

PATIENT SAFETY AND QUALITY ASSURANCE

ASTRO'S ONGOING COMMITMENT TO THE *TARGET SAFELY* INITIATIVE

FIVE-YEAR RECAP

Tim R. Williams, MD, FASTRO, outlined the development of ASTRO's *Target Safely* initiative. He was ASTRO Chair in 2010 when a series of articles in *The New York Times* examined safety in radiation oncology. To address the "inferno of scandal that was looming over the specialty," he and the ASTRO Board developed the *Target Safely* initiative: Create an anonymous national database for error reporting; enhance and accelerate radiation oncology practice accreditation; expand the educational training programs to include intensive focus on quality and safety; develop tools for cancer patients to use in discussions with their radiation oncologists; and accelerate the development of the IHE-RO program.

SAVE THE DATES

ASTRO'S 58TH ANNUAL MEETING

ENHANCING VALUE
IMPROVING OUTCOMES

**Call for abstracts opens
December 16, 2015**

**Deadline for abstract submission
February 17, 2016**

MEETING DATES: SEPTEMBER 25-28, 2016

EXHIBIT DATES: SEPTEMBER 26-28, 2016

BOSTON CONVENTION AND EXHIBITION CENTER | BOSTON

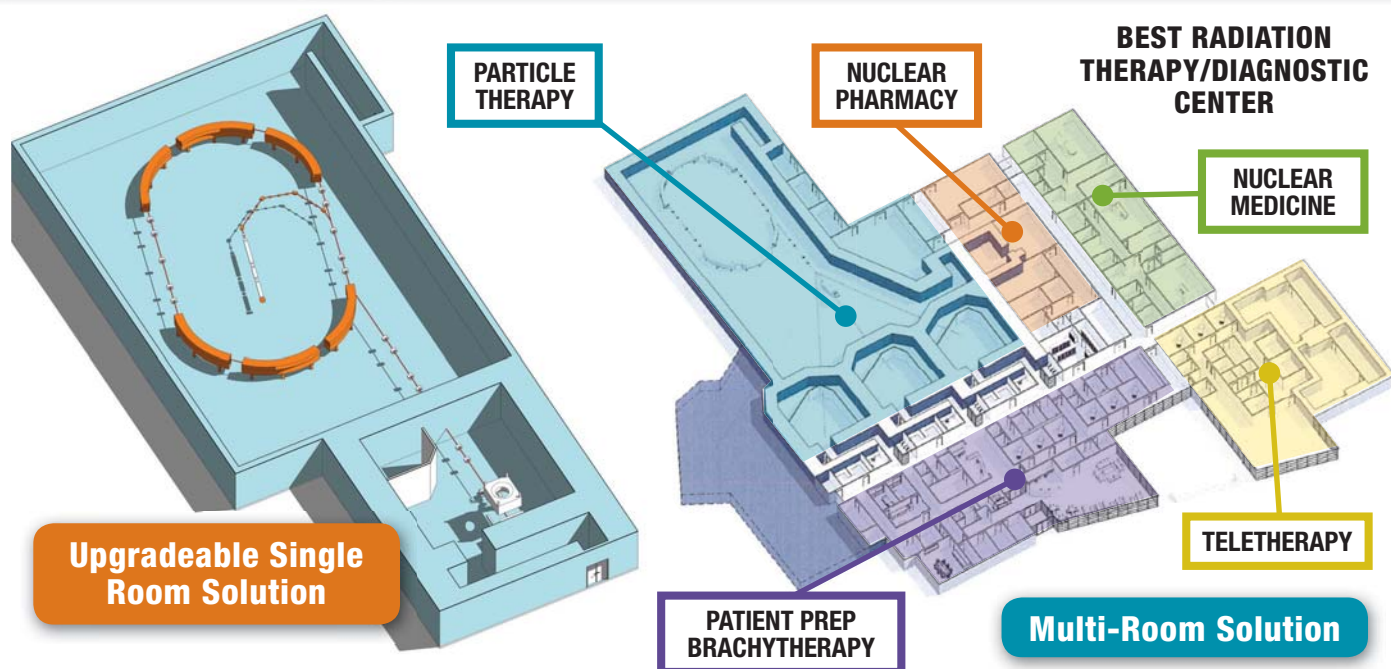
ASTRO

TARGETING CANCER CARE

Best[®] Particle Therapy



Best Medical Synchrotrons with variable energy from Proton to Carbon, in Single or Multi-Room Solutions, with or without Gantry!



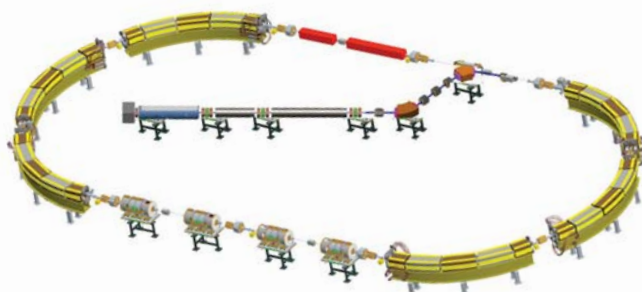
Best Proton–Carbon Therapy System

- A unique combination of advanced spot scanning with rapid energy modulation
- Elimination of neutron contamination associated with patient specific hardware

Rapid cycling technology

- Intrinsically small beams facilitating beam delivery with precision
- Small beam sizes – small magnets, light gantries – smaller footprint
- Highly efficient single turn extraction
- Efficient extraction – less shielding
- Flexibility – protons and/or carbon, future beam delivery modalities

**20 m x 10 m (75' x 38')
Smaller Area Footprint**



Best/BNL ion Rapid Cycling Medical Synchrotron (iRCMS)

Pending regulatory approval for sale in USA.

Best Particle Therapy, Inc. © 2015

Best Particle Therapy, Inc. One Best Drive, Pittsburgh, Pennsylvania 15202 USA
412 312 6700 800 706 6667 www.bestproton.com www.teambest.com

AFRICA | ASIA | EUROPE | LATIN AMERICA | MIDDLE EAST | NORTH AMERICA



ASTRO news

AMERICAN SOCIETY FOR RADIATION ONCOLOGY

ASTROnews (ISSN 1523-4185) is published quarterly at 8280 Willow Oaks Corporate Drive, Suite 500, Fairfax, VA 22031. Dues for individual membership in the American Society for Radiation Oncology are \$580 (U.S.), which includes \$38 for an ASTROnews subscription. Periodicals Postage Paid at Fairfax, VA 22030-9998 and at additional mailing offices.

Copyright 2015 ASTRO. All rights reserved.

POSTMASTER: Send address changes to ASTROnews, 8280 Willow Oaks Corporate Drive, Suite 500, Fairfax, VA 22031.

Telephone: 703-502-1550; Fax: 703-502-7852;

Website: www.astro.org/astronews.

Printed in the U.S.A., by Quad Graphics in Midland, MI

ASTRO accepts paid advertising. Although we make every effort to accept advertising only from reputable sources, publication of such advertising does not constitute an endorsement of any product or claim.

For all of the most recent news from ASTRO, please visit www.astro.org.

Printed on 10 percent postconsumer recycled paper, with eco smart inks.

14

Features

- 14 How practice patterns are changing to enhance quality and safety
A look at the quality and safety experiences of two different types of institutions.
- 18 *Target Safely* update
A look at the 2015 Annual Meeting session that highlighted the *Target Safely* initiative at five years.
- 21 Doctor as patient
Lori Lindstrom Leifer, MD, is a radiation oncologist who was diagnosed with cancer.
- 22 Results of 2015 ASTRO Member Survey
A look at the results of this year's Member Survey.

Inside

- 4 Editor's Notes
- 6 Chair's Update
- 8 Special Report

Society News

- 10 Fellowship grants
- 10 In Memoriam
- 11 Ambassadors
- 12 Special Tribute
- 24 2015 Annual Meeting Industry Recognition
- 27 Health Policy
- 28 RO-ILS
- 29 IHE-RO
- 32 From the ABR
- 34 Science Bytes
- 37 History
- 40 Journals

SENIOR EDITOR: Lisa A. Kachnic, MD, FASTRO
PUBLISHER Laura I. Thevenot

EDITORIAL DIRECTOR: Anna Arnone
MANAGING EDITOR: Erin L. Boyle

DESIGN/PRODUCTION: Kimberly Kerin
ONLINE PRODUCTION: Nikki Williams

ADVERTISING: Gene Conselyea
Triple Threat Media
732-598-3232
gene@triplethreatmedia.com

CONTRIBUTING EDITORS:
Adrienne Thrasher
Priya Lamba
Erin Young

EDITORIAL BOARD: H. Joseph Barthold, MD
Benjamin Falit, MD, JD
Amato J. Giaccia, PhD
Geoffrey S. Ibbott, PhD, FASTRO
Simon N. Powell, MD, PhD, FASTRO
Dirk Rades, MD
George Rodrigues, MD, PhD
Alexander Spektor, MD, PhD
Paul E. Wallner, DO, FASTRO

For additional and expanded stories not in the printed edition, visit www.astro.org/astronews.



ADVANCED PRECISION DESIGNED TO ADVANCE YOUR CLINIC.

Delivering dose with pinpoint accuracy is the hallmark of the **TrueBeam® system**. TrueBeam integrates imaging, motion management and patient positioning to provide optimal control for treatment delivery. With these robust tools you gain the confidence to deliver precise treatments, which helps set your clinic apart in the global fight against cancer.

[Learn more at varian.com/TrueBeam](http://varian.com/TrueBeam)

VARIAN
medical systems
A partner for **life**

Radiation treatments may cause side effects that can vary depending on the part of the body being treated. The most frequent ones are typically temporary and may include, but are not limited to, irritation to the respiratory, digestive, urinary or reproductive systems, fatigue, nausea, skin irritation, and hair loss. In some patients, they can be severe. Radiation treatment is not appropriate for all cancers. See varian.com/use-and-safety for more information.

© 2015 Varian Medical Systems, Inc. Varian, Varian Medical Systems, and TrueBeam are registered trademarks of Varian Medical Systems, Inc.

CREATING A CULTURE OF SAFETY: THE MISSIONS OF SAN ANTONIO, ASTRO AND YOUR ASTRONEWS SENIOR EDITOR



I WOULD LIKE TO COMMEND the ASTRO staff, leadership, committee members and presenters for another successful annual meeting. While ASTRO President, Bruce D. Minsky, MD, FASTRO, nicely summarizes our noteworthy plenary discussions on pages six and seven of this issue, I can share with you some personal highlights from the Clinical Trials Session. It was extremely exciting to have innovative immunology research featured in this session. Andy J. Minn, MD, PhD, from the University of Pennsylvania discussed the results of his group's phase I trial of radiation with immune checkpoint inhibition (anti-CTLA4) for metastatic melanoma using escalating doses of radiation (6-8 Gy x 2-3) given to a single-index metastatic lesion. In patients, no dose-limiting toxicities

occurred and major tumor regressions were noted both within and outside of the radiation field, with an impressive overall survival of 35 percent. Similar to his work in mice, low melanoma PD-L1 expression in clinical trial patients treated with radiation and anti-CTLA4 predicted markedly longer overall and progression-free survival, while high PD-L1 levels predicted rapid progression and persistent T cell exhaustion. These results will certainly inform future phase II trials and, most importantly, suggest a novel systemic therapy role for local radiation.

It was also great to have palliative care research emphasized in the clinical trial session. Paul W. Read, MD, PhD, from the University of Virginia Health System, presented the results of an integrated patient care program developed for advanced cancer patients. A total of 646 cancer patients were enrolled into this CARE Track program. End-of-life data of 368 CARE Track patients was compared to end-of-life data of 198 patients not enrolled in the CARE Track program (the control group). The CARE Track patients had significantly fewer end-of-life hospitalizations, more hospice care and fewer hospital deaths than the control group. This difference resulted in a reduced mean total cost of \$7,317 per patient in the last 90 days of life. The team is now enrolling patients to their "STAT RAD" program—a more rapid workflow for palliative radiation therapy for patients with bone metastases. Hopefully their results will be ready for next year's ASTRO Annual Meeting in Boston, as it would fit quite nicely with the 58th Annual Meeting theme, "Enhancing Value, Improving Outcomes."

While I was quite busy during this Annual Meeting moderating the many excellent scientific sessions, I did plan on a few spare hours to attend the Jackson Browne concert. However, I am disappointed to report that my readership failed to pony up a ticket for me, and it was completely sold out. Instead, I used the planned free time to visit the Concepción Mission. Founded in 1716, this mission was one of six authorized by the U.S. government to act as a buffer against the threat of European invasion. Reacting to the important need to provide public safety, 18th century missions in San Antonio served as community havens from Apache and foreign raids, as well as deadly diseases and drought. Churches were often the sites of these missions due to their sturdy construction. The Concepción Mission, for example, was built directly on bedrock, and its walls are four-feet-thick. Centuries old, this mission still has its original roof. It clearly has never seen a Boston winter!

Radiation oncology's current mission in the 21st century is quite similar. With the exponential growth of radiation delivery technology, we strive to develop and maintain robust departmental safety programs. While writing this editorial, I am now on day 56 at Vanderbilt. As an externally chosen chairperson, I bring a fresh set of eyes on existing quality assurance and patient safety measures. Vanderbilt has a great safety foundation, using Aria's Visual Care Path, our organization's white papers, and ASTRO's "Blue Book" *Safety is No Accident: A Framework for Quality Radiation Oncology and Care* to guide efficient and robust documentation and quality

assurance (QA) checks, in harmony with the institutional safety practices of Drs. Mantz and Powell, described on pages 15 and 17 in this issue. Yet, there are always opportunities for improvement. Luckily, ASTRO, now in its fifth anniversary of the *Target Safely* initiative, provides many outstanding tools to help streamline a continual tweaking process, including *Safety is No Accident*, which provides a real framework to develop departmental safety and to prepare for modern accreditation processes, such as the ASTRO Accreditation Program for Excellence (APEX®); the many ASTRO white papers and consensus guidelines; and the ASTRO incident reporting repository, RO-ILS: Radiation Oncology Incident Learning System®. See pages 18-20 for more details.


In brief, creating, or just continually tweaking a culture of safety is hard work so communication, engagement, teamwork, automation and education are paramount. I perform a 10-minute mandatory Monday morning huddle with all department staff and faculty to keep everyone on the same page with safety initiatives. If I can't overcome a QA barrier, I lean on my many bright and engaged department members to work together to develop an appropriate solution. I find that holding a general peer-review chart rounds twice a week, and having satellite and site-specific peer reviews, have been helpful in capturing nearly all cases prospectively. Double checking that the physician prescriptions match the plan (energies, bolus, fraction sizes, especially in palliative cases) is key. Education, re-education and continual monitoring of all QA policies and procedures should be performed. Biannual re-trainings and competency checks are powerful in this regard. Borrow from ASTRO's APEX survey guidelines and update all policies and procedures at least every two years because putting this



Mission Nuestra Señora de la Purísima Concepción de Acuña in San Antonio.

on the backburner for “when you have time” will never happen. Use available automated tools for clinic workflow, QA and reporting of near misses and misadventures, such as ASTRO's RO-ILS. These repositories will also serve us well in setting and monitoring safety metrics for the overall department and individual staff members. Create a no-blame environment for the reporting of these near or real misses, and have your QA committee perform root cause analyses with robust and accountable action plans within 24 hours of the event. Engage a QA leader and obtain hospital administration recognition and significant financial support for their important role. Further re-coop some clinical hours by employing physician extenders for inpatients and follow-ups, streamline your

templates on your medical record systems and deploy voice recognition software for your documentation.

Lastly, sign up for APEX and RO-ILS if you haven't done so already, check off part IV of your maintenance of certification (MOC) requirements (all of your department safety initiatives may now be used for MOC credit, which will save time—see page 32 for more information) and smile. Because creating and maintaining a robust culture of safety for our patients is the right thing to do. 

Dr. Kachnic is professor and chair of the Vanderbilt department of radiation oncology, Vanderbilt University Medical Center. She welcomes comments on her editorial, as well as suggestions for future ASTROnews topics, at astronews@astro.org.



ANNUAL MEETING HIGHLIGHTED TOP SCIENCE, CLINICAL RESULTS IN RADIATION ONCOLOGY

I had the pleasure of delivering the Presidential Address, focusing on the interface of technology and patient care. Remarkable advances in technology have led to improvements in the design, delivery and overall results of radiation therapy. I emphasized that, at the same time, our responsibility to be skilled and compassionate physicians is equally important. Technology and outstanding patient care are complementary, not competitive. I dedicated the talk to my mentors, colleagues and family who have provided me with boundless guidance and support for which I am so grateful.

The meeting opened on Sunday with the Presidential Symposium: “GI Cancer – Imaging, Staging, Genomics, Data Mining Approaches,” which featured three sessions on gastrointestinal cancer moderated by my mentors Leonard L. Gunderson, MD, MS, FASTRO, and Joel Tepper, MD, FASTRO. Session I focused on general issues in GI Cancer. The treatment of GI cancer is multidisciplinary, and the speakers included radiologists, gastroenterologists, radiation, medical and surgical oncologists. Robert C. Murphy, MD, PhD, discussed the latest data on the use of PET/CT imaging in GI cancers; Charles Lightdale, MD, presented the evolving use of endoscopic approaches for both staging and therapy; Adam Bass, MD, discussed the latest data on the genomics of

esophagus, gastric and rectal cancers, emphasizing the genomic similarities and differences in various portions of the GI tract and the resulting implications for tumor classification and therapy; and Vincenzo Valentini, MD, illustrated how data mining could be used to advance management of GI cancers. Session II focused on esophageal and EG junction cancers. Karyn A. Goodman, MD, discussed the indications for preoperative versus primary/definitive chemoradiation; Stephen G. Swisher, MD, discussed planned versus salvage surgery; and Dr. Tepper discussed peri-op, pre-op and post-op chemotherapy. In the final session, with an emphasis on rectal cancer, Claus Rödel, MD, evaluated the data related to preoperative chemoradiation versus using radiation or chemoradiation as the primary treatment modality. Jose Guillem, MD, discussed issues related to salvage therapy after local disease recurrence. Richard Goldberg, MD, summarized the extensive data on the evolving use of chemotherapy in colorectal cancer management and some of the newer approaches, including neoadjuvant chemotherapy.

The Clinical Trials Session, “Clinical Trials and Innovation in Radiation Oncology,” highlighted 10 top studies from this year’s Annual Meeting. Topics discussed included results of a double-blind randomized, controlled, superiority trial looking at dexametha-

ASTRO’S 57TH ANNUAL MEETING

this year centered on the theme of “Technology Meets Patient Care.” Nearly 11,000 radiation oncologists, physicists, dosimetrists, nurses and others attended the meeting at the Henry B. González Convention Center in San Antonio from October 18–21. The Annual Meeting featured 350 oral scientific sessions, 52 educational sessions, 26 panel discussions, 19 ePosters and 1,610 paper posters, with nearly 3,000 abstracts submissions received. Of special significance is the growing number of attendees from outside the U.S.—1,789 attendees were from other countries this year.

The meeting offered a wonderful mix of scientific abstracts, panels, joint sessions and three Keynote Addresses.

sone versus placebo in the prophylaxis of radiation-induced pain flare following palliative radiotherapy for bone metastases; a report from a phase II trial examining conformal radiation therapy for pediatric patients with localized ependymoma; and five-year oncologic outcomes of a randomized phase III trial examining hypofractionated versus conventionally fractionated radiotherapy for prostate cancer.

This year's Plenary Session showcased five highly rated abstracts. Tao Li, MD, PhD, discussed the results of a comparative interim analysis examining the clinical outcomes and toxicities of involved-field irradiation versus elective nodal irradiation for locally advanced thoracic esophageal squamous cell carcinoma. Supriya Chopra, MD, DNB, presented the phase III randomized clinical trial results of postoperative adjuvant conventional radiation (3-D CRT) versus image-guided intensity-modulated radiation therapy (IG-IMRT) for reducing late bowel toxicity in cervical cancer (PARC-ER trial). William U. Shipley, MD, FASTRO, reported on the results of NRG Oncology/RTOG 9601, a phase III trial of anti-androgen therapy with bicalutamide during and after radiation therapy following radical prostatectomy for patients with pT2-3pN0 disease and an elevated PSA. W. Robert Lee, MD, MS, MEd, FASTRO, also reported on a NRG Oncology randomized phase III non-inferiority study comparing two fractionation schedules in patients with low-risk prostate cancer. Vratislav Strnad, MD, shared five-year results of a randomized phase III trial of accelerated partial breast irradiation using sole interstitial multicatheter brachytherapy versus whole breast irradiation for patients with early breast cancer focusing on local control and survival rates. Benjamin Movsas, MD, FASTRO, and Lisa A. Kachnic, MD,




Connie Kissinger and Dr. Minsky hosted ASTRO's 57th Annual Meeting President's Reception.

FASTRO, did an outstanding job moderating the Plenary Session.

Arul Chinnaiyan, MD, PhD, gave the first Keynote Address on precision medicine related to oncology, "The Application of Integrative Sequencing for Precision Oncology." Francisco G. Cigarroa, MD, presented the second Keynote Address, "My Journey in Becoming a Transplant Surgeon and Chancellor of the University of Texas System: Never Leaving the Patient's Bedside." Gerald B. Hickson, MD, gave the final Keynote Address on "Addressing Behaviors that Undermine a Culture of Safety and Reliability."

And last, but in no way least, this year ASTRO honored the ASTRO 2015 Gold Medal Winners, 2015 Honorary Member, the class of 2015 Fellows and Survivor Circle Award winner at the Awards Ceremony. Carl R. Bogardus Jr., MD, FASTRO,

Carl M. Mansfield, MD, ScD (Hon.), FASTRO, and James B. Mitchell, PhD, FASTRO, received the ASTRO Gold Medal. Jack A. Roth, MD, received this year's Honorary Member designation. Seventeen ASTRO members were honored with the Fellow Designation. Vicki Shapiro received the Survivor Circle Award.

On a personal note, I was so pleased to see the great accomplishments of our Society. It was a true honor to be part of the meeting, and my sincere thanks to the ASTRO membership and staff for all your contributions. See you next year in Boston! 

Dr. Minsky is professor of radiation oncology and holds the Frank T. McGraw Memorial Chair at the University of Texas MD Anderson Cancer Center in Houston. He welcomes comments on this column at astronews@astro.org.

YEAR IN REVIEW AND WHAT'S AHEAD

ASTRO HAS CONTINUED TO FOCUS ON QUALITY AND SAFETY, the topic of this *ASTROnews* Winter edition, during the past year, as well as promoting education, science, clinical practice and advocacy.

This year, *Target Safely* celebrated five years since its inception to enhance safety and quality in radiation oncology. This ASTRO safety initiative sought to create an nonidentifiable national database for error reporting, RO-ILS: Radiation Oncology Incident Learning System®; establish a radiation oncology practice accreditation program, APEX®, the ASTRO Accreditation Program for Excellence; expand educational training programs to include a focus on quality and safety; develop tools for cancer patients to take back to their primary care physicians and oncologists to discuss radiation; and accelerate the development of the IHE-RO program. *Target Safely* has been a marked success and all fronts are gaining momentum.

In our continued effort to provide educational offerings to members, we added live self-assessment sessions to our meetings, including 10 self-assessment (SA)-CME sessions at the recent Annual Meeting. These special sessions have been designated as live SA-CME sessions to help physician and physicist attendees meet the requirements of the American Board of Radiology's (ABR) Maintenance of Certification (MOC) program.

Online education offerings at www.astro.org have also been expanded this year. Offerings include the online self-assessment modules (SAMs), which are qualified to meet the Part Two requirement of the ABR's MOC program.

These can be found at www.astro.org/onlinesams. Webinars are another online educational offering from ASTRO, and often offer the option to participate on demand. These can be found at www.astro.org/webinars. Virtual Meetings provide a chance to view scientific programming at past ASTRO meetings. Virtual Meetings can be found at www.astro.org/virtual-meetings. Watch for even more robust Virtual Meeting offerings in 2016.

As part of ASTRO's live educational offerings, we are looking forward to the upcoming Multidisciplinary Head and Neck Cancer Symposium, February 18-20, 2016, at the JW Marriott Camelback Inn Resort and Spa in Scottsdale, Arizona. The meeting will provide updated information on multidisciplinary therapies, the latest clinical research, science and new treatment approaches. A record number of scientific abstracts were submitted this year, and the program includes oral abstract sessions, keynotes, general sessions on major disease sites, interactive and panel discussions and a tumor board. The meeting is co-sponsored by the American Head and Neck Society, the American Society of Clinical Oncology and ASTRO. Find out more about the meeting at www.headandnecksymposium.org.

The Precision Medicine Workshop, with a focus on precision medicine in radiation oncology, is set for June 16-



17, 2016. It will be held at the National Institutes of Health Bethesda Campus, Bethesda, Maryland. Areas to be addressed will include genomics, imaging and real-world challenges.

We are in the early planning stages for the Multidisciplinary Thoracic Cancers Symposium. Scheduled for March 16-18, 2017 in San Francisco at the San Francisco Marriott Marquis, the meeting will bring together radiation and clinical oncologists, thoracic surgeons and all members of the treatment team for a comprehensive meeting for the thoracic cancer community. For more information about this meeting, visit www.thoracicsymposium.org.


This year, *Target Safely* celebrated five years since its inception to enhance safety and quality in radiation oncology.

We were excited to launch a new clinical research open-access journal, *Advances in Radiation Oncology*, this year. *Advances* is led by Robert C. Miller, MD, MBA, of the Mayo Clinic. *Advances*, which began accepting submissions in the fall of 2015, is publishing peer reviewed clinical trial reports and re-analyses; basic science original reports; manuscripts examining comparative and cost effectiveness research; and case reports. It also seeks high quality multi- and single-institutional series, as well as novel retrospective series; timely critical reviews; articles reporting the natural history of disease and patterns of failure; and articles on practice transformation in radiation oncology. Authors pay an article processing charge if their paper is accepted.

Lastly, ASTRO made strides in

the advocacy field in 2015. More than 200 members of Congress weighed in against the proposed Medicare cuts to radiation oncology services in letters sent to the Centers for Medicare and Medicaid Services (CMS). The letters, sponsored by ASTRO champions Sens. Richard Burr (R-N.C.) and Debbie Stabenow (D-Mich.) and Reps. Devin Nunes (R-Calif.) and Paul Tonko (D-N.Y.), urged the agency to reconsider proposed cuts to radiation therapy in the 2016 physician fee schedule that could jeopardize patient access to care. As a result of ASTRO's efforts, CMS scaled back the cuts to radiation oncology overall to two percent and freestanding centers to about three percent, compared to three percent and nine percent respectively. We also continue to work toward our three alternative payment model (APM) goals.

Those goals aim to reward radiation oncologists for participation and performance in quality initiatives that lead to reduced costs; ensure fair and stable payment for radiation oncologists in both hospital and community cancer clinics to protect cancer patients' access to care; and incentivize the appropriate use of cancer treatments that result in the highest quality of care and best patient outcomes.

In closing, 2015 has been an exciting year for ASTRO, with the five-year anniversary marking the successful implementation of the *Target Safely* initiative, as well as in our successful meetings and online educational efforts and advocacy work in Washington. With the addition of the journal *Advances*, ASTRO continues to advance and improve the delivery of high quality care to all patients. 

2015 ANNUAL MEETING PROMOTIONAL SUPPORTERS

GOLD				
SILVER				
BRONZE	CIVCO Medical Solutions	Hologic	ProTechSure Scientific	
COPPER	D3 Oncology Solutions	ProNova	Sun Nuclear	Virtual

SOCIETY NEWS

ASTRO Minority Summer Fellowship grants stipends to medical students

This year's 2015 ASTRO Minority Summer Fellowship Grant was given to three medical students to introduce them to the clinical, basic and translational aspects of radiation oncology early in their medical training.


The grants, which began in 2010, are given to students under-represented in medicine, with preference to students who are in their first or second year of study. This year, three grants were awarded, each including a stipend for an eight-week mentored training program at an institution of his or her choice; an additional amount when a final report was completed; and funding for attendance at the 2016 ASTRO Annual Meeting, where winners are encouraged to present their research findings from the program.

Each candidate must have a primary mentor who is an assistant professor or greater. The mentor works with the student to plan, direct and execute the project, and is required to meet with the applicant at least once a week. The primary or co-mentor of the project must be an active ASTRO member and an accomplished investigator in the area of research being targeted by the student applicant. All fellowship projects must be involved in clinical or basic science, giving the applicant experience with a research project and clinical exposure. There are two research tracks: Clinical Research Fellowship and Basic Science Research Fellowship.

ASTRO's Healthcare Access and Training Subcommittee reviews applications and chooses awardees of the Minority Summer Fellowship Grant.

The students chosen to receive the 2015 grants are Rasidat Adeduntan and Maxwell Ofori, both in their first year of medical school, and Oscar Padilla, in his third year of medical school.

Ms. Adeduntan's research project was "Comparison of Coronary Artery Calcium Scores after Mediastinal Radiotherapy with Protons Versus Conventional Photon Therapy," under the guidance of mentor Karen M. Winkfield, MD, PhD. Mr. Ofori's research project was "Is the chaperone nucleophosmin-1 a rational target for radiation sensitization of cancer?" and was conducted under mentor Michael L. Freeman, PhD. Mr. Padilla's research project was "Feasibility of IMRT-planned simultaneous integrated boost as a strategy for dose-escalation of spine radiosurgery," and had the assistance of mentor Kevin S. Oh, MD.

Applications for the 2016 Minority Summer Fellowship Award are now being accepted. The deadline to submit is Friday, March 4, 2016. For more information, visit www.astro.org/minoritysummerfellowship. 



IN MEMORIAM

ASTRO has learned that the following members have passed away. Our thoughts go out to their family and friends.

Lucia Boselli, MD

Donald S. Childs, MD, FASTRO

Robert W. Edland, MD, FASTRO

William T. Moss, MD, FASTRO

Robert J. Shalek, PhD, FASTRO

Wolfgang Wagner, MD

The Radiation Oncology Institute (ROI) graciously accepts gifts in memory of, or in tribute to, individuals.

For more information, call 1-800-962-7876 or visit www.roinstitute.org.

2015 CORPORATE AMBASSADORS PROMOTIONAL SUPPORTERS



PHILIPS

SIEMENS

VARIAN
medical systems

A partner for **life**

ROBERT W. EDLAND, MD, FASTRO: MEMORIES OF A PAST ASTRO PRESIDENT

IT IS MY DISTINCT PRIVILEGE to be asked to write a tribute to one of my closest friends and longtime professional associates, Robert W. Edland, MD, FASTRO.

Bob started his career in diagnostic radiology, but eventually saw the light and completed a fellowship in radiation oncology at the University of Maryland in 1964. He was chief of radiation oncology at Tripler Hospital in Oahu, Hawaii, ending 11 years of service in the Medical Corps of the U.S. Army as a lieutenant colonel in 1967. He spent three years in academic practice at the University of Wisconsin Medical School in Madison, Wisconsin, following which he founded the department of radiation oncology at the Gundersen Clinic in La Crosse, Wisconsin, where he spent the remainder of his professional career.

Bob was extremely active in the affairs of both the American College of Radiology (ACR) and ASTRO, serving as the secretary of ASTRO, and in 1986, he was elected president of ASTRO followed by a term as Chair of the Board of Directors.

He was a counselor to the ACR for seven years, and a member of the steering committee and chairman of the commission on radiation oncology of the ACR. He served a four-year term as an examiner in radiation oncology for the American Board of Radiology.

As a counterpoint to his academic and professional achievements, Bob was the consummate raconteur. His Ole and Lena stories could make you laugh until you cried. His devoted wife Carole was often the good-natured brunt of




Above: James D. Cox, MD, FASTRO, Luther W. Brady, MD, FASTRO, and Dr. Edland confer during an ASTRO meeting in the 1980s. Dr. Cox was president of ASTRO preceding Dr. Edland, from 1985-1986; Dr. Brady was president from 1971-1972.



To the left: Dr. Edland was president of ASTRO from 1986-1987.

these stories. Bob and Carole were two of the most unique and special people that I've ever had the pleasure of calling true and dear friends. My wife, Norma, and I knew them since our earliest years in ASTRO and the ACR, starting in the early 1970s. We traveled together many times to meetings ranging from Hawaii to Paris, and multiple ASTRO

and ACR meetings in between. Bob's poor health over the last few years limited his travel, but we always stayed in close contact, still swapping stories.

Bob will truly be missed as a physician, a leader and as a very close friend. 

Dr. Bogardus is professor and vice chair, department of radiation oncology, Stephenson Cancer Center, University of Oklahoma Health Sciences Center. He is a past president of ASTRO (1989-1990).

Take Patient Comfort to the Next Level

CIVCO's New C-Qual M™ Breastboard featuring the innovative Monarch™ Overhead Arm Positioner is designed to comfortably position and treat patients.

Monarch™ Overhead Arm Positioner

NEW!

Adjustable Monarch Overhead Arm Positioner increases positioning options for patients of varied torso lengths

Matches body contours for optimal arm support and patient comfort

Dual function hand grips allow for enhanced wrist comfort and increased positioning options

Easy on/off latch system of the Monarch Overhead Arm Positioner eliminates need for tools to make adjustments

Image-friendly materials optimized for multi-modality use

Enhanced bottom stop and optional Pearltec lumbar cushion comfortably support the patient

 **C-Qual M™**
Breastboard

Learn more about the benefits of C-Qual M and Monarch at civco.com

Committed to Positively Impacting Patient Care

info@civco.com | www.civco.com/ro

COPYRIGHT © 2015, CIVCO IS A REGISTERED TRADEMARK OF CIVCO MEDICAL SOLUTIONS. C-QUAL M AND MONARCH ARE TRADEMARKS OF CIVCO. ALL OTHER TRADEMARKS ARE PROPERTY OF THEIR RESPECTIVE OWNERS. ALL PRODUCTS MAY NOT BE LICENSED IN ACCORDANCE WITH CANADIAN LAW. 2015P1040 REV.A

 **CIVCO**
MEDICAL SOLUTIONS
Radiation Oncology

How practice patterns are changing to enhance quality and safety

BY THOMAS J. EICHLER, MD, FASTRO
WITH CONSTANTINE A. MANTZ, MD, AND SIMON N. POWELL, MD, PHD, FASTRO

NEARLY 25 YEARS AGO, I was an enthusiastic, freshly minted radiation oncologist launching my career. I still had (a little bit of) hair and could still hear reasonably well. I joined a thriving private practice consisting of three other



physicians with our collective experience in the neighborhood of 10 years. A couple of months into my job, I was sitting in a meeting with my partners. I remember posing this question: “Do you think that we should write a note to document that we simulated a patient?” There was an eternity of silence until my senior partner spoke: “Why?” My rationale was simple. “Because someday, we’re going to be required to document what we do.”

Well, didn’t I look smart and forward thinking! Not really. It just made sense to me that the attending physician should maintain a paper trail of the process of care for each patient. Now, don’t

be quick to harshly judge: it was a vastly different specialty than it is today. Prostate cancer was treated with 4 fields to 6840 cGy. Chemotherapy for head and neck cancer “didn’t work.” No one had a desktop computer. Implant parameters were calculated by hand. The Internet was an enticing black box called the WorldWideWeb. The Medicare Physician Fee

Schedule was in its infancy, still 10 years from being fully implemented. CMS was called HCFA.

We were doing our best to provide safe and effective radiotherapy, but we all knew we could do better.

Times have changed, mostly for the better. Few would argue with the fact that the tools with which we operate today are vastly superior and enormously more complex than two decades ago. Likewise, documentation has gone from an afterthought to an accepted part of the process of care, and integral to reimbursement in the current fee-for-service system. The last five years, however, may be remembered as being a new era of patient safety, a period when institutions and physicians embraced rigorous quality assurance (QA) principles and adopted stricter guidelines to improve outcomes and obviate potentially hazardous practices. As is often the case, the impetus for change may be born from disaster; the airline industry is a telling example. In the case of radiation oncology, it was the front-page news of patient deaths resulting from errors. In the painful aftermath, our specialty took a long, hard look in the mirror and didn’t like what it saw. But instead of burying our heads in the sand, we took a proactive approach to safety and quality that is already paying dividends and changing the way we practice for the better.

As we mark the fifth anniversary of ASTRO’s *Target Safely* initiative, *ASTRONews* reached out to a large private practice organization and a well-known academic institution to get some sense of what changes they’ve made in recent years, and how they’ve incorporated more oversight into the process of care.

Times have changed, mostly for the better. Few would argue that the tools with which we operate today are vastly superior and enormously more complex than two decades ago.

Constantine A. Mantz, MD

Chief medical officer, 21st Century Oncology (21C)

Have any of the recent publications in the *International Journal of Radiation Oncology • Biology • Physics* (Red Journal), *Practical Radiation Oncology* (PRO), *Safety is No Accident: A Framework for Quality Radiation Oncology and Care* or other ASTRO manuscripts, caused you or your facility to alter quality assurance initiatives?

Our quality assurance program is informed by a number of sources, including *Safety is No Accident*, white papers and guidelines. We also refer to practice parameters and technical standards published by the American College of Radiology (ACR), American Brachytherapy Society, American Academy of Pain Medicine and others. Of course, state and federal licensure requirements and regulations are foundational. In general, we reference high-recognition, consensus expert group guidance in selecting and organizing the elements of our QA program, and continuously update the program as these groups update their guidance documents.

Can you tell us how your practice incorporated ASTRO clinical practice guidelines that were published in ASTRO's Red Journal or PRO, and how those clinical guidelines from ASTRO have enhanced safety and quality?

We have abstracted from both ASTRO's practice guidelines and white papers to inform our Best Practices Guidelines and Physics Quality Control Program, respectively. We have also utilized guidance material published by ACR and AAPM. I have found ASTRO's material—particularly, the white papers on quality processes of advanced technologies—to be most pragmatic and helpful to our quality efforts.

What specific actions have you implemented in your practice to improve quality and safety?

Two key quality and safety initiatives within our company have been the creation of a section of Physics Quality Control within our Medical Physics department and electronic treatment prescribing.

Our Physics Quality Control team consists of a dedicated director with support staff, and is broadly tasked with harmonizing quality management throughout our network to a set of high standards of equipment validation and testing, staff training, information systems operability and safe practices. More specifically, the Physics Quality Control team coordinates with medical leadership in authoring and maintaining standard operating procedures, manages responses to

reported incidents and oversees practice accreditation activities.

We also internally developed and implemented an electronic treatment prescription in 2009. We did so in order to capture and transmit prescribing information to treatment planning and delivery staff in a more complete and efficient manner than commercially available EMR systems could achieve at that time. Furthermore, we have encoded flags within the prescription to alert physicians when needed planning parameters, such as organs at risk constraints, are missing prior to signing and completing the order.

Have any of the widely reported radiation-related adverse incidents over the past five to 10 years caused you or your facility to alter QA programs?

These tragic accidents—having occurred within reputable practices and departments—certainly motivated us. At the time, we believed our quality assurance program was good, and it had been key to our high rate of achieving practice accreditation status among our practice sites. Thereafter, we decided to leverage our electronic data management systems and staffing structure in order to augment our QA program and our clinical operations in general.

We concluded that improving the quality and transmission of prescribing information and organizing quality and safety oversight under a dedicated section and staff would help prevent errors, recognize incidents early and address them efficiently. We then formed workgroups within the company and launched our electronic treatment prescribing and physics quality control initiatives.

How have ASTRO's offerings on safety and quality in the last five years enhanced the QA in your practice?

I think ASTRO's published guidance—especially *Safety Is No Accident*—echoes our own quality and safety efforts to a great degree and satisfies us that our respective visions on this crucial matter are aligned.



Continued on Page 17

Game of Codes: The CPT/RUC process

BY PRIYA LAMBA, ESQ, MEDICARE POLICY MANAGER, PRIYA.LAMBA@ASTRO.ORG

While billing Current Procedural Terminology (CPT) codes is a ubiquitous and essential part of medical care, few understand how these codes are developed and lead to reimbursement for radiation oncology and other health care services.

Each CPT code is associated with a specific service and assigned a certain value. The value assigned to the code is used to determine the reimbursement that providers receive for that service. Radiation oncology CPT codes are developed and valued through ASTRO's participation in the American Medical Association's (AMA) CPT Editorial Panel and the AMA/Specialty Society Relative Value System Update Committee (RUC). The CPT Editorial and RUC panels review codes for all of medicine, and have members representing the entire medical profession, as well as representatives from non-physician health organizations and payers. ASTRO's Health Policy Code Development and Valuation Subcommittee (CDVC) collaborates with the AMA to revise, establish and value radiation oncology CPT codes.

The CPT Editorial Panel meeting is the first step in the creation or revision of radiation oncology CPT codes. Stakeholders, including ASTRO, can submit a code change proposal (CCP) to the panel to request new codes or revise existing codes. The CCP is a comprehensive application requiring a definition of the service, a detailed description of the work, adoption and utilization data and literature supporting the clinical efficacy of the service. Advancements in radiation therapy, such as the adoption of a new treatment modality or an improvement in an existing process of care for radiation therapy, require new or revised CPT codes. At times, the Centers for Medicare and Medicaid Services (CMS) and the RUC panel ask ASTRO to update existing codes to reflect current practices in radiation therapy.

After submission, the CPT Editorial Panel reviews the CCP and discusses the application at a meeting, where the applicants answer questions from the panel. The panel can reject, approve or delay the CCP. The panel can approve codes as Category I, used for well-established and adopted services or procedures, or Category III, used for new and emerging technology and procedures. Insurance companies assign values to Category III codes, commonly known as "carrier pricing," while Category I codes proceed to the RUC process to obtain a value used for the reimbursement rate.

When a code is submitted to the RUC panel, the specialty conducts a survey to determine the resources and time used for the particular service described by the CPT code. The survey asks for information on the technical component (TC) and/or the professional component (PC) of that particular CPT code. The TC includes the cost of equipment, staff, supplies, etc.;

the PC includes the physician work, time and supervision in providing the service. ASTRO uses data gathered from the surveys to present a recommendation for the code value to the RUC panel. The RUC panel can accept the value or change it prior to making a recommendation for a value to CMS. CMS then publishes the new CPT codes and their values in the proposed Medicare Physician Fee Schedule (MPFS) rule for public comments. The values are set in the final MPFS rule and go into effect January 1 of the implementation year. There is a two-year gap between when codes go through the CPT/RUC process and implementation.

While some have criticized the CPT/RUC process for allowing physician specialties to drive the valuation of services, the process continues to evolve to ensure a balanced, transparent and rigorous effort. ASTRO remains committed to playing a leading role in the CPT/RUC process, as well as CMS rulemaking, to ensure that radiation oncology codes keep up with the advancements in the specialty and ensure appropriate reimbursement.



Simon N. Powell, MD, PhD, FASTRO

Chairman of radiation oncology, Memorial Sloan Kettering Cancer Center (MSKCC)

Have any of the recent publications in the Red Journal, *Safety is No Accident* or other ASTRO manuscripts, caused you or your facility to alter quality assurance initiatives?

MSKCC is an institution that exists and survives solely on its reputation for excellence. If we have an event in radiotherapy that would significantly undermine patient confidence in our institution, then the demand of patients to be seen in our institution would rapidly diminish. I have worked in four different academic institutions of high quality and reputation. There is no doubt in my mind that our current safety initiatives are more developed than in any other place that I have worked or visited.

Can you tell us how your practice incorporated ASTRO clinical practice guidelines that were published in the Red Journal or *PRO* and how those clinical guidelines from ASTRO have enhanced safety and quality?

As an organization, MSKCC standardizes our treatments for all disease sites, such that we conform to an internal guideline already. Since many of our faculty contributed to the ASTRO clinical practice guidelines, our internal guidelines and ASTRO's are well aligned.

How do you think these changes in practice patterns have affected the patient experience? Have you surveyed your patients with patient satisfaction surveys on the topic?

Our patient satisfaction on trust and safety/quality is very high. We undertake regular Press-Ganey scoring systems. Our major concern in patient experience continues to be wait times, as we are always adding ad hoc urgent patients to clinic lists. We have undertaken many initiatives to improve wait times and to improve communication of expected times to be seen. For radiotherapy treatments, we have made a significant impact by adopting flexible treatment assignments—if the patient's assigned machine is delayed, we move them to another machine, with identical output parameters, so as to avoid major hold-ups on the delayed machine.

Have any of the widely reported radiation-related adverse incidents over the past 10 years caused you or your facility to alter QA programs?

Yes, we have made our plan-checking quality assurance even more rigorous. We usually perform a virtual simulation of the patient prior to day one of treatment to make sure there are no unexpected planning events that have not been identified

in the rigorous plan checking. The chance of an unmodulated intensity-modulated radiation therapy plan getting past this multi-layered plan-checking process is just about zero.


How have ASTRO's offerings on safety and quality in the last five years enhanced the QA in your practice?

They have reinforced the importance of safety and quality. Our institution functions entirely on reputation. Anything that blemishes that reputation would be a major problem for us, which makes us highly aware of safety and quality at all times. We are strongly self-motivated—ASTRO's pronouncements reinforce those issues.

In summary

Many practices may see themselves in 21C or MSKCC, practicing high quality radiation oncology, using established pathways, guidelines, best practices and model policies. Others, however, may see the opportunity for improvement by adopting more meticulous standards. Still others may want to consider practice accreditation through ASTRO's APEX program or an incident learning system such as RO-ILS.

I've heard the argument that physicians are not reimbursed for the additional time required for appropriate patient safety and quality assurance measures. On the contrary, physicians are paid for their labors in accordance with the established relative value units system. Quality, however, is expected and is not rewarded as a separate line item within a particular code. On the other hand, quality does have its rewards—and penalties—with adherence to the Physician Quality Reporting System.

And so it goes. The process of care has changed, for the better I would argue. Drs. Mantz and Powell have itemized their approaches to ensuring that their patients are treated in a safe environment that may require extra steps and more effort. Shouldn't our patients expect that level of care? I ask you to step back and hold the mirror up to your practice. Are you happy with what you see? Can you do better? My guess is that we all have room for improvement. We owe it to that human being sitting across from us, don't we? After all, some of us will be in that seat someday... 

Dr. Eichler, ASTRO Health Policy Council Chair, works at Thomas Johns Cancer Hospital, Richmond, Virginia.



TARGET SAFELY update session highlights FIVE YEARS OF PROGRESS

The five years' of progress of ASTRO's *Target Safely* initiative were outlined in Panel 14, "*Target Safely: ASTRO's Accomplishments in Five Years*" at ASTRO's 57th Annual Meeting in San Antonio.

The session was moderated by Jim Hayman, MD, FASTRO, who gave an overview on the initiative, including the tenants of the campaign that became *Target Safely*. Five speakers discussed different aspects of the radiation oncology initiative: Tim R. Williams, MD, FASTRO, discussed how the ASTRO Board of Directors developed the *Target Safely* plan; Anthony L. Zietman, MD, FASTRO, discussed chairing the multi-society effort to create *Safety is No Accident: A Framework for Quality Radiation Oncology and Care*; Benedick A. Fraass, PhD, FASTRO, discussed the series of Quality Assurance (QA) White Papers and the Integrating the Healthcare Enterprise (IHE-RO) initiative; Dr. Hayman discussed APEX®, the ASTRO Accreditation Program for Excellence; and Lawrence B. Marks, MD, FASTRO, discussed RO-ILS: Radiation Oncology Incident Learning System®.

DEVELOPING TARGET SAFELY

Dr. Williams outlined the development of ASTRO's *Target Safely* initiative. He was ASTRO Chair in 2010 when a series of articles in *The New York Times* examined safety in radiation oncology. To address the "inferno of scandal that was looming over the specialty," he and the ASTRO Board developed the *Target Safely* initiative: Create an anonymous national database for error reporting; enhance and accelerate radiation oncology practice accreditation; expand the educational training programs to include intensive focus on quality and safety; develop tools for cancer patients to use in discussions with their radiation oncologists; and accelerate the development of the IHE-RO program.

"We came up with an action plan through the remarkable effort of the board. A lot of very smart people came up with some very good ideas as to what we could do through a multi-pronged front," he said.

The *Target Safely* initiative has since brought safety and quality to the forefront of all radiation oncology practices in a positive way, he said.

SAFETY IS NO ACCIDENT

"We decided that, having come up with this *Target Safely* campaign, we needed to embody it in some way—there had to be a document that recorded it, something that could be updated regularly, something that could be disseminated widely and something that would be a benchmark of the ways in which our culture was going to change," Dr. Zietman said.

"The revised 'Blue Book,' now called *Safety is No Accident: A Framework for Quality Radiation Oncology and Care*, would enshrine these values and provide the foundation for a modern accreditation program, such as APEX," he said. He described how issues in radiation oncology in the past were the result of "over-exuberant use of technology."

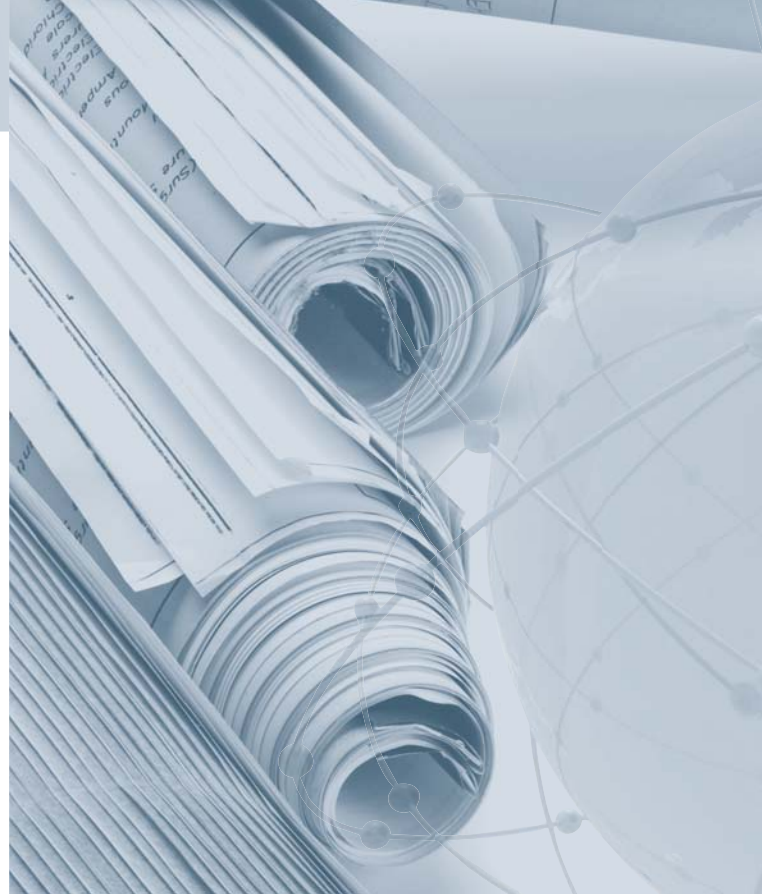
"Technology requires minimums of staffing, training and experience," he said. "Complexity requires new thinking and new procedures. Quality assurance and teamwork should be integrated into training and culture."

The previous five "Blue Books" reflected the state of radiation oncology practice from the earliest in 1968, *A Prospect for Radiation Therapy in the United States*, to the most recent "Blue Book" in 1991, *Radiation Oncology in Integrated Cancer Management*. These books were written by a group of radiation oncologists, biologists and physicists, sponsored by the Intersociety Council for Radiation Oncology and published by the American College of Radiology.

At the 2011 Intersociety Meeting, an array of stakeholders, including all the relevant societies in the space, determined to write an updated "Blue Book," with ASTRO staff and leadership leading the way. Goals included giving the *Target Safely* campaign "strength and permanence." It looked to address specific requirements of the structure, personnel and process of the modern radiation oncology center, Dr. Zietman said.

"*Safety is No Accident* was aimed to set a high bar and do so in an unapologetic fashion," he said, while also respecting new information about quality assurance and how the interdisciplinary team fits into the treatment equation.

Four writing teams were formed to work on the process, team, safety and QA aspects for the *Safety is No Accident* target audiences: the radiation oncology team, hospital executives, vendors and the public. James Galvin, PhD, led



the team that looked at standards on the process of care in radiation oncology, such as operational categories including patient evaluation, treatment delivery and follow-up care. Theresa Kwiatkowski, CMD, RT, led the team that looked at standards for the radiation oncology team, including qualifications and training, continuing education and staffing requirements. Dr. Marks led the team that looked at safety standards, including establishing a safety culture, ingraining safety into everyday practice and increasing collaboration between vendors and users. Dr. Fraass led the team that looked at management of quality assurance in radiation oncology.

“*Safety is No Accident* will be updated through the Inter-society Meetings, and I think it’s going to be a living document. This was an extraordinary collaborative effort. It was done very quickly, and it was done with an incredible sense of ownership and responsibility,” Dr. Zietman said. “Ultimately, I do believe, that by swift movement and by leadership, we changed the culture of radiation oncology.”

The value of *Safety is No Accident* has been recognized by the international community, with a recent request by the Japanese Society for Radiation Oncology (JASTRO) to translate the “Blue Book” into Japanese.

QA WHITE PAPERS, INTEGRATING THE HEALTHCARE ENTERPRISE (IHE-RO) INITIATIVE

In the process of planning *Target Safely*, five QA White Papers and IHE-RO safety-related profiles were established, Dr. Fraass said.

“At the end of January [2010], I got a call from the ASTRO Board one morning, [saying], ‘We want the Multidisciplinary Quality Assurance Subcommittee to organize some white papers.’ They asked for intensity-modulated radiation therapy (IMRT), image-guided radiation therapy (IGRT), stereotactic body radiation therapy (SBRT) and high-dose rate (HDR) brachytherapy. We added peer-review later,” he said.

Writing groups started the first four projects in early March 2010, with a list of expert reviewers lined up. The IMRT White Paper first draft, “Safety considerations for IMRT: Executive Summary,” led by Jean Moran, PhD, was the first completed, and was in early review by May 2010.

“You know how these things work—getting this from start to an actual working draft in a couple months is phenomenal,” Dr. Fraass said.

The IMRT Safety White Paper manuscript was published in a 2011 issue of *Practical Radiation Oncology* (PRO). It looked at topics not often discussed: environmental issues; culture of safety; the need for collaboration across vendors,

users and regulators to improve safety; explicit discussion of catastrophic failures and their prevention; and acknowledgment that prevention of catastrophic failure might be different than staple routine quality assurance.

“There are detailed recommendations for how to guard against catastrophic failures for this particular technique,” he said.

In addition to white papers on other radiation oncology techniques, Dr. Fraass and colleagues also wrote “Enhancing the role of case-oriented peer-review to improve quality and safety in radiation oncology: Executive summary,” published in *PRO* in 2013.

“Peer-review is not just checking the MD,” he said. “Peer-review is a general technique, which is one of the very few methods for quality assurance and non-technical issues, like target volume delineation. Peer-review can check decisions involving tradeoffs, those with several right answers and issues where there is no specific quality metric.”

On the topic of IHE-RO, which he also discussed, Dr. Fraass said: “IHE-RO is an effort that ASTRO has been supporting and running for the field of radiation oncology for 10 years. It’s part of the international effort called Integrating the Healthcare Enterprise. We support the radiation oncology domain.”

IHE-RO assists in making treatment plans run smoothly through software compatibility. He said interoperability between machines and users is key to safety.

Continued on Page 20

“Fundamentally, the way IHE-RO works is, you develop integration profiles to specify how standards will be used to satisfy specific-use cases,” he said.

“Profiles are generated and then tested by vendors at IHE-RO ‘Connectathons,’ where the vendors all get together and users are there to score the connectivity and to make sure that things work correctly. And you actually find out and test that interoperability is solved. It’s challenging because all of this has to happen under the rules of the international IHE group.”

There are approximately 16 IHE profiles either in progress or completed in radiation oncology.

“Every one of these profiles helps guarantee the safe transmission of information and the safe consumption by the other system as you move from one system to another. It’s crucial to the infrastructure that we all use,” Dr. Fraass said.

PRACTICE ACCREDITATION (APEX)

APEX grew out of a need to support safety and quality in radiation oncology as part of the *Target Safely* initiative, Dr. Hayman said. Practice accreditation is promoted in *Target Safely* for several reasons, including that accreditation demonstrates that the appropriate structures and processes have been put in place, promotes quality and safety, identifies areas that need improvement, provides accountability and improves patient and stakeholder confidence.

“In my mind, accreditation isn’t so much passing a test as working in a systematic way to improve processes in your department,” he said.

Dr. Hayman, who collaborated on establishing the program, said it was designed to be patient and safety centered, with a focus on quality improvement. It is objective, transparent and efficient, he said. *Safety is No Accident* was the foundation of the program, as well as patient-centered care, he said. Other contributing factors to APEX were the QA White Papers, American Association of Physicists in Medicine (AAPM) Task Group reports and NQF-endorsed measures.

APEX is now fully operational, with over 30 radiation oncology practices (more than 70 facilities) currently in the APEX process, 20 radiation oncology practices (50 facilities) having completed the application and in the self-assessment phase; and two radiation oncology practices (five facilities) that have completed the facility visit portion of the accreditation process and are in the final determination phase.

INCIDENT REPORTING: RO-ILS

Incident reporting is a vital component of establishing a culture of safety in radiation oncology, supporting the tenets of the *Target Safely* initiative, Dr. Marks said. He discussed how RO-ILS is enhancing the understanding of incidents in radi-

ation oncology. The mission of RO-ILS is to facilitate safer and higher quality care in radiation oncology by providing a mechanism for shared learning in a secure and non-punitive environment.

“We gain information from the reporting itself,” he said. “We understand how our systems behave, and that helps drive our policies.”

He outlined the Normal Accident Theory, coined by Charles Perrow, which says that “things will always go wrong. You can’t stop things from going wrong. Light bulbs will go out, chairs will fall, people will slip. It is just the way it is.”

“The question is, when those things go wrong, of the types of failures that you see, are those failures going to be expected or unexpected? Can you predict the type of failures that you’re going to get?” he said.

If you cannot predict when and what failures will happen, that is the definition of a complex system, Dr. Marks said. Radiation oncology is a complex system, with the potential for unforeseen issues. This is where reporting those issues can assist by identifying places where safety barriers are needed. And this, he said, is where ASTRO’s RO-ILS initiative comes into play, providing a systematic way of reporting incidents to better understand how to prevent possible incidents in the future.


The next steps in RO-ILS include revised data elements, which are expected in mid-2016; more user resources; and a Year in Review estimated for June 2016, Dr. Marks said.

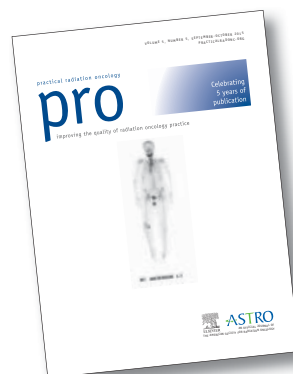
CONCLUSION OF SESSION

The “*Target Safely: ASTRO’s Accomplishments in Five Years*” session ended with an ask-the-expert question and answer segment, when the fully engaged audience asked questions about the initiative.

“To summarize the resources that have grown out of the *Target Safely* campaign, again we have *Safety is No Accident*, the QA White Papers, APEX, RO-ILS, IHE-RO and, although we didn’t talk about it today, another resource is our continued efforts to enhance the RTAnswers website’s information on radiation safety,” Dr. Hayman said at the conclusion of the session.

“There’s been a lot of work done,” he said. “There’s been a lot of volunteer effort and staff effort. They’ve done a tremendous job over the last five years addressing these issues.”

Read more about the *Target Safely* initiative and safety in radiation oncology in the 2015 September-October issue of *PRO* at www.practicalradonc.org. 



A doctor as patient: A journey of faith

BY JOHN LEIFER AND LORI LINDSTROM LEIFER, MD

I admire many things about my wife, a radiation oncologist at The University of Kansas Cancer Center, Kansas City, but none more than the intensity of her faith, and how that faith drives her passion to care selflessly for her patients. It's a faith forged through life's difficulties—including Lori's survival of a car crash that claimed the lives of two of her college classmates many years ago. It is a faith that has never flickered—though on Easter night 2013, it would be tested as never before.

I'm the writer in the family, and Lori is the physician. In this story about her experience that turned her from radiation oncologist to patient, she'll share her story with me and I'll share it with you. Here's how Lori describes that day:

"Everyone needs to know what gives them peace and comfort in life's storms. For me, it is my faith. It is my anchor and my North Star, and the living faith that Easter represents has always been the highlight of my year. So when I discovered a lump in my breast on the night of Easter Sunday, I thought, 'Lori, you are being called upon to see if your walk reflects your talk.' I felt God saying, 'You will be tested in a way that shows your true colors. I hope this makes you a better physician, wife and mom.'"

Lori had discovered a lump in her breast while showering. Being a good diagnostician, she concluded that it was a two centimeter tumor (which later proved accurate). She knew immediately that a difficult journey loomed ahead.

"I remember feeling like I was kicked in the gut and could not take a deep breath," she said. "My ability to think became overwhelmed by a litany of questions that raced through my head: Is this going to be in my lymph nodes? Will I need chemotherapy? Will I need radiation?"

TREATMENT OPTIONS

Although Lori had rehearsed how she would respond if she ever found herself in the position of one of her breast

cancer patients, she still struggled to make a decision regarding treatment:

"I always thought, if this were to happen to me, I would have a lumpectomy and radiation," she said. "Until I had cancer, I didn't understand why women were increasingly opting for mastectomies. When you have cancer, the first thing you think of is to have it gone, everything gone. You don't ever want to feel that scared again."

"I felt very strongly that I was called to continue to practice medicine—but more empathically, and with more understanding of what patients are going through," she continued. "When I feel that a patient is struggling or needs a word of empathy, I may say something like, 'You know, I've been on that medication and experienced those types of side-effects, and it really kind of sucks.' One hundred percent of the time, patients will say something akin to, 'Wow, you really do know what I am going through. That is so cool!'"

ADVICE TO COLLEAGUES

Lori's advice to radiation oncology colleagues from her experience as doctor turned breast cancer patient is encapsulated in one thought: "Our job is to provide knowledge and empower the patient in a very non-judgmental way. The patients' job is to make the decision that is right for them."


She is more committed than ever to ensuring that patients receive the right care, care that is clinically appropriate, empathic and collaborative. That's why



when I asked her to be the clinical expert on a book that I was writing for cancer patients, she embraced the opportunity. The result, *After You Hear It's Cancer: A Guide to Navigating the Difficult Journey Ahead*, is a roadmap for cancer patients and their loved ones who embark on this journey with no knowledge of the final destination.

THE FUTURE

Lori knows well that the specter of cancer is like a shadow that will follow her. And though anxiety provoking, it does not stop her from living fully.

"When I see patients with the same stage of cancer that I had [she is now in full remission], it sometimes causes my experience to come rushing back. I realize that two years, five years, even 10 years down the road, my cancer could return. I just have to live with that uncertainty and embrace every day." 

Mr. Leifer is a health care executive, consultant, academician and writer.

Dr. Leifer is assistant clinical professor at the University of Kansas School of Medicine.

ASTRO's strategic functions rank high with members

Results of the 2015 ASTRO Member Survey

ASTRO MEMBERS CONTINUE TO EXPRESS SATISFACTION with their Society membership as reported in the Annual ASTRO Member Survey (Figure 1). Active, Affiliate, Associate and International members, as well as domestic and international Members-in-Training (9,000), were invited to respond to a survey that rated various aspects of ASTRO membership benefits and services and member needs. The survey was in the field for 42 days and closed on August

3, 2015. Nearly 20 percent (1,772) of members who received the link to the survey responded. The majority of respondents were radiation oncologists (62 percent), physicists (19 percent) and residents (nine percent). International respondents were largely from Japan, Canada, India and Brazil. Please refer to the online edition of *ASTROnews* for additional respondent demographics including work setting, practice location, number of ROs, physicists and linacs per location, etc.

ASTROnews can be found online at www.astro.org/astronews.

ASTRO priorities

ASTRO's strategic plan, updated in January 2014, includes five goals that are divided into 24 strategic functions. In an effort to ensure that ASTRO is directing its resources to activities supported by its members, U.S. survey participants were asked to rate the strategic functions on a scale of one to seven with one being "not at all

FIGURE 1: MEMBER SATISFACTION

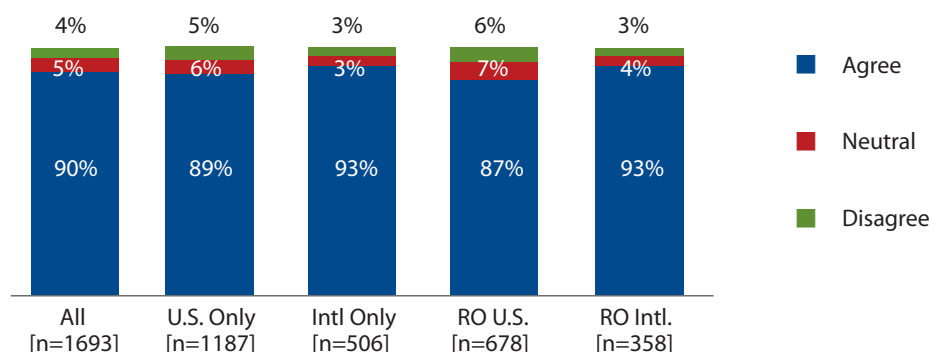


FIGURE 1: Overall, most members (90 percent) feel participation in ASTRO is a good use of their time. International members have a higher satisfaction level than any other group.

FIGURE 3: ASTRO COMMUNICATION CHANNELS

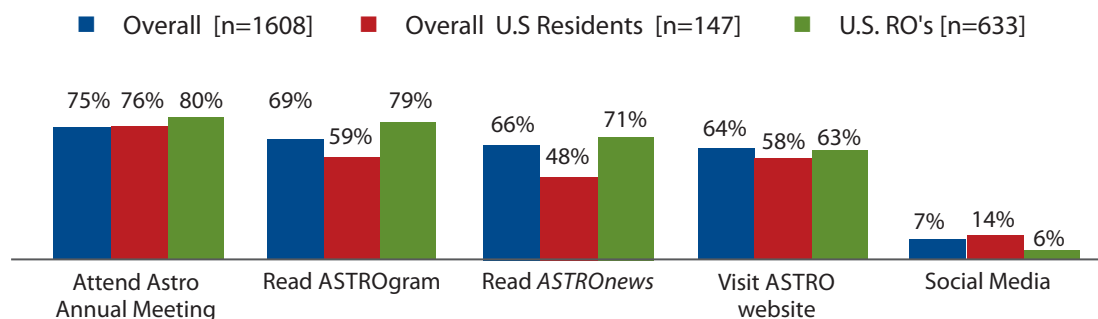



FIGURE 3: Residents follow ASTRO on social media more than others. Respondents indicated that they would continue to read *ASTROnews* if it transitioned to an online magazine.

important” and seven being “extremely important.” All were rated above five, with “Organizing the leading radiation oncology scientific meeting” (Annual Meeting) rating highest (6.42). Refer to Figure 2 for a complete list of strategic functions and ratings.

International radiation oncologists rate publishing journals and clinical practice guidelines (74 percent) as the most important functions that ASTRO provides, followed by providing education and professional development opportunities (59 percent) and advancing science (59 percent).

Communication

Members utilize all of ASTRO’s communication channels to stay informed about activities, benefits and services. In addition to attending the Annual Meeting, members stay informed by reading the ASTROgram and *ASTRONews* and visiting the ASTRO website. See Figure 3 for details. Additionally, more than a third of respondents said they contacted ASTRO throughout the past year, and the vast majority (89 percent) are satisfied with the service and responsiveness of ASTRO staff. 

Thank you to all members who took the time to complete this year’s member survey. Your responses are valuable to ASTRO and will help to shape our efforts in the coming year. Be sure to visit www.astro.org/membersurvey to see more survey results.

FIGURE 2: ASTRO PRIORITIES – U.S.

STRATEGIC PLAN FUNCTIONS	U.S. OVERALL	U.S. ROS
Organize the leading radiation oncology scientific meeting (Annual Meeting).	6.42	6.46
Publish the <i>International Journal of Radiation Oncology • Biology • Physics</i> (Red Journal).	6.33	6.34
Represent radiation oncology before government agencies, AMA and third party payers.	6.29	6.34
Educate Congress on critical policy issues concerning the specialty.	6.24	6.29
Publish clinical practice statements/guidelines.	6.10	6.08
Lead the development of payment reform initiatives and innovative payment models for radiation oncology.	6.02	6.08
Maintain a collaborative relationship with cooperative clinical trial networks and work closely with federal programs supporting cancer research including the NCI.	5.96	5.90
Promote advances in research.	5.94	5.84
Support the development of comparative effectiveness research on the value of radiation oncology.	5.94	5.93
Provide quality improvement resources to improve patient safety and to mitigate the potential for error in radiation therapy.	5.93	5.85
Publish <i>Practical Radiation Oncology</i> (PRO).	5.91	5.84
Provide educational resources for all radiation oncology trainees and interested medical students.	5.82	5.69
Educate members on the impact of health policy issues on the specialty.	5.80	5.86
Support continuous certification by increasing the number of online/live SAMS and encouraging participation in MOC.	5.77	5.65
Continue educational outreach activities to the public, referring physicians and the media.	5.71	5.71
Lead efforts to focus on scope of practice.	5.70	5.65
Develop programs for the assessment and improvement of patient care and safety.	5.69	5.59
Update standards for the training, experience and team composition necessary to perform advanced technology.	5.67	5.54
Develop small meetings as appropriate for the needs of the specialty.	5.56	5.58
Support the implementation of a data registry for radiation oncology.	5.54	5.39
Provide opportunities for basic, translational and clinical research scientists.	5.40	5.22
Work with radiation oncology societies globally to coordinate educational opportunities.	5.36	5.20
Develop the IHE-RO program, setting standards for the interchangeable use of common technologies.	5.29	5.14
Maintain a practice accreditation program.	5.17	5.00

THANK YOU

IN APPRECIATION OF ASTRO'S 2015 CORPORATE AMBASSADORS AND ANNUAL MEETING SUPPORTERS

Attendees visiting the Exhibit Hall at ASTRO's 57th Annual Meeting were treated to a fantastic display of products and services in radiation oncology and cancer care. We would like to take this opportunity to recognize some of our Corporate Ambassadors and Annual Meeting supporters.



1. ACCURAY – David C. Beyer, MD, FASTRO, Jeff Michalski, MD, MBA, FASTRO, Bruce Haffty, MD, FASTRO, and Brian Kavanagh, MD, MPH, FASTRO, thank Andy Kirkpatrick, Kevin Waters, Josh Levine, Michael Deghuae and Calvin Maurer for their Corporate Ambassadorship.



2. BRAINLAB – Francine Halberg, MD, FASTRO, Ron Allison, MD, Stephen Milito, MD, and Tim R. Williams, MD, FASTRO, thank Sean Clark and Mark Bruseski for their Corporate Ambassadorship.



3. CIVCO MEDICAL SOLUTIONS – Ron Allison, MD, Rahul Parikh, MD, James Galvin, DSc, FASTRO, Laura Thevenot and Deborah A. Kuban, MD, FASTRO, thank Mike Marshall, Nat Geissel, Charles Klasson and Dan Klassen for their Bronze Level Support.

4. ELEKTA – Laura Thevenot, James Galvin, DSc, FASTRO, Tim R. Williams, MD, FASTRO, Ron Allison, MD, Rahul Parikh, MD, Deborah A. Kuban, MD, FASTRO, and Geraldine M. Jacobson, MD, MBA, MPA, FASTRO, thank Maurits Wolleswinkel, Bill Yaeger and Laurent Leksell for their Corporate Ambassadorship.





5. MEVION – Members of ASTRO Leadership thank Joseph Jachinowski, Skip Rosenthal, PhD, Lionel Bouchet, PhD, and Mike Cogswell for their Gold Level Support.



6. NOVOCURE – Laura Thevenot, Rahul Parikh, MD, Ron Allison, MD, James Galvin, DSc, FASTRO, and Deborah A. Kuban, MD, FASTRO, thank Tracey Hanover for Novocure's Silver Level Support.

7. PROVISION HEALTHCARE – Francine Halberg, MD, FASTRO, Stephen Milito, MD, Tim R. Williams, MD, FASTRO, and Ron Allison, MD, thank David Raubach and Bill Hansen for their Copper Level Support.

8. PROTECHSURE SCIENTIFIC – ASTRO Leadership thank Stan Banaszak, Adam Wolach, Michael Glode, MD, David Raben, MD, and Justin Morgan for ProTechSure Scientific's Bronze Level Support of the meeting and for supporting the Nurses' Luncheon.



Continued on Page 26

THANK YOU



9

9. SIEMENS – Bruce G. Haffty, MD, FASTRO, Jeff Michalski, MD, MBA, FASTRO, and David C. Beyer, MD, FASTRO, thank Cécile M. Mohr, PhD, and Aenne Beer for their Corporate Ambassadorship.



10

10. VARIAN – ASTRO Leadership thank Kolleen T. Kennedy and Dow Wilson for Varian's longtime Corporate Ambassadorship.

11. VERTUAL – James Ward, Tom Swayne, Andy Beavis, PhD, Arthur Kay and Jan Antons are greeted by ASTRO Leadership for their Copper Level Support.

12. VIEWRAY – Bruce G. Haffty, MD, FASTRO, Jeff Michalski, MD, MBA, FASTRO, David C. Beyer, MD, FASTRO, Brian Kavanagh, MD, MPH, FASTRO, thank Prabhakar Tripuraneni, MD, FASTRO, Chris Raanes, Doug Keare, Michael Brandt, Gopinath Kuduvali, PhD, and David Chandler for their Silver Level Support.



11



12

WHAT'S NEW IN RADIATION ONCOLOGY CODING FOR 2016

New and revised 2016 CPT code changes

In September 2015, the American Medical Association (AMA) released the CPT® code changes that will go into effect January 1, 2016. The major changes for radiation oncology in 2016 involve updates to the brachytherapy code set that will better reflect the current process of care for these codes. The code set revisions include the deletion of six codes, the addition of seven new codes, and the revision of one existing code. Additionally, the Centers for Medicare and Medicaid Services (CMS) has retained the G-codes under the Medicare Physician Fee Schedule (MPFS) for conventional radiation treatment delivery, IMRT and IGRT for 2016.

High-dose-rate (HDR) brachytherapy code revisions

The HDR code set was revised to differentiate between radionuclide skin surface, interstitial and intracavitary brachytherapy. Two new codes were created specifically for reporting HDR radionuclide skin surface brachytherapy:

- 77767:** Remote afterloading high dose rate radionuclide skin surface brachytherapy, includes basic dosimetry, when performed; lesion diameter up to 2.0 cm or 1 channel
- 77768:** Remote afterloading high dose rate radionuclide skin surface brachytherapy, includes basic dosimetry, when performed; lesion diameter over 2.0 cm and 2 or more channels, or multiple lesions

Additionally, CPT codes 77785-77787 were deleted and replaced with

77770, 77771 and 77772. These codes should be used to report HDR radionuclide interstitial or intracavitary brachytherapy for treating tumors other than skin:

- 77770:** Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 1 channel
- 77771:** Remote afterloading high dose rate radionuclide rate interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; 2 to 12 channels
- 77772:** Remote afterloading high dose rate radionuclide interstitial or intracavitary brachytherapy, includes basic dosimetry, when performed; over 12 channels

All five of the new codes were revised to include the work associated with basic dosimetry. Therefore, CPT code 77300 cannot be reported separately. The new codes also cannot be reported with the new 2016 electronic brachytherapy codes (CPT codes 0394T and 0395T).

Low-dose-rate (LDR) brachytherapy code revisions

Two CPT codes formerly used to report simple and intermediate LDR brachytherapy, 77776 and 77777, were deleted. In place of these codes, CPT code 77799 (Unlisted procedure, clinical brachytherapy) should be used to report the work associated with interstitial radiation source application that does not rise to the level of complex LDR brachytherapy. CPT code 77778 should be used to report complex LDR interstitial brachytherapy:

77778: Interstitial radiation source application, complex, includes supervision, handling, loading of radiation source, when performed

CPT code 77778 was revised to include the work associated with supervision, handling and loading of a radiation source. Therefore, CPT code 77790 cannot be reported separately. CPT code 77778 also cannot be reported with electronic brachytherapy codes 0394T or 0395T.

Electronic brachytherapy code revisions

Two codes will be used to report HDR electronic brachytherapy in 2016. The two new codes differentiate between HDR electronic brachytherapy for skin surface and HDR electronic interstitial or intracavitary brachytherapy:

- 0394T:** High dose rate electronic brachytherapy, skin surface application, per fraction, includes basic dosimetry, when performed
- 0395T:** High dose rate electronic brachytherapy, interstitial or intracavitary treatment, per fraction, includes basic dosimetry, when performed

Category III CPT code 0182T was deleted and can no longer be reported in 2016. CPT code 0395T replaces 0182T, but was revised to clarify that the code can only be used to treat tumors other than the skin. CPT code 0394T will be used exclusively to report HDR electronic skin surface brachytherapy treatment. Both CPT codes 0394T and 0395T include the work of basic dosimetry calculation

Continued on Page 38

UCLA'S EXPERIENCE WITH IMPLEMENTING RO-ILS

THE RADIATION ONCOLOGY DEPARTMENT at the University of California, Los Angeles (UCLA), began using the RO-ILS: Radiation Oncology Incident Learning System® in June 2014. The transition from our previous paper-based system to the electronic incident learning system was seamless because many of the policies and procedures that we had in place were applicable to RO-ILS.

At UCLA, we define safety events as an unexpected change or possible deviations from a normal system behavior, which caused or has the potential to cause, an adverse effect to people or equipment. All faculty and staff are encouraged to submit safety events.

UCLA is one of more than 150 facilities now participating in RO-ILS.

Why did UCLA choose to implement RO-ILS?

The UCLA department of radiation oncology had an established culture of safety and a long-standing paper-based incident reporting system. This paper-based reporting system led to many improvements in clinical processes.

Due to the limitations of a paper-based system, such as lost files and limited data analysis, the inconsistencies of data collection and organization made it difficult to identify trends and clusters of incidents. These limitations prompted us to consider transitioning to an electronic reporting system, and RO-ILS was an excellent solution. The transition to RO-ILS provided several value adds, such as a web-based system hosted and maintained by a PSO, radiation oncology-specific data elements and access to education and support.



Michael Steinberg, MD, FASTRO, Phil Beron, MD and Nzhde Agazaryan, PhD

Furthermore, data are aggregated across participating radiation oncology institutions nationwide. Quarterly reports are provided through a summary report card and detailed commentary. These reports allow us to learn from the experiences of other radiation oncology practices, as well as track trends at our institution.

What are the benefits of using RO-ILS?

RO-ILS facilitates patient safety reporting and serves as a national incident learning system to build awareness about radiation oncology practice risks. The system allows for the tracking and analysis of institutional incidents while contributing to a national database. The American Board of Radiology (ABR) recognizes RO-ILS as a qualified practice quality improvement (PQI) project that leads to the fulfillment of the ABR Maintenance of Certification Program requirements for both physicians and physicists.

What patient information is being reported to RO-ILS?

The patient's age range and sex are the only patient details reported to RO-ILS. These data elements are required by the Agency for Healthcare Research and Quality (AHRQ), the federal agency that oversees the PSO program on a national level. A local identifier may also be submitted with each report to aid with follow-up analysis. Care is taken to avoid including protected patient information in free text fields.

What operational changes has UCLA made as a result of implementing RO-ILS?

When an event is submitted, an email is generated to a group of experts within the department for a rapid initial evaluation of the incident, to determine whether it may be a reportable event. If so, the incident is submitted to a standing committee to make a final determination of the need to report to appropriate agencies. *Continued on Page 31*

MAKING COMPLEX DATA TRANSFER SAFER

THE FACE OF HEALTH CARE IS CHANGING, with rapid adoption of new software and technology used for both storing and interacting with patient data in all aspects of medicine. Radiation oncology continues to be technology-driven, and patient safety relies on multiple checkpoints in a complex care delivery framework. While radiation oncology has always been safety-conscious, the field recognizes the increasing risk that modern treatment complexity contributes, according to *Safety Is No Accident*, part of the *Target Safety* initiative. Radiotherapy often requires complex data transfer between several software systems provided by different vendors. Additionally, many facilities have equipment hardware from multiple vendors for simulation imaging, treatment planning, and treatment delivery. For patient data to be safely and efficiently transferred between a variety of hardware and software systems, there must be agreement on what data needs to be transferred, in what format and how it should be used when it is received. IHE-RO's mission is to facilitate this communication to promote seamless and safe interconnectivity.

In the late 1990s, the Healthcare Information Management Systems Society and the Radiological Society of North America recognized both the positive clinical potential and risk of increasing digital medical data generated in routine clinical care by diverse vendors that managed data^{1,2}. Together, a cooperative effort by multi-disciplinary members of the health care team and industry members formed Integrating the Healthcare Enterprise (IHE).

Under this umbrella organization, domains for each field were developed. IHE-Radiation Oncology, or IHE-RO, was formed in 2004. Supported by ASTRO, the overarching goal of IHE-RO is to improve the interconnectivity of computer systems in use³ by providing guidelines for data transfer and a mechanism to confirm the ability of two products to work together.

Creating standards across devices can reduce human error when interfacing with devices⁴. While IHE-RO does not develop standards, it identifies gaps in current clinical practices and industry-recommended workflows. Clinical volunteer representatives from our field create a framework to apply standards, so that any vendor can develop a functionally compatible product. The goal is to allow the clinical community to practice radiation oncology safely, regardless of software origin/vendor. IHE-RO also provides a structure for practicing/testing data exchange between systems, thereby confirming that individual components of the treatment sequence do in fact accurately and effectively communicate prior to clinical implementation⁵.

In this article, we'll review an exemplar IHE-RO process, and highlight recent progress which significantly improves safety and efficiency in the radiation oncology clinic.

Integration profiles increase safety of data transfer

Successful implementation of integration profiles change the way we use our technology. First, a use case is defined by clinicians and physicists in active practice, when interactions between

systems are not ideal; for example, requiring additional procedures or checks to confirm fidelity of information transfer between systems. Anyone can suggest a use case profile: the ASTRO website provides the opportunity to describe the clinical scenario and request IHE-RO input at www.astro.org/iheroproblemform. A use case is then developed into an integration profile by IHE-RO volunteers.

After development, each integration profile is distributed to all participating vendors. Products are tested at biannual Connectathons, where the vendors demonstrate their compatibility by connecting to different software systems to demonstrate the ability to exchange and handle data correctly with workflow relevant data transfer. Connectathons provide an opportunity for vendors to come together in a noncompetitive environment, with impartial judging by academic IHE-RO representatives.

On successful completion of a Connectathon, vendors recognized as passing the IHE-RO profile can market their software and/or hardware as such. Since 2007, 158 software products from vendors have been submitted for Connectathon testing with 121 passing. In working with your current or a potential new vendor, consider adherence to the IHE-RO profiles as an important factor to minimize error and streamline the use of technology safely—vendors can provide IHE-RO certification, or you can look for Connectathon results on the ASTRO website at www.astro.org/ihero.

Continued on Page 30

TABLE 1

EXAMPLE INTEGRATION PROFILES FOR IHE-RO. ADDITIONAL PROFILES ARE AVAILABLE AT WWW.ASTRO.ORG.

PROFILE NAME	PROBLEM	SOLUTION	EXAMPLE	AVAILABILITY
Advanced Radiation Therapy Interoperability (ARTI)	Differences in describing treatment parameters caused incompatibilities and inconsistencies in plan interpretation between systems	This profile describes how to export/import external beam plans delivered and requires that the original plan content can be displayed on the receiving system	Users can verify that a dynamic was transferred with the correct angle and orientation for treatment	In use by vendors
MultiModality Image Registration for Radiation Oncology (MMRO) - III	Registered imaging modalities (MRI, PET, SPECT, etc) are useful but must be transferred correctly for planning	This profile describes the imaging datasets to allow exchange of registration, contouring and dose on non-CT images	Use of MRI images and contours in prostate cancer planning or PET in head and neck cancer planning	In use by vendors
Consistent Patient Identification in Radiation Oncology (CPRO)	Multiple systems require entering of patient demographics, requiring duplication of work and potential error	This profile describes data formatting and process for transfer of patient demographics across systems	New patient demographics entered into planning system, which transfers patient name, date of birth, contact number, etc to scheduling and treatment systems	Profile in development
Dose Compositing (DCOM)	Patients may receive treatment to the same area multiple times or at different facilities	This profile defines the characteristics of dose objects independent of treatment modality, allowing composite doses for mixed modality treatments to be calculated. It allows inclusion of previous dose to be used to design a new treatment plan	Patient treated with lung IMRT at one facility presents with thoracic spinal mets at a different facility two years later. Original treatment plan can be uploaded into new planning software	In use by vendors
Consistent Dose Content for External Beam Radiation (CDEB)	Differences in describing planned and delivered dose between systems	This profile describes the accepted way of exporting planned dose, tracking delivered dose, and displaying both in planning and delivery systems	Transferring plan to treatment delivery system, or running report of delivered dose	Profile in development
Deformable Image Registration (DRRO)	Registration of multiple image sets can be complicated by positioning, weight loss tumor response	This profile allows a single system to calculate the DSR and then share that information with other radiation oncology systems	Replanning of head and neck treatment after weight loss	Profile in development

The IHE-RO impact

In Table 1, we describe several integration profiles that have been developed or are in active development. Advanced Radiotherapy Interoperability, for example, is straightforward and widely available across most vendors. Others are still in development or have tested with only some vendors in our field. New profiles for brachytherapy and plan validation are being considered.

Profiles in use may be re-evaluated and updated if there is concern

for clinical safety. One example of this is the case of the Multi-modality Registration for Radiation Oncology (MMRO). MMRO is the profile that specifies communications between systems that create and register image sets like CT to MRI. It defines how digital imaging and communications in medicine objects for spatial registration and the images themselves are created, stored, queried, retrieved, processed and displayed.


A safety issue was detected during

initial trial implementation of the profile. This was a real world hazard related to the same Frame of Reference (the coordinate system of the image) being used for multiple image series, even if a patient was moved between images. The profile was updated to require new data elements to resolve the ambiguity. The MMRO profile was retired and replaced by MMRO II. A further update (MMRO-III) is now in place that allows non-CT images to be the primary dataset.

Summary

IHE-RO provides a unique benefit to the radiation oncology community—an opportunity to use the growing technology the way it was intended, with guidance for product design in place to ensure accurate communication across systems. Interconnectivity allows us to provide safer treatments by reducing errors in data transmission. Human error is also minimized by reducing the number of “work-arounds” performed by staff at all stages of planning and treatment. IHE-RO would not exist without the time and effort of its volunteer membership, and continues to move forward in identifying and developing new profiles to test.

References


1. Siegel EL, Channin DS. Integrating the Healthcare Enterprise: A Primer. *Radiographics*. 2001;21(5):1339–1341. doi:10.1148/radiographics.21.5.g01se381339.
2. Dreyer KJ. Why IHE?1. *Radiographics*. 2000;20(6):1583–1584. doi:10.1148/radiographics.20.6.g00no381583.
3. Curran BH. Integrating the Healthcare Environment for Radiation Oncology (IHE-RO): Improving the Practice of Radiation Oncology Through Better Information Exchange. *International Journal of Radiation OncologyBiologyPhysics*. 2007;69(3, Supplement):S673–S674. doi:10.1016/j.ijrobp.2007.07.2032.
4. Carr CD, Moore SM. IHE: a model for driving adoption of standards. *Computerized Medical Imaging and Graphics*. 2003;27(2-3):137–146. doi:10.1016/S0895-6111(02)00087-3.
5. Rengan R, Curran BH, Able CM, et al. Addressing connectivity issues: The Integrating the Healthcare Enterprise-Radiation Oncology (IHE-RO) initiative. *PRO*. 2011;1(4):226–231. doi:10.1016/j.prro.2011.06.016. 

RO-ILS

Continued from Page 28

Changes to incident reporting policies and procedures were required to incorporate the RO-ILS workflow. All events submitted are reviewed in a weekly quality meeting with a dedicated quality team consisting of members of the radiation oncology team: medical physicists, radiation therapists, a physician, a nurse, a front office representative and an administrator. Champions are assigned to each incident to investigate the details of the event and present possible solutions for the prevention of similar incidents in the future. Champions complete the follow-up sections in RO-ILS, which are reviewed by the quality team to promote accuracy and uniformity. Those incidents judged to have a greater impact are elevated to be

presented at the monthly departmental quality meeting. Faculty and staff are periodically reminded by the quality team to submit incidents into RO-ILS.

For more information on how to take part in RO-ILS, visit www.astro.org/roils or email roils@astro.org. 

Dr. Steinberg is professor and chairman of the department of radiation oncology, UCLA.

Dr. Agazaryan is professor, chief of clinical physics and quality officer of the UCLA Health Faculty Practice Group (FPG) and the department of radiation oncology, UCLA.

Dr. Beron is assistant professor, quality officer of the UCLA Health Faculty Practice Group (FPG) and the department of radiation oncology, UCLA.

2015 ANNUAL MEETING UNRESTRICTED EDUCATIONAL GRANT SUPPORTERS

ASTELLAS
ASTRAZENECA
GENOMIC HEALTH
LILLY
MERCK
PFIZER

*As of
September 2015*

Changes in the American Board of Radiology Maintenance of Certification Part IV: **ADDRESSING QUALITY OF CARE AND PATIENT SAFETY IN RADIATION ONCOLOGY**

IN 1994, THE AMERICAN BOARD OF RADIOLOGY (ABR) awarded its last radiation oncology (RO) certificate with unlimited time to expiration. Subsequently, all certificates carried with them a time-certain expiration date 10 years hence. All RO diplomates registered for initial certification after 1994 were automatically enrolled in the ABR's maintenance of certification (MOC) program¹. In a manner that is similar for all 24 member boards of the American Board of Medical Specialties (ABMS)², the ABR program is modeled around four elements, encompassing six core competencies developed by the ABMS and the Accreditation Council for Graduate Medical Education (ACGME). These core competencies are felt to represent the basic skills and knowledge necessary to practice medicine in a modern and active health care delivery system. They have been extensively documented and are well known to most practitioners³.

The four basic elements of the MOC used to evaluate and improve these competencies have also been extensively described¹ and include:

- Part 1: Professional standing
- Part 2: Lifelong learning and self-assessment
- Part 3: Cognitive expertise
- Part 4: Practice quality improvement (PQI)

As with any initiative involving significant alterations in existing programs related to education, evaluation of knowledge and skills and clinical care, there was recognition from the outset that refinements in specific portions

of program requirements would occur periodically. In this article, we report on a change in the MOC process that represents a significant refinement. It is one that we believe will greatly simplify MOC participation, and is likely to be a welcome relief to our diplomates.

The element of MOC most directly linked to immediate and demonstrable improvement in quality of care is Part IV, Practice Quality Improvement (PQI). As initially promulgated, diplomates could select a project related to some aspect of their routine clinical care for analysis. This selection could be individual diplomate-determined and initiated, or could be based on a template developed by or for a department, facility, institution or specialty society. Only society-based projects require pre-approval by the ABR. The basic intended format of projects was the P-D-S-A model, i.e., Plan the analysis, Do the project, Study the results and Act on the findings. Projects that revealed some deficiency or area of potential improvement in the topic reviewed could be immediately revised and subsequently reevaluated to determine if the anticipated improvement had occurred⁴.

Despite numerous presentations by ABR staff and volunteers regarding details of Part IV requirements, assistance with professional societies in promulgation of template projects and easing of documentation requirements, it was apparent that ABR diplomates continued to find this particular aspect of MOC confusing and burdensome (Personal communication, the American Board of Radiology, September 8, 2015). The ABR definition of "quality improvement" as "a systematic approach to the study of health care and/or a commitment to continuously improve performance and outcomes in health care," appeared to provide opportunities for additional PQI options¹. In September 2015, the ABR Board of Trustees approved a new set of guidelines for MOC Part IV that significantly broadens the nature of fulfillment requirements to include not only "projects," but "activities" that demonstrate the individual diplomate's commitment to ongoing improvements in quality of care, outcomes and patient safety.

Two categories of activities demonstrating that commitment will now be recognized as meeting Part IV requirements⁴ are:

In this article, we report on a change in the MOC process that represents a significant refinement. It is one that we believe will greatly simplify MOC participation, and is likely to be a welcome relief to our diplomates.

- Practice Quality Improvement (PQI) projects either designed by the diplomate using any standard quality improvement methodology, such as the Plan-Do-Study-Act (PDSA) cycle approach, or created and offered by professional societies.
- Participatory Quality Improvement activities in which a diplomate is engaged by choice as a volunteer or by duty during his or her workday, and which may be reasonably expected to contribute directly to, or increase the likelihood of advancement or improvement of, quality and/or safety in health care at the local or national level.

The first type of activity remains unchanged from the previous program iteration and selection of possible projects has been widely available⁴.

The second category is completely new and offers diplomates an extraordinary range of options, many of which may be a part of their routine quality assurance activities. Examples of these participatory activities for radiation oncology ABR diplomates include, but are not limited to:


- Participation as a member of an institutional/departmental clinical quality and/or safety review committee
- Active participation in a departmental or institutional peer-review process, including participation in data entry/evaluation and peer-review meeting process or Ongoing Professional Practice Evaluation (OPPE)
- Participation in RO-ILS: Radiation Oncology Incident Learning System[®]
- Participation as a member of a root cause analysis team evaluating a sentinel or quality or safety event
- Participation in at least 25 prospective chart rounds every year (peer-review of the radiation delivery plans for new cases)
- Active participation in submitting data to a national registry
- Publication of a peer-reviewed journal article related to quality improvement or improved safety of the diplomate's practice area
- Invited presentation or exhibition of a peer-reviewed poster at a national meeting related to quality improvement or improved safety of the diplomate's practice content area
- Regular participation (at least 10 years) in departmental or group conferences focused on patient safety
- Creation or active management of, or participation in, one of the elements of a quality or safety program
- Local or national leadership role in a national/international quality improvement program, such as *Choosing Wisely*[®], or other similar campaign
- Completion of a peer survey (quality- or patient safety-focused) and resulting action plan. The survey should contain at least five quality- or patient safety-related questions and have a minimum of five survey responses
- Completion of a patient experience-of-care (PEC) survey with individual patient feedback. The survey should contain at least five quality/patient safety-related questions and have a minimum of 30 survey responses
- Active participation in applying for, or maintaining accreditation, by specialty accreditation programs such as those offered by ASTRO, ACR or ACRO

- Active participation in an NCI cooperative group clinical trial (entry of five or more patients in a year)

Important details regarding other possible activities and necessary participation documentation are available on the ABR website⁴. Submission of documentation of active participation in PQI activities to the ABR is required only if a diplomate is audited. Routine submission of such proof of participation to the ABR is neither required nor currently accepted.

The ABR is confident that these new and significant MOC Part IV changes fulfill the original intent of MOC to improve quality and patient safety by incorporating many of the activities in which we are already routinely participating. By simplifying the diplomate's experience, we believe these changes can only enhance satisfaction with the overall MOC program.

References:

1. American Board of Radiology Maintenance of Certification program. <http://www.theabr.org/moc-gen-landing>. Availability verified September 6, 2015.
2. American Board of Medical Specialties. <http://www.abms.org/about-abms/>. Availability verified September 7, 2015.
3. American Board of Medical Specialties Core Competencies. <http://www.abms.org/board-certification/a-trusted-credential-based-on-core-competencies/>. Availability verified September 7, 2015.
4. American Board of Radiology MOC Part IV, Practice Quality Improvement. <http://www.theabr.org/sites/all/themes/abr-media/pdf/moc-dr-pqiguides.pdf>. Availability verified September 7, 2015. 

TUMOR METABOLISM: THE NEXT MOLECULAR TARGET IN CANCER THERAPY?



ALTHOUGH OTTO WARBURG'S SEMINAL OBSERVATION of altered metabolism in cancer was made over a century ago¹, continued research in the field has largely been relegated to efforts designed to identify, understand and ideally target the specific genomic aberrations driving a particular malignancy. This was largely based on the prevailing ideology at that time that the observed changes in cellular metabolism were a passive consequence rather than a direct cause of carcinogenesis. However, recent scientific discoveries coupled with technological advancements have stimulated a renewed interest in tumor metabolism. This emphasis on cancer metabolism is evident with the exponential rise in scientific publications exploring this research topic, and its recent inclusion as an emerging hallmark

of cancer in Hanahan and Weinberg's seminal account of common traits governing malignant transformation^{2,3}.

The Warburg effect and beyond

Differentiated cells primarily metabolize glucose to pyruvate, which is then shuttled to the mitochondria, entering the citric acid (tricarboxylic acid, TCA) cycle. This fuels oxidative phosphorylation (as its name implies, a step that requires oxygen) for maximal ATP production. However, under anaerobic conditions, differentiated cells continue to metabolize pyruvate to lactate through glycolysis, producing a lower yield of ATP. The Warburg effect describes a cancer cell's reliance on glycolysis, even in the presence of oxygen, a phenomenon termed aerobic glycolysis. We are only beginning to understand the intricate biologic advantages afforded to cancer cells by this seemingly inefficient metabolic adaption; however, what is clear is that ATP is not the only need of a cancer cell. In addition to energy, cells require macromolecule precursors, including acetyl-CoA for fatty acids, intermediates for amino acids and ribose for nucleotides. Further, maintaining redox balance is increasingly being recognized as an important biologic process implicated in carcinogenesis. An important pathway in maintaining this balance involves the generation of NADPH through the pentose phosphate pathway. The valuable carbon backbone of glucose can be utilized as a substrate for all of these important cellular needs, a process referred to as anabolic metabolism, further supporting cancers'

apparent addiction to glucose^{4,5}.

However, as would be expected, the metabolic programs that have evolved to drive tumorigenesis are far more dynamic than a single lane highway that solely utilizes glucose as its lifeline. Numerous other substrates have been identified that may also contribute to the requisite carbon and energy needs of a rapidly growing tumor. One of the most studied of these substrates is glutamine, which has been demonstrated to feed into and replenish mediators of the TCA cycle in cancer cells, a process called anapleurosis⁶. Similarly, it has recently been discovered that both primary brain tumors and brain metastases have acquired the unique ability to oxidize acetate, fueling acetyl-CoA pools in the TCA⁷. Tumor cells have been shown to utilize lipids as an alternate source of energy through fatty acid-oxidation. This represents a multistep process by which fatty acids are broken down to acetyl CoA to produce energy in the mitochondria, yielding 106 ATP per molecule of palmitate, compared to 36 ATP per molecule of glucose⁸. Therefore, cancer cells have evolved numerous strategies beyond aerobic glycolysis to ensure the required energy and substrates are available to allow for continued, unregulated growth.

Over the years, a far more expansive role for metabolic signaling has been uncovered beyond that of providing energy and biomass needs; for example, the oncometabolite 2-hydroxyglutamate (2HG) formed by mutated IDH1 modulates global methylation patterns in a cell, thereby having broad epigenetic consequences, has been discovered⁹.

Metabolites have also been shown to regulate traditional signaling pathways through phosphorylation, and even serve as a mechanism to evade immune surveillance.

Cancer metabolism and imaging

Most of our progress in translating alterations in cancer metabolism to patient care has involved imaging. The daily utilization of 18F-FDG-PET is a constant reminder of the altered glycolytic metabolism observed in cancer. However, as we described above, there are numerous other substrates that cancers utilize, and therefore, may be imaged via PET, particularly in the brain, which has a high level of baseline glucose uptake. For example, 18F labeled glutamine has recently been described to show uptake in glioma undergoing progression¹⁰. Complementary to the above-described discovery of brain tumors having the ability to oxidize acetate, 11C-acetate represents another tracer that was shown to show uptake in glioma¹¹. In addition to PET, MR spectroscopy represents another imaging modality that is based on alterations in cancer metabolism, allowing for the analysis of complex chemical systems within an anatomic framework. In brain tumors, although established metabolites have provided some direction in delineating tumor margins and differentiating tumor progression from treatment related changes, we are hopeful that continued efforts globally profiling these tumors will identify novel metabolites with higher specificity to brain tumors that may have more a broad clinical application (4). One example is the recent demonstration of detecting 2HG in IDH mutated tumors¹². Further technologic advancements, including optimized methods for visualization of hyperpolarized substrates by MR, will hopefully provide an additional level

of understanding of tumor metabolism and therapeutic response through improved spatial resolution and chemical specificity¹³.

Altered tumor metabolism as a therapeutic target

The established approach for understanding the biology of cancer, in an effort to identify novel molecular targets, has largely been genotype based. Unfortunately, clinical gains offered by this level of understanding have been limited, largely based on the complex nature of signaling networks associated with tumorigenesis and the inability to delineate the key “functional” signaling pathways actually driving growth in an individual tumor. While numerous genetic and/or epigenetic modifications may be driving tumorigenesis, we hypothesize this intricate web of cellular signaling converge on specific metabolic programs driving the aggressive phenotype in an individual tumor, making these programs unique therapeutic targets.

When considering metabolism as a therapeutic target, it is important to note that this concept is nothing new. This has been a successful chemotherapeutic strategy for decades. For example, pyrimidine analogues 5-FU and cytarabine inhibit nucleotide biosynthesis and are commonly used systemic agents. Moving forward, with renewed interest in cancer metabolism and improved technological capabilities, a key goal is to gain a deeper understanding into metabolic programs that are specifically unique to cancer, beyond that of rapidly proliferating cells, thereby extended the therapeutic potential of this approach. A recent example, although technically an epigenetic-based therapy, is the effective targeting of IDH1 mutation and accumulation of its resultant oncometabolite 2HG in AML. Another interesting agent that

has demonstrated some early clinical promise is the compound dichloroacetate (DCA), which has the potential of reverting the Warburg effect by diverting glycolytic flux into the mitochondria¹⁴.

Although it is a clear hope to have an arsenal of novel metabolism-based targeted therapies over the next few years, clear challenges for their clinical development need to be addressed. As described above, tumor cells share many of the same metabolic programs with normal, rapidly proliferating cells and even immune cells, so these need to be better understood to minimize normal tissue toxicity. Similar to the challenges posed by recently described, intratumoral genetic heterogeneity, there is likely a considerable amount of intratumoral metabolic heterogeneity that may limit targeted approaches. For example, specific metabolic programs are likely utilized to adapt to unique tumor microenvironments and recent work suggests metabolic difference between cancer initiating or stem cells and differentiated cells. Further, as metabolic pathways have evolved to accommodate to perturbations in the dynamic microenvironment, it can be expected they will have a similar dynamic response to chemical perturbations of individual pathways.

Recent scientific discoveries, coupled with technological advancements, have stimulated a renewed interest in tumor metabolism and its potential to serve as a therapeutic target. It is important to acknowledge that many scientists within radiation oncology are making important contributions to this active area of investigation: Mark Dewhirst, DVM, PhD, FASTRO, discovered that tumor cells have the ability to recycle lactate from the microenvironment and be used as a substrate¹⁵, Alec Kimmelman, MD, PhD, described

Continued on Page 36

**STATEMENT REQUIRED BY
U.S. POSTAL SERVICE SHOWING THE
OWNERSHIP, MANAGEMENT AND
CIRCULATION OF ASTRONEWS**

1. Publication Title: *ASTRONews*
2. Publication Number: 1523-4185
3. Filing Date: 10/1/2015
4. Issue Frequency: Quarterly
5. Number of Issues Published Annually: 4
6. Annual Subscription Price: \$38
7. Complete Mailing Address of Known Office of Publication:
8280 Willow Oaks Corporate Drive, Suite 500, Fairfax, VA 22031
8. Complete Mailing Address of Headquarters or General
Business Office of Publisher: 8280 Willow Oaks Corporate Drive,
Suite 500, Fairfax, VA 22031
9. Publisher: Laura I. Thevenot, 8280 Willow Oaks Corporate Drive,
Suite 500, Fairfax, VA 22031
Editor: Anna Arnone, 8280 Willow Oaks Corporate Drive,
Suite 500, Fairfax, VA 22031
Managing Editor: Brittany Ashcroft; Erin L. Boyle,
8280 Willow Oaks Corporate Drive, Suite 500, Fairfax, VA 22031
10. Owner: American Society for Radiation Oncology,
8280 Willow Oaks Corporate Drive, Suite 500, Fairfax, VA 22031
11. Known bondholders, mortgages and other security holders
owning or holding 1 percent or more of total amount of bonds,
mortgages, or other securities: None
12. Tax Status: Has not changed during preceding 12 months
13. Publication Title: *ASTRONews*
14. Issue Date for Circulation Data: Winter 2015
15. Extent and Nature of Circulation:

a. Total Number of Copies:	8,625	10,047
b. Legitimate paid and/or Requested Distribution by Mail and Outside Mail		
i. Individual Paid/Requested Mail Subscriptions	8,211	9,742
ii. Copies Requested by Employers for Distribution to Employees by Name or Position Stated on PS Form 3541:	50	50
iii. Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid or Requested Distribution Outside USPS:	0	0
iv. Requested Copies Distributed by Other Mail Classes Through the USPS:	0	0
c. Total Paid and Requested Circulations:	8,261	9,792
d. Nonrequested Distribution (By Mail and Outside the Mail)		
i. Nonrequested Copies:	150	200
ii. Nonrequested Copies Distributed Through the USPS by Other Classes of Mail:	150	100
iii. Nonrequested Copies Distributed Outside the Mail:	0	0
e. Total Nonrequested Distribution:	300	300
f. Total Distribution:	8,561	10,092
g. Copies Not Distributed:	64	45
h. Total:	8,625	10,137
i. Percent Paid and/ or Requested Circulation:	96.50%	97.03%
16. Publication of Statement of Ownership will be printed in the
Winter 2015 issue of this publication.
17. Signature and Title of Design and Production Manager:
Kimberly Kerin, 8280 Willow Oaks Corporate Drive, Suite 500,
Fairfax, VA 22031.
18. I certify that all information furnished on this form is true and
complete. I understand that anyone who furnishes false or
misleading information on this form or who omits material or
information requested on the form may be subject to criminal
sanctions (including fines and imprisonment) and/or civil
sanctions (including civil penalties).


SCIENCEbytes

Continued from Page 35

how glutamine metabolism is a critical mediator for progression of pancreatic cancer¹⁶, and Frank Pajonk, MD, PhD, identified unique metabolic programs driving cancer stem cells¹⁷, just to name a few. We are all hopeful that within the next decade, metabolism-based therapy will represent another class of anti-cancer therapeutics that can be rationally combined with traditional chemotherapy, radiation therapy, other molecular targeted agents or immune checkpoint agents to further clinical gains against this most formidable opponent.

Dr. Chinnaiyan is professor of radiation oncology, CNS service chief, director of tumor metabolism, Oakland University, William Beaumont School of Medicine.

References

1. Warburg O, Wind F, Negelein E. The Metabolism of Tumors in the Body. *The Journal of general physiology*. 1927;8:519-30.
2. Ward PS, Thompson CB. Metabolic reprogramming: a cancer hallmark even warburg did not anticipate. *Cancer Cell*. 2012;21:297-308.
3. Hanahan D, Weinberg RA. Hallmarks of cancer: the next generation. *Cell*. 2011;144:646-74.
4. Chinnaiyan P, Kensicki E, Bloom G, Prabhu A, Sarcar B, Kahali S, et al. The metabolomic signature of malignant glioma reflects accelerated anabolic metabolism. *Cancer research*. 2012;72:5878-88.
5. Vander Heiden MG, Cantley LC, Thompson CB. Understanding the Warburg effect: the metabolic requirements of cell proliferation. *Science*. 2009;324:1029-33.
6. Wise DR, Thompson CB. Glutamine addiction: a new therapeutic target in cancer. *Trends Biochem Sci*. 2010;35:427-33.
7. Mashimo T, Pichumani K, Vemireddy V, Hatanpaa KJ, Singh DK, Sirasanagandla S, et al. Acetate is a bioenergetic substrate for human glioblastoma and brain metastases. *Cell*. 2014;159:1603-14.
8. Carracedo A, Cantley LC, Pandolfi PP. Cancer metabolism: fatty acid oxidation in the limelight. *Nat Rev Cancer*. 2013;13:227-32.
9. Lu C, Ward PS, Kapoor GS, Rohle D, Turcan S, Abdel-Wahab O, et al. IDH mutation impairs histone demethylation and results in a block to cell differentiation. *Nature*. 2012;483:474-8.
10. Venneti S, Dunphy MP, Zhang H, Pitter KL, Zanzonico P, Campos C, et al. Glutamine-based PET imaging facilitates enhanced metabolic evaluation of gliomas in vivo. *Sci Transl Med*. 2015;7:274ra17.
11. Yamamoto Y, Nishiyama Y, Kimura N, Kameyama R, Kawai N, Hatakeyama T, et al. 11C-acetate PET in the evaluation of brain glioma: comparison with 11C-methionine and 18F-FDG-PET. *Mol Imaging Biol*. 2008;10:281-7.
12. Choi C, Ganji SK, DeBerardinis RJ, Hatanpaa KJ, Rakheja D, Kovacs Z, et al. 2-hydroxyglutarate detection by magnetic resonance spectroscopy in IDH-mutated patients with gliomas. *Nat Med*. 2012;18:624-9.
13. Salamanca-Cardona L, Keshari KR. (13)C-labeled biochemical probes for the study of cancer metabolism with dynamic nuclear polarization-enhanced magnetic resonance imaging. *Cancer & Metabolism*. 2015;3:9.
14. Michelakis ED, Sutendra G, Dromparis P, Webster L, Haromy A, Niven E, et al. Metabolic modulation of glioblastoma with dichloroacetate. *Science translational medicine*. 2010;2:31ra34.
15. Sonveaux P, Végran F, Schroeder T, Wergin MC, Verrax J, Rabbani ZN, et al. Targeting lactate-fueled respiration selectively kills hypoxic tumor cells in mice. *J Clin Invest*. 2008;118:3930-42.
16. Son J, Lyssiotis CA, Ying H, Wang X, Hua S, Ligorio M, et al. Glutamine supports pancreatic cancer growth through a KRAS-regulated metabolic pathway. *Nature*. 2013;496:101-5.
17. Vlashi E, Lagadec C, Vergnes L, Matsutani T, Masui K, Poulou M, et al. Metabolic state of glioma stem cells and nontumorigenic cells. Proceedings of the National Academy of Sciences of the United States of America. 2011;108:16062-7. 

HISTORY

BY ROBERT D. TIMMERMAN, MD

BACK TO THE FUTURE WITH HYPOFRACTIONATION

IT ALL STARTED WITH HYPOFRACTIONATION. At the onset of using radiation to treat cancer soon after the discovery of x-rays in 1895 and radioactivity in 1896, nearly all treatments were hypofractionated. Treatments were technologically crude, giving more dose to the skin and superficial structures than to a deep-seated target. There were few standards to ensure dose deposition was accurately quantified or delivered. Despite these difficulties, tumors responded, often dramatically. Many thought radiotherapy was the long-awaited non-surgical cure for cancer.

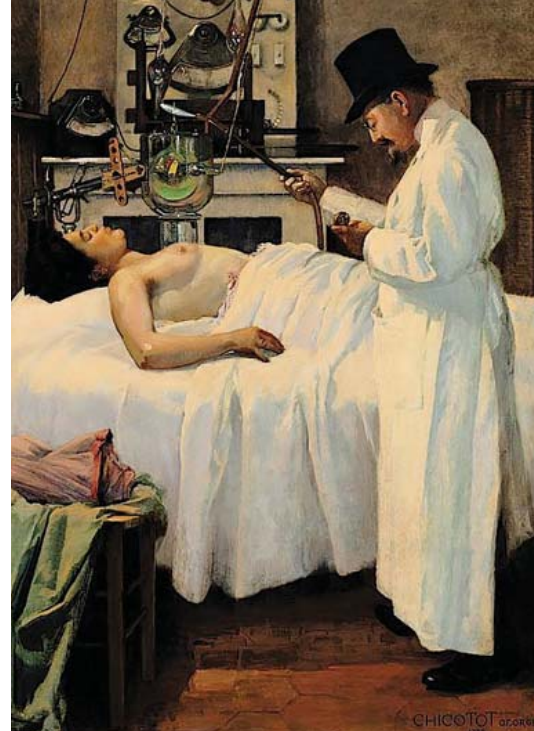
Dating to 1910, radium-contact therapy and brachytherapy were considered more practical for deep-seated tumors. Gosta Forssell from Stockholm was the early pioneer of the “Stockholm Method,” which involved radium-containing tubes placed in proximity to the tumor for intensive radiation for 24 hours¹. This hypofractionated irradiation was repeated after an interval of six weeks, and became very popular.

Teletherapy treatments using low energy “Röntgen-rays” directed from outside the body toward the tumor were more popular at the famous Erlangen Frauenklinik in Germany using hypofractionated, often single session, regimens. Originally Ludwig Seitz, and later Hermann Wintz, improved teletherapy delivery devices for high throughput treatments². In treating uterine cancer, a six by eight centimeter field directed toward a sitting patient’s pelvis was used to deliver doses defined by skin reaction (unit skin dose, USD). Treatment sessions were often separated by six to eight weeks with continuation based on

response, effectively the first “adaptive” treatments. Wintz’ clinical experiences presented at a gynecological specialist congress in 1920 prompted a participant to shout, “Cancer is defeated... man can breathe again.”

Starting around 1920, however, reports of unacceptable toxicity appeared, and accumulated, prompting concern about any future for radiation in treating cancer. Often, toxicities appeared years after completion of what had been considered a successful cancer therapy. The evidence heaped against radiation lead patients to be called “radiation victims.” Fortunately for radiation as a cancer therapy, Frenchman Claudius Regaud began experiments in 1905 related to the irradiation of the testis. He observed that the most mature differentiated cells were less sensitive to radiation. Initially unpopular, Regaud promoted a 10 fraction regimen for treating deep-seated cancers with teletherapy³.

Around 1920, simultaneously with Wintz’ favorable limelight using hypofractionation, Regaud’s trainee Henri Coutard, also a Frenchman, formed what must have seemed at the time a heretical concept of protracted-fractional radiotherapy that delivered 20-30 small dose treatments over many weeks⁴. Never wanting to abandon hypofractionation, Coutard believed in both approaches, stating that choice of fractionation should depend on the initial volume of the target (small targets warrant hypofractionation, whereas large should be more protracted)⁵. Two pinnacle presentations by Coutard at international meetings made between 1928 and 1930 that described the results of his experience changed the prevailing philosophy of treatment con-



duct for the next 100 years⁶⁻⁸. Coutard’s impressive and tolerable experience with protracted-fractional radiation in a period when severe, late toxicity from mainstream single session therapy was well publicized, understandably led to an abandonment of hypofractionation.

Many years later in the early 1950s, a glimpse of a comeback of hypofractionation came from the work of a neurosurgeon, Lars Leksell, who developed and improved a system for accurately navigating surgical instruments within the skull that was called “stereotaxy.” Leksell was impressed by the decrease in resulting entry damage within the brain facilitated by these stereotactic navigations as compared with open procedures. He wondered if the system could be used to “steer” a beam of radiation that would theoretically cause even less entry damage than surgical instruments. Working with a radiation physicist, Borge Larsson, they created the first stereotactic radiosurgery (SRS) system⁹. This was the first machine specifically designed to facilitate hypofractionated radiation delivery, and its inception was quickly followed by other technologies (e.g., protons and other charged particles) by SRS pioneers^{10,11}.

Nearly simultaneous with the early

Continued on Page 39

when performed. Therefore, CPT code 77300 cannot be reported separately. Additionally, per CPT instruction, a number of codes cannot be reported with CPT codes 0394T or 0395T, including clinical treatment planning (77261 – 77263), basic dosimetry (77300), teletherapy isodose planning (77306 – 77307), brachytherapy isodose planning (77316 – 77318), treatment devices (77332 – 77334), continuing medical physics consultation (77336), treatment management (77427, 77431, 77432, 77435, 77469, 77470, 77499), intracavitary radiation (77761 – 77763), HDR skin surface brachytherapy (77767 – 77768), HDR interstitial or intracavitary brachytherapy (77770 – 77772), LDR brachytherapy (77778), and surface application of radiation source (77789).

G-Codes continued in 2016 under the MPFS

In 2015, the AMA announced major revisions to the radiation oncology CPT code set. These changes included a simplification of the external beam treatment delivery code set (77402, 77407, 77412), the creation of a simple and complex IMRT delivery code (77385 and 77386), and the creation of a technology independent IGRT code (77387). Although these new codes were assigned Ambulatory Payment Classifications (APCs) in the Hospital Outpatient Prospective Payment System (HOPPS) last year, they were not accepted into the MPFS. Instead, CMS created G-codes to allow reporting of deleted CPT codes under the MPFS. In October 2015, CMS announced that it will continue requiring the use of G-codes under the MPFS to report conventional radiation treatment delivery (G6003 – G6014), IMRT (G6015 – G6016) and IGRT (G6001, G6002 and G6017) in 2016.

Physician Quality Reporting System (PQRS) and Electronic Health Record (EHR) update: Oncology Measures Group included in PQRS

Beginning with 2015 reporting, CMS will only be implementing a negative payment adjustment for non-participation in PQRS. There is a two-year gap between the participation year and the adjustment year, so failure to successfully participate in 2015 will result in a -2.0 percent payment adjustment of total Medicare Part B fee-for-service (FFS) payments in 2017, and failure to successfully participate in 2016 will result in a -2.0 percent payment adjustment in 2018.

CMS has renewed the Oncology Measures Group, a less burdensome option than reporting individual measures. For the Oncology Measures Group, members are required to report on a minimum of 20 unique patients, a majority (11) of which must be Medicare Part B FFS patients, as opposed to reporting on 50 percent of patients for nine individual measures.

The Oncology Measures Group can only be reported using a CMS-qualified PQRS registry, like ASTRO's PQRS*wizard*. The ASTRO PQRS*wizard* helps guide professionals through a few easy steps to rapidly collect, validate, and submit their results to CMS for payment. Participants using registry tools like the ASTRO PQRS*wizard* have a 95 percent success rate. Additionally, ASTRO offers members a MOC Part 4 Practice Quality Improvement (PQI) template that allows PQRS*wizard* participants the opportunity to use their PQRS data to complete an ABR-qualified PQI template.

Further details on the ASTRO PQRS*wizard*, implementation of incentive and payment adjustments, satisfactory reporting criteria and other details of the PQRS program are available on the ASTRO PQRS Toolkit at www.astro.org/pqrswizard.

2016 Medicare EHR Incentive Program

In October 2015, CMS finalized new requirements for the Meaningful Use program, modifying program requirements until the implementation of Stage 3 beginning in 2018. From 2015 to 2017, with some minor exceptions for first year participants in 2016, all providers will follow Modified Stage 2 objectives and measures.

Reporting period

First-time participants in the Meaningful Use program can report a 90-day reporting period, but they must attest prior to October 1, 2016, to avoid a penalty in 2017. All other participants, who have participated in Meaningful Use at least once prior to 2016, are required to report a full calendar year reporting period.


Objectives and measures

For the 2016 Meaningful Use program, all providers, regardless of prior participation in Meaningful Use, are required to report the same ten Modified Stage 2 objectives:

1. Protect Patient Health Information
2. Clinical Decision Support
3. Computerized Provider Order Entry
4. Electronic Prescribing
5. Health Information Exchange
6. Patient-specific Education
7. Medication Reconciliation
8. Patient Electronic Access
9. Secure Messaging
10. Public Health

Further details on Meaningful Use objectives and measures are available on ASTRO's Meaningful Use Toolkit at www.astro.org/ehrincentiveprogram.

Additional coding guidance

ASTRO will offer the 2016 Radiation Oncology Coding Resource, which will include guidance on all coding changes in addition to new FAQs. The 2016 Coding Resource will be available in January 2016. 

HISTORY

Continued from Page 37

investigations of SRS, an independent movement to use hypofractionated radiotherapy was coming into use that involved delivering the radiation to an anesthetized patient in the operating room^{12,13}. This approach, centered around the application of irradiation immediately after a surgical exposure and/or resection, was called intraoperative radiotherapy¹⁴. Like SRS, with intraoperative radiotherapy, it was essential to minimize the amount of normal tissues exposed to the intended high tumor dose. This was accomplished by physically moving normal tissues out the path of the radiation field (retraction) or by shielding them with barriers placed during surgery.

By the 1990s, the explosion of technologies associated with computers and computer-driven equipment provided such innovations as 3-D conformal, intensity modulated, image-guided and motion controlled radiotherapy. These were collectively implemented to bring SRS to the body by pioneers such as Hamilton from the U.S.¹⁵, Lax and Blomgren from Sweden¹⁶ and Uematsu from Japan¹⁷. Stereotactic ablative radiotherapy (SABR) to treat tumors in the body has taken radiotherapy full circle, back to the future. Again, treatments for difficult tumors, such as lung cancer, are showing rapid tumor shrinkage and eradication. Strikingly different, however, is that late radiation toxicity is not emerging on a wide scale as it did 100 years ago. Biologists are fascinated by this “new” therapy, trying to unlock its potential. Importantly, radiation is again competing with surgery as the most effective cancer therapy, giving patients more viable options.

With SABR, the miserable “late effects” experienced by patients, including vascular and inflammatory changes, have now been re-invented in a positive tone as “threshold effects.”

Geometric avoidance facilitated by technologies not available to the early practitioners can compartmentalize the occurrence of threshold effects within the tumor, including damage to tumor endothelium, induction of immune stimulation and more profound DNA damage, apart from the surrounding normal tissues. We are effectively seeing late effects in the tumor, but not in the normal tissues. The clinical results are prompting a return to hypofractionation, hopefully this time for a meaningful improvement in the clinical outcomes of our cancer patients.

Dr. Timmerman is professor and vice chair of the department of radiation oncology, University of Texas Southwestern Medical School.

References

1. Forssell G. Quelques observations de radiothérapie de tumeurs cancéreuses. *Arch d'Electr Med Exper et Cliniques*. 1910;18:801-802.
2. Seitz L, Wintz H. *Unsere Methode der Röntgen-Tiefentherapie und ihre Erfolge*. Berlin: Urban und Schwarzenberg; 1920.
3. Regaud C, Blanc J. Actions des rayons X sur les diverses générations de la lignée spermatique: extrême sensibilité des spermatogonies à ces rayons. *Compt Rend Soc de Biol*. 1906;61:163-165.
4. Coutard H. Un cas d'épithélioma spino-céleulaire de la région latérale du pharynx avec adénopathie angulo-maxillaire, guéri depuis six mois par la roentgentherapie. *Bull Assoc Franc Etude Cancer*. 1921;1:160-184.
5. Coutard H. Note préliminaire sur la radiographie du larynx normal et du larynx cancéreux. *J Belg Radiol*. 1924;13:487-490.
6. Coutard H. Die Roentgenbehandlung des epithelialen Krebses der Tonsillengegend. *Strahlentherapie*. 1929;33:249-252.
7. Coutard H. Resume des principes de technique roentgentherapie des. *Radiophys Radiother*. 1930;2:36-383.
8. Coutard H. Roentgentherapie of epitheliomas of the tonsillar region, hypopharynx and larynx from 1920 to 1926. *Am J Roentgenol*. 1932;28:313-331.
9. Leksell L. The stereotactic method and radiosurgery of the brain. *Acta Chirurg Scand*. 1951;102:316-319.
10. Kjellberg RN, Sweet WH, Preston WM. The Bragg peak of a proton beam in intracranial therapy of tumors. *Trans Am Neurol Assoc*. 1962;87:216-218.
11. Lawrence JH, Tobias CA, Linfoot JA, Born JL, Manougian E, Lyman J. Heavy Particles and the Bragg Peak in Therapy. *Ann Intern Med*. Feb 1965;62:400-407.
12. Barth G, Meinel F. [Intraoperative contact therapy in the large body cavities.]. *Strahlentherapie*. Jun-Jul 1959;109:386-395.
13. Fuchs G. [Intraoperative use of roentgen rays.]. *Wien Med Wochenschr*. Oct 29 1955;105(43):881-882.
14. Abe M, Takahashi M, Yabumoto E. Intraoperative radiotherapy of advanced cancers. *Strahlentherapie*. Oct 1973;146(4):396-402.
15. Hamilton AJ, Lulu BA, Fosmire H, Stea B, Cassady JR. Preliminary clinical experience with linear accelerator-based spinal stereotactic radiosurgery. *Neurosurgery*. Feb 1995;36(2):311-319.
16. Lax I, Blomgren H, Naslund I, Svanstrom R. Stereotactic radiotherapy of malignancies in the abdomen. Methodological aspects. *Acta Oncol*. 1994;33(6):677-683.
17. Uematsu M, Shioda A, Tahara K, et al. Focal, high dose, and fractionated modified stereotactic radiation therapy for lung carcinoma patients: a preliminary experience. *Cancer*. Mar 15 1998;82(6):1062-1070. 



ASTRO Accreditation Program for Excellence
Safety and quality for radiation oncology practice

**AN ACCREDITATION
PROGRAM BUILT ON
A FOUNDATION OF
SAFETY & QUALITY**

**FACILITY VISITS
HAVE BEGUN**

Apply now for 2015 rates!

www.astro.org/apex

ASTRO

TARGETING CANCER CARE

JOURNALS

FROM THE INTERNATIONAL
JOURNAL OF RADIATION
ONCOLOGY • BIOLOGY • PHYSICS

SEPTEMBER 1, 2015

Prospective Longitudinal Assessment of Quality of Life for Liver Cancer Patients Treated With SBRT

By Klein et al

There are many ablative therapies available for the treatment of liver tumors. One important missing piece has been the assessment of post-stereotactic body radiation therapy (SBRT) quality of life (QoL). Klein et al prospectively assessed the QoL for more than 200 patients with primary and secondary liver cancer, mostly with Child Pugh A liver function, treated by SBRT. Overall, QoL did not decline, and baseline overall QoL predicted better survival.

Precision Hypofractionated Radiation Therapy in Poor Performing Patients With NSCLC

By Westover et al

This prospective, phase I study employs image guidance and tight margins to deliver hypofractionated radiation. This treatment regimen could provide patients with poor performance status with a less burdensome alternative to conventional chemoradiation.

Utilization and Outcomes of Breast Brachytherapy in Younger Women

By Smith et al

This study looked at working-age women, finding considerable geographic variation in brachytherapy use. They examined subsequent mastectomy rates among women managed with lumpectomy plus either whole-breast irradiation or brachytherapy. The authors found that endocrine therapy status, and by extrapolation, hormone receptor status, may prove to be a helpful dis-

criminatory factor when contemplating brachytherapy in younger patients.

NRG Oncology RTOG 0822: A Phase II Study of Preoperative Chemoradiation Using IMRT for Locally Advanced Rectal Cancer

By Hong et al

Neoadjuvant chemoradiation for rectal cancer can be associated with substantial gastrointestinal toxicity. Hong et al report a prospective study by the NRG to evaluate whether or not intensity modulated radiation therapy (IMRT) could be used with this goal. Sixty-eight patients were treated with IMRT to 45 Gy, followed by a conventional boost of 5.4 Gy with concurrent capecitabine and oxaliplatin. They aimed to achieve acute GI toxicities of grade II or higher in less than 28 percent of patients, but did not make that target.

COSMIC: A Phase II Trial of IMRT Plus Carbon Ion Boost for Malignant Salivary Gland Tumors

By Jensen et al

Malignant salivary gland tumors of the head and neck are characterized by slow, infiltrative growth, which hampers resection and, by relation, resistance. Jensen et al report a combination of IMRT with carbon-ion therapy. Local control appeared promising at three years and did not appear to

depend upon resection status. Longer follow-up will be required because of the late-relapsing nature of this disease.

Indirect Tumor Cell Death After High-Dose Hypofractionated Radiation

By Song et al

The authors, employing a mouse model, showed that high-dose irradiation in a single fraction caused a progressive increase in tumor cell death over two to five days. They suggest that similar secondary, indirect forms of cell death may play an important role in clinical stereotactic radiosurgery and SBRT.

OCTOBER 1, 2015


Short- and Long-term QoL Bowel Function from Locally Advanced Rectal Cancer Treated With an Intensified Neoadjuvant Strategy in the Randomized Phase 2 EXPERT-C Trial

By Scalfani et al

The investigators found that oxaliplatin and cetuximab improved most of the symptoms associated with the primary tumor and did not appear to have a detrimental impact on long-term quality of life and bowel function.

A Phase III Trial of Long-term Androgen Suppression and Radiation Therapy With or Without Adjuvant Chemotherapy for High-risk Prostate Cancer: RTOG 9902

By Rosenthal et al

NRG RTOG 99-02 was a randomized trial of 397 patients that tested the role of adjuvant chemotherapy (paclitaxel, etoposide, estramustine) in conjunction with long-term androgen suppression, as well as conventional dose radiation therapy for patients with high-risk prostate cancer. The trial was stopped because of an increase in the number of thromboembolic events in the chemotherapy arm. 



ASTRO ANNUAL refresher

COURSE 2016

**Hilton La Jolla Torrey Pines
La Jolla, California
March 11 -13, 2016**

**Join us at this essential meeting for both
practicing clinicians and trainees!**

- Keep current on the latest guidelines and safety issues for all major disease sites.
- Learn the basic radiological and physics principles that may impact current clinical practice.
- Get insights into the use of radiation therapy for palliative care and supportive oncology.

This live activity has been approved for
AMA PRA Category 1 Credit™.

**"The Refresher
Course gives me new
insights each year, and
the confidence to know
I'm giving my patients
the best recommenda-
tions available."**

– Lawrence Cibula, MD

**Register by February 17
for advance rates:
www.astro.org/refresher**

ASTRO

TARGETING CANCER CARE

www.astro.org/refresher



#Refresher16

Introducing Leksell Gamma Knife® Icon™



Meet Leksell Gamma Knife® Icon™, the most advanced solution for cranial radiosurgery. Icon enables you to treat any cranial target with confidence – with significantly lower dose to normal tissue than other systems. Frame-based or frameless immobilization, single session or hypofractionation, radiosurgery or ultra-precise microradiosurgery – the choice is yours.

The introduction of Icon brings a number of new innovations. The unique High-Definition Motion

Management system enables frameless treatments with industry-leading accuracy. With true stereotactic Cone Beam CT, Online Adaptive DoseControl™ technology and virtual 6D couch, the dose is always delivered exactly where planned.

Born of a profound care for patients with cranial disorders, every detail of Icon has been designed with the patient in mind, and those who treat them.

Leksell Gamma Knife® Icon™ Care for the brain.

VISIT WWW.CAREFORTHEBRAIN.COM

Leksell Gamma Knife® Icon™ is not approved for sale in all countries

