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Department of Radiology-Annual Report-July 1, 1988 to June 30, 1989

David C. Levin
Thomas Jefferson University

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DEPARTMENT OF RADIOLOGY

ANNUAL REPORT
JULY 1, 1988 - JUNE 30, 1989

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

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COOPER
PUBLICATIONS

We wish to gratefully acknowledge the contributions of Sandra Ehrlich, Tessa Sheaffer, and Elizabeth Rehmman who compiled material for, organized and edited large portions of this report.

DEPARTMENT OF RADIOLOGY

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

Alfred B. Kurtz, M.D.
Professor and Vice-Chairman

DEPARTMENT DIVISIONS AND DIRECTORS

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 F. Gonzalez, M.D. - Vijay M. Rao, M.D.
Cardiovascular/Interventional Radiology	- Geoffrey A. Gardiner, Jr., 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.
Radiological Physics	- Robert O. Gorson, M.S.
Office of Radiation Safety	- Benjamin M. Galkin, M.S.

DEPARTMENTAL COMMITTEES AND CHAIRMEN

Advisory Committee	Alfred Kurtz, M.D.
Education Committee	Vijay Rao, M.D.
Research Committee	Matthew Rifkin, M.D.
Residency Selection Committee	George Gross, M.D.
Quality Assurance Committee	Paul Spirn, M.D.
Computer Committee	Gary Shaber, M.D.

DEPARTMENT FACULTY

Professors

David C. Levin, M.D., Chairman
Stephen A. Feig, M.D.
Benjamin Galkin, M.S.
Barry B. Goldberg, M.D.
Carlos Gonzalez, M.D.
Alfred B. Kurtz, M.D.
Esmond M. Mapp, M.D.
Vijay M. Rao, M.D.
Matthew Rifkin, M.D.
Robert M. Steiner, M.D.
Richard J. Wechsler, M.D.

Research Professor

Gary S. Shaber, M.D.

Clinical Professor

Mark M. Mishkin, M.D.

Professors Emeriti

Jack Edeiken, M.D.
Robert O. Gorson, M.S.
Philip J. Hodes, M.D.

Honorary Professor

A. Edward O'Hara, M.D.

Associate Professors

Peter N. Burns, Ph.D.
David Karasick, M.D.
Stephen Karasick, M.D.
Donald Mitchell, M.D.

Research Associate Professors

P. Macke Consigny, Ph.D.
Simon Vinitzki, Ph.D.

Assistant Professors

John M. Boone, Ph.D.
D. Lawrence Burk, Jr., M.D.
Wolfgang Dähnert, M.D.
Adam E. Flanders, M.D.
Geoffrey A. Gardiner, Jr., M.D.
George W. Gross, M.D.
Pamela Hilpert, M.D., Ph.D.
Barbara L. McComb, M.D.
Laurence Needleman, M.D.
Marcelle J. Shapiro, M.D.
Paul W. Spirn, M.D.
Kevin L. Sullivan, M.D.
Talin Tasciyan, Ph.D.

Clinical Assistant Professor

Joseph Bonn, M.D.

Instructors

Lorna Blum, M.D.
Stephen M. Cohen, M.D.
Emily Fox Conant, M.D.
Huynh T. Doan, M.D.
Rick I. Feld, M.D.
Sharon Segal, D.O.
Terri Tuckman, M.D.
C. Amy Wilson, M.D.
Elaine Wolk, M.D.

FACULTY WITH SECONDARY APPOINTMENTS IN RADIOLOGY

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

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

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]

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

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

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]
Professor of Radiology (Medical Physics) [secondary]

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

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

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

VOLUNTEER AND AFFILIATED FACULTY

Clinical Professórs

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, Ph.D. (Drexel University)
Joseph L. Rose, Ph.D. (Drexel University)
Henrietta Rosenberg, M.D. (Childrens Hospital of Philadelphia)
Melvin Tecotzky, Ph.D. (Agfa-Gevaert)

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)
Stephen Pripstein, M.D. (Abington Hospital)
Hugo R. Rodriguez, M.D. (Lankenau Hospital)
Joseph H. Rosen, M.D. (Jefferson Park Hospital)
Daniel M. Scotti, M.D. (Methodist Hospital)
Gustav Seliger, M.D. (Mercy Catholic Medical Center)
Noble L. Thompson, Jr., M.D. (Bryn Mawr Hospital)
Alan H. Wolson, M.D. (Lehigh Valley Hospital Center)

Visiting Clinical Associate Professors

Donald D. Cameron, M.D.
Christopher W. Canino, M.D.

Honorary Clinical Associate Professors

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

Adjunct Associate Professor

John Krall, Ph.D. (American College of Radiology)

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. Balmarch, 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)
Stephanie B. Flicker, M.D. (Deborah Heart Hospital)
Zelimar Kozic, M.D. (Wilmington Medical Center)
James F. Lally, M.D. (Wilmington Medical Center)
Arnold H. Levine, M.D. (private practice)
Cynthia L. Miller, M.D. (Methodist Hospital)
Harry E. Morgan, M.D. (private practice)
Joseph T. Murphy, M.D. (Bryn Mawr Hospital)
John T. Oglesby II, M.D. (Wilmington Medical Center)
Hayler H. Osborn, M.D. (Bryn Mawr Hospital)
Rebecca G. Pennell, M.D. (private practice)
Arthur J. Press, M.D. (Lankenau Hospital)
Donald E. Red, M.D. (Lankenau Hospital)
Norman Ira Ristin, M.D. (Jefferson Park Hospital)
Herman J. Stein, M.D. (Wilmington Medical Center)

Adjunct Assistant Professors

Paul A. Dubbins, M.S.S.B., F.R.C.R. (Plymouth, England)
Peder C. Pedersen, Ph.D. (Drexel University)
Armand Saragovi, M.D. (Rolling Hill Hospital)
Kawan Soetanto, D.Sc., M.D. (Drexel University)
Harry Zegel, M.D. (St. Agnes Hospital)

Adjunct Clinical Assistant Professor

S. Bruce Greenberg, M.D. (St. Christopher Children's Hospital)

Instructors

Ashokkumar R. Babaria, M.D. (private practice)
Joseph M. Becker, M.D. (Methodist Hospital)
John H. Garafola, M.D. (Lancaster)
Arthur S. Haber, M.D. (Mercy Catholic Medical Center)
Vartan N. Igidbashian, D.O. (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)
Edward M. Podgorski, Jr., M.D. (private practice)
Irene P. Rasis, M.D. (Wilmington Medical Center)
Emanuel M. Renzi, M.D. (Wilmington Medical Center)
John F. Schilling, M.D. (Lankenau Hospital)
Robert G. Stern, M.D. (Jefferson Park Hospital)
David Weiss, M.D. (Chestnut Hill Hospital)

Clinical Instructors

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

RADIOLOGY RESIDENTS

Mark O. Cosentino, M.D., Chief Resident
Valerie T. Greco-Hunt, M.D., Chief Resident

First Year Residents

Daniel Golding, M.D.
Eric Huettl, M.D.
Rajesh Patel, M.D.
Robert Rapaport, M.D.
Evan Siegelman, M.D.

Second Year Residents

Stephen F. Domiano, M.D.
Andrew S. Gallant, M.D.
Kenneth Kaplan, M.D.
Jonathan Shapiro, M.D.

Third Year Residents

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

Fourth Year Residents

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

RADIOLOGY FELLOWS

Cardiovascular/Interventional

Michael Soulen, M.D.
Jeffrey Weissmann, M.D.

Head and Neck (ENT)

Barry Tom, M.D.

Ultrasound/CT/MRI

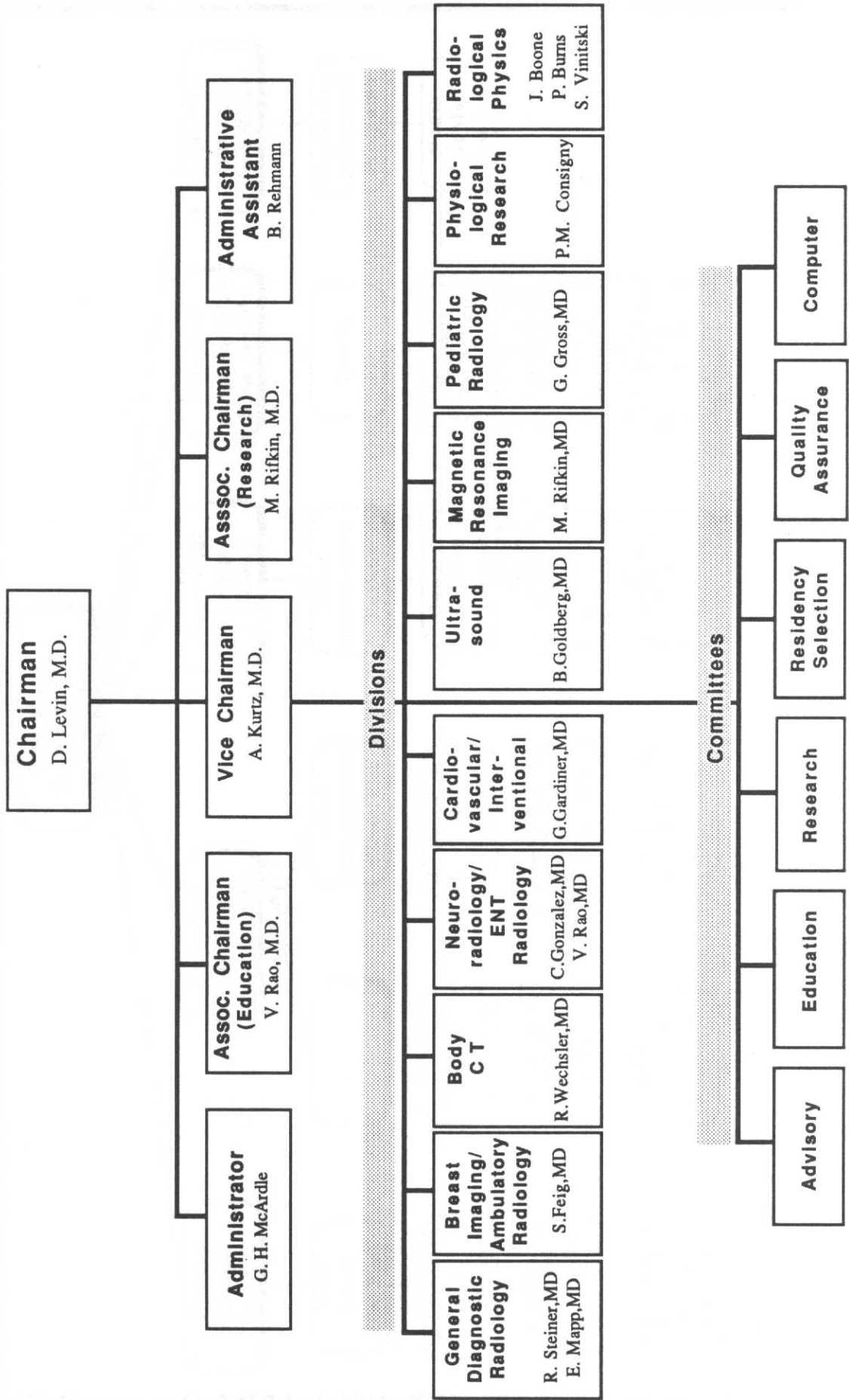
Frederick P. Ayers, M.D.
Anne M. Casey, M.D.
Keith R. Haidet, M.D.
Thomas G. Helinek, M.D.
Heidi L. Kolberg, M.D.
Ellen M. O'Mara, D.O.
Chanhi Park, M.D.
Gary S. Sudakoff, M.D.
Jorge Torres, M.D.

Neuroradiology/ENT

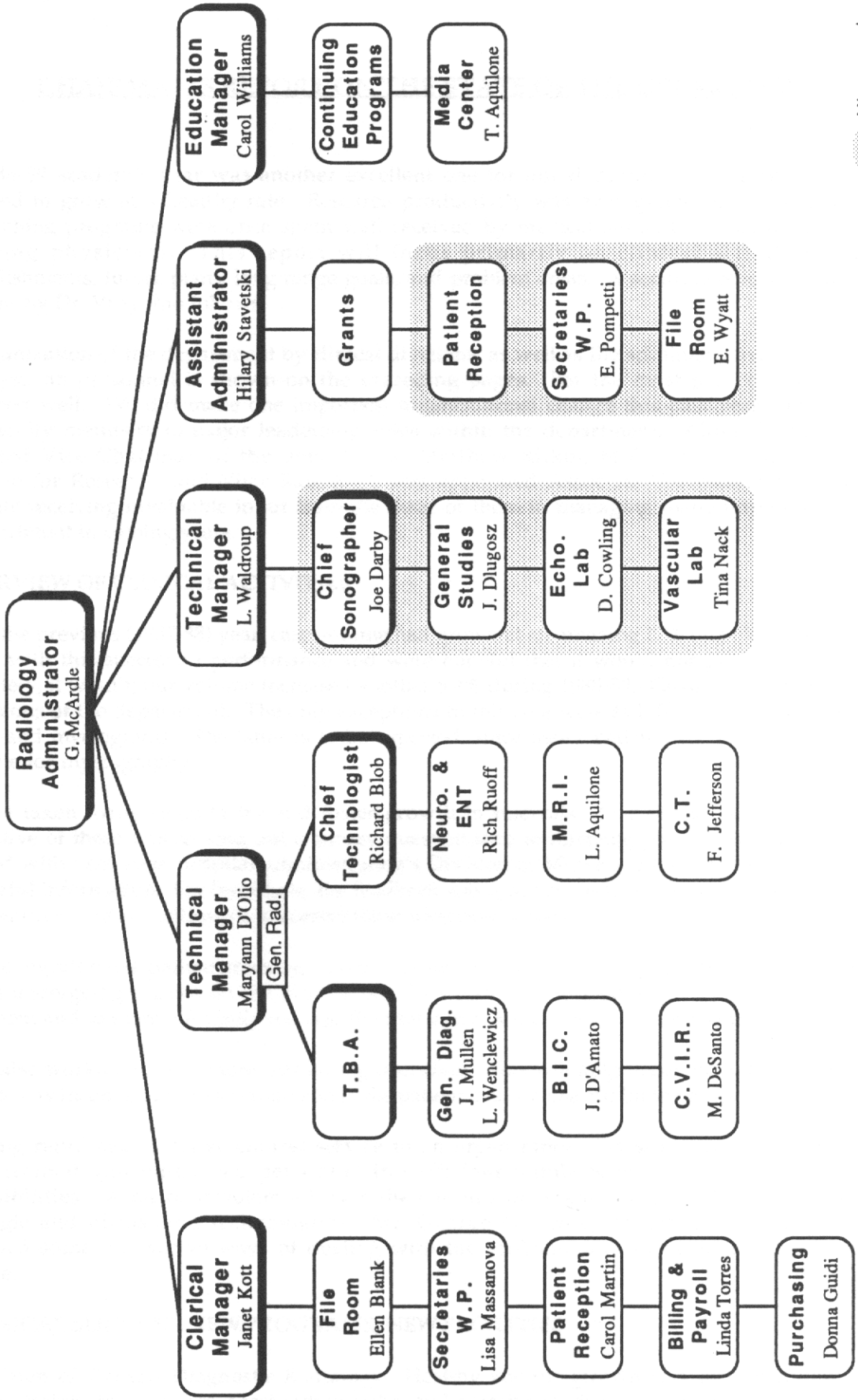
Gerard L. Helinek, M.D.
Jack I. Lane, M.D.
Michael Miller, M.D.
Harry E. Pinkus, M.D.

* * * * *

Department of Radiology



Department of Radiology



● Ultrasound

CHAIRMAN'S REPORT ON THE STATE OF THE DEPARTMENT

The 1988-89 academic year was another excellent one for our department. Our clinical caseload continued to grow at a healthy rate. Research productivity was even greater this year than before. Our teaching programs were once again well received by medical students, residents, fellows, and practicing physicians. This report will focus primarily on clinical activities, research accomplishments, future plans, long range goals, and problem areas. A separate report on educational programs by Dr. Vijay Rao follows.

The organization of the department by clinical divisions, as well as the administrative organization of non-physician personnel is shown on the preceding pages. For the most part, this structure has functioned well. We did make one important organizational change this past year - the naming of three faculty members to major leadership roles within the department. Alfred Kurtz, M.D. was appointed Vice Chairman of the department; Matthew Rifkin, M.D. was appointed Associate Chairman for Research, and Vijay Rao, M.D. was appointed Associate Chairman for Education. I anticipate receiving invaluable input from the three of them in managing many important aspects of the department in coming years.

I. OVERVIEW OF CLINICAL ACTIVITIES

During the previous (1987-88) year, case volume had grown at an amazing 17% rate. We were obviously pleased with this successful performance and were hopeful that it would not prove to be transitory. Fortunately, it wasn't; our volume increased another 8.4% during 1988-89. Growth occurred in virtually all divisions of the department. The only exceptions to this rule were falloffs in the volume of barium enemas and myelograms. The latter is to be expected, since many patients are undergoing MRI as a substitute for myelography.

We have taken many steps to try and foster growth in referrals. One of the more interesting and informative of these was to send out a survey questionnaire to referring physicians. This survey was designed with help from hospital administration's Division of Marketing and Planning and provided very useful information. On the whole, the feedback was quite positive; however, a few problem areas were identified and we will work to correct these wherever possible.

A new computerized patient tracking system, using bar code technology, was implemented for all patients undergoing studies on the third floor. This allows us to monitor every patient's stay in the department and to more efficiently manage the utilization of examining rooms and technical personnel.

We are also working to streamline our billing operation. This will help make the bills less impersonal, minimize any inconvenience and confusion to the patient, and reduce our billing costs.

Providing rapid and effective clinical service in an organization this size requires the presence of highly trained and motivated personnel in sufficient numbers to be able to cover their job responsibilities. A major problem all over the country in recent years has been the shortage of radiologic and ultrasound technologists. Mr. George McArdle, department administrator, has developed some innovative ways of dealing with the problem, and these have helped offset the shortage.

II. CLINICAL SERVICES, NEW PROGRAMS, NEW FACILITIES

A. Division of General Diagnostic Radiology: Healthy volume growth was seen in abdominal and upper gastrointestinal studies, chest radiography, and portable studies. A new radiographic room was opened on 8-NH in the new orthopaedic area and another one was opened in the temporary Emergency

Room. A new chest unit was installed. A major renovation of the "ballroom" and the adjoining consultation room on 3-NH was carried out. A technical assistant has been assigned to the ballroom on a permanent basis. The latter two changes will help expedite film reading, improve the teaching environment, and improve the ambience for referring physicians and house staff who come through in large numbers every day. A pneumatic tube system has been installed in the ballroom with connections to the Emergency Room and the Operating Room. This will greatly expedite the transport of films and wet reading reports to and from these areas. Finally, an occupational lung disease film reading service has been undertaken by Drs. Steiner and Spirn.

B. Pediatric Radiology: Dr. George Gross has once again been able to significantly increase the volume of pediatric referrals; these were up 15% during the 1988-89 academic year, compared with 10% the previous year. He has managed a very effective integration of studies from Children's Rehabilitation Hospital (now part of Jefferson Park Hospital) with our department. He has also been able to more efficiently integrate ultrasound, CT, and MRI studies into his daily clinical and teaching activities.

C. Breast Imaging: The Breast Imaging Center had a procedure volume growth of 12.5% this past year. Dr. Feig and his colleagues have not yet reached the "magic plateau" of 100 studies per day, but they have come close on several occasions. There are plans underway to assure continued growth. This can be accomplished by adding a certain number of additional scheduling slots during slow periods. With the addition of ultrasound capability in the Breast Imaging Center, the radiologists there have begun performing percutaneous aspiration of breast cysts under ultrasound guidance. Also, a new quality assurance program has been instituted. This has for a long time been a major interest of Dr. Feig and Benjamin Galkin, M.S., and they have been a major force in setting high standards of image quality throughout the region. At present, Jefferson's Breast Imaging Center is the largest and best such facility in the Delaware Valley.

D. Cardiovascular/Interventional Radiology (CVIR): The new CVIR suite opened on 5-NH this past year. In addition to two state-of-the-art angiographic laboratories, the division now has a conference/reading room, five new faculty offices with a secretarial area, an office for the chief technologist and head nurse, an office for the fellows, storage areas, a holding unit for outpatients and post-procedure observation, and a waiting room for families. The holding unit will allow the division to become much more actively involved in outpatient angiography and interventional procedures, and we are attempting to publicize the availability of this service among referring physicians. The new procedure laboratories both have digital subtraction angiography capability, which will speed up the procedures as well as make them safer and less painful for patients. Two major new interventional procedures were introduced this past year. We started using percutaneous atherectomy for the treatment of occlusive peripheral vascular disease. Our initial results with this technique are very interesting and promising. It allows the radiologist to actually remove the obstructing plaque percutaneously, as opposed to balloon angioplasty which cracks and redistributes the plaque. Percutaneous biliary stenting with the Gianturco stent was also introduced. This is an internal biliary stent which will allow us to open obstructions in the biliary tree on a long term basis without the need for externalized drainage catheters and drainage bags. The CVIR group also continued their innovative work with the Palmaz arterial stent. Currently 35 of these have been placed in obstructed iliac arteries, representing one of the largest clinical experiences in the country. These stents will hopefully optimize the results of percutaneous transluminal angioplasty and prevent restenosis.

E. Neuroradiology/ENT Radiology: Procedure growth was more moderate in this division, due primarily to our serious inability to provide clinical MRI services. As more and more of diagnostic neuroradiology shifts to MRI, there has been a slowing of growth in head and spine CT and an actual dropoff in myelography. These cases are, in effect, being lost to Jefferson since dozens of patients are being referred out each week to other MRI facilities by neurologists, neurosurgeons, and orthopaedic surgeons who are unable to schedule them on our single MRI unit. On a more favorable note, the introduction of gadolinium-DTPA as a contrast agent has enhanced the diagnostic capability of CNS MRI still further. Another recent development is the construction of new surface coils for studies of the neck and temporomandibular joints. The division is also taking steps to introduce interventional neuroradiological procedures on a broader scale. These procedures are very complex and difficult and require great technical skill. However, the results can be very dramatic in the treatment of certain

inoperative conditions, such as inaccessible cerebral aneurysms and large arteriovenous malformations and fistulas.

F. Division of Diagnostic Ultrasound: The Antenatal Evaluation Center completed its first year of operation and has been highly successful. Future rapid growth is anticipated. The AEC has been set up as its own cost center administratively. Significant growth also occurred in areas such as neonatal brain imaging, the use of color Doppler in both echocardiography and peripheral vascular studies, endovaginal studies, and ultrasound-guided interventional procedures like biopsies and drainages. The biliary lithotripsy program is growing successfully and we anticipate FDA approval of our unit during the coming year. There has been especially rapid growth in ultrasound imaging of deep venous thrombosis of the lower extremities; this procedure has largely replaced impedance plethysmography. Other relatively new procedures include transesophageal ultrasound of the stomach and esophagus and placental biopsies. Administratively, improved utilization of technologists has been achieved by cross-training general studies sonographers in the vascular and echocardiography areas. We have done the planning for an extensive renovation of the ultrasound reception and patient holding area and construction will take place during the forthcoming year. Overall, ultrasound showed a 9.4% increase in volume over the previous year. We have the largest and best ultrasound facility in the country and obviously the word continues to get around.

G. Division of Body CT: This division has shown the most vigorous growth of all our divisions, with a 25% increase in volume during the past year. Scheduling hours of the scanner on 3-NH have been extended until 11:00 PM every weeknight, and Body CT has also begun to utilize some empty slots on the Main-10 neuro CT scanners. Dr. Richard Wechsler and his colleagues are working hard to reduce the backlog of cases. Several new services are being offered - including assessment of vertebral bone mineral content, routine use of high resolution (thin slice) scanning on all thoracic CT studies, and CT portography of liver lesions to increase the sensitivity of detection of liver metastases preoperatively.

H. Division of MRI: This has been a frustrating year, because of our aforementioned inability to provide adequate clinical MRI services to referring physicians and patients. When approval was first granted by the Board of Trustees over 1 1/2 years ago for the addition of a second MRI unit, we had hoped that rapid progress would occur toward this goal. For a variety of reasons (some unforeseen), this progress has been much slower than anticipated. Nevertheless, we performed almost 3200 MRI examinations this past year. This represents a very productive output (Pennsylvania health planning agencies consider 2000 cases to be full utilization of an MRI scanner), given the fact that many of our patients are seriously ill inpatients who require prolonged set-up times and multiple imaging sequences. We have now completed plans for a new facility in a building to be constructed on Walnut Street between 9th and 10th Streets. Fortunately, this space will contain two magnet bays. The first unit will be installed as soon as the building is completed, and the second one should be installed shortly thereafter, if not simultaneously. Careful projections of future clinical needs have been made, and these show that Jefferson clearly has sufficient demand to fill three MR imagers. We expect to have this facility in operation by the summer of 1990. On the unit on Main-10, several new capabilities have been added this year. These include a major hardware upgrade which will allow more rapid scanning and cine MRI (particularly useful for cardiac studies). Improved surface coils have also been introduced.

III. FUTURE CHANGES AND INNOVATIONS

Our most important project for the coming year is to work with university administration, the architects, and construction managers to complete the new MRI facility on Walnut Street between 9th and 10th Streets. This will occupy the first floor of Jefferson's new Clinical Office Building and will house two magnet bays as noted above. The lack of adequate MRI capability has been our most serious shortcoming within the recent past, and the new units will enable us to once again meet our commitments to patient care and research in a satisfactory manner.

On a related front, we have concluded an agreement with TME, Inc., a medical ventures firm, to open an MRI facility in Lower Bucks County. This facility will be owned and operated by TME but our department will provide all professional coverage. It should begin operation next winter. We see this

as an excellent opportunity to expand Jefferson's presence throughout the Delaware Valley, as well as to broaden our own base of experience in MRI. Our relationship with TME was developed with the full support and cooperation of the hospital administration.

Several new radiographic rooms will be opened in the hospital. One is the second radiographic room in the new orthopaedic suite on 8-NH. The others are a 2-room suite in the new Emergency Room. In addition, we will continue working with hospital administration on developing the radiology component of the new Patient Testing Center and central registration area which will eventually be located on the first floor of the Foerderer Pavilion. One possibility currently under consideration is installation there of one chest radiography room and a new CT scanner which would service trauma patients from the Emergency Room, as well as body CT outpatients.

Major renovations are planned in two different areas of the department. In Core 4 on 3-NH, the Franklin head unit and the polytome will both be relocated and this area will no longer be used for clinical examinations. A new radiology library will be constructed in that space, along with five new offices, a secretarial area, and a storage area. The new radiology library will be approximately 50% larger than the present library and will be a great improvement over the current dingy, crowded, and unattractive space. On 7-Thompson, the ultrasound reception area will be completely renovated to make the area more attractive and convenient for patients. This renovation will also allow us to add some space to the Antenatal Evaluation Center.

Several new computer and communications innovations are under study. The very successful computer-based patient tracking system that has been instituted in the general diagnostic division is also to be instituted in ultrasound. We will investigate the possibility of computerized patient scheduling throughout the department, particularly for those outpatients whose referring physicians wish to schedule multiple examinations on the same day. This was identified as a problem area on the recent survey of referring physicians. Also under consideration is the possibility of installing a rapid telephone access system for radiology reports which have been dictated. This would allow a referring physician or house officer either inside or outside the hospital to immediately access a dictated report by phone as soon as the dictation has been completed. This type of system is in use in a number of other hospitals around the country, and has proven to be very popular. It would also improve the efficiency of report transcription.

Finally, we are working with members of the Department of Surgery to develop a Jefferson Vascular Disease Center. This would enable patients with peripheral vascular disease to be jointly evaluated, treated, and followed by vascular surgeons and interventional radiologists in a collaborative, rather than competitive, manner. Vascular disease specialists from the department of medicine, as well as vascular ultrasound experts from our own division of diagnostic ultrasound would also be heavily involved. We hope to attract more peripheral vascular disease patients to Jefferson with this approach, and to provide them with better care.

IV. RESEARCH ACCOMPLISHMENTS

Our department has once again had a very academically productive year. In last year's annual report, I was very pleased to note that we had given 24 presentations at the 1987 RSNA, the most important of all annual radiology meetings. At the 1988 RSNA, we had no fewer than 32 presentations - certainly one of the largest representations among all academic radiology departments. Scientific presentations were made by Drs. Pennell, Mitchell (2), Shapiro, Rao, Sullivan, Blum, Goldberg, Rifkin (3), Vinitzki, Steiner, Boone (2), Bonn, Guglielmo, Consigny, Burk, and myself (2). Refresher courses and symposium presentations were made by Drs. Feig (2), Spirn, Rifkin, Gardiner, and myself. Scientific exhibits were shown by Drs. Kurtz, Steiner, Gross, Galkin, and Wang. Many other department members participated in these projects as co-investigators.

In the area of active research grant support, the department currently has committed external grant support totaling \$2,365,524 (\$1,607,876 total direct and \$757,648 indirect). Details are shown in Appendix A. Last year's funded projects include the following: John Boone, Ph.D. has studied in vivo x-ray spectroscopic mammography (NCI-supported). Macke Consigny, Ph.D. has studied angioplasty-

induced release of mitogens from atherosclerotic arteries (AHA), factors responsible for post-angioplasty restenosis (W.W. Smith Charitable Trust), and effects of balloon and laser thermal angioplasty on atherosclerotic arteries (American Health Assistance Foundation). Barry Goldberg, M.D. has continued his high level of grant-funded research, working on the effects of prenatal ultrasound on post-natal development, characterization of atherosclerotic plaque by ultrasound, ultrasonic tissue characterization, and Doppler B-mode breast scanner construction. The first of these is directly funded by NIH; the others are NIH-funded through sub-contracts. Matthew Rifkin, M.D. is funded by NIH to study prostate cancer staging by various imaging modalities as part of the National Collaborative Diagnostic Imaging Project. Larry Needleman, M.D. is funded by NIH to study Doppler screening for pregnancy-induced hypertension. This is the largest single grant in the department and, once again, he is to be congratulated for obtaining this degree of support early in his career. Finally, several investigators received support from the Center of Excellence in Biomedical Imaging (the collaborative program involving our department and the Biomedical Engineering and Science Institute of Drexel University), funded through the Ben Franklin Partnership of Pennsylvania. Under this program, Simon Vinitzki, Ph.D. was supported in his studies of flow evaluation and plaque characterization by MRI. Peter Burns, Ph.D. studied calibration of acoustic intensity and beam shape in ultrasound and Doppler, contrast agents for ultrasound, and techniques for obtaining Doppler measurement of blood flow in splanchnic vessels.

During the past year, we have been able to add to our research space. An experimental procedure laboratory was opened on Curtis-12 utilizing replaced angiographic equipment. Dr. Consigny has opened an in vitro vascular laboratory in the Department of Physiology at Jefferson Alumni Hall. We greatly appreciate the support of Allan Lefer, Ph.D., Chairman of the Department of Physiology, in providing the latter space to Dr. Consigny. Renovation of the southeastern corner on Main-8 has allowed us to enlarge the research space used by both Drs. John Boone and Peter Burns.

V. FUTURE RESEARCH PLANS

During the 1989-90 academic year, clinical and basic research will proceed along a variety of fronts. In the General Diagnostic Radiology Division and the Pediatric Radiology Division, research will be conducted in areas such as CCD mammography, imaging in hematologic disease, dual energy radiography in detection of pulmonary nodules, the use of neural networks in analyzing both pulmonary nodules and neonatal chest radiographs, and the applications of digital radiography to portable films and pediatric chest films. The Breast Imaging Division will work on mathematical modeling for determining both radiation risk from mammography and the benefits and risks of screening for breast cancer. The Division of Cardiovascular/Interventional Radiology will begin to implement the Delaware Valley Transluminal Revascularization Registry, which has recently been organized by Dr. Geoffrey Gardiner, Jr. in conjunction with other individuals at HUP and the American College of Radiology and which hopefully will become the first large multi-center database in peripheral vascular interventional procedures. The division will also embark upon a study of endovascular ultrasound, in an attempt to visualize blood vessels from the inside rather than the outside (as occurs with angiography). Two separate prototype research instruments will be used for these studies. This is a joint collaboration with the division of diagnostic ultrasound. Additional studies of relatively new interventional techniques, like arterial stent placement, atherectomy, biliary tract stent placement, and percutaneous inferior vena cava filter insertion will be continued. In the Division of Neuroradiology/ENT Radiology, work will continue on the MRI findings in cervical spine trauma and the development of MR angiography of the carotid and vertebral circulations. Dr. Mishkin will begin as Jefferson co-investigator on a large NIH-funded grant through the University of California-San Diego comparing the side effects of intravenous non-ionic contrast agents both with and without steroid pretreatment. The division will also conduct experimental and clinical studies of interventional techniques in the treatment of cerebral aneurysms and arteriovenous malformations. Additional areas of interest include correlation of EEG mapping of the brain with both CT and MRI, and infusion of thrombolytic agents into cerebral arteries in stroke patients. In the Division of Diagnostic Ultrasound, investigators will collaborate with the CVIR division on the endovascular ultrasound project. Drs. Goldberg, Rifkin, Needleman, and Burns will continue their funded research, as outlined earlier. Additional work will be done on ultrasound contrast agents in non-cardiac applications, color Doppler techniques for imaging of the neonatal brain, and new techniques for early detection of hydrocephalus

in utero. This division has for many years been one of the major centers of ultrasound research in American radiology and their productivity continues unabated. The Body CT Division will study the efficacy of CT in staging breast cancer, the relative roles of CT and ultrasound following inferior vena cava filter placement, the yield of abdominal CT in head and neck trauma, and the efficacy of CT in evaluating postoperative liver transplant patients. The MRI Division will utilize fat suppression techniques for the evaluation of prostate cancer. They will evaluate blood flow and atherosclerotic plaque characterization by both MRI and Doppler. Fast imaging and 3-dimensional imaging techniques will continue to be expanded. They will also attempt to determine the proper pulse sequences to use in detecting subtle liver pathology.

All of the above represents just some of the clinically oriented research planned for the coming year. I am also very pleased with the way our basic research activities are proceeding. Drs. John Boone, Peter Burns, and Simon Vinitzki continue their excellent work in, respectively, radiologic imaging and image processing, ultrasound physics, and MRI physics. The past year has seen the arrival of P. Macke Consigny, Ph.D. as our Director of Physiological Research. His addition to our faculty has been a great boost for our experimental research program. Not only has he opened two new research laboratories and continued his own ongoing research, but he has greatly assisted a number of other investigators in the department in setting up experimental projects. Some of the future plans of these four Ph.D. scientists are as follows: Dr. Boone will study color spectroscopic imaging in mammography, the application of neural networks in diagnostic imaging, reduction of bowel gas motion artifacts in digital subtraction angiography, comparison of 512 vs 1024 matrices in digital subtraction angiography and their relative effects upon image quality, and corrections for scatter and veiling glare in image intensified fluoroscopy. Dr. Burns will continue work on better noninvasive methods for measuring blood flow, the production of appropriate beam geometries for uniform insonation, endovascular ultrasound tissue characterization, and correlation between ultrasound indices of vascular resistance and true impedance. Dr. Vinitzki will work on atherosclerotic plaque characterization by MRI, fast 3-dimensional MR imaging, mathematical modeling of the behavior of bulk magnetization during MR imaging, expansion of chemical shift imaging to larger anatomical regions, and flow behavior in the presence of variable aortic stenosis. Dr. Consigny will continue his studies comparing balloon angioplasty to the combination of laser thermal angioplasty and balloon angioplasty, the release of mitogens from normal and atherosclerotic arteries after balloon angioplasty, and mechanisms by which arterial sensitivity to serotonin is increased.

VI. LONG RANGE GOALS

In the clinical sphere, our most important goal is to maintain the very healthy growth rate in procedure volume that we have experienced during the past two years. This is all the more important in view of the fact that congressional legislation is now pending which will significantly reduce Medicare reimbursements to radiologists. At the moment, there are a number of important areas for potential growth in the department. These include MRI, body CT, breast imaging, the Antenatal Evaluation Center, cardiovascular and neuro interventional procedures, vascular ultrasound, and lithotripsy. In order to achieve this growth, we must rededicate ourselves to providing rapid, accurate, and sympathetic patient care. Although I believe we are performing effectively in this area (especially since we are a very large and widely dispersed department), there is always room for improvement. Further developments in computerized scheduling and rapid telephone access to dictated reports are currently under study as possible ways to improve our diagnostic services. We must expand our capabilities in providing some of the new techniques that are becoming clinically useful. These include xenon cerebral blood flow studies, CT bone densitometry, color flow Doppler, MR angiography, new interventional techniques, and others. Finally, we must expand beyond the confines of the campus wherever this is feasible and appropriate. One such venture is our association with TME, Inc. to develop an outpatient MRI center in Lower Bucks County. We are already actively discussing with them the possibility of a second locale in the Philadelphia area. The recently-announced affiliation of Jefferson with the DuPont Institute will provide an opportunity to expand our activities in pediatric radiology.

In the research sphere, our overriding goal is to continue the excellent momentum our research program has developed, and to ultimately reach the point of being considered one of the major research centers

in academic radiology. The progress made in the last several years has brought us close to this goal, but more work is still required. There are many future avenues for productive research, and we must choose those which best match the talents of our faculty and the facilities we have on hand. We have established close working relationships with other departments in the university, and it will be mutually beneficial if we can collaborate on interdisciplinary research with those other departments. It has been very gratifying to note the manner in which our Ph.D. scientists have expanded the research scope of our department. It is important to maintain the close working relationships they have developed with our clinical radiologists. Finally, it is hoped that our grant funding by NIH and other external sources will continue to increase. Our funding is already higher than many other academic radiology departments have been able to achieve, but I think it can be improved upon, especially if we are able to obtain better laboratory facilities from the university.

In the teaching sphere, we have been highly successful in attracting outstanding candidates for our residency program. Recruitment of fellows has proven to be somewhat more difficult, and we must continue our efforts to make our neuroradiology, CVIR, and US/CT/MRI fellowships as attractive as possible. We must continue to expand our educational programs for practicing physicians. One important avenue is the development of preceptorship programs, wherein practicing radiologists come to our department for periods ranging from several days to several weeks to upgrade their knowledge in one or more of our clinical divisions. Another is the development of new continuing education courses. Under Dr. Barry Goldberg's leadership, our division of diagnostic ultrasound has had a large and successful continuing education program for years. During the past year, the CVIR division sponsored two continuing education courses which were quite successful, and they anticipate expanding this next year. Hopefully, other divisions will become active in this area as well.

VII. PROBLEMS

The biggest problem facing our department, as well as all of Radiology, is the major cuts which were proposed as part of the Harvard Resource-Based Relative Value Scale and subsequently supported by the Physicians' Payment Review Commission. I will curb my inclination to say a few choice words about Dr. Hsiao's preconceived approach to the issue of physician reimbursements. Suffice it to say that it seems likely that these cuts will be enacted in some form by Congress and that Radiology will take a significant "hit". We have discussed this at some length during faculty meetings this past year, and I am confident that our department can surmount this problem by continuing to increase our volume of studies while at the same time doing a certain amount of belt-tightening. Essentially, what must be done is for us to continue enlarging our patient referral base with little or no increase in the size of our clinical faculty. During the past three years, our caseload has increased by a total of 28.3%, so we are on the right track.

If we are to grow, we obviously must have the necessary equipment. It has been extremely frustrating to the entire department to be unable to provide necessary MRI services to our patients and referring physicians. A new MRI facility is finally under construction on Walnut Street; this will contain two magnet bays. At present, we have approval to install the first magnet immediately upon completion of the building. We are endeavoring to obtain approval from the senior officers and board of trustees for simultaneous purchase and installation of the second magnet. Since all of our projections and all of our referring physicians clearly indicate that there is a need for three magnets at Jefferson, we are hopeful this approval will be given. We are also at the point where additional CT capacity will be needed. We are seeing a rapidly increasing demand for body CT (25% growth during the past year) and it has been difficult to keep up with this demand. One of our three CT scanners is now obsolete and a replacement will be needed. Hopefully, a new scanner can be placed on the ground floor of the Foerderer Pavilion in the new Patient Testing Center, where it could be used for both emergency room CT studies and outpatient body CT.

We are short on research space. We currently have four Ph.D. scientists and a fifth (Talin Tasciyan, Ph.D., an MRI physicist) will be joining us shortly. All are heavily involved in research. In addition, a number of faculty radiologists are also actively involved in experimental work, particularly in the ultrasound, CVIR, and MRI divisions. With this much basic research activity, additional laboratory space is needed. Hopefully, this will be provided to us by the University when the Life Sciences

Building opens up and space becomes available in Jefferson Alumni Hall.

Maintaining an adequate group of support personnel is a potential problem area. As indicated earlier, we are exhibiting rapid growth in a number of clinical divisions - particularly MRI, body CT, breast imaging, and ultrasound. At the same time, our resources are being strained by the 24-hour demands placed upon us by the trauma center. All of this creates additional needs for personnel to staff the department. There has been some reluctance on the part of the institution to support this. A related problem is to recruit and retain good personnel. There is a serious shortage of radiologic and ultrasound technologists in this country, and we must do everything possible to make Jefferson an attractive place to work.

A final problem pertains to clinical space. As has always been the case, our department is geographically dispersed. We currently operate facilities on 3-NH, 5-NH, Main-7, Thompson-7, Main-8, Main-10, the Breast Imaging Center, the Emergency Room, the Sports Medicine Facility, and the orthopaedic area on 8-NH. Future plans call for additional operations in the new Walnut Street MRI facility, the Patient Testing Center and the off-campus MRI facility. It is difficult to maintain economies of scale or efficient use of personnel under these circumstances, and faculty coverage of so many different areas is also a problem. All the aforementioned clinical areas will be adequate in size for the coming year with the exception of Main-10. There we are already overcrowded, and the space shortage will become acute during the next year when we will begin coverage of perhaps as many as four new MRI units. The hospital has some underutilized space on Main-11 which hopefully will be made available to us. In coming years, it is likely that the ultrasound and body CT divisions will also need some additional space for clinical activities.

VIII. ISSUES FOR THE COLLEGE AND UNIVERSITY

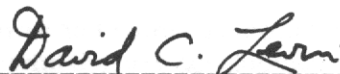
Some of the issues I alluded to in last year's report still remain. First of all, as Jefferson expands in a number of important directions such as the new Life Sciences Building, the Dupont Institute, the Clinical Office Building (including the new MRI facility), and possible new acquisitions on the east side of the campus, proper planning and management will be a formidable challenge. Secondly, it is important to provide necessary research space to the clinical departments, which bring in most of the revenues to support the University. It appears that some of the basic science departments will be nicely taken care of in the Life Sciences Building, but the clinical departments have similar needs. A third broad issue is the need to assess and appropriately introduce the expensive and complex new technologies with which organized medicine is constantly being confronted. A final issue is the selection of a new President of Thomas Jefferson University. Dr. Bluemle has announced his retirement, effective at the end of June 1990, and it will be a challenge to select a replacement who can bring the same insight, thoughtfulness, intelligence, and leadership qualities he brought to the position. It is vital that the person chosen have goals and a management philosophy that are completely compatible with those of Jefferson's present senior officers. They are steering the correct course for the institution and any radical change would be quite risky.

IX. CONCLUSION

The past year has been another outstanding one for the department of radiology in terms of clinical growth, research productivity, and teaching programs. We have built an excellent faculty group and all of us can feel a collective sense of pride at what has been accomplished. Although I have alluded above to certain problems and issues, I continue to feel optimistic about what the future holds for us.

In closing, I want to pay special tribute to certain individuals. Within the department, Mr. George McArdle, departmental administrator, has been a tremendous asset and a major factor in our growth and development. He is clearly one of the best (perhaps *the* best) in his field in the entire country. Great credit is also due to the excellent supervisory and administrative people who work with him. Outside of the department, we continue to be fortunate to have superb leadership among Jefferson's senior officers. Within the past year, Dr. Joseph Gonnella, Mr. Michael J. Bradley, Mr. Thomas J. Lewis III, and Mr. Bart Murtaugh have all received promotions. These are richly deserved; all have done outstanding jobs, and I have found them to be knowledgeable, forthright, and supportive of the

department. President Lewis W. Bluemle, Jr. has provided Jefferson with outstanding leadership for 12 years and he will be sorely missed after his retirement. On behalf of the radiology faculty, I want to express our thanks to these individuals and the many others who have worked so well with us to further Jefferson's goals.



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

TEACHING PROGRAMS

Vijay M. Rao, M.D.
Associate Chairman (Education)

INTRODUCTION

As the field of radiology continues to grow into newer and more advanced imaging technologies, so has our educational curriculum expanded to keep pace with the new developments. A multitude of teaching programs for medical students, residents, non-radiology house staff and several continuing medical education (CME) courses are offered by the Department of Radiology. In addition to the ever-popular visiting fellowship programs in the Division of Ultrasound, an increasing interest was noted in visiting fellowships offered by the Divisions of Body Computed Tomography and Magnetic Resonance Imaging. Because of the tremendous time and effort required for the proper organization of such courses, Carol Williams, B.S., R.D.M.S. was appointed as the Education Manager. Carol has done an outstanding job of supervising all aspects of the various educational programs and courses. A particular highlight of the year was the successful completion of the **Second Annual Hodes Lecture** in honor of Phillip J. Hodes, M.D. The invited speaker for 1988-89 was Stanley Baum, M.D., Professor and Chairman of Radiology at the Hospital of the University of Pennsylvania. Dr. Baum is a highly respected physician and educator, and is considered a true giant in the field of Radiology. He gave an outstanding presentation on "Academic Radiology - Past, Present and Promise for the Future." The lecture and reception were attended by approximately 160 guests.

A. RESIDENCY PROGRAM

Our residency program is nationally known for its excellent reputation. We received 254 applications for five positions and interviewed 49 applicants. We filled our five positions from our top ten choices in the National Interns and Residents Match Program (NIRMP), a record that is hard to beat. The five candidates who will begin residency in July 1990 are from Harvard Medical School, Johns Hopkins University, Brown University, Northwestern University and Jefferson Medical College. Our four residents who started in July 1988 are all outstanding.

It is my pleasure to report that each of our six graduating residents passed the written and oral portions of the American Board of Radiology examination. Program performance average in the written part of the examination ranked in the 97th percentile for physics and 94th percentile for diagnostic radiology. This, in part, is a reflection of our faculty for their dedication and interest in teaching. Two of our graduating residents were accepted into excellent fellowship programs in academic institutions. Paul Davis, M.D. will begin a fellowship in Cardiovascular/Interventional Radiology at Yale Medical Center and Richard Shlansky-Goldberg, M.D. will be a fellow in the same subspecialty at Hospital of the University of Pennsylvania. The remaining four graduates will be joining private practice groups. It is gratifying to note that 6 of our 15 graduating residents and fellows have been accepted into fine academic positions.

Clinical Training: The American Board of Radiology requires four years of training in diagnostic radiology, regardless of prior post-graduate training. The residency training program is designed to accommodate the increasing demand for sub-specialization among radiology trainees. The core curriculum is completed in 3 years, during which 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, ultrasound and pediatric radiology. The residents spend 2 months in magnetic resonance imaging and 4 months in nuclear medicine. In the fourth year, residents have the option of taking elective rotations in one or several of these areas.

Resident and Teaching Conferences: Throughout the four years of residency, our residents attend 2 hours of conferences in diagnostic interpretation given daily by attending staff. 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. Interdepartmental *Radiologic-Pathologic Correlation Conferences* continued to be very popular. Moderated by Vijay M. Rao, M.D., interesting cases are discussed by the senior residents and followed by final pathologic diagnosis presented by the pathologist. *Pediatric Case of the Week* presented by George W. Gross, M.D. was again rated highly by the residents. 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. *Radiologic Physics Course (RAD 521)*, reorganized by the physics faculty and given during the summer of 1988, was received by the residents with great enthusiasm. It consisted of 52 hours of lectures. The first year residents attended a short introductory course for 5 hours given separately.

B. TRAINING PROGRAMS 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 process of certification.

Cardiovascular/Interventional Fellowships: The Cardiovascular/Interventional Fellowship has been extended to three fellowship positions offered yearly for a one or two year period and is under the direction of Geoffrey A. Gardiner, M.D. The first year consists of two months in the non-invasive vascular lab and ten months in the combined vascular/interventional service. Interpretation of cardiac angiograms is taught during a combined conference with the cardiologists. A ten 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. One of our recent graduates, Bennett Kashdan, M.D., will be joining the faculty at New York Hospital, Cornell University. The other two were successful in securing positions of their choice in private practice.

Neuroradiology/ENT Fellowship: The Neuroradiology/ENT Fellowship is a two year program with two fellows appointed each year for a total of four fellows. This fellowship is under the direction of Carlos F. Gonzalez, M.D. The Division has state-of-the-art angiography (including digital subtraction), myelography, CT and MRI equipment all located adjacent to dedicated Neuroradiology/ENT film interpretation and consultation areas. Extensive training is given in interpretation of plain films, tomograms, CT and MRI examinations as well as in the technical aspects and interpretation of myelograms, neuroangiograms and in interventional neuroradiologic procedures. Daily film interpretation and reporting is done with the Neuroradiology Staff. There is weekly active participation in Neurosurgery Grand Rounds, Neurology Grand Rounds, ENT Grand Rounds, Head and Neck Tumor Conference as well as two weekly Neuroradiology Conferences for residents and a weekly conference with the clinical staff of Jefferson's Regional Spinal Cord Trauma Center. There are regular working conferences with the neuropathologists for neuroradiology-neuropathology correlation. Ample opportunities exist for research at the clinical and basic science level and are strongly encouraged. The graduating fellow, Adam Flanders, M.D., will be joining the faculty here.

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 rotations in ultrasound, body CT and body MRI and 2 months of research. This fellowship is under the direction of Barry B. Goldberg, M.D. 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 body and extremity studies and the physics involved with image production. Out of the six graduates, Steven Cohen, M.D. will be joining the faculty here. Cathy Piccoli, M.D. accepted a staff position at Hahnemann University. The other four will be joining private practice groups.

C. TEACHING PROGRAMS FOR MEDICAL STUDENTS AND NON-RADIOLOGY HOUSE STAFF

Freshmen Medical Students: Under the direction of Vijay M. Rao, M.D., the *Radiological Anatomy* course emphasizing cross-sectional anatomy by CT and MRI for the first year students continued to be a great success. Designed in conjunction with Dr. Richard Schmidt 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. This course consists of five sessions and covers various anatomic regions of the body.

Junior and Senior Medical Students: The department offers five separate electives in radiology for junior and senior medical students. One or more of these courses were elected by approximately 139 junior and senior class members of Jefferson Medical College.

General Radiology Elective RAD 401-01: This course is 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 RAD 401-01 elective was completed by 108 students either at Thomas Jefferson University Hospital or at affiliated hospitals/outside institutions. The house staff officers from the Department of Medicine also took this elective and found it to be a worthwhile experience.

The students 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 in small groups of 3 to 4 students. Students have the opportunity to interact on a one-to-one basis with faculty members, fellows and residents. The students attend 2-3 hours of conferences daily. An extensive teaching file is available for review. 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.

Neuroradiology Elective RAD 403-01: This elective is supervised by Carlos F. Gonzales, M.D. and was elected this past year by 8 students. The students are exposed to the entire gamut of neuroradiological procedures including angiograms, myelograms, computed tomography, and magnetic resonance imaging. The students are given the opportunity to attend and participate in all neuroradiological and otolaryngological radiology conferences. A teaching file of outstanding cases is available for their use.

Pediatric Radiology Elective RAD 405-01: This elective is supervised by George W. Gross, M.D. and was taken by 2 students. The students participate in plain film interpretation and observe special diagnostic procedures on pediatric patients. They attend all teaching conferences of the Department of Pediatrics at which our pediatric radiologist serves as a consultant. A pediatric radiology teaching file is available.

Cross Sectional Imaging (Ultrasound, Computed Tomography, and Magnetic Resonance) Elective RAD 406-01: This elective is supervised by Barry B. Goldberg, M.D. and Rick I. Feld, M.D. Each medical student rotates for an interval of two weeks in ultrasound, one week in CT, and one week in MR. An extensive videotape library on cross-sectional imaging is available for their use. The students also rotate within the various areas of CT and MR. This elective was completed by 6 senior students.

Cardiovascular/Interventional Radiology Elective RAD-407-01: This elective is supervised by Geoffrey A. Gardiner, M.D. and was chosen by 3 senior students. During their month in Cardiovascular/Interventional Radiology, students will become familiar with the wide range of procedures performed by the radiologist by first-hand observation of cases. By the end of the month, the students will have a far better understanding of both the diagnostic and interventional capabilities of this section of the Department of Radiology, thereby enabling them to become more familiar with the management of patients with vascular disease and biliary or renal obstruction.

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 to residents who are given only a minimal knowledge of a patient's history. Similar pediatric case presentations were given by George W. Gross, M.D. for the pediatric house staff.

D. CONTINUING MEDICAL EDUCATION PROGRAMS

Radiology Grand Rounds: Grand Rounds in Radiology were held bi-weekly and covered topics of interest in all radiology subspecialties. In the 16 Grand Rounds sessions given during the year, 14 were presented by invited speakers and 2 by the department faculty. A program of speakers and their topics is included at the end of this section.

Radiology Research Conferences: The bi-weekly Radiology Research Conferences were continued this year under the direction of Matthew D. Rifkin, M.D. This conference allows the faculty, residents and fellows in the department the opportunity to present the results of their research activities. A listing of the research conference topics and their presenters is also included at the end of this section.

Ninth Annual Leading Edge in Diagnostic Ultrasound Conference: The ultrasound division's ninth annual Leading Edge in Diagnostic Ultrasound, held in Atlantic City, was a major success. This year's meeting featured two pre-conference tutorials on prostate ultrasound and vascular ultrasound. Each tutorial was approved for 6.5 CME Category I hours and the Leading Edge Conference was approved for 16 CME Category I hours. In addition to approximately 150 biomedical engineers, scientists, administrators, sales representatives, and business managers, 450 course participants qualified for CME hours.

Continuing Medical Education Courses: During the academic year, the Division of Ultrasound also offered 40 one to five day continuing medical education courses in ultrasound applications for abdomen, obstetrics and gynecology, Doppler ultrasound in vascular diagnosis, prostate, neonatal brain, physics and instrumentation, cross-sectional anatomy, and echocardiography.

The Division of Cardiovascular/Interventional Radiology also sponsored continuing medical education courses on laser angioplasty and intra-arterial thrombolysis.

Postgraduate Cardiac Radiology Review Course for Radiology Residents: The second citywide bi-annual refresher course in cardiac radiology for the residents directed by Robert M. Steiner, M.D. and David C. Levin, M.D. was well received. The course was held for 2-hour nightly sessions, one per week for 8 weeks, and was attended by approximately 50 residents.

RADIOLOGY GRAND ROUNDS

Sept.13, 1988	Choice of Approach to the Patient with Stones	Demetrius Bagley, M.D. TJUH - Urology
Sept. 20, 1988	Interventional <u>What?</u> - Relationships Between Radiologists and Commercial Manufacturers	Mr. Bill Cook Cook Incorporated, Bloomington, IN
Oct. 11, 1988	Functional Brain Imaging	Chan Park, M.D. TJUH - Nuclear Medicine
Oct. 25, 1988	Abdominal Imaging: Multimodality Approach to the Patient with AIDS	Michael Hill, M.B. George Washington Med. Ctr. Washington, DC
Nov. 8, 1988	Sex Education for the Radiologist	George Gross, M.D. TJUH - Radiology
Nov. 22, 1988	The Role of MR Spectroscopy in the Investigation of Brain Function	David S. Smith, M.D., Ph.D. Hosp. Univ. Pennsylvania
Dec. 6, 1988	Polyposis Syndromes with Emphasis on Clinical and Histopathology Correlation	Abraham H. Dachman, M.D. Uniform Serv Univ of Health Sciences, Bethesda, MD
Jan. 3, 1989	Renal Osteodystrophy Revisited	Akbar Bonakdar-Pour, M.D. Temple University Hospital
Jan. 17, 1989	An Interventional Approach to Peripheral Vascular Disease	Arina van Breda, M.D. Alexandria Hospital, VA
Jan. 31, 1989	An Interventional Approach to Basic Concepts and Clinical Applications of Lithotripsy	Wolfgang Dähnert, M.D.* Peter Lewin, Ph.D.† *TJUH Radiology †Drexel University
Feb. 14, 1989	Spectroscopy Applications in the Human Body	Robert E. Lenkinski, Ph.D. Hosp. Univ. Pennsylvania
Feb. 28, 1989	Musculoskeletal CT	Bernard Ghelman, M.D. Hosp. for Special Surgery, NY
March 14, 1989	The Health Effects of Electromagnetic Fields	Carl F. Blackman, Ph.D. Environmental Protection Agency, NC
March 28, 1989	MR Applications in the Chest: New Directions	Warren B. Gefter, M.D. Hosp. Univ. Pennsylvania
April 11, 1989	MR Applications of Magnetic Resonance in Head and Neck Imaging	Larissa T. Bilaniuk, M.D. Hosp. Univ. Pennsylvania
April 25, 1989	Clinical and Radiographic Update on Orbital Tumors	Jerry A. Sheilds, M.D. Wills Eye Hospital

RADIOLOGY RESEARCH CONFERENCES

Sept. 27, 1988	Evaluation of Ultrasound Contrast Agents	Barry B. Goldberg, M.D.
	Artifactual Color Doppler Noise within Anechoic Regions: Differentiation from Flow	Donald G. Mitchell, M.D.
Oct. 4, 1988	Porcine Model for the Development of Interventional Techniques in the Gallbladder	Kevin Sullivan, M.D.
Oct. 18, 1988	Obstetrical Measurements - The Ideal Circumference	Alfred B. Kurtz, M.D.
	MRI of Rotator Cuff Tears: Prospective Comparison with Arthrography, Ultrasonography and Surgery	D. Lawrence Burk, Jr., M.D.
Nov. 15, 1988	Lactate Observation by Spectra Editing in Real-Time	Simon Vinitzki, Ph.D.
	CT and US in the Evaluation of the Recently Inserted Greenfield Filter	Flavius Guglielmo, M.D.
	The Predictive Value of Ultrasound to Determine Retained Products of Conception Following Spontaneous Abortion	Richard Shlansky-Goldberg, M.D.
Jan. 10, 1989	Do Radiologists Control Imaging Studies? Survey Results from 198 Academic Institutions	David C. Levin, M.D.
	Do Radiologists Control Angiographic and Interventional Procedures? Survey Results from 198 Academic Institutions	David C. Levin, M.D.
	Prostate Cancer Staging: Prospective Comparison of Endorectal US and MR Imaging	Matthew D. Rifkin, M.D.
Jan. 24, 1989	Triple Correlation in Temporomandibular Joint Dysfunction: MR Imaging with Arthrography, Arthroscopy and Open Surgery	Vijay M. Rao, M.D.
	The Clinical and Radiographic Patterns of Relapse in Pulmonary Sarcoidosis: Relationship to Therapeutic Regimen	Robert Steiner, M.D.
	Poiseville's Law and Why it Doesn't Work	Peter Burns, Ph.D.
Feb. 7, 1989	Balloon Occlusion of the Carotid Artery in Patients with Neck Neoplasms	Carlos Gonzalez, M.D.
	Initial Clinical Experience with the Palmaz Vascular Stent	Joseph Bonn, M.D.
	Blood Flow in the circle of Willis Following Carotid Ligation in Newborn Infants: Variations Depicted by Color Doppler Imaging	Donald G. Mitchell, M.D.

Feb. 21, 1989	Image Contrast in Spin Echo and Gradient Refocusing MR Imaging as a Function of Field Strength	Simon Vinitiski, Ph.D.
	Improving Prostate MRI with Fat Suppression, Narrow Bandwidth, and Surface Coils	Matthew D. Rifkin, M.D.
March 7, 1989	Acceleration of Thrombolysis Using a High Dose Transthorbus Bolus Technique	Kevin Sullivan, M.D.
	Ultrasonic Tissue Characterization of Blood Clots Using Spectrum Analysis	P. Macke Consigny, Ph.D.
March 21, 1989	MR Imaging of Acute Cervical Spine Trauma: Correlation with Neurologic Deficit	Adam Flanders, M.D.
	Improvement in Signal to Noise Ratio and Correction of Chemical Shift and Motion Induced Artifacts by Summation of Gradient and Spin Echo Data Acquisition	Simon Vinitiski, Ph.D.
April 4, 1989	Release of Smooth Muscle Cell Mitogens	P. Macke Consigny, Ph.D.
	Fetal Myelography	Ashok Babaria, M.D.
April 18, 1989	Enhanced Resolution of Pituitary Fossa with 3D Fat Suppressed Gradient Echo MRI: Pre- and Post Gadolinium Enhancement	Vijay M. Rao, M.D.
	MRI Appearance of Aggressive Fibromatosis	Rick Feld, M.D.
May 16, 1989	MRI Differentiation of Fibrosis vs. Recurrent Colorectal Carcinoma in the Pelvis	Lorna Blum, M.D.
	Oblique Plane MR Imaging of the Brachial Plexus: Normal Anatomy	Tom Chang, M.D.
	Bone Marrow Findings on Magnetic Resonance Imaging of the Knee: Accentuation by Fat Suppression	E. Michael Harned, M.D.

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RESEARCH PROGRAMS AND GRANTS

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Fallopian Tube Recanalization	Joseph Bonn, M.D.	(non-funded)	Ongoing Clinical Research
Prospective Evaluation of Small-System IVC Filters	Joseph Bonn, M.D.	(non-funded)	Ongoing Clinical Research
Long-Term Evaluation of Palmaz Vascular Stent Patients	Joseph Bonn, M.D.	(non-funded)	Ongoing Clinical Research
In Vivo X-Ray Spectroscopic Mammography	John M. Boone, Ph.D.	National Institutes of Health (\$35,000)	Sept 1988 to Sept 1989
Development and Evaluation of a New Class of Contrast Agents for Ultrasound	Peter N. Burns, Ph.D.	State of Pennsylvania (\$9,150)	Mar 1989 to Sept 1989
Development of Novel Transducer Systems for Doppler Measurement of Blood Flow Rate in Splanchnic Vessels	Peter N. Burns, Ph.D.	State of Pennsylvania (\$17,710)	Mar 1988 to Sept 1989
Calibration of Acoustic Intensity and Beam Shape in Ultrasound Imaging and Doppler Instruments	Peter N. Burns, Ph.D.	Radiology Research Fund (\$150,255)	Mar 1988 to Mar 1989
Angioplasty-Induced Release of Mitogens from Atherosclerotic Arteries	P. Macke Consigny, Ph.D.	American Heart Association (\$18,000)	July 1988 to June 1989

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Factors Affecting Restenosis After Angioplasty	P. Macke Consigny, Ph.D.	W.W. Smith Charitable Trust (\$120,985)	Jan 1987 to Dec 1989
Effects of Balloon Angioplasty and Laser Thermal Angioplasty on Atherosclerotic Arteries	P. Macke Consigny, Ph.D.	American Health Assistance Foundation (\$20,000)	Apr 1988 to Aug 1989
Effect of Prostatic Weight on Levels of Prostate Specific Antigen	Wolfgang Dähnert, M.D.	Radiology Research Fund (\$1,450)	Ongoing Clinical Research
Carotid MRI Arteriography	Huynh T. Doan, M.D.	(non-funded)	Ongoing Clinical Research
An Independent Evaluation of the Technical Quality of Mammography in Accredited Facilities	Benjamin Galkin, M.S.	(non-funded)	Ongoing Clinical Research
Processor Control in Mammography	Benjamin Galkin, M.S.	(non-funded)	Ongoing Clinical Research
Intraluminal Vascular Stent Placement for Recannulation of Occluded or Stenotic Vessels	Geoffrey A. Gardiner, Jr., M.D.	Ethicon, Inc. (Supply of stents)	July 1987 to July 1990
Minimally Invasive Techniques for Characterization of Atherosclerotic Plaque	Barry B. Goldberg, M.D.	National Institutes of Health (with Drexel University) (\$100,179)	Sept 1985 to June 1989
Effects of Prenatal Ultrasound on Postnatal Development	Barry B. Goldberg, M.D.	National Institutes of Health (\$579,166)	Apr 1986 to Sept 1989

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Center for Biomedical Imaging	Barry B. Goldberg, M.D.	State of Pennsylvania, Ben Franklin Partnership (with Drexel University) (\$107,180)	Sept 1987 to Aug 1989
Ultrasonic Scattering Studies in Tissue Characterization	Barry B. Goldberg, M.D.	National Institutes of Health (with Drexel University) (\$101,413)	Mar 1982 to June 1991
Ultrasound Doppler B-Mode Breast Scanner	Barry B. Goldberg, M.D.	National Cancer Institute (with Medical Systems, Inc.) (\$96,143)	Apr 1987 to Aug 1990
In Vivo and In Vitro Evaluation of Ultrasound Contrast Agents	Barry B. Goldberg, M.D.	State of Pennsylvania, Ben Franklin Partnership (\$21,025)	Mar 1988 to Aug 1988
Doppler/B-Mode Breast Scanner	Barry B. Goldberg, M.D.	State of Pennsylvania, Ben Franklin Partnership (\$21,123)	Mar 1988 to Aug 1988
Application of Split Spectrum Processing to Ultrasound Contrast Enhancement in Tissue B-Mode Images	Barry B. Goldberg, M.D.	State of Pennsylvania, Ben Franklin Partnership (\$11,500)	Nov 1988 to Aug 1989
Ultrasound Contrast Enhancement in Tissue B-Mode Images	Barry B. Goldberg, M.D.	State of Pennsylvania, Ben Franklin Partnership (\$14,000)	Nov 1988 to Aug 1989
Ultrasound and Developmental Studies in Preterm Infants	Barry B. Goldberg, M.D.	National Institutes of Health (with Department of Pediatrics) (\$102,303)	Aug 1987 to July 1990
The Use of Fluorocarbon Emulsion as a Contrast Media in the Central Nervous System	Carlos F. Gonzalez, M.D.	Johnson & Johnson Co., (with Department of Neurosurgery) (non-funded)	Ongoing Clinical Research

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Balloon Occlusion of the Carotid Artery in Patients with Neck Neoplasms	Carlos F. Gonzalez, M.D.	(non-funded)	Ongoing Clinical Research
Adaptive 3-D Brain Surface Delineation from Magnetic Resonance Images	Carlos F. Gonzalez, M.D.	In conjunction with Drexel University, Department of Biomedical Engineering	Ongoing Clinical Research
Pressure-Flow Relationships in Canine Renal Arteries	Pamela L. Hilpert, M.D., Ph.D.	Departmental Research Grant (\$8,000)	1989 to 1990
Survey of Radiological Practice Patterns in Academic Institutions	David C. Levin, M.D.	(non-funded)	Ongoing Clinical Research
Coronary Stenosis Morphology	David C. Levin, M.D.	(non-funded)	Ongoing Clinical Research
Development of a Plan for Research of Radiology Residency Programs	David C. Levin, M.D.	(non-funded)	Ongoing Clinical Research
Defecography	Esmond Mapp, M.D.	(non-funded)	Ongoing Clinical Research
Regional Cerebral Blood Flow Utilizing MRI	Mark M. Mishkin, M.D.	Radiology Research Fund (\$5,650)	Apr 1988 to Apr 1989
MRI of Central Cord Injury	Mark M. Mishkin, M.D.	Radiology Research Fund (\$6,200)	Apr 1988 to Apr 1989

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Phase IV Post-Marketing Survey of Non-Ionic Contrast Agents Compared with Ionic Contrast Agents Plus Steroids	Mark M. Mishkin, M.D.	Winthrop Pharmaceuticals (\$500,000 in supply of contrast agents)	June 1988 to Mar 1989
Perisellar Meningiomas	Mark M. Mishkin, M.D.	(non-funded)	Ongoing Clinical Research
Video Interactive Teaching of Neuroradiology	Mark M. Mishkin, M.D.	American College of Radiology	Dec 1988 to Dec 1990
Doppler Screening for Pregnancy Induced Hypertension	Laurence Needleman, M.D.	National Institutes of Health/ National Cancer Institute (\$196,914)	1988 to 1993
Incidence of Carotid Artery Disease Following Cervical Irradiation	Vijay M. Rao, M.D.	Radiology Research Fund (\$2,000)	Ongoing Clinical Research
Triple Correlation in TMJ Dysfunction: MRI, Arthrography, and Arthroscopy/ Open Surgery	Vijay M. Rao, M.D.	(non-funded)	Ongoing Clinical Research
National Collaborative Diagnostic Imaging Trial - Prostatic Carcinoma	Matthew D. Rifkin, M.D.	National Institutes of Health/ National Cancer Institute (\$196,914)	July 1987 to June 1991
Improved Detection and Characterization of Breast Pathology by MRI	Matthew D. Rifkin, M.D.	Benjamin Franklin Partnership (\$20,350)	Oct 1988 to Oct 1989
DigiRad ROC Chest Nodule Detection	Gary S. Shaber, M.D.	Jefferson Associates in Radiology (\$1,125)	Mar 1989 to Mar 1990

Title of Project	Principal Investigator	Source of Support (amount)	Period of Support
Prospective Evaluation of the Potential Resectability of Pancreatic Carcinoma	Marcelle J. Shapiro, M.D.	(non-funded)	Ongoing Clinical Research
MRI Characterization of Hematologic Diseases	Robert M. Steiner, M.D.	(non-funded)	Ongoing Clinical Research
Roentgenographic Evaluation of Stage I Alveolar Cell Carcinoma	Robert M. Steiner, M.D.	(non-funded)	Ongoing Clinical Research
Relapse in Sarcoidosis, Radiographic Analysis	Robert M. Steiner, M.D.	(non-funded)	Ongoing Clinical Research
In Vitro Analysis of Porcine Gallbladder Mucosal Destruction	Kevin L. Sullivan, M.D.	Radiology Research Fund (\$2,000)	1989 to 1990
Biliary Stone Library	Kevin L. Sullivan, M.D.	Radiology Research Fund (\$1,125)	1989 to 1990
MR Chemical Shift imaging and Spectroscopy of Atherosclerotic Plaque	Simon Vinitzki, Ph.D.	(non-funded)	Ongoing Clinical Research
Flow Evaluation and Plaque Characterization by MRI and Doppler Ultrasound	Simon Vinitzki, Ph.D.	Benjamin Franklin Partnership (\$14,000)	Mar 1988 to Aug 1988

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ABSTRACTS

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SCIENTIFIC PRESENTATIONS

LORNA BLUM, M.D.

August 23, 1988

The 7th Annual Meeting of the Society of Magnetic Resonance in Medicine, San Francisco, CA

- "Recurrent colorectal cancer: Differentiation from fibrosis with MR imaging at 1.5 T"

November 29, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "MR imaging and differentiation of fibrosis versus recurrent colorectal cancer in the pelvis"

JOSEPH BONN, M.D.

November 27, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Initial clinical experience with the Palmaz vascular stent"

JOHN M. BOONE, Ph.D.

August 8, 1988

Annual Meeting of the American Association of Physicists in Medicine, San Antonio, TX

- "X-ray spectroscopic imaging"

November 12, 1988

Department of Physics, Villanova University, Philadelphia, PA

- "The role of physics in medicine"

December 2, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "True color radiography: Displaying x-ray spectral properties using color"

February 4, 1989

Annual Symposium on Medical Imaging III (SPIE), Newport Beach, CA

- "Semi-analytical model of the point spread function of scattered radiation including a multiple scattering term"

D. LAWRENCE BURK, JR., M.D.

August 3, 1988

Guest Lecturer, Introduction to MRI, Latrobe Area Hospital, Latrobe, PA

- "MRI of the musculoskeletal system"

August 4, 1988

Guest Lecturer, Presbyterian University Hospital, Pittsburgh, PA

- "MRI of the shoulder"

August 22 - 26, 1988

The 7th Annual Meeting of the Society of Magnetic Resonance in Medicine, San Francisco, CA

- "Technical optimization of surface coil MRI of the rotator cuff"

- September 10 - 11, 1988* Guest Lecturer, General Electric MR User Seminar, Baltimore, MD
 • "Musculoskeletal MR imaging"
- September 26, 1988* Guest Lecturer, Christiana Hospital, Christiana, DE
 • "MRI of the knee and shoulder"
- November 27 - December 2, 1988* The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
 • "Three-dimensional gradient-echo MR imaging of the knee with fat suppression"
- February 16, 1989* Guest Lecturer, Rothman Institute of Pennsylvania Hospital, Philadelphia, PA
 • "MRI of the hip and knee"
- February 25 - March 1, 1989* The Society of Magnetic Resonance Imaging 7th Annual Meeting, Los Angeles, CA
 • "MRI of the rotator cuff tears: Prospective comparison with arthrography, ultrasonography and surgery"
- May 14, 1989* Guest Lecturer, The Philadelphia Orthopedic Review Course, Philadelphia, PA
 • "Orthopedic imaging"
- May 17, 1989* Guest Lecturer, Cleveland Clinic Foundation, Cleveland, OH
 • "MR of the knee"
 • "MR of the shoulder"
- May 19, 1989* The Annual Meeting of the Pennsylvania Radiological Society, Hershey, PA
 • "Orthopaedic applications of MRI"
- June 7, 1989* Guest Lecturer, Episcopal Hospital, Philadelphia, PA
 • "MRI of the musculoskeletal system"
- PETER N. BURNS, Ph.D.**
- July 26, 1988* University of Montreal Seminar on Splanchnic Flow, Montreal, Canada
 • "Flow measurement in hepatic circulation"
- September 27 - 30, 1988* Italian Society for Ultrasound in Medicine, Bologna, Italy
 • "Tissue characterization using Doppler ultrasound"
- October 31 - November 2, 1988* Seminar on Vascular Doppler, Huntington Memorial Hospital, Mountain View, CA
 • "Doppler techniques"
- February 24 - 26, 1989* India National Congress of Obstetrics and Neonatology, Pune, India
 • "Fetal well being and fetal blood flow"
 • "Experimental findings in cerebral blood flow in the neonate"
- March 10 - 12, 1989* Dx Vascular Ultrasound '89 Meeting, Orlando, FL
 • "Doppler principles"

- "Normal abdominal flow"
- "Hemodynamics"
- "Tumor blood flow"

March 20, 1989

Mississippi Ultrasound Society Annual Meeting, Jackson, MS

- "Future developments in quantitative and color flow Doppler"
- "Deep Doppler"
- "Blood flow measurements and the obstetrical patient"

April 28, 1989

Los Angeles Radiological Society, Los Angeles, CA

- "Doppler in obstetrics"
- "Hemodynamics and the Doppler spectrum"
- Panelist - "Deep Doppler"
- Panelist - "Cerebrovascular Doppler"

May 10 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Doppler ultrasound"
- "Physics for prostate ultrasound"

June 16, 1989

Fetal Doppler Symposium, Kansas City, MO

- "Bioeffects considerations for obstetrical ultrasound"

PAUL MACKE CONSIGNY, Ph.D.

January 22, 1989

Vascular Interventional Lasers Course, Philadelphia
Angiography and Interventional Radiology Society,
Philadelphia, PA

- "Atherosclerosis, atherogenesis, and laser effects"

May 10, 1989

Philadelphia Angiography and Interventional Radiology
Society, Philadelphia, PA

- "Atherosclerosis and restenosis after angioplasty"

WOLFGANG F. DÄHNERT, M.D.

June 30 - July 1, 1988

Segundo Curso Internacional de Ultrasonido, Puebla, Mexico

- "Ultrasonografia de escroto y testiculo; de vejiga urinaria"
- "Ultrasonido del riñón"
- "Ultrasonido de la próstata 1 era. parte (equipo, técnica y anatomia normal)"
- "Ultrasonido de la próstata 2a. parte (patologia)"

October 22 - 23, 1988

First International Workshop on Diagnostic Ultrasound of the
Prostate, Washington, DC

- "Source of echogenic foci in the prostate"

January 15, 1989

IV Simposio Urologia Y Nefrologia Pediatrica Y Adultos
Hospital Hermanos Melendez, San Juan, Puerto Rico

- "Sonografia en el diagnostico en la patologia del sistema genito-urinario"
- "Uso de sonografia en el diagnostico de la carcinoma de prostata"

March 2 - 4, 1989

Gallstone Lithotripsy & Litholysis Symposium,
Philadelphia, PA

- "Biliary lithotripsy with the Sonolith 3000"

March 20 - 23, 1989

Clinical Update in Ultrasound: Endorectal, Endovaginal, and Doppler Ultrasound, Palm Beach, FL

- "Scanning techniques in endorectal ultrasound"
- "Endorectal ultrasound in benign prostatic hyperplasia"
- "Endorectal ultrasound in infertility, inflammation and other miscellaneous pathology"

May 10 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Equipment for transrectal ultrasound"
- "Anatomy of the prostate"
- "Sonography of benign prostatic hyperplasia"
- "Sonography of the scrotum"

HUYNH T. DOAN, M.D.

May 21 - 26, 1989

Annual Meeting of the Association of University Radiologists, Seattle, WA

- "MR imaging of spinal cord compression"

STEPHEN A. FEIG, M.D.

August 24 - 26, 1988

Fourth International Copenhagen Symposium on Detection of Breast Cancer. Sponsored by the Danish Society of Diagnostic Radiology, Copenhagen, Denmark

- "Breast cancer screening in the USA"
- "Assessment of film quality in a multi-institutional screening program"
- "A new method to compare risk and benefit for mammographic screening"
- "Should breast self-examination be included in a mammographic screening program?"

September 23, 1988

Department of Radiology, University of Cincinnati Medical Center, Cincinnati, OH

- "Recent results from mammography screening trials"
- "Evaluation of radiation risk from mammography using absolute and relative risk models"

September 30 - October 2, 1988

Workshops in Mammography. Sponsored by Workshops in Mammography Inc., New York, NY

- "Evaluation and management of breast calcifications"
- "Mammographic interpretation, problems, pearls, and pitfalls"

October 9 - 11, 1988

Eighth Annual Breast Imaging Conference, Sponsored by Medical College of Wisconsin, Department of Radiology and Continuing Medical Education and Ausonics Corporation, Williamsburg, VA

- "State-of-the-art: Film selection and processing"
- "Interpretation: Calcifications"
- "Technique and film-screen processing"

October 14 - 15, 1988

12th Annual Michigan Fall Radiology Conference. William Beaumont Hospital, Royal Oak, MI

- "Differential diagnosis of breast masses"
- "Differential diagnosis of breast calcifications"
- "Screen-film mammography equipment, technique, quality control"

- October 29 - 30, 1988
- ACR Symposium on Mammography. Sponsored by the American College of Radiology, Chicago, IL
- "Calcifications"
 - "Localization of nonpalpable lesions"
 - "The mammography report"
- November 27 - December 2, 1988
- The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Mammographic interpretation - problems, pearls, and pitfalls" (Refresher Course No. 216)
 - "Radiation risk update" RSNA/AAPM Symposium Mammography Screening: Technology, Radiation Dose, Quality Control and Benefits to Society
- December 7, 1988
- Workshop on Clinical Issues in Early Breast Cancer Detection in the United States. Sponsored by Early Detection Branch, Division of Cancer Prevention and Control, National Cancer Institute, National Institutes of Health, Bethesda, MD
- "Risks and benefits of early breast cancer detection"
- December 20, 1988
- Mammography Society of Philadelphia. Methodist Hospital, Philadelphia, PA
- "An approach to calcifications"
- January 20 - 21, 1989
- Symposium on Practical Modalities of an Efficient Screening for Breast Cancer in the European Community. Sponsored by the Association Contre Le Cancer of Belgium, Brussels, Belgium
- "Dose and quality control of mammographic screening"
 - "Radiation risks and work-up strategies of detected lesions"
- February 10 - 11, 1989
- ACR Symposium on Mammography. Sponsored by the American College of Radiology, New Orleans, LA
- "Quality assurance with processing"
 - "Breast calcifications"
 - "The mammography report"
- March 14, 1989
- St. Lukes/Roosevelt Hospital Center. Department of Radiology Grand Rounds, New York, NY
- "Nonpalpable breast cancer, mammographic signs and techniques for pre-operative localization"
- March 16, 1989
- Philadelphia Roentgen Ray Society Blue Ribbon Lecture Series, Philadelphia, PA
- "Nonpalpable breast cancer, mammographic signs and techniques for pre-operative localization"
- April 25 - 27, 1989
- Pennsylvania Breast Cancer Awareness Task Force, Scientific Meeting. Sponsored by the Pennsylvania and Philadelphia Divisions of the American Cancer Society and the Pennsylvania Department of Health, Harrisburg, PA
- "Evidence of benefit from breast cancer screening"
 - "Radiation risk from breast cancer screening with mammography"

- May 8 - 12, 1989* Annual Meeting of the American Roentgen Ray Society, New Orleans, LA
- "Screen-film mammography equipment, technique and interpretation" (Instructional Course No. 414)
- May 12 - 16, 1989* Workshops in Mammography. Sponsored by Workshops in Mammography, Inc., Southampton, Bermuda
- "Risks and benefits of mammography"
 - "Establishing a quality assurance program for mammography"
 - "Mammographic interpretation, problems, pearls and pitfalls"
- May 18, 1989* Hahnemann University School of Medicine, Department of Radiology, Philadelphia, PA
- "Dedicated mammography equipment"
- June 22, 1989* Hahnemann University School of Medicine, Department of Radiology, Philadelphia, PA
- "Breast calcifications"
- RICK I. FELD, M.D.**
- May 11 - 12, 1989* The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ
- "Ultrasound case: Presentation and self-evaluation"
- GEOFFREY A. GARDINER, Jr., M.D.**
- August 11 - 14, 1988* Medical and Surgical Treatment of Peripheral Vascular Disease, Vancouver, British Columbia, Canada
- "Graft thrombolysis"
- December 1, 1988* The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Regional thrombolysis: Current status"
- January 27, 1989* Medical and Surgical Treatment of Peripheral Vascular Disease Conference, Tuscon, AZ
- "Thrombolytic therapy of bypass grafts"
- February 23, 1989* Medical and Surgical Treatment of Peripheral Vascular Disease Conference, Naples, FL
- "Thrombolytic therapy of bypass grafts"
- March 21, 1989* The 14th Annual Meeting of the Society of Cardiovascular and Interventional Radiology, San Diego, CA
- "Causes and treatment of restenosis following transluminal angioplasty"
 - "Thrombolysis workshop"
- BARRY B. GOLDBERG, M.D.**
- September 13, 1988* Greater Delaware Valley Ultrasound Society, Philadelphia, PA
- "Medical diagnostic ultrasound: Its rise from diverse origins and its path into the twenty-first century"

- October 17 - 21, 1988
The 1988 World Federation for Ultrasound in Medicine and Biology Meeting and Second World Congress for Sonographers hosted by the American Institute of Ultrasound in Medicine, Washington, DC
- "Medical diagnostic ultrasound: Its rise from diverse origins and its path into the twenty-first century"
 - "Evaluation of ultrasound contrast agents"
- November 4 - 5, 1988
Society of Radiologists in Ultrasound Meeting, Chicago, IL
- "Ultrasound contrast agents"
- November 27 - December 2, 1988
The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Comparison of ultrasound contrast agents: Their effectiveness in enhancing noncardiac imaging and Doppler"
- February 23, 1989
First Annual Catherine Cole-Beuglet Memorial Lecture, Irvine, CA
- "Endoscanning"
- February 24, 1989
Radiology Grand Rounds, University of California, Irvine, CA
- "Color Doppler of the abdomen"
- March 10 - 12, 1989
Dx Vascular Ultrasound '89 Meeting, Orlando, FL
- "Color Doppler of the abdominal vessels"
 - "Color Doppler of the iliofemoral region"
 - Panel discussion - "New techniques in the evaluation of the peripheral vascular system"
- April 2, 1989
Doppler Ultrasound Course, Bayamon, Puerto Rico
- "Color Doppler of the abdomen and pelvis"
 - "Doppler evaluation of renal transplants"
 - "Ultrasound contrast agents"
- May 10 - 12, 1989
The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ
- "Influences on ultrasound: Today and in the future"
- May 26 - 27, 1989
13th Annual Sonography Symposium, Nashville, TN
- "Color Doppler ultrasound"
 - "Economic aspects of ultrasound"
- June 18 - 21, 1989
Israel Society for Diagnostic Ultrasound in Medicine; The Seventh International Symposium in Ultrasound, Tel Aviv, Israel
- "Advances in endoscanning"
 - "Color Doppler of the lower extremities"
 - "Ultrasound contrast agents"
- June 29 - July 1, 1989
Sixth International Congress on the Ultrasonic Examination of the Breast, Paris, France
- "Intraoperative sonomammography"
- CARLOS F. GONZALEZ, M.D.**
- July 3 - 9, 1988
XXVI Congress of the International College of Surgeons, Milan, Italy
- "Necessity for early steroid therapy for the prevention of serious complications in Graves' ophthalmopathy"

November 17, 1988

Mercy Catholic Medical Center, Fitzgerald Mercy Division,
Darby, PA

- "New trends in correlation between MRI and CT scan in spinal trauma"

March 19 - 24, 1989

Annual Meeting of the American Society of Neuroradiologists,
Orlando, FL

- "Balloon occlusion of the carotid artery in patients with neck neoplasms"

June 17, 1989

Newcomb Medical Center, Vineland, NJ

- "MRI in neuroradiology"

GEORGE W. GROSS, M.D.

January 30 - February 3, 1989

Annual Symposium on Medical Imaging III (SPIE), Newport
Beach, CA

- "Digital processing of abdominal radiographs in neonatal necrotizing enterocolitis"

February 24 - March 2, 1989

Annual Meeting of the American Academy of Allergy and
Immunology, San Antonio, TX

- "Persistent sinusitis in severe childhood asthma"

DAVID KARASICK, M.D.

October 19, 1988

Visiting Professor, Mercy Catholic Medical Center, Fitzgerald
Mercy Division, Darby, PA

- "Metabolic bone disease"

January 10, 1989

Visiting Professor, Osteopathic Hospital of Philadelphia,
Philadelphia, PA

- "Wrist and shoulder arthrography"

STEPHEN KARASICK, M.D.

September 29, 1988

Visiting Lecturer, Mercy Catholic Medical Center, Fitzgerald
Mercy Division, Darby, PA

- "A potpourri of genitourinary radiology cases"

ALFRED B. KURTZ, M.D.

August 10 - 12, 1988

The 50th Midsummer Radiological Conference of the Rocky
Mountain Radiological Society, Denver, CO

- "Ultrasound of the prostate: techniques, detection and value"
- "Intrauterine growth retardation and the biophysical profile"
- Panelist - Diagnostic Film Reading Panel
- "Endovaginal ultrasound: The Jefferson experience"

September 14, 1988

The Michigan Sonographers Society, Madison Heights, MI

- "Endometrium: Normal and abnormal"
- "Unusual appearances of fibroids"

- September 15 - 17, 1988*
- The Eleventh Annual Seminar in Diagnostic Ultrasound of the University of Michigan Medical School, Ann Arbor, MI
- "Abdominal Doppler including color flow"
 - "The endometrium: Normal and abnormal"
 - "OB ultrasound measurements revisited: 1988"
- October 4 - 5, 1988*
- The Department of Radiology, Mayo Clinic, Rochester, MN
- "Endovaginal ultrasound: The Jefferson experience"
 - "Sonography of the endometrium and fibroids: Normal to bizarre"
 - "A practical approach to obstetrical measurements"
- October 17 - 21, 1988*
- The 1988 World Federation for Ultrasound in Medicine and Biology and the 33rd Annual Convention of the American Institute of Ultrasound in Medicine Meeting, Washington, DC
- "The ideal fetal head circumference calculation"
- January 23, 1989*
- The Department of Obstetrics and Gynecology, Lankenau Hospital, Philadelphia, PA
- "Endovaginal ultrasound: Techniques & clinical usefulness"
- January 23, 1989*
- Department of Radiology, Monmouth Medical Center, Long Branch, NJ
- "Endovaginal ultrasound"
- February 13, 1989*
- Department of Medical Imaging, Presbyterian-University of Pennsylvania Medical Center, Philadelphia, PA
- "Hepatic sonography"
- March 16, 1989*
- Department of Radiology, Montefiore Hospital Medical Center, Bronx, New York
- Presentation of interesting cases in ultrasound and computed tomography to the residents
 - Visiting Professor - "Endovaginal ultrasound"
- March 20, 1989*
- Department of Medical Imaging, Presbyterian-University of Pennsylvania Hospital Medical Center, Philadelphia, PA
- "Endovaginal ultrasonography"
- March 21, 1989*
- Greater Delaware Valley Ultrasound Society, Philadelphia, PA
- "Ultrasound of the shoulder"
- March 22, 1989*
- Department of Radiology, Mercy Catholic Hospital, Philadelphia, PA
- Presentation of cases to the residents
- April 5 - 9, 1989*
- Society for Pediatric Radiology, 32nd Annual Meeting, Guest Faculty, San Antonio, TX
- "Ultrasonography of the fetal musculoskeletal system, musculoskeletal applications of ultrasound and radionuclide imaging"
- April 24, 1989*
- Ultrasound: 1989 Conference of the Harvard Medical School Departments of Radiology and Continuing Education, Brigham and Women's Hospital, Boston, MA
- "Endovaginal ultrasound in early pregnancy"
 - "Fetal measurements: The usual and the unusual"
 - "Fetal skeletal dysplasia"

April 28 - 30, 1989

The 14th Annual Spring Diagnostic Ultrasound Conference, Los Angeles, CA

- "Biophysical profile: A radiologist's approach"
- "Prostate ultrasound: 1989 perspective"
- "Ultrasound of the endometrium and myometrium"
- "Workshop session: Endovaginal ultrasound: The Jefferson experience"

May 11 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Ultrasound of the shoulder: Is it of value?"
- "The endometrium and myometrium"
- "Vaginal ultrasound in the first trimester"
- "Fetal measurements: An update"

May 17, 1989

Columbia-Presbyterian Medical Center, New York, NY

- Grand Rounds - "Endovaginal ultrasound"
- "Doppler ultrasound in the abdomen"
- Presentation of interesting ultrasound cases to the residents

DAVID C. LEVIN, M.D.

October 3 - 4, 1988

Harvard Medical School Course, "Angiography and Interventional Radiology - 1988", Boston, MA

- "Digital angiography: Equipment and clinical trends"
- "Renal angioplasty"
- "Vascular stents as an adjunct to percutaneous transluminal angioplasty"

November 27 - 29, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Do radiologists control angiographic and interventional procedures? Survey results from 198 academic institutions"
- "Diagnostic and interventional coronary angiography"
- "Do radiologists control diagnostic imaging studies? Survey results from 198 academic institutions"

January 26, 1989

American College of Cardiology Course, "Diagnostic and Interventional Cardiac Catheterization - 1989", Bethesda, MD

- "Technical and methodological considerations in cine imaging"
- "Digital subtraction angiography: Technical and clinical considerations"

March 19 - 22, 1989

The 14th Annual Meeting of the Society of Cardiovascular and Interventional Radiology, San Diego, CA

- "The importance of the chairman's support for developing interventional radiology"
- "Do radiologists control interventional radiology?"

April 12, 1989

89th Radiology Grand Rounds, University of Medicine and Dentistry of New Jersey, Newark, NJ

- "Current status of peripheral angioplasty"

May 11, 1989

Annual Meeting of the American Roentgen Ray Society, New Orleans, LA

- Instructional Course - "Angioplasty"

June 2, 1989

Radiology Grand Rounds, Pennsylvania Hospital,
Philadelphia, PA

- "Interventional coronary angiography"

ESMOND MAPP, M.D.

August, 1988

93rd Annual NMA Scientific Assembly, Los Angeles, CA

- "Uroradiologic manifestations of S-Hemoglobinopathy"

MARK M. MISHKIN, M.D.

November 18, 1988

The Germantown Hospital and Medical Center,
Philadelphia, PA

- "Clinical applications of MRI in disease of the nervous system"

November 28, 1988

The 74th Scientific Assembly and Annual Meeting of the
Radiological Society of North America, Chicago, IL

- Panel discussion - "Iodinated contrast media" (chair)

February 23 - 25, 1989

Basic Approaches to Common Neurological Disease, National
Conference Sponsored by the Department of Neurology, Thomas
Jefferson University, Philadelphia, PA

- "Neuroradiology of degenerative CNS disorders"

April 6, 1989

Annual Meeting of the Eastern Radiological Society, Tuscon,
AZ

- "MRI and trauma of the cervical spinal cord"

DONALD G. MITCHELL, M.D.

October 17 - 21, 1988

The American Institute of Ultrasound in Medicine Annual
Meeting, Washington, DC

- "Collateral pathways of cerebral blood flow following carotid ligation in newborn infants: Delineation with color Doppler imaging"

November 27 - December 2, 1988

The 74th Scientific Assembly and Annual Meeting of the
Radiological Society of North America, Chicago, IL

- "Blood flow in the circle of Willis following carotid ligation in newborns: Variations depicted by color Doppler imaging"
- "Artifactual color Doppler noise within anechoic spaces: Differentiation from flow"

February 26 - March 1, 1989

The Society of Magnetic Resonance Imaging 7th Annual
Meeting, Los Angeles, CA

- "MRI of the uterus and ovaries: Correlation with transvaginal ultrasound"

March 9, 1989

New Jersey Institute of Ultrasound in Medicine, Summit, NJ

- "Color Doppler imaging: Non-cardiac applications"

May 10 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Color Doppler pitfalls"
- "Color Doppler: Theory and practice"
- "Female pelvis: Ultrasound/MRI correlation"
- "Color Doppler: Head to toe"

May 20, 1989

Clinical MRI: 1989 Update, Harvard Medical School
Department of Continuing Education, Boston, MA

- "Avascular necrosis"

LAURENCE NEEDLEMAN, M.D.

October 7 - 8, 1988

The Diagnostic Ultrasound Update '88, Morgantown, WV

- "Carotid Ultrasound"
- "Lower extremity venous ultrasound"

October 11, 1988

The Greater Delaware Valley Ultrasound Society Meeting,
Philadelphia, PA

- "Venous imaging and Doppler evaluation"

October 28, 1988

The Robert K. Match Distinguished Scholar Program, Long
Island Jewish Medical Center, New York, NY

- "Doppler and color Doppler echocardiography"

November 10, 1988

The Michigan Ultrasound Society, Detroit, MI

- "Obstetrical Doppler"

November 11, 1988

Visiting Professor at the Henry Ford Hospital, Department of
Diagnostic Radiology and Medical Imaging, Detroit, MI

- "Venous ultrasound"
- "Ultrasound case reviews"

November 27 - December 2, 1988

The 74th Scientific Assembly and Annual Meeting of the
Radiological Society of North America, Chicago, IL

- "Artificial color Doppler noise with anechoic spaces:
Differentiation from flow"
- "Definitive diagnosis of normal early pregnancy:
Prospective double-blind ultrasound evaluation with
vaginal and abdominal sonography"

February 19, 1989

The Department of Radiology, West Jersey Health System,
Camden, NJ

- "Carotid ultrasound"

February 23, 1989

The Department of Radiology, West Jersey Health System,
Camden, NJ

- "Doppler ultrasound"

March 9, 1989

The Department of Radiology, West Jersey Health System,
Camden, NJ

- "Vascular ultrasound"

March 10 - 12, 1989

The Diagnostic Vascular Ultrasound '89, Lake Buena Vista, FL

- "Doppler evaluation of the genitourinary tract"
- "Doppler evaluation of the liver"
- "Doppler in OB/GYN"
- "Demonstration of abdominal Doppler technique"
- "Anatomy and hemodynamics of the peripheral vascular
system"
- "Venous techniques: Imaging, duplex Doppler, and color
Doppler"
- "Demonstration of techniques"
- "Case analysis and clinical correlation"
- "Panel discussion: New techniques in evaluation of the
peripheral vascular system"

- April 6, 1989* Visiting Professor at the Reading Hospital and Medical Center, Reading, PA
- "Venous ultrasound"
 - "Case studies in ultrasound"
- April 14, 1989* The Society of Diagnostic Medical Sonographers Annual Meeting, Boston, MA
- "Ultrasound - Perinatal correlations"
 - "Obstetrical Doppler"
 - "Abdominal Doppler"
- April 28 - 29, 1989* The Eighth Annual Ultrasound Symposium of the North Carolina Ultrasound Society, Raleigh, NC
- "New advances in color Doppler"
 - "OB Doppler"
 - "Fetal echocardiography"
 - "Color echocardiography"
- May 11 - 12, 1989* The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ
- "Ultrasound of deep venous thrombosis"
 - "Is plaque characterization practical?"
 - "Ultrasound of difuse liver disease"
 - "A simplified approach to fetal echocardiography"
 - "High risk obstetric ultrasound"
- June 22 - 24, 1989* The IV Interamerican Congress of Diagnostic Ultrasound. Caracas, Venezuela
- "Advances in hepatobiliary ultrasound"
 - "Endo-ultrasound"
 - "Thyroid and parathyroid ultrasound"
 - "Carotid ultrasound"
 - "Lower extremity venous ultrasound"
 - "Ultrasound of the lower urinary tract"
- VIJAY M. RAO, M.D.**
- September 23, 1988* Guest Lecturer, The First Annual Seminar of the Sickle Cell Center of the Commonwealth of Pennsylvania, Children's Hospital of Philadelphia, Philadelphia, PA
- "Magnetic resonance imaging - The skeletal system"
- October 12, 1988* Guest Lecturer, Department of Radiology, Mercy Catholic Medical Center, Fitzgerald Mercy Division, Darby, PA
- "Head and neck imaging"
- November 11, 1988* Guest Lecturer, Department of Radiology, Pennsylvania Hospital, Philadelphia, PA
- "CT and MRI of the neck"
- November 27 - December 2, 1988* The 74th Scientific Assembly and Annual Meeting of the Radiologic Society of North America, Chicago, IL
- "Triple correlation in TMJ dysfunction: MRI with arthrography, arthroscopy and open surgery"
- December 14 - 16, 1988* Invited Faculty Lecturer, Magnetic Resonance Imaging: Present Issues and Future Challenges, All India Institute of Medical Sciences, New Delhi, India
- "MRI of bone marrow and joints"

- March 11, 1989* Invited Faculty Lecturer, First Annual Craniofacial Pain Conference, Atlantic City, NJ
- "Advancements in magnetic resonance imaging techniques to aid in the diagnosis of facial/TMJ pain"
- April 14, 1989* Guest Lecturer, Department of Radiology, Pennsylvania Hospital, Philadelphia, PA
- "Imaging of the larynx and pharynx"
- MATTHEW D. RIFKIN, M.D.**
- August 8 - 11, 1988* The Symposium on Diagnostic Imaging, Brown University Program in Medicine, Providence, RI
- "Prostate imaging"
 - "Pelvic imaging: An update"
- September 10, 1988* Delaware Urologic Association, Wilmington, Delaware
- "Prostate imaging"
- September 13 - 14, 1988* Radiology '88: Ultrasound and Genitourinary Ultrasound, sponsored by the University of Minnesota, Minneapolis, MN
- "Interventional and intraoperative ultrasound"
 - "Testicular and scrotal ultrasound: Update and clinical indications"
 - "Endorectal prostatic ultrasound for detection of malignancy"
 - "Staging of prostatic carcinoma: MRI, CT and Ultrasound"
- October 9, 1988* Ultrasound Update: 1988, Sacramento, California
- "Prostate ultrasound - Clinical indications"
 - "Prostate ultrasound - Techniques and diagnosis"
 - "Endoluminal GI ultrasound"
- October 12 - 14, 1988* Conjoint Committee - American College of Radiology - National Cancer Institute Grantsmanship Seminar, Winston-Salem, NC
- "New ultrasound techniques"
 - "The RDOG grant"
- October 17 - 21, 1988* The American Institute of Ultrasound in Medicine Annual Meeting, Washington, D.C.
- "Prostate ultrasound applications"
- November 27 - December 2, 1988* The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- Refresher Course - "Ultrasound of the prostate"
 - "Endorectal prostate ultrasound: Echogenicity of cancer versus histologic grade and desmoplastic reaction"
 - "Identification of prostate cancer with MR imaging: Optimization of TE, bandwidth, and fat suppression"
 - "Prostate cancer staging: Prospective comparison of endorectal ultrasound and MR imaging"
- December 14, 1988* Pittsburgh Roentgen Society, Pittsburgh, PA
- "Staging of prostate cancer: CT, MRI and Ultrasound"
 - "Prostate ultrasound, update 1988"

- December 14 - 15, 1988* Visiting Professor, Department of Radiology, University of Pittsburgh, Pittsburgh, PA
- "Doppler in obstetrics"
 - "Scrotal ultrasound"
 - "Intraoperative and invasive ultrasound"
- January 11, 1989* Visiting Professor, St. Luke's Hospital, Kansas City, MO and Visiting Professor, University of Kansas City Medical Center, Kansas City, MO
- "Obstetrical Doppler applications"
 - "Testicular and scrotal ultrasound"
- January 11, 1989* Greater Kansas City Radiological Society, Kansas City, MO
- "Transrectal ultrasound in the diagnosis and management of prostate cancer"
- February 1, 1989* Mercy Catholic Medical Center, Fitzgerald Mercy Division, Darby, PA
- "Body MRI applications"
- February 20, 1989* Pittsburgh Urology Association, Pittsburgh, PA
- "Staging of prostate cancer"
- February 25 - March 1, 1989* The Society of Magnetic Resonance Imaging 7th Annual Meeting, Los Angeles, CA
- Refresher Course - "MRI of the male pelvis"
 - "Improving prostate MRI with fat suppression, narrow bandwidth and surface coils"
- March 20 - 23, 1989* Clinical Update in Ultrasound: Endorectal, Endovaginal and Doppler Ultrasound, Palm Beach, FL
- "Anatomy and pathogenesis of diseases of the prostate"
 - "Endorectal ultrasound of prostate cancer"
 - "Endorectal ultrasound of the prostate: Biopsy techniques"
 - "Endorectal ultrasound, screening tool or hype?"
- March 31 - April 1, 1989* Weekend Ultrasound Seminar, Hilton Head, SC
- "Ultrasound anatomy and examination of the prostate"
 - "Staging prostate cancer"
 - "Transrectal and transperineal biopsying: Patient preparation, use of the Bard biopsy gun and other devices"
 - "Non-prostate GU ultrasound: Kidney, bladder, scrotum"
- April 7, 1989* Texas Radiological Society's Annual Convention, Galveston, TX
- "Abdominal Doppler applications"
 - "Doppler applications in obstetrics"
 - "Prostate ultrasound"
- April 15, 1989* Innovations in Urologic Oncology, St. Barnabas Medical Center, Livingston, NJ
- "Prostate cancer staging: MRI, Ultrasound, CT"
- April 21, 1989* First Annual Spring Ultrasound Conference, Bristol Regional Medical Center, Bristol, TN
- "Prostate ultrasound"
 - "Intraoperative ultrasound"
 - "Abdominal Doppler"

April 28, 1989

13th Annual Ultrasound Symposium, State University of New York Health Science Center at Brooklyn, Brooklyn, NY

- "Sonomammography update"
- "Ultrasound of the musculoskeletal system"
- "Renal ultrasound"
- "Prostate ultrasound"

May 7, 1989

89th Annual Meeting of the American Roentgen Ray Society, New Orleans, LA

- "Ultrasonography of the prostate - Categorical course on genitourinary imaging"

May 10, 1989

Prostate Tutorial, The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Anatomy of the prostate and pathogenesis of prostatic disease"
- "Abnormal ultrasound anatomy"
- "Sonography of prostatic cancer"
- "Biopsy technique"
- "Voiding studies, screening and miscellaneous issues"

May 11 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Interventional procedures: Update"

SHARON R. SEGAL, D.O.

May 11 - 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "Ultrasound case: Presentation and self-evaluation"

June 1, 1989

John F. Kennedy Hospital, Stratford, NJ

- "Liver ultrasound"

GARY S. SHABER, M.D.

June 27 - July 1, 1989

Computer Assisted Radiology '89, Berlin, Germany

- "Detectability evaluation of a photostimulable phosphor digital radiographic system"

MARCELLE J. SHAPIRO, M.D.

November 28, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Percutaneous intracavitary therapy: A novel approach to severe hemoptysis associated with pulmonary aspergilloma"

PAUL W. SPIRN, M.D.

November 28, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- Refresher Course - "Critical care chest radiology - Plain film interpretation: A survival guide"

February 14, 1989

Radiology Grand Rounds, Brigham and Women's Hospital, Boston, MA

- "Radiology of lung resection"

- February 15, 1989* Department of Radiology, Massachusetts General Hospital, Boston, MA
- Grand Rounds - "Radiology of pneumonectomy and lobectomy"
 - "Practical ICU radiology"
- February 21, 1989* Department of Radiology, Our Lady of Lourdes Hospital, Camden, NJ
- "Practical ICU radiology"
- March 8, 1989* Annual Meeting of the Society of Thoracic Radiology, San Diego, CA
- "Radiology of the chest after thoracic surgery"
- May 9, 1989* 89th Annual Meeting of the American Roentgen Ray Society, New Orleans, LA
- Instructional Course - "A practical approach to intensive care chest radiology"
- ROBERT M. STEINER, M.D.**
- July 1 - 2, 1988* Visiting Lecturer, l'Aquila University, l'Aquila, Italy
- "Pitfalls in CT of chest"
 - "MR of bone marrow"
- October 20 - 21, 1988* Visiting Professor, University of Tennessee Medical School, Memphis, TN
- "Current status of cine CT"
 - "Congenital heart disease in the adult"
 - "MR of bone marrow"
- October 28, 1988* Guest Speaker and Meeting Chair, Dr. Robert K. Match Distinguished Scholar Program, "New Frontiers in Cardiac Imaging", New York, NY
- "Current status of cine CT"
- November 4, 1988* Visiting Lecturer, Continuing Medical Education Program, Mercy Hospital, Wilkes Barre, PA
- "Indications for MRI of the body"
- December 1, 1988* The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL
- "Patterns of clinical and radiologic relapse in pulmonary sarcoidosis"
- January 12, 1989* Visiting Professor, Tulane University, New Orleans, LA
- "Congenital heart disease in the adult"
- January 13 - 14, 1989* Visiting Panelist, Tristate Pulmonary Society, Biloxi, MS
- February 8, 1989* Guest Speaker, Johns Hopkins School of Public Health, Baltimore, MD
- "Radiology of pneumoconiosis"
- March 8, 1989* Annual Meeting of the Society of Thoracic Radiology, San Diego, CA
- "Radiology of the chest after thoracic surgery"
 - "Multimodality approach to the pericardium"

KEVIN L. SULLIVAN, M.D.

November 29, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Acceleration of thrombolysis with a high-dose transthorbus bolus technique"

SIMON VINITSKI, Ph.D.

August 22 - 26, 1988

The 7th Annual Meeting of the Society of Magnetic Resonance in Medicine, San Francisco, CA

- "Fat and motion artifact suppression in combined gradient and spin echo (GREASE) technique"

October 5, 1988

Los Alamos/UNM Center for Non-Invasive Diagnosis, Los Alamos, NM

- "Quantitation of lung water by magnetic resonance"

November 4 - 9, 1988

The Annual Meeting of the Society of Engineers in Medicine and Biology, New Orleans, LA

- "Real time NMR data processing"

November 28 - December 3, 1988

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL

- "Image contrast in spin-echo and gradient refocusing MRI as a function of field strength"

March 1 - 3, 1989

The Society of Magnetic Resonance Imaging 7th Annual Meeting, Los Angeles, CA

- "Partial angle inversion recovery (PAIR) imaging"
- "3D gradient echo chemical shift imaging"

RICHARD J. WECHSLER, M.D.

January 11, 1989

Fitzgerald Mercy Catholic Hospital, Philadelphia, PA

- "Interesting mediastinal problems"

March 8, 1989

Presbyterian Hospital, Philadelphia, PA

- "Anterior mediastinal masses"

May 12, 1989

The Leading Edge in Diagnostic Ultrasound, Atlantic City, NJ

- "CT and ultrasound evaluation of superficial masses"

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EXHIBITS AND POSTER PRESENTATIONS

Annual Meeting of the American Association of Physicists in Medicine, San Antonio, TX, 1988

- "Three parameter equivalent spectrum as an index of beam quality." (Exhibitor: JM Boone)
- "The scatter point spread function in diagnostic radiology." (Exhibitor: JM Boone)
- "T1/T2 contrast in fast MRI as a function of field strength." (Co-exhibitors: S Vinitski, R Griffey, B Griffey, JM Boone, A D'Adamo)

Federation of American Societies for Experimental Biology, Summer Conference on the Endothelium, Copper Mountain, CO, 1988

- "Phorbol amplification of serotonin-induced arterial contraction is endothelium-dependent." (Exhibitor: PM Consigny)

The 7th Annual Meeting of the Society of Magnetic Resonance in Medicine, San Francisco, CA, 1988

- "Improvement in signal to noise ratio and correction of CSI artifact in long TR/TE musculoskeletal MRI by combining gradient and spin echoes." (Co-exhibitors: S Vinitski, DG Mitchell, DL Burk, DW Levy, MD Rifkin)

The American Institute of Ultrasound in Medicine Annual Meeting, Washington, DC, 1988

- "Artifactual color noise within anechoic spaces: An easily avoidable pitfall of color Doppler imaging." (Co-exhibitors: DG Mitchell, P Burns, L Needleman)
- "Color Doppler imaging of cerebral blood flow in newborn infants." (Co-exhibitors: DG Mitchell, DA Merton, H Desai, P Wolfson, L Graziani, BB Goldberg)
- "Color Doppler imaging of superficial masses of suspected vascular etiology." (Co-exhibitors: DG Mitchell, DA Merton, L Needleman, V Igidbashian, BB Goldberg)

The 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, IL, 1988

- "The role of MR imaging in bone marrow hypoplastic, hyperplastic and replacement syndromes." (Co-exhibitors: RM Steiner, VM Rao, MD Rifkin, DG Mitchell, S Murphy, L Burk, L Ballas, S Vinitski, D Radech) Award: Cum Laude
- "Fractal nature of breast calcifications." (Co-exhibitors: BM Galkin, CA Miller, SA Feig, HD Muir) Award: Certificate of Merit

- "Chest radiographic appearances in neonates on ECMO." (Co-exhibitors: GW Gross, HJ Desai)
- Ultrasound Case of the Day: "Splenic artery pseudoaneurysm." (Co-exhibitors: DG Mitchell, L Blum, AB Kurtz)
- Ultrasound Case of the Day: "Cystic neuroblastoma with metastatic disease of the liver." (Co-exhibitors: P Hilpert, AB Kurtz)
- Ultrasound Case of the Day: "Poorly differentiated mucinous adenocarcinoma of sigmoid colon metastatic to the tunica vaginalis of the left hemiscrotum." (Co-exhibitors: W Dähnert, MD Rifkin, AB Kurtz)
- Ultrasound Case of the Day: "Pedunculated retroperitoneal liver hemangioma." (Co-exhibitors: L Needleman, RJ Wechsler, AB Kurtz)
- Ultrasound Case of the Day: "Ovarian fibroma." (Co-exhibitors: S Segal, R Feld, AB Kurtz)

**The 1988 World Federation for Ultrasound in Medicine and Biology Meeting,
Washington, DC, 1988**

- "Color Doppler imaging of superficial masses of suspected vascular etiology." (Co-exhibitors: DA Merton, DG Mitchell, L Needleman, V Igidbashian, BB Goldberg)
- "Color Doppler imaging of cerebral blood flow in newborn infants." (Co-exhibitors: DA Merton, DG Mitchell, H Desai, P Wolfson, L Graziani, BB Goldberg)

**SPIE Conference on Medical Imaging III,
Newport Beach, CA, 1989**

- "Digital chest images for bronchopulmonary dysplasia in children." (Co-exhibitors: Y Wang, GW Gross, A D'Adamo)
- "Computerized monitoring and analyzing radiology report turnaround time." (Co-exhibitors: Y Wang, CD Lockard, GS Shaber, GH McArdle, RM Steiner, DC Levin)

**UCLA Symposium on Molecular Biology of the Cardiovascular System
Keystone, CO, 1989**

- "Release of smooth muscle cell mitogens from arteries after balloon angioplasty." (Exhibitor: PM Consigny)

**Annual Meeting of the American Academy of Allergy and Immunology,
San Antonio, TX, 1989**

- "Persistent sinusitis in severe childhood asthma." (Co-exhibitors: GW Gross, T Kerut, S McGeady, HC Mansmann)

**The Annual Meeting of the Society of Magnetic Resonance Imaging,
Los Angeles, CA, 1989**

- "Partial angle inversion recovery (PAIR) imaging." (Co-exhibitors: DG Mitchell, S Vinitiski, S Albert, MD Rifkin, DL Burk Jr)
- "Sampling bandwidth and fat suppression in long TR/TE body MRI at 1.5T." (Co-exhibitors: DG Mitchell, S Vinitiski, MD Rifkin, DL Burk Jr, D Levy)
- "3D gradient echo chemical shift imaging." (Co-exhibitors: DG Mitchell, S Vinitiski, J Szumowski, VM Rao, DL Burk Jr, MD Rifkin)

**Annual Meeting of the American Society of Neuroradiologists,
Orlando, FL, 1989**

- "Enhanced resolution of pituitary fossa with 3D fat suppressed gradient echo MRI: Pre- and Post gadolinium enhancement." (Co-exhibitors: V Rao, S Vinitiski, A Babaria, AE Flanders, M Mishkin, CF Gonzalez)

**Annual Meeting of the Pennsylvania Radiological Society,
Hershey, PA, 1989**

- "The value of MR in bone marrow hyperplastic, hypoplastic and replacement syndromes." (Exhibitor: RM Steiner)

**37th Annual Meeting of the Association of University Radiologists,
Seattle, Washington, 1989**

- "MR imaging of the cerebellum." (Co-exhibitors: AE Flanders, HT Doan)

**Greater Delaware Valley Ultrasound Society,
Philadelphia, PA, 1988-1989**

- "Ultrasound case of the day." (Co-exhibitors: AB Kurtz, L Needleman, DW Dähnert, DG Mitchell, MD Rifkin, RI Feld, RJ Wechsler, P Hilpert, L Blum, S Segal, BB Goldberg)
 - "Splenic artery pseudoaneurysm"
 - "Cystic neuroblastoma with metastatic disease of the liver"
 - "Poorly differentiated mucinous adenocarcinoma of sigmoid colon metastatic to the tunica vaginalis of the left hemiscrotum"
 - "Pedunculated retroperitoneal liver hemangioma"
 - "Ovarian fibroma"

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

JOSEPH BONN, M.D.

- Program Committee, Philadelphia Angiography and Interventional Radiology Society
- Reviewer, *Radiology*
- Reviewer, *Interventional Radiology*

JOHN M. BOONE, Ph.D.

- Member AAPM Task Force in Image Intensifiers - TV Systems
- Member, AAPM Task Force in Ionization Chambers for Diagnostic Radiology
- Reviewer, *Medical Physics*

D. LAWRENCE BURK, Jr., M.D.

- Cum Laude Award: "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitski S, Radech D)

PETER N. BURNS, Ph.D.

- Chairman, AIUM Doppler Standards Subcommittee
- Member, AIUM International Committee
- Member, AIUM Standards Committee
- Member, AIUM Nomenclature Subcommittee
- Consulting Member, FDA OB/GYN Panel
- Board of Directors, International Perinatal Doppler Society
- Editorial Board, *Ultrasound in Medicine and Biology*
- Editorial Board, *Journal of Ultrasound in Medicine*
- Editorial Board, *Journal of Vascular Technology*
- Reviewer, Scientific Program Committee, 1990 AIUM Meeting
- Reviewer, *American Journal of Physiology*
- Reviewer, *Gastroenterology*

- Reviewer, *IEEE Transactions on Sonics and Ultrasonics*
- Reviewer, *Investigative Radiology*
- Reviewer, *Journal of Clinical Ultrasound*
- Reviewer, *Journal of Ultrasound in Medicine*
- Reviewer, *Journal of Vascular Technology*
- Reviewer, *Medical Instrumentation*
- Reviewer, *Radiology*
- Reviewer, *Ultrasound in Medicine and Biology*

STEPHEN A. FEIG, M.D.

- Expert Witness, Mammography Section, Task Force for Standard Setting in Radiology, American College of Radiology
- Member, Committee on Breast Imaging, American College of Radiology
- Member, Committee on Professional Self-Evaluation and Continuing Education, Chairman of the Section on Breast Diseases, American College of Radiology
- Member, Committee on ACR Symposia, American College of Radiology
- Member, Committee on Systematized Refresher Courses (Co-Chairman), Faculty on Breast Disease, American College of Radiology
- Member, Breast Task Force, American College of Radiology
- Member, Committee on Mammography Home Study Course, American College of Radiology
- Member, Program Committee, 24th National Conference on Breast Cancer, American College of Radiology
- Member, Committee on Mammography Symposia, American College of Radiology
- Member, Executive Committee, Society of Breast Imaging
- Editorial Board, *Breast Disease, An International Journal*
- Reviewer, *American Journal of Roentgenology*
- Reviewer, *Investigative Radiology*
- Reviewer, *Journal of the American Medical Association*
- Reviewer, *RadioGraphics*
- Reviewer, *Cancer*
- Reviewer, *Radiology*

- Certificate of Merit Award: "Fractal nature of breast calcifications," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Galkin GM, Miller CA, Feig SA, Muir HD)

RICK I. FELD, M.D.

- Homer Mitchell Branch, Jr., M.D. Fellowship Award by Division of Diagnostic Ultrasound, CT, and MRI, Thomas Jefferson University Hospital (May 1988)

BENJAMIN M. GALKIN, M.S.

- Member, Publishing Policy Committee, American Institute of Physics
- Certificate of Merit Award: "Fractal nature of breast calcifications," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Galkin GM, Miller CA, Feig SA, Muir HD)

GEOFFREY A. GARDINER, Jr., M.D.

- Member, Committee on Training Programs, Society of Cardiovascular and Interventional Radiology
- Consulting Editor, *Journal of Cardiovascular and Interventional Radiology*
- Reviewer, *Radiology* (Cardiac, Interventional and Vascular sections)

BARRY B. GOLDBERG, M.D.

- William J. Fry Memorial Lecturer, The 1988 World Federation for Ultrasound in Medicine and Biology Meeting
- Treasurer, World Federation for Ultrasound in Medicine and Biology
- Treasurer, International Congress on the Ultrasonic Examination of the Breast
- Chairman, Archives Committee, American Institute of Ultrasound in Medicine
- Chairman, Archives Committee, World Federation for Ultrasound in Medicine and Biology
- Vice-Chairman, Faculty, Diagnostic Radiology Section, Committee on Systemized Refresher Courses, American College of Radiology
- Co-Chairman, Audit Committee, World Federation for Ultrasound in Medicine and Biology
- Member, Advisory Editorial Board and International Liaison Committee, Ultrasound in Medicine and Biology
- Member, Administrative Council, World Federation for Ultrasound in Medicine and Biology
- Member, Committee on Accreditation, American College of Radiology
- Member, Awards Committee, American Institute of Ultrasound in Medicine

- Member, Channel 10 Medical Advisory Board, WCAU-TV, CBS Television Stations, Philadelphia, PA
- Member, International Commission on Radiological Education, Radiological Society of North America
- Member, Technology Advisory Council on the Center for Advanced Sensor Technologies, Advanced Technology Center of Southeastern Pennsylvania
- Member, Committee on Radiology Education in the Third World, Radiological Society of North America
- Member, Executive Committee, International Association for Endosonography
- Member, International Advisory Board, Seventh Congress of the European Federation of Societies for Ultrasound in Medicine and Biology, 1990
- Coordinator of Ultrasonography for Topics in Radiology, *Journal of the American Medical Association*
- Associate Editor, *Surgical Endoscopy, Ultrasound, and Interventional Techniques*
- Editorial Advisory Board, *Clinics in Diagnostic Ultrasound*
- Editorial Advisory Board, *Journal of Clinical Ultrasound*
- Editorial Consultant, *American Journal of Roentgenology*
- Editorial Consultant, *Applied Radiology*
- Editorial Consultant, *Journal of Ultrasound in Medicine*
- Editorial Consultant, *Radiology*
- Certificate of Merit Award: "Color Doppler Imaging of Superficial Masses of Suspected Vascular Etiology," Scientific Exhibit at the 1988 Meeting of the American Institute for Ultrasound in Medicine (Co-exhibitors: Merton DA, Mitchell DG, Needleman L, Igidbashian V, Goldberg BB)

CARLOS F. GONZALEZ, M.D.

- Member, American Society of Neuroradiology, Committee on CT and MRI Contrast Media

ROBERTO. GORSON, M.S.

- Member, Board of Directors and Treasurer of the American Board of Medical Physics
- Chairman, AAPM History Committee
- Chairman, ACMP Honors and Awards Committee
- Member, National Academy of Sciences Committee on Film Badge Dosimetry
- Reviewer, *Radiology*
- Reviewer, *Medical Physics*

- Certificate of Esteem and Gratitude from the American Board of Health Physics for Devoted Services as Board Member, Examiner, and Chairman, 1960-1968 (Awarded June, 1989)

GEORGE W. GROSS, M.D.

- A. Edward O'Hara, M.D. Award for Excellence in Teaching, Department of Radiology, Thomas Jefferson University Hospital, June 1, 1989

DAVID KARASICK, M.D.

- Program Committee, Philadelphia Roentgen Ray Society
- Consulting Editor, *Skeletal Radiology*
- Musculoskeletal Reviewer, *American Journal of Roentgenology*
- Musculoskeletal Reviewer, *Radiology*
- Musculoskeletal Reviewer, *RadioGraphics*
- Musculoskeletal Reviewer, *Critical Reviews in Diagnostic Imaging*
- Book Reviewer, *American Journal of Roentgenology*

STEPHEN KARASICK, M.D.

- Member, GU Section, Written Examination, American Board of Radiology

ALFRED B. KURTZ, M.D.

- Chairperson, Committee on Education and Training of the Commission on Ultrasound, American College of Radiology
- Member, Committee on Biologic Effects of the Commission on Ultrasound, American College of Radiology
- Member, Commission on Ultrasound, American College of Radiology
- Examiner, Oral Boards, Ultrasound Category, The American Board of Radiology
- Member, Committee on Quality Assurance of the Commission on Ultrasound, American College of Radiology
- Member, Scientific Exhibits Committee, Radiological Society of North America
- Treasurer, Society of Radiologists in Ultrasound
- Chairperson, Education Committee of the American Institute of Ultrasound in Medicine
- Member, Informational Media Committee, American Institute of Ultrasound in Medicine
- Member, Conventional Planning Committee, American Institute of Ultrasound in Medicine

- Reviewer, Scientific Program for the 1988 World Federation for Ultrasound in Medicine and Biology, American Institute in Medicine Meeting
- Chairperson, Program Committee, Greater Delaware Valley Ultrasound Society
- Member, Membership Committee, Greater Delaware Valley Ultrasound Society
- Member, Graduate Course, Blue Ribbon Committee, Philadelphia Roentgen Ray Society
- Member, Manuscript Review Panel, *American Journal of Roentgenology*
- Member, Editorial Board, *Journal of Ultrasound in Medicine*
- Member, Ultrasound Manuscript Reviewer, *Radiology*
- Reviewer, *Journal of the American Medical Association*

DAVID C. LEVIN, M.D.

- Director-at-Large, North American Society for Cardiac Radiology
- 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 and Chairman-Elect of the Council on Cardiovascular Radiology, American Heart Association
- Board of Trustees, Society for Cardiac Angiography
- Scientific Program Committee, Association of University Radiologists
- Ethics Committee, Society of Cardiovascular and Interventional Radiology
- Training Programs Committee, Society of Cardiovascular and Interventional Radiology
- Budget Committee of the Council on Cardiovascular Radiology, American Heart Association
- Long Range Planning Committee of the Council on Cardiovascular Radiology, American Heart Association
- Council Affairs Committee, American Heart Association
- Assembly Delegate, American Heart Association
- Ad Hoc Committee on Publications, Association of University Radiologists
- Ad Hoc Committee on Annual Meeting Support, Association of University Radiologists
- Ad Hoc Committee on Standards for Responsible Conduct of Research, Association of University Radiologists
- Associate Editor, *Radiology*

- Board of Editors, *Investigative Radiology*
- Associate Editor, *Cardiovascular and Interventional Radiology*
- Reviewer, *American Journal of Roentgenology*, (Cardiac, Interventional and Vascular Radiology)
- Editorial Board, *American Journal of Cardiac Imaging*
- Reviewer, *New England Journal of Medicine*
- Editorial Board, *Clinical Imaging*
- Editorial Board, *Current Diagnosis*
- Reviewer, *Catheterization and Cardiovascular Diagnosis*

ESMOND MAPP, M.D.

- Treasurer, Philadelphia Roentgen Ray Society, 1988-1989
- Membership Chairman, Pennsylvania Radiological Society
- Member, Executive Committee, *Radiology*, 1988 and 1989
- Alternate Counselor, American College of Radiology State Chapter, 1988-1989
- Member, Committee on Manpower, American College of Radiology
- Reviewer, *RadioGraphics*, 1988-1989

MARK M. MISHKIN, M.D.

- Chairman, Neuroradiology Section, Written Examination, American Board of Radiology
- Chairman, Committee on Drugs and Contrast Media, American College of Radiology
- Board of Trustees, American Registry of Pathology, Armed Forces Institute of Pathology
- Member by Appointment, Advisory Committee on Radiopharmaceuticals to the Food and Drug Administration
- Guest Examiner, Oral Examination, American Board of Radiology
- Member, Committee on Radiologic Units, Standards, and Protection, American College of Radiology
- Treasurer and Executive Committee, Eastern Radiological Society
- Delegate, Council of Medical Specialty Societies from the American College of Radiology
- Commission on Education, American College of Radiology
- Medical Imaging Advisory Committee, Holy Family College
- Reviewer, *Cancer*

DONALD G. MITCHELL, M.D.

- Reviewer, *Radiology*
- Reviewer, *RadioGraphics*
- Reviewer, *American Journal of Roentgenology*
- 1988 Editor's Recognition Award with Distinction for Review of *Radiology* Manuscripts
- Certificate of Merit Award: "Color Doppler Imaging of Superficial Masses of Suspected Vascular Etiology," Scientific Exhibit at the 1988 Meeting of the American Institute for Ultrasound in Medicine (Co-exhibitors: Merton DA, Mitchell DG, Needleman L, Igidbashian V, Goldberg BB)
- Cum Laude Award: "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitiski S, Radech D)

LAURENCE NEEDLEMAN, M.D.

- Member, Board of Directors, Joint Review Committee on Education in Cardiovascular Technology (representative of the American College of Radiology)
- Member, Small Parts Review Committee, 1988 World Federation for Ultrasound in Medicine and Biology Meeting
- Member, Abdominal Doppler Review Committee, 1988 World Federation for Ultrasound in Medicine and Biology Meeting
- Honorary Member, Venezuelan Association of Ultrasound in Medicine
- Journal Reviewer, *Radiology*
- Reviewer, *Annals of Internal Medicine*
- 1988 Editor's Recognition Award with Special Distinction from *Radiology*
- Certificate of Merit Award: "Color Doppler Imaging of Superficial Masses of Suspected Vascular Etiology," Scientific Exhibit at the 1988 Meeting of the American Institute for Ultrasound in Medicine (Co-exhibitors: Merton DA, Mitchell DG, Needleman L, Igidbashian V, Goldberg BB)

VIJAY M. RAO, M.D.

- Chairperson, Blue Ribbon Committee of the Philadelphia Roentgen Ray Society
- Ad Hoc Member, Research Manpower Committee, NLHBI - National Institutes of Health
- Reviewer, *Cancer Research*
- Cum Laude Award "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitiski S, Radech D)

MATTHEW D. RIFKIN, M.D.

- Member, Refresher (Categorical Course) Committee, Radiological Society of North America
- Member, American Institute of Ultrasound in Medicine Convention Program Committee
- Chairman, Credentials Subcommittee, Society of Radiologists in Ultrasound
- Member, Categorical Course Faculty, 1988 Educational Meeting, American Institute of Ultrasound in Medicine
- Member, Endocavitary Review Committee, American Institute of Ultrasound in Medicine
- Member, Refresher Course Faculty, 1988 American Roentgen Society
- Member, Ultrasound Education Subcommittee, American College of Radiology
- Member, Ultrasound Commission, American College of Radiology
- President, Delaware Valley Magnetic Resonance Imaging Society
- Member, Executive Committee, Delaware Valley Magnetic Resonance Imaging Society
- Editorial Board, *Journal of Ultrasound in Medicine*
- Editorial Board, *Uroradiology*
- Reviewer, *Radiology*
- Reviewer, *American Journal of Roentgenology*
- Reviewer, *Investigative Radiology*
- Reviewer, *Journal of Ultrasound in Medicine*
- Reviewer, *Journal of Clinical Ultrasound*
- Cum Laude Award "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitzki S, Radech D)

MARCELLE J. SHAPIRO, M.D.

- Lecturer, Annual Women in Medicine Dinner, University of Pennsylvania School of Medicine and the Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania
- Executive Committee, Philadelphia Angiography and Interventional Radiology Society
- Executive Committee, Medical Alumni Society of the University of Pennsylvania School of Medicine
- Program Committee, Philadelphia Angiography and Interventional Radiology Society

- Reviewer, *American Journal of Roentgenology*
- Reviewer, *Investigative Radiology*
- Reviewer, *Journal of Interventional Radiology*

ROBERT M. STEINER, M.D.

- Chairman, Program Committee, North American Society of Cardiac Radiology
- Member, Governor's Advisory Committee and Nominating Committee (Pennsylvania), American College of Cardiology
- Member, Board of Directors, North American Society of Cardiac Radiology
- Member, Scientific Exhibits Committee and Committee on Diagnostic Radiology, Pennsylvania Radiology Society
- Member, Scientific Exhibits Committee, Radiological Society of North America
- Member, Cardiopulmonary Training Committee, Society of Thoracic Radiology
- Editorial Board, *American Journal of Cardiac Imaging*
- Editorial Board, *Heart and Vessel*
- Editorial Board, *Radiology Reports*
- Editorial Board, *Critical Reviews in Diagnostic Imaging*
- Reviewer, *Radiology*
- Reviewer, *American Journal of Roentgenology*
- Abstractor, *Radiology*
- Cum Laude Award: "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitiski S, Radech D)

KEVIN L. SULLIVAN, M.D.

- Reviewer, *Radiology*

SIMON VINITSKI, Ph.D.

- Cum Laude Award: "The Role of MR Imaging in Bone Marrow Hypoplastic, Hyperplastic and Replacement Syndromes," Scientific Exhibit at the 74th Scientific Assembly and Annual Meeting of the Radiological Society of North America, 1988 (Co-exhibitors: Steiner RM, Rao VM, Rifkin MD, Mitchell DG, Murphy S, Burk L, Ballas S, Vinitiski S, Radech D)

YEN WANG, M.D

- Chairman, Validation and Implementation Committee, ACR-NEMA Digital Imaging and Communication Standard
- Chairman, Digital Radiographic Committee, American College of Radiology
- Member, ACR-NEMA Digital Imaging And Communication Standards Committee
- Member, ACR-NEMA. RIS/IHS/PACS Committee
- Editor, *Critical Reviews in Diagnostic Imaging*
- Editorial Reviewer, *American Journal of Roentgenology*

RICHARD J. WECHSLER, M.D.

- Member, Program Committee of Philadelphia Roentgen Ray Society

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Appendix A

FUNDED RESEARCH

ACTIVE GRANT SUMMARY

Revised 7/7/89

(Report reflects entire award period)

Principal Investigator (current acct. #)	Title of Project	Funding Source	Funding Dates	Personnel Costs	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Costs Funded
Boone, John (080-02449)	In Vivo X-Ray Spectroscopic Mammography	NIH/NCI	9/9/88-8/31/89	13,776	10,000	23,776	11,148	34,924
Consigny, P. Macke (#1) (internal acct. # not yet assigned)	Angioplasty-Induced Release of Mitogens from Atherosclerotic Arteries	American Heart Assn.	7/1/89-6/30/90	7,229	9,135	16,364	1,636	18,000
Consigny, P. Macke (#2) (080-01468)	Determination of the Factors Responsible for Restenosis After Angioplasty	W.W. Smith	7/1/88-12/30/89	21,415	15,115	36,530	6,689	43,219
Consigny, P. Macke (#3) (080-01483)	Effects of Balloon Angioplasty and Laser Thermal Angioplasty on Atherosclerotic Arteries	American Health Assis. Fndtn.	4/1/88-9/30/89	13,640	6,360	20,000	N/A	20,000
Goldberg, Barry (#1) (080-05231)	Center of Excellence for Biomedical Imaging (Subcontract through Drexel Univ.)	Ben Frkin. Prgrm	9/1/87-8/31/89	64,550	42,630	107,180	N/A	107,180
Goldberg, Barry (#2) (080-03122)	Effects of Prenatal Ultrasound on Postnatal Development	NIH/ NICHD	4/1/86-9/30/89	246,892	155,372	402,264	176,902	579,166

ACTIVE GRANT SUMMARY

Revised 7/7/89

(Report reflects entire award period)

Principal Investigator (current acct. #)	Title of Project	Funding Source	Funding Dates	Personnel Costs	Other Direct Costs	Total Direct Costs	Indirect Costs	Total Costs Funded				
Goldberg, Barry (#3) (080-05222)	Techniques for Characterization of Atherosclerotic Plaque (Subcontract through Drexel University)	NIH	9/30/85-6/29/89	55,629	5,605	61,234	38,945	100,179				
Goldberg, Barry (#4) (080-05212)	Ultrasonic Scattering Studies in tissue Characterization (Subcontract through Drexel University)	NIH NHLBI	3/1/82-6/30/91	55,247	7,089	62,336	39,077	101,413				
Goldberg, Barry (#5) (080-05226)	Ultrasound Doppler B-Mode Breast Scanner (Subcontract through Daltex, Inc.)	NIH/NCI	4/1/87-8/31/90	53,431	6,285	59,716	36,427	96,143				
Needleman, Larry (080-03353)	Doppler Screening for Pregnancy-Induced Hypertension	NIH/ NICHD	7/1/88-5/31/93	587,744	53,686	641,430	373,141	1,014,571				
Rifkin, Matthew (080-03363)	National Collaborative Diagnostic Imaging Project	NIH/NCI	9/4/87-7/31/91	94,381	82,665	177,046	73,683	250,729				
TOTAL FUNDED ACTIVITY								1,213,934	393,942	1,607,876	757,648	2,365,524