr. 1987 to Apr. 1988
Radiological Manifes- tations of Spinal Trauma	M. Mishkin, M.D.// A. Babaria, M.D.	(non-funded)	Ongoing Clinical Research
MRI of Central Cord Injury	M. Mishkin, M.D.// J. Osterholm, M.D. K. Koo, M.D. S. Vinitzki, Ph.D.	Radiology Research Fund (\$6,200)	Apr. 1987 to Apr. 1988

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
MRI of Patient with Spinal Cord Injury: A Comparison with Myelography and Computed Tomography	M. Mishkin, M.D./// S. Vinitzki, Ph.D. J. Osterholm, M.D. P. Gorsuch, M.D. E. Podgorski, M.D. A. Babaria, M.D. D. L. Burk, Jr., M.D.	(non-funded)	Ongoing Clinical Research
Perisellar Meningiomas	M. Mishkin, M.D.//	(non-funded)	Ongoing Clinical Research
High Resolution MR Imaging of Spinal Cord Injury	M. Mishkin, M.D.// S. Vinitzki, Ph.D. C. Gonzalez, M.D.	(non-funded)	Ongoing Clinical Research
Angiodynography of the Neonatal Brain	D. Mitchell, M.D.// B. Goldberg, M.D. L. Needleman, M.D. G. Gross, M.D. H. Desai, M.D. L. Graziani, M.D.	(non-funded)	Ongoing Clinical Research
Doppler Evaluation of the Placental Circulation	L. Needleman, M.D.// B. Goldberg, M.D. B. Chayen, M.D. R. Wapner, M.D.	(non-funded)	Ongoing Clinical Research
Ultrasound and CT of the Liver Transplant	L. Needleman, M.D.// C. Miller, M.D. R. Wechsler, M.D. S. Munoz, M.D. A. Kurtz, M.D.	(non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Doppler Screening for Pregnancy-Induced Hypertension	L. Needleman, M.D.//	Radiology Research Fund (\$15,000)	Jan. 1987 to Dec. 1987
Multi-Modality Evaluation of the Female Genital Tract	R. Pennell, M.D.// D. Mitchell, M.D. M. Rifkin, M.D.	Radiology Research Fund (\$7,200)	Ongoing Clinical Research
Avascular Necrosis in Sickle Cell Anemia	V. Rao, M.D.// R. Steiner, M.D. D. Mitchell, M.D. S. Ballas, M.D. D. L. Burk, Jr., M.D. S. Vinitzky, Ph.D. M. Rifkin, M.D.	(non-funded)	Ongoing Clinical Research
Sleep Apnea: Cephalometry using MR	V. Rao, M.D.// K. Doghramji, M.D. R. Steiner, M.D. Z. Jabourian, M.D. A. Farole, M.D.	(non-funded)	Ongoing Clinical Research
Effect of Hyperthermia on MR Signal Charac- teristics in Head and Neck tumors	V. Rao, M.D.// S. Vinitzky, Ph.D. L. Tupchong, M.D. L. Lowry, M.D.	(non-funded)	Ongoing Clinical Research
Comparison of CT, Ultrasound and MR in the Evaluation of Thyroid and Parathyroid Masses	V. Rao, M.D.// M. Rifkin, M.D. D. Mitchell, M.D. H. Cohn, M.D.	(non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Comparison of Arthrography, Arthroscopy and Magnetic Resonance Imaging in Temporomandibular Joint Disorders	V. Rao, M.D.// D. Karasick, M.D. D. L. Burk, Jr., M.D. A. Farole, M.D.	(non-funded)	Ongoing Clinical Research
Plain Film Diagnosis and MR in Sickle Cell Anemia: Analysis based on Alpha Gene Levels	V. Rao, M.D.// R. Steiner, M.D. S. Ballas, M.D.	(non-funded)	Ongoing Clinical Research
ROC Evaluation of Filmless Digital Radiographic System	G. Shaber, M.D.// Y. Wang, M.D. R. Shlansky, M.D. A. D'Adamo	(non-funded)	Ongoing Research
High Resolution CCD Planar Array Digital Radiography	G. Shaber, M.D. C. Lockard E. Nerlinger	Radiology Research Fund (\$18,000)	Ongoing Research
Evaluation of the Value of Digital Radiography in Portable Chest Radiology	R. Steiner, M.D.// G. Shaber, M.D. A. D'Adamo	(non-funded)	Ongoing Clinical Research
Human Laser Angioplasty	G. Teitelbaum, M.D. G. Gardiner, Jr., M.D.	Radiology Research Funds (\$93,000)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Rabbit Laser Angio- plasty	M. Cosigny, Ph.D., MCP// G. Teitelbaum, M.D. G. Gardiner, Jr., M.D.	American Heart Assoc. (funding through Medical College of Pennsylvania)	July 1986 to June 1987
Retrievable Vena Caval Filter	G. Teitelbaum, M.D.// M. Moritz, M.D. M. McGurrin, M.D. B. Davies, M.D. A. Carabasi, M.D. B. Jarrell, M.D.	TJUH Dept. of Surgery (funds as needed)	Ongoing Clinical Research
Ultrasonographic Evaluation of the Normal and Abnormal Infant Hip	M. Vilaro, M.D.// G. Gross, M.D. P. Pizzutillo, M.D. B. Goldberg, M.D.	(non-funded)	Ongoing Clinical Research
Lesion Detectability as a Function of a Magnet Field Strength	S. Vinitzki, Ph.D.// M. Rifkin, M.D. D. Mitchell, M.D. R. Griffey, Ph.D. B. Griffey, Ph.D.	(non-funded)	Ongoing Clinical Research
Image Contrast in an Inhomogeneous Magnetic Field	S. Vinitzki, Ph.D.// M. Rifkin, M.D. D. Mitchell, M.D. D. L. Burk, Jr., M.D.	(non-funded)	Ongoing Clinical Research
Quantification of Flow in MRI	S. Vinitzki, Ph.D.// H. Ortega, M.D. J. Boone, Ph.D. D. Mitchell, M.D. M. Rifkin, M.D.	(non-funded)	Ongoing Clinical Research

Title of Project	Investigator// Co-investigator(s)	Source of Support (Amount)	Period of Support
Real Time Image Processing in MRI	S. Vinitzki, Ph.D.// A. D'Adamo U. Szoumowski, Ph.D. R. Griffey, Ph.D.	(non-funded)	Ongoing Clinical Research
MRD and T1 Profiles of Human Tissues	Y. Wang, M.D., D.Sc.(Med)// H. Choi, M.D. V. Rao, M.D. R. Steiner, M.D. G. Wolf, M.D.	(non-funded)	Ongoing Clinical Research
Digital Imaging Processing Techniques	Y. Wang, M.D., D.Sc.(Med)// G. Shaber, M.D. R. Steiner, M.D.	(non-funded)	Ongoing Clinical Research
Development of Digital Imaging and Communication Standards and Implementation	Y. Wang, M.D., D.Sc.(Med)//	American College of Radiology (funds as needed)	Ongoing ACR Study

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ABSTRACTS

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39. Rifkin MD, Wechsler RJ, Marks G: A comparison of computed tomography and endorectal ultrasound in staging rectal cancer. Proceedings of the Association of University Radiologists Thirty-Fifth Annual Meeting Abstract #61, Charleston, SC, March 22-26, 1987.
40. Rifkin MD: Prostatic Ultrasound. Radiology 161(P):222, 1986.
41. Rifkin MD, Heffelfinger D, Kurtz AB, Pasto ME, Baltarowich OH, Cole-Beuglet C, Goldberg BB: Outpatient therapy of intra-abdominal abscesses following early discharge from the hospital. THE YEAR BOOK OF DIAGNOSTIC RADIOLOGY, Year Book Medical Publishers, Chicago, 1987.
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46. Vinitzki, Fuka M, Matwiyoff NA, Rifkin MD: Contrast enhancement in low angle gradient refocusing techniques. Magnetic Resonance Imaging 5(1S):22:23, 1987.
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48. Wang Y: Current development of digital radiography. Invest Radiol 21(9):S 48, 1986.

May 13, 1987

SCIENTIFIC PRESENTATIONS

DAVID C. LEVIN, M.D.

October 6-8, 1986

- Harvard Medical School Course
"Angiography and Interventional
Radiology," Boston, MA
- "Basic digital subtraction angiography equipment"
 - "Advances in digital subtraction equipment"
 - "Renal angioplasty: techniques, complications, results"

December 3-5, 1986

- The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Angioplasty of coronary artery bypass grafts"
 - "Diagnostic and interventional coronary angiography"

January 30, 1987

- American College of Cardiology Course,
Diagnostic & Interventional Cardiac
Catheterization - 1987, Bethesda, MD
- "Current considerations in the selection and use of cineangiographic equipment"
 - "Digital subtraction angiography - present and future use in the catheterization laboratory"

March 13, 1987

- University of California, San Francisco
30th Annual Postgraduate Course in
Diagnostic Radiology, San Francisco, CA
- "Non-cardiac interventional angiography in the thorax"
 - "Principles of interpretation of coronary arteriograms"
 - "Plaque morphology: a new way of looking at the coronary arteriogram"

April 22, 1987

- Mercy Catholic Medical Center, Darby, PA
- "Current status of renal angioplasty"

April 27, 1987

- Christiana Hospital-Medical Center of
Delaware, Newark, DE
- "Clinical applications & future directions of digital subtraction angiography"

May 15, 1987

- American Heart Association Symposium on
Prevention and Consequences of
Atherosclerosis, Philadelphia, PA
- "Coronary atherosclerotic plaque
morphology and its clinical consequences"
- Radiology Grand Rounds, Hospital of the
University of Pennsylvania, Philadelphia,
PA
- "Understanding the technology of digital
subtraction angiography"

May 26, 1987

OKSANA BALTAROWICH, M.D.

May 20-21, 1987

- Massachusetts General Hospital
Department of Radiology, Boston, MA
- "Normal fetal anatomy"
 - "2nd and 3rd trimester fetal anomalies"
 - "Endovaginal sonography"
 - "Case presentations of obstetrical
abnormalities"

ROBERT L. BRENT, M.D., PH.D.

July 6-12, 1986

- Annual Meeting of Teratology Society
Boston, MA
- "The role of teratologist in medical
education"
 - "Production of monoclonal antibodies
against rat visceral yolk sac"
 - "Serum proteins versus free amino acids
as a source of amino acids for protein
synthesis by cultured rat embryos"
 - "Studies concerning the effects of low
level prenatal X-irradiation on
postnatal adult behavior"

September 7-8, 1986

- Ross Laboratory Roundtable on "Medical-Legal
Issues in Pediatrics", Washington, DC
- "Malpractice experiences and issues"

October 5-8, 1986

Conference on "The Pediatrician of the
'90's: Issues Relating to Children's
Health Care", Cancun Sheraton Resort,
Cancun, Mexico

October 9, 1986

- Philadelphia Obstetrical Society, College of
Physicians, Philadelphia, PA
- "Irresponsible expert witness"

October 23, 1986	William B. Stromme Lecturer in Maternal-Fetal Medicine, University of Minnesota, Minneapolis, MN - "Etiology of human birth defects" - "The irresponsible expert witness" - "Are progestational agents teratogenic?"
November 15, 1986	Clean Air Council Conference: "Radiation: Understanding the Risks", Philadelphia, PA - "Reproductive risks of low dose irradiation"
November 18, 1986	Philadelphia Bar Association, Medicolegal Committee, Philadelphia, PA - "Lack of scholarship by physicians and lawyers in the controversy of negligence litigation"
December 10-11, 1986	Department of Obstetrics & Gynecology, William Beaumont Army Medical Center, El Paso, TX - "Etiology of human malformations" - "Twenty-five years since thalidomide: what have we learned about the causes of limb defects?" - "Irresponsible expert witness" - "Immunological aspects of development"
January 8, 1987	Food and Drug Administration, Washington, DC - "Introductory talk on progestins and their alleged teratogenicity"
January 21, 1987	Children's Hospital of Philadelphia, Philadelphia, PA - "Etiology of human birth defects"
March 5, 1987	Department of Epidemiology, University of Pennsylvania, Philadelphia, PA - "Do sex steroids produce non-genital birth defects?"
March 6, 1987	The Delaware Academy of Medicine Wilmington, DE - "Genetic and mutagenic risk of chemicals and radiation to the pediatric patient"
March 10-14, 1987	New Chairmen's Meeting, Association of Medical School Pediatric Department Chairmen, Ponte Vedra Club, Ponte Vedra, FL - "A chairman's view of medical liability"

- March 18, 1987
Catholic Medical Center of Brooklyn and Queens, Jamaica, NY
- "The effects of ionizing radiation on the fetus"
- March 25, 1987
Third Annual Dr. Peter Danis Lecturer, Cardinal Glennon Children's Hospital, St. Louis, MO
- "Medicolegal encounters as a defendant and expert witness"
- "Etiology and prevention of human birth defects"
- April 1-3, 1987
University of Texas, Department of Obstetrics and Gynecology, Temple, TX
- "A radical look at pediatric dermatology"
- "The etiology of mental retardation"
- "Protecting the public from environmental hazards"
- "Effects of radiation on the developing fetus"
- "Clinical aspects of IUGR"
- "Epidemiology for the clinician"
- April 20, 1987
American Academy Pediatric Environmental Hazards Committee Meeting, Elk Grove, IL
- "Radiation Risks"
- April 23-24, 1987
Annual High Risk Pregnancy Symposium
University of Louisville, Louisville, KY
- "Epidemiology for the clinician"
- "Etiology and prevention of human birth defects"
- "Litigens - progestational agents and bendectin"
- April 27-30, 1987
American Pediatric Society, Society for Pediatric Research Meetings, Anaheim, CA
- "Vitamin supplementation as a method of preventing experimentally induced birth defects"
- "Amino acid requirements and protein synthesis in the very young embryo"
- May 20, 1987
New York Academy of Medicine, New York, NY
- "Causes of congenital malformations"
- June 12, 1987
Delaware Valley Chapter of American Medical Writers Association, Philadelphia, PA
- "Litigation produced pain, disease and suffering"

June 12, 1987

September 1-4, 1986

Seminar on "What You Should Know About Radiation Effects", The Philadelphia County Medical Society, Philadelphia, PA

- "Fetal, gestational and genetic effects"

June 13-18, 1987

Teratology Society Meetings, Rancho Mirage, CA

- "The effects of intrauterine medroxy-progesterone acetate (MPA), 17 hydroxy-progesterone caproate (17-OH PC), norethindrone (N), or triamcinolone acetone (TA) exposure on embryonic development"
- "The effect of teratogenic antisera on rat fetal development when administered late in development"
- "The effects of teratogenic antisera on protein synthesis and degradation by the cultured rat conceptus"
- "The risk of mental retardation from low level radiation exposure"
- "Congenital malformations induced by mono-clonal antibodies against rat visceral yolk sac antigens"
- "Effects of vitamin supplementation on the occurrence of neural tube defects in the rat"
- "Chromosomes of 4, 7, and 8-day gestation rat embryos after X-irradiation on day 0.5"
- "Glycogen content of the rat visceral yolk sac and the effect of a teratogenic antiserum"
- "Potential human teratogenicity of the most frequently prescribed drugs"
- "Postnatal effects of protracted prenatal X-irradiation in the rat"

November 30 - December 5, 1986

February 1-4, 1987

March 7-8, 1987

H. T. DOAN, M.D.

March 22-27, 1987

35th Annual Meeting of the Association of University Radiologists, Charleston, SC

- "Paraspinal muscle in chronic back pain"
- "New method for occlusion of the transverse sinus in head and neck surgery"

STEPHEN FEIG, M.D.

September 1-4, 1986

Fourth International Congress on Senology
Paris, France

- "Prebiopsy localization of nonpalpable breast lesions"
- "Benefit and risk considerations in screening"
- "Clinical significance and staging of nonpalpable breast cancer"

November 30-December 5, 1986

The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Xeromammography: principles, equipment, techniques, and quality control"
- "Methods and equipment for prebiopsy localization of nonpalpable breast lesions"
- "Screening mammography: benefits and risks"

February 6-8, 1987

American College of Radiology, Mammography Symposium, New Orleans, LA

- "Calcifications"
- "The mammography report"

March 7-8, 1987

Department of Radiology University of California School of Medicine, San Francisco, CA

- "Mammography technique and quality control"
- "Wording the mammography report"
- "Other non-mammographic imaging modalities"
- "Breast calcifications"

March 9-13, 1987

30th Annual Postgraduate Course in Diagnostic Radiology, Department of Radiology, University of California School of Medicine San Francisco, CA

- "A current assessment of benefits and risks from screening mammography"
- "Comparison of xeromammography and screen/film mammography"
- "Methods for localizing nonpalpable breast lesions prior to biopsy"

March 15-19, 1987

Workshops in Mammography, Inc.
Key Biscayne, FL

- "Dedicated mammography equipment: evaluation and use"
- "Risks and benefits of mammography"
- "Evaluation and workshop of breast masses"
- "Evaluation and workshop of breast calcifications"
- "Mammography technique and quality control"

July 3-12, 1986

September 15-17, 1986

GEOFFREY A. GARDINER, JR., M.D.

January 9, 1987

Clinical Update: Thrombolytic Therapy -
Strategies for Peripheral Vascular Disease
and Interventional Radiology, Fort
Lauderdale, FL

- "Thrombolysis of occluded arterial
bypass grafts"

January 29, 1987

Richmond Radiological Society, Richmond, VA

- "Graft thrombolysis: long-term
follow-up"

March 5, 1987

Good Samaritan Hospital, Phoenix, AZ

- "Intra-arterial thrombolysis of grafts
and native arteries"

April 1, 1987

Germantown Hospital, Philadelphia, PA

- "Thrombolytic therapy in peripheral
arterial occlusions"

April 13, 1987

Veteran's Administration Medical Center
Department of Radiology, Dallas, TX

- "Thrombolytic therapy in peripheral
arterial occlusions"

April 16, 1987

Doctor's Hospital, Columbus, OH

- "Thrombolytic therapy in peripheral
arterial occlusions"

June 9, 1987

University of Chicago, Chicago, IL

- "Short and long-term outcome of
thrombolysis for peripheral vascular
occlusions"

BARRY B. GOLDBERG, M.D.

- July 5-12, 1986
Medical Seminar/Symposium Cruise to Alaska
- "Diagnostic ultrasound: its present uses and a look into the future"
- September 15-19, 1986
The 31st Annual Convention of the American Institute of Ultrasound in Medicine, Las Vegas, NV
- "Regulations, economics and departmental management"
- September 22-23, 1986
NIH Workshop on the Evolution of the Human Atherosclerotic Plaque, Rockville, MD
- "Member of panel: ultrasound B-mode assessment"
- October 8, 1986
Children's Hospital of Philadelphia Philadelphia, PA
- "History of ultrasound in medicine and its importance in the evaluation of the pediatric patient"
- October 25-26, 1986
Society of Radiologists in Ultrasound Chicago, IL
- "Development of an ultrasound facility"
- November 30-December 2, 1986
The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Usefulness of Doppler in the evaluation of portal hypertension"
- January 11-16, 1987
Great Medical Getaways, Frenchman's Reef, Virgin Islands
- "Diagnostic ultrasound, CT and MR: an update and a look into the future"
- February 11-16, 1987
34th Annual Meeting, Puerto Rico Chapter of the American Academy of Pediatrics San Juan, Puerto Rico
- "Normal and abnormal fetal anatomy"
- "Evaluation of fetal well-being -- Doppler"
- "Ultrasound placental imaging"
- March 21, 1987
Children's Hospital of Philadelphia Philadelphia, PA
- "Applications of color Doppler"

October 7, 1986
April 6, 1987

Latin American Neurology
Latin American Congress of Neurology
Allentown Radiological Society
Allentown, PA
- "Advances in diagnostic ultrasound"

April 16, 1987

St. Barnabas Medical Center
Livingston, NJ
- "Advances in diagnostic ultrasound"
- "Pancreatic ultrasound: its place in diagnostic imaging"

May 6-9, 1987

The Leading Edge in Diagnostic Ultrasound,
Atlantic City, NJ. Sponsored by the
Division of Diagnostic Ultrasound,
Department of Radiology, Thomas Jefferson
University Hospital, Philadelphia, PA
- "Color Doppler imaging: current and
future applications"
- "Retroperitoneum and renal ultrasound"
- Member of panel: "Current status of
tissue characterization"

June 8-10, 1987

Israel Society for Diagnostic Ultrasound
in Medicine, the Fifth Barry B. Goldberg
Lectureship, Tel-Aviv, Israel
- "Abdominal Doppler: an update"
- "Endoscanning of the male pelvis"
- "Color Doppler and its usefulness"

June 11-16, 1987

The Sixth Congress of the European
Federation of Societies for Ultrasound, in
Medicine and Biology, Helsinki, Finland
- "The usefulness of two-dimensional color
Doppler in the evaluation of iatrogenic
pseudoaneurysms"

CARLOS GONZALEZ, M.D.

September 17, 1986
July 21, 1986

National Medical Association Scientific
Assembly, Family Practice Section, New York,
NY
- "CAT scanning - uses & abuses in
neurologic evaluation"

October 27-30, 1986

Latin American Neuroradiology Society, VIII
Latin American Congress of Neuroradiology,
Lima, Peru

- "Intracranial pathology"
- "Paraorbital pathology"
- "Neuroradiological advances in neuroophthalmology"
- "Nuclear magnetic resonance"
- "Infectious and inflammatory diseases in CNS"
- "Congenital anomalies"
- "Hydrocephalus, atrophies, degenerative diseases"
- "Paranasal sinuses and nasopharyngeal disorders"

November 12, 1986

Department of Medical Imaging, Mercy
Catholic Medical Center, Fitzgerald Mercy
Division, Darby, PA

- "Extracranial vascular disease"

March 16-18, 1987

Computed Tomography Tutorial/Workshop
Department of Professional Education
Philips Medical Systems

- "Imaging techniques of the orbits"
- "Imaging techniques for infections of the central nervous system"
- "Imaging techniques of the paraorbital region"

ROBERT O. GORSON, M.S.

March 19, 1987

Meeting of Health Physics Society, DVC
King of Prussia, PA

- "The probability of causation in radio-carcinogenesis"

June 12, 1987

Meeting of Philadelphia County Medical
Society, Philadelphia, PA

- "Stochastic effects of low level radiation exposure"

GEORGE W. GROSS, M.D.

September 18, 1986

Corneal DAM Course, Polyclinic Medical
Center, Harrisburg, PA

- "MRI - clinical applications in pediatrics"

January 27, 1987

Pediatric Grand Rounds, Polyclinic Medical Center, Harrisburg, PA

- "Ultrasonography in the pediatric patient"

February 27, 1987

Pediatric Grand Rounds, Fitz-Mercy Catholic Medical Center, Darby, PA

- "MRI in pediatrics"

March 11, 1987

Pediatric Grand Rounds, Christiana Hospital, Wilmington, DE

- "Imaging of children with urinary tract infection"

DAVID KARASICK, M.D.

September 8, 1986

International Skeletal Society Meeting Vancouver, British Columbia

- "Pubic lesions simulating malignancy"

ALFRED B. KURTZ, M.D.

August 5, 1986

The 8th Summer Symposium on Ultrasound CT, and MR, Hyannis, Cape Cod, MA

- "Sonography of fetal skeletal dysplasias"
- "A global survey of fetal measurement charts: which are preferable and why"
- "The status of chorionic villus sampling and other invasive obstetrical procedures"

September 5-6, 1986

Diagnostic Ultrasound in Obstetrics and Gynecology, The Johns Hopkins Medical Institutions, Baltimore, MD

- "IUDs and endometrical cavity echoes"
- "Skeletal anomalies"
- "Obstetrical measurements revisited"

September 18-19, 1986

The 31st Annual Convention of the American Institute of Ultrasound in Medicine, Las Vegas, NV

- "Ultrasound in breast: historical perspective and current applications"
- "Film panel moderator"
- "Categorical course - abdomen, moderator"

- October 19-23, 1986 The 11th Annual International Body Imaging Conference, Kauai, Hawaii
- "Ultrasound/CT evaluation of the liver"
 - "Discussion of unknown cases"
 - "Placenta and chorionic villous sampling"
 - "Doppler evaluation of the abdomen"
 - "Normal and abnormal pancreas
Comparison of ultrasound/CT"
- November 8, 1986 The Annual Scientific Assembly of the Southern Medical Association and the Medical Association of Georgia, Atlanta, GA
- "Obstetrical ultrasound: determination of gestational age"
 - "Obstetrical ultrasound: detection of fetal anomalies"
- November 17, 1986 OB/BYN Grand Rounds, Crozer-Chester Medical Center, Chester, PA
- "Most recent advances in the detection of growth retardation"
- November 20, 1986 The Blue Ribbon Lecture Series, The Children's Hospital of Philadelphia, Philadelphia, PA
- "Sonographic evaluation of selected problems in pregnancy"
- November 30-December 5, 1986 The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Ultrasound of the pancreas, refresher course"
 - "Multimodality transplanation"
 - "Doppler ultrasound evaluation of the obstetric patient"
 - "Endovaginal ultrasound evaluation of complicated first trimester pregnancies: Correlation with transabdominal technique"
 - "Doppler ultrasound evaluation of the hypertensive portal system"
- December 10, 1986 Philadelphia Roentgen Ray Society, Philadelphia, PA
- "Scientific session - film reading panel"

January 5, 1987

Department of Radiology, Montefiore Hospital
Medical Center, Bronx, NY

- "Case presentation to residents"
- "Newest applications in obstetrical
ultrasound: Doppler evaluation and
endovaginal technique"

January 6, 1987

Department of Radiology, St. Luke's -
Roosevelt Hospital Center, New York, NY

- "Case presentations to residents"
- "Ultrasound of the breast: historical
application and current applications"

February 11, 1987

Department of Radiology, Mercy Catholic
Medical Center, Fitzgerald Mercy Division,
Darby, PA

- "Ultrasound of the liver with CT
correlation"

March 2, 1987

Department of Obstetrics and Gynecology,
The Lankenau Hospital, Philadelphia, PA

- "Doppler evaluation in obstetric
ultrasound"

March 5, 1987

The Central Ohio Radiological Society
Meeting, Columbus, OH

- "Obstetrical Doppler"

March 5-6, 1987

Department of Radiology, Ohio State
University, Columbus, OH

- "Fetal skeletal dysplasias"
- "Obstetrical measurements"

March 11, 1987

Department of Radiology, The University
of Connecticut Health Center,
Farmington, CT

- "Unknown case presentation by residents"
- "Grand Rounds - unknown cases"
- "Grand Rounds - Doppler evaluation of
the abdomen"

March 12, 1987

Department of Radiology, Hartford Hospital,
Hartford, CT

- "Unknown case presentation by residents"
- "The fetal neural axis"
- "The new standards in obstetrical
ultrasound"

March 19, 1987

Pediatric Radiology, The Children's Hospital of Philadelphia, Philadelphia, PA
- "Prenatal diagnosis of congenital anomalies"

March 22-26, 1987

35th Annual Meeting of the Association of University Radiologists, Charleston, SC
- "Intraoperative ultrasound to facilitate breast mass resection"
- "Endovaginal ultrasound - A technique for evaluation of non-follicular pelvic masses"
- "A pelvic phantom for endovaginal scanning"

April 4, 1987

American Cancer Society, Women's Imaging Center of Delaware, Wilmington, DE
- "Update - ultrasound imaging of the breast"

April 20, 1987

Department of Radiology Monmouth Medical Center, Long Branch, NJ
- "Ultrasound and CT of the pancreas"

April 27, 1987

The 7th Annual Washington Imaging, Conference, Washington, DC
- "Ultrasound of the breast"
- "Fetal neural axis"
- "Multiple gestations"

May 7, 1987

Home Talent Night, The Philadelphia Rotogen Ray Society, Philadelphia, PA
- "CT manifestations of liver transplant complications"

May 7-8, 1987

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ. Sponsored by the Division of Diagnostic Ultrasound, Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, PA
- "Obstetrical measurements and their accuracy"
- "The high-risk obstetrical examination: growth retardation and the biophysical profile"

May 19, 1987

Home Talent Night, Greater Delaware Valley Ultrasound Society, Philadelphia, PA
- "Color doppler imaging of the neonatal intra cranial circulation"

ESMOND MAPP, M.D.

July 23, 1986

91st Annual National Medical Association
Scientific Assembly, New York, NY
- "Gastrointestinal manifestations of AIDS"
- Moderator, "Magnetic Resonance Imaging
session"

September 26, 1986

National Naval Medical Center,
Bethesda, MD
- "Gastrointestinal manifestations of
AIDS"

October 3, 1986

Medical Society of Delaware,
Lewes, DE
- "Magnetic resonance imaging"

November 19, 1986

National Naval Medical Center,
Bethesda, MD
- "Radiology of the stomach"

March 27, 1987

National Naval Medical Center,
Bethesda, MD
- "Cancer of the esophagus - diagnosis
and complications"

April 8, 1987

Mercy Catholic Medical Center, Darby, PA
- "A potpourri of gastrointestinal radiology
cases"

MARK M. MISHKIN, M.D.

October 9-10, 1986

University of Wisconsin School of Medicine
- "Radiologic diagnosis of intracavernous
aneurysms"
- "Spinal stenosis-radiological
characteristics"
- "Radiological workup of patients with
head trauma"

May 18, 1987

University of Texas, M.D. Anderson Hospital,
Houston, TX
- "Vasculitidies of the cerebral vessels"

May 18, 1987

McKenzie Lecture, Houston Radiological
Society, Houston, TX
- "Perisellar Meningiomas"

June 11, 1987

Western Massachusetts Radiological Society
Holyoke, MA

- "Non-ionic contrast media - medical, economic and legal implications"

DONALD G. MITCHELL, M.D.

August 20, 1986

The Society of Magnetic Resonance
in Medicine, 5th Annual Meeting,
Montreal, Canada

- "Staging AVN of the femoral head by MRI: initial observations"

October 8, 1986

Community Medical Center, Scranton, PA

- "The biological basis of extracranial MRI"

March 2-4, 1987

Society of Magnetic Resonance Imaging, 5th
Annual Meeting, San Antonio, TX

- "The unique MRI appearance of the reactive interface in avascular necrosis: the double line sign"
- "Hemorrhagic adnexal masses: 1.5 Tesla MR imaging"

May 7, 1987

The Leading Edge in Diagnostic Ultrasound,
Atlantic City, NJ. Sponsored by the
Division of Diagnostic Ultrasound,
Department of Radiology, Thomas Jefferson
University Hospital, Philadelphia, PA

- "Color Doppler imaging: new applications"

May 19, 1987

Greater Delaware Valley Ultrasound Society,
Home Talent Night, Philadelphia, PA

- "The neonatal circle of Willis: color Doppler imaging"

May 25, 1987

35th Annual Meeting of the Association of
University Radiologists, Charleston, SC

- "The normal and ischemic proximal femur: high resolution and chemical shift MRI of resected specimens"

LAURENCE NEEDLEMAN, M.D.

July 20-25, 1986

- The Leading Edge in Diagnostic
Atlantic City, NJ. Sponsored by
Primer Curso Internacional De Ultrasonido en
Puebla, Puebla, Mexico
- "Ultrasound of the liver, gallbladder,
pancreas and spleen"
- "Ultrasound of the liver, gallbladder,
pancreas and spleen, part II"
- "Intra-abdominal collections"
- "Ultrasound of the thyroid and breast"
portal hypertension

November 30-December 5, 1986

- The 72nd Scientific Assembly and Annual
Meeting of the Radiological Society of North
America, Chicago, IL
- "Doppler ultrasound evaluation of the
hypertensive portal system"
- "Doppler ultrasound evaluation of the
obstetric patient"

NEERUJA G. PENNELL, M.D.

November 30-December 3, 1986

- The 72nd Scientific Assembly and Annual
Meeting of the Radiological Society of North
America, Chicago, IL
- "Understanding abdominal duplex Doppler"

December 11, 1986

- State University of New York, Downstate
Medical Center. School of Diagnostic Medical
Sonography, Brooklyn, NY
- "Understanding abdominal duplex Doppler"

December 11, 1986

- State University of New York, Downstate
Medical Center, Department of Radiology
Brooklyn, NY
- "Doppler ultrasound of the abdomen and
pelvis"

January 23-25, 1987

- Hospital Hernandez, San Juan, Puerto Rico
- "First trimester ultrasound"
- "Obstetrical measurements"
- "American institute of ultrasound in
medicine obstetrical guidelines"
- "The normal and abnormal fetus"
- "Fetal growth and well-being"
- "Normal and abnormal gynecologic
ultrasound"
- "Ultrasound in obstetrics and gynecology"

April 6-7, 1987

- University of Florida, School of Medicine,
Department of Radiology, Gainesville, FL
- "Sonography of fetal anomalies"
- "Sonography of the placenta and amniotic
fluid."
- "First trimester ultrasound"

VIDAY M. RAO, M.D.

July 21, 1986

- 91st Annual National Medical Association
Scientific Assembly, New York
- "Bone marrow patterns in
painful sickle cell disease"

May 7-9, 1987

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ. Sponsored by the Division of Diagnostic Ultrasound, Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, PA

- "Interpretation of the cerebrovascular examination"
- "Duplex Doppler examination case review"
- "Clinical applications of abdominal Doppler: duplex Doppler ultrasound of portal hypertension"
- "Obstetrical Doppler ultrasound"
- "Meet the professor/film review session: obstetrics"

REBECCA G. PENNELL, M.D.

November 30-December 3, 1986

The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Endovaginal ultrasound of first trimester pregnancies: correlation with transabdominal technique"

March 12-14, 1987

IV Curso De Actualizacion: "Avances en Ecografia Vacular y Otros Metodos de Imagenes," Bogota, Columbia

- "Principles of abdominal Doppler ultrasound"
- "Normal and abnormal Doppler renal evaluation: the transplant kidney"
- "Doppler evaluation of the hypertensive portal system"
- "Doppler ultrasound in the obstetric patient"

May 9, 1987

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ. Sponsored by the Division of Diagnostic Ultrasound, Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, PA

- "Endovaginal ultrasound evaluation of the abnormal intrauterine gestational sac"

VIJAY M. RAO, M.D.

July 21, 1986

91st Annual National Medical Association and Scientific Assembly, New York, NY

- "Bone marrow patterns by MRI during painful sickle cell crisis"

October 21, 1986

Mercy Catholic Medical Center of
Southeastern Pennsylvania, Darby, PA
- "Interesting head and neck cases"

March 24, 1987

35th Annual Meeting of the Association of
University Radiologists, Charleston, SC
- "Post cricoid soft tissue width index
(STWI): an important clue to early
abnormality"

June 12, 1987

Annual Meeting of the Pennsylvania Academy
of Ophthalmology and Otolaryngology,
Hershey, PA
- "Mucocles of the paranasal sinuses"

MATTHEW D. RIFKIN, M.D.

September 16, 1986

RSNA Seminar for Medical Editors and
Writers, New York University Medical Center,
New York, NY
- "Recent advances in diagnostic
ultrasound"
- "Neonatal and perinatal ultrasound"

September 17-19, 1986

31st Annual Convention of the American
Institute of Ultrasound in Medicine, Las
Vegas, NV
- "Prostate imaging"
- "Small parts imaging: an update"

October 24-26, 1986

Society of Radiologists in Ultrasound,
Chicago, IL
- "The rectal wall"

October 27-28, 1986

Fifth Annual Symposium on International
Radiology, New York University Medical
Center, New York, NY
- "Renal pelvis, ureter and urinary
bladder"
- "Testes"

November 4, 1986

Grand Rounds at the Brigham and Women's
Hospital, Harvard Medical School, Boston, MA
- "Prostate ultrasound"

November 14, 1986

Grand Rounds at the University of
Massachusetts Medical Center, Worcester, MA
- "Endoscopic ultrasound"

- November 30-December 5, 1986 The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
 - "Prostatic ultrasound" - refresher course
- January 21, 1987 Section on Urology, the New York Academy of Medicine, New York, NY
 - "Endorectal prostatic ultrasound: clinical implications"
- January 22-24, 1987 Duplex Imaging, University of California, San Diego, CA
 - "Doppler evaluation of the compromised fetus"
 - "Doppler analysis of the aorta and inferior vena cava."
 - "Doppler of the native and the transplanted kidney"
- February 1-7, 1987 Sixth Annual Winter Congress and Seminar Body Imaging, Cortina, Italy.
 - "Scrotal ultrasound"
 - "Prostate imaging"
 - "Interventional techniques utilizing ultrasound guidance"
- February 7-11, 1987 Sixth Annual Winter Seminar, London, England
 - "Introduction to non-invasive diagnostic procedures of the carotid arteries"
 - "Prostate imaging"
- February 13, 1987 Faculty of Hospital Hermanos Melendez, Bayamon, Puerto Rico
 - "Diagnostic and therapeutic ultrasound of the transplanted kidney"
 - "The urinary bladder"
 - "The scrotum"
 - "Ultrasound invasive urological procedures"
 - "The prostate, seminal vesicles and urethra"
 - "Transabdominal and transurethral scanning"
 - "Transperineal and transrectal scanning"
- February 17, 1987 Grand Rounds at Columbia University College of Medicine, Department of Radiology, New York, NY
 - "Endoscopic Ultrasound"

- March 3, 1987 San Antonio Ultrasound Society, San Antonio, TX
 - "Prostatic Sonography"
- March 10, 1987 Washington, D.C. Chapter of the A.I.U.M., Washington, DC.
 - "Scrotal ultrasound"
- March 23-26, 1987 35th Annual Meeting of the Association of University Radiologists, Charleston, SC
 - "Intraoperative ultrasound to facilitate breast mass resection"
 - "A comparison of computed tomography and endorectal ultrasound in staging rectal cancer"
- April 7-10, 1987 Ultrasound: 1987, Brigham and Women's Hospital, Harvard Medical School, Boston, MA
 - "Intra-operative sonography"
 - "Prostatic sonography"
 - "Abdominal and transplant Doppler"
- April 9, 1987 Grand Rounds, New England Deaconess Hospital, Harvard Medical School, Boston, MA
 - "Non-prostatic endoscopic ultrasound"
- April 27-May 1, 1987 87th Annual Meeting, American Roentgen Ray Society, Miami, FL
 - "Prostate ultrasound"
- May 7-10, 1987 The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ. Sponsored by the Division of Diagnostic Ultrasound, Department of Radiology, Thomas Jefferson University Hospital, Philadelphia, PA
 - "Doppler evaluation of the liver and renal transplants"
 - "Endorectal ultrasound: prostate and rectal tumors"
- May 19-20, 1987 Endosonography, Middlesex Hospital, London, England
 - "Radiology in staging rectal cancer"
 - "Ultrasound appearance of early prostatic cancer and biopsy techniques"
- May 27, 1987 Mercy Catholic Medical Center, Darby, PA
 - "MRI of the abdomen"

June 12, 1987

Symposium on Tissue Characterisation,
Bethesda, MD
- "Sonographic characteristics of prostate
cancer"

GARY SHABER, M.D.

November 30-December 5, 1986

The 72nd Scientific Assembly and Annual
Meeting of the Radiological Society of North
America, Chicago, IL
- "Resolution and threshold detectability
evaluation of a filmless digital
radiographic system"
- "High-resolution digital mammography
using a planar array charge-coupled
device"

ROBERT M. STEINER, M.D.

October 10, 1986

Annual Meeting - Trends in Critical Care
Nursing. Philadelphia, PA
- "Radiology of trauma, radiology of
critical care"

November 3, 1986

Agfa-Gevaert Symposium, Guadeloupe, French
West Indies
- "New imaging technologies: magnetic
resonance and cine CT"

November 10, 1986

Gordon Culver Memorial Lecture
Buffalo General Hospital, Buffalo, NY
- "Magnetic resonance and cine CT"

November 10, 1986

New York University Medical School
Buffalo and Veteran's Administration
Hospital, Buffalo, NY
- "Adult congenital heart disease"

November 10, 1986

Buffalo Radiologic Society, Buffalo, NY
- "Multimodality approach to the
pericardium"

November 18, 1986

Annual Meeting of the American Heart
Association, Dallas, TX
- Chairman, Scientific session

January 8, 1987

Hahnemann Hospital, Cardiology Grand Rounds
Philadelphia, PA
- "New imaging technology: cine CT"

February 19, 1987

Annual Meeting of the Society of
Thoracic Radiology, Orlando, FL
- "Ischemic disease: which modality is
best?"

March 12, 1987

Mercy Catholic Medical Center
Darby, PA
- Case presentations

March 23, 1987

35th Annual Meeting of the Association of
University Radiologists, Charleston, SC
- "Pulmonary abnormalities in liver
transplantations"

April 7, 1987

Visiting Professor, Long Island Jewish
Hospital, New York, NY
- "Cine-CT, current applications"

April 16, 1987

Radiology Conference, Garden State Hospital,
Marlton, NJ
- "Asbestosis"

April 27, 1987

Annual American Occupational Medical
Association Conferences, Philadelphia, PA
- "Diagnosis of pneumoconiosis"

May 8, 1987

Deborah Heart and Lung Center, Browns Mills,
NJ
- "Asbestosis Pulmonary Grand Rounds"

GEORGE TEITELBAUM, M.D.

September 12, 1986

University of California - Irvine Medical
Center, Orange, CA
- "Cardiovascular MRI"

October 31, 1986

The George Washington University Hospital,
Washington, DC
- "Vascular MRI applications"

January 9, 1987

Huntington Memorial Hospital, Pasadena, CA
- "Diagnosis and treatment of pulmonary
thromboembolism"

February 10, 1987

Bryn Mawr Hospital, Bryn Mawr, PA
- "MRI and the surgeon"

June 23, 1987

George Washington University Hospital,
Washington, DC

- "MRI artifacts, ferromagnetism, and magnetic torque of various intravascular filters, stents and coils"
- "Insertion and recovery of a new vena caval filter"

SIMON VINITSKI, PH.D.

July 10, 1986

Lovelace Research Foundation, Albuquerque,
NM

- "High field MR imaging"

August 9, 1986

10th Annual Meeting of NMR Spectroscopists,
Southwestern Region, Santa Fe, NM

- "Sodium gradient refocusing imaging"

August 12-16, 1986

Meeting of the Society of Magnetic Resonance
in Medicine, Montreal, Quebec, Canada

- "Effect of the sampling rate on MRI"
- "Image contrast in fast low angle imaging"

December 10, 1986

NMR Workshop, Santa Fe, NM

- "Contrast in fast gradient refocusing imaging"
- "Contrast enhancement in low angle imaging"

February 28-March 2, 1987

Fifth Annual Meeting of the Society for
Magnetic Resonance Imaging, San Antonio, TX

- "Contrast enhancement in low angle imaging"

YEN WANG, M.D.

November 30-December 5, 1986

The 72nd Scientific Assembly and Annual
Meeting of the Radiological Society of
North America, Chicago, IL

- "ACR-NEMA digital imaging and communication standards"

February 1-5, 1987

SPIE Medical Imaging XV, Newport Beach, CA

- "Minimal requirements of ACR-NEMA digital imaging and communication standards"
- "ACR-NEMA exchange media standards"

RICHARD J. WECHSLER, M.D.

February 18, 1987

Society of Thoracic Radiology Annual
Post-Graduate Course, Orlando, FL

- "Moderator, panel on thoracic interventional procedures"
- "The misplaced thoracic venous catheter"

May 1, 1987

Boston Veterans Hospital, Jamaica Plain,
MA

- "Typical roentgen features of large abdominal masses"

May 7, 1987

Philadelphia Roentgen Ray Society
Philadelphia, PA

- "Computed tomography of liver transplantation"

May 8, 1987

The Leading Edge in Diagnostic Ultrasound,
Atlantic City, NJ. Sponsored by the
Division of Diagnostic Ultrasound,
Department of Radiology, Thomas Jefferson
University Hospital, Philadelphia, PA

- "Ultrasound/CT of the abdomen"

EXHIBITS AND POSTER PRESENTATIONS

The 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, Illinois, 1986.

- "The technical quality of mammography in centers participating in a regional breast cancer awareness program". (Co-exhibitors: SA Feig, BM Galkin, HD Muir) - Awarded Honorable Mention.
- "Xeromammography" - Audiovisual slide-tape cassette. (Exhibitor: SA Feig).
- "Needle location in breast diagnosis" - Audiovisual slide-tape cassette (Exhibitor: SA Feig)
- "Benefits and risks of breast cancer screening" (Exhibitor: SA Feig)
- "Understanding the ischemic hip with 1.5-TMR imaging (Co-exhibitors: DG Mitchell, VM Rao, CE Spritzer, et al) Cum Laude.

The 31st Annual Convention of the American Institute of Ultrasound in Medicine, Las Vegas, Nevada, 1986.

- AIUM Film Reading, Case presentations, Poster Session (Exhibitor: AB Kurtz)

The Society of Magnetic Resonance in Medicine, 5th Annual Meeting, Montreal, Canada, 1986.

- "Avascular necrosis of the femoral head: Morphologic assessment with magnetic resonance imaging and computed tomography correlation. Poster session (Co-exhibitors: DA Mitchell, MK Dalinka, VJ Rao, et al).
- "Optimizing imaging of adnexal masses with 1.5T MRI": Poster session (Co-exhibitors: DG Mitchell, MC Mintz, CE Spritzer, D Gassman, HY Kressel)

35th Annual Meeting of the Association of University Radiologists, Charleston, South Carolina, 1987.

- "Brachial approach for cerebral angiography (DSA) using a 4-French catheter" (Exhibitor: HT Doan)
- "Intra-arterial infusion chemotherapy: experience with 136 infusions (Exhibitor: G Teitelbaum)

Society of Nuclear Medicine, 34th Annual Meeting, Toronto, Canada, 1987.

- "Evaluation of renal artery stenosis in rabbits: MRI, angiography and nuclear medicine": Poster session (Co-exhibitors: DG Mitchell, M Tobin, R Leveen, et al)

DAVID C. LEVIN, M.D.

- "Understanding the ischemic hip with 1.5-TMR imaging" (Co-exhibitors: DG Mitchell, VM Rao, E Spritzer, et al)

Director-at-Large, North American Society for Cardiac Imaging

Member of the Panel * * * * *

Scientific Advisor, NSNA Research and Education Fund, North America

Cardiac Radiology Task Force, American College of Radiology

Vice-Chairman of the Council on Cardiovascular Radiology, American Association

Board of Trustees, Society for Cardiac Angiography

Examiner, American Board of Radiology Oral Examinations in Interventional Radiology

Associate Editor, RADIOLOGY

Board of Editor, INVESTIGATIVE RADIOLOGY

Associate Editor, CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY

Reviewer in Cardiac and Interventional Radiology, AMERICAN JOURNAL OF ROENTGENOLOGY

Editorial Board, AMERICAN JOURNAL OF CARDIAC IMAGING

Reviewer, NEW ENGLAND JOURNAL OF MEDICINE

ROBERT L. BRANT, M.D.

Council Member, National Council on Radiation Protection and Measurements

Member, Society for Experimental Biology and Medicine Management Committee

Member, Philadelphia Public Health Advisory Commission

Editorial Board, PEDIATRICS

Editorial Board, PAIN THERAPY

HONORS, EDITORIAL ACTIVITIES, SERVICE FOR NATIONAL OR REGIONAL
RADIOLOGICAL ORGANIZATIONS

DAVID C. LEVIN, M.D.

- Executive Committee, Association of University Radiologists
- Director-at-Large, North American Society for Cardiac Radiology
- Member of the Program Committee, Radiological Society of North America
- Scientific Advisor, RSNA Research and Education Fund, Radiological Society of North America
- Cardiac Radiology Task Force, American College of Radiology
- Vice-Chairman of the Council on Cardiovascular Radiology, American Heart Association
- Board of Trustees, Society for Cardiac Angiography
- Examiner, American Board of Radiology Oral Examinations in June 1987
- Associate Editor, RADIOLOGY
- Board of Editors, INVESTIGATIVE RADIOLOGY
- Associate Editor, CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY
- Reviewer in Cardiac and Interventional Radiology, AMERICAN JOURNAL OF ROENTGENOLOGY
- Editorial Board, AMERICAN JOURNAL OF CARDIAC IMAGING
- Reviewer, NEW ENGLAND JOURNAL OF MEDICINE

ROBERT L. BRENT, M.D.

- Council Member, National Council on Radiation Protection and Measurements
- Member, Society for Experimental Biology and Medicine Membership Committee
- Member, Philadelphia Public Health Advisory Commission
- Editorial Board, PEDIATRICS
- Editorial Board, FETAL THERAPY

STEPHEN A. FEIG, M.D.

- Serving on the following committees under the commission of Diagnostic Radiology of the American College of Radiology:
 - Committee on Breast Imaging
 - committee on Professional Self-Evaluation and Education, Chairman of the Section on Breast Diseases
 - Committee on Systemized Refresher Courses, Co-Chairman - Faculty on Breast Disease
- Program Committee, Fourteenth International Congress on Senology, Sponsored by the International Senologic Society, Paris, France, September 1-4, 1986
- Member, National Council on Radiation Protection and Measurements, Scientific Committee 72: Mammography
- Member, Executive Committee, Society of Breast Imaging
- Editorial Board, THE INTERNATIONAL JOURNAL OF BREAST DISEASE
- Editorial Consultant, AMERICAN JOURNAL OF ROENTGENOLOGY
- Editorial Consultant, JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION

BENJAMIN M. GALKIN, M.S.

- Member, Publishing Advisory Committee, American Institute of Physics
- Chairman, Publications Committee, American Association of Physicists in Medicine
- Honorable Mention Award for scientific exhibit presented at the RSNA Meeting

GEOFFREY A GARDINER, JR., M.D.

- Reviewer/Abstract Writer - CARDIOVASCULAR AND INTERVENTIONAL RADIOLOGY
- Reviewer - Cardiac, interventional and vascular sections of RADIOLOGY

Barry B. Goldberg, M.D.

- Who's Who in America
- Consultant to the Department of Radiology, The Radiation Effects Research Foundation, Hiroshima City, Japan
- Treasurer - World Federation for Ultrasound in Medicine and Biology
- Chairman - Archives Committee, American Institute of Ultrasound in Medicine
- Chairman - Archives Committee, World Federation for Ultrasound in Medicine

and Biology

- Chairman - Audit Committee, World Federation for Ultrasound in Medicine and Biology
- Member of the Commission on Ultrasound, American College of Radiology
- Member of the Advisory Editorial Board and International Liaison Committee, World Federation for Ultrasound in Medicine and Biology
- Member of the Administrative Council, World Federation for Ultrasound in Medicine and Biology
- Member of the Committee on Accreditation, American College of Radiology
- Member of the Committee on Quality Assurance, American College of Radiology
- Member of Channel 10 Medical Advisory Board, WCAU-TV, CBS Television Stations, Philadelphia, Pennsylvania
- Member of the Committee on Radiology Education in the Third World, Radiological Society of North America
- Member of the Nominating Committee, American Institute of Ultrasound in Medicine
- Member of the Subcommittee on Magnetic Resonance Imaging, Philadelphia Roentgen Ray Society
- Member of the Awards Committee, American Institute of Ultrasound in Medicine
- Member of the Executive Committee, International Association for Endosonography
- Coordinator of Ultrasonography for JAMA Topics in Radiology
- Associate Editor of SURGICAL ENDOSCOPY, ULTRASOUND AND INTERVENTIONAL TECHNIQUES
- Member of the Editorial Advisory Board, CLINICS IN DIAGNOSTIC ULTRASOUND
- Editorial Advisory Board of ULTRASOUND IN MEDICINE AND BIOLOGY
- Editorial Board of the JOURNAL OF CLINICAL ULTRASOUND
- Editorial Board of the JOURNAL D'ECHOGRAPHIC ET DE MEDICINE ULTRASONORE
- Editorial Board of ARCHIVES OF CLINICAL IMAGING

- Editorial Consultant for the AMERICAN JOURNAL OF ROENTGENOLOGY
- Editorial Consultant for APPLIED RADIOLOGY
- Editorial Consultant for CHEST
- Editorial Consultant for the JOURNAL OF ULTRASOUND IN MEDICINE
- Editorial Consultant for PEDIATRICS
- Editorial Consultant for RADIOLOGY
- Editorial Consultant for MEDCOM FACULTY OF MEDICINE
- Advisory Committee of ULTRASONIDOS EN MEDICINA

CARLOS GONZALES, M.D.

- Member of the American Society of Neuroradiology, Committee on CT and MRI Contrast Media
- Elected Fellow of the College of Physicians of Philadelphia

ROBERT O. GORSON, M.S.

- Member of the Board of Chancellors of the American College of Medical Physics
- Chairman of the Nominations Committee of the National Council on Radiation Protection and Measurements
- Member of the Constituting Panel of the American Board of Medical Physics as Representative of the Radiological Society of North America
- Chairman of the Awards Committee of the American College of Medical Physics
- Chairman of the History Committee of the American Association of Physicists in Medicine
- Member of the Committee on Governmental Relations, American College of Radiology
- Member of the Committee on Radiologic Units, Standards and Protection, American College of Radiology
- Representative for the RSNA, American Radium Society and American Academy of Dermatology to the National Council on Radiation Protection
- Member of the National Council on Radiation Protection, Scientific Committee No. 16 on Dental X-Ray Protection

- ° Member of the National Council on Radiation Protection, Scientific Committee No. 9 on X-Ray and Gamma Beam Structural Shielding
- ° Member of the American College of Radiology Commission on Radiologic Units, Standards and Protection, Committee on Disaster Planning
- ° Representative of the American College of Radiology to the ANSI Medical Devices Technical Advisory Board
- ° Member of the Committee on Standards and Protection, Pennsylvania Radiological Society
- ° Member of National Council on Radiation Protection, Scientific Committee No. 44 on Medical Radiation Exposure
- ° Critical reviewer for RADIOLOGY, MEDICAL PHYSICS and HEALTH PHYSICS

DAVID KARASICK, M.D.

- ° Skeletal Examiner - American Board of Radiology, 1987
- ° Program Committee - Philadelphia Roentgen Ray Society, 1987
- ° Participant in the Orthopaedic/Radiologic/Pathologic Monthly Conference, County Medical Society of Philadelphia, 1987
- ° Musculoskeletal Reviewer, AMERICAN JOURNAL OF ROENTGENOLOGY
- ° Musculoskeletal Reviewer, RADIOLOGY
- ° Consulting Editor, SKELETAL RADIOLOGY
- ° Consulting Editor, JOURNAL OF THE INTERNATIONAL SKELETAL SOCIETY

STEPHEN KARASICK, M.D.

- ° Genitourinary Examiner - American Board of Radiology, 1987
- ° Genitourinary Radiology - American Board of Radiology (Written Examination)
- ° American Board of Radiology Writers' Workshop, Iowa City, Iowa - May 20, 1987

ALFRED B. KURTZ, M.D.

- ° Member, Committee on Biologic Effects of the Commission on Ultrasound, American College of Radiology
- ° Member, Committee on Education and Training of the Commission on Ultrasound, American College of Radiology
- ° Examiner, Oral Board, Ultrasound Category, The American Board of Radiology

- Member, Education Committee of the American Institute of Ultrasound in Medicine
- Secretary, Society of Radiologists in Ultrasound
- Member, Blue Ribbon Ad Hoc Committee on Physician Certification in Ultrasound, American Institute of Ultrasound in Medicine
- Chairman, Constitution Committee, American Institute of Ultrasound in Medicine
- Member, Scientific Exhibits Committee, Radiological Society of North America
- Member, Committee on Ultrasonography, Pennsylvania Radiological Society
- Chairman, Program Committee, Greater Delaware Valley Ultrasound Society
- Member, Membership Committee, Greater Delaware Valley Ultrasound Society
- Member, Program Committee, Philadelphia Roentgen Ray Society
- Member, Manuscript Review Panel, AMERICAN JOURNAL OF ROENTGENOLOGY
- Member, Editorial Board JOURNAL OF ULTRASOUND IN MEDICINE
- Reviewer, JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION
- Member, Ultrasound Manuscript Reviewer, RADIOLOGY

ESMOND MAPP, M.D.

- Treasurer, Philadelphia Roentgen Ray Society - 1986-87
- Membership Chairman, Pennsylvania Radiological Society - 1986-87
- Consultant - Center for Devices and Radiological Health, Food and Drug Administration
- Member, Executive Committee - Radiology 1987 (ACR Summit)
- Member, Manpower Committee - American College of Radiology

MARK MISHKIN, M.D.

- Member, Board of Chancellors - American College of Radiology
- Chairman, Commission on Human Resources - American College of Radiology
- Chairman, Committee on Fellowship Credentials - American College of Radiology

- Chairman, Neuroradiology Section Written Examination - American Board of Radiology
- Treasurer and Member, Executive Committee - Eastern Radiological Society
- Member, Committee on Drugs and Contrast Media - American College of Radiology
- Board of Trustees, American Registry of Pathology
- Member, Board of Trustees, American College of Radiology Foundation
- Member, Committee on Radiological Unity Standards and Protection - American College of Radiology
- Member Board of Trustees, American College of Radiology Institute
- Member, Committee on Continuing Evaluation of Post Graduate Education - American College of Radiology
- Reviewer, CANCER

DONALD G. MITCHELL, M.D.

- Cum Laude Award of the Radiological Society of North America for the scientific exhibit entitled "Understanding the Ischemic Hip with 1.5-TMR Imaging." Exhibited at the 72nd Scientific Assembly and Annual Meeting, Chicago, 1986
- Society of Magnetic Resonance Imaging - presided over Musculoskeletal Works-in-Progress and Abdominal Proffered Paper Sessions
- Manuscript Reviewer, RADIOLOGY

LAURENCE NEEDLEMAN, M.D.

- Certificate of Recognition from the American Medical Association for Participation in and Successful Completion of a Workshop for the Preparation of Program Evaluation Specialists in Allied Health Educational Program Accreditation.
- Manuscript Reviewer: RADIOLOGY

MARGIT LASSEN NORDBERG, Ph.D.

- Member of the Scientific Program Committee, AAPM
- Member of the Professional Information and Clinical Relations Committee, AAPM
- Member of the Refresher Course Committee, RSNA

VIJAY M. RAO, M.D.

- Cum Laude Award of the Radiological Society of North America for the scientific exhibit entitled "Understanding the Ischemic Hip with 1.5-TMR Imaging." Exhibited at the 72nd Scientific Assembly and Annual Meeting, Chicago, 1986
- Member of the Graduate Course Committee of the Blue Ribbon Society, a chapter of the Philadelphia Roentgen Ray Society
- Elected to Sigma XI Scientific Research Society

MATTHEW RIFKIN, M.D.

- Member, Ultrasound Commission, American College of Radiology
- Member, Ultrasound Education Sub-Committee, American College of Radiology
- Site Surveyor, The Joint Review Committee on Education in Diagnostic Medical Sonography, American Institute of Ultrasound in Medicine
- President, Greater Delaware Valley Ultrasound Society
- Editorial Advisory Board, JOURNAL OF ULTRASOUND IN MEDICINE
- Reviewer, RADIOLOGY
- Reviewer, AMERICAN JOURNAL OF ROENTGENOLOGY
- Reviewer, INVESTIGATIVE RADIOLOGY
- Reviewer, UROLOGIC RADIOLOGY
- Reviewer, JOURNAL OF ULTRASOUND IN MEDICINE
- Reviewer, JOURNAL OF CLINICAL ULTRASOUND

GARY SHABER, M.D.

- Member of the American College of Radiology, Committee on Integrated Electronic Communication and Education
- Member, American College of Radiology - Multi-University Committee
- Consultant, National Board of Medical Examiners

ROBERT M. STEINER, M.D.

- Member, Governor's Advisory Committee Eastern Pennsylvania, American College of Cardiology

- ° Chairman, Program Committee, Philadelphia Roentgen Ray Society
- ° Member, Executive Committee, Philadelphia Roentgen Ray Society
- ° Member, Scientific Exhibits Committee, Radiological Society of North America
- ° Member, Fellowship Training Committee, Society of Thoracic Radiology
- ° Reviewer, AMERICAN JOURNAL OF ROENTGENOLOGY
- ° Editorial Board, HEART AND VESSEL
- ° Exhibit Review Committee, RADIOGRAPHICS
- ° Abstractor and Reviewer, RADIOLOGY

SIMON VINITSKI, Ph.D.

- ° Reviewer, STROKE
- ° Organizer, Santa Fe NMR Workshop

YEN WANG, M.D.

- ° Editor, CRITICAL REVIEWS IN DIAGNOSTIC IMAGING
- ° Chairman, Digital Radiography Committee, American College of Radiology
- ° Chairman, Implementation and Validation Committee, ACR-NEMA Digital Imaging and Communication Standards
- ° Member, ACR-NEMA Digital Imaging and Communication Committee
- ° Reviewer, AMERICAN JOURNAL OF ROENTGENOLOGY

RICHARD WECHSLER, M.D.

- ° Manuscript Reviewer, CRC CRITICAL REVIEWS IN DIAGNOSTIC IMAGING
- ° Manuscript Reviewer, CANCER
- ° A. Edward O'Hara Award for Excellence in Teaching

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ADDENDUM

Office of Radiation Safety

1986 Annual Report

OFFICE OF RADIATION SAFETY

1986 ANNUAL REPORT

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I. SUMMARY OF PERSONNEL MONITORING PROGRAM FOR 1986

ALARA EVALUATION

1986 ANNUAL DOSE RANGES (in rems)	NUMBER OF PERSONS			
	Body	Hand	Eye	Other
No measurable exposure	405	55	18	1 collar 2 wrist
0.010 - 0.100	599	23	5	3 collar 3 wrist
0.101 - 0.250	70	7	3	4 collar 1 wrist
0.251 - 0.500	22	7		5 collar
0.501 - 0.750	4	4		3 collar 1 wrist
0.751 - 1.000		7		5 collar 1 wrist
1.001 - 2.000		4		3 collar
2.240		1		1 collar
2.350				1 collar
3.000				1 collar
6.020				1 collar
8.080		1		
10.880				1 collar
TOTALS	1,100	109	26	29 collar 8 wrist

Whole Body Monitoring

Twelve-thousand, one hundred and forty-five radiation dosimeters (film badges, ring badges etc.) were issued during calendar 1986 to monitor 1,100 persons who, by the nature of their duties, were occupationally exposed to x-radiation, gamma radiation, and/or energetic beta radiation. This represents a 20.6% increase over 1985 in the use of personnel monitors. Of the 1,100 persons who were monitored approximately 75% were from clinical departments and 25% were from basic science departments.

Thirty-seven percent of those monitored for whole body exposure received no measurable exposure. Ninety-nine percent received less than 10% of the maximum permissible whole body dose (MPD). No one exceeded 15% of the MPD.

Hand Monitoring

Receipt

Of the 1,100 persons monitored for whole body exposure 109 were also monitored for possible exposure to the hands. These people routinely handled milliCurie amounts of gamma emitting radionuclides, energetic beta emitters (P-32) or else routinely performed special x-ray studies. All received less than 3% of the MPD (for hands) except for one person who received 11% of the MPD.

Eye-Head Monitoring

Twenty-six physicians who routinely performed special x-ray studies were also monitored for possible exposure to the eyes. None exceeded 5% of the MPD.

II. RADIOISOTOPE STATISTICS FOR 1986

Receipt

The amount of radioactivity received during 1986 was 576 Curies compared with 430 Curies in 1985, a 34% increase over 1985. Over 95% of the radioisotopes was for the clinical Nuclear Medicine and Radiation Therapy programs.

Disposal (Commercial)

During 1986 there was more use of in-house "decay-to-background" disposal of radioactivity resulting in less use of outside commercial services. Compared with 1985 commercial disposal was down by 9% in terms of radioactivity (412 mCi vs. 455 mCi), and down 28% in terms of volume (1463 gallons vs. 2032 gallons). The latter is important since commercial disposal fees are based on volume.

Inventory Control Report

Page 4 contains summary reports of the receipt, disposal and transfer of radioactive materials for calendar 1986.

TOTAL 200 412.529

Transfer (Outside)

Activity

(in milliCuries)

H-3	0.080	(to other)
S-35	0.015	(to other)
P-32	0.200	(to other)
TOTAL	0.295	(to other)

5,984.3

Radioisotope Inventory Control Report

<u>Isotope</u>	<u>Receipt</u>	<u>Amount (mCi)</u>
H-3		574.40
C-14		86.96
Na-22		0.10
P-32		73.80
S-35		107.32
Ca-45		5.00
Cr-51		57.31
Co-57		0.13
Fe-59		5.82
Ga-67		1,765.71
Mo-99		235,280.00
Tc-99m		304,378.00
In-111		192.87
I-123		0.44
I-125		1,801.57
I-131		2,956.49
Xe-133		18,460.00
Ir-192		1,984.54
Tl-201		998.94
TOTAL		568,729.40

Disposal (in approximate milliCuries)

<u>Isotope</u>	<u>via sewer system</u>	<u>commercial source</u>	<u>released to atmosphere</u>
H-3	81.145	321.059	0.250
C-14	16.696	7.575	
Na-22	--	0.092	
P-32	23.549	3.750	
S-35	25.690	20.570	
Ca-45	0.106	--	
Cr-51	11.740	4.750	
Co-57	0.063	0.152	
Fe-59	0.480	0.115	
In-111	0.400	--	
I-125	60.329	54.466	0.030
I-131	0.050	--	
Xe-133	--	--	4,995.900
TOTAL	220.248	412.529	4,996.180

Transfer (outside Jefferson)

<u>Isotope</u>	<u>Activity (in milliCuries)</u>
H-3	0.080 (to other researchers)
S-35	0.015 (to other researchers)
I-125	0.200 (to other researchers)
Ir-192	6,964.800 (returned to vendor)

III. RADIOISOTOPE LABORATORY SURVEY PROGRAM

During 1986 personnel from the Office of Radiation Safety conducted 556 inspections of Jefferson's radioisotope laboratories. This represents an increase of 30.5% over the previous year.

IV. BIOASSAYS

Thyroid Monitoring Program

During 1986, the Radiation Safety staff performed 41 thyroid counting procedures on 12 individuals who could have been exposed to radioiodine during the course of their work. The results from these procedures indicate that all of these individuals received little or no thyroid dose. All thyroid doses were well below maximum permissible limits of 15 rem/yr. Results of the monitoring program are summarized below:

<u>Range of Thyroid Dose Commitment to Each Individual</u>	<u>Number of Individuals</u>
0.01 rem or less	6
>0.01 to 0.09 rem	5
>0.09 to 0.26 rem	1
>0.26 rem	0

Urinalysis for Tritium

In addition to the urinalyses performed under the supervision of individual licensees, the Office of Radiation Safety performed 3 urinalyses for tritium on 1 individual who handled bulk quantities of tritium (>10 mCi). The measured body burden of tritium was less than 1.0% of permissible limits. Total body dose commitment was estimated to be less than 1 mrem.

V. AIR SAMPLING

Air samples were collected during 25 iodine labelling experiments, 9 iodine therapy drinks, and 8 xenon-133 diagnostic procedures, to quantitate the airborne release of radioactivity to controlled and uncontrolled areas. The results indicate that average yearly air borne concentrations were well below permissible limits.

VI. INTERACTION WITH THE U.S. NUCLEAR REGULATORY COMMISSION

Inspection

In October the NRC conducted an unannounced inspection of licensed activities at Jefferson. (Unannounced inspections are routinely used by the NRC to check for compliance with federal regulations.) This was a two day, in-depth evaluation of our radiation safety program.

At the conclusion the inspector met with a representative of Hospital Administration in the presence of members of the Radiation Safety Staff.

In an oral report the inspector noted four minor items of non-compliance (one of which was questionable). All the items related to the brachytherapy program in the hospital. The inspector complimented Jefferson on having a very effective radiation safety program.

Prof. Galkin reported the inspector's findings at the December meeting of the University Radiation Safety Committee meeting and described the actions taken to correct the items of non-compliance.

Misadministrations of Radioactive Materials

Two diagnostic misadministrations occurred during 1986 both of which were reported to the NRC as required by regulations, and to the University Radiation Safety Committee.

License Amendment

A request to amend our NRC broad license was filed in November; this was still pending at the end of the year.

VII. X-RAY SURVEY PROGRAM

The radiation safety survey program of x-ray equipment in the College, Allied Health Sciences Center and Hospital continued on a regularly scheduled basis throughout the year. These surveys were conducted by or under the supervision of the Medical Physics Division or the Office of Radiation Safety.

VIII. MICROWAVE EQUIPMENT AND ELECTRON MICROSCOPES

The Office of Radiation Safety has an on-going program to check microwave units and electron microscopes.

IX. NEW CONSTRUCTION

Prof. Galkin in consultation with Mr. George McArdle of the Department of Radiology provided the radiation shielding specifications for several new x-ray rooms in the hospital. He also inspected the installation of the shielding during construction.

X. TEACHING

Radiation Safety Indoctrination Sessions

Mr. John Keklak conducted six (6) bi-monthly sessions for isotope users

to acquaint them with radiation safety practices and policies at Jefferson.

Two new isotope training manuals were prepared by the Radiation Safety Staff.

Resident and Staff Training

Prof. Benjamin Galkin conducted a 20 hour physics review course for radiology residents preparing to take the American Board of Radiology examination. He also presented 12 hours of radiation safety lectures to first and second year radiology residents.

Numerous other one-on-one and small group sessions were held with the staff from nursing services, cardiac catheterization, radiation therapy, radiology, nuclear medicine, etc.

XI. RESEARCH

Grant

Prof. Galkin is the Principal Investigator on a one year NIH small grant in the amount of \$34,000. Co-investigators are S.A. Feig, M.D. and A.S. Patchefsky, M.D.

Scientific Exhibit

Galkin, B.M., Feig, S.A., Muir, H.D. "The Technical Quality of Mammography in Centers Participating in a Regional Breast Cancer Awareness Program. 72nd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, Illinois, November, 1986. Awarded Honorable Mention Citation. Selected for Publication in RadioGraphics.

XII. HONORS

Prof. Galkin completed a three year term as Chairman of the Publications Committee of the American Association of Physicists in Medicine.

Mr. John Keklak served as President of the Delaware Valley Society for Radiation Safety, the local chapter of the national Health Physics Society.

XIII. CHANGE IN PERSONNEL

Mr. John Guldin, III, Environmental Health Technician resigned. His replacement is Mr. Richard Dixon, who joined our staff in November 1986.

XIV. INSTITUTIONAL RADIOISOTOPE LICENSES ISSUED DURING 1986

Licensee & Department	Isotope	Possession Limit	Purpose
H. Callahan Urology	H-3	1 mCi	<u>In vivo</u> bacterial adherence assays in rabbits (H-3, C-14).
	C-14	5 mCi	
	I-125	10 mCi	<u>In vitro</u> radioimmunoassays for serum studies.
	I-131	5 mCi	
J. Martinez Cardeza	H-3	50 mCi	Synthesis studies of proteins. S-35 <u>in vivo</u> rabbit metabolism studies. Exogenous labelling of proteins for binding and metabolic studies.
	C-14	20 mCi	
	S-35	20 mCi	
	I-125	50 mCi	
	I-131	2 mCi	
R. Bell Neurology	H-3	35 mCi	Cerebral metabolism of glucose. Iodination of proteins.
	C-14	5 mCi	
	I-125	15 mCi	
D. Prockop Biochemistry	H-3	50 mCi	H-3, C-14 will be used primarily for labelling proteins synthesized by culture cells and tissue. P-32 to be used for experiments involving recombinant DNA technologies. S-35 will be used for both protein labelling and DNA studies. I-125 will be used for labelling antibodies and subsequent RIA studies.
	C-14	50 mCi	
	P-32	50 mCi	
	S-35	50 mCi	
	I-125	10 mCi	
G. Brainard Neurology	C-14	10 mCi	<u>In vivo</u> measurement of cerebral metabolism in animals (rats, monkeys).
	I-125	200 uCi	
C. Owens Biochemistry	H-3	10 mCi	Cell proliferation <u>in vitro</u> . Enzyme assays (<u>in vitro</u>) using P-32 ATP as substrate. Cell toxicity (<u>in vitro</u>) using release of Cr-51.
	P-32	25 mCi	
	Cr-51	20 mCi	
S. Shapiro Cardeza	H-3	200 mCi	H-3, C-14, S-35 used for synthesis studies of proteins. I-125, I-131 exogenous labelling of proteins for binding and metabolic studies.
	C-14	50 mCi	
	S-35	50 mCi	
	I-125	50 mCi	
	I-131	5 mCi	

B. Ponnappa Pathology	H-3	10 mCi	<u>In vitro</u> experiments with biological samples prepared from rats, rabbits and mice.
	C-14	10 mCi	
	P-32	10 mCi	
	S-35	5 mCi	
	Ca-45	5 mCi	
	I-125	5 mCi	
S. Peters Pulmonary Medicine	H-3	5 mCi	<u>In vitro</u> studies where cells will be labelled; as standards for TLC and HPLC for radioimmunoassays.
	C-14	1 mCi	
S. Murphy Cardeza	Cr-51	2 mCi	Reinfusion of labelled platelets into human volunteers to test viability after storage in experimental bags.
A. Thomas Pathology	H-3	10 mCi	Measurements of inositol metabolites in rat liver cells. Enzyme assays.
	C-14	1 mCi	
G. Grunwald Anatomy	H-3	25 mCi	Biochemical and immuno- logical assays of proteins. Iodine labelling of proteins.
	C-14	10 mCi	
	P-32	10 mCi	
	S-35	10 mCi	
	I-125	20 mCi	
D. Wenger Medical Genetics	H-3	50 mCi	Assays of enzymatic activity and metabolism <u>in vitro</u> and tissue culture.
	C-14	20 mCi	
	S-35	50 mCi	
I. Damjanov Pathology	H-3	1 mCi	Tissue culture, cell labelling, immuno- precipitation autoradio- graphy in mouse tissue.
	C-14	1 mCi	
	P-32	2 mCi	
	S-35	1 mCi	
R. Rubin Pathology	H-3	10 mCi	<u>In vitro</u> labelling and metabolic studies.
	C-14	10 mCi	
	P-32	10 mCi	
	Ca-45	5 mCi	
A. Christensen Biochemistry	P-32	5 mCi	Labelling DNA or oligo- nucleotide for <u>in vitro</u> hybridization experiments. DNA sequencing, labeling proteins <u>in vitro</u> .
	S-35	5 mCi	

There were 82 licensees at the end of 1986 compared with 69 licensees at the end of 1985, an increase of 18.8%.