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ASTRO news

AMERICAN SOCIETY FOR RADIATION ONCOLOGY

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BY LISA A. KACHNIC, MD, FASTRO

EDITOR'S*notes*

TALES OF A FAILED PHYSICIAN-SCIENTIST

HOW DO WE ADVANCE cutting-edge science in radiation oncology? We bridge our novel developments in the laboratory to clinical studies. This overarching goal has driven my career, and although, I may be a successful national clinical trial leader, I am a failure at my true aspiration to be a physician-scientist.

As early as high school, I ditched my classwork to assess potential colon cancer carcinogens at the American Health Foundation in Valhalla, New York. I fondly remember donning Michael Jackson-like steel gloves to feed potential carcinogenic cocktails to very angry rats, and later harvesting their organs to isolate and analyze their DNA. Please don't judge my nerd factor; I truly loved the DNA extraction steps. I continued this scientist trajectory and was fortunate to be a research scholar during my undergrad years at Boston College, where I was expected to abandon the traditional classes so I could spend my days examining the correlation of ganglioside composition in the etiology of glioblastomas, work that I continued in medical school.

When entering my residency in radiation oncology at Massachusetts General Hospital (MGH), I was fortunate to spend more than a year in the laboratory. Importantly, I had a dynamic, young attending mentoring me in this regard. The major focus of my research at that time was evaluating the role of the proteins p53, DNA-PK, Fanconi Anemia gene complex (FA), and the breast cancer susceptibility genes (BRCA1 and BRCA2) in DNA Double Strand Break Repair, work that I attempted to continue with little protected time and an institutional American Cancer Society grant as a young attending at Virginia Commonwealth University, and more recently, upon my return to MGH and Boston University, with a cadre of non-National Cancer Institute (NCI) grants. Yet, with growing in-house and national clinical responsibilities combined with my inability to successfully obtain NCI funding, my laboratory efforts were not sustainable. While I produced some quality data and publications, I failed myself in terms of my overarching career goal.

In retrospect, the reasons for my failure as a physician-scientist are multi-factorial, and are well defined in "Keys to a successful career as a physician-scientist" by Dr. Powell and colleagues on page 13. First, I should have better established myself early on, perhaps taking additional time in between my residency and first job to obtain further laboratory data, laying the foundation for successful National Institute of Health and NCI grant awards. Second, I should have negotiated for protected laboratory time and a research start-up financial package at my first job and found myself a research mentor and key collaborators during these critical years. Most importantly, I should have learned how and when to say "no" to clinical opportunities that all detracted from my lab time and efforts.

How can ASTRO help in facilitating physician-scientist careers? One important mechanism is the ASTRO Junior Faculty Career Research Training Award, discussed by David Kirsch, MD, PhD, in "Career paths for physician-scientists in radiation oncology" on page 16, which can provide bridge fund-

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> Without a cadre of high-quality physician-scientists to drive basic and translational discovery, the cutting-edge of our specialty may be lost.

BY BRUCE G. HAFFTY, MD, FASTRO

CHAIR'S*update*

ASTRO: ONE-STOP SHOPPING TO MEET OUR PROFESSIONAL NEEDS

AS I RETURNED FROM OUR EXCITING, busy and successful ASTRO Annual Meeting in San Francisco to my practice in New Jersey, I realized how with just one week away, things catch up with us given our multiple roles, tasks and responsibilities. Some of the multiple tasks I needed to keep up with included routine patient care, research responsibilities, manuscript responsibilities, hospital responsibilities regarding practice performance and improvement, practice accreditation preparation, administrative and billing issues, meeting meaningful use of the EMR, education and training of students and residents, continuing education and other MOC requirements, and others, not to mention my personal life and family obligations. Reflecting on these responsibilities that we all face on a day-to-day basis made me realize just how complex clinical medicine has become and how difficult it is to keep up with everything. In my role as chair of the ASTRO Board, I began to evaluate what ASTRO is doing to facilitate our professional lives to the greatest extent possible.

I first went through our website in some detail, realizing that there were so many services and products in ASTRO's portfolio, it was initially difficult to get my hands around all of it and to articulate how all of these products address my professional needs. I tried to create a visual schematic to summarize how ASTRO is serving its membership in meeting our needs. It quickly became clear to me, in reviewing our mission statement and reviewing ASTRO's portfolio of products, that it is not only the membership, but also our patients who are at the center of the schematic.

Meeting the needs of our busy lives, however, requires more than just adding products. It also requires that ASTRO, its valuable staff and dedicated volunteers put thought into making these products and services as accessible, user friendly and efficient as possible to minimize redundancy and to facilitate meeting the broad needs of our constituency. While there is always room for improvement and we look to the membership for continued feedback and input, ASTRO continues to strive to provide products and services which not only serve a specific need, but also can simultaneously serve multiple needs so that redundancies are minimized, efficiencies are maximized and all of our obligations and goals are met, while maintaining the highest quality we can in our primary goal of the delivery of the best patient care.

Many ASTRO initiatives meet multiple goals. One simple example, and one of the most highly valued assets that ASTRO has to offer is our journals, *PRO* and the Red Journal. The journals not only provide us with current, evidence-based articles that impact our daily practice, but they provide a venue for meeting CME requirements as well as Self-Assessment CME requirements to maintain board certification, state licensure and hospital credentialing. Through the gateway to the ABR, the CME or Self-Assessment CME that we earn through the journals can be directly linked electronically into the ABR website so credit is allocated to our ABR requirements instantaneously.

Another example is the recent launch of RO-ILS: Radiation Oncology Incident Learning System™. This is an important initiative that allows radiation facilities to report issues related to potential problems or errors in the delivery of radiation. Participation is voluntary, and the data is centrally reviewed by an independent party who will summarize and analyze the data for feedback. Participants can learn from other facilities when potential errors or near-misses occur and can modify their processes to prevent future issues.

This valuable product meets multiple needs. First and foremost, it is a

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product that is meant to benefit patient safety and quality care. Second, participation can be used to fulfill the ABR's Part IV Practice Quality Improvement Requirement for MOC. Finally, all of our hospitals and radiation treatment facilities have practice improvement programs that we are expected to participate in to continue to meet a variety of regulatory needs and/or accreditation requirements. RO-ILS can fulfill this requirement in most cases, demonstrating that the facility is striving to improve quality and safety in the delivery of radiation.

A final example is ASTRO's PQRS*wizard*. The Physician Quality Reporting System (PQRS) is an incentive program that provides bonuses and confidential feedback for satisfactorily reporting quality measures on Medicare fee-for-service beneficiaries. The ASTRO PQRS*wizard* is an online registry tool that provides a guide to collect and report data to the Centers for Medicare and Medicaid Services using the Oncology Measures Group. The Oncology Measures Group is an alternative to individual measures reporting option that significantly reduces the burden of participation in PQRS because, instead of having to report on 80 percent of all patients for three measures, providers are only required to report on 20 unique patients. In addition to this product providing financial incentive to your practices and facilitating the fulfillment of PQRS requirements, ASTRO has developed a PQRS Oncology Measures Group PQI template, which is a free companion offering to the ASTRO PQRS*wizard* and guides participants through the required steps to complete a related ABR-qualified PQI project.

These are just a few examples of products and services that ASTRO provides to help us to meet the multiple needs of our professional lives. We are very excited about the launch of APEx, our accreditation program, which, like the other examples mentioned, will serve multiple needs for the practice and practitioners, while establishing high quality standards for our practices.

ASTRO continues to strive to meet the needs of its membership and our patients through multiple products and services. We look forward to continued feedback from our members on how ASTRO can facilitate meeting the broad daily needs of our professional lives and, most importantly, improve the quality of lives of the patients we serve.

Dr. Haffty is professor and chair of the Department of Radiation Oncology at Rutgers-Robert Wood Johnson Medical School and New Jersey Medical School and associate director of the Rutgers Cancer Institute of New Jersey. He welcomes comments on this column at astronews@astro.org.

BY MICHAEL L. STEINBERG, MD, FASTRO

FRESH "START"

ASTRO'S STATE OF THE ART RADIATION THERAPY (START) meeting returns to Las Vegas, April 10-12, 2015, at the Venetian Hotel. This meeting began humbly as the ASTRO IMRT Practicum back in 2002, and has matured to become the preeminent meeting in our specialty addressing practical and innovative use of our rapidly evolving complex technologies, as well as novel applications of recent developments in cancer biology.

This year's meeting promises to be the best yet, and I am definitely going to be there. I am a speaker at the meeting and will be addressing critical health policy issues related to our new technologies. I will cover the aftermath of the Medicare final rule and discuss what happened and how we are moving forward.

In addition to health policy issues, the meeting is organized into focused disease site sessions, including head and neck, central nervous system, breast, lung, gastrointestinal and prostate. Each of the disease site sessions will conclude with an interactive challenging case panel, which will highlight the practical aspects of a typical yet difficult case that has been encountered in practice. A special session will focus on current state-of-the-art therapies for sarcoma, lymphoma and gynecologic cancers.

START is described by previous attendees as "practice changing" because this meeting is about the actual doing of things rather than the theory or supposition behind it. In the case of START, the term "state-of-the-art" is probably better described as "nuts and bolts" – understanding the details of how to actually apply complex and rapidly changing treatment techniques to real patients in real patient care circumstances. In addition, START addresses our critical need to understand how to implement and sustain the utilization of our complex treatment techniques safely and with appropriate oversight to ensure consistent quality of care.

The START meeting is designed specifically for radiation oncology, and the program is intended for radiation oncologists, physicists, dosimetrists and radiation therapists who wish to gain an understanding of these complex technological issues while developing an appreciation of the "art" as well as the "science" of the application of cutting-edge planning and treatment delivery techniques. The meeting will provide timely education on the most updated guidelines and technological advancements, but also to promote discussion on how to safely and effectively implement new guidelines and technology for patients being treated in your clinic today.

Besides, Vegas is a fun place to visit to gain CME and earn Part 2 SA-CME credit by participating in any of the four Live SAMS that will be offered at the meeting. I encourage you to attend to gain practical, clinically oriented education you can use in your practice.

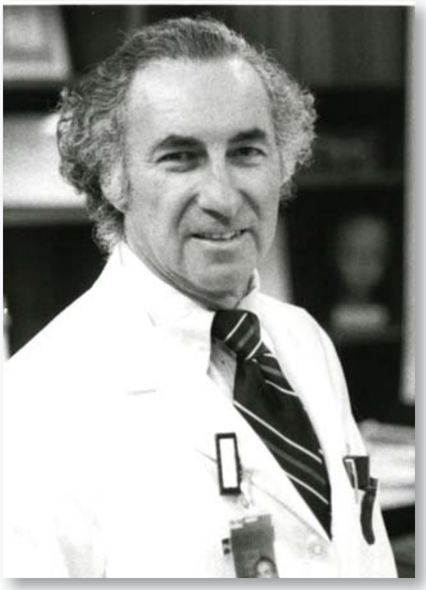
Registration and housing for the State of the Art Radiation Therapy meeting are now open. Visit www.astro.org/start for more information or to register.

Dr. Steinberg is professor and chairman of radiation oncology at the David Geffen School of Medicine at UCLA. He welcomes comments on this column at astronews@astro.org.

START addresses our critical need to understand how to implement and sustain the utilization of our complex treatment techniques safely and with appropriate oversight to ensure consistent quality of care.

BY LOUIS S. CONSTINE, MD, FASTRO, AND YUHCHYAU CHEN, MD, PHD

PHILIP RUBIN, MD, FASTRO: *Reflections on a radiation oncology pioneer*



ON SEPTEMBER 24, radiation oncology lost one of its pioneers, the visionary Philip Rubin MD, FASTRO, University of Rochester chair emeritus, former ASTRO chair (1978-1979) and Gold Medalist (1984), who was 87 years young. Those who knew Phil vividly recall his relentless drive to understand the effects of radiation on normal tissues, to forge new approaches to eradicating cancer and to create a specialty that would be proud of its contributions to curing cancer.

Phil grew up in Brooklyn, New York. He received his MD from the SUNY Downstate College of Medicine in New York City. He completed his residency in radiology at the University of Michigan in Ann Arbor, Michigan, where he was profoundly influenced by Isadore Lampe, MD. Phil then went to the National Cancer Institute (NCI) under J. Robert Andrews, MD, DSc, as the first chief of radiation therapy, where he worked on defining radiation tolerance of normal tissues. After the NCI, he founded the Department of Radiation Oncology at the University of Rochester in 1957 and was chair for 39 years.

His genius was his capacity to imagine ways in which we could all contribute to his mission of understanding and curing cancer with minimal toxicity. Phil was instrumental in forming the NCI Committee of Radiation Oncology Studies and the American Club of Therapeutic Radiologists that evolved into ASTRO. He was the first chief of clinical radiation therapy at the NCI; founder and first editor of the *International Journal of Radiation Oncology • Biology • Physics*; and a co-founder of the Radiation Therapy Oncology Group.

He dedicated his career to studying the adverse effects of radiation on normal tissues, and for more than 25 years was principal investigator of an NCI Clinical Experimental Radiation Research Interface Center (the longest running program project grant). He was prescient in advocating cancer survivorship programs, reflecting his appreciation for the never-ending risks to normal tissues from prior radiation exposure. Seminal concepts that resulted from his research include the biocontinuum of radiation effects and abscopal effects of radiation through the interactions of tissue vasculature, stem cells, cytokines and cell differentiation. His book, *Solitary Metastasis*, published in 1968, heralded the concept of cancer oligometastasis.

Phil was passionate in teaching doctors at all levels of their training, from medical students to practicing radiation oncologists. His dedication to teaching is demonstrated by his many textbooks, including *TNM Atlas with Onco-anatomy*, *Clinical Oncology for Medical Students and Physicians*, the seminal *Clinical Radiation Pathology* (with George Casarett, PhD), and recently the two-volume *ALERT: Adverse Late Effects of Cancer Treatment* (with Larry Marks, MD, FASTRO, and Dr. Constine).

He taught us more than we can begin to relate, from the *Law and Order of Radiation Sensitivity* (of normal tissues) to the critical need to engage life with every bit of our energy to fulfill our personal destinies. He inspired us to contribute whatever we could imagine was within our capacities, and never rest until we felt satisfied. Our personal experiences were no doubt mirrored by countless others.

Phil was like a tornado of swirling love, enthusiasm, imagination, warmth and determination. In his wake are people who have been profoundly affected by him—countless patients who are alive because of his personal care and pioneering cancer research, young physicians who he trained to be superb oncologists and young scientists who he inspired to enrich our understanding of oncology. But most of all, in his wake are people everywhere who observed what it is like to live life with unquenchable passion. The entire world of radiation oncology and cancer therapy rose to a

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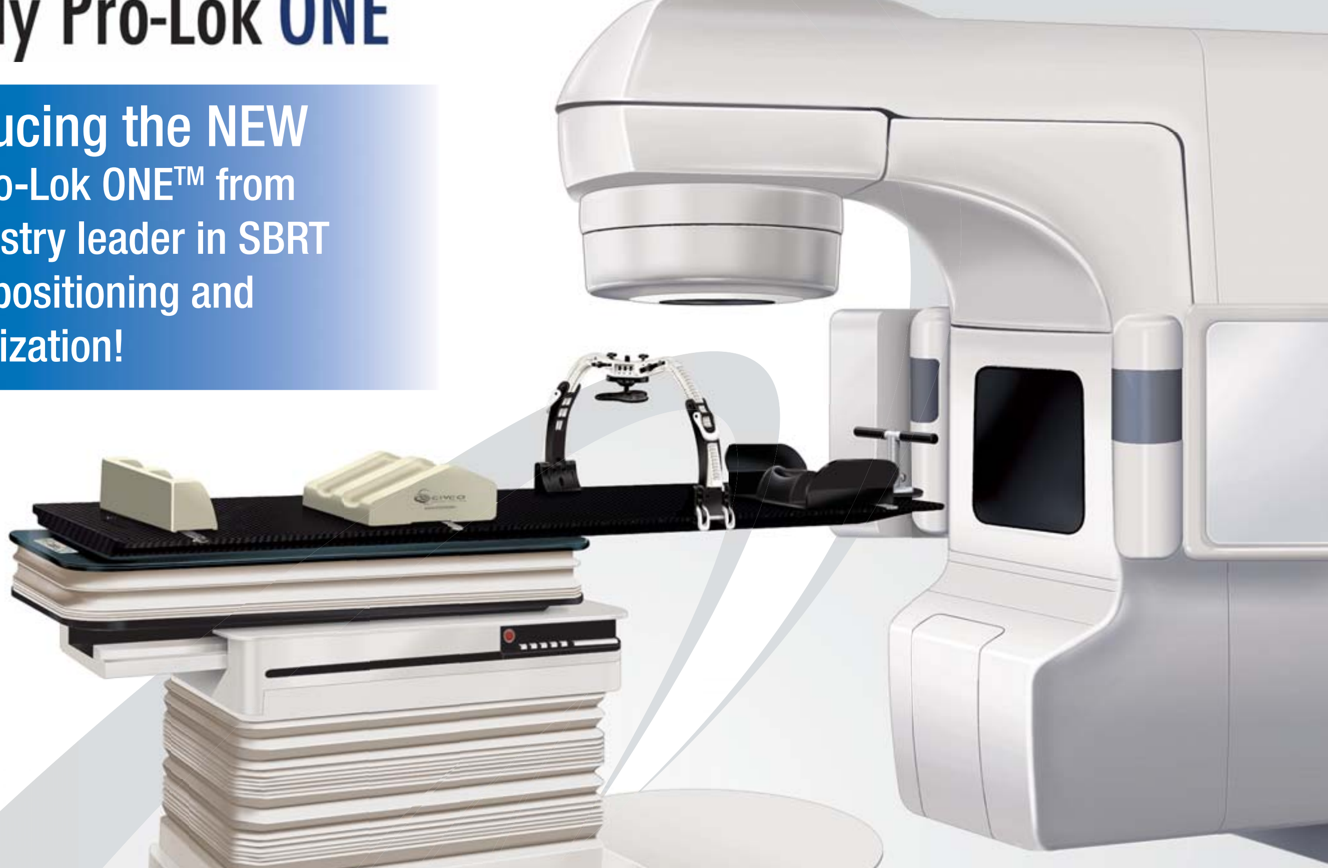

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SOCIETY NEWS

Two medical students receive $4,800 in research stipends from ASTRO

BY THE HEALTHCARE ACCESS AND TRAINING SUBCOMMITTEE

ONE OF THE CENTRAL MISSIONS of ASTRO's Healthcare Access and Training Subcommittee (HATS) is to increase educational and professional opportunities for minorities within the field of radiation oncology. The Minority Summer Fellowship Award was designed to further this mission through a mentored summer research experience for medical students with backgrounds that are traditionally under-represented in medicine.

Established in 2010, this program selects two students to complete an eight-week, mentored training program at an institution of their choice. Applicants may elect to apply in either a basic science or clinical research track. A $2,400 stipend is provided to each award recipient. Awardees are encouraged to attend and present their research at the ASTRO Annual Meeting the following year. Travel funds ($600) are provided to support attendance at ASTRO's Annual Meeting.

The students selected to receive the 2014 awards are Aaron Parzuchowski of Johns Hopkins University School of Medicine in Baltimore (clinical research) and Angel Moran of the University of California Davis School of Medicine in Sacramento, California (basic science).

Parzuchowski spent the summer completing his research project, "Incidence of protocol deviations in pediatric versus adolescent and young adult populations with Hodgkin's lymphoma and its impact on clinical outcomes," under the guidance of his mentor Stephanie Terezakis, MD. Using the Children's Oncology Group repository, Parzuchowski evaluated radiation therapy plans, assessing radiation quality and protocol deviations based on recommended radiation dose and volume. Each plan was assigned a quality score and correlated with patient outcomes to determine any potential association between the two measures.

"It has been an amazing experience, particularly building a relationship with my mentor as well as improving upon my skills and knowledge in regard to conducting research," Parzuchowski said.

Moran's research project, "Protracted irradiation generates selective DNA damage linked to radiation resistance," was completed under the mentorship of Jian-Jian Li, MD, PhD, and Andrew Vaughan, PhD, MSc. His project used genomic DNA and gene expression analysis to investigate the mechanisms underlying radiation resistance. His project aimed to advance knowledge about the genetic changes induced in tumor resistance by performing whole genome sequencing of surviving clones from protracted irradiation, which exhibit different sensitivities to radiation. "This program has solidified my interest in radiation oncology as a career. I plan to continue conducting research throughout my training and career in hopes of contributing to cancer research," Moran said.

Applications for the 2015 Minority Summer Fellowship Award are now being accepted. The deadline to submit applications is March 6, 2015. 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.

James P. Fitzgerald, MD
Rodney R. Rodriguez, MD, PhD
Philip Rubin, MD, FASTRO
Juan A. Santos-Miranda, MD, PhD
Paul W. Scanlon, MD, FASTRO
John Robert Stewart, MD

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KEYS TO A SUCCESSFUL CAREER AS A PHYSICIAN-SCIENTIST

BY SIMON N. POWELL, MD, PHD, FASTRO, AMATO J. GIACCIA, PHD, ALEXANDER SPEKTOR, MD, PHD, AND APARNA KESARWALA, MD, PHD

PHYSICIAN-SCIENTISTS ARE AN IMPORTANT ASPECT of radiation oncology and play a vital role in advancing the field. With 20 years of experience recruiting and mentoring physician-scientists, we have seen several key factors that must be addressed to ensure physician-scientists receive the necessary support to foster a successful career in the field.

CRITERIA FOR SELECTING A FACULTY-LEVEL PHYSICIAN-SCIENTIST

Selecting a physician-scientist for a faculty position, either a laboratory investigator or a clinical investigator, will differ between institutions, depending on needs. However, factors that are considered universally by recruiting departments include quality of training (both clinical and laboratory), mentorship, publications and potential for future contributions to the field. The most important feature in an interview is to converse openly and let the candidate's personality and drive come through.

A universal criterion in the selection process is training. While the most intense of these experiences is through a combined MD-PhD degree, there are also a significant number of individuals who possess strong research skills and have completed an MD degree. A second important consideration in the evaluation process is the individual's mentor and laboratory during the training process. It is presumed that publications and grant support weigh heavily in the hiring criteria; however, the quality and rigor of the training and publications are even more important. A final consideration is assessing the potential contribution of the applicant to the field of radiation oncology. There are a plethora of well-trained physician-scientists in cancer biology looking for academic jobs; however, the dedication and commitment of the applicant to the radiation sciences is critical if the field is to move forward.

MENTORING, EARLY DEVELOPMENT AND THE KEYS TO SUCCESS FOR A PHYSICIAN-SCIENTIST

There are key components for success in recruiting and mentoring physician-scientists. A physician-scientist is considered successful if he or she has run an independent research program for more than five years after completion of all training. Based on our own observations, the success rate is less than 50 percent; however, there is a lack of published data. Of the 20 Holman Pathway trainees in radiation oncology during the first 10 years of the program, 75 percent were working in an academic department[1].

The single most common factor for success in mentoring and training successful physician-scientists is the time spent in research. One year of research during residency is almost never adequate; at least two and usually three or more years of research after completing a doctoral degree is preferred. This can be achieved by creating post-residency fellowships, which are not popular in radiation oncology since there is a significant difference in salary between a fellow and a new faculty member. An alternative is to utilize an instructor-level position, which has faculty status and a higher salary than a fellow, and is time-limited, allowing the time for research.

A supportive department is critical to success. It is important to obtain the correct grounding to develop a good research plan, to develop collaborations with key individuals, to succeed with publications and to lay the foundation for successful grant applications.

Each physician-scientist should have an advisory committee to monitor the research progress and advise the faculty member in all aspects of scientific, clinical and career development. This committee should construct a clear professional development plan in conjunction with the physician-scientist that includes both short- and long-term goals and reinforce what is expected of an individual in their career path for advancement and promotion. The mentoring plan should also include sufficient time to attend meetings and conferences to help the physician-scientist acquire new scientific and clinical skills. In this age of precision medicine and big data, analytical, computational and programming skills are essential.

WHAT ARE THE REASONS FOR FAILING AS A PHYSICIAN-SCIENTIST?

As a general rule, failure occurs when one or more of the keys to success are missing. Mentoring is critical because making bad scientific decisions early in a career can hold back progress over the critical first five years. Departments can lack commitment when the going gets tough: if the funds for

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CROPS serves as resource for physician-scientists

Radiation oncology attracts an extremely competitive pool of applicants with significant research experience and interest, including the highest percentage of MD/PhDs of any specialty[1]. Many individuals are attracted to radiation oncology with aspirations toward physician-scientist careers. Conclusions from recent studies suggest that scarcity of mentorship, training in grant writing and established funding sources in combination with the current compensation structure in academic departments are potential obstacles[2-3].

In order to address some of these potential obstacles, the Community of Radiation Oncology Physician-Scientists (CROPS) was recently established. The mission of CROPS is to advance basic and translational research in radiation oncology and promote the careers of physician-scientists in the specialty by bringing together individuals at all stages of their careers, facilitating the open exchange of ideas, creating a collaborative environment, promoting mentorship and funding opportunities, and raising awareness of the issues pertinent to basic and translational researchers in radiation oncology.

CROPS held its inaugural workshop at ASTRO's 56th Annual Meeting in San Francisco. Topics included an overview of the current status of physician-scientists and the obstacles currently faced by aspiring physician-scientists and potential solutions. Topics for future workshops include applying for jobs, grant writing, mentorship, establishing collaborations and funding opportunities. An open community on RO*hub* allows CROPS members to connect with each other between in-person events. RO*hub* is accessed from the ASTRO website.

CROPS is also working closely with ASTRO leadership on a joint ASTRO-CROPS Mentoring Program, which will help to promote a research community across institutions.

All ASTRO members are invited to join CROPS and propose new ideas and initiatives that will benefit the entire community. The future of research in radiation oncology is at a critical juncture, and coordinated efforts by the entire community are necessary to ensure the future of the specialty.

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supporting the physician-scientist are discretionary funds fed from the margins of the departmental operations, then as soon as the margins are trimmed or become nonexistent, many department chairs will be tempted to stop the flow of funds into nurturing physician-scientists. Furthermore, departments then cut back on the planned number of positions, creating a shortage of good physician-scientist positions. The solution is to insulate the funds for physician-scientists, whenever possible, to prevent the temptation to eliminate this funding. Funding obtained from a defined source, such as separate institutional funds for recruitment, is much more likely to survive when there is pressure on operational funds.

With good institutional and departmental support and the strong drive to succeed, physician-scientists have a good chance of succeeding long-term. This success is important to the future of the field because physician-scientists play a key role in driving new developments in the specialty.

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Dr. Powell is chair of the department of radiation oncology at Memorial Sloan Kettering Cancer Center in New York, a member of the Molecular Biology Program of Sloan Kettering Institute, incumbent of the Enid A. Haupt Endowed Chair and professor of graduate medical sciences at Weill Cornell Medical College.

Dr. Giaccia is the Jack, Lulu and Sam Willson Professor in Cancer Biology in the Department of Radiation Oncology at Stanford University in Stanford, California, director of the Cancer Biology Program and associate director for basic sciences at the Stanford Cancer Institute.

Dr. Spektor is an instructor of radiation oncology at Harvard Medical School and a radiation oncologist at the Brigham and Women's Hospital and Dana-Farber Cancer Institute in Boston.

Dr. Kesarwala is an assistant clinical investigator in the radiation oncology branch of the National Cancer Institute.

CAREER PATHS FOR PHYSICIAN-SCIENTISTS IN RADIATION ONCOLOGY

BY DAVID G. KIRSCH MD, PHD

THIS IS AN EXCITING TIME FOR RESEARCH IN RADIATION ONCOLOGY. During the past few years, many gene mutations that drive cancer have been identified. Also, molecular mechanisms that govern the cellular response to ionizing radiation have been described. In addition, novel genetically engineered mouse models and new techniques for genome editing have been developed, which provide opportunities to make new discoveries with potential for translation into the clinic. At the same time, the field of radiation oncology has been fortunate to attract talented medical students, many of whom have completed rigorous PhD training in the basic sciences. With so many talented trainees entering our field and the tremendous opportunities in cancer research and radiation biology, this should be a golden era for radiation oncology research. However, as a field, we are not reaching our potential for basic and translational research. This is likely a consequence of many factors; however, this article will focus on the challenges that physician-scientists face when they begin a career in radiation oncology leading an independent laboratory.

Although there are many different training pathways that can lead to success, if a radiation oncologist wants to maintain an independent research program, then he or she will need to receive grants from the federal government, foundations or other sources. The competition for these grants is generally not restricted to other radiation oncologists and radiation biologists. Instead, the competition includes medical oncologists, pediatric oncologists and other cancer researchers. Medical oncologists and pediatric oncologists often have significantly more postdoctoral research training than radiation oncologists. For example, they often have three, four or more years of postdoctoral research experience. Therefore, they typically have more publications on their CV and, more importantly, have more often defined a scientific niche, developed a model system or research approach with which they can establish an independent research program. In contrast, radiation oncology residents may have only 12 months of research training during residency. Even with the Holman Research Pathway for residency training, 21 months

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CAREER PATHS FOR PHYSICIAN-SCIENTISTS IN RADIATION ONCOLOGY

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With so many talented trainees entering our field and the tremendous opporunities in cancer research and radiation biology, this should be a golden era for radiation oncology research.

for research training may not be sufficient time for trainees to publish papers and develop a scientific niche upon which they can successfully build a research program and compete for grants against others who have a much longer period of postdoctoral training.

How can trainees in radiation oncology receive a similar level of postdoctoral research training as in other oncology subspecialties? The Holman Research Pathway is a good place to start. However, when trainees finish the Holman Research Pathway, they may still require further training in a mentored research environment. Currently, there is no standard pathway to support junior faculty in radiation oncology to complete postdoctoral research training and promote their transition to scientific independence. If trainees complete residency training and initially want to spend most of their professional effort in a mentored scientific environment, they may be offered faculty positions with a lower salary.

To provide some salary and protected research time, residents can apply for the National Institutes of Health Mentored Clinical Scientist Research Career Development Award (K08). The K08 award requires a commitment of 75 percent effort for research and provides up to $100,000 of salary support per year for up to five years. The K08 grant mechanism is a bridge that medical oncologists and pediatric oncologists often utilize to achieve scientific independence because it provides salary support for protected research time. However, there are only a small number of radiation oncologists with K08 or related career awards. This may be because the salary support from these highly competitive grants generally does not cover 75 percent of the salary of a junior faculty member in radiation oncology. Therefore, trainees with the potential to become independent physician-scientists may seek faculty positions where more of their time is devoted to caring for patients so that they can obtain a higher salary. These kinds of positions make it more challenging to compete for grants with physician-scientists from medical oncology and pediatric oncology.

There are examples of physician-scientists in radiation oncology who have successfully established an independent laboratory without lengthy postdoctoral research training and while spending several days per week caring for patients. In addition, there are many models in which radiation oncologists can successfully contribute to basic and translational research without leading an independent lab. However, if the goal of the trainee is to lead an independent research lab, then the more time that a radiation oncologist has for research training when they complete residency training, the greater the likelihood for success in obtaining independent research grants.

What can ASTRO do to address this challenge? ASTRO already supports faculty development with the ASTRO Junior Faculty Career Research Training Award with $100,000 annually for two years. The goal of this grant mechanism is to provide bridge funding so that a junior faculty member can obtain K08 or similar career development funding. If organizations that support radiation research would also supplement the salary of K08 grant awardees, then this would make the pathway to scientific independence more financially viable for both departments and trainees. To receive a K08 award, radiation oncologists must compete with the very best physician-scientists in other oncology subspecialties. This support is an investment in some of our best trainees, which will not only yield a great dividend in future basic and translational research in radiation oncology, but will also help ensure the health of our specialty in the years ahead.

Dr. Kirsch is associate professor and vice-chair for basic and translational research in the Department of Radiation Oncology at Duke University Medical Center in Durham, North Carolina.

Restructure of clinical trial system addresses evolving needs

BY THOMAS J. FITZGERALD, MD, DAVID S. FOLLOWILL, PHD, JAMES GALVIN, DSC, FASTRO, MICHAEL V. KNOPP, MD, PHD, JEFF M. MICHALSKI, MD, MBA, FASTRO, AND MARK A. ROSEN, MD, PHD

IN MARCH 2014, A NEW ERA OF ONCOLOGY CLINICAL TRIALS management was initiated by the National Cancer Institute (NCI). It was recognized that the NCI's Clinical Trials Cooperative Group Program had outstanding accomplishments and many practice changing studies during the past 50 years.

With influence from the 2010 Institute of Medicine (IOM) report, "A National Cancer Clinical Trials System for the 21st Century: Reinvigorating the NCI Cooperative Group Program," NCI restructured its clinical trial system to meet the evolving needs of modern clinical trials. NCI has established a new network to promote more rapid protocol development and clinical trial execution. The network is poised to take advantage of the rapidly expanding field of tumor genomics and availability of new agents generated by the robust interest in targeted tumor pharmacology. Clinical trial investigators will be able to conduct trials to validate the extraordinary amount of available biomarker and therapeutic information.

The new network consists of multiple components. The former nine adult cooperative groups have been consolidated into four adult groups in the National Clinical Trials Network (NCTN). The four adult groups are the Alliance for Clinical Trials in Oncology, ECOG-ACRIN Cancer Research Group, NRG Oncology and SWOG. As was the case under the earlier cooperative group program, the Children's Oncology Group, which focuses solely on childhood cancers, serves as the fifth NCTN group. The NCTN structure also includes a Canadian Collaborating Clinical Trials Network. Information from all groups will be integrated into a single informatics platform in order that information can be integrated and distributed in a uniform manner. Through these mechanisms the expectation is that the new groups will be able to interact in an unprecedented manner creating opportunities for novel protocol development. For example, both adult and pediatric investigators are now collaborating on a single soft tissue sarcoma protocol linking diseases that were previously treated in a non-uniform manner. It is anticipated that many lymphoma clinical trials will now integrate between adult and pediatric investigators to bridge the gap in care identified for adolescent and young adult patients. Protocols will be built with adaptive features permitting investigators to enroll patients in cross-group studies through the Clinical Trial Support Unit. This will help to accrue the appropriate number of patients to studies asking questions on subsets of patients including unique biomarkers within individual disease types (e.g., triple negative breast, etc.).

The new NCTN program is intended to be transformative in providing the best infrastructure to conduct publicly funded cancer clinical trials. The infrastructure includes the network groups and the Lead Academic Participating Sites, the National Community Oncology Research Program, tumor banks and the Imaging and Radiation Oncology Core (IROC).

Of interest to the radiation oncology community is the new cooperative organization IROC. IROC consists of the six quality assurance (QA) centers:

- IROC Houston (the former Radiological Physics Center).
- IROC St. Louis (the former Image-guided Therapy Center).
- IROC Philadelphia (RT) (the former Radiation Therapy Oncology Group QA Center).
- IROC Philadelphia (DI) (the former ACRIN Core Lab).
- IROC Ohio (the former CALGB Imaging Core Lab).
- IROC Rhode Island (the former Quality Assurance Review Center).

IROC's two co-directors are David Followill, PhD, of IROC Houston, and Michael Knopp, MD, PhD, of IROC Ohio. The consolidation of these organizations under the leadership of a centralized core team will improve efficiency and optimize the use of these services by the entire network. This new organization provides increased interaction between imaging and radiation therapy benefiting the clinical trials community. All of the IROC QA Centers are performing aspects of radiation therapy and imaging QA with divisions of labor following the associations that each QA Center had with the former Cooperative Group Program.

IROC will begin to federate activities in a uniform manner for efficiency and economy of scale. It will continue to support the NCTN through trial design support, institution/site/investigator credentialing, data acquisition, data management and case review. IROC data will be integrated with NCTN statistical centers for analysis and in the future with tumor banks to complete the full portfolio of required data for protocol analysis.

The informatics platform of the future for data acquisition and storage will be based largely on cloud technologies. The American College of Radiology (ACR) will facilitate these activities to ensure enterprise-level function throughout the NCTN. It is anticipated that IROC will be fully capable of providing services to investigators worldwide, enabling rapid and productive clinical trial execution. It is essential that data quality be maintained at a high level to assure data integrity and confidence in clinical trial outcomes. Targeted therapies in development will be coupled with traditional treatment strategies; therefore, accurate assessment of imaging for both target definition and treatment response is crucial for trial analysis. Protocol compliant radiation therapy treatment execution is essential for validating certain clinical trial outcomes. IROC processes will insure the integrity of imaging and radiation therapy data for analysis of NCTN clinical trials.

IROC is supported by the NCI grant #1U24CA180803-01 administered by the ACR.

Thomas J. FitzGerald, MD, of the University of Massachusetts Medical School, is the principal investigator of IROC Rhode Island.

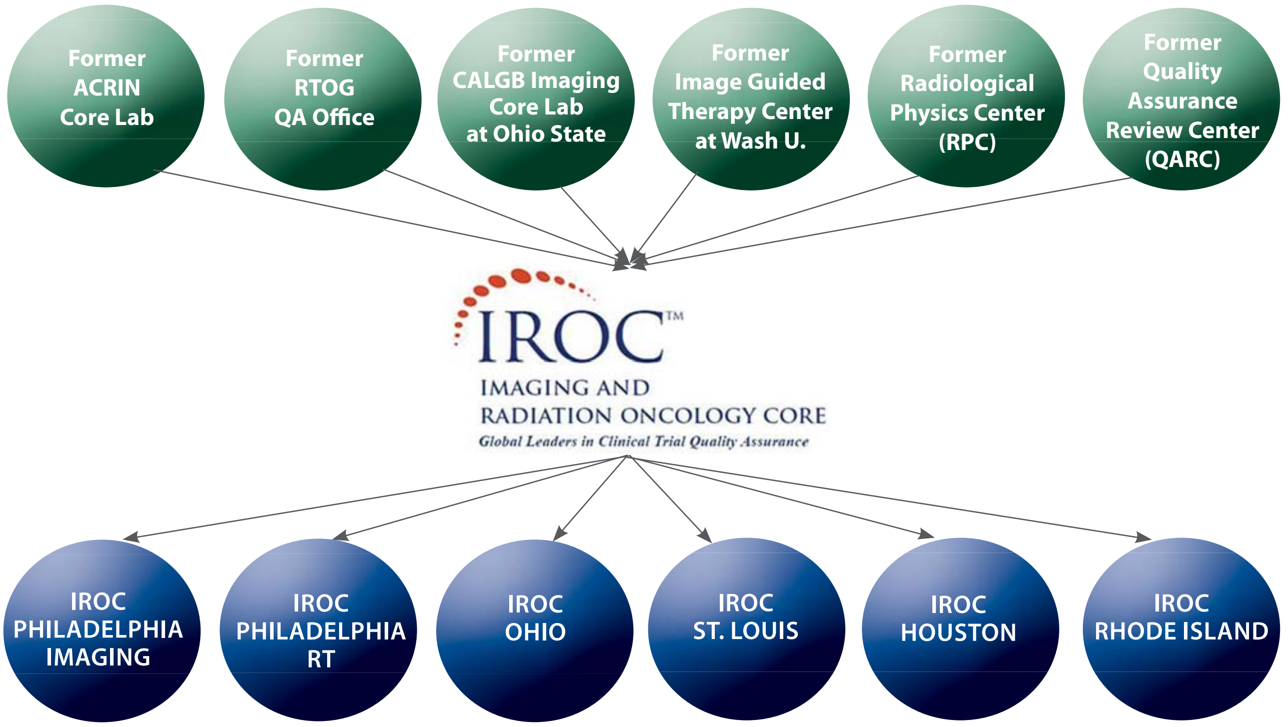
David S. Followill, PhD, of MD Anderson Cancer Center, is the principal investigator of IROC Houston.

James Galvin, DSc, FASTRO, of Thomas Jefferson University, is the principal investigator of IROC Philadelphia (RT).

Michael V. Knopp, MD, PhD, of the Wright Center for Innovation in Biomedical Imaging, Wexner Medical Center at The Ohio State University, is the principal investigator of IROC Ohio.

Jeff M. Michalski, MD, MBA, FASTRO, of the Washington University School of Medicine, is the principal investigator of IROC St. Louis.

Mark A. Rosen, MD, PhD, of the University of Pennsylvania Health System, is the principal investigator of IROC Philadelphia (DI).



INFORMATION IS KEY TO MEMBER SATISFACTION

Results from the 2014 ASTRO Member Survey

BY ANNA ARNONE, VICE-PRESIDENT OF MEMBER RELATIONS AND COMMUNICATIONS, ANNAA@ASTRO.ORG, STEPHANIE STEVENS, RESEARCH AND EVALUATION SENIOR MANAGER, STEPHANIES@ASTRO.ORG AND ANUM HABIB, RESEARCH ANALYST, ANUMH@ASTRO.ORG

THE ANNUAL ASTRO MEMBER SURVEY was conducted June 23 through July 21 to assess the level of satisfaction members have with the work ASTRO does on their behalf as well as to learn about any areas for improvement or new products or services that the Society should explore. The survey was sent to Active, Affiliate, International, Associate and Member-in-Training members. Satisfaction across all segments of membership remains high. Satisfaction is reported highest when members feel well-informed about benefits and services, new initiatives and practice management policies. Sixteen percent (1,532) of members who received the link to the online survey responded, of which 59 percent (902) were either domestic or international radiation oncologists. Today, ASTRO membership is at a record high with nearly 11,000 radiation oncology professionals from around the globe. A brief summary of the survey findings follows.

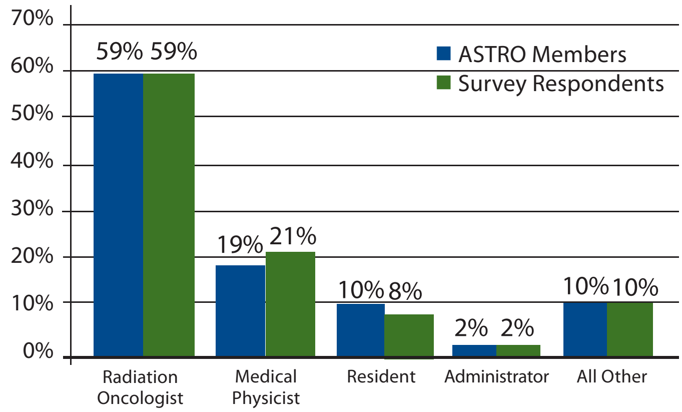
RESPONDENT/PRACTICE DEMOGRAPHICS

ASTRO membership is comprised of all segments of the radiation oncology workforce with the majority being radiation oncologists (including residents) and physicists. The percentage of survey respondents by occupation correlates closely with the ASTRO membership *(see Figure 1)*. On average, respondents have been in practice for 17.1 years with radiation oncologists, medical physicists and radiation therapists practicing for slightly more than 18 years. The small group of radiation biologist (n=14) and medical dosimetrist (n=16) respondents report the lengthiest tenure, 22.9 and 21.0 years respectively.

Sixty-eight percent of survey respondents indicate that their primary practice is located in the U.S. Of the thirty-two percent who indicate that their primary practice is located outside of the U.S., the majority come from Japan (4.2 percent), Canada (3.6 percent), Brazil (2.1 percent) and India (1.9 percent). The remaining respondents are from 56 countries. Most practices (66 percent) are located in urban settings. This is especially true among international radiation oncologist respondents where 88 percent report an urban practice location. The majority of respondents (79 percent) work in a hospital-based practice setting at least three days per week *(see Figure 2)*. More than half (53 percent) of U.S. radiation oncologist respondents are employed in a private practice/community-based system, while 52 percent of international radiation oncologist respondents are primarily employed in an academic/university system *(see Figure 3)*. Practice size is split almost evenly between small (fewer than 500 unique patients per year) and medium (500-999 patients per year) *(see Figure 4)*.

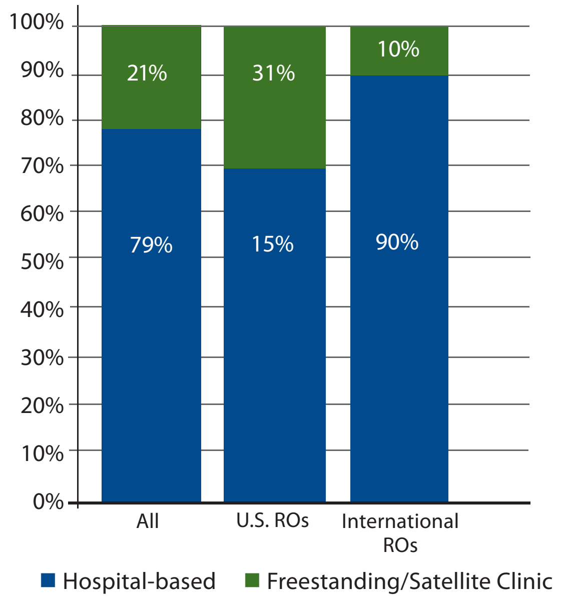
Radiation oncologists and physicists were asked to identify which modalities/technologies are currently in use in their

FIGURE 1: DEMOGRAPHICS – OCCUPATION



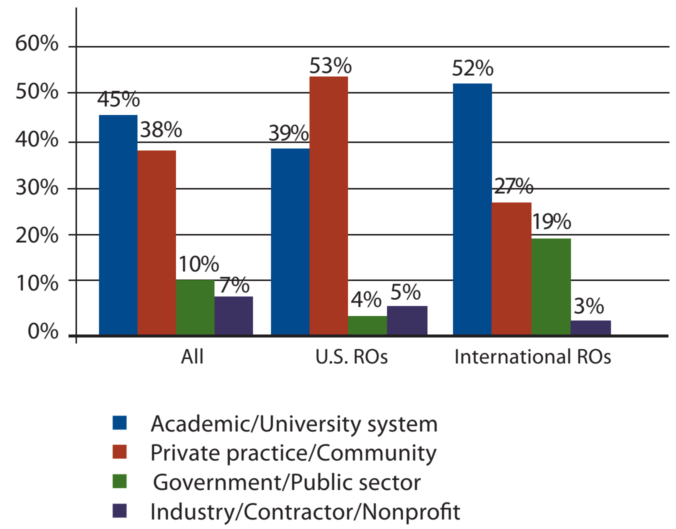
The mix of survey respondent occupations closely mirrors the ASTRO membership. Occupations included in the "All Other" category include other (1.6%), clinical oncologist (1.5%), oncology nurse (1.5%), medical dosimetrist (1.1%), radiation therapist (1.0%), radiation biologist (0.9%), nurse practitioner (0.7%), physician assistant (0.3%), veterinarian (0.3%), diagnostic radiologist (0.1%) and surgical oncologist (0.1%).

FIGURE 2: DEMOGRAPHICS – PRIMARY PRACTICE/WORK LOCATION



The majority of respondents work in a hospital-based location at least three days per week.

FIGURE 3: DEMOGRAPHICS – PRIMARY EMPLOYER



The primary employer for more than half of U.S. RO respondents is private practice/community whereas academic/university system is the primary employer for the majority of international RO respondents.

practice. IMRT, IGRT and 3-D CRT are the modalities cited most as technologies currently in use. SBRT and SRS are cited as the top modalities that respondents plan to implement within the next 18 months. Based on data from past surveys, the use of brachytherapy has decreased 13 percent since 2012. Members are embracing the value of implementing technology in their management of patient records. The majority (59 percent) of respondents use an Electronic Health Record system for their patient information.

MEMBER CHALLENGES

Reimbursement cuts continue to be the top challenge faced by U.S. radiation oncologists overall *(see Figure 5)*. A more in-depth look into the response to reimbursement cuts reveals that private practice respondents find reimbursement cuts more challenging than respondents from academic institutions *(see Figure 6)*. The survey finds that U.S. radiation oncologists are becoming more adept at participating in federal quality incentive programs. The scale has shifted from 63 percent "extremely challenging" in 2013 to 33 percent in 2014.

Forty-seven percent of U.S. radiation oncologists report having a freestanding radiation oncology practice not owned by a radiation oncologist in their community. This number has increased by 4 percent since 2012. Since 2012, between 80 and 87 percent of radiation oncologist respondents have reported a decrease in the number of referrals, consults and

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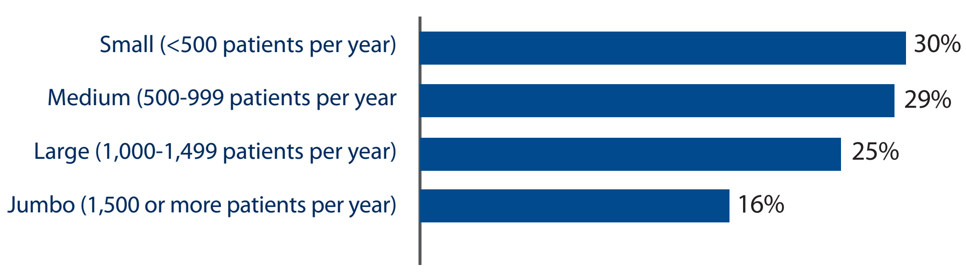
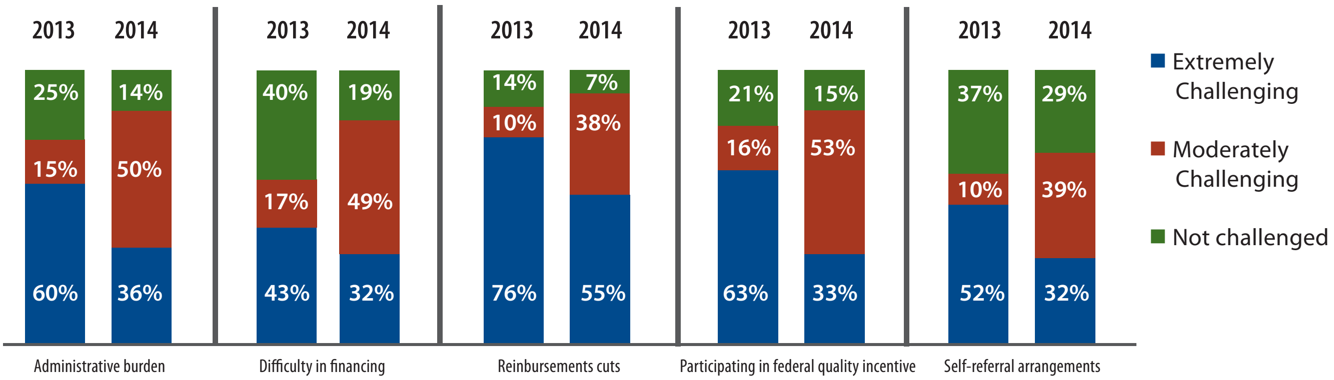
FIGURE 4: DEMOGRAPHICS – PRACTICE SIZE



Radiation oncologist respondents were asked to define the size of their practice based on the annual total number of unique patients. A majority of radiation oncology practices have either fewer than 500 patients per year or between 500 and 999 patients per year.

FIGURE 5: CHALLENGES – U.S. PRACTICE CHALLENGES



Reimbursement cuts continue to be the top challenge faced by U.S. radiation oncologist respondents.

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revenue as a result of these freestanding non-radiation oncologist practices.

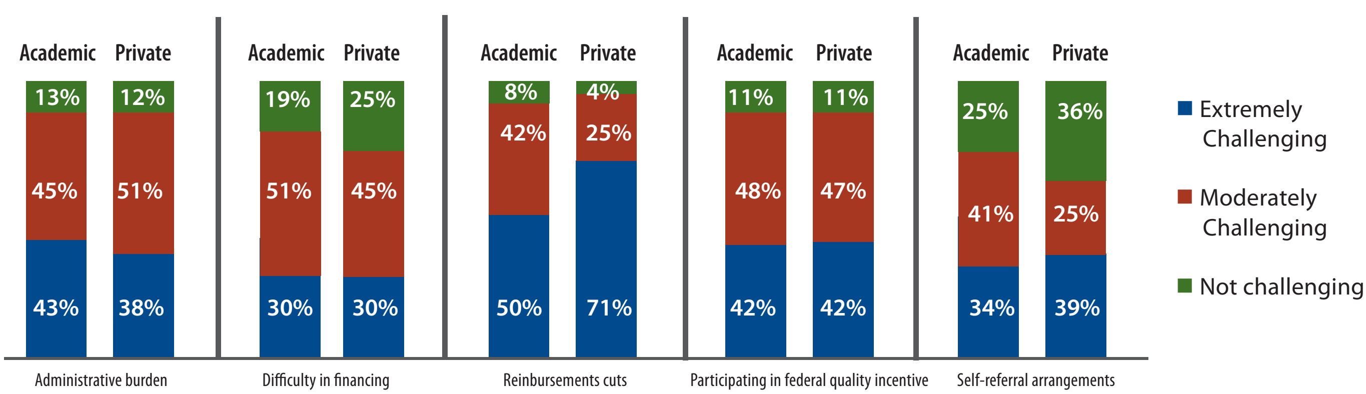
MEMBERSHIP EXPERIENCE

Most survey respondents (88 percent) feel that participation in ASTRO is a good use of their time. International respondents (93 percent) especially agree that participation is valuable *(see Figure 7)*. There are many ways in which a member can participate in ASTRO, from attending meetings to volunteering on a workgroup or as a committee member. A call for volunteers goes out to members via the ASTROgram in the January/February timeframe every year. Members are encouraged to make the most of their membership experience by volunteering time, energy and expertise and availing themselves of the Society's resources.

More than a third (35 percent) of respondents contacted ASTRO throughout this past year, and the majority are highly satisfied with the interaction with ASTRO staff. The weekly ASTROgram is a key communication tool for ASTRO. In addition to keeping members apprised of what is happening in Washington from a legislative and health policy perspective, members are reminded of important Society meetings, initiatives and resources through the ASTROgram. Seventy-nine percent of U.S. radiation oncologist respondents read the ASTROgram to stay informed about ASTRO activities. The ASTRO website and *ASTROnews* are also cited as valuable communication tools. Stay tuned in the coming year for new enhancements to ASTRO.org. Social media is gaining in popularity among respondents.

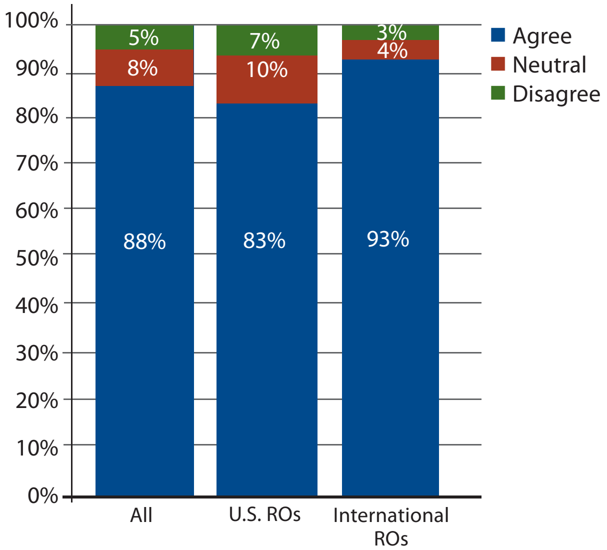
Providing education and professional development opportunities and publishing journals (*International Journal of Radiation Oncology • Biology • Physics* (Red Journal) and *Practical Radiation Oncology*) are ranked as ASTRO's most important functions by U.S. respondents *(see Figure 8)*. These are also two top goals of ASTRO's strategic plan, which is available online at www.astro.org/strategicplan. International respondents rank publishing clinical practice guidelines and

FIGURE 6: CHALLENGES – U.S. PRIVATE VS. U.S. ACADEMIC



Both U.S. private practice and U.S. academic radiation oncologists find reimbursement cuts "extremely challenging;" however, the severity of concern is greater within the private practice community.

FIGURE 7: MEMBERSHIP EXPERIENCE – SATISFACTION



Overall, a large majority of respondents feel that participation in ASTRO is a good use of their time. Both domestic and international radiation oncologists agree that participation in ASTRO is a good use of their time.

FIGURE 8: MEMBERSHIP EXPERIENCE – IMPORTANCE OF ASTRO FUNCTIONS

	All U.S.	All Int'l
Provide education and professional development	67%	52%
Publish Red Journal and *PRO*	65%	73%
Publish clinical practice statements	59%	74%
Educate Congress/regulators	47%	N/A
Advocate for appropriate reimbursement	47%	N/A
Provide quality improvement resources	47%	N/A
Advance science	46%	47%
Advocate coverage of radiation therapy	43%	N/A
Raise public awareness of radiation oncology	38%	27%
Provide information on regulatory issues	28%	N/A
Provide coding guidance	27%	N/A
Provide patient resources	25%	N/A
Provide funding opportunities	18%	17%
Provide committee opportunities	13%	9%

U.S. respondents rank providing education and professional development opportunities as the most important function ASTRO serves, while international respondents rank publishing clinical practice statements at the top. Both U.S. and international respondents agree that publishing the Red Journal and *PRO* are important functions of ASTRO.

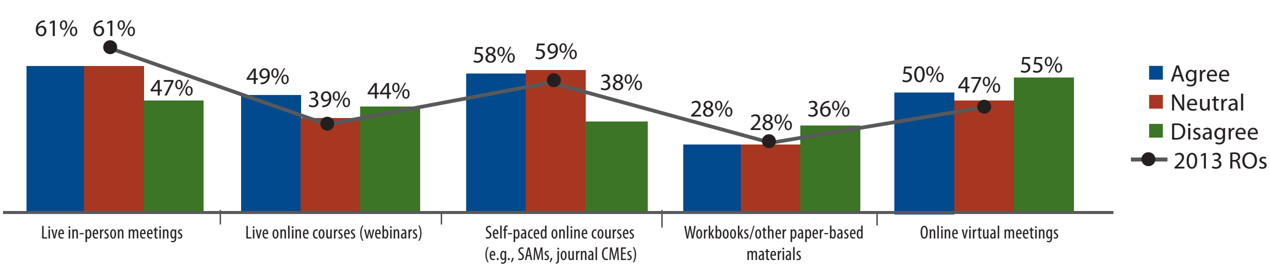
journal publications as ASTRO's most important functions *(see Figure 8)*. Overall, respondents have a high level of satisfaction with ASTRO's educational programs. Most respondents prefer live, in-person meetings; however, self-paced online courses have increased in popularity by 10 percent compared to 2013 *(see Figure 9)*. Overall, respondents cited the desire to improve patient outcomes as the top factor for influencing participation in an education program, a jump from fourth position in 2013.

SUMMARY

The landscape of radiation oncology practice and member participation in ASTRO has not shifted much over the past few years. However, the survey clearly suggests that ASTRO must continue to offer quality online educational offerings to keep pace with member needs, develop strong quality improvement programs, advocate on behalf of members to prevent adverse legislative and health policy decisions and keep members informed of benefits, programs and services.

There is much that can be learned from the responses to the ASTRO Member Survey. The valuable information gleaned from this survey will be used throughout the year to continue to make ASTRO the premier radiation society in the world. Thank you to all members who took the time to complete the 2014 ASTRO Member Survey.

FIGURE 9: MEMBERSHIP EXPERIENCE – EDUCATION FORMAT



Most members prefer live meetings and self-paced online courses; however, many international members prefer virtual meetings. Year over year, self-paced online courses have increased in popularity by 10 percent, while live, in-person meetings have decreased by 4 percent.

BY ERIN YOUNG, MPP, HEALTH POLICY ANALYST, ERINY@ASTRO.ORG

WHAT'S NEW IN RADIATION ONCOLOGY CODING FOR 2015

One year delay for several new and revised 2015 CPT® codes

In August, the American Medical Association (AMA) released a revised set of CPT codes for radiation oncology that were anticipated to go into effect January 1, 2015. Typically, the Centers for Medicare and Medicaid Services (CMS) assigns values to the new and revised CPT codes in the final Medicare Physician Fee Schedule (MPFS) rule. However, in the final MPFS rule released October 31, 2014, CMS did not assign values to all of the new radiation oncology CPT codes, thereby delaying implementation of many of the new codes until January 1, 2016. The agency plans to release proposed values for the non-implemented CPT codes next summer in the CY 2016 MPFS proposed rule. Following a public comment period, the final valuations will be released late next year in the final CY 2016 MPFS rule and will take effect January 1, 2016.

How to report radiation oncology services in 2015

Medicare Physician Fee Schedule

For professional fees valued under the MPFS, CMS will use the same radiation oncology CPT® code set in 2015 that it used in 2014. However, due to the changes made by AMA to the radiation oncology code set, some of the CY 2014 codes were deleted. Therefore, CMS has assigned G-codes to the deleted codes to allow practitioners to report services as they did in 2014 (Figure 1). Note that CMS accepted the new teletherapy and brachytherapy isodose planning CPT codes and assigned values to them in the CY 2015 MPFS final rule (Figure 2). Thus, in 2015, teletherapy and brachytherapy isodose planning will be reported using new CPT codes (77306, 77307, 77316, 77317, 77318), and not with CMS-assigned G-codes.

Hospital Outpatient Prospective Payment System

CMS accepted all of the new and revised 2015 CPT codes in the Hospital Outpatient Prospective Payment System (HOPPS). In the Medicare hospital outpatient environment, hospital reimbursement is based on Ambulatory Payment Classifications (APCs). CPT codes are assigned to an APC based on clinical and resource use similarity. The new intensity modulated radiation therapy (IMRT) delivery codes (77385 and 77385), image guided radiation therapy (IGRT) code (77387), conventional radiation treatment delivery codes (77402, 77407, and 77412) and isodose planning codes (77306, 77307, 77316, 77317, 77318) all received values within their respective APCs and can be used for reporting in 2015 in the HOPPS.

Private payers

While Medicare will only accept the 2014 radiation oncology code set with the addition of the G-codes under the MPFS, it is unclear whether all private payers will follow the same model. Many private payers have traditionally not accepted G-codes, and their electronic systems may not be prepared to accept them. If this is the case, some payers may choose to utilize the new 2015 CPT code set, even though these codes will not have Medicare-assigned values for 2015. ASTRO is continuously monitoring decisions on private payers' reporting requirements and will provide up-to-date information on the ASTRO website. ASTRO will also publish coding guidance on both the G-codes and the new 2015 CPT code set in the *ASTRO 2015 Radiation Oncology Coding Resource*. Members are strongly encouraged to contact their payers to see whether they will be accepting the new 2015 CPT codes or G-codes in 2015.

Teletherapy and brachytherapy isodose planning code changes for 2015

Three teletherapy CPT codes (77305, 77310 and 77315) and three brachytherapy CPT codes (77326, 77327 and 77328) will be deleted in 2015. There are no G-codes associated with these deleted codes for 2015. Five new codes were created that will be reported for these services. Both Medicare and private payers will accept these new codes in 2015. Note that all five new codes already include the work associated with the basic dosimetry calculation. Do not report 77300 with these codes.

CPT® code changes slated for January 1, 2016

Important changes to the radiation oncology CPT code set are now scheduled to take effect January 1, 2016. All payers will accept the following codes in 2016, and the codes will be assigned Medicare values. If a private payer will not accept G-codes in 2015 and will adopt the new set of CPT codes, they will use the following

Figure 1
Radiation Therapy G-Codes Replacing CY 2015 CPT Codes

CY 2014 CPT Code	CY 2015 HCPCS Code	Long Descriptor
76950	G6001	Ultrasonic guidance for placement of radiation therapy fields
77421	G6002	Stereoscopic X-ray guidance for localization of target volume for the delivery of radiation therapy
77402	G6003	Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks; up to 5MeV
77403	G6004	Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks; 6-10MeV
77404	G6005	Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks; 11-19MeV
77406	G6006	Radiation treatment delivery, single treatment area, single port or parallel opposed ports, simple blocks or no blocks; 20MeV or greater
77407	G6007	Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks; up to 5MeV
77408	G6008	Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks; 6-10MeV
77409	G6009	Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks; 11-19MeV
77411	G6010	Radiation treatment delivery, 2 separate treatment areas, 3 or more ports on a single treatment area, use of multiple blocks; 20MeV or greater
77412	G6011	Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; up to 5MeV
77413	G6012	Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 6-10MeV
77414	G6013	Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 11-19MeV
77416	G6014	Radiation treatment delivery, 3 or more separate treatment areas, custom blocking, tangential ports, wedges, rotational beam, compensators, electron beam; 20MeV or greater
77418	G6015	Intensity modulated treatment delivery, single or multiple fields/arcs, via narrow spatially and temporally modulated beams, binary, dynamic MLC, per treatment session
0073T	G6016	Compensator-based beam modulation treatment delivery of inverse planned treatment using 3 or more high resolution (milled or cast) compensator, convergent beam modulated fields, per treatment session
0197T	G6017	Intra-fraction localization and tracking of target or patient motion during delivery of radiation therapy (e.g., 3-D positional tracking, gating, 3-D surface tracking), each fraction of treatment

guidance in 2015. Key changes to the CPT code set include:

- Major revisions to the external beam treatment delivery code set.
- Creation of two new codes defining different levels of IMRT complexity.
- Creation of a technology independent IGRT code, which now includes the previous Category III tracking code (0197T).
- Bundling of IGRT into the IMRT delivery codes.

External beam treatment delivery code changes

Beginning January 1, 2016, only three CPT® codes (77402, 77407 and 77412) will be used to report conventional radiation therapy treatment delivery performed with a megavoltage beam. There are new descriptors and reporting criteria for these three codes (Figure 3). The G-codes assigned in 2015 to the nine deleted conventional radiation therapy treatment delivery codes (77403, 77404, 77406, 77408, 77409, 77411, 77413, 77414 and 77416) will be deleted in 2016. In the new code set, energy level of the megavoltage beam no longer defines the complexity level.

IMRT treatment delivery code changes

Two new IMRT treatment delivery codes will be utilized for reporting in 2016 (Figure 4). These codes replace CPT® code 77418. The technical component (TC) of image guidance and tracking will be included in the IMRT delivery codes. When guidance and tracking are performed, the physician will only report the professional component (PC) of the new guidance and tracking code. Note that the complex conventional treatment delivery code (77412) now includes field-in-field techniques that are commonly used in treating breast cancer. This should not be confused with breast IMRT.

IGRT code changes

A new code will be utilized in 2016 that describes guidance and tracking:

- 77387: Guidance for localization of target volume for delivery of radiation treatment delivery, includes intrafraction tracking, when performed.

The G-codes assigned in 2015 to the deleted IGRT codes (77421, 76950 and 0197T) will be deleted in 2016. CPT code 77014 will remain in the CPT

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Figure 2

CPT Code	CPT Code Descriptor
77306	Teletherapy isodose plan; simple (1 or 2 unmodified ports directed to a single area of interest), includes basic dosimetry calculation(s)
77307	Teletherapy isodose plan; complex (multiple treatment areas, tangential ports, the use of wedges, blocking, rotational beam, or special beam considerations), includes basic dosimetry calculation(s)
77316	Brachytherapy isodose plan; simple (calculation[s] made from 1 to 4 sources, or remote afterloading brachytherapy, 1 channel), includes basic dosimetry calculation(s)
77317	Brachytherapy isodose plan; intermediate (calculation[s] made from 5 to 10 sources, or remote afterloading brachytherapy, 2-12 channels), includes basic dosimetry calculation(s)
77318	Brachytherapy isodose plan; complex (calculation[s] made from over 10 sources, or remote afterloading brachytherapy, over 12 channels), includes basic dosimetry calculation(s)

FIGURE 3

CPT Code	CPT Descriptor	Criteria for Use
77402	Radiation treatment delivery, ≥1 MeV; simple	All of the following criteria are met (and none of the complex or intermediate criteria are met): single treatment area, one or two ports, and two or fewer simple blocks.
77407	Radiation treatment delivery, ≥1 MeV; intermediate	Any of the following criteria are met (and none of the complex criteria are met): two separate treatment areas, three or more ports on a single treatment area, or three or more simple blocks.
77412	Radiation treatment delivery, ≥1 MeV; complex	Any of the following criteria are met: three or more separate treatment areas; custom blocking, tangential ports, wedges, rotational beam, field-in-field or other tissue compensation that does not meet IMRT guidelines, or electron beam.

FIGURE 4

CPT Code	CPT Descriptor	Criteria for Use
77385	Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; simple	Any of the following: prostate, breast, and all sites using physical compensator-based IMRT.
77386	Intensity modulated radiation treatment delivery (IMRT), includes guidance and tracking, when performed; complex	Includes all other sites if not using physical compensator-based IMRT.

code set, but should no longer be reported to describe the work associated with IGRT. All guidance and tracking should be reported using the new CPT code 77387.

Although the technical component was bundled into the IMRT delivery codes, IGRT code 77387 was not bundled into the conventional radiation therapy treatment delivery codes. Physicians should continue to report the global (TC and PC) of 77387 if image guidance is performed during conventional radiation treatment delivery in a freestanding setting. In a hospital setting, 77387-TC has been packaged into an APC code with the service for which it is provided and will not be reimbursed separately. However, when medically necessary for conventional treatment delivery, 77387-TC should still be reported for tracking purposes and for non-HOPPS payers. Physicians should continue to report 77387-PC in the hospital setting, and it will be reimbursed separately.

PHYSICIAN QUALITY REPORTING SYSTEM (PQRS) AND ELECTRONIC HEALTH RECORD (EHR) UPDATE

Oncology Measures Group Renewed for 2015 PQRS

Beginning in 2015, CMS will 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.

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 such as 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

Continued on Page 31

BY PAUL E. WALLNER, DO, FASTRO, AND ANTHONY L. ZIETMAN, MD, FASTRO

UPDATE: THE HOLMAN RESEARCH PATHWAY

IN 1998, THE AMERICAN BOARD OF RADIOLOGY (ABR) created the B. Leonard Holman Research Pathway (HRP) as an alternate route to ABR certification in radiation oncology and diagnostic radiology.

In 2013, a 10-year retrospective review of the program was reported[1]. The analysis demonstrated that from the perspective of adding to the pool of scientists and educators, the program had been a success, albeit in modest numbers. Approximately 160 trainees enter radiation oncology programs each year; therefore, from 2000 to 2014, approximately 2,400 trainees began their training. During that period, 99 individuals applied to the HRP program, and 97 were accepted (approximately 4 percent of all radiation oncology program applicants). Applications reached a peak of 12 candidates in 2009 and 2010, with a subsequent decline.

Evaluation of the "experiment" also confirmed a number of additional elements considered by the program developers. Because there was reduction in the clinical training experience (from 36 to 27 months and from 450 to 350 external beam patients), there was a concern regarding performance in initial certification examinations. This concern has proven to be without merit, with HRP trainees demonstrating a higher first-time examination pass rate than their non-HRP peers. HRP trainees did enter academic practice at a significantly higher rate than their non-HRP cohort, and HRP trainees significantly outperformed their non-HRP peers in academic productivity in the five-year post-training interval, as measured by number of publications, presentations and research projects, as well as amount of research funding[1].

A recent introspective analysis of the radiation research enterprise[2] and an additional analysis of the HRP experience have raised several issues of interest and concern to the ABR. Although initial levels of extramural research funding for HRP trainees were clearly higher than their non-HRP peers, the long-term funding and academic performance of those individuals remains to be established, especially in an environment of reduced federal biomedical research funding generally, and in radiation research specifically. In the internal ABR review[1], although the HRP trainees' performance was exemplary, there was a concern regarding the apparent drop-off in applications and the potential ramifications of that decline, if sustained. Another disconcerting finding was that despite the fact that all radiation oncology programs are required to have radiation research, of the initial cohort of HRP trainees, 49 of 97 (50.5 percent) were in six programs, and 28 (28.8 percent) were in two programs.

The ABR recognizes that the HRP represents a major career commitment for participants and a significant support commitment from host programs. The ABR will continue to monitor program and participant performance to make changes in the program as appropriate, and to work closely with all radiation research stakeholders to address the larger issues at hand in the radiation research enterprise.

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1. Wallner, PE, Ang, KK, Zietman, AL et al. The American Board of Radiology Holman Research Pathway: 10-year retrospective review of the program and participant performance. *Int J Radiat Oncol Biol Phys*. 2013; 85 (1) 29-34.
2. Wallner, PE, Anscher, MS, Barker, CA et al, Current Status and Recommendations for the Future of Research, Teaching, and Testing in the Biological Sciences of Radiation Oncology: Report of the American Society for Radiation Oncology Cancer Biology/Radiation Biology Task Force, Executive Summary. *Int J Radiation Oncol Biol Phys.* 2014; 88 (1) 11-17.

HOLMAN RESEARCH PATHWAY RADIATION ONCOLOGY APPLICATIONS

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
APPLICANTS	2	1	3	5	6	6	8	4	6	12	12	11	10	8	5

BY JAMES YU, MD, JAMES ALAN HAYMAN, MD, MBA, FASTRO, AND RONALD CHEN, MD, MPH

DELIVERING HIGH-QUALITY CANCER CARE: THE INSTITUTE OF MEDICINE'S RECOMMENDATIONS AND IMPLICATIONS FOR RADIATION ONCOLOGY

IN 2013, THE INSTITUTE OF MEDICINE (IOM) released a 360-page report, "Delivering High-Quality Cancer Care: Charting a New Course for a System in Crisis," which outlined the challenges facing those delivering and receiving cancer care now and in the future. In this Science Bytes installment, we attempt to summarize this document with particular emphasis on its impact on radiation oncology. This article draws substantially from a presentation delivered by Dr. Hayman at the 2013 Best of ASTRO Meeting, which is available in the Virtual Meeting.

It is well known that the demographics of the United States are changing. The number of older adults is expected to become more diverse and to double from current levels by 2030, resulting in a 45 percent increase in cancer incidence during this time. If predicted physician workforce shortages come true, the burden of care may be further distributed to families and to those with limited training. Concurrent with this expansion in the number of patients, the cost of cancer care is expected to increase substantially, from $125 billion in 2010 to $173 billion in 2020. Therefore, given the increasing complexity of modern cancer care, a patient- and provider-centered, evidence-based cancer care delivery system is needed. The ideal system is illustrated in the committee's conceptual framework (Figure 1).

Though on the surface this all sounds like relatively obvious, vague and well-meaning management talk, the committee was able to delve specifically into recommendations that will hopefully bring practical changes to cancer care. Furthermore, comparing and contrasting the new recommendations to those given in 1999 can provide valuable insight as to the unique direction that these recommendations are taking cancer care. Finally, given the influential nature and role of IOM, the recommendations will likely guide future health care research and national policy.

In 1999, IOM recommended changes that were related to quality and coordination of care between health care providers (via evidence-based guidelines, multidisciplinary care teams, use of high-volume centers for complex procedures, electronic medical records and use of core clinical quality measures), and equality (by recommending training and funding for the study of underserved populations and by enhancing services for the uninsured and underinsured). Though much progress has been made, the 2013 recommendations revisit many of the 1999 recommendations. Where the 2013 recommendations are different are in the areas of emphasis: on patient-centered care (with truly engaged and informed patients, and an adequately staffed workforce providing affordable care) and on the learning health care system (that relies on and provides evidence-based care, translation from evidence to clinical practice and back).

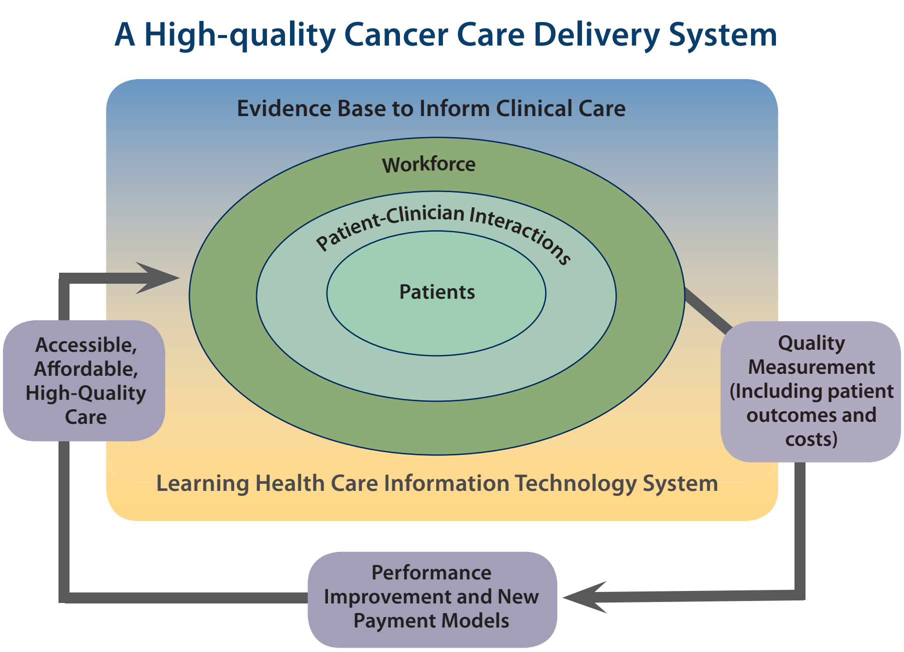
> Given the increasing complexity of modern cancer care, a patient- and provider-centered, evidence-based cancer care delivery system is needed.

To chart the course out of a system in crisis, IOM made the following 10 recommendations: 1) provide clinical and cost information to patients, ideally with decision aids; 2) end of life care should be consistent with the patient's values, with timely referral to hospice; 3) care should be coordinated, adequately staffed and team-based including primary/geriatric care; 4) training in core competencies should be funded by the federal government and developed and promoted through accreditation, certification and training programs; 5) the breadth of data on cancer interventions should be expanded, in particular for older patients with multiple comorbid conditions; 6) a learning health care information system needs to be developed, and a common set of data elements should be developed and collected; 7) this learning health care system should be able to be analyzed in real-time and incentivized by the Centers for Medicare and Medicaid Services (CMS); 8) a national quality reporting program for cancer should be developed; 9) health disparities should be reduced through a national strategy, support of innovative programs and continued support of community programs; and 10) improve the affordability of cancer care by leveraging existing efforts to reform payments and eliminate waste through CMS pressure, use of evidence-based efficient medicine and novel payment models.

What do these recommendations mean in particular for radiation oncology? First, we should identify areas where radiation therapy practice needs more evidence before broad adoption. The ASTRO *Choosing Wisely®* recommendations were a first step in this process. We should develop patient-centered guidelines for communicating the cost and impact of radiation treatment, and disseminate these guidelines to our patients and colleagues. We should support new payment models that aim to improve the efficiency, coordination and affordability of cancer care. Finally, we need to support a learning health care system by participating in the development and collection of common data elements and collect data in particular on those patients who are traditionally underserved or not well represented in clinical trials either because of advanced age or comorbid illness. Through concerted efforts in evidence development, improved patient communication, coordination with other health care providers and a focus on efficient and cost-effective treatment, we can move a system in crisis to one where all patients receive the best possible care.

This article was submitted on behalf of the Clinical, Translational and Basic Science Advisory Committee.

FIGURE 1 – CONCEPTUAL FRAMEWORK FOR A HIGH-QUALITY CANCER CARE DELIVERY SYSTEM



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HISTORY

BY WENDELL LUTZ, PHD

THE BEGINNING OF LINAC RADIOSURGERY AT THE JCRT

THIS IS THE STORY OF THE DEVELOPMENT of linac radiosurgery at the Joint Center for Radiation Therapy, Harvard Medical School. At about the same time similar efforts were taking place in Buenos Aires, Vicenza, Montreal and Heidelberg. In 1983, Dr. Ken Winston, a neurosurgeon at Children's Hospital, wanted to bring the Gamma Knife to Boston to treat inoperable arteriovenous malformations (AVMs). Cost and certificate of need issues blocked the effort; however, Dr. Winston was undeterred. He approached Dr. Sam Hellman, director of the JCRT, to ask if this kind of treatment would be possible with a linac. Dr. Hellman expressed some reluctance, but left the decision to Dr. Bengt Bjarngard, head of physics.

Dr. Winston presented his idea for this new linac application to the entire physics group. He explained how Gamma Knife worked, the nature of AVMs and their already successful treatment with radiation (Gamma Knife and protons). Dr. Bjarngard thought that there may be something to this and asked me to explore it further. I met with Dr. Winston and he showed me something that he thought might be useful—the Radionics BRW CT-guided brain biopsy system. We thought perhaps this was the key to making this project work and that we might be able to use the BRW system to guide small radiation beams into the brain in a manner similar to guiding a biopsy probe.

We then needed to marry the BRW system to a linac for very accurate and rigorously verifiable treatments of AVMs. First, we needed to design a localizer box that would fit the BRW head ring for determination of target coordinates with plain film angiography. Second, we needed to position the patient's head independent of the couch and lasers, both for accuracy and setup verification. The BRW floor stand was perfect for this with adaptations. Third, since non-coplanar beams or arcs would be necessary, couch and gantry axes needed to intersect within at least 0.3 mm. We moved the linac slightly to make this possible. Fourth, a set of position-adjustable secondary collimators placed near the head would be needed primarily for accuracy but also to sharpen the beam penumbra. Our treatment strategy was to use four arcs 45 degrees apart. Dose distributions from nearly spherical to fairly elongated were possible depending on the lengths and weightings of the individual arcs. Circular fields produce the sharpest gradients under these circumstances. Fifth, and above all, we had to design proof positive tests that we were hitting each patient's target accurately from all directions. We did this. Traditional port films would be useless. If each of our quality assurance tests was followed rigorously, mistakes by individuals would never lead to errant irradiations.

Angiographic localization posed a mathematical dilemma. Unless the sides of our newly designed angiographic localizer box were parallel to the film plane, the mathematics became very complicated. None of us could solve this problem. Our solution then was to put "out-riggers" on the angiographic box to facilitate parallel alignment of these planes. About a year later, Drs. Bob Siddon and Norman Barth produced an elegant solution to this problem. The "out-riggers" were abandoned.

We tested this radiosurgery system for geometric accuracy extensively with targets of known coordinates (direct measure of the linac accuracy) and hidden targets (small ball bearings) of unknown coordinates placed inside the Rando phantom head. Hidden targets were localized (i.e., target coordinates determined) by CT and angiography. Our "aiming" accuracy was analyzed from multiple port films (possible with steel balls as targets) taken from many directions. Our aim proved excellent in all cases. These hidden target tests modeled very accurately the results that could be expected in patient treatments, according to Dr. Winston.

Physicists, physicians and Dr. Winston carefully reviewed all tests, measurements and elaborate quality assurance procedures that would accompany each treatment. No problems were uncovered. This project was a team effort with many members of the JCRT contributing.

In January 1986, Dr. Winston successfully treated a patient with an AVM. Today, she is a healthy, 60-year-old woman.

In January 1986, Dr. Winston successfully treated a patient with an AVM. Today, she is a healthy, 60-year-old woman.

Shortly after this, Dr. Jay Loeffler became director of radiosurgery at the JCRT. He thoughtfully expanded the applications of this treatment modality into malignancies and other benign lesions in the brain. Later he developed, with Varian and Radionics, the first dedicated radiosurgery linac.

Meanwhile, I joined the radiation oncology department at the University of Arizona at the invitation of its chair Dr. Robert Cassady. At this time, there was considerable interest in the JCRT radiosurgery approach. With Dr. Cassady's support and significant contributions from Dr. Bruce Lulu and Bill Kimball we assisted almost 40 institutions in implementing this radiosurgery technique.

This article was submitted on behalf of the ASTRO History Committee.

Continued from Page 4

EDITOR'S*notes*

ing until the aspiring physician-scientist can obtain similar career development funding through NIH/NCI. Additionally, ASTRO recently hosted the first CROPS (Community of Radiation Oncology Physician-Scientists) workshop with its mission of promoting the careers of physician-scientists. ASTRO is working with CROPS leadership to foster a joint ASTRO-CROPS Mentoring Program. Such resources may have served me well in my early career and are a critical investment to the success of our developing physician-scientists. Without a cadre of high-quality physician-scientists to drive basic and translational discovery, the cutting-edge of our specialty may be lost.

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

ROhub

Visit the CROPS open community on RO*hub* by logging on to the ASTRO website with your user name and password and clicking the RO*hub* icon at the top of the page.

Continued from Page 8

SPECIAL*tribute*

new level as a consequence of his remarkable skills, dedication, brilliance and creativity.

The center of Phil's tornado was his calm, his wife Bobbi of 61 years who passed away last year. They are survived by three children, six granddaughters, two great-grandsons, two brothers, as well as many dear family and friends.

We all loved Phil dearly, and a void in our lives will forever exist. The world is diminished by his absence, but was enriched by his presence.

Visit www.astro.org/historyinterviews to read a previously conducted interview with Dr. Rubin.

Dr. Constine is the Philip Rubin Professor of Radiation Oncology and Pediatrics, vice-chair of the Department of Radiation Oncology and director of the Judy DiMarzo Cancer Survivorship Program at the James P. Wilmot Cancer Institute of the University of Rochester Medical Center in Rochester, New York.

Dr. Chen is the Richard T. Bell Professor of Radiation Oncology, department chair and director of clinical investigation of radiation oncology at the James P. Wilmot Cancer Institute of the University of Rochester Medical Center.

Continued from Page 26

HEALTH*policy*

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.

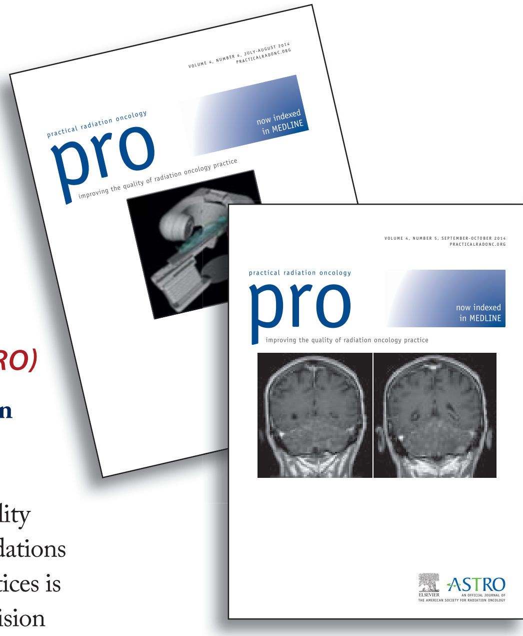
Further details on PQRS, the Oncology Measures Group, the ASTRO PQRS*wizard* and the MOC PQI template are available on ASTRO's PQRS Toolkit at www.astro.org/pqrswizard.

2015 Medicare EHR Incentive Program

The Medicare and Medicaid EHR Incentive Programs are CMS programs that use downward payment adjustments to promote the adoption, implementation and meaningful use of certified EHR technology (CEHRT) by eligible professionals. Failure to successfully demonstrate meaningful use in 2015 will result in a -3.0 percent payment adjustment of total Medicare Part B FFS claims in 2017. Members who have never participated in the program before are only required to demonstrate meaningful use for a 90-day period in 2015. Members who have participated in program before (even if unsuccessfully) are required to demonstrate meaningful use for the full year.

Hardship exceptions are available, and ASTRO encourages members to submit a hardship exception application by July 1, 2015 to avoid the 2017 payment adjustment. More information on the EHR Incentive Program and Hardship Exceptions Application is available on ASTRO's EHR Incentive Program Toolkit at www.astro.org/Practice-Management/EHR-Incentive-Program/Index.aspx.

JOURNALS



FROM THE JULY-AUGUST 2014 ISSUE OF *PRACTICAL RADIATION ONCOLOGY (PRO)*

Quality Standards in Radiation Medicine

by Donaldson et al

Distilling the many available quality standards, guidelines, recommendations and indicators down to best practices is difficult. This article creates a decision tree framework to inform the further development of national and international standards. Potters and Kapur further explore the issue in a commentary.

FROM THE SEPTEMBER-OCTOBER 2014 ISSUE OF *PRO*

Prospective Peer Review Quality Assurance for Outpatient Radiation Therapy

by Ballo et al

MD Anderson Cancer Center looked at the patient data for nearly 3,000 patients who participated in a weekly peer review conference. As a result, they found that compliance with the program was satisfactory and resulted in decreased treatment plan changes and a move toward treatment consensus. They conclude that participation in the program created a culture of guideline adherence and discussion.

FROM THE *INTERNATIONAL JOURNAL OF RADIATION ONCOLOGY • BIOLOGY • PHYSICS* (RED JOURNAL)

AUGUST 1, 2014

Design and Implementation of Bundled Payment Systems for Cancer Care and Radiation Therapy

by Falit and Bekelman et al

Falit et al argue that fragmented reimbursement has led to perverse incentives that could be corrected within a fee-for-service system by specialty- or modality-specific "bundling." Bekelman et al argue for provider, patient and payer consortiums to conduct payment reform experiments to test which designs work.

SEPTEMBER 1, 2014

Considerations for Observational Research Using Large Data Sets in Radiation Oncology

by Jagsi et al

There is a growing interest in observational research in oncology conducted using large-scale data sources such as registries and claims-based data sets. The Red Journal assembled a panel of experts in health services research to provide a concise and well-referenced review intended to inform those in radiation oncology who wish to understand or embark on such research.

OCTOBER 1, 2014

Efficacy of Synbiotics to Reduce Acute Radiation Proctitis Symptoms and Improve Quality of Life

by Nascimento et al

This randomized, double-blind, placebo-controlled trial investigated the effect of synbiotics on the symptoms of acute proctitis and quality of life in patients undergoing radiation therapy for prostate cancer. The results demonstrated a reduction of proctitis symptoms and an improvement of quality of life in those patients.

Breast Cancer Laterality Does Not Influence Survival in a Large Modern Cohort

by Rutter et al

These authors assessed the higher incidence of cardiovascular morbidity and mortality of radiation therapy to the left breast using the National Cancer Data Base and a contemporary group of patients. Results showed that radiation therapy for left-sided breast cancer does not appear to increase the risk of death.

NOVEMBER 1, 2014

Point/Counterpoint: Traditional Phase 1, 2 and 3 Trials in Thoracic Radiation Oncology

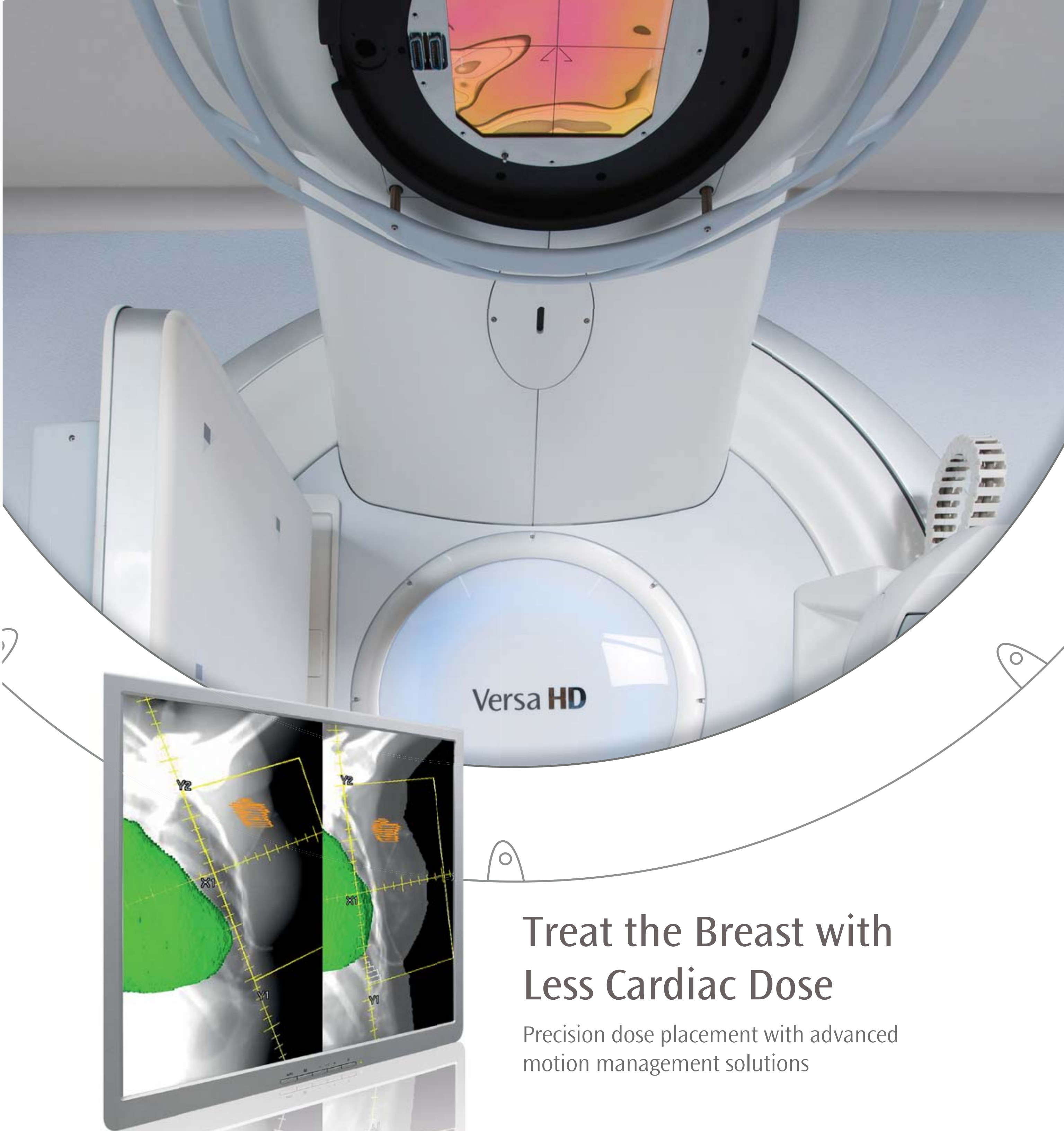
by Finn and Snee and Machtay et al

Finn and Snee argue that this process, developed for drugs, is inefficient and costly for radiation therapy, and may occasionally yield incorrect results. Machtay et al point out that it is the three-step trial system that has led to the current multidisciplinary standard of care.

Partial Breast Radiation Therapy with Proton Beam: 5-Year Results With Cosmetic Outcomes

by Bush et al

This reports on a phase 2 trial to determine efficacy, toxicity and cosmetic results of protons for APBI. The cosmetic results assessed by patients and physicians were good to excellent in 90 percent of subjects and were well maintained through five years.


Versa HD
Y2
X1
Y1