

UT SOUTHWESTERN THE TARGET

News from the Department of Radiation Oncology

Are highly targeted radiation treatments safe? Quality control is the key issue

The advent of newer radiation treatment technologies such as intensity modulated radiation therapy (IMRT) and stereotactic body radiation therapy (SBRT) offers increased benefits to patients by improving cancer control and generally avoiding harm. Researchers at UT Southwestern have actively developed and implemented these advanced technologies for the betterment of our patients' outcomes. However, recent articles in high profile publications

gans. A meticulous quality assurance program, along with a staff of experienced physicians and physicists, are the keys to ensuring all patients are safely treated with these newer technologies.

UT Southwestern faculty members are leaders in developing national quality standards in conjunction with the major professional organizations. Task Group 101 of the American Association of Physicists in Medicine, a multi-year effort to outline the best practice guidelines for SBRT, is scheduled for publication this summer. The American Society for Radiation Oncology also recently formed several task forces to address safety concerns. Robert Timmerman, M.D., professor and director of clinical research, and Timothy Solberg, Ph.D., professor and director of medical physics and engineering, are major contributors to both efforts.

Machine safety

Today's treatment process requires a significant amount of technology, from treatment machine commissioning, to patient CT images and computerized treatment simulation information. All of this information must be coherently stored, processed through an electronic medical record, and transferred between treatment devices so that the therapist can treat

CONTINUED PG 8

VOLUME 1, SUMMER 2010

UT Southwestern to treat breast cancer with CyberKnife

Physicians at UT Southwestern have developed a new protocol to treat early stage breast cancer with the Accuray CyberKnife® System, with the hope of providing post-lumpectomy breast cancer patients with a radiation therapy option that may offer a reduced risk of infection combined with improved cosmetic results.

Currently, partial breast irradiation (PBI) is achieved either through the use of a catheter implant or with 3-D conformal external beam radiation (3DCRT). However, there

CONTINUED PG 3

What's Inside

Department news 2-3

Keloid scar treatment and total skin electron beam therapy 4-5

Clinical trials listing 5

Profile: cancer survivors on the Radiation Oncology staff 6

Patient support groups 7



Setup for CyberKnife treatment

like *The New York Times* point out that, in rare cases, such treatments are capable of inflicting serious harm.

It is not surprising that a highly potent and technologically intensive treatment capable of eradicating deadly cancers could also, if misguided, cause great harm to healthy or-

UT Southwestern graduates first class of radiation therapists

Three students recently became the first graduates of UT Southwestern's radiation therapy program, the only such program entirely based in North Texas.

The graduates include Aline Kadadi, Sienna Kim and Rebecca Solis, all of whom subsequently passed the national board exam administered by the American Registry of Radiologic Technologists (ARRT) to become certified radiation therapists.

UT Southwestern's School of Health Professions and the Department of Radiation Oncology jointly established the radiation therapy program in August 2008. Students receive classroom training at the School of Health Professions, and engage in hands-on training in the Department of Radiation Oncology's clinics at UT Southwestern Medical Center and at Methodist Richardson Cancer Center.

The program takes two years (five semesters) to complete and leads to either a Bachelor of Science degree or a post-baccalaureate Certificate in Radiation Therapy. Currently, four new students are admitted to the program each

academic year.

"The strength of our program is our small class size, which allows for individualized attention both in the classroom and clinic," says Carol Scherback, assistant professor and program director. "In addition, our students are trained and have access to some of the most advanced radiation treatment technology available."

Graduating students must demonstrate clinical competency in multiple areas, including radiation treatment delivery, simulation procedures, dosimetry, physics, beam modification devices and general patient care.

All B.S. degree and post-baccalaureate graduates are eligible to apply for the ARRT certification exam.

The program is accredited by the Joint Review Committee on Education in Radiologic



Left to right: Aline Kadadi, RTT; Sienna Kim, RTT; and Rebecca Solis, RTT

Technology and the Southern Association of Colleges and Schools, and is recognized by the ARRT.

"The goal of our program is to educate competent, entry-level radiation therapists who provide quality patient care," adds Ms. Scherback. "We also encourage professional growth and participation in research to advance the practice of radiation therapy." ♦

News in brief

RapidArc treatment now available

The Department of Radiation Oncology this spring began treating patients using Varian RapidArc radiotherapy technology. RapidArc continuously changes the gantry speed, dose rate, and shape of the treatment aperture to deliver treatments two to eight times faster than conventional therapy, reducing a typical 10 to 15-minute treatment to less than one minute in some cases.

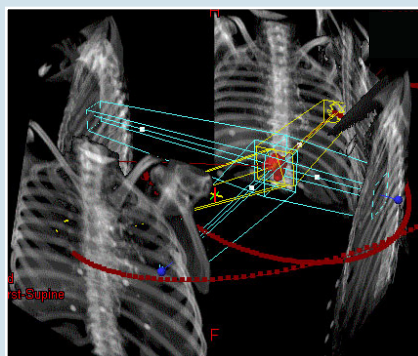
The implementation of RapidArc involved commissioning new treatment planning software and extensive testing, as well as a small modification to the clinic's Varian Trilogy linear accelerator.

The purpose of the new technology is primarily to make therapy more convenient for patients who must undergo multiple treatments. RapidArc will not reduce the total number of treatments patients require.

Prostate cancer patients are the first to benefit from the new RapidArc technology,

potentially followed by head and neck patients.

"The shape of the tumor and nearby healthy tissues will determine the best technology to use," says UT Southwestern medical physicist Ryan Foster, Ph.D. "We don't want to use RapidArc just because it's faster; we also want to consider the optimal dose distribution for the patient."



RapidArc plan showing movement of gantry in red lines (Credit: Varian Medical Systems)

Department researchers garner CPRIT grants

Two researchers were awarded funding recently in the first round of grants from the newly established Cancer Prevention and Research Institute of Texas (CPRIT).

Dr. Sandeep Burma, assistant professor of radiation oncology, was awarded \$857,106 to study the impact of glioblastoma-specific oncogenic events on DNA repair pathways and the implications for therapy. Dr. David Chen, professor of radiation biology, received \$25,000 to support a multi-investigator study of DNA double-strand break repair and genomic stability.

New residents arrive

The Department welcomes Joseph "Chip" Hodges II, M.D., MBA, and Aaron Laine, M.D., Ph.D., to the medical resident training program. Qinan Bao, Ph.D., is a new resident in the medical physics program.

Treating breast cancer with CyberKnife *continued from page 1*

are some disadvantages to both of these current methods.

In both interstitial and intracavitary brachytherapy, indwelling catheters can lead to infection, mastitis, hematoma, or even abscess. In the initial clinical experience with MammoSite®, 51.9 percent of patients experienced drainage from the catheter site, 3.7 percent encountered infection, 5.6 percent hematoma and 1.9 percent abscess.

Using 3DCRT eliminates the risk of infection from indwelling catheters and prevents a second invasive procedure. However, in dosimetric comparisons, 3DCRT results in a higher dose to the remaining normal breast than is seen with brachytherapy.

Two recent reports investigating 3DCRT also have raised concern about unacceptable cosmetic results in patients getting treated with this method. In one recently reported study evaluating Intensity Modulated Radiation Therapy (IMRT), 7 out of 32 evaluated patients developed “unacceptable” cosmesis, leading to premature closure of the study.

Stereotactic body radiation therapy (SBRT) is a new therapeutic paradigm for treating localized tumors outside of the central nervous system and involves delivering very high doses of focused radiation using unique beam arrangements and special immobilization equipment.

As already demonstrated in lung and liver cancers, SBRT offers hope for improved local control of cancers, which may translate into gains in survival, especially for smaller early stage lesions.

New CyberKnife protocol

The CyberKnife system at UT Southwestern is a 6 MV linear accelerator mounted on a robotic arm that moves freely around the patient, allowing for millimetric accuracy

and a more tightly controlled dose gradient compared to conventional linear accelerator radiotherapy systems.

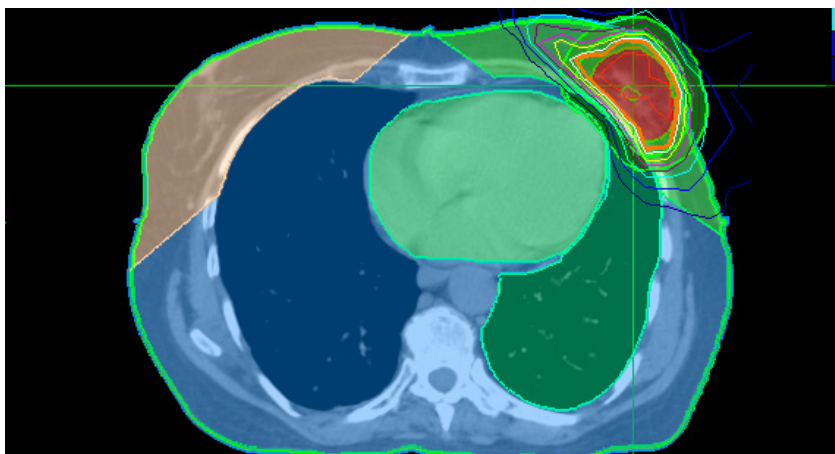
UT Southwestern was one of the first five sites in the world to install a CyberKnife in 1997, and continues to maintain leadership in the usage of this system by implementing the latest hardware and software in partnership with the manufacturer, Accuray.

By using the CyberKnife to deliver SBRT to the breast, physicians hope to mimic or improve the excellent local control rates seen in current treatments of early stage breast cancer while attempting to increase convenience, limit invasiveness, decrease toxicity and improve cosmesis compared to

eral breast control is achieved. The treatment regimen will be carried out in a total of five treatments rather than the 25-30 treatments typically associated with conventional radiation.

“A five-treatment course should be a more tolerant regimen than our three-treatment regimens currently used for liver and lung cancer, which may lessen the toxicity to tissues in close approximation such as skin and improve cosmetic outcome over currently used radiation techniques,” says Dr. Timmerman.

Dose-limiting toxicity from this treatment will likely relate to skin problems, which will be carefully monitored.



Sample plan of CyberKnife breast treatment. Dose is contained in the orange field with very little dose delivered to heart, residual breast or contralateral breast.

The protocol is being carried out in conjunction with experts in the Breast Cancer Program at UT Southwestern’s Harold C. Simmons Comprehensive Cancer Center. The CyberKnife protocol will be one of many options available for patients offered through the program.

Patient eligibility

Eligible patients must have appropriate staging studies identifying them as AJCC stage T1 or T2 (≤ 3 cm) treated with lumpectomy and axillary node dissection with at least six nodes sampled or sentinel node biopsy. Patients with up to three positive nodes without microscopic or macroscopic evidence of extracapsular extension are eligible. If chemotherapy is planned, it must begin no earlier than two weeks following completion of radiation therapy. ♦

For more information, contact Clinical Research Manager Jean Wu at 214-648-7015 or visit www.utsouthwestern.edu.

other methods of radiation treatment.

“In particular, we believe a very abbreviated, non-invasive, outpatient treatment would be considered a favorable option to underserved populations of women living in more remote areas for whom longer courses of treatment pose a barrier,” says study lead author Robert Timmerman, Ph.D., professor of radiation oncology.

The CyberKnife study will take the form of a phase I dose escalation safety study. The purpose of the study will be either to determine the maximum tolerated dose or to continue until a dose is reached where a significantly high level of expected ipsilat-

Total skin electron beam therapy (TSEBT) for mycosis fungoides

Mycosis fungoides, a relatively rare cutaneous T-cell lymphoma, is highly responsive to total skin electron beam therapy (TSEBT), a treatment that is often curative for early-stage disease and offers dramatic symptom relief in later stages.

TSEBT is a highly fractionated therapy designed to deliver the prescribed dose in many low dose fractions over a period of several weeks for the purpose of minimizing possible skin reactions.

In the UT Southwestern TSEBT procedure, the patient stands at a distance of 330 cm from the linear accelerator, 25 cm behind a clear acrylic shield that serves to both degrade the energy of the incident electrons and scatter them to distribute a uniform dose over the skin surface.

The treatment plan utilizes a 2-day treatment cycle in which the patient is treated in three standing positions each day (six positions per cycle). At each position, two beams directed at gantry angles of 250 and 290 degrees are used for a total of 12 exposures per treatment cycle.

This method generates a uniform and a wide, rather than focused, field of electron radiation over the patient's skin surface while directing the more penetrating, contaminant x-ray component of the treatment beam safely above or below the patient.

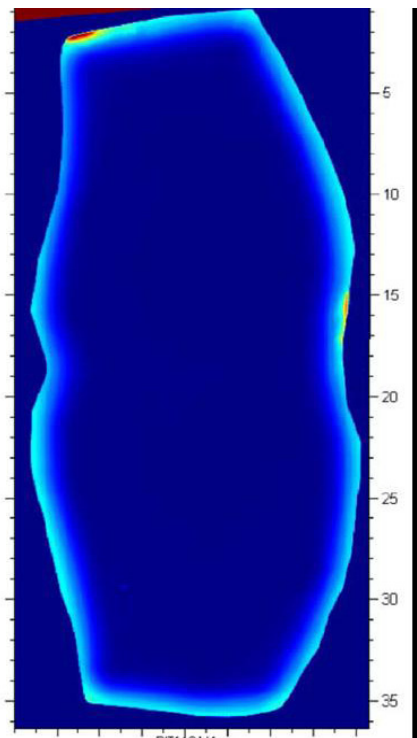
During the first treatment cycle, small dosimeters are placed on the patient to verify that the prescribed and delivered doses are the same.

Some areas of the body will not receive an adequate radiation dose as a result of self-shielding. These areas, which include skin folds, under the breasts, the soles of the feet, and between the buttocks, must be irradiated individually to ensure adequate coverage.

In contrast, some areas exhibiting increased sensitivity to the radiation, as determined by the physician's evaluation of skin reactions, may need to be shielded for part of the treatment course. Typical areas of shielding include the hands and feet. The eyes are always shielded, either with internal or external shields.

The standard prescription dose for favor-

able cases with curative intent is usually 3600 cGy. The dose at 4 mm skin depth, normally deep enough to treat mycosis, is approximately 3000 cGy.



Sagittal image of the trunk of a phantom: the light blue rim shows the superficial nature of the radiation dose distribution (bright spots are known light leaks in film)

In some cases, due to skin reactions, the full dose may not be delivered, but positive outcomes can be seen with a minimum of 3000 cGy delivered.

In the case of more extensive disease, where the goal is palliation, 2000 cGy may relieve symptoms including extreme pruritus.

"Mycosis is generally a very slow, progressive disease," says David Pistenmaa, M.D., professor of radiation oncology.

"It can sometimes take years to diagnose correctly because its symptoms — minor skin irritation — resemble those of benign skin conditions."

The Department of Radiation Oncology

works together with UT Southwestern's dermatology clinic to identify and treat patients presenting with this disease, which affects about 1,400 people per year in the U.S.

Mycosis fungoides may present as a single or several small patches; it can also present with extensive involvement of the skin surface.

Small lesions can be treated with focal radiation therapy, whereas patients with extensive involvement of the skin need TSEBT.

Diagnosis of mycosis fungoides is made by biopsy. While radiation therapy alone may offer a complete cure for early-stage disease, it is usually followed by one or more topical treatments to prolong the benefits of radiation therapy.

The Department of Radiation Oncology utilizes a Varian 21-EX linear accelerator operating in a high dose rate mode for the delivery of TSEBT.

For all patients, the dose to be delivered per field per treatment cycle is calculated using the following dose calculation formula:

$$\left(\text{Prescribed Skin Dose per Treatment Cycle} / 2.414 \right) \times 0.5$$

The factor 2.414 is an institution-specific quantity that has been adjusted from the published MD Anderson Cancer Center value of 2.8 and validated through measurement.

Monitor units (the amount of "beam-on" time) per treatment field are then calculated knowing the machine output at the patient location under TSEBT treatment conditions, which for our machine has been measured to be 0.1 cGy per MU. Within UT Southwestern, this formula consistently yields an accurate delivered dose measured to be within plus or minus 5 percent of the clinically prescribed dose.

The process of TSEBT delivery can be labor intensive as it is important both to position the patient accurately initially and to check their positioning frequently throughout treatment.

Unlike other radiation treatments in which the patient is immobilized, the TSEBT ap-

CONTINUED PG 5

Keloid scars controlled with radiation therapy

In addition to treating cancer, radiation therapy has long been used to manage several different benign conditions. Keloid scars, formed by a fibrous and sometimes disfiguring overgrowth of scar tissue, are one of the non-cancerous conditions most frequently seen by the Department of Radiation Oncology.

Keloids are usually treated with surgical resection followed by steroid injections. In those cases where scars do not respond to steroids, radiation therapy is offered.

“You don’t want to expose people to radiation if you don’t have to because of the risk of developing future malignancies secondary to radiation therapy,” explains Ramzi Abdulrahman, M.D., assistant professor of radiation oncology. “We treat keloids when other therapies have failed. We try to defer radiation, particularly in young patients, for this reason.”

Fibromatosis generally occurs in response to tissue injury (ear piercing, accidental cuts, surgical wounds, etc.). People with darker skin, including African Americans and Hispanics, are more susceptible to the development of fibrous keloids.

“Keloids can be a serious problem, particularly if they develop in the neck or abdomen,” says Dr. Abdulrahman. “Sometimes they become infected and keep growing due to repeated injury. It can cause problems with joints depending on the location and extent of scarring.

“It’s not just cosmetic. Some people are completely disfigured and it can be psychologically damaging. Not even surgery can help by

itself because any injury keeps making scars.”

The Department of Radiation Oncology employs several different methods to treat keloids. They include electron beam therapy; contact therapy in which molds are made to conform to the treatment site; and interstitial brachytherapy in which a catheter is placed into the surgical site to temporarily deliver a radioactive source directly to the area of resection.

Ideally treatment will begin within 24 hours of surgery to prevent fibroblasts from forming. The Department of Radiation Oncology works closely with the surgical specialists at UT Southwestern to deliver prompt care in these instances.

“For keloid treatment, the surgeons inform us of the timing of the surgical procedure so we can plan our treatment in advance,” says Dr. Abdulrahman. “After surgery, the patients are brought to our clinic for treatment. Often we go to the operating room to place catheters in the surgical wound to deliver brachytherapy once the patient recovers.”

The typical dose is 1200 cGy given in three fractions of 400 cGy each over a period of two days.

“We have fairly good success treating keloids with radiation,” Dr. Abdulrahman says. “Recurrence rates are relatively low.”

Local control ranges from 70-90 percent after excision and treatment with radiation. The origin and location of the keloid scar has some prognostic bearing on the outcome of treatment, with burn-induced keloids having a higher likelihood of recurrence. ♦

Total skin electron beam treatment *continued*

paratus requires the patient to hold various treatment postures on their own.

Says Joe Dugas, Ph.D., a resident in the medical physics and engineering program, “Physicists and therapists must actively work together to assess the patient’s positioning throughout each phase of each treatment cycle.

“TSEBT is very effective for treating mycosis and we have become quite efficient in our techniques, but it still takes considerable dedicated time and human resources, as well as particular attention to the regions requiring boosting and shielding.” ♦

Clinical trials

Patients currently are being enrolled in clinical trials for treatment of the following cancers:

Breast

RTOG 0413: A randomized phase II study of conventional whole breast irradiation (WBI) versus partial breast irradiation (PBI) for women with stage 0, I or II breast cancer.

042010-052: A phase I study of CyberKnife® partial breast irradiation (PBI) for early stage breast cancer.

Gastrointestinal

102006-052: A phase II study of preoperative radiation with concurrent capecitabine, oxaliplatin and bevacizumab followed by surgery and postoperative 5-FU, leucovorin, oxiliplatin (FOLFOX) and bevacizumab in patients with locally advanced rectal cancer.

082007-088: A randomized phase II/III study of TNFerade biologic with 5-FU and radiation therapy for first-line treatment of unresectable locally advanced pancreatic cancer.

052010-013: A phase I study of single fraction stereotactic body radiation therapy (SBRT) for patients with hepatic metastases.

Gynecologic

GOG 0249: A phase III trial of pelvic radiation therapy versus vaginal cuff brachytherapy followed by paclitaxel/carboplatin in patients with high-risk, early stage endometrial cancer.

For more information, contact Clinical Research Manager Jean Wu at 214-648-7015 or visit our Web site at www.utsouthwestern.edu.

Staff member cancer survivors: “We care because we’ve been there”

Most patients undergoing treatment at the Department of Radiation Oncology don’t realize that some of the medical professionals championing their recovery were once cancer patients themselves.

UT Southwestern medical physicist Michael Speiser, Ph.D., and radiation therapists Catie Wallace, RTT, and Jay Dwyer, RTT, have all battled cancer and say they use the experience to provide more empathetic care to the patients they now interact with on a daily basis.

Ms. Wallace was just 16 when she was diagnosed with nasopharyngeal cancer after being treated with antibiotics for what her doctor initially thought was an ear infection.

“At first I was told there was about a 50 percent chance that I would survive,” recalls Ms. Wallace. “And that’s probably one of the worst things you could possibly hear at age 16. I had never even had a boyfriend, I had just started driving, I had all these aspirations to go to college and law school. My whole world slowed down; it was literally as if everyone in the room was moving like slow-motion robots. I couldn’t believe it.”

Fortunately, her odds were revised dramatically upward, to 90 percent, after she was seen by specialists in pediatric oncology in her home state of Oklahoma. Surgery was followed by four rounds of chemotherapy, which was then followed by radiation therapy.

Change of direction

“I lost 40 pounds and all of my hair,” says Ms. Wallace. “They threatened me with a PEG tube [percutaneous endoscopic gastrostomy or “feeding” tube] to eat with because they thought I wouldn’t be able to swallow from the radiation treatments and I was determined not to do that. So I ate anything I could find; even if it hurt I just ate it. My mom was so great. She would make milkshakes around the clock for me, or she would make food for the family and something different for me every night.”

Ms. Wallace made a full recovery, entered college on time, and began mastering the prerequisites for her law career as planned. But then one day she got to thinking.

“I remember walking back from the library

one day and I didn’t really feel like I was on the right path with my life for some reason,” she says. “And I started thinking about two ladies, Tracy and Lori, who had been my radiation therapists and wondering how they got to do their job. During my treatment they brought gifts for me, they celebrated milestones with



Left to right: Michael Speiser, Ph.D.; Catie Wallace, RTT; and Jay Dwyer, RTT

me. They were my friends.

“So I started looking and it turned out the University of Oklahoma had a radiation therapy program. I thought ‘this is what I’m supposed to do.’ I felt like this was my calling to help people in this way.”

Candidate for research

Jay Dwyer was likewise diagnosed at a young age, having just finished his senior year of high school. A urologist examining his swollen testicle stated that it was likely cancer and scheduled Mr. Dwyer for surgery the very next day.

“My world was flipped upside down just like that,” he remembers. “The worst part of it was being in the same room as my mom and seeing her reaction to the news in her face.”

After surgery, in which the diagnosis was confirmed as cancer, Mr. Dwyer was invited to participate in a protocol comparing three rounds of chemotherapy to the standard of four rounds that was given at the time. He chose to participate.

“So we got to the third treatment and the doctor said I didn’t have to come back - it

turned out I was in the experimental group. My mother was very apprehensive. But I was confident; I said ‘if the doctors say we’re done then we’re done.’

“This summer I’ll be a 22-year cancer survivor. I’m married and have three kids, all of whom were conceived naturally. I think the credit goes to my participation in the protocol, because I’ve met many other survivors of this particular cancer who received the standard treatment of the day who are now sterile.

“That’s the great thing about research – if people weren’t pushing the envelope for research and different protocols we wouldn’t have all the beneficial new treatments that we have now. In this particular case, we would have more young men not able to have families.”

First-day surprise

Indeed, cancer treatment has progressed so far that Michael Speiser only required one round of chemotherapy when he was also diagnosed with testicular cancer two years ago, on his very first day of working at UT Southwestern.

“Here’s my photo when I got my employee I.D. badge that morning,” Dr. Speiser says, flashing a photo of a full-faced man with a wide, engaging smile. “And here’s my I.D. taken a couple of months later.” The photo shows a gaunt face with stark features, no hair and no hint of a smile.

Dr. Speiser had been experiencing some discomfort for several weeks and took some time during his first day to run his symptoms by personnel in the UT Southwestern emergency department. They immediately scheduled him for surgery the following day.

“Mine was an aggressive but highly curable form of cancer,” Dr. Speiser says. “I had concerns and felt fortunate that I was able to ask our own physicians. They are very knowledgeable and great people to work with.

“After surgery I was given the option of lymph node dissection or two cycles of chemo. But [professor of radiation oncology] Dr. David Pistenmaa pointed out new results from a phase III trial that said you only need one cycle of chemo. After consulting with other experts,

I ended up getting just one, which halved my exposure to chemotherapy.”

Dr. Speiser had already chosen a career in medical physics prior to his encounter with cancer, but says the experience has made him more understanding of patients.

“I have a Ph.D. in biomedical physics, I work in radiation oncology, I have access to some of the smartest, most caring physicians in the world, and it was still a confusing and difficult process.

“What I realized is that you have to surrender to the people who give you care. When I go and get chemo I have to trust that everybody who’s giving me medication is doing it exactly right. It’s the same for our patients: we just have to make sure everything works

right and that we give them the best care that we possibly can.”

The department’s three cancer survivors have on occasion shared their personal stories with patients.

“My concern is the patient and the smallest detail I can do to take care of them.” — Catie Wallace, RTT

“I do feel closer to them and understand how they feel and what they’re going through,” Ms. Wallace says.

“When I see people who are sad and depressed, depending on the person, sometimes I will tell them. I say ‘I have lain on the treatment table before, I have worn the head mask, I’ve

felt all the things you’re feeling, and I just want you to know that there is hope.”

“I don’t talk to a lot of people about it, but it makes me very patient care oriented,” she continues. “My concern is the patient and the smallest detail I can do to take care of them. The fact that I went through this and made it just keeps me smiling. Even if my day is bad, I’m lucky and feel blessed to be here.”

Says Mr. Dwyer, “When I was younger I was embarrassed about having had testicular cancer.

“Now I’m much more interested in educating people about early screenings, prevention and early treatment. I want to communicate to them about the expertise and cutting-edge research that we have here.” ♦

Cancer patient support groups at Simmons Cancer Center

Open to all cancer patients, family and caregivers, these free support groups at UT Southwestern’s Simmons Cancer Center provide the opportunity to share concerns, inspiration and advice about living with cancer in the company of others with similar experiences. Within this encouraging atmosphere patients find understanding, friendship, resources and a foundation for hope. Our support groups include:

Husbands and Partners of Women with Cancer

This support group is for husbands and partners of women with a cancer diagnosis. Meetings are held on the first and third Tuesday of every month from 5:30 to 7 p.m. To register, call Jack Hamilton at 214-645-2742.

Women’s Journey of Hope Support Group

This support group is available to women who are surviving a cancer diagnosis. It meets on the first and third Tuesday of every month from 5:30 to 7 p.m. To register, call Sonya Reyes at 214-645-2672.

Caregivers Journey: Education, Information and Support

This class offers caregiver support through education and information on many relevant topics to enhance your effectiveness as a caregiver. Classes are offered on the second Wednesday of the month from noon to 1:00 p.m. and on the fourth Wednesday of the month from 6:00 to 7:00 p.m. To register, call Sonya Reyes at 214-645-2672.

Thriving After Breast Cancer: Lymphedema Support Group

This class uses exercise/movement to reduce the effects of lymphedema. It meets on the third Friday of each month.

Man to Man

For men with prostate cancer, this group meets on the second Monday of every odd-numbered month (January, March, May, July, September, November) from 4:30 to 6 p.m. To register, call Tamara Dickinson at 214-645-8787.



Quality assurance for safe radiation treatment *continued from page 1*

the patient. Mistakes anywhere in the process could result in clinics potentially mistreating one or more patients.

During the commissioning process, a physicist will perform numerous calculations and irradiate “phantoms,” or models, which exactly replicate a patient’s anatomy, tumor location and radiation scattering properties. Through direct measurement the physicist verifies that what the treatment machine is doing and what the planning system is calculating are in fact the same.

Ongoing quality assurance must take place to make sure a machine continues to operate properly. Every morning at UT Southwestern’s Department of Radiation Oncology, therapists perform measurements to verify that the treatment machines are operating properly. On a monthly basis, physicists verify a more extensive set of parameters. And every year, a physicist will spend a week or more on each machine to perform a full evaluation and calibration.

Patient quality assurance

With patients, some quality assurance procedures are very basic but profound, such as making sure the correct patient is on the table. For IMRT or SBRT patients – procedures in

which small errors can have enormous implications – the department has a policy of evaluating every individual treatment plan in a phantom designed exclusively for each patient.

Says Dr. Solberg “We have 60 new SBRT and IMRT patients every month, which means that every night after we finish seeing patients we’re doing an average of three phantom irradiations. We want to make sure patients are treated with the highest standards of care and safety, with no chance of an error.

“A dose as high as 20 Gy given all at once has a very potent effect. If you point it in the wrong place, it has profound adverse consequences. So there is a very systematic process for making sure the machines work properly and a very systematic process for making sure each individual patient plan is correct.”

People in place

Finally, it is important to have adequate human resources to perform these more specialized kinds of radiation procedures. Implementing technology-intensive procedures requires a team approach.

As the largest radiation treatment center in North Texas, the Department of Radiation Oncology employs 12 physicists, resulting in

a high physicist-to-patient ratio. In addition, dosimetrists and machine therapists fulfill specialized training requirements for the more specialized, technology-intensive treatments like SBRT.

“In some ways you can look at SBRT like a liver transplant,” Dr. Solberg continues. “It takes special resources and you don’t see every hospital doing it unless they’re willing to set the standard of care high and provide the resources.”

Another standard of care at UT Southwestern is the department’s policy that both a physician and a physicist must be physically present at the machine in addition to the therapist whenever an SBRT patient is treated.

“We feel the more experts are there, the less likely there is to be an error,” says Dr. Solberg. “Our position is somewhat controversial because some centers resist doing this, saying they don’t have time or resources. My response would be ‘then don’t do the procedure.’”

“Patients who come here can count on the fact that we will have tested all the parameters before they get on the table and then there will be physicians and physicists with them while they’re getting treated.” ♦

Visit us on the Web at
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