Cancer Consult

HIGHLIGHTS from the 2009 American Society for Radiation Oncology Meeting
Dear Colleagues and Friends:

The Department of Radiation Oncology is pleased to be highlighted in this issue of Cancer Consult. As you will see in the following pages, 2009 was a very productive year in the department. Our participation in the 51st annual American Society for Radiation Oncology (ASTRO) meeting in Chicago in November provides a glimpse into the breakthrough research in which we are involved. We were very well-represented at this meeting, with more than 20 oral and poster presentations. In addition, Ping Xia, PhD, our new head of medical physics, led an education session on the transition from 3D IMRT to 4D IMRT. And for the first time, each of our residents who attended ASTRO had a poster or oral presentation, which speaks very highly of the dedication and caliber of our residents.

This newsletter also highlights our extensive database of more than 11,000 prostate cancer patients who have undergone surgery, external beam radiation therapy or brachytherapy at Cleveland Clinic. This database, which is one of the largest in the world, is meticulously maintained by Chandana Reddy, our biostatistician, and has been the source for more than 100 papers.

In October, we were fortunate to welcome executives from major radiation oncology corporations to our campus as part of the Medical Innovations Summit on “Improving the Prognosis: Cancer Cures through Innovation.” It was a chance for experts from throughout the world to wrestle with the challenges in developing new approaches to cancer care and to discuss future trends and opportunities. This newsletter includes an overview of the summit on pages 6-7.

We hope you find this edition of Cancer Consult valuable, as it highlights new directions in our field and some of our newer programs within the Taussig Cancer Institute. Our most important mission is to deliver outstanding care to our patients and ultimately to win the war on cancer. On behalf of the department, I would like to thank all of you for your ongoing support and I look forward to continued collaboration with you. Please feel free to contact me with any questions, concerns or suggestions on how we can improve our service to you and your patients, at suhj@ccf.org.

Sincerely,

John Suh, MD
Chairman, Department of Radiation Oncology
Cleveland Clinic to Launch Pilot Study to Compare Calypso with other Therapy Modalities

Tumor motion during radiation therapy has always presented difficult challenges for radiation oncologists. New medical technology, however, is helping radiation oncologists address this challenge.
In 2005, Cleveland Clinic was one of five medical centers in the nation that participated in a prostate cancer research study involving unique and innovative technology, the Calypso 4D Localization System. Developed by Calypso Medical Technologies Inc., the external beam radiation system precisely tracks the movement of the prostate during therapy, optimizing radiation targeting and minimizing its side effects. The purpose of the clinical study was to evaluate a nonionizing electromagnetic method to align the prostate treatment site for therapy and to monitor its position throughout therapy delivery.

“During the preliminary research phase of the Calypso System, we demonstrated that there is fairly substantial motion of the prostate while the patient is lying on the treatment table,” says Rahul Tendulkar, MD, Cleveland Clinic radiation oncologist. “One of the benefits of the Calypso System is its ability to track the position of the prostate in real time by emitting radio-frequency signals from miniature Beacon wireless electromagnetic transponders about 8 mm in length. The transponders are implanted transrectally into the prostate in an outpatient procedure. The transponders transmit the information at a frequency of every one-tenth of a second, which enables the real time information.”

The clinical study compared the electromagnetic positioning to setup using skin marks and to stereoscopic X-ray localization of the transponders. Study results published in the *International Journal of Radiation Oncology, Biology and Physics* in 2007 determined that the difference between skin marks versus the Calypso System alignment was found to be > 5 mm in vector length in more than
75 percent of fractions. Comparisons between the Calypso System and X-ray localization showed good agreement.

Qualitatively, the continuous motion was unpredictable and varied from persistent drift to transient rapid movements. Displacement > 3 mm and > 5 mm for cumulative durations of at least 30 seconds were observed during 41 percent and 15 percent of sessions, respectively.

For individual patients, the number of fractions with displacement > 3 mm ranged from 3 percent to 87 percent, whereas the number of fractions with displacements > 5 mm ranged from 0 percent to 56 percent. What’s more, the Calypso System’s transponders were typically stable four days post implant (all by 14 days) and < 1 mm standard deviation for inter-transponder distances over time. All of the transponders remained functional throughout therapy.

“The Calypso System is a clinically efficient and objective localization method for positioning prostate patients undergoing radiotherapy,” the study concluded. “Initial treatment setup can be performed rapidly, accurately and objectively before radiation delivery. The extent and frequency of prostate motion during radiotherapy delivery can be easily monitored and used for motion management.”

“The vast majority of prostate cancer patients are candidates for treatment with the Calypso System,” says Dr. Tendulkar. “However, there are a few contraindications such as, patients with implanted devices including neurostimulators and cardiac pacemakers, because these devices might interfere with the transponder signals. Patients who have had hip replacement surgery or who are obese are not candidates for this treatment.”

In 2010, Dr. Tendulkar will be launching a pilot research study that will compare the Calypso System with other treatment modalities such as cone beam CT scan-based image guidance and ultrasound-based image guidance technology.

Modern external beam radiation therapy utilizes CT scans and sophisticated software to create a three-dimensional computer model of the area being treated. This allows clinicians to more precisely target treatments at the tumor and spare surrounding healthy tissue or organs. The intensity modulated radiotherapy is combined with an image guidance system for localization of the prostate. This combination provides the delivery of a focused and individualized dose of radiation to a small area within the pelvis.

“In our small pilot study, we want to make a head-to-head comparison of each image-guided technology to help us define the accuracy of each method in delivering radiation therapy to treat prostate cancer patients,” says Dr. Tendulkar. “Initially, we expect to recruit three to five patients. Depending on the preliminary data we collect from that small group of patients, we may be able to increase the patient pool to 15 or 20.” The pilot study is being funded by a $50,000 grant from the Scott Hamilton CARES Foundation.

Dr. Tendulkar notes there are research studies under way at other academic and medical institutions that are exploring whether the Calypso System can be utilized to treat other cancers of the body, such as those in the pancreas, lung, and head and neck.
Resident Wins 2009 American Medical Association Award

Cleveland Clinic Radiation Oncology resident Michael Burdick, MD, recently earned first place in the Clinical Medicine category at the American Medical Association-Resident and Fellow Section Research Symposium for his poster presentation: “External Beam Radiotherapy Followed by 90Y Ibritumomab Tiuxetan in Relapsed Bulky Follicular Lymphoma.” Dr. Burdick presented the poster at the American Society for Radiation Oncology annual meeting. His paper on the project has been accepted for publication in the *International Journal of Radiation Oncology, Biology and Physics.*

Dr. Burdick graduated from the University of Virginia and earned his medical degree from Virginia Commonwealth University. Before coming to Cleveland Clinic, he completed an internship at the University of Washington. Dr. Burdick’s training also involved a year at the National Institutes of Health in brain tumor research, spurring his interest in cancer.

“I wanted to pursue oncology, but I vacillated between medical and radiation oncology,” he says. “Radiation won because of the cool technologies.”

Dr. Burdick says the chance to work with a world-renowned staff drew him to Cleveland Clinic. “I knew I would see every type of tumor, as well as every technique used in radiation oncology at Cleveland Clinic,” he says. “The residency program has exceeded my expectations. I’ve gotten excellent preparation for my boards, but I’m also prepared to become a well-rounded physician.”
While immunotherapy has improved treatment since its approval in the late ’90s, Cleveland Clinic radiation oncologist Roger Macklis, MD, says that sites harboring bulky disease are associated with a particularly poor likelihood of responding and shorter durability of response. Dr. Macklis and his colleagues recently reported encouraging results of a Phase II study in which external beam radiotherapy (EBRT) was combined with yttrium-90 ibritumomab tiuxetan (90Y-IT) in 11 patients with relapsed or refractory bulky follicular lymphoma. Cleveland Clinic resident Michael Burdick, MD, presented a poster on the study during the 2009 American Society for Radiation Oncology annual meeting (see related story).

For the purpose of the study, bulky disease was defined as >5 cm. Using computed tomography (CT)-based planning, bulky disease sites were contoured as the gross tumor volume with a planning margin of 1 cm to 2 cm added, depending on anatomical location. EBRT was delivered as 2400 cGy in 8 fractions.

Once the patient achieved complete blood count recovery, 90Y-IT was administered at a dose of 0.3 or 0.4 mCi/kg, depending on platelet counts. Response was measured by positron emission tomography/CT and/or CT three to four months after administration.

“In general, this combined approach appeared to work as we hypothesized,” says Dr. Macklis. “In contrast to prior patterns of failure analysis data in this patient population, a brief course of external beam radiotherapy prevented relapse in sites of bulky disease.” Both in-field control and progression-free survival compared favorably to historical data. The complete and overall responses to combined therapy as measured three to four months after 90Y-IT were 64 percent. Median progression-free survival was 17.5 months.

“While the trial was not statistically significant due to its nonrandomized design and small size, we hope our results will create a paradigm for the future,” says Dr. Macklis. Plans are currently being considered for an industry-funded multicenter trial expanding on this experience.
Taussig Cancer Institute Chairman Derek RagHAVAN, MD, PhD, chaired a roundtable discussion on the “Grand Challenges in Contemporary Cancer Treatment and Biology.” Tom Miller, CEO of workflow solutions at Siemens; Sir Bruce Ponder, MD, director of the Cancer Research UK Cambridge Research Institute; and William Hait, MD, senior vice president and worldwide leader of hematology and oncology at Johnson & Johnson, concluded that while developing cancer treatments is time-consuming and costly, information technologies will be important in pairing the right patients with the right treatments.

Partnering with others can help speed the development process, Miller said. But accounting is the greatest impediment to progress. “We don’t know the return on the investment we do,” he said.

Cleveland Clinic president and CEO Toby Cosgrove, MD, opened the summit with an address on healthcare reform, saying that in the United States, we are debating health insurance reform instead of health care reform. Rather than demand higher reimbursements for care, doctors and hospitals ought to demand greater efficiency in delivering care, he said. In addressing innovation in healthcare, Dr. Cosgrove said, “Some people see devices and drugs as a problem. We see them as part of the solution.”

In October 2009, Cleveland Clinic hosted a Medical Innovations Summit that brought more than 900 prominent physicians, senior executives from pharmaceutical and medical device companies, entrepreneurs, investors and others together for an in-depth analysis of innovation in the field of cancer.

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John Suh, MD, chairman of the Department of Radiation Oncology in the Taussig Cancer Institute, moderated a panel on the “Revolution in Radiotherapy Technology,” with Jean Marc Andral, president of Advanced Radiotherapy, IBA; Shawn Guse, vice president of International Operations, TomoTherapy and CEO of Compact Particle Acceleration Corporation; Tomas Puusepp, CEO at Elekta; Eric Lindquist, senior vice president of Accuray; and Dow Wilson, president of Oncology Systems, Varian. The group provided a firsthand analysis of new directions and challenges for innovators in radiotherapy.

“Radiation oncology is at the forefront in terms of using evidence-based medicine to differentiate various approaches to cancer,” Dr. Suh said. “Technological advances and a better understanding of how tumors respond to treatment have meant shorter and more precise radiation treatment options. The question has become: At what cost?”
The two-day event highlighted the need for partnerships among researchers and developers, since no one institution or company has the financial or intellectual assets to go this route alone.

Device manufacturers agreed that the economic challenges of developing and testing technology are huge. “One successful cancer drug would produce more revenue than all of the companies on this stage,” said Mr. Guse.

Panel members returned to a familiar summit theme, stressing the importance of informatics to improve access to patient data and increase outcomes research. “Radiation plays a role in nearly two-thirds of all cancer patients, but we are losing market share in some areas to other care modalities,” said Mr. Wilson. “We have great tools, but we have to prove their worth. We have to make a better case about the outcomes of radiation treatments. Comparative effectiveness will become more and more important.”

In his keynote address, Sam Palmisano, IBM chairman, president and CEO, revealed that the time has come for a smarter healthcare system. “The single issue that is most critical to the future of healthcare in this country—and the world—is the need for a true healthcare system,” he said. “And I believe we have a better chance now than ever before to build it.”

Mr. Palmisano said that there is a broad consensus—forged, in many respects, by the example of such institutions as Cleveland Clinic—that American healthcare must become patient-centric. But it must also be value-focused, evidence-based, accountable and sustainable.

Clearly, a smarter healthcare system, optimized around the patient, would increase efficiency, reduce errors, achieve better quality outcomes and save lives. “It could embed best practices and medical knowledge—as well as real-time patient monitoring—into clinical and business workflows, for error-free delivery of care,” said Mr. Palmisano. “And that alone is ample justification for the investment.”

The summit concluded with the unveiling of the “Top 10” Medical Innovations for 2010, emerging technologies that will shape healthcare this year. The list of breakthrough devices and therapies was selected by a panel of Cleveland Clinic physicians and scientists. This year’s No. 1 innovation was Bone Conduction of Sound for Single-Sided Deafness: a new nonsurgical, removable hearing and communication device designed to imperceptibly transmit sound via the teeth to help people with single-sided deafness.

For a complete list of the “Top Ten” and details of next year’s summit, “Obesity, Diabetes & the Metabolic Crisis,” visit clevelandclinic.org/innovations.

“Radiation oncology is at the forefront in terms of using evidence-based medicine to differentiate various approaches to cancer.”
Clinical databases are becoming more prevalent at institutions that treat large populations of prostate cancer patients. The Cleveland Clinic database is unique in its breadth and depth of information and in its multidisciplinary orientation, notes biostatistician Chandana Reddy, MS.

“We are the only institution that integrates radiation and surgery patients in a single database,” she says. “That structure was decided at the outset as the most accurate way to track and compare outcomes across different patient populations.”

Data on all patients treated by prostatectomy, external beam radiation or brachytherapy are entered from multiple sources. “To create a complete profile for each patient, the database includes patient demographics, family history to second-degree relatives and all pre- and post-treatment clinical data,” Reddy explains. Each patient’s pre- and post-treatment PSA values, biopsy Gleason score and tumor stage are recorded, along with the treatment modality.

For patients who undergo external beam radiation or brachytherapy, the database captures dosimetry, radiation dose and the number of fractions or the number of brachytherapy seeds. Following completion of treatment, all follow-up PSA results are recorded to track patient outcomes in terms of disease-free survival, biochemical recurrence, cancer recurrence and all-cause mortality.

At the 2009 ASTRO meeting, the Cleveland Clinic database was the foundation for three oral presentations and four poster presentations, including an oral presentation by Andrew Vassil, MD, (see related story). Other ASTRO presentations that utilized the database featured an analysis of treatment effectiveness in prostate cancer patients younger than 55 and an exploration of factors that are predictive for early mortality in men treated for localized prostate cancer.

“These studies demonstrate the power of our database,” Reddy says. “Because it contains such in-depth data on such a large number of patients, researchers have the luxury of selecting exactly the patient population they want to study.”

Another advantage for researchers is that individual patient records in the database are indexed by a unique patient number. This allows easy retrieval and cross-referencing with stored prostate biopsy tissue samples. “The tissue repository enhances the utility of the prostate cancer database by providing DNA for molecular studies,” Reddy explains.

Beyond pure research applications, the database also is used for treatment planning and quality monitoring, she adds. “Our core group of prostate cancer specialists reviews the trends in patient treatment and outcomes as a tool for improving quality of care and pursuing new avenues of research. One of the results from these review meetings was our group’s research in the area of prostate cancer specific mortality. We were the first institution to begin studying this endpoint across all treatment modalities, and we are now seeing other institutions assess their patients for this endpoint.”

Historically, more than 100 papers have been published based on research using the database. In addition to the presentations at ASTRO in 2009, the database was used for two oral presentations and two posters presented at the American Brachytherapy Society annual meeting and three posters presented at the Genitourinary Cancers Symposium.

Cleveland Clinic Taussig Cancer Institute is home to one of the most sophisticated prostate cancer databases in the world. Containing comprehensive baseline, treatment and follow-up data on more than 11,000 patients treated since 1986, the database is a powerful resource for prostate cancer research.
Andrew Vassil, MD, resident and investigator in the Department of Radiation Oncology, presented a study during the 2009 ASTRO annual meeting assessing the duration of androgen deprivation therapy used in the management of patients with high-risk prostate cancer undergoing curative external beam radiation therapy.

Dr. Vassil examined earlier studies and compared them to more recent Cleveland Clinic outcomes. Earlier research showed that for men with locally advanced prostate cancer, the addition of long-term (> 2 years) androgen deprivation (AD) in addition to definitive external beam radiotherapy resulted in improved local and distant control; disease-specific survival; and, in some cases, overall survival. Other studies have shown that higher doses of radiation therapy are safe, and may be more effective for patients with localized prostate cancer. AD therapy is associated with multiple side effects, including an increased risk of heart attack.

Recently, with the advent of PSA screening, a stage migration has occurred, resulting in diagnosis at an earlier stage, younger age, lower PSA, and with a less aggressive cancer. “Because of these prostate cancer population changes, patients treated on prior trials are not representative of current patients,” says Dr. Vassil. “In addition, radiation techniques and doses used in the past are now considered suboptimal. Despite these significant changes, it remains common practice to offer long-term AD to patients with localized disease.”

Dr. Vassil and his colleagues reviewed Cleveland Clinic institutional outcomes, stratified by duration of AD, to estimate its effect on prostate cancer control and survival. The study included 553 patients with high-risk prostate cancer treated at Cleveland Clinic.

All these patients received high-dose radiation therapy using modern delivery techniques. Treatment with more than six months of AD did not appear to improve PSA control or disease recurrence rates. These patients also had worse overall survival and appeared to develop cancer resistant to the effects of androgen suppression sooner (also known as androgen-independent prostate cancer).

“Long-term AD may cause weight gain, hot flashes, mood changes, bone mineral density loss and heart disease for no therapeutic gain,” concludes Dr. Vassil. “It is possible that modern radiation techniques delivering high radiation doses may overcome the need for long-term AD, thus preserving patients’ quality of life after receiving curative treatment.”
NEW RESEARCH:

Cleveland Clinic Leads RTOG Randomized Study for Patients With Inoperable Early-Stage Lung Cancer

Cleveland Clinic Radiation Oncologist Gregory Videtic, MD, is the principal investigator for a new randomized Phase II study comparing stereotactic body radiation therapy (SBRT) schedules for medically inoperable patients with stage I peripheral non-small cell lung cancer (NSCLC).

SBRT is a novel form of radiation delivery that is becoming increasingly utilized to manage NSCLC in patients for whom surgery is contraindicated, because it delivers highly precise, very high-dose radiotherapy (RT) in very few fractions. SBRT requires very accurate tumor delineation and methods by which tumor motion due to breathing is accounted for during the delivery process.

SBRT has been shown to provide remarkably high rates of local control, comparable to those seen with surgery, but with little severe toxicity in what is otherwise a fragile patient population. The optimal treatment schedule in the setting of SBRT is currently an active area of investigation. When first being explored a decade ago, up to 10 treatments might have made up a course of SBRT. The primary objective of the RTOG 0915 randomized Phase II study is to determine the one-year rate of ≥ grade 3 adverse events related to treatment with single fraction versus 4 fractions of SBRT in medically inoperable patients with stage I NSCLC. Sponsors of the study are the Radiation Therapy Oncology Group (RTOG) and the National Cancer Institute.

“What is interesting in the RTOG 0915 study is that we think the delivery of a single fraction or multiple fractions will be essentially equivalent in eradicating the cancer,” says Dr. Videtic. “Now we’re interested in which treatment will be associated with the lowest rate of side effects for these fragile patients, even though the risk of developing complications may be low to begin with. As we now are seeing these patients many months and even years after their cancer is eradicated, we are finding that for tumors close to the rib cage, there may be a higher risk for patients to develop delayed fractures.”

Lung cancer is the leading cause of cancer mortality in the United States. Eighty percent of lung cancers are NSCLC, and approximately 15 to 20 percent of these patients present with early localized NSCLC. Patients who undergo surgical treatments can expect a five-year survival rate of 50 to 70 percent, depending on the initial size of their tumors.

However, a significant number of NSCLC patients do not qualify for the surgical treatment because of co-morbidities including advanced heart disease, emphysema, bronchitis or other complications such as tumor location.

Medically inoperable early-stage NSCLC patients have been historically treated with conventional external beam RT. Unfortunately, these RT treatment results invariably proved inferior to surgical results, likely due to the interaction between an inability to control the cancer with modest RT doses and the underlying medical conditions of the patients.

For example, one study involved 141 patients with stage I NSCLC who were treated with RT using modern techniques and staging. The median RT dose delivered was 64 Gy (range: 48 Gy to 80 Gy). The overall survival rate at one and five years was 39 percent and 13 percent, respectively, while the progression-free survival was 48 percent and 28 percent at two and five years, respectively. Forty-nine percent of patients had local failure as part of their relapse pattern. In fact, other studies have reported local recurrence to be the most common cause of failure with standard RT.

SBRT was pioneered by Swedish and Japanese medical researchers more than 10 years ago. In the United States, Indiana University has been a leader in SBRT research, conducting foundational

To refer a patient, please call Dr. Videtic at 216.444.9797.
research trials about six years ago. After promising Phase I study results, a Phase II prospective study was carried out, involving 70 patients who received doses of 60 Gy to 66 Gy in three fractions during one to two weeks. With a median follow-up of 17.5 months, actuarial local control at two years was 95 percent. However, the study also found that Grade 3 to 5 toxicity occurred in 14 patients, which on analysis proved to be associated with tumor location, i.e., lesions in close proximity to the tracheobronchial tree and mediastinum. Currently, RTOG is conducting a study on the maximally tolerated SBRT dose for this class of tumors (RTOG 0813). All ongoing studies in SBRT now make the distinction between such tumors, termed central, and all others, termed peripheral.

Since the efficacy and safety of SBRT for peripheral tumors has become established, medical oncologists at Cleveland Clinic have collaborated with radiation oncologists in offering SBRT treatments to stage I NSCLC patients.

“It’s very gratifying that we can offer not only an effective but safe treatment for NSCLC patients, because before SBRT their options were extremely limited,” says Dr. Videtic. “This represents a huge shift in practice.”

Some of the secondary objectives of the RTOG 0915 study will include estimating the one-year local control rate in patients and estimating the one-year overall survival and disease-free survival rate.

Patients will be randomly assigned to two groups. One group will receive a single fraction once, and the second group will receive a single fraction once a day for four days.

For more information about the RTOG 0915 study, visit http://www.clinicaltrials.gov/ct2/show/NCT00960999.
“Patient data is one of the most important properties of Cleveland Clinic because it provides a solid foundation for outcomes research,” she says. “If we are to advance the care of patients, we have to look retrospectively at how all of our new technology is impacting patients in terms of the length and quality of their lives.” Cleveland Clinic’s leadership in implementing the electronic medical record was a key factor in luring Dr. Xia from California to Ohio as the first female head of Medical Physics.

Dr. Xia sees the role of her team of physicists as helping radiation oncologists solve clinical problems and speeding the implementation of new findings into practice. With the evolution of intensity modulated radiation therapy (IMRT) and recent advances in image-guided radiation therapy (IGRT), Dr. Xia says her team is focusing on motion management, or adaptive therapy. “We know the patient is a dynamic target,” she says. “We have to determine the best way to use new technology to individualize radiation oncology.”

Dr. Xia shared her insights in an education course at ASTRO, “Transitioning from 3D IMRT to 4D IMRT and the Roles of Image Guidance,” with co-presenter Peter Balter, PhD, from M.D. Anderson Cancer Center. Dr. Xia focused on how IGRT and 4D CT technologies can be used to improve dose delivery precision and accuracy, particularly with dynamically changing tumor volumes.

“In the old days, we treated large fields,” she says. “We cast a net so big that anything within it would be affected.” IMRT opened the possibility of conformal dose distributions to tumors of nearly any shape. But conformal treatment presented its own challenges.

“We could precisely target the tumor and spare surrounding tissue, but if the tumor moved, we’d miss it,” she says. The advantages of conformal dose distribution can only be realized if radiation oncologists can precisely associate the patient’s anatomy with delivered dose in both spatial and temporal fashion. Today, 4D planning includes incorporating changes in patient anatomy into treatment planning.

Drs. Xia and Balter examined lung, prostate, and head and neck cancers to illustrate technical challenges when tumors change by the second, day or week. “Organ movements and anatomic changes in patients require us to explicitly include a time variable into both planning and delivery,” says Dr. Xia.

For more information, contact Dr. Xia at xiap@ccf.org.
IGRT provides better defined margins and more precise patient positioning, as well as better localization of the target during treatment. But Dr. Xia cautions that no single IGRT tool can address all clinical issues. Each new tool must be carefully evaluated to determine its usefulness in various tumor types.

Dr. Xia is active in the Radiation Therapy Oncology Group and says she plans to continue her study on the development of 4D radiation therapy, including deformable image registration to expedite contouring in treatment planning, 4D planning and 4D treatment delivery.

**Why 4D Delivery?**

- **Track fast moving organs**: adjust treatment portals during treatment.
- **Adapt to daily changes of the organ filling** (such as the bladder and rectum): adjust treatment positions prior to treatment.
- **Adapt to slow anatomy changes in head and neck patients**: adjust treatment plans periodically during the treatment course.

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Cancer Consult provides information from Cleveland Clinic Taussig Cancer Institute specialists about innovative research and diagnostic and management techniques.

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Cleveland Clinic Taussig Cancer Institute annually serves more than 26,000 cancer patients. More than 250 cancer specialists are committed to researching and applying the latest, most effective techniques for diagnosis and treatment to achieve long-term survival and improved quality of life for all cancer patients. Taussig Cancer Institute is part of Cleveland Clinic, an independent, not-for-profit, multispecialty academic medical center.

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Clinical Trials
Directory Now Online

Cleveland Clinic Taussig Cancer Institute offers an online tool for physicians, patients and caregivers to search for open clinical trials. The web-based clinical trials database lists all of the trials being managed by oncologists in the Taussig Cancer Institute that are accepting patients. At any given time, several hundred cancer clinical trials are under way on the man campus, and at Hillcrest and Fairview hospitals.

To search the database, visit clevelandclinic.org/cancerclinicaltrials

Radiation Therapy Oncology Group (RTOG) Trials Open to Enrollment

**RTOG 0227**
Phase I/II study of pre-irradiation chemotherapy with methotrexate, rituximab, and temozolomide and post-irradiation temozolomide for primary central nervous system lymphoma

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

**RTOG 0433**
A Phase III international randomized trial of single versus multiple fractions for re-irradiation of painful bone metastases

**RTOG 0436**
A Phase III trial evaluating the addition of cetuximab to paclitaxel, cisplatin, and radiation for patients with esophageal cancer who are treated without surgery

**RTOG 0534**
A Phase III trial of short-term androgen deprivation with pelvic lymphnode or prostate bed only radiotherapy (SSPORT) in prostate cancer patients with a rising psa after radical prostatectomy

**RTOG 0538**
Phase III comparison of thoracic radiotherapy regimens in patients with limited small cell lung cancer also receiving cisplatin and etoposide

**RTOG 0614**
A randomized, Phase III, double-blind, placebo-controlled trial of memantine for prevention of cognitive dysfunction in patients receiving whole-brain radiotherapy

**RTOG 0617**
A randomized Phase III comparison of standard-dose (60 gy) versus high-dose (74 gy) conformal radiotherapy with concurrent and consolidation carboplatin/paclitaxel +/- cetuximab (IND #103444) in patients with stage IIIA/IIIB non-small cell lung cancer

**RTOG 0619**
A randomized Phase II trial of chemoradiotherapy versus chemoradiotherapy and vandetanib for high-risk postoperative advanced squamous cell carcinoma of the head and neck

**RTOG 0825**
Phase III double-blind placebo-controlled trial of conventional concurrent chemoradiation and adjuvant temozolomide plus bevacizumab versus conventional concurrent chemoradiation and adjuvant temozolomide in patients with newly diagnosed glioblastoma

**RTOG 0813**
Seamless Phase I/II study of stereotactic lung radiotherapy (sbrt) for early-stage, centrally located, non-small cell lung cancer (NSCLC) in medically inoperable patients
Critical to Taussig Cancer Institute’s success is the complete partnership established with Cleveland Clinic’s nationally recognized teams of cancer care specialists. The following leaders from other Cleveland Clinic institutes collaborate with Taussig staff to provide the most advanced oncologic care to our patients:

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Miller Family Heart & Vascular Institute
Thomas Rice, MD
David Mason, MD
Sudish Murthy, MD

Neurological Institute
Mannmeet Ahluwalia, MD
Lilyana Angelov, MD
Gene Barnett, MD
Samuel Chao, MD
Bruce Cohen, MD
Joung Lee, MD
Jeremy Rich, MD
Burak Sade, MD
Glen H. Stevens, DO, PhD
Tanya Tekautz, MD
Michael Vogelbaum, MD, PhD
Robert Weil, MD

Ob/Gyn & Women’s Health Institute
Joseph Crowe, MD
Jill Dietz, MD
Richard Drake, MD
Pedro Escobar, MD
Alicia Fanning, MD
Katherine Lee, MD
Lawrence Levy, MD
Chad Michener, MD
Holly Pederson, MD
Peter Rose, MD
Robyn Stewart, MD

Orthopaedic & Rheumatologic Institute
Michael Joyce, MD
Steven Lieberman, MD

Pulmonary Institute
Rendell Aston, MD
Thomas Gildea, MD
Michael Machuzak, MD
Peter Mazzone, MD
Madhu Sasidhar, MD

Pediatric Institute & Children’s Hospital
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Eric Kodish, MD
Michael Levien, MD
Gregory Plautz, MD
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