

Spring 1988

## Focal Spot, Spring 1988

Follow this and additional works at: [http://digitalcommons.wustl.edu/focal\\_spot\\_archives](http://digitalcommons.wustl.edu/focal_spot_archives)

---

### Recommended Citation

Focal Spot, Spring 1988, April 1988. Bernard Becker Medical Library Archives. Washington University School of Medicine.

This Book is brought to you for free and open access by the Focal Spot at Digital Commons@Becker. It has been accepted for inclusion in Focal Spot Archives by an authorized administrator of Digital Commons@Becker. For more information, please contact [engeszer@wustl.edu](mailto:engeszer@wustl.edu).

SPRING, 1988

VOLUME 19, NUMBER 1

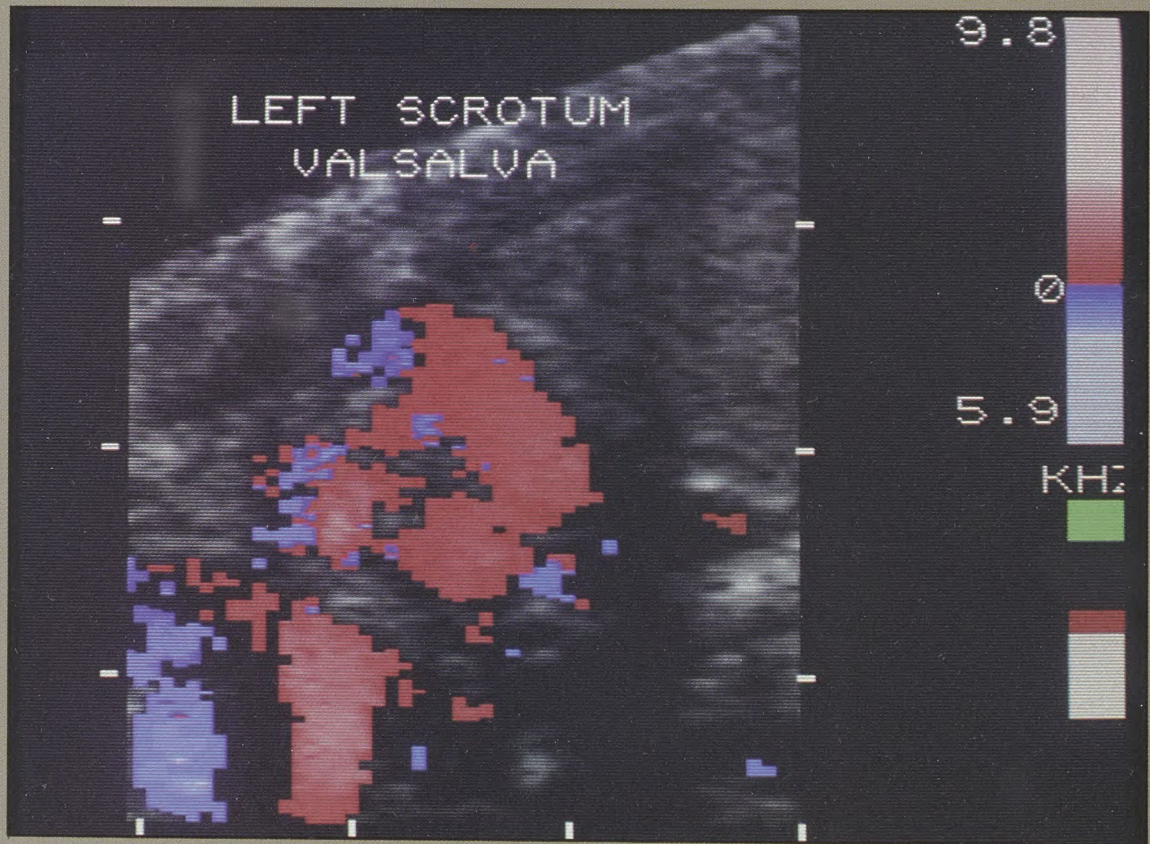
# FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY

IMAGING  
ESTROGEN  
RECEPTORS



Indevan  
ARCHIVES  
Property of Washington University  
Medical Library, APR 5 '88



*Images produced by the latest in ultrasound technology—color-flow Doppler—reveal the direction and character of blood flow. Here, as the patient bears down, abnormal blood flow into the scrotum is apparent. This varicocele is similar to that described in the story, "Making a Colorful Sound."*

# FOCAL SPOT

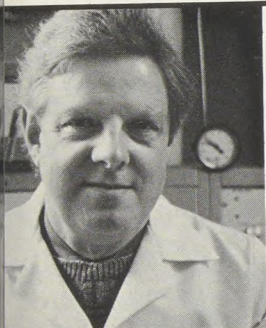
SPRING, 1988

VOLUME 19, NUMBER 1

MALLINCKRODT INSTITUTE OF RADIOLOGY

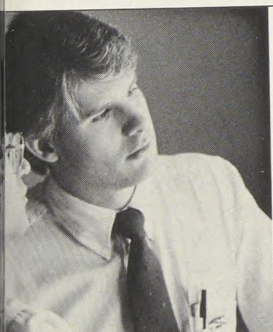
## 10 PUTTING THE KEY IN THE LOCK

A decade of commitment produces revealing images of estrogen receptors in breast cancer.



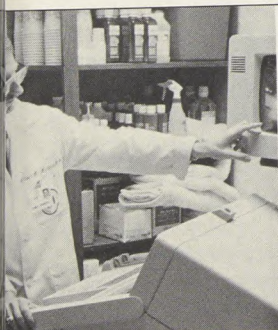
## 16 PEARLS, GEMS, AND BITS OF WISDOM

A day in the life of a Mallinckrodt resident.



## 24 MAKING A COLORFUL SOUND

Color-flow Doppler takes ultrasound technology one step further.

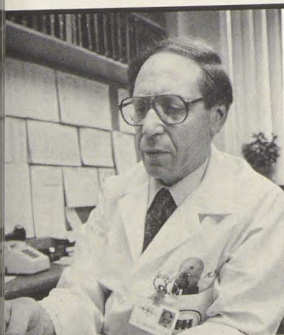


## 2 SPOT NEWS

## 8 MEDIA FOCUS

## 27 FYI

## 32 REFLECTIONS

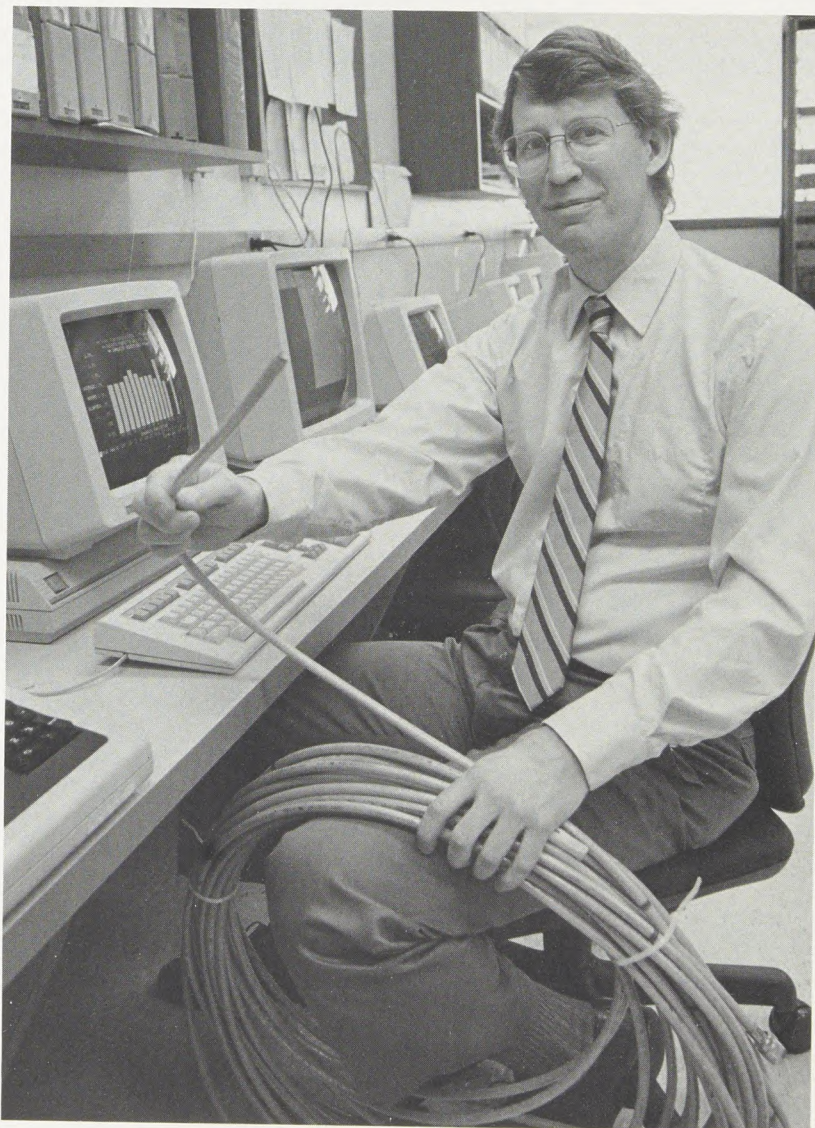


MALLINCKRODT  
INSTITUTE  
OF RADIOLOGY  
WASHINGTON UNIVERSITY MEDICAL CENTER

### ON THE COVER:

Michael J. Welch, Ph.D., professor of radiation chemistry in radiology, is one of the primary collaborators in estrogen receptor research. Welch's group has created a radiopharmaceutical to produce PET images of breast tumors in vivo. Photograph by Mike DeFilippo.

# SPOT NEWS



*Steve Rodewald, programmer analyst with Mallinckrodt's computer section, holds a length of the Ethernet cable over which all computer data flow.*

altered to run on the new equipment.

Rodewald says the biggest change in the system is not its headquarters, but the pathway information takes to and from the terminals. Formerly, each workstation required its own four dedicated wires. That resulted in a complicated tangle of wire as the system grew. Now, all the data from all terminals travel on a single, shared Ethernet coaxial cable. Terminals can be added without having to run a set of wires back to the computer. That Ethernet cable stretches 1.3 miles as it connects the Institute, CSRB, Children's Hospital, the East Building, and other satellite facilities.

Steve Kohler

## Computers On The Move

The move went so smoothly that most Mallinckrodt employees were not aware when they switched on their computer terminals on Monday, December 14, that the computer section had changed locations. After months of preparation, the vast computing power of the Institute was physically relocated from Mallinckrodt's 12th floor to the fourth floor of the Clinical Sciences Research Building (CSRB) on Friday evening, December 11.

For most, that puts the

computers farther away. Since information travels to and from the computers at near the speed of light, that makes little difference. What does matter is that the move provided a chance to upgrade the equipment. According to Steve Rodewald, programmer analyst, the last of the older model PDP-11 computers is now gone. The network now includes two new Micro PDP-11/73s, seven Micro-VAX IIs, and a VAX Cluster of two VAX 11/750s, all products of Digital Equipment Corporation. The familiar programs look the same on the terminal screens, but have been

# SPOT NEWS

## Mallinckrodt's Join Forces, Give Three Grants

The reputations of Mallinckrodt, Inc. and Mallinckrodt Institute of Radiology as pioneers in research will be enhanced through a grant program that both sponsors hope "will strengthen their research relationship," says R. Gilbert Jost, M.D., professor of radiology and chief of the Diagnostic Division.

Jost was a member of the seven-man committee (four from the Institute and three from Mallinckrodt, Inc.) responsible for setting the wheels in motion for the research grant program. Other faculty on the committee were Bruce L. McClennan, M.D., professor of radiology; Barry A. Siegel, M.D., professor of radiology and medicine and director of the Division of Nuclear Medicine; and Michael J. Welch, Ph.D., professor of radiation chemistry.

After reviewing seven proposals, the research committee awarded three grants totaling \$42,000. The grants, trailblazers for this new program, were awarded based on the scientific quality of the proposal and whether it would make a contribution to ongoing projects at Mallinckrodt, Inc.

S. M. Moerlein, Ph.D., received \$14,000 for the funding of "Evaluation of (123 I)R (+)-SCH 23982 as a Radiopharmaceutical for Imaging Cerebral Dopaminergic D-1 Receptor Areas with SPECT." R. E. Drzymala, Ph.D., was awarded a \$14,000 grant for research on "Photographic Block Verifier." Landis Griffith, M.D.,

Ph.D., and Mark Mintun, M.D., jointly received \$14,000 for the study of "Preliminary Evaluation of 11 C-Labeled Acetate for Renal Imaging by Positron Emission Tomography."

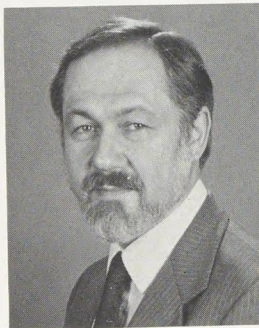
## Hyperthermia Researchers Meet

Twenty-three abstracts were presented to 50 researchers involved in the study of radiation and hyperthermia when they assembled in the Radiation Oncology Center in November, 1987, for the Third Annual Midwestern Regional Radiation Research meeting.

Guest lecturer Paul Doetsch, Ph.D., assistant professor of biochemistry, Emory University School of Medicine in Atlanta, Georgia, presented his abstract on "Molecular Biological Approaches for Studying Radiation Damage to DNA and Its Repair."

Host faculty for this forum for scientific communication were Joseph L. Roti Roti, Ph.D., professor of cancer biology and chief of the cancer biology section in the Radiation Oncology Center, and Ryuji Higashikubo, Ph.D., assistant professor of cancer biology. H. Gregg Claycamp, University of Iowa Medical School, Iowa City, Iowa; T. Dan Griffiths, Northern Illinois University, DeKalb, Illinois; and Douglas Martin, Kansas University Medical Center, Kansas City, Kansas, completed the program committee.

## Nussbaum Awarded NCI Grant



Thomas Murry

Gilbert H. Nussbaum, Ph.D.

Gilbert H. Nussbaum, Ph.D., associate professor of radiation physics in radiology, has received a five-year grant for \$350,000 from the National Cancer Institute for his proposal entitled "Vasodilator-Assisted Hyperthermia of Deep-Seated Tumors in the Pelvis and Abdomen." The grant will support a pre-clinical study of the use of vasodilator drugs to improve hyperthermia (thermotherapy) of deep-seated tumors.

In applications of hyperthermia (e.g., elevation of tumor temperature to 42.5 degrees Centigrade), the rate of cooling of tissue being heated is directly proportional to the rate of blood flow, i.e., the perfusion rate in the tissue. In the research to be conducted, the presumed improvement in tumor hyperthermia will be obtained through vasodilator-induced shunting of blood from tumor to normal tissue, thereby making the tumors easier to heat. Rationale for the use of vasodilators to facilitate the desired improvement is provided by the substantially reduced capacity for dilation of blood vessels in

tumors in comparison with that in normal tissue.

Nussbaum and fellow researchers Bahman Emami, M.D., professor of radiology, and E. Kaye Smith, assistant professor of pathology, will investigate distributions of perfusion rates and elevated temperatures in tumors and normal tissues in the absence and presence of vasodilators.

## Bound For Paris

Todd H. Wasserman, M.D., professor of radiology, has received a \$33,000 travel grant from the National Cancer Institute. This grant supports traveling expenses for junior investigators attending the Sixth International Conference on Chemical Modifiers in Cancer Treatment held in Paris, France, in March, 1988.

As North American chairman of the conference, Wasserman is responsible for awarding the grants to eligible recipients in North America and for coordination of scientific, fiscal, and logistical support for the conference.

# SPOT NEWS

## Lee Presents MRI Statement

By invitation of the National Institutes of Health (NIH), Joseph K. T. Lee, M.D., professor of radiology, presented his statement on "MRI of the Male Pelvis" at the Magnetic Resonance Imaging Consensus Development Conference in Bethesda, Maryland, in October, 1987.

Sponsored by the Warren Grant Magnuson Clinical Center and the NIH Office of Medical Applications of Research, the conference established the efficacy of MRI, determined clinical applications of the technology, and compared it to other imaging modalities, such as computed tomography (CT) and ultrasound.

A panel of radiologists, surgeons, internists, and public health officers weighed the scientific evidence presented in a total of 20 abstracts and concluded the conference with the reading of a written statement to the conference audience; the statement also was released to media representatives.

Additional sponsors of the conference were the Division of Research Resources, National Cancer Institute; National Heart, Lung, and Blood Institute; National Institute on Aging; National Institute of Neurological and Communicative Disorders and Stroke; National Institute of Mental Health; and Food and Drug Administration.

## McClennan President-Elect

After serving since 1973 as secretary-treasurer of the Society of Uroradiology, Bruce L. McClennan, M.D., professor of radiology, was designated president-elect at the Society's meeting in February in Orlando, Florida. He will be installed officially as president for one term at the September, 1989, meeting in Hilton Head, South Carolina. As president, McClennan will be responsible for organizing the 1990 meeting, which also serves as a postgraduate course, with attendees earning CME credit hours for their participation.

## Technology Transfer

Joining 18 other eminent scientists, Michael W. Vannier, M.D., associate professor of radiology, has been named an advisory member of the NASA technology applications team.

His assignment is to help the team identify and verify priority national needs in which the application of NASA technology will serve to benefit the public and private sectors. Vannier will aid the transfer on the Biomedical and Rehabilitation Advisory group.

## Hente Elevated To Fellow

On June 29, 1987, Norman L. Hente, R.T., B.S., supervisor of medical photography at Mallinckrodt, was elected a Fellow of the American Society of Radiologic Technologists (ASRT).

ASRT is a national organization whose 15,000 members are healthcare specialists in the fields of radiography, radiation therapy technology, nuclear medicine technology, and diagnostic medical sonography.

The Institute now has three ASRT Fellows on staff. This is significant because only 89 technologists have been honored as fellows since the program began in 1956. Armand Diaz, R.N., R.T., FASRT, assistant professor of technical administration, was named a Fellow in 1971, and Gary S. Brink, R.T., B.S., FASRT, chief technologist, was honored in 1979.

## Thank You, CIC Volunteers

The Cancer Information Center (CIC) held its annual CIC Appreciation Luncheon in December, 1987, to officially recognize the efforts of 15 volunteers who contributed a total of 1,743 hours to the Center in 1987.

"The Center recently celebrated its tenth anniversary," said Lois Howland, R.N., CIC managing director. "We have one volunteer who has been with us for ten years and two volunteers for eight years. We are grateful to all our volunteers, whether they've been with us for

ten years or ten days, and the luncheon is our way of saying thank you."

Special guests included Carlos A. Perez, M.D., professor of radiology, director of the Radiation Oncology Center and founder of the Cancer Information Center; Gary Ratkin, M.D., physician advisor; Frederick A. Hermann, president, Barnard Hospital Board of Trustees; Edwin B. Meissner, chairman, Barnard Hospital Board of Trustees; Elizabeth Burns, Barnard Hospital Board of Directors; Susan Collins, director of Volunteer Services; Beverly Kobeissi, administrator, Radiation Oncology; and Connie Povilat, administrative assistant for Communications and Outreach Programs.

The CIC was founded in 1977 to serve three primary needs of cancer patients—information, resources such as wigs and prostheses, and emotional support. It was the first such institution in the United States. The CIC is cosponsored by the Radiation Oncology Center of Mallinckrodt and Barnard Free Skin and Cancer Hospital.

# SPOT NEWS

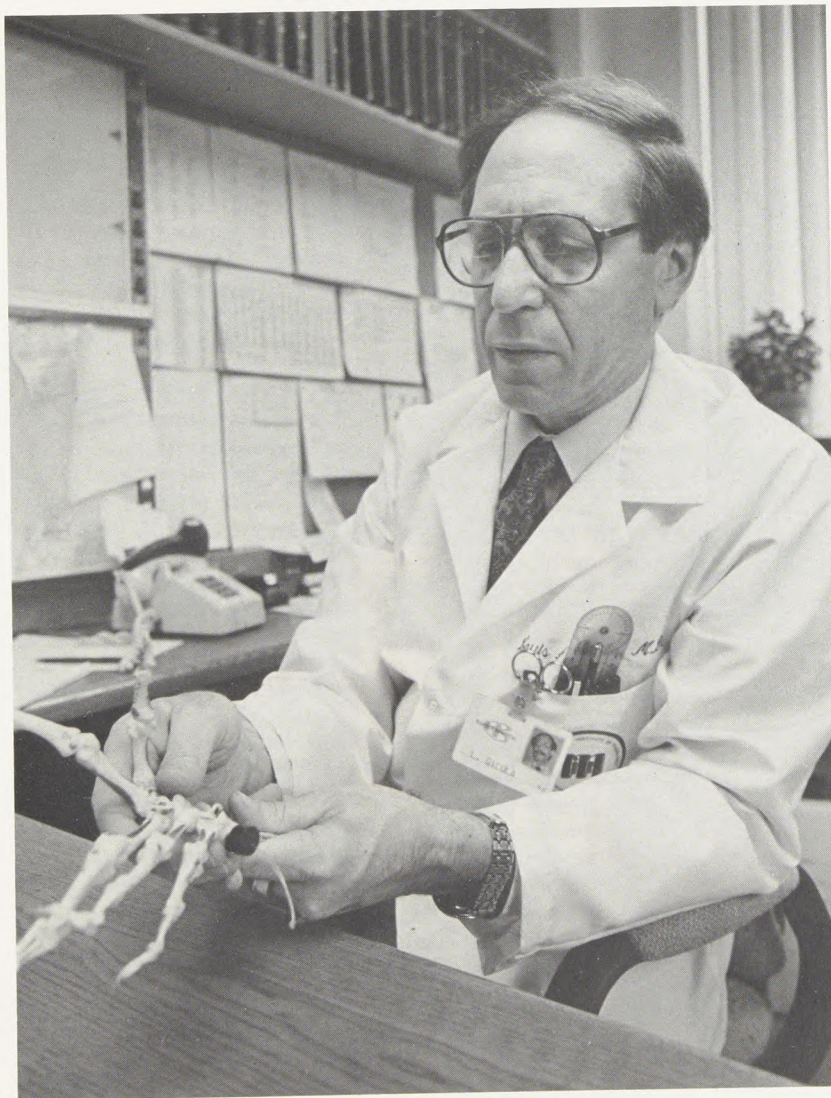
## Welch Cochairs Workshop

Sixty chemists involved in nuclear-related fields gathered for a three-day workshop in February at the National Academy of Sciences in Washington, D.C.

Cochairmen Michael J. Welch, Ph.D., professor of radiation chemistry in radiology at Mallinckrodt Institute of Radiology, and Gregory R. Choppin, Ph.D., professor of chemistry at Florida State University, organized the workshop to identify and assess the training requirements for chemists involved in the fields of nuclear medicine and nuclear industry. Resource papers were distributed in early January to those chemists planning to attend. In the initial session, authors of those resource references briefly highlighted important topics from their papers.

Participants were divided into five panels concentrating on the areas of nuclear and radiochemistry, related research disciplines, national laboratories, nuclear medicine applications, and the nuclear power and process industry. Each panel drafted a report incorporating the conclusions of that panel; a finding was drafted from the five reports. It will be published in June of 1988.

The workshop, supported by the Department of Energy, the National Institutes of Health, and the Electric Power Research Institute, was organized under the auspices of the Board on Chemical Sciences and Technology (BCST) of the National Research Council in cooperation with their Committee on Nuclear and Radiochemistry.



Steve Kohler

*Louis A. Gilula, M.D.*

## Gilula Covers Problems, Solutions

Louis A. Gilula, M.D., professor of radiology and codirector of the musculoskeletal section, and Jim Dobyns, M.D., a hand surgeon from the Mayo Clinic, were responsible for organizing the Third International Wrist Investigators Workshop held in Orlando, Florida, in November, 1987. The workshop was held in conjunction with the American Hand Society's

meeting on the distal radioulnar joint.

"The forum was organized to discuss difficult problems and potential solutions as well as to develop cooperative efforts among major investigators of the wrist," said Gilula.

Washington University Medical Center's Paul M. Weeks, M.D., Plastic Surgery, and Paul R. Manske, M.D., Orthopedic Surgery, were among those surgeons participating in the workshop.



# SPOT NEWS

## Evens In Berlin For Schering Conference

Ronald G. Evens, M.D., Elizabeth Mallinckrodt professor of radiology and director of the Institute, was a guest speaker at the "Modern Imaging—State of the Art" international symposium in Berlin in January, 1988. Evens, one of five presenters from the United States, spoke on "Electronic Imaging—Its Promise, Reality and Costs."

The symposium, sponsored by the Board of Executive Directors and the Pharmaceuticals Division Board of Schering AG, featured prominent researchers who delivered papers on one of nine main topics: computerized tomography, magnetic resonance tomography, basic radiological systems, ultrasound, picture archives and communication system, digital subtraction angiography, contrast media, interventional radiology, and positron emission tomography.

## Tolmach Paper Cited In 375 Publications

In 1961, Leonard J. Tolmach, Ph.D., professor of radiobiology in radiology, and Toyozo Terasima, National Institute of Radiological Sciences in Japan, developed a technique that demonstrated changes in radiosensitivity during the mammalian cell cycle.

In the 26 years since the findings were first reported, 375 other publications have cited this paper for the research's impact on the fields of cancer therapy and cell biology. In Volume 30, #46, dated November 16, 1987, of *Current Contents*, a library of more than 1,150 of the world's most important journals, Tolmach and Terasima were awarded the highly coveted Citation Classic as recognition for their achievement.

To earn this recognition, a paper must be a highly cited publication as identified by *Science Citation Index*, *Social Sciences Citation Index*, or *Arts & Humanities Citation Index*. Citation rates differ for each discipline depending on the relative size of the field involved. To appreciate the scope of Tolmach's and Terasima's achievement, the average 1973 article published in a *Sciences Citation Index*-covered source was cited approximately ten times between 1973 and 1983.

## Breaking Ground At St. Louis Centre

Mallinckrodt Institute of Radiology is breaking ground in several ways with the construction of a mammography screening center on the fourth floor of St. Louis Centre in downtown St. Louis. The Screening Center's official unveiling and ribbon-cutting ceremony was February 19, 1988, with representatives from government, health-care and community leaders, and the media in attendance. The ceremony coincided with the Working Women's Survival Show at Cervantes Convention Center on February 19 through the 21st. In addition to sponsoring an informational booth and the child-care center at the show, the Institute provided the Mallinckrodt Mammography Mobile for breast cancer screening.

"Every 15 minutes three women get breast cancer and one woman dies. Mallinckrodt Institute is committed to breaking new ground in the fight against this disease," says Judy Destouet, M.D., associate professor of radiology and head of mammography at the Institute. "We believe so strongly in the effectiveness of the mammogram that Mallinckrodt was one of the first in the nation to sponsor a van to take mammography to stores and workplaces. We hope that going to the Screening Center will become as routine for women as going to St. Louis Centre for dinner or to shop."

The Mammography Screening Center at St. Louis Centre is a first-of-its-kind

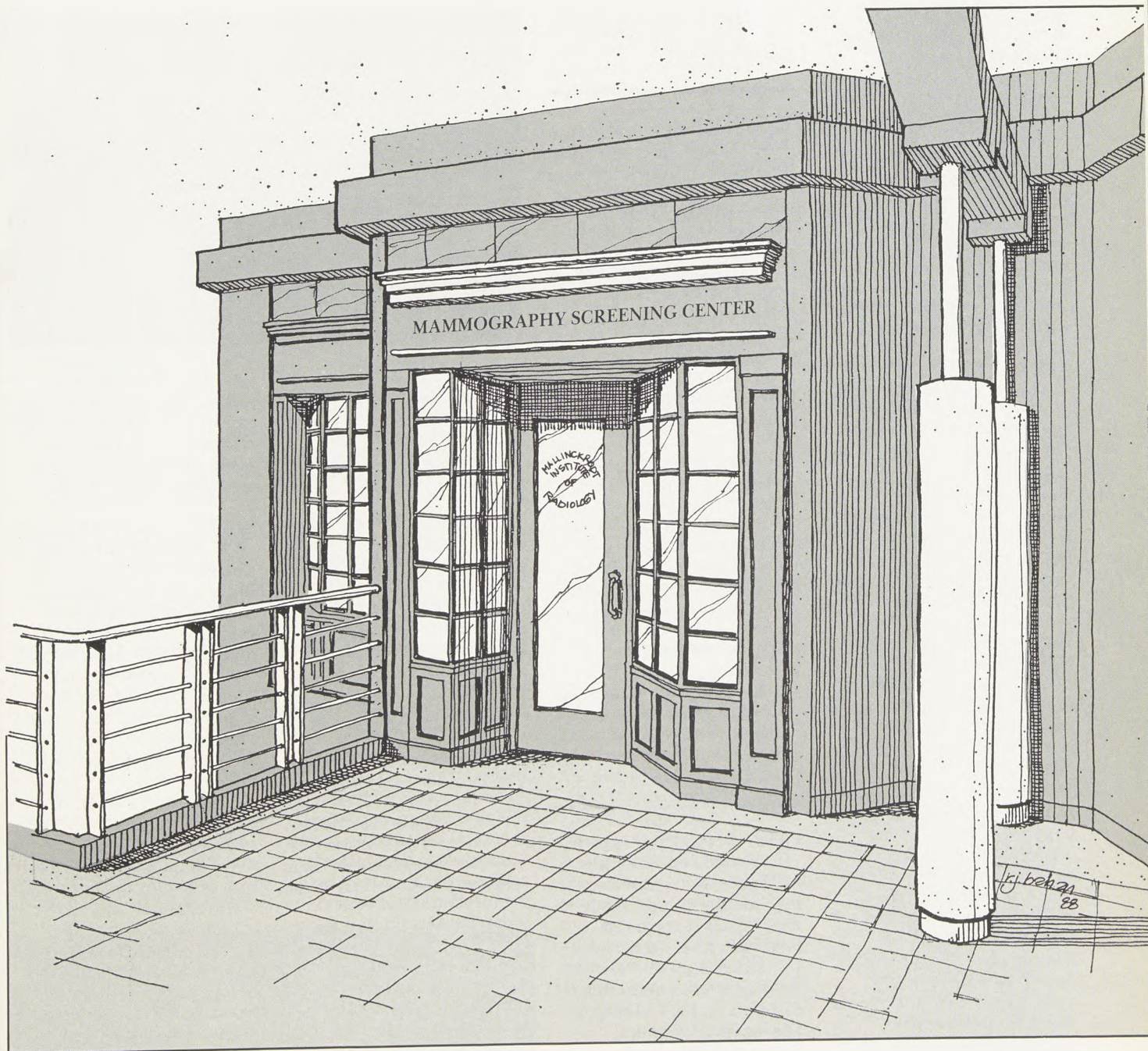
healthcare center located inside the largest enclosed urban shopping mall in the United States. St. Louis Centre, a four-level mall, opened in August, 1985, and now has 140 stores and shops. Because of its central location and accessibility to major highways, the shopping mall attracts residents from across the bistate area. Its architecture and variety has made it one of St. Louis' most popular attractions.

Perhaps the largest contingent of visitors to St. Louis Centre is the approximately 110,000 people working in the downtown area. Roughly 60,000 of those workers are women. Those women, in addition to the hundreds who shop daily at St. Louis Centre, now have a convenient and readily available mammography screening center where they can have a mammogram completed in less time than it takes to have lunch. The cost of a screening mammogram is \$50.

Breast cancer is the second leading cause of all cancer deaths among women, and one out of ten women will develop breast cancer in her lifetime. According to Ronald G. Evens, M.D., director of the Institute, "Screening mammography must become as routine as buying food and clothing. No other test in radiology—not even the chest X ray—has been as successful as mammography in diagnosing disease. If cancer is caught at an early stage, the cure rate jumps from less than 50 percent to more than 90 percent."

Evens, who initiated the idea for a screening center at St. Louis Centre, is committed to screening as many women as possible for breast cancer. The Center is the newest unit

# SPOT NEWS



of the Institute's Mammography Outreach Program. Designed by the architectural firm of Stone Marracini Patterson, the Center offers an inviting, non-clinical atmosphere in which women can feel completely at ease while having this most important test. The Screening Center

employs the same high-technology equipment used on the Mammography Mobile and at Washington University Medical Center.

According to Evens, widespread screening for breast cancer is the only way to defeat this disease. The goal of the Screening Center, as with all the Institute's

screening facilities, is to raise awareness of the critical importance of early detection of breast cancer through mammography.

# MEDIA FOCUS

In December, 1987, the well-regarded magazine **Diagnostic Imaging** devoted a special supplement to a report on a symposium organized by **Ronald G. Evens, M.D.**, Elizabeth Mallinckrodt professor of radiology and director of the Institute, and **Bruce L. McClennan, M.D.**, professor of radiology. The conference, held September 25th through the 27th, gathered experts concerned with the advent of low osmolality contrast media (LOCM).

In his summary report on the conference, Evens says, "The subject is complex and controversial, requiring opinions and data from many points of view... We have a new technology (LOCM) with definite benefits, yet the suggested most important benefits of reducing mortality and morbidity are neither proven nor qualified. Second, this new technology is at a much higher cost and has become available at a time of great concern for any increase in medical costs."

Evens' comments serve as an introduction to the papers presented at the conference, including one by McClennan, who writes that a practical approach to LOCM must include a cautious evaluation of advantages: "A wholesale switch to a more costly drug may not be in the best interest of either the patient or the society at this point, nor may it be entirely necessary."

McClennan concludes that LOCM can be of value for high-risk, high-pain patients, but that certain procedures are still optimally performed using conventional contrast material.

The conference, with the sole purpose of educat-

ing users of contrast media, was sponsored by Mallinckrodt, Inc.

**Kellyn Betts**, a freelance medical and science writer based in New York, filed stories with both the **Medical Tribune** and **Laser Medicine and Surgery News** concerning Lithostar, the non-water bath extracorporeal shockwave lithotripter under investigation at Mallinckrodt.

After interviewing **Bruce McClennan, M.D.**, professor of radiology and chief investigator of Lithostar, Betts was able to contrast its operation and benefits with those of other treatment modalities. Betts says a new method of using lasers to disintegrate stones shows promise, and her articles compare the Siemens-made Lithostar with the alternative technology.

Neither story had appeared as *Focal Spot* went to press, but both were expected within the first half of the year.

The story of the expedition **Marcus Raichle, M.D.**, professor of radiology and neurology, made to the high Karakoram in Pakistan, first published in the fall edition of *Focal Spot*, appeared in shortened form in the **St. Louis Post-Dispatch** on Monday, December 29.

The article, printed on the front page of "Everyday," featured color photos taken by Raichle. It told of his part in research into acute mountain sickness being conducted by the Birmingham (England) Medical Research Expeditionary Society.



Steve Kohler

An American favorite—**The Body Human**—will be reborn in the spring of 1988 when that television program returns to the air after a three-year absence.

**Charles "Chuck" Bangert**, producer for the new generation of shows, plans to produce four installments. For the first in the series, he brought his cameras to Mallinckrodt Institute of Radiology in mid-November to record footage of color-flow Doppler ultrasound and three-dimensional imaging techniques. The footage will be considered for inclusion in the new generation's first segment, tentatively titled "Sex in America." Bangert says the program will be a reexamination of sexual behavior and physiological responses to stimulation.

The winner of four Emmy Awards, two for earlier installments of *The Body Human*, Bangert is chairman of New Screen Concepts, a New York production company. A one-man crew, he writes, films, and edits complete productions. His filming here included interviews with **William Middleton, M.D.**, and **Michael Vannier, M.D.**

When "*The Body Human*" returns to television this spring, Mallinckrodt settings will be featured. Here, writer/producer **Charles Bangert** trains his film camera on a color-flow Doppler machine.

When **Laurie Stokes**, a reporter at WCIA-TV, Channel 3 in Champaign, Illinois, got the assignment to produce a series concerning modern medical imaging, she turned to Mallinckrodt as her primary source. Three of the four segments in the series were videotaped here, with Mallinckrodt physicians serving as experts.

**Marcus Raichle, M.D.**, professor of radiology and neurology, led Stokes' viewers on a tour of a positron emission tomography (PET) scanner and explained its operation. The capabilities of magnetic resonance imaging (MRI), particularly in its latest "cine" form, were outlined by **Fernando Gutierrez, M.D.**, assistant professor of radiology. And an interview with **Joseph K.T. Lee, M.D.**, professor of radiology, was devoted to the subject of computed tomography (CT) and its workings.

The resulting four-part report aired on consecutive evening news programs during mid-February.

# MEDIA FOCUS

One of the hottest stories at Mallinckrodt continues to be the three-dimensional reconstruction of heart images from individual magnetic resonance imaging (MRI) "slices." The promise the new technology offers, especially to pediatric patients with congenital heart problems, has attracted the attention of news media from around the country and abroad. West Germany's Channel Two, or ZDF (for Zweites Deutsches Fernsehen), sent director **Rudy Schwarz** and two crew members to **Michael W. Vannier's** lab for footage of the latest 3-D images. The resulting three-minute report aired on a nationwide science magazine show called **Gesundheitsmagazin PRAXIS** at 9 p.m. German time, February 11.

A similar two-minute report was produced by **MedSource's Dave Lucas**. He taped an interview with **Dan Dixon** and his son **Alex**, who benefitted from the 3-D imaging process. That video report was distributed to 64 U.S. television stations beginning January 14.

Following the presentation of his paper on the research to the RSNA convention, Vannier was the

subject of an interview for Chicago's NBC affiliate, **WMAQ**. The news item was broadcast on December 4.

Print media did not overlook the story, either. **Cardiology Today's Hilary Frazer** wrote in the January edition about how three-dimensional images aid surgeons in their planning.

And **Mr. Wizard** was interested. The studios of Don Herbert, a.k.a. Mr. Wizard, produce science and medicine spots for insertion into news programs. Called "**How About...**," the 90-second reports are distributed to small- and medium-sized markets around the country. One of 30 generated for 1988 focused on the work of Vannier and his colleagues, saying that the 3-D process promises "less expensive, faster, and safer" diagnoses. The videotape was released for distribution on January 1.

Local media was no less concerned. Veteran **KMOX** radio reporter **Joan Beuchman** conducted an

*While a crew member videotapes, West German television producer Rudy Schwarz interviews Robert Knapp, B.M., R.T., concerning the three-dimensional reconstruction of magnetic resonance images.*

interview with Vannier about his work's applications, then followed with a comparison of more traditional cardiac catheterization techniques, courtesy of **Fernando Gutierrez, M.D.** The feature was broadcast during the third week of December.

**Bill Britt**, a reporter for the **St. Louis Business Journal**, wrote a story that appeared on page 18 of the January 11 edition, explaining the 3-D imaging technique to that paper's readers. Subscribers to **St. Louis Weekly** also read the news, thanks to reporter **Keith Klamer's** interview that ran on January 20.

Most recently, **Channel 4's Al Wiman** has made several trips to the Institute for interviews with Vannier, Gutierrez, a patient who has been involved in the study, and the patient's cardiologist.

Since the day Raymond Dart discovered it in 1924, the fossilized skull of the so-called Taung child has stirred controversy. With features of both hominid and ape, the skull is sometimes said to have belonged to the "missing link." Despite the application of the latest radiologic technology to the problem of determining the skull's place in the human family, the big questions remain unanswered.

The most recent study of the skull, using the latest advances in computed tomography (CT), made it possible to see previously obscured structures in the skull. Studying dentition patterns, **Michael W. Vannier, M.D.**, associate professor of radiology, and **Glenn C. Conroy, Ph.D.**, professor of anatomy

and anthropology at Washington University, discerned great ape-like features. But other details, notably brain shape, suggest a hominid relationship.

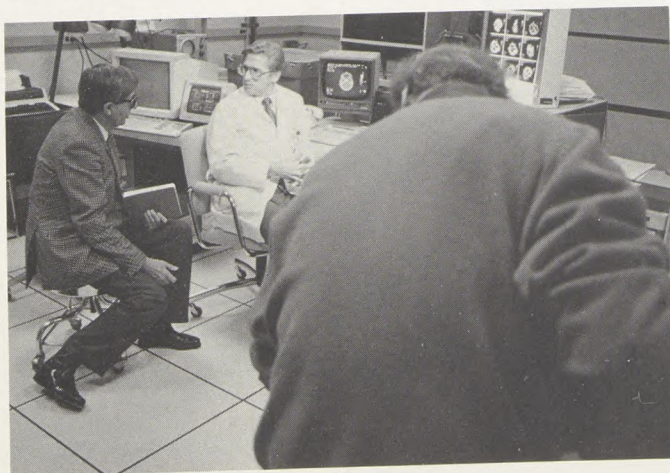
The story of the new, if indecisive, evidence in the mystery made the cover of **Nature** for the week of October 15 and then rated a story in the **New York Times** on October 20.

The announcement on October 16, 1987, that **First Lady Nancy Reagan** had been diagnosed as suffering a breast lesion stirred local interest not just in breast cancer but in its early and effective detection. Area medical reporters were quick to seek the advice of Mallinckrodt professionals.

**Al Wiman**, medical reporter for **KMOV-TV**, Channel 4, spoke on camera with **Judy Destouet, M.D.**, head of the Mammography Program, and informed his viewers of the benefits of screening mammography on the evening news of the same day.

**KSDK's Jennifer Graves** also produced a news story that featured Destouet in an interview with reporter **Karen Humphrey**. That story led the evening news program on October 16.

Reporter **Stephanie Grant's** newspaper story, presenting a local follow-up to the national news, centered on an interview with Destouet, who commented on the need for mammography and its availability. The story appeared in the west editions of the **Suburban Journal** newspapers.



Steve Kohler



*Michael J. Welch, Ph.D., professor of radiation chemistry in radiology, at the control panel of one of the Institute's cyclotrons employed in the production of short-lived radioisotopes.*

# PUTTING THE KEY IN THE LOCK

A Collaboration of Scientists  
Creates Images of Estrogen Receptors

---

by Steve Kohler

**W**e will never know the names of the 13 women. As subjects in a research project, their anonymity was guaranteed. But we all owe them a debt; their contribution capped a decade of cancer research and pointed ahead in new directions. Each woman had only recently learned that she had breast cancer. But within 24 hours of receiving that shocking news, each agreed to participate in an experimental project that focused her attention even more acutely on her newly diagnosed tumor, yet guaranteed her no immediate help. "Your daughters may benefit," was the closest the scientists involved in the breast cancer study could come to assuring a return on the women's investments.

The researchers looked ahead to the day when their work in imaging tumors would be used to tailor cancer treatments precisely for each patient. That was the long-term goal, 10 to 15 years away by conservative reckoning. Success at the present level would be one big step along the way to that objective.

## PUTTING THE KEY IN THE LOCK

**F**or the study, each woman agreed to receive an injection of radiolabeled estradiol, a derivative of natural estrogen with radioactive tracer atoms chemically attached to the molecules. If the researchers were right, and a decade of developmental studies said they were, then the estrogen would bind itself to the estrogen receptors in the women's systems. And the radiotracer could be tracked on a positron emission tomography (PET) scanner to reveal the concentration of those estrogen receptors in the tumors, producing images of the cancer itself.

**W**hat are estrogen receptors and why is their presence important?

Naturally occurring estrogen receptors can most easily be thought of as molecular structures that resemble tiny keyholes in function, according to a metaphor drawn by Michael J. Welch, Ph.D., professor of radiation chemistry in radiology at Mallinckrodt Institute of Radiology and principal investigator on the project. The keys that precisely fit those molecular keyholes are estrogens.

Estrogen receptors occur in the human uterus, in the ovaries and the brain, but they also tend to be present in breast tumors. They occur in roughly two-thirds of breast tumors in postmenopausal women and in a third to a half of breast tumors in premenopausal women. Estrogen is the female sex hormone responsible for the development of secondary sex characteristics. And the presence of estrogen receptors in cancerous tissue is well-known from in vitro assays performed on excised breast tumors.

Anti-estrogen drugs, such as tamoxifen, work to block those receptors, filling the keyholes

and keeping out the estrogen that is strongly suspected of being a cause for the growth of breast cancer. In tumors classed as estrogen receptor-positive (those with a concentration of receptors above a clinically determined level), hormonal therapy with tamoxifen is effective in almost two-thirds of the

---

*The stakes were high  
for the culmination  
of a decade of  
research.*

---

cases. And where such hormonal therapy is effective, it is often the treatment of choice, thanks to its relatively few and minor side effects. Andrea McGuire, M.D., instructor in radiology, calls it "a good drug," and notes that some patients have continued to receive tamoxifen therapy for as long as five years. The most successful tamoxifen therapy drives cancer into remission, presumably by cutting off the supply of estrogen to the estrogen receptors.

That fact holds great promise for cancer patients because primary tumors that spread, or metastasize, often maintain their concentrations of estrogen receptors. A method for imaging metastatic tumors and their activity levels could serve as a great aid to treatment planning. By means of such images, patients could be quickly and accurately qualified as candidates for tamoxifen therapy. And they wouldn't have to wait to determine if the tamoxifen was working. A second scan could quickly show if the estrogen was being blocked by the drug or if

the hormonal therapy needed to be adjusted.

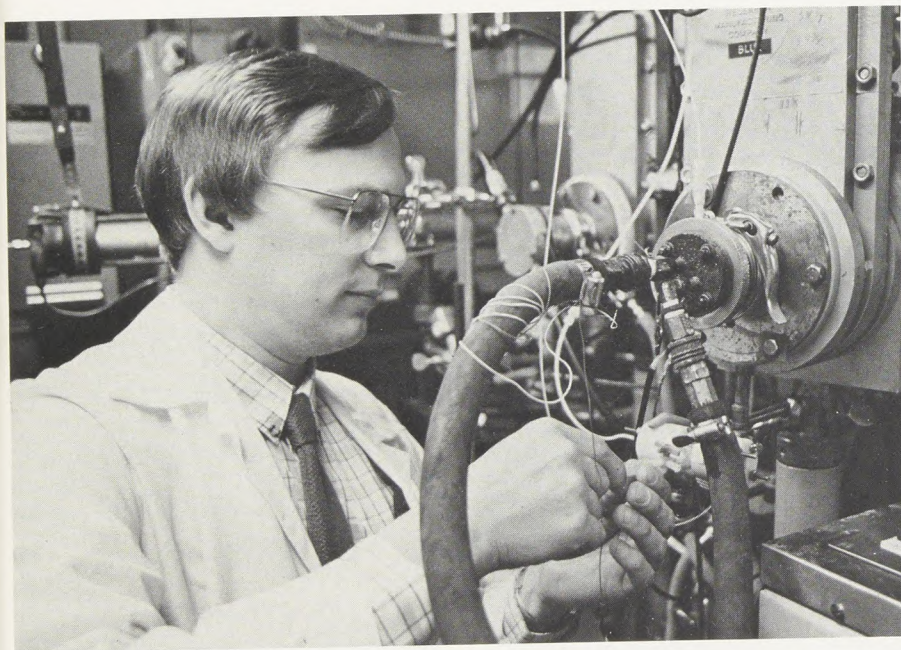
Successful PET images of receptors in primary breast tumors and their metastases would be the first ever in vivo images. The stakes were suitably high for the study involving the 13 women that was the culmination of a decade of research.

**T**he story of those 10 years is not just one of the selflessness of the subjects involved. It is also a tale of vision, commitment, and luck.

The project began in 1975, almost completely by chance, when Welch and John A. Katzenellenbogen, Ph.D., professor of chemistry at the University of Illinois, Urbana, happened to share a cab from John F. Kennedy airport to Brookhaven National Laboratory on Long Island. Both already eminent scientists, they were there to review a grant proposal for the Department of Energy.

An expert in organic synthesis, Katzenellenbogen was looking for someone with expertise in radiopharmaceutical formulation. His lab was producing ligands, compounds that bind with receptors in the body, and he wanted to explore the possibilities for using that particular behavior in imaging. Welch turned out to be just the man such a project needed, and a collaboration evolved that Katzenellenbogen says is "of the very best type. Each of us understands enough about the other's work that we can check on it."

Many kinds of receptors occur in the human body. In fact, most commonly prescribed psychoactive drugs work by blocking specific receptors in the brain. But, Welch says, "The idea that we could use them as a method for visualizing tumors was pretty novel back in 1975."



Steve Kohler

**James W. Brodack, Ph.D., research instructor in radiology, loading the fluorine target of the cyclotron.**

Producing such images became the team's goal. The vision was clear from the start, Welch says. "Between us we believed we could see the project through." But the path of their scientific detective work was blocked at many turns. "Many of our approaches led to dead ends."

The big trick turned out to be the formulation of a radioligand that retained its natural qualities as an estrogen, even when a radioactive atom was chemically attached to its molecules. It had to behave like an estrogen in order to be taken up by the receptors. And it had to show a low tendency to bind elsewhere. Additionally, the radiotracer part of the compound had to meet certain criteria for activity. All this had to be accomplished on the invisible, molecular level.

Because estrogen receptors—even where they are present in tumors—are relatively few in

number, Welch explains, agents of high specific activity are required. Simply put, that means every estradiol molecule prepared should carry a radiotracer atom with it. Otherwise, the estrogen that "hooks up" with the receptor might not have an emitter attached. The result: no image. But making such high specific activity compounds is much more difficult than formulating less active tracers.

The team of researchers—more than 20 have been involved over the years, who together have made almost 50 trips between St. Louis and Urbana—began working with gamma emitters, using bromine as the radioactive agent. Immature rats were the first subjects, chosen because the young animals naturally possess a concentration of estrogen receptors in the uterus. Conventional assay techniques revealed how well developmental compounds were linking with those receptors.

The bromine was relatively easy to work with chemically, Welch says, "but the images were awful because of the

character of the isotopes available." Even so, that early work yielded the first images of receptors in humans, circa 1982. Barry A. Siegel, M.D., Director of the Division of Nuclear Medicine and another member of the team, gained approval to apply the technique to humans.

---

*So evident was the advancement such an image represents that it was named "Image of the Year" for 1987.*

---

The effort to achieve better pictures shifted the group's interest away from the gamma cameras to the PET scanner, a more sophisticated instrument that promised greater contrast and detail. Fluorine was the element of choice for PET imaging. But it brought with it a new set of problems.

Radioactive fluorine-18 possesses a half-life of only 110 minutes. That's good because it limits the exposure to radiation to a few hours, according to the rule that the majority of radiation disappears in four to six half-lives. That short life and the small, measured dose of a PET study keeps exposure "within the diagnostic range," according to McGuire. No side effects from such minimal radiation have been noted.

But the short half-life makes matters difficult for chemists who must synthesize the compounds. In order to arrive at the scanning appointment with the appropriate dose, a chemist must begin the synthesis with large amounts of radioactivity. Those



## PUTTING THE KEY IN THE LOCK



*Mark A. Mintun, M.D., assistant professor of radiology, positioning a breast cancer patient for a PET scan. The volunteer subject received an injection of the research team's latest radioligand shortly before the scan.*

who prepare positron emitters by hand would therefore irradiate themselves. The team developed a novel solution to this problem, overcoming it like they did so many other obstacles. Jim Brodack, Ph.D., research instructor in radiology at Mallinckrodt, located and programmed a robot to take over the work. (See sidebar.)

Improvements in the compounds continued, and four complete generations were developed. Welch says the fine tuning did not involve setbacks, "they're improvements. You learn from every step." He adds, "Oh, there were a few days

while we were first working with the flourine when we got depressed and thought it would never work. But that's the challenge, to overcome the problems. That's why people do science—for the breakthroughs." According to Mark Mintun, M.D., assistant professor of radiology and the team member responsible for analyzing the data, "Even the way we thought about PET images required improvement."

Today, work toward additional breakthroughs continues. Welch and his colleagues are correlating the imaged receptor levels with the efficacy of tamoxifen therapy. They hope to reduce the rate at which their latest radiopharmaceutical is metabolized; the longer the time before the body breaks it down, the higher the concentration in the tumor. The result may be

images that provide more information. Also being considered is the possibility that, because the compound concentrates effectively in the estrogen receptors of tumors, it might be used to carry radiation of a level that kills cancer cells.

---

*A short half-life makes matters difficult for the chemists who synthesize the compounds.*

---

More effort will be devoted to those and other approaches following the clinical evaluation of the work to date. In those first 13 studies, an almost perfect correlation resulted between the new imaging technique and laboratory assays done on the volunteers' excised tumors. The PET images have reliably demonstrated the uptake of the radio-labeled estrogen at the sites of the primary tumors and also in several metastases. The researchers' commitment paid off.

If, as Welch says, people do science for the breakthroughs, then the clinical trials surely qualify. In one case, the PET image clearly revealed both the primary tumor and its metastasis. So evident was the advancement such an image represents that it was named "Image of the Year" for 1987 at the Society of Nuclear Medicine's annual meeting. By 1997, if the scientists' foresight is accurate, such images will be commonplace tools for guiding cancer treatment—a profound example of research coming to fulfillment. □

Steve Kohler

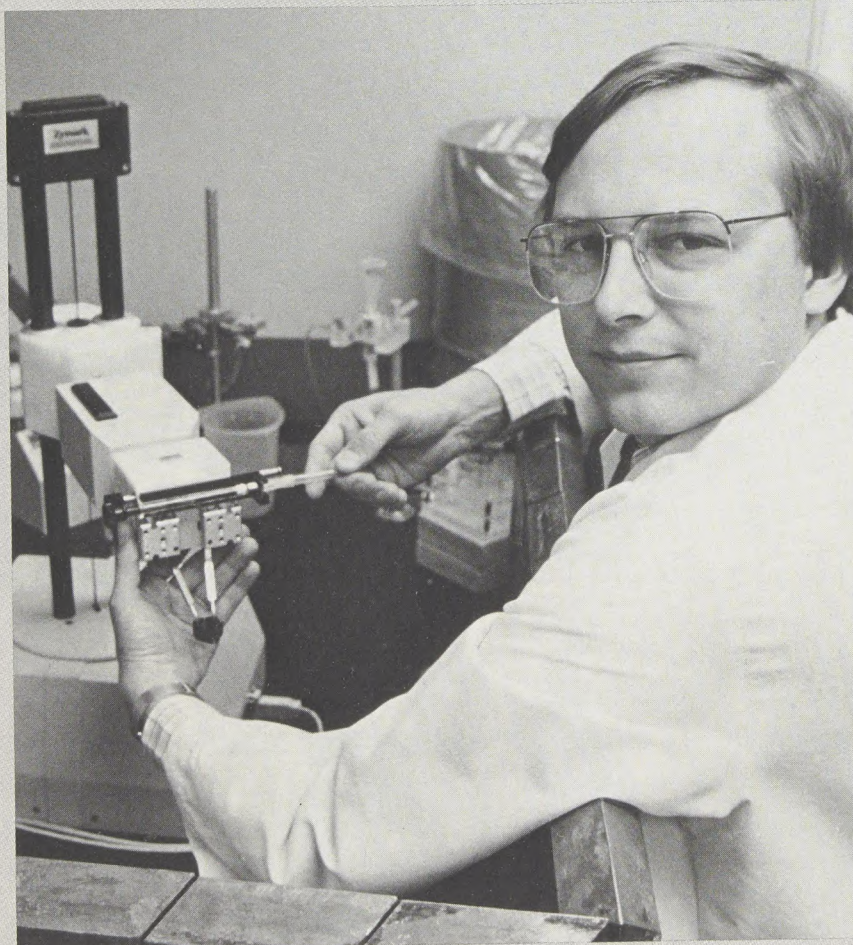
## BORN TO WORK

At the end of 80 minutes of exacting manipulation that requires nine reagents in several synthetic steps, Brobot's arm glides forward smoothly to deliver the product of his efforts—a tiny vial of F-18-fluoroestradiol, a radio-labeled pharmaceutical for use in the imaging of breast tumors. It's probably the world's total supply of the valuable drug.

Brobot, who works in the basement of Barnard Hospital, was the first robot in the nation to be employed in the production of radiopharmaceuticals, a demanding task. His ability to work in a radioactive environment day in and day out has proved to be a great advantage in the development of new compounds.

The man for whom Brobot is named—Jim Brodack, Ph.D., research instructor in radiology at Mallinckrodt—used to formulate the compounds himself, at the risk of irradiation. Brodack still performs the final step of sterilizing the compound, just as a human check on Brobot's work. But his exposure has been reduced by 90 percent, thanks to the presence of the robot.

Operating from a lead-encased booth, Brobot receives the radioactive flourine his work requires through a pressurized tube from the cyclotron below, where it has been prepared via proton bombardment for 90 minutes. The robot then dries the fluorine of all water and combines it with the



Steve Kohler

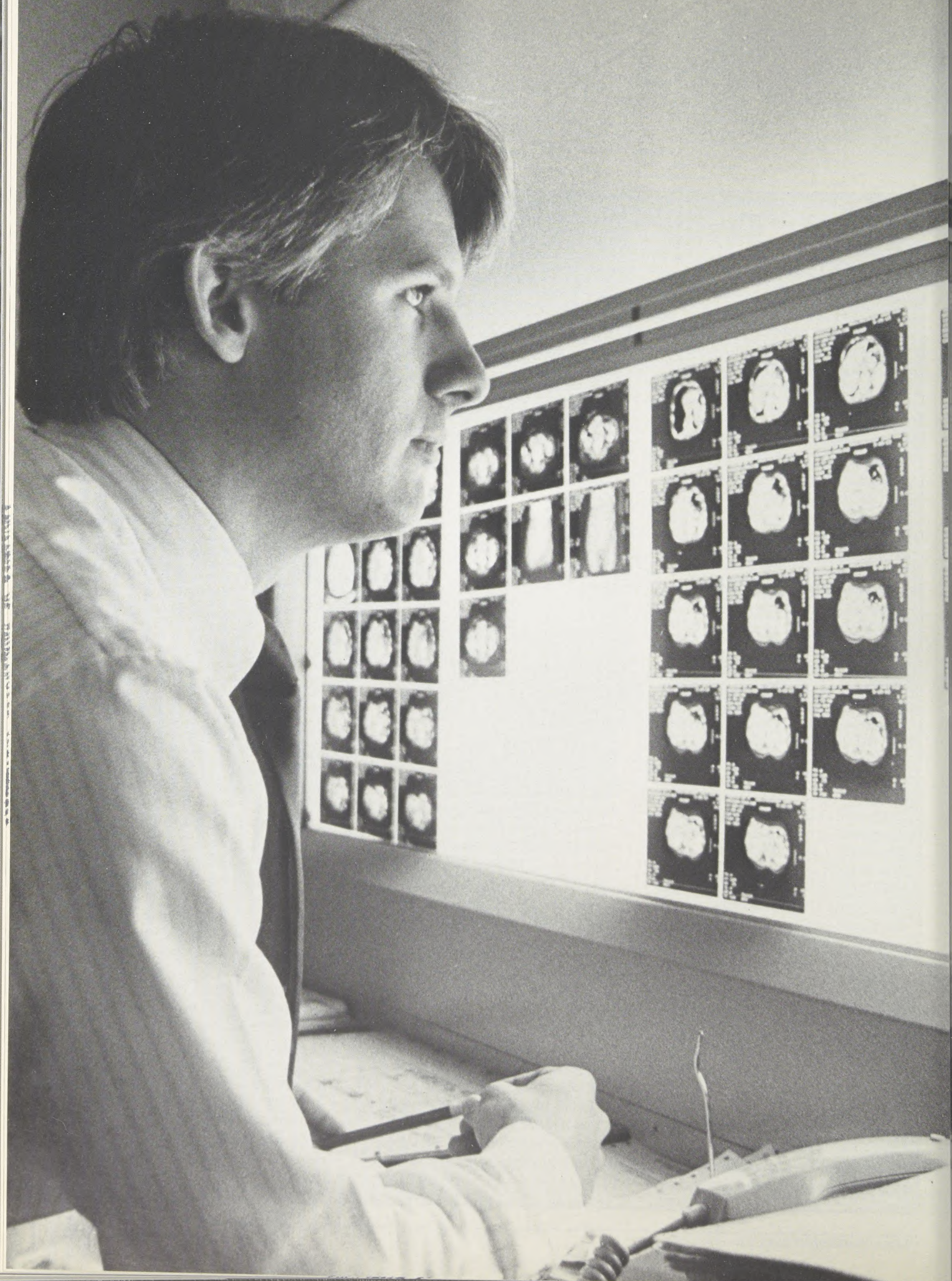
*Brodack with the robot nicknamed "Rodack," which he adapted for the tasks of handling radioactive materials used in the creation of pharmaceuticals for imaging.*

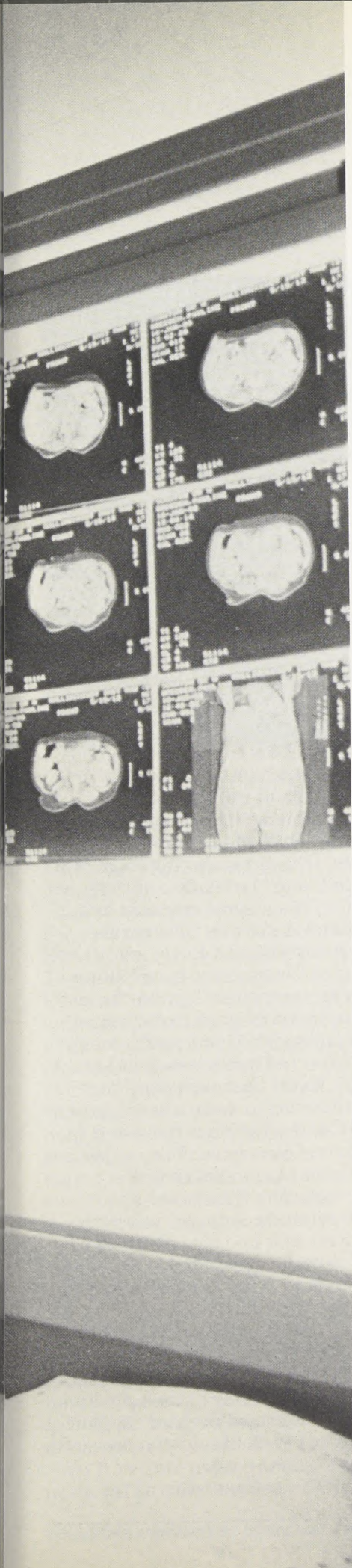
organic material that has been prepared previously by Brodack or another chemist on the research team. When the final formulation is complete, the resulting F-18-fluoroestradiol is sent via pneumatic tube to the clinical or research site.

Brobot's arm enjoys four degrees of freedom, and an assortment of available hands grasp, inject, vibrate, and pour. He throws switches and opens valves, lifts glassware and stirs.

To empower the robot, Brodack dictates a series of motions, sending instructions from a remote control. Then he enters that set of actions into the robot's computer memory by giving it an English name: over rack one, lift tube one, and so forth.

Manufactured by the Zymark Corporation for applications that did not initially include the production of pharmaceuticals, Brobot and his "brother," Rodack, have taken to the work. Together, they create a half-dozen radioactive compounds that further the applications of PET at Mallinckrodt. □





# PEARLS, GEMS, AND BITS OF WISDOM

A Day in the Life of a Second-Year Resident

by Steve Kohler

**I**t is January 18, 1988, the Monday on which many will celebrate Dr. Martin Luther King, Jr.'s birthday. For Mike Evert, M.D., a second-year resident at Mallinckrodt, the holiday is a dream on someone else's pillow.

**7:00<sup>AM</sup>** Up before six and at the Institute early, he looks ahead to a 14-hour day. Notoriously a long service, the computed body tomography (CBT) rotation promises to be more grueling than usual today because it is the residents' first day and because one of the three who would normally be in the reading room is off in the Bahamas, presenting a paper.

Evert, possessed of a dry wit, allows his voice to rise only slightly as he wonders aloud how good a paper must be to qualify for a reading in paradise. He, too, is at work on a paper—one he's expected to present at an upcoming installment of the regular noon conference. Evert jokes that maybe he'll "start off with a

little wine and cheese," then give a 20-minute presentation, with time for questions afterward. John Engels, M.D., the third-year resident on CBT today, applauds the novel idea.

Soon, Joseph K.T. Lee, M.D., professor of radiology and codirector of the CBT service, arrives balancing a stack of slide carousels to begin the workday with a didactic conference. Accompanying him is Threasa Reiman, M.D., a fellow in abdominal imaging, who will serve as a second attending physician.

Lee's slides show both common and uncommon examples of CT scans. He flashes through them quickly, naming each unusual element of the anatomy represented. Occasionally, he



Steve Kohler

---

*The mass appears to be related to the stomach and not an adrenal tumor; the patient is dismissed.*

---

directs a question at one of the residents. Following one particularly tough question, Evert makes a mental note. It will be a long time before he fails to consider the possibility that an otherwise inexplicable image might show an abscess that began as a fishbone perforation of the esophagus.

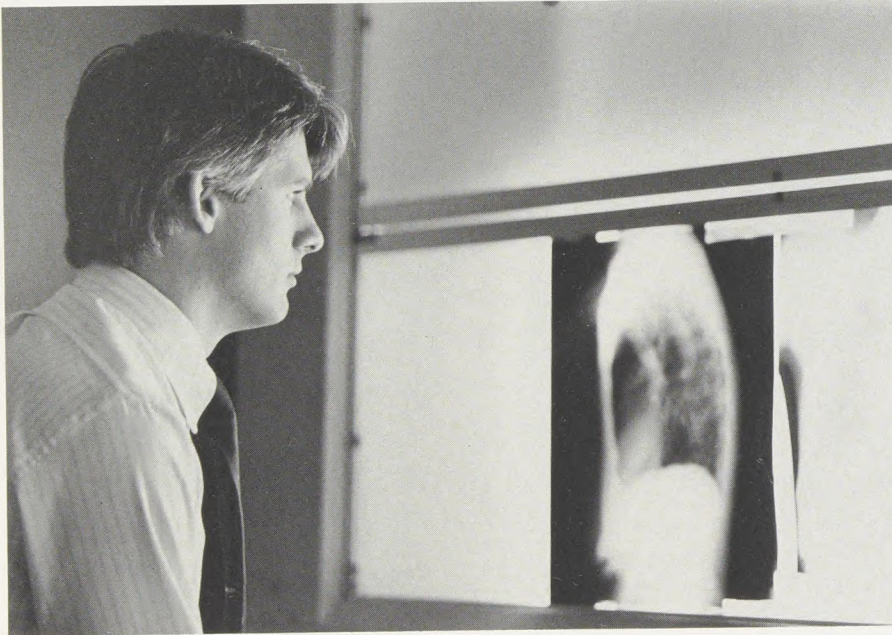
The unusual case and the straightforward lesson it teaches makes the concise interchange between teacher and student an example of what residents call "Joe's pearls." Thresa Reiman says of these bits of Lee's wisdom, "Most people have to pay for them. We get them free."

**8:00<sup>AM</sup>** When the conference ends, attention shifts to the first patients of the day. The two scanners will keep both residents busy. Evert goes to the desk of the fifth floor waiting room. The first chart he reads concerns him; the clinical question being asked is not one CT answers effectively, and Evert adopts the role of consultant by speaking with the patient's physician to suggest a magnetic resonance imaging (MRI) procedure for the suspected intracardiac lesion.

Evert then orders up the study on the next patient, and at 8:26, the films are delivered to the reading room. The outpatient has been complaining of a cough. The films show an unrelated condition, but both Evert and Lee have difficulty determining whether what they see is an adrenal mass or gastric diverticulum.

"Give more contrast," Lee instructs. One of Joe's pearls is that it's easy to get a patient to drink too little contrast medium, but hard to administer too much. "When in doubt, give more contrast," is the rule.

The patient balks at the



Steve Kohler

request to drink more of the liquid; she doesn't feel well and has already choked back one eight-ounce cupful. Together, Evert and the technologist prevail.

The next patient goes into the scanner, and by 9:13 the films are up on the multiviewer. Thresa Reiman consults with Evert on the case, but they can only agree that an indeterminate nodule is clear. Reiman considers putting a phantom in the machine—an inanimate target of carefully established density—to help them decide whether the nodule's comparative density makes it suspicious or not. But eventually, she decides against it, reasoning that it won't solve their mystery.

Not much time exists for anything but application to the job, but during a brief lull Evert and Engels kid one another about their capacities for recall. Engels can't remember a phone number he uses regularly.

"Yeah, but you remember diseases really well," Evert says. "You'll be able to give a diagnosis. I'll be able to give you the

number of somebody to call."

The films of the patient re-scanned with additional contrast arrive. The imaged mass appears to be related to the stomach and not an adrenal tumor. The patient is dismissed. Joe's pearl has been a gem.

**10:15<sup>AM</sup>** The third patient presents a routine comparison of new files with old, and the fourth patient of Evert's day slides gently into the scanner's gantry at 10:15. In the reading room, Lee watches the monitors that show what the scanners are recording. When Evert returns from directing the exam, Lee sends him back to the control room for one more "slice."

The patient has come for follow-up. An earlier brain CT revealed a mass. Chemotherapy was prescribed. Now, chest films have imaged a new nodule. The new films provide a clear picture of its shape, the irregularity an indication to the schooled eye that a malignancy is present. The disease has recurred.

Evert dictates his day's early

cases for transcription, creating a short break in the intensity. Engels and Reiman continue to interpret films from their latest patient.

Results for Evert's fifth case are cheerier when the images show no cancerous mass. The next person in the scanner has complained of pain, but Evert can find no apparent cause. A metal hip implant fragments the beam of the scanner, making interpretation more difficult.

Looking with more experienced eyes, Lee suspects an obstruction of the small bowel. His evidence: the oral contrast medium is not as diluted there as he expects it to be. He says it's possible an earlier hysterectomy—apparent on the film—left adhesions. His suggestion again is the administration of more contrast and a waiting period before a repeat of the exam. Evert should also find out if the hysterectomy came as a result of cancer.

This patient, too, dislikes the thought of drinking more contrast and complains that she is "in agony." Her hysterectomy, 15 years ago, was cancer-related. Lee's preliminary call begins to look more like a gem.

## BITS OF WISDOM

**11:13<sup>AM</sup>** By 11:13, the films on the next case are up on the light-box, but a rush on the radiologists' services occurs, and before Evert can begin his interpretation, two more scans must be directed.

A half-hour later, with the information moving rapidly now, the physicians diagnose a primary lung tumor in the eighth patient, with involvement of the mediastinal lymph nodes. But Lee wants to go further. He indicates a missing kidney and asks what happened to it.

Evert knuckles down, studying the films and testing his memory. "It's not a congenital absence, because the adrenal is shaped normally. When the kidney is congenitally missing, the adrenal changes shape," he thinks aloud. "And it wasn't removed because of cancer, since the adrenal is still present. So I'd say the kidney was removed surgically because of chronic stone disease."

At the resident's correct interpretation, Lee delivers one of the golden rules frequently quoted at Mallinckrodt, originally attributed to Bruce McClennan, M.D.: "The history is on the film."

For the previous patient, a young woman with Hodgkin's disease, Lee recommends an injection of intravenous contrast for better definition. The unenhanced films have not revealed whether an unusually large pulmonary artery is actually a tumor. The problem is that she has left the waiting room. A search begins.

Films on Evert's ninth patient go under consideration at noon.

A rare pancreatic tumor brought this man back for follow-up, and Evert discovers an enlarged spleen and ascites—



Steve Kohler

---

*The history  
is on the film.*

---

fluid in the peritoneal cavity—but no significant changes and no recurrent tumor.

One of the scanners quits working inexplicably at 12:15, and Evert takes the opportunity to get his lunch—salad and spiced tea—from the cafeteria. Most often, he brings a lunch packed the night before by his wife, Barbara. Today, he's forgotten it. While he's thinking of his family, Evert recalls that as he left this morning, he accidentally awakened one-year-old Lauren. A typical Monday.

Evert redirects his attention from his family to his work so that he can take up the films of the woman who has been waiting for a repeat scan since drinking a second cup of contrast liquid. He still finds no indication of why she is suffering, no mass. Lee's earlier speculation is the most reasoned choice, and Evert calls for a small bowel series.

**12:55<sup>PM</sup>** At 12:55, the malfunctioning scanner begins to operate again without having created a bottleneck. Ten minutes later, the tenth set of films is on the rollerboard. After cancerous nodules were removed from this patient's left lung, concern shifted to his right side. Reiman and Evert agree that these films show no new cause for worry, but only after they scrutinize the scans together for a full ten minutes, trying out possibilities on one another.

"The hard thing here is the understanding of the anatomy in this horizontal, sliced format," Evert explains. "That's not the way it's taught, not the way it occurs." As usual, the devil is in the details.

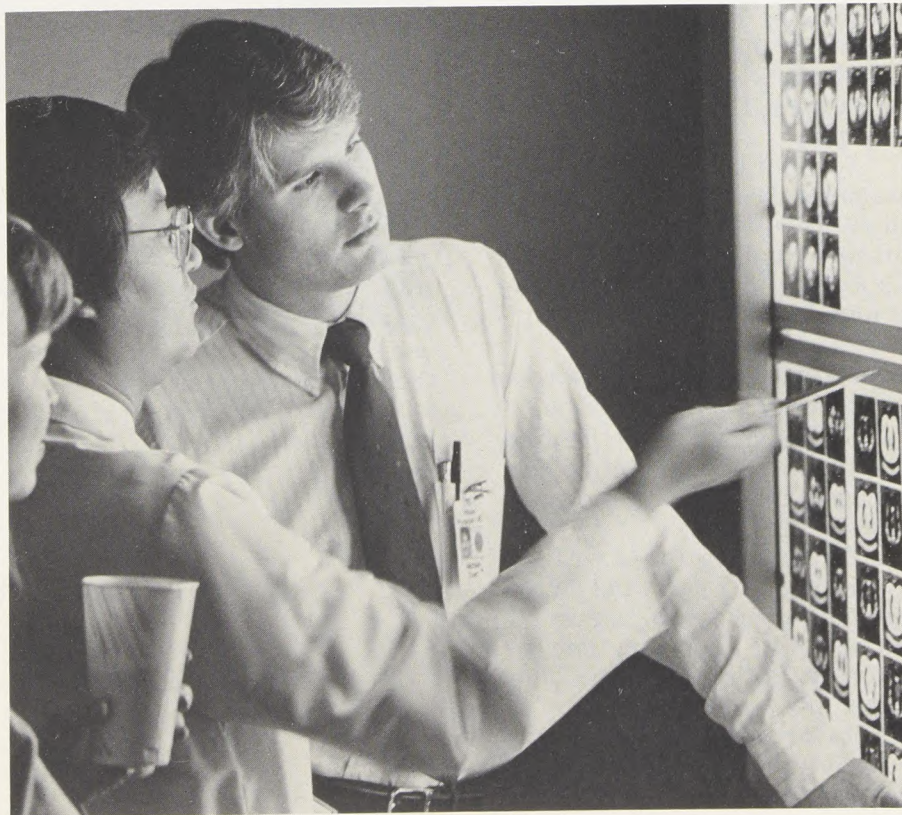
**1:30<sup>PM</sup>** When the phone rings, it's an intern anxious for news about one of the patients, and Evert delivers the diagnosis that a mass has been imaged, highly suspicious for cancer. By 1:30, Evert is six cases behind in dictating results, and Reiman nudges him gently to get his notes down on tape. Lee suggests that the team might be done early, so quickly are the cases proceeding.

The intern who phoned arrives for an explanation of the films. Evert obliges with a brief consultation. Then it's on to the next patient. Suffering from pancreatitis or a pancreatic abscess, the young man receives an intravenous injection of contrast medium from Evert. The subsequent films reveal large amounts of fluid collecting in the pararenal space. Each lower slice shows more; Evert is intrigued

by this unusual development and asks Doris, the technologist at the machine, to continue scanning in single centimeter increments.

After 51 such slices are recorded, Lee comes to the control room to investigate. Evert, truly excited, says, "This is a great case. I like this cut especially," pointing to one of the images arrayed on the lightbox. The fluid extends into the pelvis, an uncommon occurrence that will provide the subject for a presentation.

But Lee is not as impressed, and the tension in the reading room soars to its highest point of the day when he suggests that such a gross condition did not require such minute examination. If Evert is prepared to argue, he recants when Reiman asks him if he would doubt the "Sultan of CT," Lee's nickname. The tension breaks.



Steve Kohler



## BITS OF WISDOM

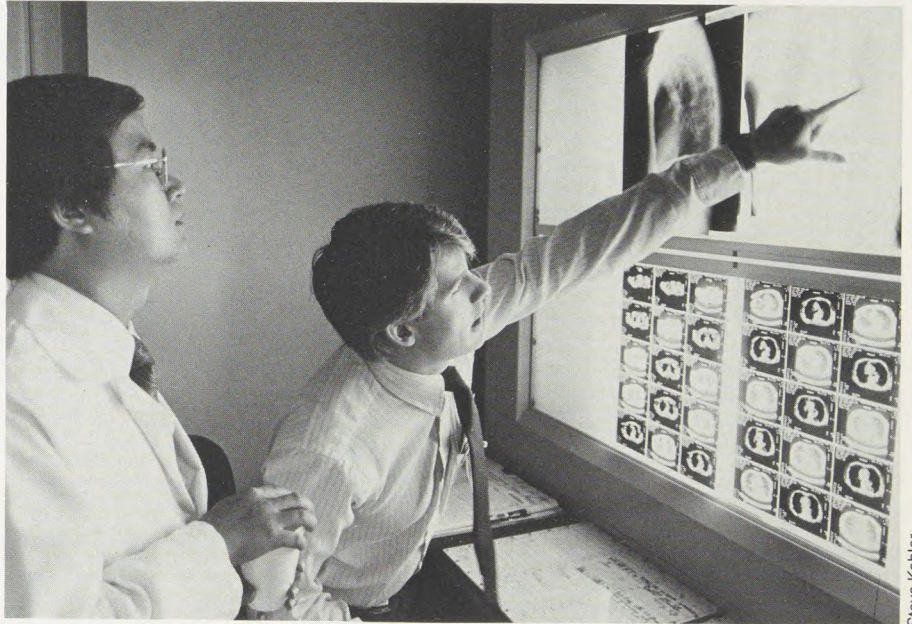
**3:10<sup>PM</sup>** Evert's next patient, directed to the fifth floor for a liver CT at 3:10, also requires I-V contrast. Because his cardiac output is poor, the films lack the enhancement they might have, but Evert achieves adequate diagnostic quality. Hepatomegaly—an enlargement of the liver—is apparent, but otherwise the team agrees that there are no problems on the film. The patient asks to know what the exam has revealed, so Evert delivers his interpretation directly.

The young woman with Hodgkin's disease has been located waiting quietly in her primary physician's office. She returns for new scans to be performed with the addition of contrast, but someone has worried her unnecessarily by saying that this repeat exam means new disease has been diagnosed. It takes first Reiman and then Evert to console her. They explain the reason for the new study, and the young woman regains her composure. The contrast is injected.

Scans of the distraught woman's chest show only good news. The suspect pulmonary artery actually is as big as it first appeared, no mistake. No tumor is found. "That's a bet I would have lost," Lee says, subtly delivering one more bit of wisdom by not being certain too soon.

Evert himself takes the diagnosis to the woman at 4:27. She collapses in relaxation and cries tears of relief.

Then Evert turns to writing up his reports. Engels and Reiman assume the next two cases in succession to allow him time to catch up. But a team of residents interrupts to ask about the results for their patient with the huge reservoir of fluid in his pararenal space. Together, the



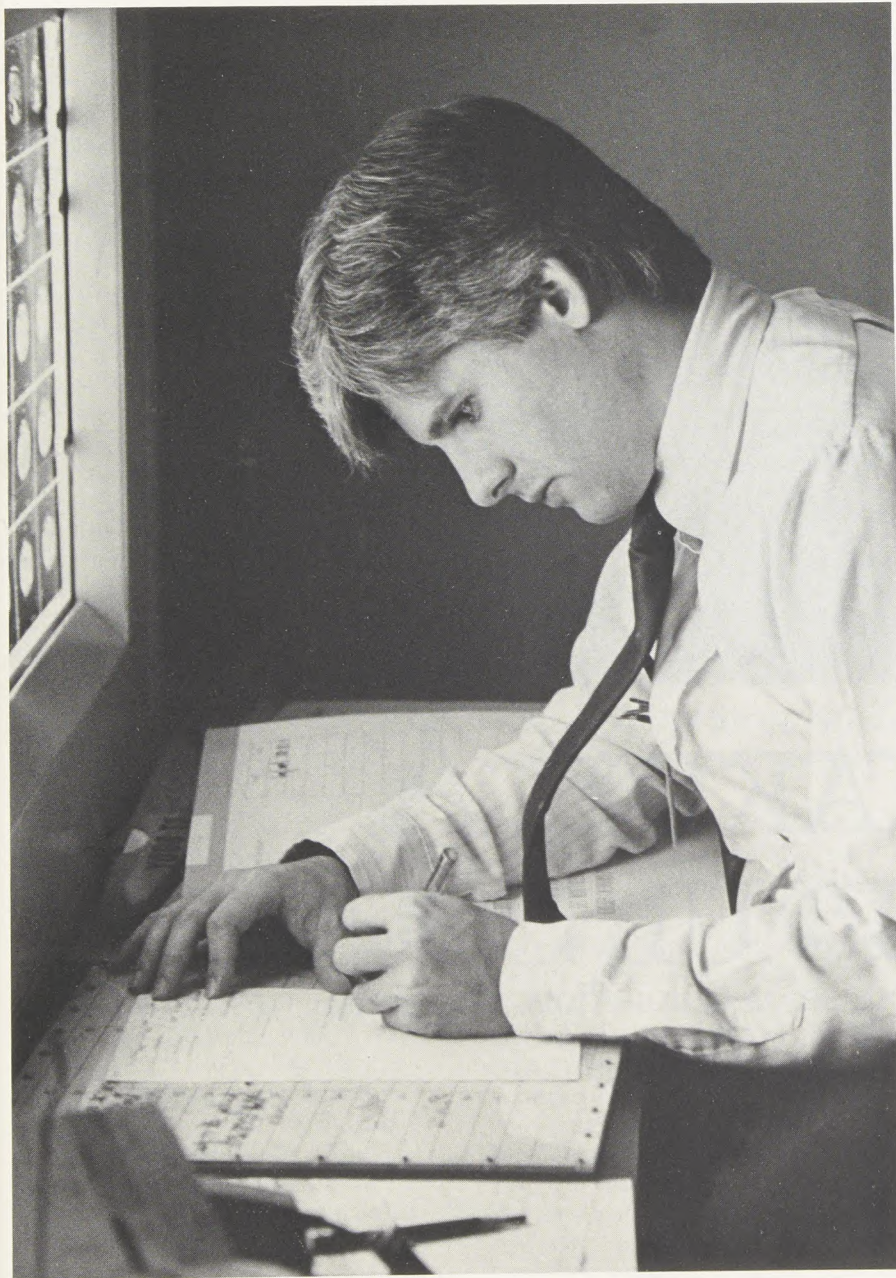
Steve Kohler

doctors determine to draw off some of the fluid under the guidance of CT. But not until tomorrow or the next day.

Lee helps Evert interpret two cases left over from the weekend, then the pair begin practicing the precise and forceful flick of the wrist required to wedge films on the lightbox without pushing them into place. Even in this, Lee directs, gently showing the way.

At 5:05, the order in which the physicians arrived begins to reverse itself. Lee calls it "an easy day." Thirty cases have been interpreted, 14 of them by the second-year resident, all with the assistance of an attending physician.

**6:00<sup>PM</sup>** Reiman leaves next, and the reading room falls into quiet except for the lowered voices of Evert and Engels as they dictate their late cases. Just past 6:00 p.m., eleven hours after he arrived, Evert prepares to go home. He will have a chance to see his daughter before she goes to bed—an opportunity he's hurrying to take advantage of. He'll have time to reflect on the day's cases and on Joseph K. T. Lee's teaching. And he'll undoubtedly consider his awareness that the end of today's work is the beginning of tomorrow's. □



Steve Kohler

---

*“The hard thing here  
is the understanding  
of the anatomy in  
this horizontal,  
sliced format.”*

---



Steve Kohler

# MAKING A COLORFUL SOUND

The Promise of Color-Flow Doppler

by Candace O'Connor

**A**n exam is in progress, and the screen of the color-flow Doppler machine is sparkling with tiny blue and red squares. Those squares—or pixels—are visible proof that blood is flowing through the patient's testicular vein, down into his scrotum. But they are also a sign that something is wrong. In a normal exam, this patient's blood would be flowing in exactly the opposite direction, up into his renal vein and from there to his heart. "Varicocele" is the medical name for his condition, but Jim Doell (a pseudonym) and his wife know it better for the vexing problem it has posed in their lives: infertility.

The machine that so vividly displays this blood flow is the newest in a family of ultrasound scanners at Mallinckrodt Institute of Radiology. Since it arrived last fall, doctors have been using it as a diagnostic tool in a variety of research and clinical procedures. Already, they are enthusiastic about its benefits.

"Color-flow Doppler is becoming the noninvasive standard for vascular imaging," says Bruce L. McClennan, M. D., professor of radiology and chief of the abdominal section and genitourinary radiology. Using this new technology, doctors can easily identify vessels and quickly determine the presence, direction and character of blood flow. "Faster, more accurate disease detection will be possible whenever assessment of blood flow is important," he adds.

William Middleton, M.D., assistant professor of radiology, quickly lists a variety of color-flow Doppler's current uses. With time, still more will develop. "It's a very exciting technology with many interesting applications," he says. In the abdomen, for instance, the machine can evaluate the patency of all major vessels and help detect early signs of kidney transplant rejection. It is particularly useful in ruling out portal vein thrombosis, an obstruction of the vessels supplying blood to the liver. It can aid in diagnosis of abdominal tumors and congenital malformations.

In the carotid arteries, color-flow Doppler already plays a

major role in detecting atherosclerotic disease. To illustrate, Middleton replays a videotape of one patient's exam. Her right carotid artery is completely occluded by plaque. Up to the point of obstruction, tiny red pixels sparkle brightly; past the plaque, the artery is ominously dark.

---

*"Color-flow Doppler is becoming the noninvasive standard for vascular imaging."*

---

Middleton's own research concentrates right now on two other important areas. With G. Leland Melson, M.D., professor of radiology and head of diagnostic ultrasound, and the interventional staff, he is studying hemodialysis patients. Since their blood is regularly withdrawn for cleansing, then reinjected, these patients must have vessels with rapid blood flow for large vascular access. To develop such access, doctors usually create a shunt, or fistula, between an artery and a vein in a limb.

But complications sometimes occur: aneurysms (or abnormal dilations), thrombosis (or clotting off), and stenosis (narrowing of the vessels). Middleton's team wants to compare the results of angiographic evaluations with color-flow Doppler exams.

His second area of research is the scrotum. With resident David Thorne, he is studying such inflammatory conditions as epididymitis and orchitis, which result in increased blood flow to the area. They are also compar-

ing normal volunteers with patients who have varicoceles, the abnormally dilated veins that can lead to infertility.

Jim Doell, a young computer programmer for a large St. Louis company, had already seen a urologist for a fertility workup. For some time, he and his wife had been trying unsuccessfully to conceive. He came to Mallinckrodt Institute to see whether the varicocele suspected by his doctor would be confirmed by color-flow Doppler.

Varicoceles like Doell's develop when valves fail in the testicular vein, which normally carries blood up into the abdomen. Instead, the blood begins flowing down into the scrotum, resulting in an abnormally dilated vessel. And somehow, these dilated veins affect fertility.

"No one knows for sure how varicoceles cause infertility, but most believe it to be a heat-related phenomenon," says Middleton. "Physiologically, the testes need to be located in the scrotum, not the abdomen, so they are cooler. Perhaps when

---

*The colorful pixels twinkling through the tortuous vessel told a clearcut story.*

---

dilated vessels surround the testes, heat increases, affecting sperm motility so that some patients become infertile."

In Doell's case, the colorful pixels twinkling through the tortuous vessel told a clearcut story. He would need treatment to close off the affected vein. Meanwhile, says Doell, it was interesting and reassuring to see

---

*While technologist Beth Muehlenbrock, R.T., RDMS, applies the transducer to the neck of a patient to image the carotid artery, William Middleton, M.D., directs the exam. The color-flow Doppler machine also has a videotape capacity to make records of examinations.*

---

## A COLORFUL SOUND

his problem in vivid color. "I felt more a part of what was going on," he says.

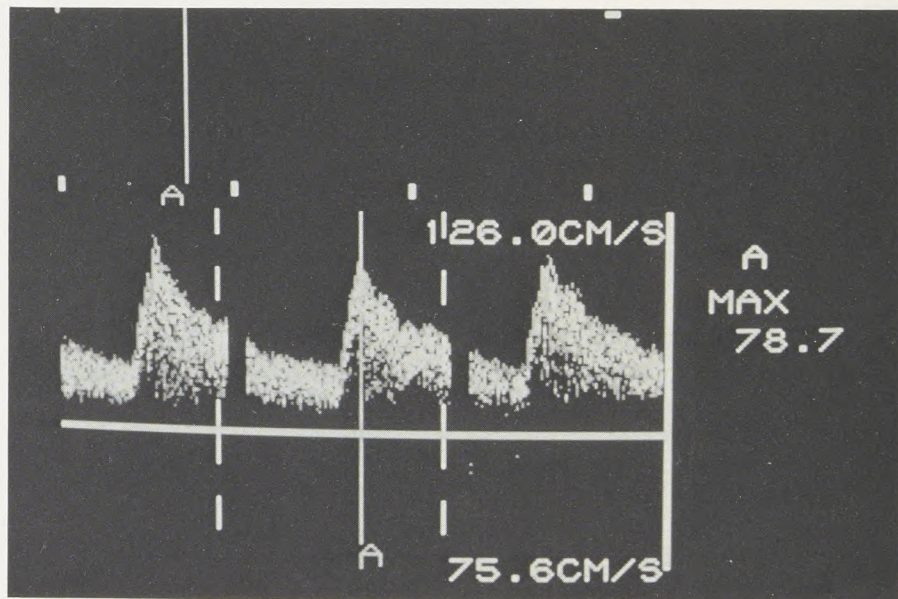
**T**he color-flow unit used at Mallinckrodt that helped Doell has emerged in recent years as a result of a dual effort. On one side were Boeing Aerospace researchers, who brought to the work their knowledge of radar tracking technology. On the other was the ultrasound industry, with experience from the latest generation of ultrasound equipment, the duplex Doppler scanner.

Duplex Doppler and color-flow Doppler share similar principles. They both rely on a phenomenon identified by Johann Christian Doppler in 1842. The Doppler effect is a change in the frequency of sound waves that occurs when the source and observer are in motion relative to one another.

"When you hear a train whistle coming toward you, it has a certain pitch," explains Middleton. "When it goes past you in the opposite direction, it has a different pitch. Depending on the speed of the train, the pitch will vary. That is the Doppler effect."

**H**ere is how color-flow works: a small transducer is electrically stimulated to produce sound waves, which it transmits into the patient. These waves hit body structures and create echoes that return to the transducer which, in turn, sends a tiny electrical charge back to the machine. Processors there analyze these echoes for amplitude, frequency shift, and phase shift.

The machine knows that a phase shift means a moving target—blood flow, for instance. By the direction of the shift, the machine can also tell whether



that flow is moving toward or away from the transducer. Based on that information, it assigns a red (usually arterial flow) or a blue color (venous flow) to that part of the image. If the machine also detects a frequency shift, it lightens that color to indicate a faster-moving target. Non-moving targets are assigned shades of gray.

---

*The machine knows  
that a phase shift  
means a moving  
target—blood flow,  
for instance.*

---

Color-flow Doppler, Middleton stresses, is not the final answer in some cases. An excellent screening modality, it is frequently used together with angiography to make a diagnosis. "But it has improved our accuracy and allowed us to feel more confident in making certain diagnoses," he says.

*A conventional duplex Doppler wave form from a normal carotid artery. The velocity information provides indirect evidence of vessel narrowing. Color-flow Doppler directly images any constrictions.*

**I**n December, Jim Doell came back to Mallinckrodt as an outpatient for an embolization procedure to correct his varicocele. Using a catheter inserted through his femoral vein, an interventional team inserted a tiny balloon into his testicular vein. The balloon, when inflated, will shut off the dilated vein; blood flow will be redirected to other vessels, and the varicocele will disappear.

It will take some time for his sperm supply to build up and mature. In eight months, he'll return for a sperm count to make sure the treatment was successful. But Doell and his wife are hopeful—some couples have achieved pregnancy just two to three months after treatment. If the Doells are that fortunate, color-flow Doppler will have played a part in this most important success. □

# FYI

## THE DIRECTOR'S OFFICE REPORT

### NEW STAFF

**Andrea H. McGuire, M.D.**, instructor in radiology, Division of Nuclear Medicine.

### OFF STAFF

**Lixin Lang, M.A.**, has entered the Ph.D. program in Chemistry at the University of Missouri, Columbia.

**Sian E. Iles, M.D.**, assistant in radiology, Division of Nuclear Medicine, has joined the staff of Victoria General Hospital, Halifax, Nova Scotia. Iles will also join Dalhousie University as a staff lecturer.

**George F. Murphy, M.D.**, instructor in radiology, has joined the staff of Halifax Infirmary, abdominal imaging section, Halifax, Nova Scotia.

**Patricia G. Corder, M.D.**, assistant in radiology, has entered private practice in the department of radiology at St. John's Mercy Medical Center, St. Louis.

**Karen L. Beetham, Ph.D.**, instructor in cancer biology in radiology, has accepted a position at the University of Iowa.

### RECENT PROMOTIONS

**M. Victoria Marx, M.D.**, has joined the staff as instructor of radiology, effective January 1 and will become assistant professor of radiology effective July 1, 1988 in the interventional radiology section.

**Jay P. Heiken, M.D.**, was promoted to associate professor of radiology with tenure, as of January 1.

"CT Diagnosis of Intestinal and Mesentery Disease in Childhood"

**William D. Middleton, M.D.** "Doppler Color Flow Analysis of Normal Flow Patterns in the Carotid Bifurcation"

**Tom R. Miller, M.D.**, president, "Nuclear Medicine (Bone)"

**Joseph K.T. Lee, M.D.**, president, "General Diagnosis (Liver: Hemangioma/Metastases)"

**Scott A. Mirowitz, M.D., Jay P. Heiken, M.D., Joseph K.T. Lee, M.D.**, "Cavernous Hemangioma of the Liver: MR Imaging Tissue Specificity Using a Simplified Index of T2 Relaxation"

### SCIENTIFIC EXHIBITS

**Steven S. Ellenberg, M.D., Michael W. Vannier, M.D., Robert H. Knapp, B.M., R.T.**, "Three-dimensional CT of Midfacial Fractures"

**John C. Laschinger, M.D., Michael W. Vannier, M.D., Robert H. Knapp, B.M., R.T., Fernando R. Gutierrez, M.D., James L. Cox, M.D.** "Three-dimensional MR Imaging of Congenital Heart Disease"

### SCIENTIFIC SESSIONS

**Scott A. Mirowitz, M.D., Klaus J. Sartor, M.D., Arthur J. Prenskey, M.D., Charles L. Abramson, M.D., Mokhtar H. Gado, M.D., Fred J. Hodges, M.D.**, "Metabolic and Degenerative Diseases of the Brain in Children: Role of MRI Imaging"

**John B. Konefal, M.D., Bahman N. Emami, M.D., Miljenko V. Pilepich, M.D.**, "Radiation Therapy of Malignant Melanoma: Analysis of Dose Fractionation"

**Bruce L. McClelland, M.D., Ralph V. Clayman, M.D., Scott Nadel, M.D.**, "Extracorporeal Shock Wave Lithotripsy with a Non-Water Bath System"

**Michael W. Vannier, M.D., John Laschinger, M.D., Robert H. Knapp, B.M., R.T., Fernando R. Gutierrez, M.D., Suzanne A. Gronnemeyer**, "Three Dimensional Surface Reconstruction Imaging for Evaluation of Congenital Heart Disease from ECG-triggered MR Images"

### AMERICAN SOCIETY FOR THERAPEUTIC RADIOLOGY AND ONCOLOGY

The following Mallinckrodt staff members participated in the 29th Annual Scientific Meeting of the American Society for Therapeutic Radiology and Oncology, Boston, October 18-23.

### SCIENTIFIC SESSIONS

**Perry W. Grigsby, M.D.**, "Multivariate Analysis of Prognostic Factors in Pediatric and Adult Thalamic and Brainstem Tumors"

**Joseph R. Simpson, M.D., Ph.D.**, co-moderator, "Central Nervous System II Session"

**Robert J. Myerson, M.D., Ph.D.**, "Endocavitary Radiation for Early Rectal Carcinomas: The Experience at Washington University"

**Carlos A. Perez, M.D.**, co-moderator, "Hyperthermia II—Technology" and "Carcinoma of the Vagina: Long-term results with Definitive Radiation Therapy"

## SYMPOSIA

### RADIOLOGICAL SOCIETY OF NORTH AMERICA

The following Mallinckrodt staff members participated in the 73rd Scientific Assembly and Annual Meeting of the Radiological Society of North America, Chicago, November 29-December 4.

### REFRESHER COURSES

**Mokhtar H. Gado, M.D.**, "Hydrocephalus"

**Bruce L. McClelland, M.D.**, "Oncologic Imaging of the Genitourinary Tract"

**Stuart S. Sagel, M.D.**, "Oncologic Thoracic CT"

**Joseph K.T. Lee, M.D.**, "MR Imaging of the Kidney and Adrenal Glands"

**Dennis M. Balfe, M.D.**, "CT of Peritoneal Spaces and Ligaments"

**William A. Murphy, M.D.**, "Bone Marrow Imaging, MR Imaging, CT, and Scintigraphy"

### SCIENTIFIC SESSIONS

**Martin S. Weinhaus, Ph.D., Grace Kim, B.A.**, "Computerized Enhancement of Radiation Therapy Portal (and Other) Film Images"

**Scott J.J. Evans, M.D., Marilyn J. Siegel, M.D., Dennis M. Balfe, M.D.**

# FYI

## SYMPOSLA

**Larry D. Simpson, Ph.D.**, co-moderator, "Physics II—Radiolabeled Antibodies"

**James H. Wynstra, M.D.**, "Radiotherapy in Carcinoma of the Nasal Cavity"

**Bahman Emami, M.D.**, co-moderator, "Hyperthermia III—Clinical"

## POSTER SESSIONS

**Richard D. Lovett, M.D.**, "Preliminary Evaluation of Toxicity and Tumor Response to Radiotherapy with Cis-Platinum and 5-Fluorouracil for Advanced or Recurrent Gynecologic Malignancies"

## REFRESHER COURSES

**Carlos A. Perez, M.D.**, "Principles, Practice and Results of Local (Superficial) Hyperthermia"

**Bahman Emami, M.D.**, "Applied Techniques and Clinical Practice of Interstitial Hyperthermia"

**Joseph R. Simpson, M.D., Ph.D.**, "Stereotactic Interstitial Implantation for the Treatment of Malignant Brain Tumors"

## RELATED EVENTS

**Beverly J. Kobeissi, M.A., M.B.A.**, moderated a roundtable discussion on CPT-4 at the Society for Radiation Oncology Administrators (SROA).

**Andrei Laszlo, Ph.D.**, assistant professor in cancer biology in radiology, was awarded a travel grant to the Eighth International Congress of Radiation Research, held July 19-24 in Edinburgh, Scotland. He presented to the Congress a paper titled "Alteration of Heat Shock Protein Expression in Heat Resistant Variants of Mammalian Cells." Laszlo presented a paper entitled "Protein Synthesis, Heat Shock Proteins and Thermotolerance" at the Third Annual Midwest Meeting of Radiation Research held in St. Louis, November 13-14. **Laszlo and Kenzo Ohtsuka, Ph.D.**, research associate, addressed the 27th annual meeting of the American Society of Cell Biology, November 16-20 in St. Louis. They presented "Nuclear Translocation of HSP 70 in Normal, Heat Resistant, and Thermotolerant Chinese Hamster Fibroblasts."

**Paul L. Molina, M.D.**, presented "Magnetic Resonance Imaging of the Abnormal Thymus" at the Open Scientific Session of the Eleventh Annual Meeting and Course of the Society of Computed Body Tomography, Monterey, California, March 2.

## VISITING PROFESSORS & INVITED LECTURERS

**Gilbert H. Nussbaum, Ph.D.**, associate professor of radiation physics in radiology, presented "Physical and Technical Aspects of Clinical Hyperthermia" at the Stehler Foundation for Cancer Research, Houston, Texas, February 4. He also presented "Promise and Problems of Clinical Hyperthermia," February 17, and "Physical Aspects of Clinical Hyperthermia," February 18 at the Medical College of Wisconsin, Milwaukee.

**Jay P. Heiken, M.D.**, associate professor of radiology, presented "Applied Magnetic Resonance Imaging Physics: Gradient Echo Pulse Sequences, Surface Coils," "Magnetic Resonance Imaging of the Abdomen," "CT of the Peritoneal Spaces," and "CT and MRI of the Liver," at the Magnetic Resonance Symposium: CT & Imaging Update, Cape Town, South Africa, February 12-13. While in South Africa, Dr. Heiken also presented "MRI of the Pelvis" and "MRI of the Liver" at the Witwatersrand University Medical School, Johannesburg, South Africa, February 20-21.

**William A. Murphy, M.D.**, professor of radiology, lectured on "Identification through Medical Radiology" at the meeting of the National Association of Medical Examiners, in Philadelphia, February 16. He presented "Musculoskeletal Marrow MRI," at the Society for Magnetic Resonance Imaging meeting in Boston, February 28.

**Tom R. Miller, M.D., Ph.D.**, associate professor of radiology, Nuclear Medicine, lectured on "Survey of Three-Dimensional Image Display," at the annual midwinter meeting of the Computer and Instrumentation Councils, Society of Nuclear Medicine, Phoenix, February 15-16.

**Daniel D. Picus, M.D.**, assistant professor of radiology, presented "Per-cutaneous Angioplasty" at St. John's Mercy Medical Center, St. Louis, December 12.

**Perry W. Grigsby, M.D.**, assistant professor of radiology, presented "The Use of External Beam and Intracavitary Irradiation in the Management of Endometrial Carcinoma," at The Future of Brachytherapy Educational Conference, Humana Hospital, Phoenix, February 5.

**Michael W. Vannier, M.D.**, associate professor of radiology, presented "Three Dimensional Analysis of Magnetic Resonance Images" to the Magnetic Resonance Imaging of the Human Brain conference at The Salk Institute for Biological Studies, October 23. He also presented an "Introduction to 3-D Imaging" and "Problems and Pitfalls of 3-D Imaging" to the 3-D Imaging in Medicine meeting sponsored by the Hospital of the University of Pennsylvania, December 10-12. Vannier attended the International Electronic Imaging Conference and spoke on "Practical Experience 3-D Reconstruction in a Local Image Network" in Boston, November 3.

# FYI

**Bruce L. McClelland, M.D.**, professor of radiology, spoke on "Low Osmolar Contrast Media" and "Renal Extracorporeal Shock Wave Lithotripsy" (ESWL), at the Colorado Radiologic Society and was a visiting professor at the University of Colorado where he presented "CT of the Kidney," February 18. McClelland presented "Extracorporeal Lithotripsy of Biliary and Urinary Tract," St. John's Mercy Medical Center, St. Louis, February 25. He also presented "Low Osmolar Contrast Media and Contrast Reactions" to the Central West Texas Radiologic Society, March 4, in Abilene, Texas.

**Harvey S. Glazer, M.D.**, assistant professor of radiology, attended Computed Body Tomography 1988. He presented "CT of the Mediastinum," "CT of the Larynx" and "CT of the Neck," Orlando, February 18-21. Glazer participated in the Society of Computed Tomography's Eleventh Annual Course. He spoke on "CT of the Mediastinum" and "CT of Lobar Collapse," Monterey, California, February 29-March 4.

**Mokhtar Gado, M.D.**, professor of radiology, presented "X-ray Diagnosis of Spinal Stenosis" and "Magnetic Resonance Imaging: Its Future Role in Diagnosis of Low Back Pain," at the Low Back and Sciatic Pain: Evaluation and Treatment meeting, at Washington University, December 11. Gado spoke on "Normal Anatomy" at the 6th Annual Society of Magnetic Resonance Imaging Meeting, Boston, February 27-March 2.

**Carlos A. Perez, M.D.**, professor of radiology, spoke on "Clinical Experience with Hyperthermia and Irradiation in the Treatment of Superficial Malignant Tumors," at the Clini-Therm First Annual Users Meeting in Maui, Hawaii, January 13-16. He participated in the 14th Annual Fred J. Woods Lecture Series where he spoke on "Radiation Therapy of Head and Neck Cancer" and on "Hyperthermia of Head and Neck Cancer," Tampa, Florida, February 12-13.

**Barbara Blair Hasse, R.N., B.S.N., M.A.Ed.**, co-presented with **Mary Ann Williams, R.N.**, "Radiation Oncology—A Vital Team Approach" in both abstract and poster form to the Society of Gynecologic Nurse Oncologists, Miami, February 1-4.

**Joseph L. Roti Roti, Ph.D.**, attended the presidential symposium of the Cell Kinetics Society meeting. He presented "Effects of Caffeine on the Radiation-Induced Alterations in Synthesis of #170-KD nuclear protein(s) in G-2" which was co-authored by Roti Roti, Ryuji Higashikubo, Ph.D., and J.M. Holland, Ph.D., Omaha, March 24-26. Roti Roti served as symposium chairperson at the Radiation Research Society meeting, where he presented "Heat-Shock Effects on the Structure and Functions of the Nuclear Matrix," April 16-21 in Philadelphia.

**Barry A. Siegel, M.D.**, professor of radiology, was a visiting professor at the University of Arkansas Medical Center, Little Rock, February 26. He presented "Ventilation—Perfusion Lung Scanning" to a meeting on Pulmonary Embolism sponsored by the University of Arkansas Medical Center, February 27-28.

**Bahman Emami, M.D.**, professor of radiology, presented "Interaction of Bleomycin and Hyperthermia: Mallinckrodt Experience," at Clini-Therm Corporation's First International Users Meeting and Hyperthermia Symposium, in Maui, Hawaii, January 13-16. Emami also presented "Interstitial Thermo-Brachytherapy: St. Louis Experience," to the American Endocurietherapy Society meeting in Lake Tahoe, January 18-22.

**Joseph K.T. Lee, M.D.**, professor of radiology, participated in a postgraduate course sponsored by the G.U. Society in Orlando, Florida, January 30. He gave several lectures in a postgraduate course sponsored by the University of Pennsylvania in Cancun, Mexico, February 15. He also was a speaker in the CT Society postgraduate course in Monterey, February 29.

## AWARDS

**Michael J. Welch, Ph.D.**, professor of radiation chemistry, was selected the 1988 recipient of the St. Louis Section Award administered by the St. Louis Section of the American Chemical Society. The award will be presented April 23.

**Barry A. Siegel, M.D.**, professor of radiology, and **Michael J. Welch, Ph.D.**, professor of radiation chemistry, co-investigators, were awarded a grant for research entitled "Tumor Localization and Imaging Using Alpha-Colon Cancer Monoclonal Antibodies." The principal investigator is Gordon Philpott, M.D., associate director, department of surgery, Jewish Hospital.

**Jay P. Heiken, M.D.**, associate professor of radiology, received the 1987 Editor's Recognition Award with Distinction from *Radiology*.

## GRAND ROUNDS

**Daniel D. Picus, M.D.**, assistant professor of radiology, spoke on "Percutaneous Abscess Drainage" at Washington University, January 6.



# FYI

## TECHNOLOGIST NEWS

**Gary Brink, R.T., B.S., FASRT**, chief technologist, has been appointed vice chairman of the American Society of Radiologic Technologists (ASRT) Commission on Professional Development.

**Norman Hente, R.T., B.S., FASRT**, technical supervisor, has accepted an appointment to serve on the American Society of Radiologic Technologists (ASRT) Commission on Professional Development.

**Michael Kleinhoffer**, senior radiography student, was appointed student representative to Mallinckrodt's Radiography Program Advisory Committee for 1988.

**Michael Ward, R. T., M.Ed.**, chief technologist and director of technical education, worked with the Career Education Center of the St. Louis Public School System for six weeks this fall in their "Career Pathfinders" curriculum program. He was appointed to serve on the Commission on Education for the American Society of Radiologic Technologists (ASRT).

**Sharon Albertina, R.T.**, technical supervisor of Mallinckrodt's outpatient section, was reappointed technologist representative on Mallinckrodt's Radiography Program Advisory Committee for 1988.

## APPOINTMENTS

**Donald R. Bernier, C.N.M.T.**, chief technologist—Division of Nuclear Medicine, was reappointed as a member of the Committee on Nuclear Medicine Technology of the Commission on Human Resources of the ACR.

**Gilbert H. Nussbaum, Ph.D.**, associate professor of radiation physics in radiology, was appointed co-editor of the recently launched joint newsletter of the North American Hyperthermia Group and the European Society for Hyperthermic Oncology.

**Dixie Anderson, M.D.**, associate professor of radiology, was elected president of the American Association of Women Radiologists (AAWR) at the Radiological Society of North America (RSNA) meeting in Chicago.

**Bahman Emami, M.D.**, professor of radiology, was appointed associate editor of the International Journal of Radiation Oncology Biology Physics.

**Joseph L. Roti Roti, Ph.D.**, professor of cancer biology, was appointed to the nominating committees of the Cell Kinetics Society and the International Cell Cycle Committee.

**Bruce L. McClennan, M.D.**, professor of radiology, has been appointed to serve on the 1988 Genitourinary Radiology Subcommittee of the Radiological Society of North America (RSNA). McClennan was also appointed a member of the Committee on Marketing of the Commission on Marketing Communications of the ACR.

## CIC NEWS

*The Cancer Information Center (CIC) is cosponsored by the Radiation Oncology Center of Mallinckrodt Institute of Radiology and the Barnard Free Skin and Cancer Hospital at the Washington University Medical Center. The CIC is now open every Thursday until 8:00 p.m.*

### CONTRIBUTIONS

Mr. and Mrs. Harry Goldberg in memory of Dorothy, sister of Mr. and Mrs. Jack Darrow

Mr. and Mrs. Harry Goldberg in memory of Lil, sister of Mr. and Mrs. Leon Pultman  
Marion C. Eichelberger

Karen Greening  
Mr. Edward H. Trezn in memory of Earl J. Anderka

Mr. Lester Segar  
Wendy Syberg and Becky Badger in memory of Albert Hoermann

Mr. and Mrs. Edmonstone Thompson in honor of Mr. and Mrs. Richard Hawes

Julia A. Bishop in memory of Margaret Pisco and Howard Meveray

Leo Nolan in memory of Joan Burton  
Ed Meckerle in memory of Joan Burton

Friends at the downtown YMCA in memory of Mrs. Leonard J. Nick

Keith Jacobs  
Susan Sabala  
Rita Wildhaber

Mr. George A. Roland in memory of Rosemary Stevens

Mr. and Mrs. Edward Glock in memory of Rosemary Stevens

Helen Houle in memory of Jan Wheeler's father

Boonchai Chittikuladilok and family in memory of Lee Imes

Mr. and Mrs. Frederick Hermann in memory of Mrs. Thelma Cates

James Chervek in memory of George Marty

Becky Castiglioni in memory of Frank Lakowski  
Bruce and Sharon Hagy in memory of Robert Frenz, Sr.

Mrs. Ernest Kretschmar in memory of Harry Hartkopf

The Carl Maddox family in memory of George Marty

Mr. Barnett R. Denton in memory of George Marty

Barbara Semon in memory of George Marty

Frank Chambers in memory of George Marty

Kate and Leslie Streib in memory of George Marty

Mallinckrodt Fund, Inc.

Mr. and Mrs. Everett Siegel in memory of Fowler Caffelt

Mr. and Mrs. Warren Vetter in memory of George Marty

Mr. Linus J. Macke in memory of George Marty

Ina B. Guetschow

Mr. and Mrs. Harry Donnegan in memory of George Marty

Katherine Dohr in memory of George Marty

Mr. Frank J. Reedy, Jr. in memory of George Marty

Mrs. Cecelia Johnson Buesse in memory of John Sevier Johnson

Ms. Susan Skae

Mrs. Sandra E. Esrock

Mrs. Frederick Hermann in memory of Mrs. Ralph Causey

Mrs. La Verta Dillard in memory of William B. Patton

# FYI

The Dan Dill family in memory of George Marty  
Mr. and Mrs. Len Schreme in memory of William B. Patton

Miss Patricia Theobald  
Mr. and Mrs. Thomas Bommarito in memory of Paul Voellinger  
Mr. and Mrs. T. Grimes in memory of Paul Voellinger  
Mr. and Mrs. Edward Erbar in memory of Paul Voellinger  
Mr. and Mrs. Robert Gruchala in memory of Paul Voellinger

Employees of Fannie May Candies in memory of Thomas Saputo  
Pat Heuberger in memory of Henry Hensley  
Barbara Eulberg in memory of Paul Voellinger

Mr. and Mrs. H.C. Heinemann in memory of Wesley Nash  
Mr. and Mrs. Gene Cordani in memory of Charles Missavage  
Kenneth G. Yancheck  
Mr. and Mrs. Jimmie Frye in memory of Paul J. Schmiech

Mr. and Mrs. Marvin Hoorman in memory of Elsie D. Schmeding  
Carol Lama  
Mrs. Madlyn G. Adams in memory of Carl Cambron  
Mrs. Marie Dzieman in memory of Carl Cambron  
Mrs. Nadine McNaughton in memory of Carl Cambron

Mr. and Mrs. Martin McNaughton in memory of Carl Cambron  
Mr. and Mrs. Samuel Terriema in memory of Carl Cambron

Mr. and Mrs. Wesley K. Hill in memory of Dr. Maury Sosnoff

Mr. and Mrs. Victor A. Callaman in memory of Marion Eichelberger  
Mary Holtsclaw in memory of Ida Tucker  
Irene Herries in memory of Eliot Cohen  
Blanche C. Behrens in memory of Lester Behrens  
Lillian E. Minges in memory of Gene R. Hoss  
Keith Jacobs

Mr. and Mrs. Michael Jostedt in memory of Mrs. Ray Long  
Mrs. Wendell G. Scott

Mr. and Mrs. Mel Miller in memory of Dr. Charles Abramson  
Mrs. Phyllis Moosmann in memory of Ruby Long  
Mr. Lacy Gorman in memory of Sally Gorman  
Mrs. Ernest Kretschmar in memory of Mrs. Vincent Hollo

Mr. and Mrs. Frederick Hermann in memory of Leonore Loeb  
Florence M. Kasiske  
Oliver R. Sheffield in memory of Marjorie Bonner  
Mr. and Mrs. Herman Thaller in memory of Marilyn Katz

Mr. and Mrs. Edward Kline in memory of Edmond T. Jones

Frank, Rita and Barbara Dinyer in memory of Edmond T. Jones

Mr. and Mrs. Robert C. Strain in memory of William R. Cady  
Mr. Boris Miller  
Ruth R. Block in honor of Mr. and Mrs. Gene Petty  
Bob J. Leach and Robbin O'Dowd in memory of Nellie May Elkins

Fred P. May, Jr.  
Jarster Heating and Air Conditioning  
Mr. and Mrs. Warren Vetter in memory of Elma Stanger  
Linda Brink Pauly in memory of Floramae Brink  
Rose Erxleben for the T.G.B. Retirement Commission in memory of Hilda Rabold

## CALENDAR

### March 14, 1988

2nd Annual Daniel R. Biello Memorial Lecture "Affairs of the Heart," H. William Strauss, M.D., Division of Nuclear Medicine, Massachusetts General Hospital, Boston.

### April 11, 1988

City Wide Radiology Conference, Leroy Sante Lecture, St. Louis University.

### April 16-21, 1988

8th Annual North American Hyperthermia Group Meeting  
Philadelphia, PA

### April 16-20, 1988

American Radium Society  
Seattle, Washington

### May 9, 1988

R. Gilbert Jost, M.D., Stuart S. Sagel, M.D., "Direct Digital Radiography," Department of Radiology, Mallinckrodt Institute of Radiology, Scarpellino Auditorium.

### May 13-18, 1988

American Roentgen Ray Society  
San Francisco, CA

### May 24-27, 1988

International Clinical Hyperthermia Group Meeting  
Philadelphia, PA

### June 12-17, 1988

1988 Hyperthermia School "Clinical Aspects of Hyperthermia"  
Durham, NC

### June 13-17, 1988

Canadian Association of Radiologists  
Edmonton, Canada

### June 14-17, 1988

Society of Nuclear Medicine  
San Francisco, CA

### June 26-30, 1988

American Medical Association  
Chicago, IL

# REFLECTIONS

BRUCE L. McCLENNAN, M.D.

I have been privileged to serve on the Executive and Agenda Committee of the American College of Radiology's Intersociety Commission and to represent the Society of Uroradiology at the Summit Meeting.

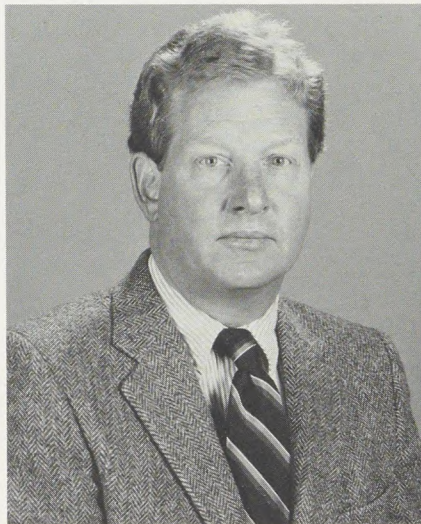
The Intersociety Commission was formed with the purpose of establishing communications among the leadership of national radiological societies. It is but one variation on the theme of coordinating the work of national societies to encourage unity.

Since the American College of Radiology (ACR) attempts to speak for all of American radiology, it was important to have the input of all the groups in the field. A uniform opinion that represents the deliberations and consultations of all organizations in the radiologic community lends greater credibility to recommendations and actions.

In 1980, invitations were extended to all nationally recognized radiology societies, and 22 joined the Commission. Since then, others have joined, and the Intersociety Commission now represents more than 30 groups. Also, the American Board of Nuclear Medicine and the American Board of Radiology participate as observers, as does the AMA.

In 1981, the first Summit Meeting was held, with 23 societies taking part. One of the major functions of the Intersociety Commission has been to organize and convene the Annual Summit Meeting. As was stated at one of the first Summit Meetings, "The broader the base of participation, the more meaningful the deliberations and the more significant the decisions and recommendations."

The Summit Meeting continues to act as a catalyst



between the various organizations and the American College of Radiology. The purpose of the Summit Meeting continues to be advisory, not to make or set policy. As Dr. John J. Harris, Jr., chairman of the Board of Chancellors, pointed out in 1981, "The Summit is not an annual meeting of the Intersociety Commission, but rather a gathering of the leaders of radiology."

The Summit Meeting of 1987, my first, took up two topics for discussion: 1) the marketing of radiology and radiological services 2) patients' rights; the radiologist as the patients' advocate.

A full day's discussion was organized on each topic. Dr. Ronald Evens and I attended the session on marketing and participated in the stimulating discussions of the day. Dr. Joseph Marasco, president of the American College of Radiology chaired the session, which covered definitions of marketing, marketing research, and identification of the product (radiology by radiologists). We made suggestions regarding the target markets of patients, referring physicians, and government and third-party payers, among others.

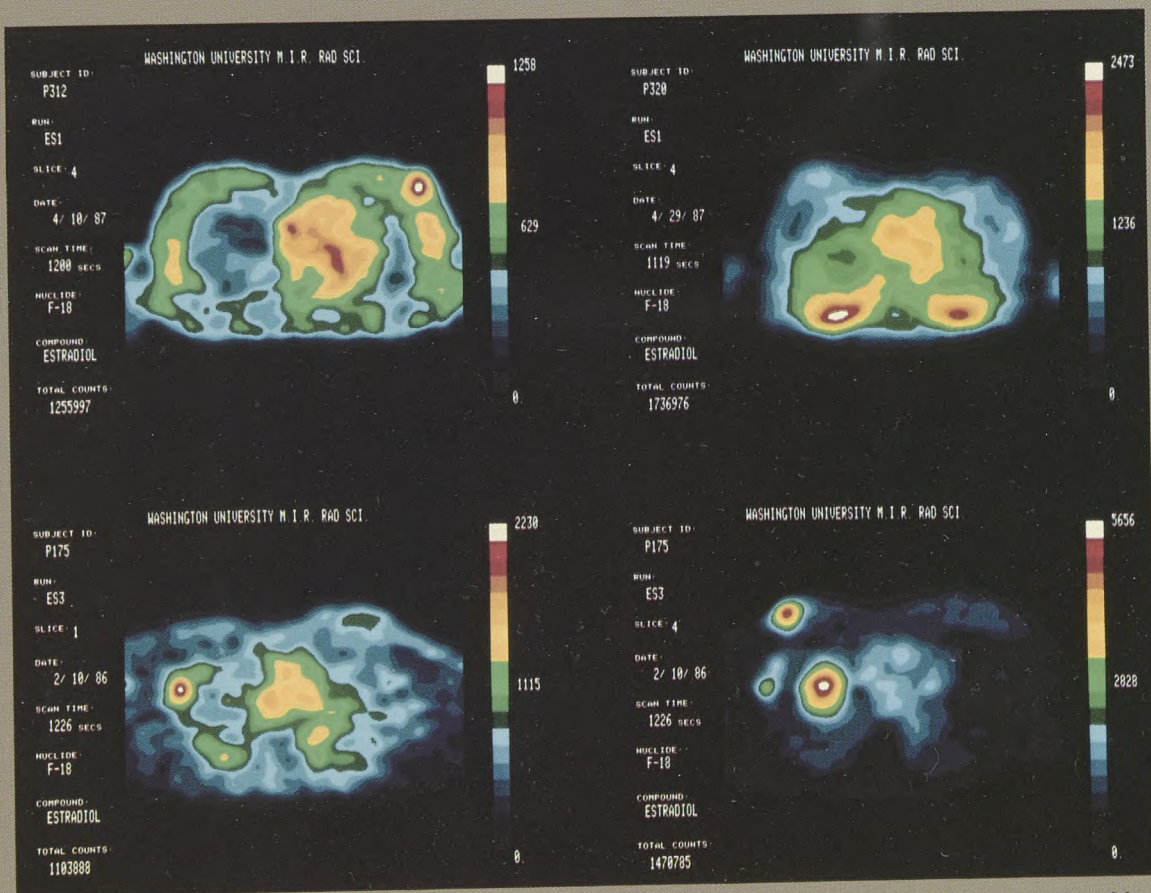
Debates sometimes became heated during discussions of turf

and the competence to use new imaging modalities. The end result was a white paper titled, "Marketing Radiology and Radiology Services," which was submitted to the American Board of Radiology and its council at their annual meeting. The bywords of that report were that Radiology CARES (Competent, Available, Responsive, Economical, and Safe).

The patient's rights discussion, chaired by Dr. Melvin Figley, editor emeritus of the *AJR*, stressed the need for quality service in the radiological process and the radiologist as patients' advocate. We got down to details, including the informed consent process, what to tell the patient about the results of an exam and when, selection of procedures, and the radiologist's role as a consultant. The quality of our facilities and the need for board-proven competence were also discussed. Those topics again reflected marketing concerns by pointing out the need for quality service delivered by quality radiologists in an informed, caring atmosphere.

The issues for the 1988 Summit haven't been decided, but cost reduction in health care, recertification, relative value scales, and the study of standards of care—as well as the old diehards of marketing and turf—will all be viable candidates for group discussion next summer.

The Intersociety Commission and the Summit Meeting are solid examples of the unity that exists within our specialty. I'm pleased to have been a part and to represent the Society of Uroradiology. Many of the important issues raised and discussed at the Summit Meeting have found their way into the American College of Radiology's policies to the continued benefit of its members and the entire field of radiology. □



Images obtained from three of the first 13 subjects to be scanned using the radiopharmaceutical developed by a team of Mallinckrodt researchers and their colleagues at the University of Illinois—Urbana. Upper left: Uptake in an estrogen receptor-positive primary breast tumor. The uptake can be seen clearly in the left breast, located in the upper right part of the image. Upper right: Minimal uptake of the radioligand is seen in an estrogen receptor-negative tumor of the right breast. Enlargement of the right breast by the tumor is apparent. Lower images: In the left image, uptake of the compound is observed in the area of the right axilla at the site of the estrogen receptor-positive metastasis. In a lower slice, pictured at right, uptake is seen in both the estrogen receptor-positive primary tumor and in the right axilla.

# FOCAL SPOT

MALLINCKRODT INSTITUTE OF RADIOLOGY

MALLINCKRODT  
INSTITUTE  
OF RADIOLOGY

AT WASHINGTON UNIVERSITY MEDICAL CENTER

Director, Mallinckrodt Public Relations  
Executive Editor  
Michaele Gold

Managing Editor  
Steve Kohler

Associate Editor  
Vicki Kunkler

Design  
Cunningham/Purviance  
Marketing Communications

Contributing Writer  
Candace O'Connor

Administrative Assistant  
Kay Stockstrom

Photographers  
Mike DeFilippo  
Thomas Murry  
Steve Kohler

**Focal Spot** magazine is published three times a year by the Mallinckrodt Institute of Radiology at the Washington University Medical Center at 510 South Kingshighway, St. Louis, Mo 63110.

Permission is granted to reproduce articles contained herein, provided **Focal Spot** magazine of the Mallinckrodt Institute of Radiology at the Washington University Medical Center is credited.

Public Relations Department  
Mallinckrodt Institute of Radiology  
510 South Kingshighway  
St. Louis, MO 63110  
(314) 362-2866.



An architect's rendering of the facade of Mallinckrodt's new Mammography Screening Center, located on the fourth floor of St. Louis Centre. For more information, see the story in the Spot News section.

Non-Profit Organization  
U.S. Postage  
PAID  
St. Louis, Missouri  
Permit No. 1032

ARCHIVES  
SERIALS DEPT  
MEDICAL LIBRARY  
WASHINGTON U SCHOOL OF MED  
BOX 8132