

Summer 1988

Focal Spot, Summer 1988

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SUMMER 1988

VOLUME 19, NUMBER 2

FOCAL SPOT

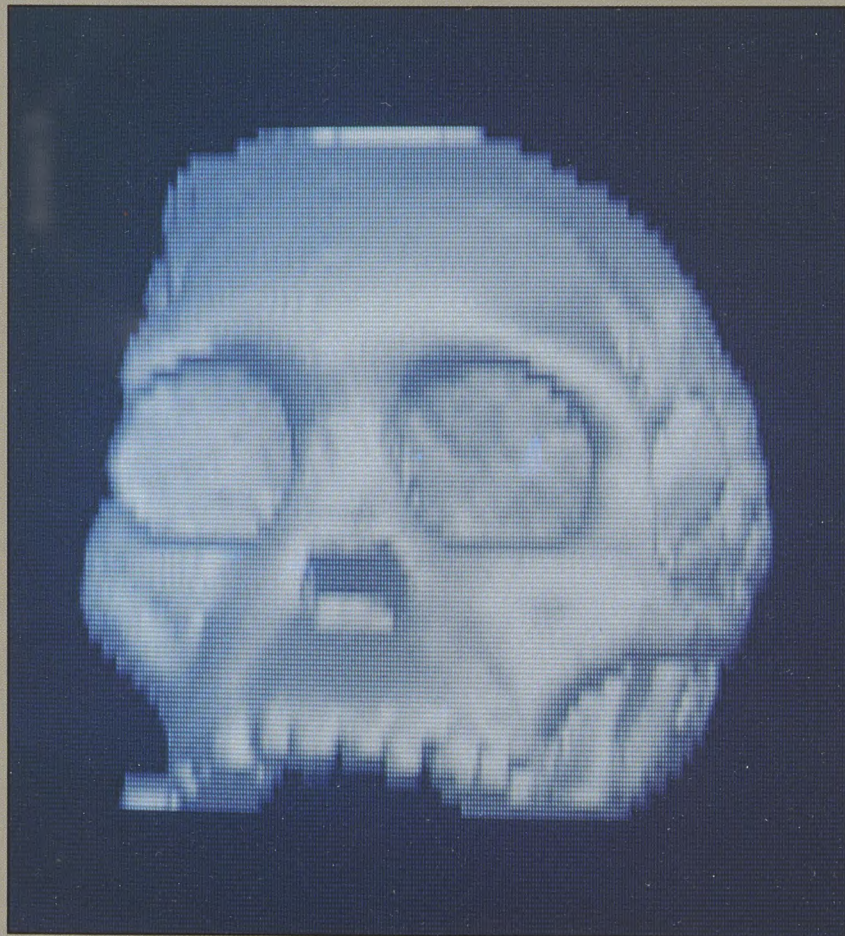
MALLINCKRODT INSTITUTE OF RADIOLOGY

MAKING
MANDY WELL

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Indexed ARCHIVES



The two-million-year-old Taung fossil as seen by computed tomography and displayed on the high-resolution Pixar image computer. New information concerning dental eruption patterns and sinus systems in the ancient creature has been revealed by imaging techniques developed at Mallinckrodt Institute of Radiology; more is on the way.

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MALLINCKRODT INSTITUTE OF RADIOLOGY



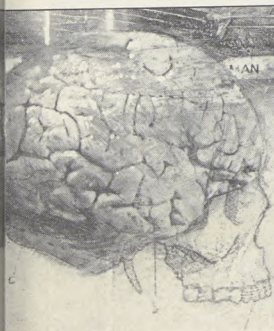
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MALLINCKRODT
INSTITUTE
OF RADIOLOGY
WASHINGTON UNIVERSITY MEDICAL CENTER

ON THE COVER:

Seven-year-old Amanda Smith is one of the many St. Louis-area children who have benefitted from the collaborative philosophy that governs the pediatric section of Mallinckrodt Institute of Radiology. Photograph by Steve Kohler.

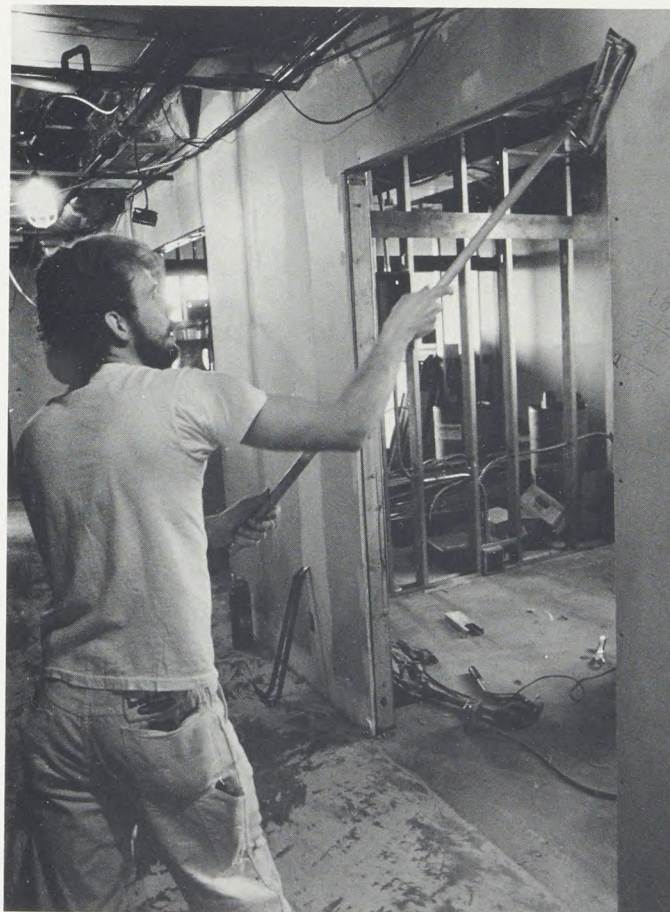
SPOT NEWS

Fossil Study Brings Prize

The revolutionary application of computed tomography (CT) to the study of early hominid fossil skulls (see the related feature story in this issue) at Mallinckrodt Institute has brought honor to two researchers here.

Michael W. Vannier, M.D., associate professor of radiology and director of the image processing laboratory, and Glenn C. Conroy, Ph.D., professor of anatomy and anthropology, have been awarded the Phillip V. Tobias Essay Prize of the Institute for the Study of Man in Africa. Their paper, "Dental development of the Taung skull from computed tomography," won the award and a substantial cash prize. The award recognizes world-famous anthropologist and humanist Phillip Tobias, professor of anatomy, human paleontology, and zoology at the University of the Witwatersrand in Johannesburg, South Africa.

Tobias himself made the presentation to Conroy in May when the Washington University researcher was in South Africa to arrange the CT examination of rare early hominid fossils.



Steve Kohler

Private Space Established

With the opening of the new Breast Diagnostic Center on the tenth floor of the west pavilion, Mallinckrodt Institute of Radiology has established a central location for all procedures related to the breast. The center serves both in- and outpatients in an "attractive, friendly-looking, and less clinical setting," says Judy Destouet, M.D., associate professor of radiology and head of mammography.

The new suite, designed primarily as a private space for women, commands a view of Forest Park. Adjacent to Rand Johnson on 10300, the

Preparing drywall for painting, David Johnson of the Mallinckrodt maintenance crew works toward the completion of the new Breast Diagnostic Center on 10 West.

center was created from what was formerly a bank of offices. It is accessible to doctors' offices and near outpatient operating rooms, Destouet says.

The diagnostic center is dedicated to the work-up of all breast symptoms and will allow an evaluation of the Institute's capability for stereotaxic guided aspiration of nonpalpable breast lesions. In operation since early July, the center was first conceived in February of 1987 as a way to consolidate services.

Clinical Trials To Begin On Gallstones

Mallinckrodt Institute of Radiology will continue its pioneering efforts in the field of extracorporeal shock-wave lithotripsy (ESWL), as experimental studies for the treatment of gallstones and biliary duct stones using the new Siemens biliary shock generator attached to the Lithostar are scheduled to begin in the summer of 1988.

Though West German researchers report that Lithostar is now used successfully to treat gallstones in their country, Mallinckrodt will be the first of 10 sites in the United States approved for the biliary study. Here in St. Louis, the project will be a joint venture, with the Institute working closely with the departments of Surgery and Gastroenterology.

Mallinckrodt was the first in the nation to use the Lithostar system in the treatment of kidney stones. This time, Lithostar will have a biliary attachment which uses ultrasound guidance. Successful biliary ESWL may benefit a large number of patients since gallstones are 10 times more common than kidney stones.

SPOT NEWS

Volunteers Retrained

At the heart of the CanSurmount volunteer recertification program conducted on March 22 were the informal speeches presented by four of the volunteers. Addressing their peers, the four told of their experiences in visiting other cancer patients to help them cope with their diseases.

Bernice Elrod, the first volunteer to make a Can-Surmount visit; Larry Howe, who has been a cancer patient since he was 14 and now specializes in visiting teenagers; Judy Imes, a visitor to family members of cancer patients since her husband received a visit; and Sol Hoffman, a senior Olympian with lung cancer that has metastasized to his brain, spoke to the group.

All CanSurmount volunteers were required to attend in order to be recertified. They received training in listening and communications skills and heard a medical update on cancer from Gary Ratkin, M.D., physician advisor to the group. Lois Howland, BSN, told the volunteers that 41 of them had made 151 visits and donated 319 hours of their time.

CanSurmount volunteers are people with cancer who call on their own experiences to help others through anxious times. CanSurmount is headquartered in the Cancer Information Center on the first floor, Barnard corridor, Barnes Hospital.



Bernice Elrod, a CanSurmount volunteer, addresses her colleagues during the recertification program.

Steve Kohler

Evens To Three Top Posts

Ronald G. Evens, M.D., professor and head of radiology and director of Mallinckrodt Institute of Radiology, recently has been chosen to serve as president of two organizations and president-elect of a third. He will lead the American Roentgen Ray Society (ARRS), the Association of University Radiologists (AUR), and the Washington University Medical School Alumni Association.

As president-elect of the ARRS, the nation's oldest professional radiology association, Evens will

serve a one-year term before taking over from president Lee F. Rogers, M.D., at the helm of the 4,100-member group. Among his duties for 1988 are the organization of the scientific program for the society's next meeting and the selection of the Caldwell Lecturer—a distinguished scientist who will receive a medal honoring Eugene W. Caldwell, M.D., a pioneer radiologist and former president of the ARRS.

Evens also has begun a term as president of the AUR, an organization representing more than 2,000 university-affiliated radiologists from throughout North America. The AUR is the only radiologic organization specifically dedicated to promoting full-time academic radiology. Evens is the first president to represent Missouri.

Alumni of the Washington University Medical

School who gathered at their recent reunion selected Evens as the new president of the alumni association. His one-year term officially began July 1, 1988. Among his charges are the preparation of the scientific program to be presented at the 1989 gathering, which will coincidentally mark Evens' own 25th anniversary of graduation from medical school.

His capacity for leadership and expertise in the socioeconomic issues of medicine make Evens much sought as a consultant to industry, medical centers, universities, and professional organizations.

SPOT NEWS

New Fellows Announced



R. Gilbert Jost, M.D.

Three of Mallinckrodt Institute of Radiology's own will be among the 136 who are honored as new fellows of the American College of Radiology (ACR) on September 27, 1988, in Cincinnati, Ohio.

R. Gilbert Jost, M.D., professor of radiology and chief of the diagnostic division; Todd H. Wasserman, M.D., professor of radiology; and Joseph K.T. Lee, M.D., professor of radiology, have been elected to fellowship by the ACR's board of chancellors. The position is conferred "on the basis of outstanding

contributions and service to radiology," according to the letter of confirmation from Thomas F. Meaney, M.D., chairman of the board of chancellors. A relative few such fellowships are granted each year. Also honored will be St. Louis radiologist Bruce J. Walz, M.D., an associate professor of clinical radiology.

The ACR is the principal organization devoted to the advancement of radiologic science and the improvement of service to the patient, with more than 20,000 members in diagnostic and therapeutic radiology, radiologic physics, and related disciplines.



Joseph K.T. Lee, M.D.

Wilson Award To Two Top Students

For the third time in its 20-year history, the Hugh M. Wilson Award was presented to two equally qualified winners in 1988. Like recipients in 1985 and 1987, Eric C. Kleerup, M.D., and Rosalie J. Hagge, M.D., shared the award, given to graduating medical

students in recognition of meritorious work in the basic or clinical radiological sciences.

From among five nominees, Kleerup and Hagge stood out for their "exceedingly excellent and important research," according to Dixie J. Anderson, M.D., associate professor of radiology, who helped review the nominations.

Hagge worked on the Pixar Image Computer under the primary supervision of Tom R. Miller, M.D., Ph.D., associate professor of radiology. She created a program that takes advantage of the speed of that processor to permit interactive filtering of a cardiac-gated blood pool study and allows the operator to select the type of filter to be used at the time of viewing.

Kleerup worked under the direction of Jerold W. Wallis, M.D., assistant professor of radiology, to develop display software for single photon emission computed tomography (SPECT) that is now used clinically in the Division of Nuclear Medicine. The features of the program make reading SPECT studies "much easier than would otherwise be possible," according to the letter of nomination for Kleerup from Miller, Wallis, and Barry A. Siegel, M.D., professor of radiology and director of the Division of Nuclear Medicine.

The dual award was presented to the future radiologists at the Annual Senior Awards Night in May by Ronald G. Evens, M.D., Elizabeth Mallinckrodt professor of radiology and director of Mallinckrodt.

Rating Pixar's Potential

Pixar, the high-powered computer created for the generation of special effects in movies, and a second generation of medical software are again being evaluated in Mallinckrodt Institute of Radiology's image processing laboratory.

Philips Medical Systems has acquired the technology and is developing PICS 2000 software. Mallinckrodt was selected as the first beta test site for the new programs that produce detailed images that can be colored and manipulated onscreen. Michael W. Vannier, M.D., associate professor of radiology, and his colleagues are testing, criticizing, noting bugs in the system, and making recommendations to software developers on the project.

The high-speed Pixar system employs a choice of volume rendering or shading to display three-dimensional images from two-dimensional computed tomography or magnetic resonance imaging data sets. The software allows users to see "inside" the images and to manipulate them.

Once the bugs are out of the system, investigators plan comparison tests with other modalities to determine empirically if the computer images are an improvement over more conventional methods of displaying diagnostic information.



Todd H. Wasserman, M.D.

SPOT NEWS

H. William Strauss Delivers Second Biello Lecture

Referring to "the Biello legacy" and Dan Biello as a man whose life could be characterized by the words "courageous, pioneer, and investigator," H. William Strauss, M.D., delivered the Second Annual Daniel R. Biello Memorial Lecture on March 14, 1988.

Speaking in Scarpellino Auditorium, Strauss discussed the latest techniques in both heart and lung imaging and their relationship to Biello's earlier research work. Strauss is professor of radiology at Harvard Medical School and director of nuclear medicine at Massachusetts General Hospital. In introducing him, Barry A. Siegel, M.D., Mallinckrodt's director of nuclear medicine, called Strauss "the father of modern cardiovascular nuclear medicine."

The talk, entitled "Affairs of the Heart and Lung," traced the combined use of fatty acid and thallium imaging to detect myocardial ischemia. Strauss also detailed recent investigations into methods of identifying cerebral tissue that is at risk for stroke. And he described several new devices, including a sodium iodide detector that can be placed over a patient's left ventricular blood pool while the patient goes about his daily endeavors. The machine records cardiac responses to environment and activity for later study and comparison with EKGs, yielding information valuable in the prescription of

exercise for heart patients.

The Biello lectureship serves as a testimonial to the respect Biello's Mallinckrodt colleagues have for him. At the time of his death in June, 1986, after a struggle with Hodgkin's disease, Biello was professor of radiology and associate director of the Division of Nuclear Medicine. He was a highly productive scientist, with more than 50 journal articles and book chapters to his credit. Through a series of studies, he developed new criteria for interpreting ventilation-perfusion lung scans. His approach—the Biello criteria—is in general use by the nuclear medicine community.

Stone Named Vice-President

Mallinckrodt's business manager, Donald R. Stone, C.P.A., has been elected vice-president of the Greater St. Louis Chapter of the Healthcare Financial Management Association, a professional group of 350 members.

As the new vice-president, Stone's responsibilities include planning and organizing the nine or 10 educational programs to be presented to members this year. He will also assist the president and preside in her absence.

Stone has previously served the organization as secretary and treasurer.

Spring Flowers Symbolize New Hope

The American Cancer Society's nationwide observance of Daffodil Day was celebrated in grand fashion at the Cancer Information Center on March 22. Nearly 2,500 daffodils were distributed, five times the number from previous years.

The flowers, considerably more than had been expected, were provided by General Dynamics Corporation as representative of a corporate donation to the American Cancer Society. For the patients, visitors, and staff who received the blooms, they served as a

springtime symbol of new hope.

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

Lois Howland, director of the Cancer Information Center, shares one of 2,500 daffodils on the American Cancer Society's Daffodil Day, March 22.



Steve Kohler

SPOT NEWS

McClennan Helps To Develop Course

Bruce McClennan, M.D., has been invited to join the American College of Radiology's Intersociety Committee on Systematized Refresher Courses. McClennan, professor of radiology and director of abdominal radiology at Mallinckrodt Institute of Radiology, will serve on the Subcommittee on Genitourinary Radiology. He joins doctors Glen Hartman and Harold Pollack at the helm of that group.

The subcommittee is charged with developing plans for a categorical course on genitourinary radiology at the 1989 meeting of the American Roentgen Ray Society in New Orleans. Recurring cycles of courses dealing with each of the major anatomic categories, technique-oriented modalities, mammography, and pediatric radiology are presented. The primary responsibility of each committee member is to prepare for planning and chairing a future categorical course in his or her area of interest.

PET Research



Steve Kohler

Mark A. Mintun, M.D.

Research into the clinical applications of positron emission tomography (PET) to map the functional anatomy of the brain will be aided by a grant won recently by Mark A. Mintun, M.D., assistant professor of radiology.

Mintun has been named a Research and Education Scholar by the Radiological Society of North America (RSNA). The three-year-old scholar's program awarded Mintun \$45,000 per year for two years, saying his work would "help found a tradition of excellence" for the plan.

Mintun, who will work primarily with Marcus E. Raichle, M.D., professor of radiology and neurology, and others on the team, says the research is three-pronged: 1) adapt techniques to the new, high-resolution PET scanners on the seventh floor, 2) employ a new image-reconstruction algorithm to reduce background noise in the images, and 3) develop a technique for reducing artifacts by aligning the brain images in a new way.

Ultimately, the goal is to arrive at PET protocols that can show what is functionally wrong with the brains of individuals with mental disorders.

Lee Directs MRI

As part of an increased commitment to magnetic resonance imaging, Joseph K.T. Lee, M.D., professor of radiology, has been named the director of the MRI program by Ronald G. Evens, M.D., professor and head of Mallinckrodt Institute of Radiology.

Lee replaces the committee that steered MRI when it was considered an experimental modality. His appointment was effective February 15. Lee reports that he has been charged with speeding MRI's advancement, directing clinical applications and clinical research, and coordinating basic research. Joining the staff July 1 to oversee that basic research is physicist William Perman, Ph.D., formerly with the University of Wisconsin.

Lee says he accepted the assignment for its challenge and because "MRI is a rapidly growing field, with established clinical uses and great promise for the future." He is particularly interested in investigating its application to the body and its use in providing biochemical information, not just images.

Director Named Vice-Chancellor

Ronald G. Evens, M.D., Elizabeth Mallinckrodt professor of radiology and director of the Institute, has assumed the additional duties of vice-chancellor for financial affairs at Washington University.

In naming Evens to the post, William H. Danforth, M.D., chancellor of the University, said, "Ron Evens has demonstrated exceptional leadership in not only his role as head of the nation's largest department of radiology, he also brought valuable leadership to Children's Hospital at a time when its financial situation would benefit from innovative and fiscally sound management." Evens recently completed a two-and-a-half-year term as president of St. Louis Children's Hospital.

Wasserman Chairs Conferences

More than 180 scientific abstracts were presented to researchers involved in cancer studies at the Sixth International Conference on Chemical Modifiers in Cancer Treatment held in March, 1988 in Paris, France.

The conference, sponsored by the American College of Radiology and the National Cancer Institute, focused on chemical modifying drugs used to enhance the killing effects of radiation therapy in cancer cells.

Todd H. Wasserman, M.D., professor of radiology and the North American

SPOT NEWS

chairman of the March conference, was elected chairman of the seventh international conference to be held in the fall of 1990.

Wasserman also has been elected joint chairman of the Third International Conference on the Interaction of Radiotherapy and Chemotherapy. The conference, sponsored by the National Cancer Institute and the American College of Radiology, will convene in the spring of 1990 at Asilomar Conference Center in Monterey, California.

Brachytherapy Technology Moves Ahead

Four newly purchased remote afterloading machines are advancing brachytherapy technology in the Radiation Oncology Center. Brachytherapy employs sealed radioactive sources to treat tumors at close distances or in direct contact. Rapid dose falloff protects normal tissue near the tumor, but personnel exposure to radiation has been an issue. The new units store radioactive sources in self-contained, shielded safes, then configure and transport them to applicators in the patient.

Located in patient rooms and portable, the units are programmed with the prescribed sources and duration of treatment. Once the machine's transport channels are connected to the applicators, the treatment is initiated via remote control from outside the patient's room. An intercom system keeps staff and patient in voice contact, and video



monitoring of patients is available at the central nursing station.

During the course of the implant, treatment can be interrupted easily, allowing the nursing staff to provide necessary care. When a treatment-interrupt switch is activated, radioactive sources automatically withdraw into the shielded safe, eliminating exposure to personnel. According to Eric Slessinger, M.S., instructor of radiation physics, "Remote afterloading represents the most up-to-date means for minimizing radiation exposure to medical personnel involved in brachytherapy."

Three of the remote

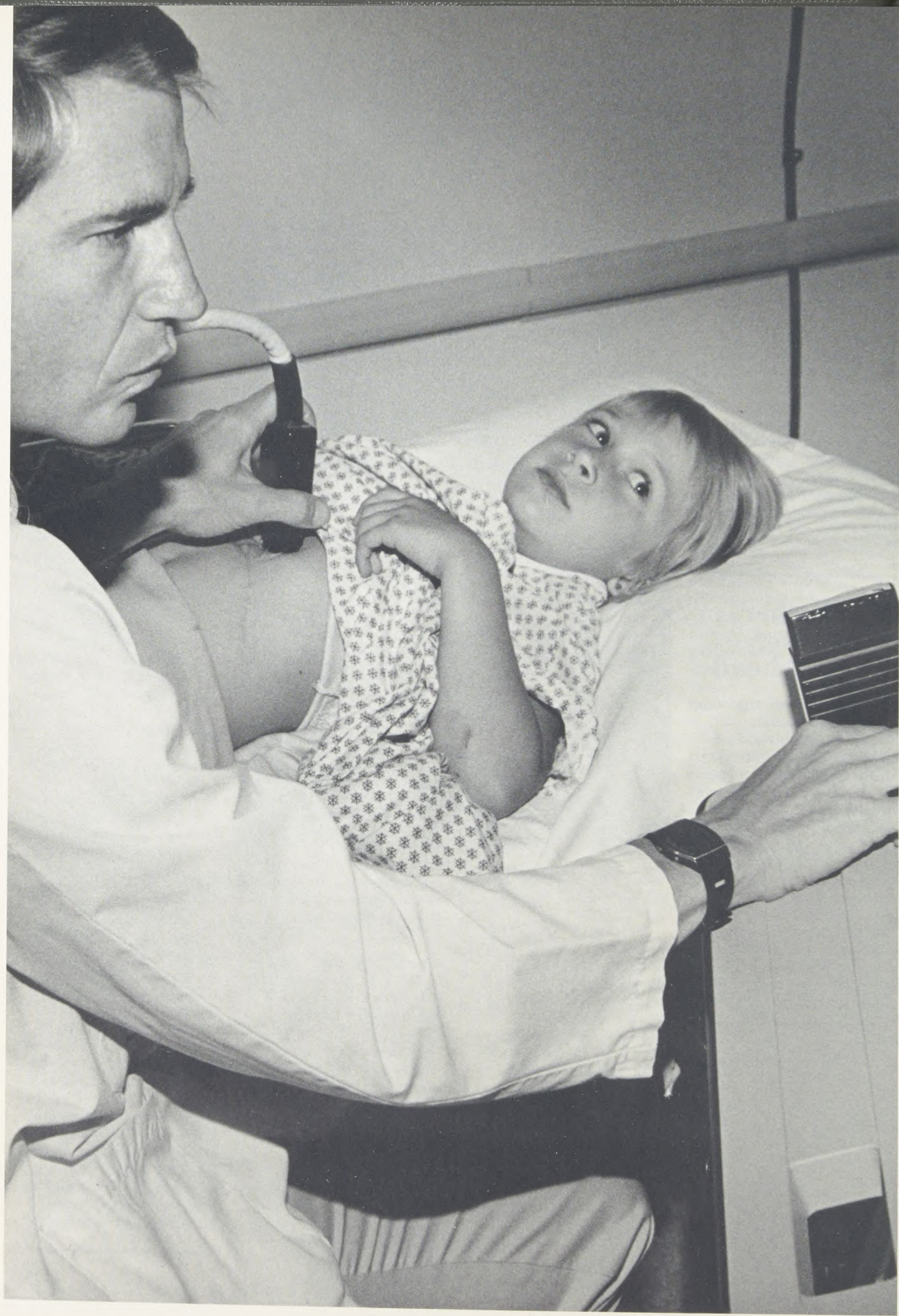
An afterloading brachytherapy machine of the type that the Radiation Oncology Center is installing.

afterloading units will be installed in the gynecological implant suite; one of those has the capacity to simultaneously control the treatment of two cervical cancer patients located in adjacent rooms. The other two units can treat either endometrial or cervical sites using flexible linear cesium sources.

The fourth machine will be devoted to breast, head, and neck sites, using flexible iridium-192 linear sources. Additionally, the bronchus, esophagus, rectum, and other sites tradi-

tionally managed by manual afterloading are treatable with the new units.

Remote afterloading technology is a product of Europe, relatively new to the U.S. The new machines were manufactured by the Nucletron Corporation in the Netherlands. Their addition makes the Radiation Oncology Center one of the largest remote afterloading brachytherapy facilities in the country.



MAKING mandy WELL

by Steve Kohler

On the evening of December 14, 1984, Amanda Smith, then just three years old, came to St. Louis Children's Hospital jaundiced and obviously very ill. Amanda's pediatrician suspected hepatitis—a diagnosis that early blood work failed to support. The real trouble was neither so obvious nor so commonplace. By the time Mandy finally left the hospital 35 days later, she had toughed her way through two major surgeries and had made medical history.

Her first ultrasound exam, directed on that cold evening by Gary D. Shackelford, M.D., professor of radiology, was the start of a series that continues today and may well go on for Amanda's lifetime. It revealed the earliest clue—enlarged bile ducts in the liver—in what became a collaborative search for the source of Mandy's problem.

MAKING MANDY WELL



Steve Kohler

Mandy Smith today

"You can see how important radiology was to this case."

"We could image the bile ducts, but we couldn't determine the cause. The enlargement was suggestive of an obstruction of the drainage of the bile," Shackelford says. A computed tomography (CT) scan confirmed the enlargement. Normally two millimeters in diameter in someone of Amanda's small stature, hers measured seven millimeters. The CT results also showed an enlarged gallbladder filled with bile sludge and an enlargement of the pancreatic duct.

The distended pancreatic duct indicated a low, or distal, blockage. But it was important to differentiate between an intrinsic obstruction, like a stricture or a stone, and an extrinsic mass. "We couldn't nail it down with ultrasound," Shackelford says. Because gas is such an impediment to ultrasound penetration, that technique never clearly revealed the pancreas itself. CT showed an enlarged head of the pancreas, but provided no delineation of tissue type, no reason to suspect trouble there.

Between trips to the radiology suite on the first floor, Mandy lay listlessly in her room upstairs. Her parents, Terry and Kathy, never left. They slept on the couch that folded out or in a chair at Amanda's bedside. Brother T.J., due to celebrate a birthday, had to forego a family celebration when he went to visit relatives. Over the course of Mandy's treatment, Terry recalls "two or three hundred X rays."

While that may be a time-distorted memory, there's no doubt that the pediatric reading room became a hub of Mandy's young life. Gathering there with Shackelford were his colleagues—Marilyn J. Siegel, M.D., associate professor of radiology, and William H. McAlister, M.D., professor of radiology and chief of the section.

Joining them was a team of clinicians: infectious disease specialist Gregory A. Storch, M.D.; pediatric gastroenterologist Robert J. Rothbaum, M.D.; chief of pediatric surgery at Children's Hospital, Jessie L. Ternberg, M.D.; her fellow, Sterling Blocker, M.D.; and many others—all those with talents that might apply. Surgeon Ternberg recalls, "Many times we got together there with the films, trying to figure out why Amanda had this problem."

Pediatric radiology as practiced at Mallinckrodt is configured to ease such cooperation. None of the radiologists specializes; each is a generalist with broad experience. And the physical setup promotes communication. The large, central reading room, uncommon among radiology departments, puts radiologists in constant, face-to-face contact with clinicians. "We funnel the images and the clinicians

"We funnel the images and the clinicians together. Subtle details get shared in the give-and-take."

together," McAlister says. "Important information and subtle details all get shared in the give-and-take. A bit of knowledge that might otherwise get lost may change your thinking and open whole new avenues of investigation. You don't get that when reading rooms are compartmentalized."

That way of doing business takes more time. Radiologists go over every film with other physi-

cians, normal films included. "But that's the price you must pay to get the valuable information on the tricky ones," McAlister says.

He further explains the section's philosophy: "I like the general concept of being able to do a number of things—whatever seems appropriate for the patient. If you concentrate on doing just one thing, you may be tempted to stretch its usefulness; we have a built-in flexibility."

Part of that versatility comes from having so many imaging techniques available in the section, without the need to schedule or transport patients elsewhere. In Amanda's case, cooperation and flexibility proved their great value.

After CT had shown her enlarged pancreas, Mandy was wheeled just a few feet for further ultrasound studies. Still sedated, she also happened to have less intestinal gas at that moment, and the pictures promised to be good. The sonogram zeroed in on the area isolated by CT. Revealed there for the first time was a small mass in the head of the pancreas—in the precise location that would explain the blockage of both ducts. The success, however, brought despair to the team that had grown so fond of the little blonde girl. Malignancy was feared.

In the operating room, Ternberg was prepared to perform a Whipple procedure, or radical pancreatoduodenectomy, that might save Mandy's life only by changing it drastically. Shackelford was in the operating suite to provide films, and he recalls how Ternberg found the mass as expected, then chose not to perform the drastic cancer operation despite the pathologist's diagnosis that the tumor was

*For eight days, the
Smiths lived in the
knowledge that
Mandy had cancer.*

malignant. "She heard doubt in his voice, or something. Anyway, she held off," he says.

Ternberg says only that the pathologist was not positive about the results from the frozen section, and she decided not to proceed on the basis of uncertain findings.

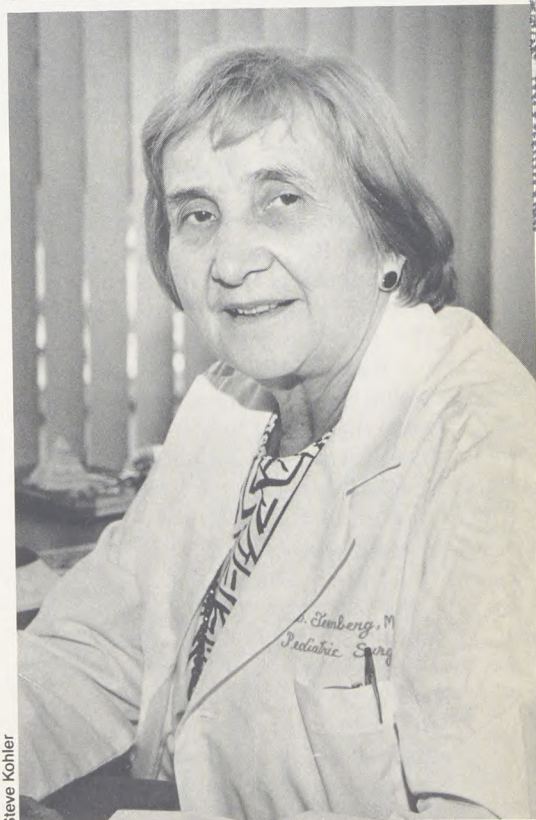
For eight days, while more studies and additional stains were done on the tissue from the mass, the Smiths lived in the knowledge that Mandy had cancer. Then, on December 28, Christmas came late with news that the tumor was definitely benign. It was finally classed as a hemangioendothelioma, an extremely rare, vasoactive tumor that is so uncommon, "you could hold all the literature in the palm of one hand," according to Ternberg.

Again, the surgical team and the radiologists met in the reading room to lay plans. Ternberg recalls of the imaging, "If we hadn't had that kind of radiology, we'd have had to perform an exploratory laparotomy. And then we could have been even more confused."

On New Year's Eve, 1984, little Mandy was back in surgery. With the aid of increasingly accurate images, Ternberg undertook a complicated operation that Shackelford calls "ingenious." It reestablished the flow from the gallbladder by opening its tip directly into the duodenum, bypassing the duct that was blocked by the

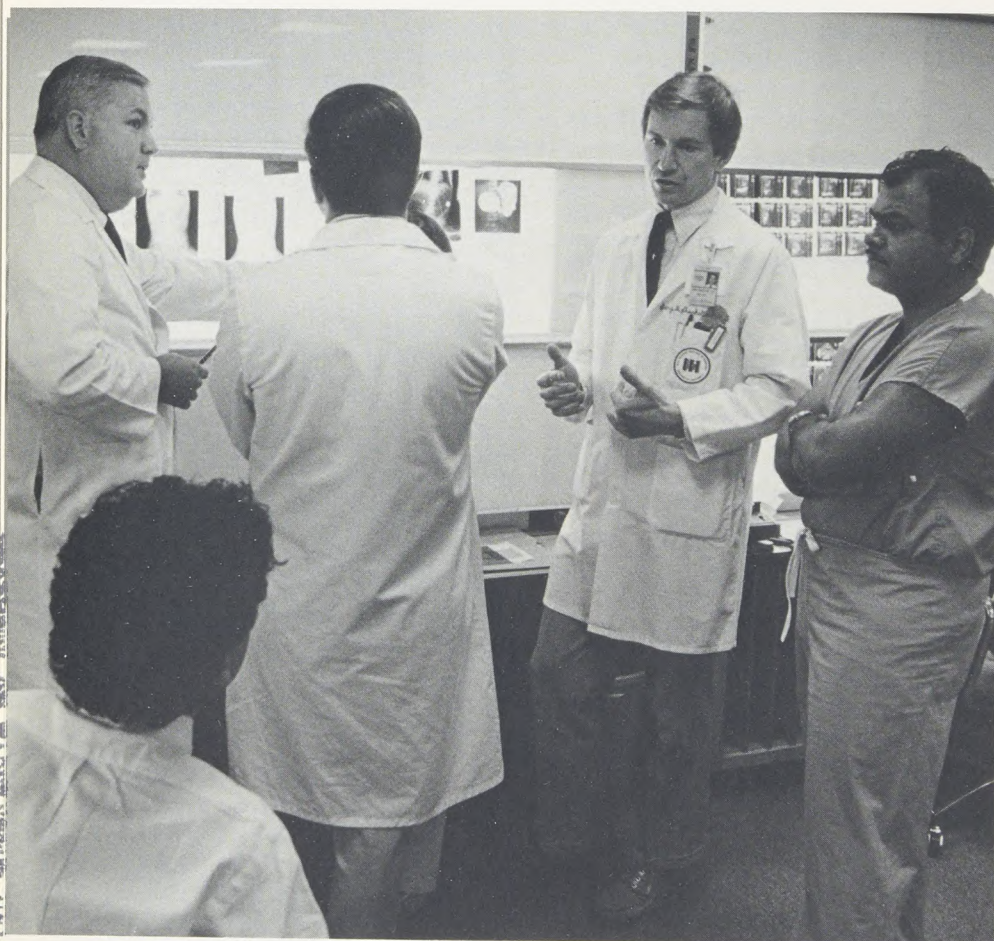
Ternberg was prepared to perform a procedure that might save Mandy's life only by changing it.

Jessie L. Ternberg, M.D.



Steve Kohler

MAKING MANDY WELL



Steve Kohler

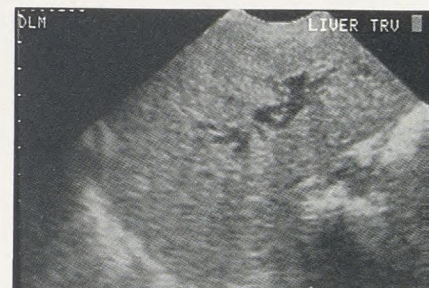
mass. To drain the pancreatic enzymes, Ternberg resected the tail of the pancreas and hooked it into a loop of the small bowel. The pancreas then drained in a reverse fashion in what's known as a Roux-en-y anastomosis.

Warned that the procedure might take 12 hours, the Smiths were delighted when it took only five. Ternberg was pleased, too; it was the first time she had combined the two procedures for a single patient. "Then there was hope," she says.

Post surgery, radiology entered Mandy's life again. No one knew what to expect of the tumor that had been left undisturbed. Some physicians suspected that it might have been growing slowly since birth and worried that it would continue.

Mandy went home on January 17, after visits from the St. Louis Blues and the baseball Cardinals brightened her recovery. Three months later, the mass was again difficult to image, but radiologists applied what they had learned earlier, and subsequent checkups have shown no growth. Mandy's reviews shifted to six-month intervals, and most recently she's been told she doesn't have to come back for a year. Her new plumbing system works perfectly. Her doctors suspect that the normal direction of flow may reestablish itself as the tumor becomes smaller relative to her body size.

Holding up a sheaf of imaging reports, Ternberg says, "You can see how important radiology was



An early clue in unraveling the mystery of Mandy's illness was this ultrasound image of her liver. It shows enlarged bile ducts, the dark elements in the top center.

Gary D. Shackelford, M.D., second from right, discusses a challenging case with his colleagues in the pediatric radiology reading room.

to this case." Tucked beneath the papers in the file is a Polaroid photo of the surgeon and her young patient on discharge day, something more than just an objective case note.

Shackelford, who thrives on the challenge of tough calls, says of this one, "We don't read cases in a vacuum. We help each other so we can help the patients. This time it worked." Then he adds that he looks forward to Mandy's visits.

For the Smiths, whose only daughter is now a healthy, active seven-year-old, the recollection of the family's toughest experience is trying. "But we couldn't have asked for any better," they say. "They all tried and tried until they nailed it."

And Mandy? Well, she'll show you her rib-to-rib "zipper" if you ask, and with the understatement characteristic of the survivor, she'll tell you, "The tape hurt the worst." □



Steve Kohler

A W O M A N ' S

Choice

by Candace O'Connor

Two years ago, Nancy Berninger was leading a healthy, active life. Administrative assistant to the president of Union Pacific Technologies, she had a busy career. She was an exercise buff, had just turned 40, and was careful to keep in shape. The last thing on her mind was breast cancer.

But in December, while taking a bath, she noticed a tiny lump under her arm. A biopsy revealed that it was malignant. Nancy was

referred to Mallinckrodt Institute of Radiology, where a team of physicians evaluated her case and explained her surgical options.

Still dazed from her diagnosis, Nancy heard for the first time about breast conservation, a relatively new approach to breast cancer surgery. Unlike the modified radical mastectomy which removes the cancerous breast, a more limited lumpectomy removes just the lump itself and a surrounding rim of tissue. Following surgery,

radiation treatments kill any remaining cancer cells—and the woman has kept her breast.

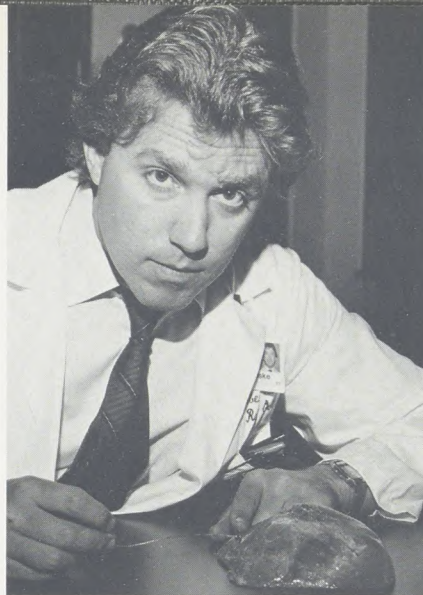
"I decided that if I had a chance to keep my breast, I was going to do that," Nancy says now. "If you had the choice, wouldn't you want to keep yours?"

The breast conservation approach which Nancy chose was developed more than 20 years ago by surgeons in Europe and Canada. It has steadily gained favor among U.S. physicians and their patients since 1985, when results were first published from the National Surgical and Adjuvant Breast and Bowel Project, a major multi-center study which included the Washington University Medical Center.

In that project, some 2,000 breast cancer patients were randomly assigned to undergo mastectomy, lumpectomy, or lumpectomy plus radiation. Five years later, the results were dramatic. With lumpectomy plus radiation, the chance of recurrent cancer within the affected breast was less than five percent—equivalent to the chance of recurrence within a mastectomy scar. And the long-term survival rates for the procedures were also the same.

"Clearly, breast conservation surgery and irradiation is providing patients with the same opportunity for survival and control of their tumor as more extensive procedures," says Carlos A. Perez, M.D., professor of radiology and director of the Radiation Oncology Center.

This new approach may also encourage women, frightened by the prospect of mastectomy, to seek diagnosis sooner. "In many cases, women fear losing their breast more than they fear losing their lives," says Judy Destouet, M.D., associate professor of radiology and head of the Mammog-



Steve Kohler

Robert R. Kuske, M.D., studies a model of a breast and the small wire that delivers a dose of iridium 192 to cancer cells.

"I would like to see every woman with breast cancer evaluated by a team of physicians who help her pick the best surgical option."

raphy Program. "If they know that when a breast cancer is small, it can be treated with less disfiguring surgery, they may come in for a screening mammogram."

Not all women with breast cancer are candidates for conservation. Diffuse tumors throughout most of the breast and multi-centric disease, with calcification in many areas of the breast, are best treated with mastectomy. But rigid size criteria that once limited this procedure to tumors up to four centimeters in size have now been abandoned in favor of cosmetic considerations.

"We have to have a mind's eye picture of what the breast will look like after surgery," says Robert R. Kuske, M.D., chief of the breast service at Mallinckrodt. Removing a big tumor from a large-breasted woman may leave her with an accepta-

ble appearance. But taking a medium-sized tumor from a small-breasted woman might remove half her breast. She would be better served with mastectomy followed by breast reconstruction.

"Iwould like to see every woman with breast cancer evaluated by a team of physicians who help her pick the best surgical option," says Kuske. "Patients cooperate better if they have a hand in choosing their treatment—and it's an advantage to us as physicians to have patients with this attitude."

During her operation, Nancy's surgeon, Robert Lund, M.D., discovered a tiny, one-and-a-half centimeter lump in her right breast—"about the size of an eraser on a number two pencil," he would tell her later. He also removed 19 lymph nodes to test for the spread of cancer; only one was affected.

A typical breast conservation procedure takes one-and-a-half to three hours to complete. The surgeon removes the tumor with a centimeter or so of surrounding tissue, then the radiation oncologist implants tiny plastic tubes into the cavity while the patient is still asleep.

The next day, the oncologist inserts into these tubes small radioactive wires that deliver a dose of radiation to kill any remaining cancer cells. The wires, which can be slipped out easily without anesthetic, stay in the patient for an average of two days, depending upon the amount of radiation needed.

To determine the proper dose for his patients, Kuske and the surgical team recommend a vivid technique: blotting the cancerous specimen with India ink before the surgeon halves it for examination. Under the microscope, the edge of the specimen

will stand out in sharp relief. Then it is easy to measure how close the last tumor cell comes to the edge of the specimen.

"If the tumor cells go right up to the edge, I want to increase the dose by leaving the radioactive implant in place," Kuske says. "If they're nowhere near the edge, I can also lower the dose by removing the implant earlier."

Teamwork is crucial to this stage of treatment too, he says. The diagnostic radiologist may be called in for consultation; the radiation oncologist, surgeon, and pathologist are closely linked during and after surgery. A medical oncologist is also important, in case any cells have escaped into the bloodstream.

Over seven weeks, Nancy had 35 external radiation treatments, 25 for her breast and lower neck, plus 10 "booster" treatments aimed precisely at the point where the cancer was found. Except for a bit of fatigue, she had no side effects from the radiation. Nine chemotherapy treatments, necessary because of her lymph node involvement, were not as easy, she admits. But all the women in her waiting room became fast friends—an informal support group for each other.

With the breast conservation approach, radiation treatments usually begin two weeks after surgery and continue over four to seven weeks for a short time each day. Checkups are scheduled every three months for the first year. A mammogram of the treated breast is done at six months after treatment, and of both breasts at one year.

This extensive follow-up is sometimes regarded as a drawback of the procedure. "But with a mastectomy, the opposite breast is at higher risk than normal," Kuske says. "You'll be watching that woman very care-

fully to make sure she doesn't develop cancer there. So the follow-up really should be about the same for both procedures."

The initial cost of breast conservation surgery and irradiation, higher than mastectomy, appears to be a disadvantage, too. Yet Kuske points out that conservation actually costs the same or less than mastectomy plus reconstruction.

For some patients, the weeks of radiation treatment may also pose a problem. When her cancer was diagnosed last fall, First Lady Nancy Reagan apparently decided against breast conservation because her busy schedule made such a lengthy commitment impossible.

But these considerations must be weighed against the great cosmetic and psychological benefits of conservation. In a survey of 200 Institute breast conservation patients, Kuske found that one year after treatment, 85 percent could not tell which breast had undergone radiation. Radiated breasts usually look better and feel more natural than reconstructed breasts after mastectomy.

"The treatment of breast cancer is a personal decision," says Destouet. "I'm just concerned that women know what their options are."

Unfortunately, some physicians still fail to present this option to their breast cancer patients. Women facing mastectomy often come to Kuske for a second opinion after a friend or neighbor has told them this new procedure is available.

In St. Louis, recent estimates indicate that only 50 percent of all breast cancer patients are treated with breast conservation. In Boston, that figure soars to more than 80 percent, and in

Europe, to still higher levels.

At least five states now legally require women to be offered this choice. "I think it's a sad commentary when legislators have to force physicians to mention the options. Since this procedure is medically proven, the medical community itself should have taken the initiative," Kuske says.

Nancy Berninger is pleased that she had the choice. Two years after diagnosis, she is cancer-free, with only a tiny scar to show for her surgery. Back to her active schedule, she has sometimes wondered why more women aren't using this approach. "You just want to be whole," she says. □

An innovative piece of equipment may soon be helping Mallinckrodt Institute physicians diagnose early-stage breast cancer. The Stereotaxic Breast Biopsy Device, arriving this summer, will allow doctors to take cells from non-palpable breast lesions—without open biopsy. A pathologist can then look at the cells to determine whether they are benign or malignant.

This instrument, developed in Europe, is currently available at only one other U.S. institution. Because it is so new, it will be tested for six months to make certain that its results are as accurate as those from conventional biopsy.

"If we can get enough cells and sample the right area, it will be wonderful. We will have a diagnosis without surgery and can sit down as a team to discuss therapeutic planning," says Judy Destouet, M.D., head of the Mammography Program. □

TAUNG

AUSTRALOPITHECUS

PARANTHROPUS

HOMO ERECTUS

EARLY HOMO SAPIENS

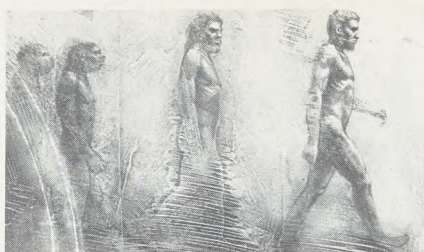


THE
CASE OF THE
MISSING
LINK

“These are the days of lasers in the jungle.”

—Paul Simon

by Steve Kohler



The young patient died mysteriously some 2,000,000 years ago. That's nearly 70,000 generations or 25,000 lifetimes using modern reckoning—plenty of time to be forgotten. But the inquiry into the case continues, and the effort to extract information from the patient's remains has intensified. Lately, radiology has played an expanding role in coaxing the truth from this isolated relict of humankind's shadowy prehistory.

Actually, all that's left of the patient is the front half of a skull and the fossilized brain that protrudes from it — just a handful of nearly solid rock known as the Taung child. It's a specimen that has riveted the interest of scientists since 1924, when it was discovered in the lime pits of South Africa's Taung quarry. Raymond Dart named it *Australopithecus africanus*, the southern ape of Africa, and it remains the type specimen for that species.

The discovery of the fossil shifted the attention of anthropologists from Asia to Africa for the first time, and Dart's estimate of its age at a million years set the scientific community on its ear. Until then, human evolution was thought to reach back only 200,000 years or so. The obvious humanlike qualities of the little skull made it the focus of even more acute attention.

But no agreement has yet been reached concerning the child's true place in the evolutionary lineup. Eminent paleoanthropologists disagree heatedly over every proposed interpretation.

Estimates of the child's age at the time of death range from 2.7 to seven years. No one even speculates on the gender because no post-cranial material exists to provide clues. For the same reason, no estimates of stature are possible either. And harmony has not been reached concerning how old the remains

*No agreement has
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evolutionary lineup.*

really are. Because the stratum from which the fossil was recovered was not recorded, arguments range all the way from one to two million years before present.

Is the romantic notion accurate? Do we have here the fossil of a helpless, almost human child, toddling bipedally across the veldt, struggling to use crude tools and aimed irrevocably at language use? Or is the fossil just one more apelike skull—old, but from a dead-end branch of the evolutionary tree?

Is the Taung child the "missing link," as was first claimed by Dart, that long-sought example of the evolutionary stage that sprang from the apes and gave rise to *Homo sapiens*?

These are the big questions that have kept the debate over the Taung child boiling for so long and continue to be matters of heated disagreement. The answers—when they come—will be made up of smaller, sometimes minute, deductions and discoveries. In the intricate maze of mystery presented by the Taung fossil, creative radiology is providing insight.

CUTTING TEETH

Teeth are the hardest and most readily preserved parts of the body. Even the ancient Taung skull sports a nice set. And teeth tell interesting stories.

For example, humans show a relatively delayed pattern of molar eruption that is associated with a long period of infancy, dependence, and the socialization of youngsters by their parents.

Was the Taung child still in the care of its mother, busily learning complex behavior from her? Or was instinct the driving force for a wild little animal kicked from the nest early? An examination of the teeth might add solid information to the proposed answers to that question.

Such an exam would show nothing in an adult, where all permanent teeth would already be in place. But in the arrested development of a child, with molar eruption halted by a premature death, the information might be invaluable. The trouble is that the skull consists of dense, fossilized bone that resists successful penetration by X ray. And those in possession of the priceless fossil are protec-

tive, not inclined to subject it to experimental techniques.

So Glenn Conroy, Ph.D., professor of anthropology and anatomy at Washington University Medical School, and Michael W. Vannier, M.D., associate professor of radiology and director of the image processing laboratory at Mallinckrodt Institute of Radiology, determined to prove themselves, then apply their respective sciences to the skull.

During his 1987 tenure as visiting scientist at Argonne National Laboratory, Vannier had created programs that allow computed tomography (CT) scans of extremely dense ceramics. He'd learned what he calls "tricks" to reduce the artifacts that had always obscured scans of very dense materials. He also determined how to adjust a CT scanner to deal with the extreme electron density of the proposed subject. Earlier attempts to X-ray the Taung skull had produced only disappointing results because no one had developed the necessary technique.

For practice, Vannier scanned rocks that Conroy borrowed from the geology department. "Nobody would have believed that a CT scanner could examine a rock," Vannier says. But under his direction, it could.

To satisfy the curators of the Taung fossil at the University of the Witwatersrand, Conroy and Vannier demonstrated on a 30-million-year-old fossilized skull of a sheeplike mammal from the western U.S. They took two-millimeter slices through the cranial and nasal cavities to show CT's ability to distinguish between mineralized bone and sandstone matrix. The resulting images, reproduced in three dimensions from the two-dimensional data by Vannier's programming, show the bones as

if no sediment had ever infilled them. Thirty million years of fossilization is effectively wiped away. As a bonus, life-sized, geometrically accurate models can be made from the data, a benefit that will make precise duplicates of rare fossils available to investigators everywhere and reveal internal structures that were previously obscured, thanks to computer-aided manufacturing techniques.

The preliminary research was published in the journal, *Science*, and gained the attention of the keepers of the Taung fossil. The pair of researchers then traveled from St. Louis to South Africa on a grant from the Leakey Foundation. They borrowed time on the CT scanner at Johannesburg's Hillbrow Hospital to collect their data.

Collaborators Dean Falk and Michael W. Vannier combine their talents to expose the secrets kept by very old fossils.

And for the first time, the state of development of all of Taung's unerupted dentition was made visible. To help place the results in perspective, a chimpanzee skull and a modern human skull, both at the same stage of molar eruption, were also scanned. The results, Conroy reports, were clear: The pattern is most like that of a three-year-old pongid, or ape. The first molar has erupted, yet none of the other permanent teeth has developed significant root structure. In humans, the incisors, canines, and third premolars would be expected to show at least some root structure by the time the first molar



Steve Kohler



erupts. In great apes, however, first incisors are commonly delayed for two years after the molars appear—a condition reflected by the Taung specimen.

But it's not fair to discount the fossil as somehow less important just because its dental pattern resembles an ape's and not a contemporary human's. In fact, the earliest unqualified example of our genus, *Homo habilis*, has also been reported to show ape-like dental patterns. It may instead be reasonable to suggest that our dental eruption sequence and the prolonged infancy that accompanies it made their appearance recently in our evolution. No matter the conclusion, this sort of solid evidence was not available at all before the application of modern radiologic techniques.

SINUS CONDITIONS

One yardstick of the australopithecines' place on the evolutionary tree has been the extent of development of the various sinus systems. As primates became habitually bipedal, the pressures associated with a change to upright posture required easily observable adaptations in the sinuses. Different species exhibited different forms. Lucy (after the Beatles' "Lucy in the Sky with Diamonds"), a significant fossil officially named *Australopithecus afarensis*, displays a greatly enlarged sinus system. That trait is shared with all five robust australopithecine fossils that are scorable, but not with contemporary humans. For this reason and many others, the robust line is often considered an evolutionary dead end.

The Taung child, as representative of the more slender gracile line that is generally thought to lead to *Homo sapiens*, has been said to reflect a different adaptation. But recent work suggests

that Taung, too, possesses such a sinus system, only in a juvenile stage.

And the new CT scans by Vannier and Conroy fuel the controversy by revealing a previously unknown feature—a well-developed maxillary sinus that, if seen in a human child today, "would be very, very strange," according to Vannier. "Kids today don't have sinuses like that. Even most adults lack such well-developed sinuses. It's remarkable."

The scans show that the maxillary sinus has extended into the hard palate and the

*For practice, Vannier
scanned rocks that
Conroy borrowed
from the geology
department.*

space behind the cheek, a condition previously reported only in chimpanzees and robust australopithecines.

Apparently, isolating the characteristics of the many strains of early hominids becomes more difficult with each revelation. As Conroy says, "You can't get too dogmatic about lineage. All of paleoanthropology is a probability game. The best we can do is to determine the biology of these old animals, find out how they made their livings and when humanlike characteristics first began to appear."

BRAIN PATTERNS

A debate has raged in the pages of scientific journals for almost nine years now: two of the country's most respected anthropologists have

rebutted one another's work and tried out their new arguments. Their topic has been the sulci, or furrows on the brain, of the Taung child and whether they more closely resemble a human's or a pongid's.

Dean Falk, Ph.D., professor of anthropology at the State University of New York, Albany, has held that the sulcal patterns and particularly the position of the lunate sulcus indicated a similarity with the chimpanzee. The lunate sulcus, a crescent-shaped trough that approximates the forward boundary of the visual cortex, has been pushed toward the rear as man's forebrain has evolved. In Falk's interpretation of the endocast, no such change had begun by the time the Taung child lived. Humanlike cerebral organization is not apparent in the Taung fossil evidence, Falk believes.

Staunchly disagreeing, Ralph L. Holloway, Ph.D., professor of anthropology at Columbia University, claims a humanlike position for Taung's lunate sulcus and a more advanced cerebral organization. He implies a capability for complex behavior by what must have been a hairy little human. The intellectual battle has been waged in a heated exchange of six papers that stopped just short of name-calling.

Though Falk wrote that "one year from now I hope I will not be writing the seventh paper in this series" and urged others to get involved, the question remained unresolved until radiology and Mallinckrodt's image processing laboratory entered the fray.

Replacing the techniques of stereoplotting and stretching dental floss from point to point with three-dimensional computer imaging was like turning on a light in a previously shaded

room. Throwing the switch were Vannier and Charles Hildebolt, Ph.D., D.D.S., research associate in radiology and an anthropologist by training.

The X,Y, and Z coordinates were digitized for points along each sulcus to be studied, using a technique developed in the lab. A computer-aided design system from McDonnell Douglas organized the data and produced three-dimensional images. To make valid comparisons, human and chimp brains of roughly equivalent volumes were also scanned, and the results were graphed. Comparable sulci on each of the brains were tested for differences, and the work was repeated to assure its reliability.

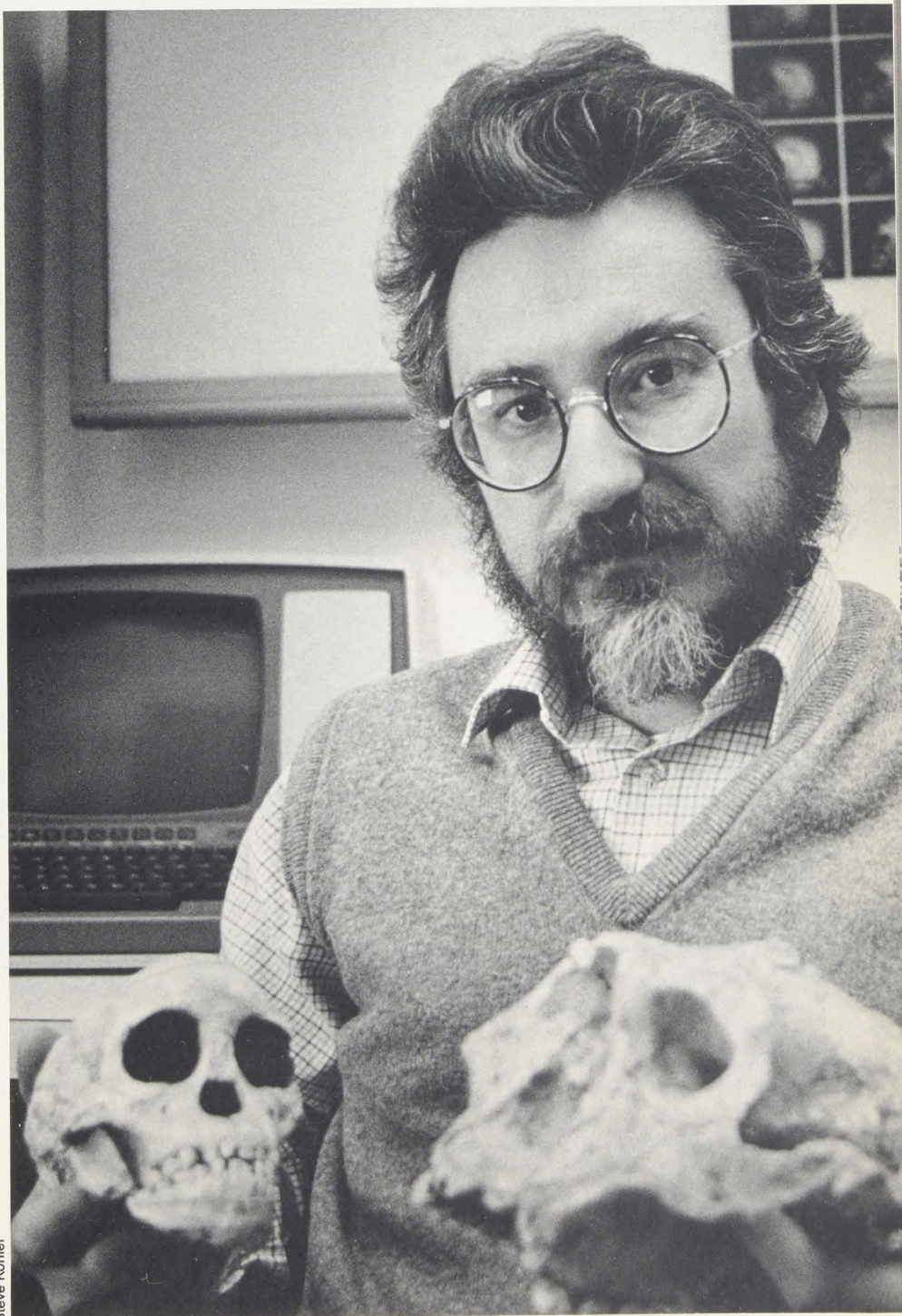
With the precision of the computer applied to the question, Falk hopes to lay the debate to rest once and for all. Results are being reviewed, and publication of a paper is expected soon.

Meanwhile, Falk describes every visit to Vannier's lab as "science fiction city." She sees enormous potential and explains that the application of imaging techniques is late in coming to anthropology because "our types are not often affiliated with medical centers where this work goes on. And no one before has made the effort to learn about the facilities and make the collaborations."

The odds against any individual bone becoming fossilized and then unearthed millions of years later are astronomical, as anyone who has lost his keys knows. Only a few hominid specimens from two and three million years ago have been found. They may be

In his medical school laboratory, anthropologist Glenn C. Conroy displays casts of the Taung child's skull (left) and a robust australopithecine.

"Just because its brain looks like a chimp's, we can't say what that brain was thinking."



Steve Kohler



representative of populations and they may not.

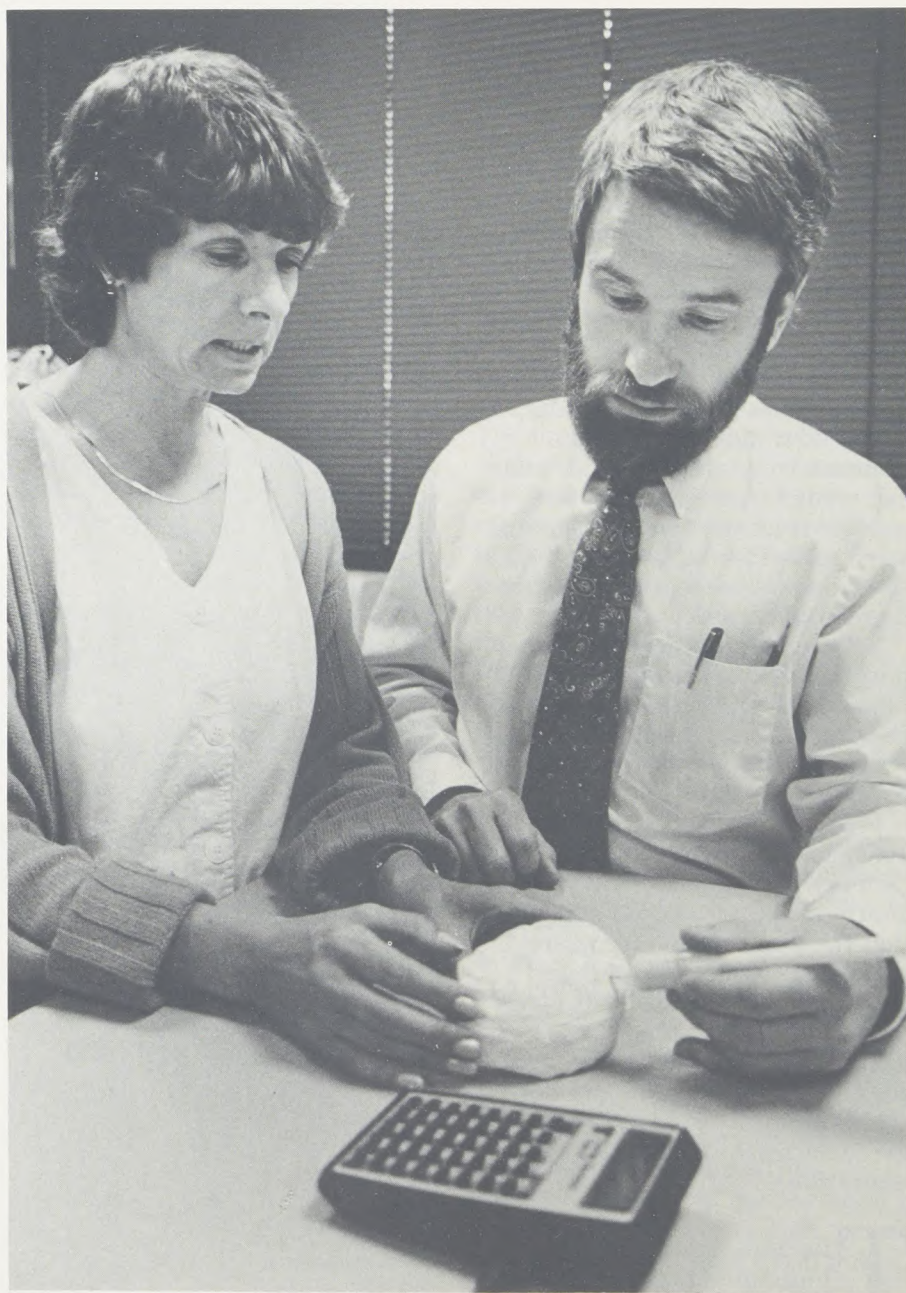
The mosaic of features displayed by the Taung fossil shows that it is "not a little human, but just as important it is not a little ape," as Vannier and Conroy have written. Falk and Conroy agree that Taung, complete with its apelike features, is almost certainly in the human lineage, if only in the sense that it is what a "bipedal, culture-bearing hominid of the era" was like, according to Falk. "Just because its brain looks like a chimp's, we can't say what that brain was thinking."

By way of illustrating the problem, Conroy gives the example of stepping out onto the street to point at a man and say, "That's your father." The odds of the man's actually being your biological father are very small,

For the first time, the state of development of all of Taung's unerupted dentition was made visible.

of course. But it's a good bet that both the stranger and your father walk erect, share an ecological niche, possess roughly the same sized brain, and eat pretty much the same diet. So it is for the Taung child, who died so long ago, and our distant ancestors.

To the highly inferential science of paleoanthropology, radiology is bringing its precision. The resulting harmonious partnership will extract still more information from the Taung fossil; Vannier and Hildebolt are preparing to apply a



Anthropologists Dean Falk and Charles Hildebolt discuss the application of the three-dimensional digitizer to an endocast of the Taung skull.

more powerful processor to their data, creating detailed volumetric visualizations. Glenn Conroy is in South Africa as this is written, arranging for access to other

fossils that promise to reveal their secrets to CT. From Mallinckrodt Institute and Washington University, where a "tremendous symbiotic relationship" exists between clinical and basic scientists, in the words of Conroy, will come new answers to very old questions. Those answers, Falk says, "could revolutionize paleontology." □

Steve Kohler

CHANGING TIMES

Prehistory, or at least our understanding of it, changes. An anthropology text from just two years ago may be badly outdated, and publications frequently announce discoveries that "Change Notions on Human Evolution."

Those headlines are not always journalistic hyperbole. As many as 80 percent of all hominid fossils have been unearthed since 1970, when big expeditions first began to be organized. Each new find has added to the record, and the prospect for locating many more is excellent. Unfortunately, however, just as technology promises to extract new secrets from old bones, politics may be closing down some of the sites to exploration. The flux is constant.

Evolutionary history suffers disagreements, uncertainties, lack of a complete fossil record, and changes in thinking. Nonetheless, here—as a reference for placing the Taung child in time—is a condensed prehistory, courtesy of anthropologist Charles Hildebolt.

Million Years Before Present

Development

130	Virtually all previously known species become extinct; dinosaurs disappear. No animal weighing more than 20 pounds survives.
65	Primate-like mammals diverge from insectivores. Omnivorous ground dwellers, some were active during all hours.
53.5	The first true primates appear. These Eocene prosimians (the lower primates) were much like today's lemurs of the Malagasy Republic (Madagascar).
37.5	The number of prosimians is greatly reduced. First evidence in the fossil record of anthropoids, the suborder that contains monkeys, apes, and humans.
23—5.5	Golden age of superfamily Hominoidea, the taxon to which apes and humans belong. Dryopithecus and Proconsul, two famous examples of Miocene hominoids, die out by the end of the Miocene and are probably not in the human lineage. Sivapithecus, on the Indian subcontinent, is ancestral to the orangutan and of the genus that may have been the common ancestor to apes and humans. But this stem ancestor has not yet been found. Earliest hominids (ancestors of humans) begin to evolve separately from apes. Drought shrinks the forest; species adapt or become extinct.
3.7	First certain evidence of bipedality: footprints preserved on an African lakebed.
3.5—2	A confusing era of several species apparently evolving side by side. Many humanlike characteristics appear among <i>Australopithecus afarensis</i> , <i>africanus</i> , <i>robustus</i> , and <i>boisei</i> . Brains remain small; faces are pronounced.
2.5	A second great drought forces hominids from the edge of the shrinking forest onto the savanna. Diet begins to include scavenged meat. Tools appear in the fossil record.
2	The fossil of <i>Homo habilis</i> , first example of our genus, shows an increase in brain size. Broca's area may be present, preparatory to language use. World's population = 200,000.
1.6	General trend to increasing brain size and shrinking face accelerates. Early <i>Homo erectus</i> fossils reveal a stature of six feet.
1.5—1	Australopithecines become extinct after nearly four million years of success. No one knows why.
.5	<i>Homo erectus</i> first employs fire. Hunting becomes a source of food; plant gathering is still the main strategy.
.4	<i>Homo sapiens</i> evolves.
.035	Cro-Magnon represents the first of <i>Homo sapiens sapiens</i> .
.010	Domestication of plants and animals. World's population = 5,000,000.

THE DIRECTOR'S OFFICE REPORT

NEW STAFF

Francisco Li, M.S., research assistant in radiation physics in radiology.

Ying Su, B.S., research assistant in radiation physics in radiology.

OFF STAFF

Gail C. S. Anderson, M.D., instructor in radiology, accepted the position of director and radiation oncologist of the Greater Pittsburgh Cancer Center, Pittsburgh.

Bruce A. Cross, M.D., instructor in radiology, Division of Radiation Oncology, accepted a position with Akron General Hospital and Northeast Ohio University College of Medicine.

Kathryn A. Hackman, B.S., research assistant in radiology, Division of Radiation Sciences, accepted a research assistant position under a DNA mapping grant procured by Maynard Olsen.

Gilbert H. Nussbaum, Ph.D., associate professor of radiation physics in radiology, gave an invited talk on "Physics of Clinical Hyperthermia: Progress and Problems" at Varian Associates, Palo Alto, California, March 7.

Jay P. Heiken, M.D., associate professor of radiology, spoke on "CT and MRI in Detecting and Characterizing Focal Lesions of the Liver" at the Washington State Radiological Society Meeting, Seattle, Washington, May 23. He presented "MRI of the Pelvis" at the University of Washington, Seattle, May 23. Heiken delivered "CT of the Upper Abdomen," "CT of the Peritoneal Spaces, Omentum, and Mesenteries," "Extranodal Lymphoma," and "CT of the Upper Abdominal Mass" at the Twenty-fifth Anniversary of the Chinese University of Hong Kong International Seminar of Medical Imaging, Hong Kong, June 25-July 4.

Joseph K. T. Lee, M.D., professor of radiology, was visiting professor at Kansas University Medical School and St. Lukes Hospital, Kansas City, Missouri, April 14. He was visiting professor at Bowman Gray School of Medicine, Winston-Salem, North Carolina, April 29 and at the University of Connecticut, May 11.

James A. Purdy, Ph.D., professor of radiation physics in radiology, spoke on "Three Dimensional Radiation Therapy" at the First Asian Varian Users meeting in Hong Kong, March 4-6. His topic was "Computer Control in Radiation Therapy" at the Twelfth United States Varian Users Meeting in Monterey, California, May 2-3.

Louis A. Gilula, M.D., professor of radiology, as visiting professor, spoke on "CT and 3D CT of the Wrist," "Ligamentous Instabilities of the Wrist," "Pedal Venography," and "Radiography and Trauma of the Hand" at the University of Wisconsin, Madison, May 5-6.

Bruce L. McClennan, M.D., professor of radiology, lectured on "Low-Osmolality Contrast Media" and "CT of Renal Masses" at the University of Virginia, Charlottesville, April 14-15.

Michael W. Vannier, M.D., associate professor of radiology, spoke on the "Medical Application of 3-D Computer Imaging" at the May Data Processing Management Association dinner meeting featuring past presidents of the organization. He presented "Application of 3-D Reconstruction Images in a Clinical Setting: Problems and Pitfalls" as guest lecturer at the Twenty-first Annual Professional Meeting of the Missouri Chapter of American College of Surgeons at Lake Ozark, Missouri, June 10-12.

VISITING PROFESSORS & INVITED LECTURERS

Bahman Emami, M.D., professor of radiology, chaired the hyperthermia session and presented "Performance Characteristics of Improved Microwave Interstitial Antennas for Local Hyperthermia" and "A Retrospective Study of Irradiation versus Combined Irradiation and Hyperthermia in Recurrent Head and Neck Cancers" at the North American Hyperthermia Group Meeting in Philadelphia, April 16-18. He spoke on "Regional Hyperthermia: Assessment of Tolerance to Treatment" at the Deep Local and Regional Hyperthermia: The BSD-2000 Approach Symposium in Essen, Germany, April 29-30. As visiting professor, Emami spoke on "Techniques and Clinical Results of Both Local and Deep Hyperthermia" at State University of New York, Stony Brook, June 1.

"Clinical Applications of Local (Superficial) Hyperthermia" was Emami's topic at Current Concepts in Radiation Therapy, University of Minnesota, Minneapolis, May 18-20.

Joseph L. Roti Roti, Ph.D., professor of cancer biology in radiology, as invited lecturer, spoke on "The Effects of Radiation and Heat on the Ability of Nuclear DNA to Undergo Supercoiling Changes" at Colorado State University, February 28, and at University of Rochester, May 3. He lectured on "Nuclear Proteins in Radiation and Heat Effects" at University of Utah, March 4. Roti Roti presented "DNA Supercoiling Changes and Assay for DNA Damage and Repair" for the Pathology Department of St. Luke's Hospital West, St. Louis, March 9.

FYI

SYMPOSIA

Joseph L. Roti Roti, Ph.D., professor of cancer biology in radiology, presented "Effects of Caffeine on the Radiation-induced Alterations in the Synthesis of 170 kD Nuclear Proteins in G2" in the Presidential Symposium of the Cell Kinetics Society Meeting, Omaha, Nebraska, March 24. Roti Roti chaired and organized the symposium "The Nuclear Matrix in Radiobiology" and presented a symposium talk entitled "Heat-Shock Effects on the Structure and Function of the Nuclear Matrix" at the Radiation Research Society Meeting, Philadelphia, April 16-21. He also chaired a poster/minipresentation "Heat and Radiation—Molecular to *In Vivo*," presented posters entitled "DNA Supercoiling Changes in Nucleoids Isolated from HeLa Cells Through the Cell Cycle" and "Changes in DNA Supercoiling Following γ -Irradiation of L5178Y S and R Cells," and co-authored "The Effects of Heat and Radiation on the Ability of DNA to Undergo Supercoiling Changes" and "Interaction of Heat and Radiation—Accessibility of Damaged DNA" at the Radiation Research Society Meeting.

Bahman Emami, M.D., professor of radiology, presented talks entitled "The Use of Hyperthermia for Breast and Chest Wall Lesions" and "The Use of Hyperthermia for the Treatment of Malignant Melanomas" at the 1988 Hyperthermia School: Clinical Aspects of Hyperthermia at Duke University Medical Center, Durham, North Carolina, June 13-17.

Gilbert H. Nussbaum, Ph.D., associate professor of radiation physics in radiology, presented a paper entitled "Manipulation of Hyperthermic Temperature Distributions produced with a Three-Electrode Capacitive Device in Pelvic and Abdominal Sites in Adult Pigs" at the Eighth Annual Meeting of the North American Hyperthermia Group in Philadelphia, Pennsylvania, April 16-19. He attended the Twenty-third San Francisco Cancer Symposium, "Radiation Effects on Normal Tissue: Clinical Tolerance Levels" in San Francisco, May 4-5.

Mokhtar Gado, M.D., professor of radiology, presented "Principles and Interpretations: MRI of the Brain" at the MRI Symposium at the Veterans Medical Center, Bronx, New York, April 21. He spoke on "CT and MRI of Low Back Pain and Sciatica" at the Eighth Annual Washington Imaging Conference in Washington, D.C., April 25-29. Gado lectured on "MRI and CT in the Evaluation of Sella and Parasellar Lesions" at the 1988 Neuroradiology Review Course at Oak Brook, Illinois, April 30-May 1. A talk on "Periventricular High Signal (PVHS) and Correlation with Histologic Examination: A Post-Mortem Study" was given by Gado at the Twenty-sixth Annual Meeting of the American Society of Neuroradiology in Chicago, May 15-20.

Marilyn J. Siegel, M.D., associate professor of radiology, spoke on "Imaging of the Pediatric Pelvis," "CT and MRI of the Pediatric Mediastinum," and "CT of

the Pediatric Abdomen" at the Society of Computed Body Tomography in Monterey, California, February 29-March 4. She gave a presentation on "Childhood Lymphangiomas: MRI Imaging" at the Association of University Radiologists in New Orleans, April 17-21.

Jay P. Heiken, M.D., associate professor of radiology, presented the paper "Pelvic Masses of Uncertain Etiology in Males: CT and MRI Evaluation," at the Open Scientific Session of the Eleventh Annual Meeting and Course of the Society of Computed Body Tomography, Monterey, California, March 2.

Yvonne C. Taylor, Ph.D., assistant professor of cancer biology in radiology, presented her abstract on "Radiation Effects on DNA Supercoiling in AT vs. Normal Human Fibroblasts" at the Thirty-sixth Annual Meeting of the Radiation Research Society, Philadelphia, April 16-21.

Andrei Laszlo, Ph.D., assistant professor of cancer biology in radiology, presented the paper "Different States of Thermotolerance in Mammalian Cells" at the ICN-UCLA Symposium on Stress-Induced Proteins at Keystone, Colorado, April 10-16. He chaired the session "Thermotolerance and Heat Shock Proteins" and presented the paper "Mechanisms of Thermotolerance: Less Damage or Better Repair" at the North American Hyperthermia Group and Radiation Research Society Annual Meeting in Philadelphia, April 16-21.

William A. Murphy, M.D., professor of radiology, lectured on "Percutaneous Bone Biopsy" and took part in a rotating seminar on "Imaging the Adult Hip" at the Twentieth Annual International Diagnostic Course, Davos, Switzerland, March 20-25. He presented "Imaging the Temporomandibular Joint" for the St. Louis Functional Jaw Orthopaedic Society, April 6. Murphy served as moderator of a Scientific Program at the Association of University Radiologists, New Orleans, April 18. "Musculoskeletal Magnetic Resonance Imaging" was the lecture given by Murphy at the conference on Clinical Disorders of Bone and Mineral Metabolism sponsored by Henry Ford Hospital, Detroit, Michigan, May 9.

Joseph K.T. Lee, M.D., professor of radiology, presented a course on magnetic resonance at the Medical College of Wisconsin, Milwaukee, March 26. He was the speaker at the City Wide Radiology Meeting of the Greater Kansas Radiology Society, April 13-14. Lee attended the Washington Imaging Conference, Washington, D.C., April 27-28 and the Twenty-fifth Anniversary of Chinese University of Hong Kong International Seminar of Medical Imaging, Hong Kong, June 25-July 4.

Michael W. Vannier, M.D., associate professor of radiology, presented a talk on "3D Medical Imaging" at The Indiana Society of Radiologic Technologists, Warsaw, Indiana, April 7-8.

FYI

SYMPOSIA

Paul L. Molina, M.D., instructor in radiology, presented "CT of the Chest Wall and Pleura" and "CT of the Pericardium" at the Twenty-fifth Anniversary of the Chinese University of Hong Kong International Seminar of Medical Imaging, Hong Kong, June 25-July 4. He delivered "Magnetic Resonance Imaging of the Abnormal Thymus" at the Thirty-sixth Annual meeting of the Association of University Radiologists, New Orleans, April 19.

Carlos A. Perez, M.D., professor of radiology and director of the Radiation Oncology Center, presented "Controversies in Radiation Therapy in Carcinoma of the Breast," "Pediatric Central Nervous System Tumors" and "Quality Assurance in Radiotherapy" at the Fourth Reunion Nacional de la Asociacion Espanola de Radioterapia y Oncologia in Alicante, Spain, March 2-5. He spoke on "Clinical Applications of Hyperthermia" for the Metropolitan Association of Radiation Therapists, Chicago, March 17; "Summary of Progress in Clinical Studies: Problems and Approaches for the Future" for the North American Hyperthermia Group, Philadelphia, April 15-16 and "Hyperthermia in Clinical Practice" for the American Radium Society, Seattle, Washington, April 17-20. Perez delivered "Irradiation in the Definitive Management of Carcinoma of the Uterine Cervix" and "Radiation Therapy in Carcinoma of the Vagina" at the New York Roentgen Society Meeting in New York City, May 6. His topics were

"Definitive Radiotherapy for Non-Small Cell Lung Cancer: Results and Recommendations" and "Managing Therapeutic Complications of Radiotherapy, Including PCI Neurotoxicity" at the First International Conference on Imaging and Therapy of Lung Cancer in Agrigento, Italy, May 16-21. Perez spoke on "Carcinoma of the Tonsillar Fossa: Non-randomized Comparison of Preoperative or Postoperative Irradiation and Surgery or Irradiation Alone with Long Term Results" at the Gilbert H. Fletcher Society in Spain, June 12-19.

Todd H. Wasserman, M.D., professor of radiology, presented "Chemical Modifiers and Radiation" at the U.S.-Japan Cooperative Cancer Research Program Meeting in San Francisco, March 14-15. He attended the Sixth International Conference on Chemical Modifiers for Cancer Treatment in Paris, France, in March. Wasserman spoke on "Radiation Therapy and the Management of Lymphoma" at the Lymphoma 1988 Symposium at Jewish Hospital, St. Louis, April 15, and "Chemical Modifiers: Future Prospectives" at the Varian Users Meeting in Monterey, California, May 2. His topic was "The Role of Radiotherapy in the Management of Non-Hodgkin's Lymphoma" at the Mercy Hospital Annual Cancer Symposium, Chicago, May 5. Wasserman presented "Update of Clinical Radiation Oncology" at the Washington University Center Alumni Association, St. Louis, May 7.

Bruce L. McClennan, M.D., professor of radiology, presented "Extracorporeal Shock-Wave Lithotripsy" and "Low-Osmolality Contrast Media" for the Advanced Course on Radiologic Techniques, Chicago, May 18-19. He spoke on "Biliary Extracorporeal Shock-Wave Lithotripsy from the Viewpoint of Genitourinary Radiology" at the First International Course on Biliary Lithotripsy, Boston, July 11-13. McClennan presented postgraduate courses at Stowe, Vermont, sponsored by the University of Vermont, July 14-16. He will attend Radiology 1988, The Summit, where topics of "Standards of Care," "Quality Assurance," and "Recertification" are agenda items under the heading of Assessment of Professional Competence, Park City, Utah, August 5-7.

Harvey S. Glazer, M.D., associate professor of radiology, presented talks on "MRI of Mediastinum with CT Correlation," "CT of Mediastinal Vessels," "CT and MRI of Larynx and Neck," "CT of Cystic Neck Masses," "CT of the Thymus," and "CT of the Post-Op Chest" at the Ninth Annual Loyola University Hawaiian Meeting, March 21-25.

Louis A. Gilula, M.D., professor of radiology, spoke on "Radiology of the Traumatized Wrist" at the Twentieth International Diagnostic Radiology Course in Davos, Switzerland, March 20-25. His topic was "Painful Wrist: Radiological Approach" at the Toronto Radiological Society and "CT of the Musculoskeletal System" at the University of Toronto, April 25.

Kenzo Ohtsuka, Ph.D., research associate in cancer biology in radiology, presented the paper "Intracellular Localization of hsp 70 in Normal, Transiently Thermotolerant and Permanently Heat Resistant Chinese Hamster Fibroblasts" at the ICN-UCLA Symposium on Stress-Induced Proteins at Keystone, Colorado, April 10-16.

SOCIETY OF NUCLEAR MEDICINE

The following Mallinckrodt staff members participated in the Thirty-fifth Annual Meeting of the Society of Nuclear Medicine, San Francisco, June 14-17.

William J. Powers, M.D., Lee W. Tempel, M.D., and Robert L. Grubb, Jr., M.D., "Prognosis of Medically Treated Hemodynamic Cerebral Ischemia."

William J. Powers, M.D., Robert L. Grubb, Jr., M.D., Lee W. Tempel, M.D., and Marcus E. Raichle, M.D., "PET Measurements of Cerebral Hemodynamics Do Not Identify Patients Who Benefit from EC/IC Bypass."

Tom R. Miller, M.D., Ph.D., chaired session and presented "Three-Dimensional Display of Nuclear Medicine Images."

ORAL PRESENTATIONS

Stephen M. Moerlein, Ph.D., Gregory S. Lannoye, Ph.D., Dah-Ren Hwang, Ph.D., and Michael J. Welch, Ph.D., "No-carrier-added Synthesis of Br-77 Bromospiperone via Microwave-Treated, CuCl-Assisted Nucleophilic Bromodeiodination."

FYI

Carla J. Mathias, B.A., Michael J. Welch, Ph.D., Lixin Lang, M.S., Marcus E. Raichle, M.D., Wynn A. Volkert, Ph.D.*, and Joseph C. Hung, Ph.D.*, "Single Pass Extraction of d,l and Meso Tc-99m HM-PAO in Primate Brain." *University of Missouri, Columbia.

Martyn G. Pomper, B.S.*, James W. Brodack, Ph.D., Carla J. Mathias, B.A., Kathryn E. Carlson, M.S.*, John A. Katzenellenbogen, Ph.D.*, and Michael J. Welch, Ph.D., "21-18F Fluoro-16-Ethyl-19-Norprogesterone (FENP): Synthesis and Target Tissue Selective Uptake of A Progesterone Receptor-Based Radiotracer." *Department of Chemistry, University of Illinois, Urbana.

Paul L. Chesis, B.A., and Michael J. Welch, Ph.D., "Comparison of Bromo vs. Iodoalkyl Triflates for F-19-Radiolabeling of Secondary Amines."

Michael J. Welch, Ph.D., Carla J. Mathias, B.A., Stephen M. Moerlein, Ph.D., Judith M. Connett, Ph.D., and Gordon W. Philpott, M.D., "Radioiodinated Tyramine-Cellobiose (TC) Labeling of Monoclonal Antibodies (MAbs): Comparison with Lactoperoxidase (LP) Labeling."

Yizhen Sun, Ph.D.*, Carla J. Mathias, B.A., Michael J. Welch, Ph.D., Judith M. Connett, Ph.D., Gordon W. Philpott, M.D., and Arthur E. Martell, Ph.D.*, "Development and Evaluation of a New Bifunctional Chelate to Radiolabel Antibodies." *Department of Chemistry, Texas A&M University, College Station, Texas.

Michael J. Welch, Ph.D., Joel S. Perlmutter, M.D., Andrea H. McGuire, M.D., Carla J. Mathias, B.A., James W. Brodack, Ph.D., Mark A. Mintun, M.D., and John A. Katzenellenbogen, Ph.D.*, "Uptake of Fluorine-18-Labeled Sex Hormones in Mammalian Brain: Measured with F-18 Ligands and PET." *Department of Chemistry, University of Illinois, Urbana.

Mark A. Green, Ph.D.*, Michael J. Welch, Ph.D., Carla J. Mathias, B.A., Marc E. Shelton, M.D., and Steven R. Bergmann, Ph.D., M.D., "Validation of Potential Cerebral and Myocardial Blood Flow Tracers: Single-Pass Studies of Copper Bis(thiosemicarbazones)." *School of Pharmacy, Purdue University, West Lafayette, Indiana.

Marc E. Shelton, M.D., Michael J. Welch, Ph.D., Carmen S. Dence, M.S., Dah-Ren Hwang, Ph.D., and Steven R. Bergmann, Ph.D., M.D., "F-19 Fluoromisonidazole: A Potential Marker of Salvageable Myocardium."

Dah-Ren Hwang, Ph.D., Lixin Lang, M.S., Carla J. Mathias, B.A., Michael J. Welch, Ph.D., and Dov Kadmon, M.D.*, "A Potential PET Image Agent for Prostate and Prostate Derived Tumors. N-3- F-18 - fluoropropylputrescine 1." *Department of Urology, Baylor College of Medicine, Houston.

Stephen M. Moerlein, Ph.D., Allan Daugherty, Ph.D., and Michael J. Welch, Ph.D., "Ga-68 DTPA-LDL: A Potential Radiopharmaceutical for In-Vivo Imaging of Low-Density Lipoprotein Receptor Activity with PET."

POSTER PRESENTATIONS

Stephen M. Moerlein, Ph.D., Katrina R. Wade, B.A., Carla J. Mathias, B.A., Michael J. Welch, Ph.D., "Radioiodinated SCH-23982: A Potential Radiopharmaceutical for Mapping Cerebral Dopamine D-1 Receptors with SPECT."

Paul L. Chesis, B.A., and Michael J. Welch, Ph.D., "Radiosynthesis of F-18 Fluoroalkyl Diprenorphine Analogs for Positron Emission Tomography Studies of Opiate Receptors."

William J. Powers, M.D., Michael Stabin, M.S.*, David Howse, M.D.*, John O. Eichling, Ph.D., and Peter Herscovitch, M.D.*, "Radiation Absorbed Dose Estimates for Oxygen-15 Radiotracers in Newborn Infants." *Oak Ridge Associated Universities, Oak Ridge, Tennessee.

Tom R. Miller, M.D., Ph.D., Jerold W. Wallis, M.D., Kondapuram S. Sampathkumaran, Ph.D., and Rosalie J. Hagge, M.D., "Interactive Digital Filtering of Gated Cardiac Studies During Cine Display."

Tom R. Miller, M.D., Ph.D., Jerold W. Wallis, M.D., and Alan D. Wilson (medical student), "Interactive Reconstruction in Single-Photon Tomography."

RELATED EVENTS

Tom R. Miller, M.D., Ph.D., gave an invited talk on "Image Computer Networks" for the Technologists' Section.

SEVENTH INTERNATIONAL SYMPOSIUM ON RADIOPHARMACEUTICAL CHEMISTRY

The following Mallinckrodt staff members participated in the Seventh International Symposium on Radiopharmaceutical Chemistry, Groningen, The Netherlands, July 4-8.

ORAL PRESENTATIONS

Stephen M. Moerlein, Ph.D., and Michael J. Welch, Ph.D., "Parameters Affecting the Labeling of 68Ga-DTPA-LDL: A Potential Radiopharmaceutical for In-Vivo Imaging of Tissue Low-Density Lipoprotein Receptor Activity with PET."

Martyn G. Pomper, B.S.*, John A. Katzenellenbogen, Ph.D.*, Ralph D. Thomas, Ph.D.*, Carla J. Mathias, B.A., Henry van Brocklin, M.S., and Michael J. Welch, Ph.D., "Fluorine-18 Labeled 11 B-Substituted Estrogens: Synthesis, Receptor Binding, and Comparative Target Tissue Uptake Studies." *Department of Chemistry, University of Illinois, Urbana, Illinois.

Ramunas J. Motekaitis, Ph.D., Yizhen Sun, Ph.D.*, Christopher Bannochie, B.A.*, Arthur E. Martell, Ph.D.*, Carla J. Mathias, B.A., and Michael J. Welch, Ph.D., "Stabilities of Complexes of Trivalent Metal Ions of Radiopharmaceuticals with Synthetic Chelating Ligands." *Department of Chemistry, Texas A&M University, College Station, Texas.

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SYMPOSIA

Dah-Ren Hwang, Ph.D., Lixin Lang, M.S., Carla J. Mathias, B.A., Dov Kadmon, M.D.*, and Michael J. Welch, Ph.D.,

"N-3-18-Fluoropropylputrescine: A Potential PET Imaging Agent for Prostate and Prostate Derived Tumor. *Department of Urology, Baylor College of Medicine, Houston, Texas.

Michael J. Welch, Ph.D., Carla J. Mathias, B.A., Stephen M. Moerlein, Ph.D., Judith M. Connett, Ph.D., and Gordon W. Philpott, M.D.,

"Tyramine-Cellobiose (TC) Labeling of Antibodies: A Comparison with Other Labeling Techniques."

Dah-Ren Hwang, Ph.D., Carmen S. Dence, M.S., Michael J. Welch, Ph.D., Marc E. Shelton, M.D., and Steven R. Bergmann, Ph.D., M.D., "An Improved Synthesis of No-Carrier-Added 2-18F-fluoro-1-(2-Nitro-1-imidazolyl)-2-Propanol."

POSTER PRESENTATIONS

Dennis A. Moore, Ph.D., Michael J. Welch, Ph.D., Katrina R. Wade, B.A., Arthur E. Martell, Ph.D., and Ramunas J. Motekaitis, Ph.D., "Neutral Complexes of In-111 Containing Triamine Based Hexachelating Ligands."

Gregory S. Lannoye, Ph.D., Stephen M. Moerlein, Ph.D., Michael J. Welch, Ph.D., "Radiosynthesis of N-(W-[18F] fluoroalkyl) Derivatives of the Dopaminergic Receptor-Binding Ligand Raclopride."

James W. Brodack, Ph.D., and Michael J. Welch, Ph.D., "Automated Synthesis of Positron-Emitting Radiopharmaceuticals Based on Generator-Produced Radionuclides."

Dah-Ren Hwang, Ph.D., Stephen M. Moerlein, Ph.D., Carmen S. Dence, M.S., and Michael J. Welch, Ph.D., "Microwave-Facilitated Synthesis of 18F-Spiperone."

Michael J. Welch, Ph.D., Carla J. Mathias, B.A., Yizhen Sun, Ph.D.*, William G. Dilley, Ph.D., Heinrich Seeko, Ph.D.,** **Samuel A. Wells, Jr., M.D., Gordon W. Philpott, Ph.D., Judith M. Connett, Ph.D., and Arthur E. Martell, Ph.D.*,** "N-(2-Hydroxy-3,5-methylbenzyl)-N²-(2-Hydroxy-5-Bromoacetamidobenzyl)-Ethyl-enediamine-N,N²-Diacetic acid: A New Bifunctional Chelate for Radiolabeling Antibodies." *Texas A&M University, College Station, Texas, **Baylor College of Medicine, Houston, Texas.

ELECTIONS

Jay P. Heiken, M.D., associate professor of radiology, was elected to membership in the Society of Computed Body Tomography at the Eleventh Annual Meeting of the Society of Computed Body Tomography, Monterey, California, February 20-March 4.

Joseph K.T. Lee, M.D., professor of radiology, elected vice-president elect of the Computed Body Tomography Society in February and elected to the Board of Directors of the Genitourinary Society in January.

Bruce L. McClennan, M.D., professor of radiology; **Judy M. Destouet, M.D.,** associate professor of radiology, and **Venkata R. Devinenei, M.D.,** assistant professor of radiology, were elected to the Board of Directors of the Missouri Radiological Society in March.

Todd H. Wasserman, M.D., professor of radiology, has been elected chairman of the Seventh International Conference on Chemical Modifiers of Cancer Treatment to be held in 1990. He has also been elected joint chairman of the Third International Conference on the Interaction of Radiotherapy and Chemotherapy for 1990 to be held in Monterey, California.

GRANTS

Joseph L. Roti Roti, Ph.D., professor of cancer biology in radiology, has received continuation of the grant "Radiation Induced Alterations of Chromosomal Protein" through March, 1989.

James A. Purdy, Ph.D., professor of radiation physics in radiology, is principal investigator for an industrial research grant from Computerized Medical Systems, Inc. to develop a 3D radiation treatment planning system. Coinvestigators include Robert E. Drzymala, Ph.D.; William B. Harms, B.S.; John W. Wong, Ph.D.; Martin S. Weinhaus, Ph.D.; and Bahman Emami, M.D.

GRAND ROUNDS

Bruce L. McClennan, M.D., professor of radiology, spoke on "Extracorporeal Shock-Wave Lithotripsy/Renal and Biliary" and "CT of Indeterminate Renal Masses" on Grand Rounds at Columbia Presbyterian Medical Center, New York City, April 6-7.

FYI

TECHNOLOGIST NEWS APPOINTMENTS

Armand Diaz, R.N., R.T., FASRT, assistant professor of technical administration, has been appointed chairman of the Task Force on Vascular Imaging Technology by the president of the American Society of Radiologic Technologists. The task force will be responsible for the development of the scope of practice and position descriptions for vascular imaging/special procedure technologists.

Michael D. Ward, R.T., M.Ed., chief technologist and director of technical education, presented "Medical-Legal Aspects of Radiology and Medicine" at the Spring Symposium at Lutheran General Hospital, Parkridge, Illinois, April 23, and at the Illinois State Society of Radiologic Technologists District 14 Meeting, Alton, Illinois, May 17. Ward has been selected for elevation to the honorary designation of fellow of the American Society of Radiologic Technologists (ASRT) in recognition of his outstanding contributions to the organization and his profession. He is the youngest radiologic technologist to earn this distinction. He also has been reappointed to the Committee on Student Affairs of ASRT for 1988-89.

Michael D. Ward, R.T., M.Ed., chief technologist and director of technical education, and **Armand Diaz, R.N., R.T., FASRT**, assistant professor of technical administration, have coauthored "What Educators In Radiologic Technology Should Know About Due Process of Law" for publication in Radiologic Technology. This paper has been accepted for the ASRT Directed Readings Program for technologist continuing education.

Melanie Elick, R.T., received her Bachelor of Arts degree with honors in management/business administration from Webster University, May 4.

Paul Becker, senior student in radiologic technology, presented a video on "What's It Like to be a Technologist" at the February meeting of the Missouri Society of Radiologic Technologists at Forest Park Community College.

Donald R. Bernier, R.T., presented "Clinical Applications of Positron Emission Tomography" at the Eighth Annual Nuclear Medicine Symposium, Rhode Island Hospital, Providence, Rhode Island, April 30. Bernier has been appointed representative to the Advisory Committee of the Nuclear Medicine Technology Certification Board.

William A. Murphy, M.D., professor of radiology, has been appointed to the Editorial Board of the *Journal of Computer Assisted Tomography*.

James A. Purdy, Ph.D., professor of radiation physics in radiology, has been appointed to the Executive Committee of

the Governing Board of the American Institute of Physics and vice-chairman of the American Board of Medical Physics.

Jay P. Heiken, M.D., associate professor of radiology, has been appointed codirector of Computed Body Tomography at Mallinckrodt.

CIC News

The Cancer Information Center (CIC) is cosponsored by the Mallinckrodt Institute of Radiology and the Barnard Free Skin and Cancer Hospital at the Washington University Medical Center.

CONTRIBUTIONS

Mr. and Mrs. Donald R. Kulp in memory of Ruth Holland Vernice Berent in memory of Harold Conley

Mr. and Mrs. Bill Loesing in memory of Paul Bradsher Sylvia Schacter in memory of William Rothman

La Vaughn Engelland in memory of Mat Worker

Mr. and Mrs. George O'Rourke in memory of Mat Worker

La Vaughn E. Meyers in memory of Mat Worker

Hilma Classe family in memory of Lillian

The workers at Alco Controls (care of Donald L. Shoemaker) in memory of Gail Magnum

N.R. Nilson in memory of Clarence O. Hardy

Mr. and Mrs. Sidney Bronfin in memory of Betty Kruse

Mr. and Mrs. Fred LeRoy in memory of Allyn Aach

Mr. and Mrs. Charles J. Fank in memory of Don Pallarito

Mrs. Bernice Nilson in memory of Clarence O. Hardy

Mr. and Mrs. Kenneth Nilson in memory of Clarence O. Hardy

Mr. and Mrs. Dorsey Wallenmeyer in memory of Gladys Leiter

Mr. and Mrs. Doug Rider in memory of Kay Dunshee

Lois Howland in memory of Connie Foley

Elsie K. Frye in memory of Connie Foley

Ken and Leslie Kotiza in memory of Connie Foley

Robert and Jacqueline Sanderson in memory of Connie Foley

Ken, Shawn, John and Anne Suelthaus in memory of Connie Foley

Mr. and Mrs. Richard Wolff in memory of Connie Foley

Mr. and Mrs. Mark Sauer in memory of Connie Foley

Mr. and Mrs. Paul Watson in memory of Connie Foley

Whitfield School in memory of Connie Foley

Mr. and Mrs. Burt P. Schwarz, Jr. in memory of Connie Foley

Mr. and Mrs. Paul Hatfield in memory of Connie Foley

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CONTRIBUTIONS

Friends and Associates at Protein Technologies International in memory of Connie Foley

New Neighbor League County Investment Club in memory of Connie Foley

Nancy E. Maxwell in memory of Connie Foley

Mrs. Frederick L. Hawes in memory of Connie Foley

Mrs. Hugo Heinemann in memory of Connie Foley

Mr. and Mrs. William Vollmer and Fred in memory of Connie Foley

Mrs. Carol W. Rucker in memory of Connie Foley

Mr. and Mrs. Christopher Edwards and family in memory of Connie Foley
5th grade class of Conway School in memory of Connie Foley

Mr. and Mrs. Jim Kline in memory of Connie Foley

Mr. and Mrs. Martin Marion in memory of Connie Foley

Kathryn J. O'Neill in memory of Connie Foley

Mr. and Mrs. Robert Ramsey and family in memory of Connie Foley

Mrs. Sara S. Fredrickson in memory of Connie Foley

John Edwards in memory of Connie Foley

Mr. and Mrs. J. Hugh Rogers in memory of Connie Foley

Mr. and Mrs. Bruce Korn in memory of Connie Foley

Mr. and Mrs. Douglas Wilton in memory of Connie Foley

Brian McAuley in memory of Connie Foley

Mrs. Emily Gebhard and C.B. Gebhard and family in memory of Connie Foley

Mr. and Mrs. John R. Schaeffer in memory of Connie Foley

Dr. and Mrs. Steven Plax and Andy in memory of Connie Foley

Ken and Helen Goldstein and Jeff and Sharon Goldstein in memory of Connie Foley

Ralph Kuhlman family in memory of Connie Foley

Marie Reichardt in memory of Simon Taslichky

Carol and Sal Falcone in memory of Helen Knox

Mr. and Mrs. Ernest Adelman and James in memory of Connie Foley

Jackie Ruthsatz in memory of Connie Foley

Ladue Junior High School Parents' Association in memory of Connie Foley

Mr. and Mrs. Kenneth N. Kermes in memory of Connie Foley

Julie Summers and family in memory of Connie Foley

Mr. and Mrs. Ron Prasse in memory of Connie Foley

Mrs. Myrtle Newman and Mrs. Wilma Draper in memory of Simon Taslichky

Mr. and Mrs. David E. Miller in memory of Connie Foley

Mr. and Mrs. Marshall Friedman and family in memory of Connie Foley

Mr. and Mrs. Robert F. Powers and Jonathan and Benjamin in memory of Connie Foley

Mr. and Mrs. Loren R. Watts in memory of Connie Foley

The Martin Marion family in memory of Mrs. Rawly McCoy

Mrs. Sally K. Hermann in memory of Connie Foley

Mr. and Mrs. Peter Fischer in memory of Connie Foley

Mr. and Mrs. Robert E. Strain in memory of Connie Foley

Mr. and Mrs. David B. Guthrie in memory of Connie Foley

Mr. and Mrs. Ted Izzard in memory of Connie Foley

Mr. and Mrs. Sidney J. Bronfin for a speedy recovery of Mrs. Sylvia Rosen

Mr. and Mrs. Bentley S. Freeman in memory of Shirley P. Kash

Sherrill L. Lindberg in memory of Connie Foley

Mr. Barnett K. Fisher in memory of Mrs. Armetta Street

Verla E. Thaier

Ribbon Cutting

The simultaneous release of the National Cancer Institute statistics reporting the increase of breast cancer cases and the opening of the **Mammography Screening Center at St. Louis Centre** sparked renewed interest in mammography from national and local print and electronic media.

The innovative idea of offering mammography screening in the largest, enclosed urban shopping mall in the United States drew requests for interviews from ABC-TV network news and local network affiliates—**KTVI-TV** channel 2, **KMOV-TV** channel 4, **KSDK-TV** channel 5, **KPLR-TV** channel 11, and **KDNL-TV** channel 30.

As the public's awareness of breast cancer increased, St. Louis radio stations **KMOX**, **KHTR**, and **KSLH** offered mammography information to their listeners through interviews with **Judy Destouet, M.D.**, head of the Institute's Mammography Program.

As additional information resulting from studies on mammography was released, the print media requested interviews with Institute faculty. Focusing on the increase in breast cancer cases coupled with the convenience of mammography screening at the St. Louis Centre facility, a story was issued over **UPI** wires. Newspapers nationwide picked up the story, including the **Wall Street Journal**.

Locally, the **St. Louis Business Journal**, the **Suburban Journals**, and the **St. Louis Post-Dispatch** ran articles based

CALENDAR

August 29-

September 3, 1988

5th International Symposium on Hyperthermic Oncology, Kyoto, Japan

September 4-8, 1988

European Society for Therapeutic Radiology and Oncology, The Hague, Netherlands

September 12, 1988

Seventeenth Annual Wendell G. Scott Memorial Lecture "Where Do We Go From Here?" Carol M. McCarthy,

Ph.D., J.D., president, American Hospital Association, Scarpellino Auditorium

October 9-14, 1988

American Society for Therapeutic Radiology and Oncology, New Orleans, Louisiana

November 27-

December 2, 1988

Radiological Society of North America, Chicago, Illinois

FYI

on a quote by **Ronald G. Evens, M.D.**, director of the Institute: "Screening mammography must become as routine as buying food and clothing."

Marketing mammography in a retail environment brought inquiries from **Self**, **Family Circle**, and **Mature Outlook** magazines, with articles appearing in the June issues.



Norman Hente



Norman Hente



Norman Hente



Norman Hente



Norman Hente



Norman Hente



Norman Hente

REFLECTIONS

DIXIE J. ANDERSON, M.D.

Prior to the founding of the American Association of Women Radiologists (AAWR) seven years ago, there was no national forum for women's issues. Organizing and working together within the discipline of radiology has been effective. Our focused consideration continues to find equitable solutions.

What are the issues? One is the perception that women are not rewarded on a par with men. Some of the reasons for this are almost hopelessly enmeshed in societal priorities, such as women's greater role in child care. The result is that women often must prove themselves in a way not usually required of men, who are often assumed to be interested in advancement. One goal of the AAWR is to raise the consciousness of both men and women toward gender equality and to sort out the various reasons that inequities occur.

The idea of equal recognition for equal work gets confusing thanks to a subtly disseminated expectation that women be strict mimics of men. Women want recognition as individuals with unique qualities. Women may be more care-taking and less aggressive, positive attributes that may be viewed as a reason for having women as part of an academic department or private practice.

Successfully incorporating women into radiology is not facilitated by requiring that we be like men, but by discovering ways in which each person, regardless of sex, can contribute to the organization. The individual and the group should have ongoing chances to define a job or position. The support the Mallinckrodt faculty enjoys is not evident in many other working environs.

Problems and perceived problems demand attention and evaluation if changes are to be



Dixie J. Anderson, M.D.

Steve Kohler

made. For many years, one of the "problems" of women in radiology was said to be that pregnancy and X rays were incompatible. Many people thought it was inappropriate for women to become radiologists; what if they got pregnant? Worse than that, the topic was never publicly aired.

When I became pregnant, almost 15 years ago during my first year of radiology residency training, I felt uncomfortable informing my director. I worried that my fluoroscopy training would be interrupted. I asked that I be allowed to continue doing fluoroscopy using double-apron protection, but my request was denied because of "possible legal repercussions." The fear was that I would hold the group liable for any untoward result. I had come a long way; my commitment to radiology was strong, and I was disappointed with this stance.

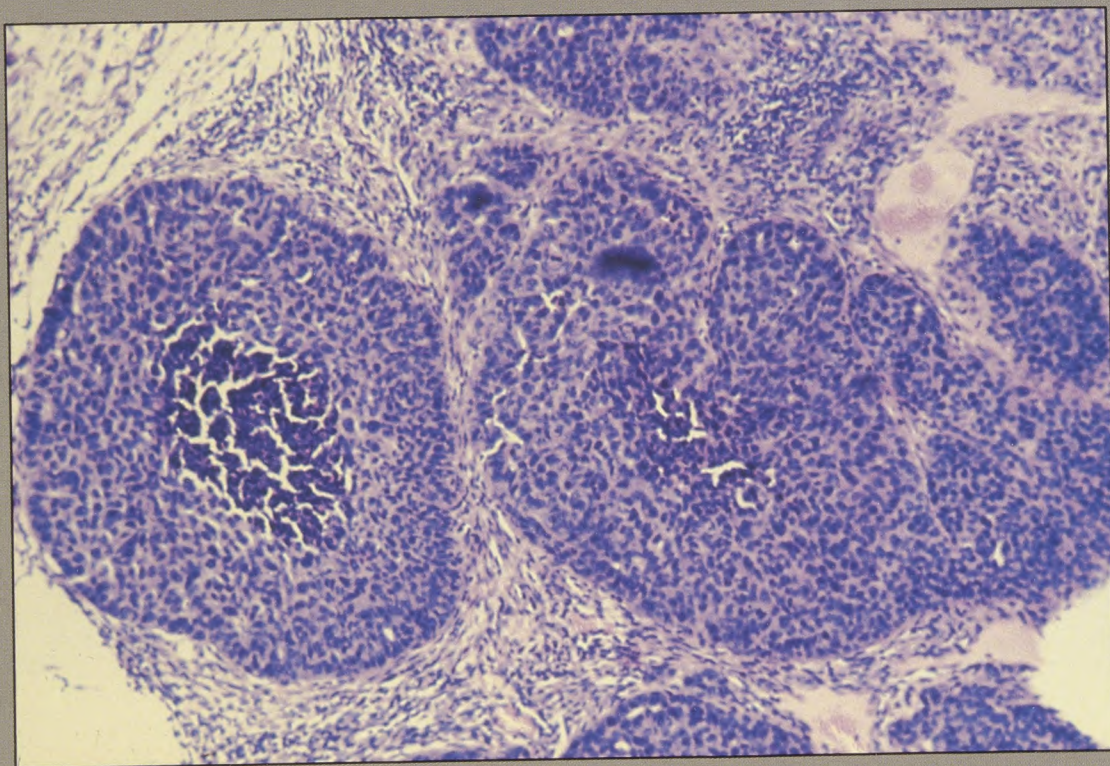
In response to many such incidents, the AAWR developed a

position statement¹ establishing guidelines for pregnant radiologists. In the process, the issue became a respectable topic of rational discussion. That in itself was a major breakthrough.

The AAWR is currently addressing maternity/paternity leave. What is an appropriate parenting policy? There are no easy answers to this question, but there are existing models. European countries confronted this issue long ago and developed policies that are often impressively progressive. Non-professional working women in many U.S. jobs have an established maternity leave policy. In AAWR discussion so far, it has been difficult to draft a policy that meets all needs. One point that almost all agree upon, however, is that it would be a step forward if every department or group had a parenting policy that was well-known to employees.

There are many other women's issues, such as part-time practice, the isolation of women who work, and the successful combination of child-rearing and the practice of radiology. Though these topics often affect women more than men, they are not exclusively our problems. Increasingly, men are finding themselves confronted with similar issues, either personally or because they have women colleagues. The AAWR is providing leadership in these areas. At the same time, the AAWR serves as a strong support group encouraging women to be part of the major radiological societies at all levels. I am proud of the AAWR's accomplishments, and I look forward to a continuing association with the group.

(1) Adler YT, Fernbach SK, Hayman LA, Redman HC, Rumack C. The impact of maternity on radiologists: the AAWR position. *AJR* 146: 415-417, Feb., 1986.



Cells in the oxygen-poor region of tumors like this one can be made more responsive to radiotherapy via the use of cell sensitizers. In the next edition of Focal Spot, the latest in such cancer research is explored.

FOCAL SPOT

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