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FEATURING KEYNOTES: Mallory Weggeman, Paladin Partners and Adm. James Stavridis, USN (Ret.)

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Dr. Hossein Jadvar on the future of cancer treatment
A few years ago, a close friend and his wife were visiting our home. My wife, Jodie, had just given birth to our son a few months prior and my friend’s wife was due in a few months. So, there was a lot of discussion going on between the two, with advice and concerns being shared. At one point in the conversation, Jodie asked if they were going to find out the gender of the baby. My friend’s wife said they wouldn’t, but not because they wanted to be surprised or because of any expense involved with the ultrasound. Instead, she was concerned about what the ultrasound would do to the fetus, because and I quote, “Ultrasound hurts dolphins, imagine what it does to babies!”

To my wife’s credit, she managed not to laugh out loud. The point of this story and how it ties into the issue is that we were talking with someone a little bit misinformed. That’s a light theme running through this issue, with debates around proton beam therapy (p. 59) and some possible misinformation about CT tube culpability in regard to dose in our cover story (p. 36).

Beyond those stories, we offer a look behind the scenes, for DOTmed’s version of “How it’s made” covering X-ray and CT tubes (p. 50). Two of the biggest tube manufacturers in the industry walked us step-by-step through the process and as I’m sure you can imagine, there’s a lot that goes into making a tube.

For radiation therapy, we offer a thorough rundown of what’s going on in the sector with interviews and input from manufacturers, independent sales and service organizations and end users (p. 64).

This issue also offers a number of interesting interviews, including a Q&A with Dr. Ronald DePinho, president of the University of Texas MD Anderson Cancer Center (p. 26), Dr. Bruce Haffty, incoming president of ASTRO (p. 32) and Dr. Hossein Jadvar, president elect for SNMMI (p. 80). Each of these doctors provided a wealth of fascinating information, so much so in fact, that it was difficult to put the stories together due to space limitations and the reluctance to edit down such great material. But, that’s what we had to do and you can see the fruits of our labor on those pages.

And speaking of fruits of labor, my friend’s wife did eventually acquiesce to an ultrasound. So they were well-prepared to welcome their healthy baby girl into the world. I’m sure you’ll be happy to know, they didn’t name her Flipper.

Until next issue!

Sean Ruck
Editor-in-Chief
sruck@dotmed.com
DOTmed HealthCare Business News
In October:
Don’t Miss Our Annual MR Issue. The MR is a staple of diagnostic imaging — but what about the more exotic (and expensive) PET/MR? Who’s using it for what, and does it have a future? Read what DOTmed finds out. We’ll also look at intraoperative MR, the practical challenges of scanning in the midst of surgery, and dealing with a massive magnetic field in and around the operating room.

In November:
Celebrate RSNA’s 100th Anniversary with HealthCare Business News. We’ll have a special section highlighting the historic milestones that the RSNA has reached in its continuous enhancements to medical imaging and its contributions to improving diagnosis and subsequent treatment of diseases across the board. We’ll also have our annual RSNA Exhibitor Preview, and much more.

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Scientists at Vetmeduni Vienna, the Medical University of Vienna, the Ludwig Boltzmann Institute for Cancer Research, and the company Tissuegnostics, came together to create software that reliably diagnoses cancer cells by specifically identifying cell structures and proteins. They conducted a study using the software and it was recently published in the journal Plos One.

When deciding what cancer therapy a patient needs, a pathologist usually analyzes organs and tissues under a microscope, but two independent pathologists agree with each other for only one out of every three diagnoses, according to the study. “We observed a relatively high user dependent variation despite the fact that the pathologists were excellently trained experts in the field,” Dr. Lukas Kenner, one of the chief investigators in the study, wrote to DOTmed News.

The software — Histoquest 4.0 — is not intended to replace pathologists but instead act as a supplemental technology to improve the reliability of the diagnosis.

For the study, the scientists analyzed 30 liver cell carcinomas with the software on the TissueFAXs imaging system and assigned them to either “negative” or “highly positive” categories. The software uses algorithms and highly sensitive digital photography, which makes it better able to show the matrix of cells and the cell nucleus compared to the human eye, with a microscope.

“We believe that this improvement in accuracy of diagnosis can be used to improve treatment decisions and even more importantly avoid treatment cycles with drugs that are inadequate,” wrote Kenner. “Thereby, the patients will receive as first choice the best suitable drug, and the tumor or disease has much less time and chance to escape.”

He thinks that this software will be revolutionary for personalized medicine for cancer and will benefit from the growing number of specific drugs that can target single molecules.

---

Johnson & Johnson draws controversial devices

Johnson & Johnson announced on Wednesday that it is initiating a worldwide market withdrawal of all of its Ethicon morcellation devices that still remain on the market. The devices include the GYNECARE MORCELLEX Tissue Morcellator, MORCELLEX SIGMA Tissue Morcellator System and the SYNECARE X-TRACT Tissue Morcellator.

In April, the FDA evaluated the use of laparoscopic power morcellation for the removal of the uterus or uterine fibroids and recommended against it because it poses a risk of spreading cancer tissue. After that, Ethicon stopped sales and distribution of its devices.

At the U.S. FDA Obstetrics and Gynecology Devices Panel of the Medical Devices Advisory Committee on July 10th and 11th, it was announced that using the devices makes it difficult for physicians to preoperatively diagnose some malignancies, particularly leiomyosarcoma, and that there is a risk that they can spread unsuspected cancer tissue.

“We believe Ethicon morcellation devices perform as intended and that there are patients who can benefit from procedures using laparoscopic power morcellators,” Matthew Johnson, director of communications at Ethicon, wrote to DOTmed News in an email.

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GE’s Vizamyl shows promise in two studies

GE Healthcare presented two studies at the Alzheimer’s Association International Conference in Copenhagen on Wednesday that demonstrated the value of [18F]flutemetamol for assessing patients with cognitive disorders.

[18F]flutemetamol is GE’s investigational radiopharmaceutical product for PET imaging of beta amyloid neuritic plaque density in the brains of adults with cognitive impairment who are being evaluated for Alzheimer’s disease and other causes of cognitive impairment. It received FDA approval in October 2013 and was marketed as Vizamyl.

For the first study, the researchers injected 232 patient who had amnestic Mild Cognitive Impairment (aMCI) with [18F]flutemetamol and conducted brain scans on them. They found that the patients with positive [18F]flutemetamol scans were about 2.5 times more likely to convert to probable Alzheimer’s disease (pAD) than those with negative scans.

They concluded that [18F]flutemetamol can predict the progression from aMCI to pAD. “These findings demonstrate the potential role of [18F]flutemetamol in stratifying those patients at higher risk of developing Alzheimer’s disease, beyond its use as a diagnostic tool,” Dr. David Wolk, lead investigator of the study and assistant director of the Penn Memory Center, said in a statement.
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Surgery better than endoscopy for some early esophageal cancers

Posted online: July 29, 2014 by Lauren Dubinsky

For early-stage esophageal cancer, traditional surgical resection has better outcomes than endoscopic resection, according to a recent study published in the Journal of the National Cancer Institute. This is the largest study to date comparing the two procedures for the treatment of the condition.

“We felt this was an important area to expand on existing studies from single centers to do a multicenter evaluation,” Dr. David J. Bentrem, senior author of the study and director of the gastrointestinal oncology lab at Northwestern Memorial Hospital, wrote to DOTmed News.

The researchers at Northwestern Medicine used the National Cancer Data Base — an American College of Surgeons Commission on Cancer and American Cancer Society program — and reviewed the outcomes of over 5,000 patients from 824 different hospitals.

They found that even though surgical resection is a more invasive procedure, it was associated with an 87.6 percent five-year survival rate compared to a 76 percent five-year survival rate for endoscopic resection.

In addition to the survival rates, the researchers also investigated the increasing use of endoscopic esophageal resection. They found that its usage increased from 19 percent in 2004 to 53 percent in 2010 for T1a cancers — the cancer is growing into the lamina propria or muscularis mucosa — and increased from 6.6 percent in 2004 to 20.9 percent in 2010 for T1b cancers — the cancer has grown through the other layers and into the submucosa.

Even though there isn’t strong evidence-based research that supports that it’s the best treatment option, more and more physicians are opting to perform the procedure. The reason is because there are small single center studies that suggest that the procedure is a safe technique when experts perform it.

“Due to the complexity and morbidity of esophageal surgery, there was relatively quick adoption of these endoscopic techniques,” Dr. Rajesh N. Keswani, co-author of the study and interventional gastroenterologist at Northwestern Medicine, wrote to DOTmed News.

Medical technology benefits U.S. economy

Posted online: July 18, 2014 by Lauren Dubinsky

In the U.S., there is a rise in chronic diseases as number of elderly Americans increase and sedentary lifestyles and unhealthy diets become more prevalent. Some in the health care industry think that medical technology can effectively prevent and manage the illnesses, but others believe that the economic benefits don’t offset the costs.

The Milken Institute set out to investigate what type of impact medical technology has on the economic burden of disease. They released a study yesterday that found that it has a positive benefit of over $23 billion per year in the U.S.

“In a time when there are so many changes in health care delivery and the incentives system and a concern over the cost of care, the debate about whether there should be more technological innovations or not keeps on going,” Anusuya Chatterjee, author of the study and senior economist at the institute, told DOTmed News.

She added that the study revealed that it’s worth investing in medical technology because of the immense benefit it brings to individuals, as well as society as a whole through economic growth.

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Standardizing breast density notification

Posted online: July 21, 2014 by Lauren Dubinsky

A bill was introduced last Thursday that aims to standardize a requirement to notify patients if they have dense breast tissue. To date, 19 states have enacted breast density notification laws but there is no federal standard that requires that women are informed.


The bill sets the minimum federal standard, which was assigned by the Secretary of Health and Human Services (HHS), for notifying women that they have dense breasts and recommending that they discuss additional screening options, when necessary, with their physicians.

The bill also calls for HHS to boost research in order to improve screening options for women with dense breast tissue.

“By requiring that patients be informed if they have dense tissue, this bill allows women to make potentially lifesaving choices about their care,” Feinstein said in a statement.

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Most physicians e-prescribe now

Posted online: July 16, 2014 by Lauren Dubinsky

Most physicians are ditching manually written prescriptions and embracing e-prescribing, according to a recent Office of the National Coordinator for Health Information Technology report.

The researchers used data from Sure-scripts — an e-prescription network that is used by most community pharmacies in the U.S. — and found that the number of physicians e-prescribing with an electronic health record grew from 7 percent in December 2008 to 70 percent in April 2014.

Currently, Minnesota has the highest amount of physicians e-prescribing — 100 percent — and Alaska has the lowest — 48 percent.

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Robotic-assisted ultrasound becoming a reality

Posted online: August 14, 2014 by Lauren Dubinsky

Researchers at Icahn School of Medicine at Mount Sinai successfully performed a robotic-assisted ultrasound examination in Germany on a patient in Boston and the findings were published in the Journal of the American College of Cardiology-Imaging.

Many have tried to bring cardiac ultrasound and robotics together in the past, but it never made it to the clinical practice because there were too many challenges standing in its way. “Now the robots are more efficient and lightweight and you can have them routed to standard connections,” Dr. Partho P. Sengupta, director of cardiac ultrasound research at Icahn School of Medicine at Mount Sinai, told DOTmed News. “For those reasons, this was the right time for looking at ultrasound applications.”

For the study, the researchers used a small, lightweight robotic arm with built-in ultrasound technology in Boston and connected it to a personal computer with a low-bandwidth Internet connection in Munich, Germany. They were able to perform the ultrasound exam on the patient’s carotid artery in four minutes.

Sengupta said that when the technology becomes widely used in clinical practice, it will bring considerable benefits to healthcare. “The delay in the diagnosis leads to more morbidity and maybe more utilization of other resources,” he said. “If you have a more prompt identification of a problem, it may reduce the time of recovery.”

Physicians spend a lot of time trying to come to a diagnostic conclusion — 70 to 80 percent of the time they are struggling to get the right decision and 20 to 30 percent of the time they are explaining the therapeutic options to the patients, said Sengupta.

But with this technology, that will change. Share this story: dotmed.com/news/24029
Data collection system personalizes cancer treatment

Posted online: July 23, 2014 by Lauren Dubinsky

A new data collection system called Oncospace may help physicians make optimal treatment decisions for cancer patients. A study investigating the system was presented at the annual American Association of Physicists in Medicine meeting.

Oncospace works by gathering comprehensive information on patients with head and neck cancer including their family history, medications, surgical procedures, test results, tumor characteristics, treatments and outcomes. By doing that, the researchers can detect patterns, predict potential side effects and collect other information that will aid them in coming up with the best treatment plan.

The study presented at the meeting is part of the researchers’ Oncospace analytic program which aims to collect information on all patients to personalize care for new patients. The study investigated whether they can use the radiation dose imagery to better predict toxicities for the patients in order to improve treatment plans.

The researchers compiled a database of more than 500 patients and they are continuing to add more to it.

“Our whole goal with this program is to collect information on all of our patients, basically treating them as if they’re all on a clinical trial, and use that mass information or knowledge to personalize the care for new patients,” Todd McNutt, lead author of the study and associate professor of medical physics and director of clinical informatics in radiation oncology at the Johns Hopkins University School of Medicine, said in a teleconference.

The researchers found that based on information from 513 head and neck cancer patients, those who got high doses of radiation to small areas of the larynx, esophagus and muscles of the throat were more likely to have trouble swallowing.

Additionally, they found that patients who had lower doses of radiation to larger areas of the salivary glands, inside of the mouth, or lower jaw were more likely to have dry mouth.

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Dunlee to introduce new tube at RSNA

Posted online: July 24, 2014 by Sean Ruck

On July 9, Royal Philips announced the departure of their health care division CEO, Deborah DiSanzo, and subsequent management restructuring with the health care division now reporting directly to company CEO Frans van Houten. Just two days after DiSanzo’s departure it was announced that Pat Fitzgerald, former president of Dunlee, was also leaving.

Laura Hafner, the director for Global Sales and Marketing for the Dunlee division, will assume the leadership role for the Generators, Tubes and Components Division third party business.

DOTmed News recently spoke with Hafner to learn more about her history and to find out what the changes mean when it comes to Dunlee’s tube production.

Hafner confirmed that Dunlee will continue to manufacture their existing line of tubes — with those offerings covering more than 100 models. She also confirmed Dunlee will maintain its existing distribution network and continue to develop new tubes.

Hafner hinted that there are plans to introduce a new tube at this year’s RSNA, although she couldn’t offer further details at this time.

“Right now, it’s a time for introspection for some us,” Hafner said.

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ACR calls for tomo coverage

Posted online: July 25, 2014 by Lauren Dubinsky

The American College of Radiology (ACR) is pushing for the Centers for Medicare and Medicaid Services (CMS) and private insurers to cover breast tomosynthesis.

Even though tomosynthesis is proven to have benefits over digital mammography, more research is needed to assess long-term clinical outcomes. Research investigating what subgroups of women based on age, breast density and frequency of exam would benefit the most from the exams, is also needed.

In order for that research to be carried out, the technology has to be widely available and reimbursement plays a major role in that.

CMS stated last November that tomosynthesis is an essential component of digital mammography and because of that it cannot be billed separately. But ACR responded to that by creating CPT codes for tomosynthesis when scientific literature showed that the technology met the American Medical Association (AMA) CPT Editorial Panel criterion.

In order to create a CPT Category 1 code, the association requires that a procedure is FDA approved and in general use. The codes were approved by the editorial panel in February.

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TractManager acquires MD Buyline

Posted online: August 5, 2014 by Lauren Dubinsky

TractManager-technology-enabled compliance and contract management service provider, which is marketed under MediTract, announced yesterday that it has acquired MD Buyline. Together they make the only comprehensive health care spend and contract management solution, according to the companies.

“MD Buyline determined that by combining its capabilities with those of TractManager, it could provide its customers with a more valuable offering, an end-to-end solution, allowing them to manage their vendors from procurement through to contract execution and management,” Satin Mirchandani, CEO of MD Buyline, wrote to DOTmed News.

The transaction will also guarantee that MD Buyline has access to the capital and resources that it needs to provide its customers with that type of a solution.

“Health care providers, especially hospitals, are being asked to optimize each dollar of spend,” wrote Mirchandani. “We see the combination of MediTract and MD Buyline as facilitating operational efficiency consistent with the highest standards of compliance and efficiency.”

TractManager provides health care technology, systems and services including contract management, compliance and business intelligence solutions. With its MediTract solution, the company works with over 6,000 health care facilities and over 130,000 users in the U.S. and international markets.

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Former president of Dunlee leaves Philips Healthcare

Posted online: July 17, 2014 by Sean Ruck

As of this past Friday, Pat Fitzgerald, former president of Dunlee, has decided to leave Philips Healthcare and pursue other business interests effective immediately, Diedrich Dirks, senior vice president and GM of the Generators, Tubes and Components Division (GTC) announced in a news release.

According to Dirks, Philips plans to retain ownership and operation of the Dunlee Division. “Dunlee remains an important part of continued expansion of our OEM tube and component business”, Dirks commented, “and we feel retention of this business is in the best interest of both Philips and our customers.”

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Hospital exploring alternatives after radiotracer price hike

Posted online: July 17, 2014 by Lisa Chamoff

 Hospitals are beginning to explore and use alternatives to two manufactured radiotracers that both saw major price increases earlier this year.

Canadian radiopharmaceutical firm Jubilant DraxImage announced at the end of February that it was increasing the prices of macroaggregated albumin (MAA) and diethylenetriamine pentaacetate (DTPA), which are used for ventilation/perfusion (V/Q) scans to diagnose or rule out a pulmonary embolism. The company, which had announced a shortage of MAA last September, said the previous prices had not covered production costs or allowed for any manufacturing improvements, putting the long-term availability of MAA and DTPA at risk.

Some facilities are investigating custom MAA vials from compounding pharmacies, which work directly with prescribers to prepare personalized medications for patients, at a lower cost than the commercial kits. AnazaoHealth Corp., a specialty pharmacy headquartered in Tampa, Fla., that serves the nuclear medicine market, has seen more interest in the product.

The company came out with the custom compounded MAA vials, which were sold for a higher price than the commercial kits during the drug shortage, Robert McKenzie, senior vice president of research and development for AnazaoHealth, told DOTmed News. After Jubilant DraxImage increased their prices, AnazaoHealth started receiving more calls about the custom vials.

“We cannot state for sure that this is why we’ve seen the increase,” McKenzie said. “I believe it’s because they see the clinical value in custom preparations.”

While there is no other manufactured drug that can be used as a substitute for MAA in the perfusion portion of the scan, which evaluates how well blood circulates within the lungs, some facilities have recently switched to a lower-cost, but still effective, substitute for DTPA — pyrophosphate, or PYP, for the ventilation part, which examines airflow.

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A step forward for proton therapy

Posted online: July 17, 2014 by Lauren Dubinsky

Ion Beam Applications SA (IBA) announced yesterday that it has received Marketing Authorization from the FDA for its Compact Gantry Beam Line. It’s the treatment room for their new proton therapy system, ProteusONE, and it was the last piece that needed authorization for the whole system to receive FDA approval.

ProteusONE is a single-room proton therapy system and it’s smaller, less expensive and faster to install than traditional proton therapy systems, according to the company. They expect that this will intensify the national interest in the system.

The conventional systems can cost up to $100 million but the ProteusONE only costs about $25 million, Nicolas Denef, ProteusONE product manager, told DOTmed News. That’s a big deal for the U.S. market since price is one of the main concerns.

Right now, there are 14 proton therapy facilities operating in the U.S. and 12 in development, according to the National Association for Proton Therapy. However, those are mostly in big university centers, said Denef.

“What ProteusONE is going to bring is the ability to have proton therapy for much more communities and for small community hospitals,” said Denef.

Share this story: dotmed.com/news/23858

Hidden info in PET images aids cancer treatment

Posted online: July 23, 2014 by Lauren Dubinsky

Information that is hidden in imaging tests has the potential to help physicians choose the right radiation therapy dose to kill tumors, according to a study presented at the annual American Association of Physicists in Medicine.

It’s currently the largest study that uses radiomics — extracting statistical information from images — to assist in determining the likelihood of cancer progression or its response to treatment based on PET scans of patients with non-small-cell lung cancer and head and neck cancer.

“This is different from what has been done in the past,” Joseph Deasy, senior author of the study and chair of the department of medical physics at Memorial Sloan-Kettering Cancer Center, said in a teleconference. “Diagnostic imaging was typically only used to identify the presence of the cancer or to outline the extent of the disease to define the field that gets the high dose of radiation.”

For the study, the researchers conducted PET scans on 163 non-small-cell lung cancer patients and 174 head and neck cancer patients before and after treatment. From each tumor, they got information about the intensity value of the PET image, the roughness of the image, the shape of the tumor, etc.

Share this story: dotmed.com/news/23901
Royal Philips announced yesterday that its ultra mobile ultrasound system, VI-
SIQ, received 510(k) clearance from the FDA. It’s the first Philips ultrasound system
to combine greater mobility, performance and simplicity into a miniaturized solution.

VI-SIQ consists of a lightweight tablet with a built-in kickstand and it’s designed so it
can easily be transported to wherever it’s needed. It also has a 2.5 hour battery life and
built-in Wi-Fi to transfer DICOM data to the hospitals’ PACS.

Even though it’s a miniaturized system, it’s capable of delivering high-quality images
because of its smart transducer. Philips took some of the beam-forming capability from
their cart-based systems, miniaturized it and put it into the VI-SIQ transducers.

Traditional transducers on the carts leverage the beam-forming capability in the
cart, but VI-SIQ’s transducers take some of the beam-forming capability from the cart
and transfer it to the transducers.

“It really is a rather sophisticated piece of equipment that extracts incredible data and
image quality in a small package,” Sean Gallimore, vice president of global ultrasound
marketing at Philips, told DOTmed News.

The company believes that it will increase clinicians’ access to diagnostic scans for ob-
estriical and abdominal applications. “It’s so easy to use and it’s so mobile that we think
more people will use this in a clinical practice, and not tie-up the more expensive equipment,
to do routine examinations,” said Gallimore.

He added that clinicians who don’t currently use ultrasound will find VI-SIQ valuable
because it’s easy to use, affordable and useful for different applications.

Other companies, including GE Healthcare, have miniaturized ultrasound systems
on the market. Gallimore said that what makes VI-SIQ unique is its higher image qual-
ity and easy user interface.

East Africa was one of the first markets VI-SIQ was introduced into. Philips is looking
to partner with some organizations in Africa so that they can train clinicians, midwives
and paraprofessionals in the region.

“We want to get them certified in training and to use this VI-SIQ system as a way of reduc-
ing the number of high-risk pregnancies that occur outside of hospitals,” said Gallimore.

VI-SIQ is also commercially available in India, China, France and Germany.

When Philips was doing their research to design the system, they spoke with many
clinicians around the world in order to find out what they need in an ultrasound system.
Gallimore said that VI-SIQ is a “product for the globe.”

Share this story: dotmed.com/news/23923

FDA approves Philips’ mobile ultrasound

Posted online: July 25, 2014 by Lauren Dubinsky
Mammo screening beneficial for women over 75

Posted online: August 8, 2014 by Lauren Dubinsky

Breast cancer in older women that is detected with mammography leads to earlier stage diagnoses and reduces the rate of more advanced breast cancer, according to a recent study published online in the journal Radiology. The researchers believe that this supports regular mammography screening in women 75 and older.

“What this study indicates is that the same benefits of early detection with mammography screening hold for women 75 years and older just as they do in younger women,” Dr. Judith A. Malmgren, one of the researchers and affiliated assistant professor at the University of Washington’s School of Public Health, told DOTmed News.

In recent years, controversy has surrounded mammography screening for that age group. The American Cancer Society recommends annual mammograms for women 75 and older if they are in good health but the U.S. Preventative Services Task Force states that there isn’t adequate evidence concerning its benefits and harms.

The reason why there isn’t sufficient evidence is because older women are not good candidates for clinical trials. “In women 75 and older, life expectancy is an issue, so to have them involved in a clinical trial, they don’t have the same length of follow-up options as younger women,” said Malmgren.

She decided to conduct a prospective cohort study with her research partner, Dr. Henry Kaplan, because she had access to the data she needed from the Swedish Cancer Institute in Seattle. The data from the institute’s registry included over 14,000 breast cancer cases and 1,600 of them were patients over age 75.

They uncovered that a majority of the breast cancers detected with mammography were in the early stage, but the cancers detected by the physician or patient were more likely to be in the advanced stage. Additionally, the mammography-detected breast cancer patients were more often treated with lumpectomy and radiation and had fewer mastectomies and less chemotherapy than the patients with cancers detected by themselves or the physician.

Genomic test personalizes prostate cancer treatment

Posted online: July 30, 2014 by Lauren Dubinsky

A genomic test is able to determine what patients would benefit the most from radiation therapy after prostate cancer surgery, according to a recent study conducted by Thomas Jefferson University.

Surgery is intended to cure prostate cancer but in some cases, it’s not possible to totally cure the cancer. Physicians have created high risk criteria based on clinical factors in order to determine the likelihood of recurrence but it’s not always the most effective approach because only 50 percent of high risk patients ever develop metastases.

“The clinicopathological prognostic and predictive factors have enabled us to select patients for various therapies. However, we know that different patients respond differently,” Dr. Robert Den, assistant professor of radiation oncology and cancer biology at the university, wrote to DOTmed News. “The use of genomics provides us with further insight into the cancer and allows us to personalize therapy.”

The genomic test is called Decipher and it’s created by the genome diagnostics company, GenomicDx. It produces a gene signature from a patient’s cancer tissue sample and then classifies them into high, intermediate and low risk for cancer recurrence and metastases.

Obstacles in the way of value-based relationships

Posted online: July 31, 2014 by Lauren Dubinsky

Distrust and an unwillingness to accept financial risk are standing in the way of value-based relationships between health care payors and providers, according to a recent FTI Consulting, Inc. study.

Out of the 251 providers in the study, only 16 percent said that they are willing to accept the financial risk associated with entering into a value-based relationship with insurers. Additionally, 41 percent of the primary care physicians who are not in a value-based relationship said that their distrust of payors is what’s stopping them.

“This lack of trust will be a huge hurdle for payers to overcome as they often cite provider buy-in and engagement as critical to the success of any value-based arrangement,” Dr. Phil Polakoff, senior managing director and chief medical executive of the health solutions practice at FTI Consulting, said in a statement. “The two groups are still significantly distant in attitudes towards value-based arrangements — a difference that can stand in the way of creating new forms of payment.”

Ever since the Affordable Care Act was introduced, both payors and providers have been getting ready for the switch to value-based reimbursement programs through Accountable Care Organizations, bundled arrangements and new relationships.

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New device provides deeper melanoma imaging

Posted online: August 11, 2014 by Lauren Dubinsky

Researchers from Washington University in St. Louis created a new hand-held device that might change the way physicians diagnose and treat melanoma. The device was described in a paper published yesterday in The Optical Society’s journal, Optics Letters.

It’s called a photoacoustic microscope and works by measuring how deep a melanoma tumor is. A laser beam shines into the skin on the tumor and melanin absorbs the light and the energy is transformed into high-frequency acoustic waves.

The acoustic waves don’t scatter as much as light when it travels through the skin so they’re able to penetrate deeper. Since the tumor cells produce more melanin than the healthy skin cells around it, the acoustic waves can map the whole tumor with high resolution.

There’s a detector on the device that can then turn the acoustic signal into a 3-D image on a screen.

The traditional ways — high-resolution optical techniques — to diagnose and determine treatment don’t measure the tumor well because they don’t transform the light into acoustic waves. Other methods such as high-frequency ultrasound, MR and PET use acoustic waves but ultrasound doesn’t have enough image contrast and MR and PET have inadequate resolution.

In order to determine if the tumor is cancerous, a biopsy has to be performed to remove part of the tumor. If the tumor depth is not accurately measured before the biopsy and the surgeon finds out during the procedure that the tumor is deeper than they thought, the patient may have to undergo another surgery.

“The surgical treatment plan is dependent upon determining the depth of tumor invasion into the skin, and this cannot be adequately determined when only part of the lesion has been sampled,” Lynn Cornelius, one of the authors of the study, wrote to DOTmed News. “This device will potentially allow us to scan the remaining tumor on the skin to determine the depth of invasion and plan surgical management appropriately.”

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New catheter improves stroke treatment

Posted online: July 31, 2014 by Lauren Dubinsky

A new magnetically-assisted remote-controlled catheter (MARC) allows physicians to better visualize and evaluate brain tissue while treating a stroke, according to a study released at the annual Society of NeuroInterventional Surgery meeting.

The standard way that physicians assess the tissue is by manually maneuvering the catheter and visualizing its progress with X-ray guidance. But the researchers at the University of California set out to investigate if MARC with MR guidance can maneuver through complex vessel anatomy and help the physician see the tissue better.

“Because it’s an MR-based modality as opposed to an X-ray-based, you get all the benefits of the visualization capabilities of MR while being able to navigate the catheter itself,” Alastair Martin, one of the researchers of the study and professor of radiology at the university, told DOTmed News.

For the study, the researchers sought to determine the average procedure times and how successful a MARC prototype guided by MR is, compared to a manually-navigated catheter guided by MR and X-ray. Each procedure they performed used a cryogel vascular model that simulates the main and branch blood vessels in a human body.

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Philips and Accenture create brain-controlled software

Royal Philips and Accenture — a global management consulting technology services and outsourcing company — announced yesterday the development of their proof of concept software that allows a person with no mobility to control their environment with brain commands. The software is used in conjunction with a wearable device that is connected to a tablet.

“This work highlights the potential of digital technologies to transform the way we work and live, which directly aligns with Philips vision for the future of healthcare,” Dr. C. Anthony Jones, vice president and chief marketing officer for patient care and monitoring solutions at Philips, wrote to DOTmed News.

Philips, Accenture, Emotiv — a neuroengineering company — and Fjord — a service design consultancy — came together to develop the technology for patients with amyotrophic lateral sclerosis (ALS) and other neurodegenerative diseases. ALS is a disease that 400,000 people suffer with every year and it damages their brain and spinal cord nerve cells, which gradually reduces their voluntary muscle movement.

“As their bodies begin to fail them, their minds are still very much alive,” wrote Jones. “Exploring how this proof of concept can potentially help improve the quality of life for ALS patients, or anyone with a neurodegenerative disease, with the potential of gaining some independence, was the focus for Philips, Accenture and Emotiv.”

The wearable device and the Emotiv Insight Brainware, which scans EEG brainwaves, are connected to a tablet and the users can make brain commands to control Philips products, including Philips Lifeline Medical Alert Service to call for medical assistance, Philips SmartTV, and Philips Hue personal wireless lighting. The patient can also control those products with eye and voice commands.

The Emotiv technology works by using sensors to tap into the electrical signals that the user’s brain produces in real-time in order to detect their thoughts, feelings and expressions.

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Cardiovascular device innovations will raise prices

New innovations in cardiovascular technology are expected to increase the prices of the devices in the next few years, according to Novation’s spring 2014 CV Watch report. The average price for cardiac implants is projected to decrease by two to six percent this year but it will increase by up to 35 percent in the next few years.

In January, Medtronic announced that the U.S. renal denervation trial for the treatment of resistant renal hypertension did not meet its efficacy goal, which was a big letdown for the industry. Before the announcement, over 60 companies all over the world started creating similar products and spent millions on research and development.

The question that remains now is whether the loss of the multi-billion dollar U.S. marketplace will heighten the pressure on existing product prices. Novation expects that the decrease in prices for pacemakers, implantable defibrillators and drug-eluting stents in the past few years will most likely slow down, which will make cardiovascular supply savings harder to realize.

About 850,000 patients currently suffer from mitral valve regurgitation in the U.S. and that number is expected to increase as the aging population grows, according to the report.

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Cerner acquires Siemens Health Services

Posted online: August 7, 2014 by Lauren Dubinsky

Cerner Corporation and Siemens AG announced on Tuesday that Cerner will acquire Siemens Health Services — assets of Siemens’ health information technology business unit — for $1.3 billion in cash. The companies will also be forming a strategic alliance to invest in projects that integrate health IT with medical technologies.

“As we thought about the amount of innovation and interoperability that we could demonstrate in multiple ways, we got more and more excited about the possibilities,” Zane Burke, president of Cerner, told DOTmed News.

Based on 2014 estimates, Cerner and Siemens Health Services combined have 20,000 associates in over 30 countries, 18,000 client facilities, $4.5 billion of annual revenue and $650 million of annual research and development investment.

Burke thinks that the acquisition is going to benefit both companies. “We actually have a fair number of solutions that would help complete the Siemens footprint in our EHR diagnostic,” he said. “So immediately we’ll bear some assets that Siemens clients can take advantage of if they so choose. We think that’s a really great thing for them and for us overall.”

The companies expect that the acquisition will close in the first quarter of 2015. Siemens Health Services will retain their leadership but a new name will be created for the combined business.

Additionally, Siemens’ Soarian solution name will be kept but it will be rebranded by Cerner. Cerner plans to support and advance the Soarian platform for at least the next 10 years.

The strategic alliance that the two companies are forming will bring new solutions to market that combine Cerner’s health IT expertise and Siemens’ medical device imaging expertise. The alliance has a three-year initial term and each company will invest up to $50 million to fund the projects.

One of the innovations the alliance will work on is embedding information from the EHR inside diagnostic and therapeutic technologies.

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MESA and Asteral announce merger

Posted online: August 1, 2014 by Lauren Dubinsky

MESA Group Holdings GmbH and Asteral Limited announced an agreement today to merge their operations. The merger is backed by a company owned by the Permira funds.

This new combined group brings together MESA’s pan-European expertise in vendor-independent servicing of high-end medical equipment and Asteral’s expertise in vendor-independent equipment provision and asset management as well as their strong U.K. presence.

MESA’s executive chairman and founder, Robert Piconi, will head the group and the chief executive of the Asteral board, Christopher Langley, has been selected to be the special adviser to the group’s board.

“As a combined group, we will be in an even stronger position to help our customers deliver improved patient care by leveraging our expertise in the way that medical facilities are planned, procured, managed and maintained,” Piconi said in a statement.

MESA is based in Switzerland and was founded in 2009 and it’s now the largest independent pan-European provider of diagnostic imaging engineering services and asset management solutions. They have a presence in 12 countries including the U.K., Germany, Poland and Spain and sell to over 600 diagnostic imaging clinics and hospitals.

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Multimodality imaging driving preclinical imaging market

Posted online: August 4, 2014 by Lauren Dubinsky

Multimodality imaging, specifically PET/CT and PET/MR, will be a significant driving force behind the preclinical animal research imaging market through 2022, according to a recent Decision Resources Group report.

Multimodality imaging can do what PET and SPECT alone cannot, which is scatter and attenuation correction. “Your image is of a lot better quality, you can do more involved research with it and you can do more quantitative studies,” Felix Lam, a group analyst at Decision Resources Group, told DOTmed News.

Stricter scientific journal publication requirements are creating a greater demand for the higher-quality imaging that multimodality imaging provides. “When reviewers are looking over research that is submitted for publication they’ll a lot of times be asking — why wasn’t this done with a PET/CT instead of just a PET,” said Lam.

A few technical hurdles are still standing in the way of the development of PET/MR, so for now, most research facilities are using PET and MR separately.

Some of the components used to create a PET system, including the PET ring, interfere with the magnet inside of an MR system. But manufacturers are working on that problem right now and soon there should be a solution, said Lam.

Last December, the National Institute of Health made sequester cuts that hurt funding for preclinical research, which in turn hurt the sales for the imaging systems. However, the funding is expected to gradually improve through 2022, according to the report.

“There is more and more of that emphasis on getting a lot of evidence for evidence-based medicine, and preclinical research is a big part of that,” said Lam. “There is that drive coming from those corners to get better quality preclinical research.”

In order to help research facilities get funding, the preclinical vendors have employed researchers and grant writers to support the grant process.

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Economic downturn led to decline in health care spending

Posted online: August 5, 2014 by Lauren Dubinsky

The economic downturn, not the Affordable Care Act, was the cause of about 70 percent of the recent decline in health care spending growth from 2009 to 2011, according to a new study published in Health Affairs. As the economy starts to recover, health care spending may start to increase at a faster pace.

The researchers at Northwestern University set out to investigate the impact that the economic downturn had on the health care spending of the privately-insured, working-age population. They looked at 2007 to 2011 private insurance claims data from the Health Care Cost Institute, which accounts for almost 47 million individuals with employer-sponsored insurance.

They found that health care spending growth slowed down by 2.6 percent from 2009 to 2011 compared to the previous two years. They then calculated the overall decline in employment during that period and determined that health care spending growth would have been 1.8 percent higher if the economy did not wane in 2008.

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Focused ultrasound’s first North American pediatric patient

Posted online: August 12, 2014 by Gus Iversen

On July 17th the Focused Ultrasound Foundation and the Hospital for Sick Children (SickKids) at Sunnybrook Health Sciences Center in Toronto, teamed up to treat a 16 year old male suffering from osteoid osteoma — a benign bone tumor in his leg. The patient became the first North American pediatric patient ever to receive high-intensity focused ultrasound (HIFU), and has recovered with no reported complications to date.

Osteoid osteoma occurs most commonly in males 10 to 35 years of age, but has been reported in patients as young as seven months. Despite its small size — about one centimeter — the tumor is known to cause extreme pain, and treatment itself has historically been a painful process with a drawn out recovery.

Until the mid-90s, physicians would typically scrape the tumor from the bone or else remove the affected part of the bone entirely. Since then, radiofrequency or laser energy has been standard to burn the tumor away with the assistance of CT guidance.

Although comparably less invasive, that process may leave patients susceptible to radiation exposure, infection, burning of the surrounding tissue, and bone fractures resulting from the hole remaining after treatment.

Share this story: www.dotmed.com/news/24011
CMS releases final rule for Medicare payment

Posted online: August 6, 2014 by Lauren Dubinsky

On Monday, the Centers for Medicare and Medicaid Services issued its final rule for payment policies and rates for inpatient stays at general acute care and long-term care hospitals, for FY 2015.

They announced that the payment rate update to general acute care hospitals will be 1.4 percent, and 0.9 percent for long-term care hospitals. The rates will go into effect on Oct. 1.

"Today’s policies further support our efforts to continue improving the care our Medicare beneficiaries receive while also cutting the growth of Medicare costs," Marilyn Tavenner, administrator for CMS, said in a statement. "This final rule builds on our recent efforts to improve hospital performance while giving hospitals the clarity and resources they need to deliver the best possible patient care."

CMS is implementing the Affordable Care Act’s Hospital Acquired Condition Reduction Program and starting in FY 2015, hospitals that have the poorest performance rate for hospital-acquired conditions (HACs) will receive a one percent reduction in their Medicare inpatient payments.

The current HAC program is saving about $30 million each year by not providing Medicare payment to treat conditions that are deemed “reasonably preventable“ and occur after the patient has been admitted to the hospital for another condition.

The Hospital Value-Based Purchasing Program awards acute care hospitals with incentive payments based on the quality of care they provide to Medicare patients. CMS is increasing the amount of Medicare payments to all participating hospitals, available to fund the value-based incentive payments under the program, to 1.5 percent of the base operating diagnosis-related group payment amounts.

The agency reported that the estimated amount available for value-based incentive payments in FY 2015 will be about $1.4 billion. The maximum reduction in payments under the Hospital Readmission Reduction program is currently 2 percent but CMS announced they will increase it to 3 percent.

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Radiotherapy steps outside of cancer treatment

Posted online: July 24, 2014 by Lauren Dubinsky

Radiotherapy is mostly used for cancer treatment, but two studies presented at the annual American Association of Physicists in Medicine meeting have shown that it can also be useful for the treatment of high blood pressure and atrial fibrillation.

A combination of nerve signals and hormonal interactions between the brain, heart, blood vessels, and kidneys control blood pressure, and if those nerves are surgically removed or damaged, blood pressure could potentially be controlled. Currently, invasive surgical procedures are used to do that, but researchers at the Stanford University School of Medicine and Cancer Institute have started to explore the use of radiotherapy.

"We have the tools to accurately target these nerves that are responsible for communication between the brain and the kidneys,” Peter Maxim, lead author of the study and assistant professor of radiation oncology at the university, said in a teleconference.

For the study, the researchers treated six pigs with high blood pressure with 40 Gy of radiation in a single treatment to the nerves around the arteries that lead to the kidneys. After a follow-up, they found that all of the pigs survived and had no adverse events.

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Upcoming Events

**ASTRO**
- **Dates:** September 14 – 17
- **Location:** Moscone Center, San Francisco
- **Years in existence:** 56
- **Average attendance:** 11,000
- **Who should attend:** Radiologists, oncologists, physicians, researchers

**iHT2**
- **Dates:** September 16 – 17
- **Location:** New York Academy of Medicine, New York
- **Years in existence:** 8
- **Who should attend:** Health IT leaders and executives

**NYMIIS**
- **Date:** September 18th
- **Location:** Marriott Marquis, New York
- **Years in existence:** 5
- **Who should attend:** Radiologists, cardiologists, pathologists, physicians, technologists involved with medical imaging, CIOs, hospital executives and PACS and RIS administrators.

**ASSH 2014**
- **Location:** John B. Hynes Convention Center Boston
- **Dates:** September 18 – 20
- **Years in existence:** 69
- **Average attendance:** 1,000
- **Who should attend:** Hand surgery fellows, residents in orthopedics, plastic and general surgery

**2014 ASNC Annual Scientific Meeting**
- **Dates:** September 18 – 21
- **Location:** Seaport World Trade Center, Boston
- **Years in existence:** 19
- **Average attendance:** 1,000
- **Who should attend:** Cardiologists, radiologists, scientists, technologists, imaging specialists, and other professionals in the practice of nuclear cardiology

**Fall IDN 2014**
- **Location:** Arizona Biltmore, Phoenix
- **Dates:** September 21 – 23
- **Years in existence:** 20
- **Average attendance:** 1,000+
- **Who should attend:** Health system executives and department managers

**HCP Hospital Pharmacy Conference Fall 2014**
- **Location:** Hyatt Regency O’Hare Chicago
- **Dates:** October 6 – 8
- **Years in existence:** 7
- **Average attendance:** 250
- **Who should attend:** Hospital pharmacy directors

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We are the preferred MRI Shielding Vendor for Cleveland Clinic, University Hospital, UPMC, and other leading facilities.
Eric Maass, Engineering Director and Sr. Master Black Belt, at Medtronic, one of the largest biomedical companies in the world, will be one of the featured speakers at the 18th Software Design for Medical Devices Conference hosted by International Quality and Productivity Center [IQPC] on October 27-28 in Boston. This is a specialty event recommended for medical device manufacturers, software engineers, software developers, hardware vendors, solution providers, quality assurance people, and lifecycle management experts. Also making presentations will be executives from Siemens Healthcare, GE Healthcare and Philips Healthcare – among others.

HCBN: Is this your first time speaking at the Software Design Conference?
EM: Yes, and I’m looking forward to it, I hear the IQPC people put on a good event. I know I’m going to be sharing the ‘stage’ – if I can call it that – with many of the top people in software design and development, so it should be great. My part, called “Managing Risk Exposure and Reducing Recalls” is a working title; I’m refining that with my co-speaker, but it’s going to be close to what we cover.

HCBN: Can you give us a snapshot of some key initiatives you’re working on at Medtronic?
EM: We have a lot of groups at Medtronic, but let’s consider CRDM, Diabetes and Surgical Technologies groups, which represent the range of products that involve software. For diabetes, we have products that deal with the diabetes condition “open loop” – separate products that can sense a person’s glucose level, and separately, dispensing insulin. But we are developing products that are closed loop systems for diabetics, where the sensing system is interfaced with the dispensing of insulin. The system monitors your glucose levels and automatically dispenses the medication as needed. The pacemaker -- which Medtronic pioneered – is a classic example of a closed loop system. But these products also need to ‘talk’ to the doctor. The challenge is, we want to be able to keep the physician up to speed on what is going on, if the person needs an intervention or something that will actually save their life. On the other hand, we also need to be very cognizant of security.

HCBN: Security is a big issue today, isn’t it?
EM: Yes, we need to protect the patient’s information and there are actual regulatory requirements that we have to observe. But more importantly, we want to make sure the information is protected from people who are trying to hack the information, where they are intentionally trying to sabotage the communication with the physician. So we have a lot of considerations in terms of trying to make the communication available where it needs to be and also securing it and keeping it from going where it should not go.

HCBN: Can you give us an example of some of the safeguards you employ?
EM: Sure, cyber security involves the challenge of giving the physician access to get the records they need as expeditiously as possible, while protecting the patients from having their information accessed or hacked. But some of the solution is also fairly straightforward. For example, in order to get access to an implanted device, the ‘bad guys’ would have to be very close to the source, they have to be right next to the person’s body. The communication, by design, only goes a very short distance -- so it is not like some unauthorized person can program a pacemaker from a mile away.

HCBN: And finally – what exactly is a Master Black Belt?
EM: We actually have two separate programs where that term is used, “Lean Six Sigma” and DRM, which stands for Design|Reliability|Manufacturability. A Master Black Belt is someone who can work with the executives – someone who understands the key goals of the organization and helps achieve those goals using the rigorous methods in terms of software, product and process development.

Editors Note: For more information on the 18th Software Design for Medical Devices Conference, visit www.sdm-dconference.com/ If you would like to attend the event, mention code “SDMD_DM” for a discount on admission.

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Hospital Spotlight: The University of Texas MD Anderson Cancer Center

The University of Texas MD Anderson Cancer Center

Location: Houston, Texas
Mission: Eliminate cancer in Texas, the nation and the world through outstanding programs that integrate patient care, research and prevention, and through education for undergraduate and graduate students, trainees, professionals, employees and the public.
Year founded: 1941
Number of beds: 656
Number of employees: 19,655
Number of faculty: 1,600
Number of volunteers: 1,200
Active clinical research protocols: 1,065 (about 7,600 patients registered), the largest in the nation.
President’s name: Ronald A. DePinho, MD

1. The University of Texas MD Anderson Cancer Center.
2. Bryan Kee, M.D., assistant professor in Gastrointestinal Medical Oncology, talks with a patient.
4. MD Anderson’s research program is considered one of the most productive in the world aimed solely at cancer.
5. The Vara Martin Daniel Children’s Play Park at the MD Anderson Children’s Cancer Hospital.
6. The Tree of Life sculpture in MD Anderson’s Mays Clinic.
7. More than a dozen diagnostic imaging technologies are available to visualize tumors in both bone and soft tissue.
Specialties:
The University of Texas MD Anderson Cancer Center is one of the world’s most respected centers devoted exclusively to cancer patient care, research, prevention and education.

Noteworthy distinctions:
• Since 1944, more than 940,000 patients have turned to MD Anderson for cancer care in the form of targeted therapies, surgery, chemotherapy, radiation and proton therapy, immunotherapy, or combinations of these and other treatments.
• The institution’s faculty members are among the most esteemed in the nation, including seven Institute of Medicine members, two National Academy of Sciences members and four Academy of Arts and Sciences fellows.
• MD Anderson’s research program is considered one of the most productive in the world aimed solely at cancer, with more research grants awarded by the National Cancer Institute than any other center.
• U.S. News & World Report’s “Best Hospitals” survey has ranked MD Anderson as one of the nation’s top two cancer centers every year since the survey began in 1990.

Recent Developments:
MD Anderson’s Cancer Network™ advances its mission of eliminating cancer by collaborating with community hospitals and health systems to improve the quality of care nationwide and globally. Members benefit from access to MD Anderson’s best practices, leading edge technologies, patient treatment protocols, education, research and unique multidisciplinary approach to patient care. Recent partners include Banner Health in Arizona, Cooper University Health Care in New Jersey and Hospital Israelita Albert Einstein in Brazil.

MD Anderson launched the unprecedented Moon Shots Program in 2012 to dramatically accelerate the pace of converting scientific discoveries into clinical advances that significantly reduce cancer deaths. The program brings together teams of researchers and clinicians to mount comprehensive attacks on an initial eight cancers: acute myeloid leukemia and myelodysplastic syndrome, chronic lymphocytic leukemia, melanoma, lung cancer, prostate cancer, and triple-negative breast and high-grade serous ovarian cancers. To date, the program has received $139 million in philanthropic commitments. The goal is for all cancers to become moon shots.
Dr. Ronald A. DePinho, president of The University of Texas MD Anderson Cancer Center, recently spoke with DOTmed HealthCare Business News about what distinguishes MD Anderson in the cancer sector.

Before delving into the questions, DePinho raised a fundamental issue regarding the state of cancer today.

“Cancer has a major gap — knowledge. The complete knowledge to prevent it, the knowledge to detect it and the knowledge as to what drives it. With greater knowledge that comes from amassing data, we can see patterns and develop and apply targeted technologies that are precisely directed to tumor sites,” DePinho says.

HCBN: MD Anderson has continually been recognized as one of the top cancer centers in the nation. What makes that possible?

RD: Our excellence rests on the people we have here — from our nurses and physicians to our staff and educators. It’s an energized group, focused on our mission of ending cancer in Texas, our nation and the world. One of the things that has led to our being the premier cancer treatment facility is our multi-tiered approach. Patients get a team of physicians. So for breast cancer, a patient sees an oncologist, a reconstructive surgeon and the list goes on.

Once that team comes up with a regimen, a specialized multidisciplinary team reviews each patient treatment plan. This team could consist of more than 100 professionals who bring their knowledge to bear on patients – including nutritionists, physical therapists, survivorship specialists and more. They challenge, they offer insights – all geared to helping the patient through the cancer journey.

Another aspect that makes MD Anderson special is that we’re outward looking. We’re not simply serving the Houston population — 70 percent of our patients are from outside the Houston area.

And since we know not everyone is able to travel to MD Anderson, we’re sharing our knowledge with the world. We have a national network of partners and affiliates, including sites in Madrid, Spain, Istanbul and Turkey. We also have 29 sister institutions in countries around the globe with whom we partner with on research. This allows us to “export” our protocols and the knowledge we glean daily from our clinical trials and patient care – all part of our mission.

Finally, our reputation is driven by our research and its impact on patient care. We have one of the largest research portfolios among hospitals. With approximately $700 million, we are number one in grants from the National Cancer Institute. We have 11,000 patients currently on clinical trials, and are responsible for leading one-third of FDA clinical trials for cancer.

HCBN: Are there any recent developments you’d care to discuss?

RD: We have some really exciting work in ovarian cancer that we believe is a practice-changing approach. Traditionally, the goal has been reductive surgery. But unless we eliminate all disease, the chance of long-term survival is unchanged — as if the surgery wasn’t performed.

However, if you first provide systemic therapy, reduce the disease and then do surgery, we believe you can greatly increase survivability.

There are a number of developments that drive us. Immunotherapy is very strong. The impact on melanoma and the combination with checkpoint inhibitors with patients showing durable responses is nothing short of historic. From vaccines all the way to checkpoints, immunotherapy is amazing. We’re very proud of our role, but also very happy and grateful to be able to give patients new hope for formerly terminal forms of cancer.

Another area I’m excited about is the introduction of powerful analytic capabilities to understand optimal treatment options for individuals. This will change the practice of medicine. MD Anderson has been at the forefront of understanding what the data can teach us about each patient and how that information can drive care. Again, MD Anderson will share its data, so that this knowledge benefits patients not just in Houston, but around the world.

HCBN: Are there any new modalities or technologies either recently adopted or currently being explored for cancer treatment that you’re excited about?

RD: This is a truly revolutionary time in the history of medicine but specifically in cancer.
What does the U.S. health care industry have to do to survive?

By Tom Spees

The U.S. health care system is going to be put under a tremendous amount of pressure in the years to come.

One fact staring us in the face is that the U.S. Census Bureau estimates the number of Americans today over age 62 now stands at 46 million. The government believes that number will be 82 million by the year 2030. That sounds like a long time, but that is only 15 years from now.

Obviously older people are the ones who are going to need the most health care — so everybody can connect the dots for themselves: more services will be required for more people.

Over the past few years, we have seen a real trend going toward IDNs trying to gain a better handle on controlling their operating expenses. This holds true for all expenses, and especially big-ticket equipment maintenance costs associated with CT or MR service.

More than ever, we are seeing IDNs seeking alternative service options for some high-cost assets. These options can include some lower cost models from the OEMs, alternative service companies like independent service organizations, OEM Multi-vendor service organizations, or even in-house clinical engineering teams. These are all various service options IDNs and hospitals now are carefully considering.

For many years, our industry accepted a practice of actually paying as much, if not more, for equipment maintenance of an asset over its lifetime than its original purchase price.

If you look at a Total Cost of Ownership model on a high end imaging modality, such as an MR system or a CT system, it is not unusual to see an IDN actually doing just that. They pay more to maintain it than they did to buy it.

I think most people would agree that the average consumer would never accept that kind of an ownership model for the products they buy. You would not buy a refrigerator for $2,000 and expect to pay $2,000 in maintenance expenses over the course of its lifetime. You would probably just go buy another one. And for higher ticket items like an automobile, you would not buy a $50,000 automobile and expect to pay $50,000 in maintenance expenses over the course of the seven or eight years that you own it.

That is an economic model the average consumer would not tolerate.

Now in fairness, high end DI assets are revenue generating, and a different TCO model can be acceptable as part of a comprehensive business plan. But IDNs and hospitals did not have alternative service options that were very well-established in the past. In recent years however, those alternative options have become readily available and very viable. Choices exist today that can reduce expenses without compromising patient care or clinical uptime.

The other realization that hospitals and IDNs are coming to understand is that not all of their major capital assets have to be treated equally when it comes to equipment maintenance and level of care. The service level that you might need for an acute care 64-slice CT system that is located in your emergency department might be totally different from the level of service maintenance that you would need for a 16-slice system that is located in your diagnostic imaging department because they are used very differently and relied upon differently.

I think that as health care continues to look at operating cost efficiencies, we are going to see the trend of hospitals and IDNs seeking alternative service and really taking a much more aggressive management approach towards the assets they own and operate. The asset management model is really beginning to prevail. Today, there are a growing number of companies that specialize strictly in helping IDNs with asset management, and those companies will continue to help provide benefit from economy of scale.

The bottom line is that as a society, we will be forced to provide a tremendous amount of additional health care with a disproportionate amount of funding. High end equipment maintenance choices will need to be carefully considered to fit the new economic model, while providing quality diagnostic exams with no increased risk to the patient or the Provider.

About the author: Tom Spees is a 30+ year veteran having held numerous executive positions in marketing and sales. He has experience relating to sales and service of diagnostic imaging capital equipment, digital radiography, PACS, as well as extensive background in imaging components. He is the Director of Sales, North America, for the GTC Division of Philips Healthcare, known commercially as Dunlee.

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To view these products online, visit dotmed.com and enter DM24096 into the search window. Have a new product? Email your press release to pr@dotmed.com. For a chance to be included in the New Product Showcase, include a high resolution shot of the product.

**DR digital upgrade**

Varian recently released the i5DR digital upgrade. According to the company, the upgrade will improve workflow, enhance image quality and prolong the life of your asset. The i5DR software is a cost effective solution that is fully integrated into industry standard U-arms. The i5DR user interface provides fully integrated control of the u-arm positioner, collimator and generator allowing for seamless image acquisition. i5DR is optimized for use with Varian’s 17” x 17” (43cm x 43cm) flat panel digital detector. The i5DR upgrade provides significant savings in comparison to purchasing an entirely new digital system and extends the life and utility of the existing asset.

**Ultra mobile ultrasound system**

Royal Philips announced that it has received 510(k) clearance for its ultra mobile ultrasound system, VISIQ, in the U.S.

VISIQ’s touch-screen gesture controls are familiar to anyone who has used a smartphone or tablet. It allows users to easily capture images, take measurements and share data. In addition, VISIQ offers many of the automatic image optimization features found on Philips’ premium EPIQ system, as well as built-in Wi-Fi for DICOM data transfer to hospital or cloud-based PACS.

At the heart of the VISIQ system is a smart transducer that fits comfortably into the user’s hand. Drawing on more than 30 years of experience in ultrasound, Philips has taken advantage of advances in miniaturization to integrate a sophisticated broadband micro-digital beam former and powerful image acquisition module into the transducer. VISIQ targets OB and abdominal applications and lays the foundation for a future range of portable ultrasound products to meet the evolving needs of clinicians and patients.
**Proton therapy specific cone beam CT solution**

IBA, a provider of proton therapy solutions for the treatment of cancer, recently announced combined clearances from the FDA that will enable IBA to market-launch the Proton Therapy specific Cone Beam Computed Tomography solution. IBA has received clearance for its imaging platform adaPT Insight and for the Compact Gantry Beam.

As a component of IBA’s Image Guided Proton Therapy solution, CBCT provides 3D imaging for increased accuracy in patient treatment. It is fully integrated with IBA’s imaging platform adaPT Insight, to offer fast 6D corrections of patient positioning for IBA’s Proteus PLUS and Proteus ONE proton therapy solutions. IBA’s first CBCT is at the validation phase and the first clinical use is expected for the second half of 2014.

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**Ultrasound wipes**

Advanced Ultrasound Electronics is pleased to announce the availability of Sono-Wipes, a one-step disinfectant deodorizer wipe specifically made for ultrasound equipment.

Sono-Wipes come in 50ct packs of non-abrasive, non-damaging large (7” x 11”) moist wipes. The packs have ultra-stick technology to keep them fixed to equipment for convenient use, to keep your equipment looking new and sanitized.

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**Next generation bronchoscopy system**

Vision-Sciences announced the launch of its next generation video bronchoscope and EndoSheath technology.

Vision-Sciences’ EndoSheath bronchoscopy system is the latest addition to its innovative endoscopy line for the Critical Care market. The new bronchoscope features design improvements for instrument maneuverability, suction capacity, and handling ergonomics intended to enhance physician ease-of-use while maintaining the unparalleled efficiency, cost-efficacy, and patient safety elements of the sterile, disposable EndoSheath technology.

The BRS-5100 bronchoscope is fully compatible with the 7000 Series Vision System.
Virtualization of clinical applications

By Matthew Bishop

UnityPoint Health is a large multi-campus health system serving patients across Iowa, Illinois and Wisconsin and is currently managing two large data centers. Instead of continuing to purchase more hardware-based servers and expanding these data centers, leadership decided to move to a completely virtual server environment. This project was made more urgent by a hardware replacement cycle. We had passed the four year life span of the equipment and were faced with the prospect of replacing not just the 12 servers in our main center, but the mirrored system in a disaster recovery location.

We knew maintenance and power costs would rise as we expanded our operations. We had to grow our application server environment, but more hardware through capital expenditures no longer made sense.

Developing support for what some saw as a “big leap” to virtualization was critical. Internal communications and transparency were key and we worked closely with our PACS Governance Council to gain their consent needed within our IT governance framework.

An important element to achieving the consent was proving that “the big leap” would occur without any gaps in service or performance. Stakeholders needed assurance that the system would continue to meet the internal service level agreements.

At first, we moved cautiously, implementing the virtual environment while still maintaining our physical servers. We made sure all the applications worked in our test system and only then did we change out the first physical server for the first virtual server. From then on, we switched servers one at a time. A week later we were unracking the old servers and getting them ready for removal.

Before switching to virtual servers we were seeing a lot of study sequencing and study acquisition related problems caused by a system operating at max capacity and above. These problems result in excessive administrative overhead for both our system administrators and our vendors’ support team. The move to a virtual environment resulted in much less administration time devoted to correcting application errors that were created by the physical hardware operating at and above capacity. Radiologists and clinicians were able to access and view exams in a faster and more efficient manner and we recorded a 175 percent increase in the ability of an application server to process incoming images.

We improved performance in almost every server on the test system. One of the most impressive discoveries was in the area of disaster recovery. Bringing up our physical server-based mirror site required two hours with a full 45 minutes devoted to failing over applications to the servers. Our virtual disaster recovery system came up in less than three minutes.

Data from Microsoft Performance Monitor demonstrated our servers were typically running at 60 to 70 percent during peak loads. After the switch to the virtual machine, our processing dropped to just 20 percent at peak.

The virtualized environment also provided better network load balancers. With our own network switch within the Citrix NetScaler application delivery controller we had an independent configuration that didn’t have to compete with other users.

The move allowed us to upgrade to Windows 2008 allowing us to achieve a dramatic improvement in performance. These accelerated standards can be attributed not just to an improved operating system, but also to better hardware in the virtualized environment. We went from individual one gigabit network connections to a large virtual machine server farm with shared 30 gigabytes of bandwidth and a ten gigabit mix on the application server network cards.

We saw these improvements in our performance testing throughout the conversion process. Processor, network and disk queues demonstrated that while a large numbers of operations were waiting, on the virtual side, there were no operations queued.

With this experience, we started to virtualize other applications to achieve the same kind of performance benefits. These solutions included dictation voice recognition systems and qualitative intelligence and communication systems (QICS); our workflow and communication solution.

During this process we also added a browser-agnostic viewer that allows physicians access from a variety of mobile devices. With the addition of an Enterprise Image Repository we were able to achieve a vendor neutral archive that effectively met the needs of our growing affiliate health systems.

For UnityPoint Health, moving into the unfamiliar territory of creating a virtual environment for imaging and other applications was more than worth it. As the number of scans has grown from 800,000 to more than 1.2 million and rising, the system has continued to exceed our expectations. The results included both greatly improved performance coupled with a significant reduction in costs.

About the author: Matthew Bishop is Enterprise Solutions Architect at UnityPoint Health. Its network includes 17 UnityPoint Health Hospitals and 15 community network hospitals.
Amid the rapidly changing healthcare landscape, you need solutions to help keep you one step ahead. With McKesson’s enterprise medical imaging solutions, you can bring together disparate systems into one working environment to streamline your complex workflows.

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Learn more about McKesson’s solutions for radiology at mckesson.com/medicalimaging.
The 56th annual ASTRO meeting will take place September 14 — 17 at the Moscone Center in San Francisco. DOTmed HealthCare Business News caught up with incoming president Dr. Bruce Haffty in advance of the show to learn a little about him, get his take on what to see at this year’s event as well as updates on goings-on at the association.

HB: Can you share a little of your health care background?
BH: In terms of health care, I was a biomedical engineer. And then from that, I applied and went to medical school. Being a biomedical engineer, I have a strong interest in technology. When I saw what radiation oncologists did — I saw they were involved with not only the technologic aspect of care, but also lots of direct hands-on patient care and face-to-face contact. Both aspects were important to me in choosing the field of radiation oncology.

HB: How did you get involved with ASTRO?
BH: ASTRO is our major society. Really, it’s the preeminent organization for radiation oncology for everything from showcasing advances at the annual meeting, to quality education and advocacy. I initially got involved because I was in academic health care — presenting studies at the meeting. Over the years, I became more involved on various committees and worked my way up.

HB: What’s your favorite part about the show?
BH: The theme of the meeting is, “Targeting Cancer: Technology & Biology.” There’s been an explosion of new ideas and approaches to delivery of cancer therapy the technology, but also on the biological front. We are working to decrease toxicity of treatment, improve outcomes and improve the quality of life for patients.

From my perspective, the most important thing about the meeting is attending those scientific sessions which present the latest information in the fields we’re interested in. My personal interest is in the field of breast cancer. Certainly, the plenary and the clinical trials are also always interesting to me as ways to see the latest coming out in the field.

I think the second part of that is being able to network and talk face-to-face with colleagues about their research and their interpretation of various studies. The presidential symposium is also exciting. That symposium usually has world-leading experts talking about their particular area of expertise. Of course, this year I’m particularly excited because I got to pick the topic which is on breast cancer, titled “Changing paradigm in the local regional management of breast cancer.” This year, we have about 12 experts talking about how local-regional treatment of breast cancer has really changed in the last few years.

There will be areas where there’s debate and then areas where there’s discussion — including where we’re heading in the future with clinical trials and research directions.

One keynote is focuses on safety and errors. This ties in with a program we launched in partnership with AAPM called the ROLS program (Radiation Oncology- Incident Learning System). It’s a national patient safety initiative where radiation oncology departments can enter data about the safety issues occurring at their center. There is no cost for centers to participate, and ASTRO and AAPM will aggregate and analyze the data to ensure the best radiation oncology safety procedures and processes are in place — to protect our patients as well as the entire radiation oncology treatment team.

HB: What is the big mission you are championing during your time leading the association?
BH: This year, our accreditation program will continue to be a big focus. I’ve been involved; however this has been a massive effort over the past few years by many ASTRO volunteers and staff. It involves accreditation of a practice. It’s ensuring that radiation oncologists and physicists maintain quality and safety, meet standards, and continue to improve their quality of practice.

My own area of moving ASTRO forward is making sure we provide all of our members with a broad portfolio of meetings and venues that meet the needs of the membership. I also want to make sure that the portfolio of products that we produce continues to help improve the quality of patient care and helps our members apply those in a meaningful way.

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**ASTRO Exhibitor Preview**

Stop by these booths and tell them DOTmed sent you!

**Accuray Incorporated (Booth 1908)**

Accuray Incorporated, a radiation oncology company that develops, manufactures and sells precise, innovative tumor treatment solutions, will be showcasing its latest technologies, including the CyberKnife® M6™ and the TomoTherapy® Hi™ Systems. Stop by our booth for treatment planning and delivery demonstrations, as well as educational sessions.

**Acceletronics (Booth 428)**

Premier provider of field maintenance solutions for Linear Accelerators and CTs nationwide offering major savings without compromise to uptime or quality. Equipment resales, relocations and removals, and machine purchases. Our RadParts subsidiary provides both new and tested used parts globally to support In House and Independent Service Organizations. ISO9001:2008 Audited Quality System.

**Brainlab, Inc. (Booth 1328)**

Brainlab is featuring the latest software applications to streamline and expedite the radiotherapy treatment planning process. Automatic Brain Metastases Planning* enables monitor-unit and time efficient radiosurgery while minimizing dose to normal brain tissue and providing new treatment possibilities for larger volumes and higher numbers of metastases. *FDA clearance pending

**Mevion Medical Systems (Booth 728)**

The MEVION S250 Proton Therapy System is designed to preserve all of the treatment benefits of traditional proton systems while removing the obstacles of size, cost, and complexity while changing the economics and accessibility of proton therapy worldwide.

**Oxford Instruments Healthcare (Booth 2502)**

Oxford Instruments Healthcare specializes in providing quality after-market CT and MRI maintenance services, equipment sales and parts to health care practitioners in imaging centers, hospitals and private practices across America. We focus on delivering world-class service for your CT & MRI systems, and can cover support on everything from coldheads and compressors to coils and CT x-ray tubes. Our expertly refurbished equipment and parts undergo a comprehensive quality inspection to meet or exceed OEM specifications — helping you to save a substantial amount of money without compromising quality.

**Radiology Oncology Systems, Inc. (Booth 1638)**

Pre-owned linear accelerators (Varian, Elekta, Siemens, Tomotherapy), radiation oncology equipment systems (CT Simulators, PET/CT, HDR, Dosimetry), and diagnostic imaging equipment (MRI, CT, X-Ray, Ultrasound) are all available for your practice through R.O.S. R.O.S. provides the largest assortment of quality, pre-owned equipment in the radiation oncology market, with flexible levels of service and support, depending on your needs. Our network of pre-qualified service providers are the best in the industry, and installation support is available worldwide.

**Siemens Healthcare (Booth 928)**

The MAGNETOM® RT Pro edition from Siemens Healthcare is a comprehensive package for radiation therapy professionals. It integrates MRI’s excellent soft-tissue differentiation to help ensure more accurate treatment planning and delivery, without radiation dose. The MAGNETOM RT Pro edition includes a top-of-the-line 70 cm open bore MRI scanner (either MAGNETOM Aera 1.5T or MAGNETOM Skyra 3T), an optional Tim Dockable Table and high-channel flex coils. Positioning accessories, dedicated MR applications, workflow protocols, and optional post-processing software are also part of the package.
The tides of health care delivery are turning. As the fee-for-service structure shifts to a population-based accountable care organization model, we expect to see the emergence of a more balanced, value-based health care ecosystem. Payors will seek ways to decrease cost, while patients will become active participants in their care, demanding improved outcomes that mean a quicker return to their daily lives. To meet these demands, individual hospitals and larger systems alike will look to invest in diagnosis and treatment innovations to meet the future needs of our evolving medical system. However, many of these devices and associated procedures are stalled in various stages of research and development. We must find a way to accelerate the pace to commercial success as hospitals strive to achieve the ACO model’s population-based health goals.

One way to help achieve the goals of improving the quality of care and reducing costs is by minimizing complications associated with traditional/open surgery, which are estimated at up to $25 billion annually. Fortunately, there are a number of less invasive options offering fewer risks currently available or in development. The challenge is that there is a pervasive culture in our health care system that is adverse to innovation, resulting in a lagging adoption to new approaches that ultimately widens disparities in care delivered across the country. A Johns Hopkins University study recently published in the *British Medical Journal* reveals the under-utilization of minimally invasive surgery in the U.S. (Cooper et. al., 2014). In studying four common minimally invasive procedures (appendectomy, colectomy, hysterectomy, and lung lobectomy), they found that mean hospital utilization rates ranged from 71 percent to as low as 13 percent. The authors concluded that, despite reductions in pain, infections and risk of subsequent surgery, adoption of minimally invasive procedures is wildly inconsistent. Higher utilization is loosely associated with urban location, larger hospital size and teaching hospitals; however, no clear trends were apparent.

**Learning the lessons of innovation**
As one of the early champions of the Gamma Knife, I have witnessed the challenges of integrating a noninvasive treatment approach into patient care firsthand. Systemic barriers can slow adoption of new technology by health care professionals to a glacial pace. The Gamma Knife was invented in 1951 as a promising tool in noninvasive radiosurgery, yet wasn’t commercially available in the U.S. until 1987. That’s 36 years of painstaking research, regulatory hurdles and bureaucratic red tape; all the while patients were denied access to a better treatment. The Gamma Knife and other stereotactic radiosurgical technologies are mainstream in hospitals, being used to treat movement disorders, arteriovenous malformations, brain tumors, epilepsy, and many more conditions.

So when I became aware of a technology that could impact current practices to a far greater extent, I understood the challenges ahead. About eight years ago, I was searching for effective ways to treat brain tumors without needing to open the skull or use radiation, and I learned about a nascent technology with tremendous potential — focused ultrasound. As I delved deeper, I quickly learned that the company developing the technology was under-resourced. Meanwhile, other companies and laboratories across the world were independently researching the technology without the benefit of collaboration. Determined not to see this innovative technology languish through the same long process from R&D to widespread utilization, we created what we believe is the first philanthropy in the U.S. dedicated to advancing a medical technology — the Focused Ultrasound Foundation. The Foundation’s mission is to accelerate the development and adoption of this noninvasive technology so that it can benefit patients in years rather than decades. And we believe that the technology will also be of tremendous benefit to the institutions and professionals providing care in the ACO model.
**Focused Ultrasound – A non-invasive approach on the horizon**

While focused ultrasound holds immense potential, the technology, for the most part, is in its infancy. Currently, it is approved by the Food and Drug Administration (FDA) for two indications – the treatment of symptomatic uterine fibroids and reducing the pain from bone metastases. This is merely the tip of the iceberg, with more than 40 potential applications that are in various stages of development in the U.S. and around the globe.

Focused ultrasound is steadily pushing its way to the forefront of noninvasive therapy. Two systems to treat prostate cancer are currently under FDA regulatory review. There is a pivotal trial ongoing at several U.S. centers using focused ultrasound to treat essential tremor, with earlier-phase clinical studies ongoing in brain tumors, Parkinson’s disease and OCD. There is great interest in using focused ultrasound to temporarily open the blood-brain barrier and allow drugs to penetrate the brain and treat tumors. Researchers have also noted its potential to enable localized and targeted drug delivery—releasing drugs in potent concentrations to a specific point anywhere in the body while minimizing systemic delivery and toxicity. Focused ultrasound could be pivotal to the future of health care. But, we have a long way to go.

The Foundation is working aggressively to overcome the hurdles focused ultrasound faces in becoming a standard of care. Within our various programs, we fund translational preclinical and early clinical research, foster collaboration to break down the silos that hinder innovation and help aggregate the evidence required for widespread reimbursement.

**Value of non-invasive technologies**

Hospital systems that want to thrive in the new environment will need to invest in the future. We will see an increased demand from payors and patients for noninvasive treatments, like focused ultrasound, that will shorten or eliminate hospital stays, reduce readmission rates, diminish infection rates and other risks, and ultimately lower the cost of care.

For patients, focused ultrasound offers the potential of less pain, reduced complications, and getting back to their lives faster. With treatments like focused ultrasound available, patients will come off the sidelines. As you eliminate the fear of complex surgery or radiation from the equation, I believe many patients with benign but nevertheless serious conditions will opt for treatment rather than simply toleration. This will help to decrease the cost of care and improve the overall health of the population — the ultimate goal of the ACO model.

Realizing the value of innovations like focused ultrasound requires investment and long-term vision. Early adapting academic medical centers are already vested in the technology. Hospital systems who want to maintain a competitive edge should continue to track the technology.
Industry Sector Report: CT

How the MITA Smart Dose Standard is ruling the CT market

By Lisa Chamoff

The latest “doc fix” law signed by Congress back in April, otherwise known as the Protecting Access to Medicare Act, may have yet again delayed cuts to physician reimbursements under Medicare, but it also has the potential to cut payments to radiologists and is already changing the landscape of the CT market.

Lawmakers used what has become their annual delay of the Medicare payment adjustment to address a host of other healthcare issues, including concerns about exposure to radiation from CT scans. Under the law, which takes effect at the beginning of 2016, hospitals, doctors’ offices and imaging centers will see their Medicare reimbursements cut by 5 percent on diagnostic CT scans if the machines they use for the exams don’t meet the Medical Imaging & Technology Alliance’s (MITA) Smart Dose Standard. The cut will be hiked to 15 percent by 2017.

Reducing dose in CT has long been a priority for both OEMs and radiologists alike, but the new legislation and reporting requirements have led to a closer look at how to track and lower dose — and protect patients from unnecessary radiation exposure.

The new legislation in essence takes the Smart Dose Standard — dose optimization and increased transparency around dose level that was developed about a year ago by MITA — and attaches reimbursement rates to it, says David Fisher, vice president of healthcare policy and strategy at Siemens Healthcare, and former executive director of MITA.

New CT scanners currently on the market are already compliant with the Smart Dose Standard, providing notifications and alerts if the dose is above certain thresholds; automatic exposure control, or modulating patient dose during a scan; pediatric protocols; and DICOM dose structured reporting, which saves dose information in a digital database and gives facilities an easier way to monitor and report dose information and compare the information to that of other facilities.
Solve the service puzzle with Consensys

We believe the right person to decide how to best service your diagnostic imaging equipment is you. And we are here to help by providing world-class service solutions utilizing our service management expertise and our proprietary tools and technologies that are designed with your needs in mind. Our reputation is built on delivering high quality and reliable service to our customers. We can empower your diagnostic imaging program.

MRI  |  CT  |  Ultrasound  |  Mammography
“The installed base [of older machines] is a different story,” Fisher says.

While much of the current installed base of CT systems is compliant, manufacturers will be reaching out to their customers to explore their options and ensure their scanners will meet the requirements of the new law. According to Gail Rodriguez, the current executive director of MITA, a third of the installed base can’t be upgraded.

“We are talking to all our customer base,” Fisher says. “We’re communicating with our installed base about our equipment [they own] to tell them, ‘Yes your product does meet the standard,’ or it won’t and you’ll get cuts. For Siemens, the vast majority of our customers meet the standard, or will meet the standard in 2016.”

Late last year, the Joint Commission also announced new standards for accredited hospitals, critical access hospitals and ambulatory health care organizations that provide diagnostic imaging services, including documentation of CT radiation dose in the patient’s clinical record. While the changes were originally supposed to take effect July 1, 2014 with additional changes phased in by 2015, the revised standards will now be implemented by July 2015.

Impact on legacy equipment

Facilities with older equipment need to make some decisions, though that doesn’t necessarily mean spending millions on new machines.

One such solution comes from Medic Vision, a company that provides software for medical image enhancement that improves image quality from lower-dose CT scans. The software, SafeCT, is currently being used by several leading medical centers, including Cedars-Sinai Medical Center in Los Angeles, Massachusetts General Hospital in Boston and Montefiore Medical Center in New York City.

“SafeCT will clean the noisy low-dose images and will send them to PACS for reading,” says Eyal Aharon, the chief executive officer. “So when radiologists read those images, in most cases they were acquired at half the dose.”

Aharon says the company has received a lot of inquiries, especially from states like California and Texas that have instituted dose reporting requirements.

“People are more and more aware that they need to take care of it,” Aharon says. “Three years ago, when I had meetings with potential customers, I had to explain why they needed to pay attention to radiation dose. Now I don’t have to explain.”

Fisher says that facilities should be looking at dose reduction beyond just the regulations.

“It’s not just about if are you compliant with the standard,” Fisher says. “There are lots of features that new equipment has and tremendous advances in dose reduction over the last decade. It’s really important for the customer to understand that it’s not just about the dollars. There are other important factors that go into that decision.”

Still, the smaller companies provide cost-effective solutions to facilities that aren’t yet in the market for new equipment.

“As a small company, one of the things that I would be happy to see is that people are aware that they don’t have to go to the CT vendor for a solution,” Aharon says. “There are other solutions out there that are doing the same thing for less than half the price of the GE and Siemens of the world.”

Ken Denison, GE’s global marketing director for CT products, says the company has updated about 70 percent of its installed base at no charge, though that still leaves some older scanners.

Since the law only applies to diagnostic CT done in a Medicare outpatient setting, Denison says facilities can look at what machines are in use and possibly swap them.

“Maybe I can upgrade one of them,” Denison says. “What we’re doing is helping healthcare providers.”

Aharon says that the big OEMs won’t retrofit the lower-level systems. One customer in New Jersey has one 64-slice and four 16-slice CT scanners. The OEM offered to retrofit the 64-slice scanner, but said the facility would have to replace the others, Aharon says. Instead, Medic Vision installed the SafeCT system in the data center, supporting all five existing scanners.

“Most of the CTs in the U.S. are 16 slices or less,” Aharon says. “They are working fine. They do what they need to do, especially for the private sector and smaller hospitals. There’s no need to replace them.”

Studies have compared different iterative reconstruction techniques, including those offered by OEMs. A recent University of Pittsburgh study compared the diagnostic quality of low-dose CT exams for pulmonary embolism post-processed with SafeCT and GE’s ASIR. Four experienced radiologists evaluated the processed exams and provided rankings for image quality and diagnostic value, with 48 percent of the ratings favoring SafeCT, 48 percent indicating no difference and 4 percent favoring ASIR. A clinical study performed by Massachusetts General Hospital that compared Siemens SAFIRE and SafeCT found both to be comparable, with each having slight advantages and disadvantages.

Denison, of GE, says that the comparison between SafeCT and ASIR didn’t go into enough detail, looking at lower doses and thinner slices. He notes that the company’s newer technologies, Veo and ASiR-V, expand the dose reduction capabilities, and that clinical comparisons should be in within the next few months.

“In a point in time, these kinds of filters [such as SafeCT] looked good, but we’ve already moved on to the next thing,” Denison says.

When asked about the comparison, Siemens spokesman Jeffrey Bell noted that internal studies with a phantom identified a 54 to 60 percent dose reduction using a test method that assessed noise, CT numbers, homogeneity, low-contrast resolution, and high contrast resolution, and that low dose data reconstructed with SAFIRE showed the same image quality compared to full dose data based on this test.

Sapheneia is also a big independent player in the post-processing space with its Clarity platform. Greg Mason, product applications and support specialist, says that aside from only working with newer scanners, OEMs
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Industry Sector Report: CT

can only reduce noise in the raw data state. If
the OEM software pulls out too much noise,
it’s more difficult to sharpen the edges of the
organs being examined.

“We do everything post process,” Mason
says. “We find the edges of the structure of
the body before we remove any noise at all.”

Another advantage is that Clarity can be
used on all makes, models and generations
of scanners and if a hospital buys a new
scanner, Sapheneia will transfer the license
to the new machine.

Satrajit Misra, the CT business unit senior
director for Toshiba America Medical Sys-
tems, says third party products can only add-
dress part of the MITA Smart Dose Standard.

“You need the scanner to support things
like automatic exposure control,” Misra says.

Reducing noise in images is only one step
in an image improvement product, whereas
Toshiba’s solution addresses things such as
mA, exposure control, reconstruction and
dose reporting.

“We address the entire imaging chain,
whereas the third party products address the
last step,” Misra says.

Watch your dose
PACSHealth makes a PACS-based automa-
ed dose monitoring solution, DoseMonitor,
which works with multiple modalities, in-
cluding CT. Its first commercial version was
released in 2010 at RSNA and the company
has more than 200 sites signed or live, and
competes with GE and Radimetrics, which
was acquired by Bayer HealthCare in 2013,
for market share.

Dose information can be examined with
the PACSHealth software on the patient lev-
el, looking at a patient’s cumulative radiation
exposure, which will be especially important
when the Joint Commission requirements
take effect. The software also takes the im-
age of the patient and measures them both
A-P and laterally, yielding the patient’s ef-
fective diameter. It can compare scanners
and even look at the individual technologist’s
historical dose record.

“The most important thing about dose
monitoring has to do with consistency and
measuring quality of the product,” says
Mike Battin, vice president and chief operat-
ing officer of PACSHealth, LLC.

Battin says radiation dose is something
that all facilities need to stay on top of, as
much as they monitor the IV drugs given to
a patient during surgery. Some facilities have
even started advertising dose monitoring as
a way to stay competitive.

“It’s important for the patient that facilities
implement real-time dose monitoring,” Battin
says. “The industry had been working diligent-
ly to make this a reality in the near future.”

The Radimetrics Enterprise Platform,
which was showcased at RSNA in 2013, is a
single-platform solution that manages radia-
tion and contrast dose.

“It allows for data access in every area of
the workflow,” says Dennis Durmis, head of
the Americas region for Radiology & Inter-
ventional for Bayer HealthCare.

Sectra, which offers a web-based dose
monitoring solution called DoseTrack, goes to
the lengths of calculating actual organ doses.

“What’s really important isn’t the base
amount of radiation, but which organs are
affected,” says Kevin Collins, vice president
of product management at Sectra North
America.

The software can make calculations
based on study data and produce charts
showing which organs were exposed and
how much radiation the organs were ex-
posed to.

“We’re just trying to get all the informa-
tion we can,” Collins says.

Dominic Siewko, imaging systems radia-
tion safety officer for Philips Healthcare, says
although organ dose calculation is one of
the next frontiers, any calculation is a rough
estimation and therefore, not very clinically
useful at the moment.

“Just because you’re calculating some-
thing doesn’t mean it’s adding value to the
patient’s treatment,” Siewko says.

Keeping track of dose tracking
With all software out there from OEMs and
independents to track and reduce radiation
dose, how can facilities stay on top of it all?

That’s where West Physics comes in. For the
past two years, the company has offered what
it calls a “turnkey” service that owner Geoff
West says looks at everything holistically.

“What we’ve seen in a lot of centers is they
buy dose-tracking software (but) there’s no
one at the facility who knows what to do with
all that information,” West says. “There needs
to be somebody who is actually reviewing and
chopping up this data to see where the trends
are and knowing what to do with it.”

The company can log in to those differ-
ent systems and maintain oversight, sending
reports and providing recommendations in
line with best practices.

“We’ll tell them your CT doses on brain
with contrast is too high,” West says.

The demand for this service has increased
as facilities get ready for Joint Commission
requirements.

“The radiologists are trained to read ex-
ams, they’re not trained to run dose reduc-
tion programs,” West says. “The medical
physicist is really the radiation expert.”

The ACR’s Dose Index Registry — a data
registry that allows facilities to compare their
CT dose measurements to regional and na-
tional values — is another resource. ACR
provides free, lightweight software that runs
in the background at a facility. Data are sent
automatically to the software from scanners,
PACS, or third party dose monitoring soft-
ware, and the anonymous data is stored in
a database. The ACR provides facilities with
periodic feedback reports comparing their
results by body part and exam type to ag-
gregate results.

The registry launched in May 2011. As of
the end of June, 642 facilities have contrib-
uted data on 10.9 million exams.

Aharon of Medic Vision says it’s disap-
pointing that the new regulations are re-
lated only to reporting dose levels, not set-
ting specific targets for lowering dose. In
Israel, where Medic Vision is based, there are
guidelines for radiation levels and 80 percent
of the scanners are already equipped with
dose reduction capabilities.

“I think the authorities are missing the
point, because eventually what you want to
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Industry Sector Report: CT

get is a low dose scan, not just the reporting of it,” Aharon says. “I think that regulations should also look at radiation levels. The main goal would be better served if they had defined some thresholds.”

Rodriguez, of MITA, says the Smart Dose Standard was developed during the economic downturn, when many hospitals were not buying new scanners. The organization has since been working to raise awareness on the issue, and find ways to get these standards put into practice.

“It’s our sense that hospitals are going to do everything they can to be compliant,” Rodriguez says.

Ongoing debate: Does the tube have an impact on dose?

There may be a misconception — though perhaps not as widespread as it used to be — that the X-ray tube is what impacts the dose, not the CT scanner. Laura Hafner, the senior director of global sales and marketing for Dunlee, a Philips subsidiary that manufactures X-ray tubes, says the scanner is what controls the dose given to the patient, and that the OEMs may be fueling the misconception a bit.

“Regardless of what type of tube you are using, whether it is a GE manufactured tube, each tube is going to have the same dose output depending on what the scanner tells that tube to produce,” Hafner says. “Part of GE’s sales strategy is, I think, to put a little bit of that fear and doubt that if you do not use the GE-manufactured tube, your patients are going to be receiving more dose. You can see that in some of the messages they include in the patient records.”

Denison, of GE, says this is not true, and that the X-ray output from a tube for a given mA (milliamperes of current) and kV (kilovolts of potential) is inherently dependent on the design of the tube.

“There may be differences in the total flux of the X-rays as well as in the power spectrum of the X-rays, both of which affect the exposure to the patient,” Denison says. “When GE designs tubes, we measure the exposure to the patient according to standard methods. From those measurements, made on several tubes and several CT systems, we can determine the output profile of the tube/system combination.”

“Is it possible to design two tubes to produce the same output when used in the same CT system and with the same mA and kV? Yes,” Denison says. “Will every tube design used in the same CT system and with the same mA and kV produce the same output? No.”

Hafner says she agrees that the X-ray output depends on the tube’s design, and notes that Dunlee tubes are manufactured to the exact designs as the GE originals. This includes the inherent filtration and attenuation of the X-ray beam.

“There are actually differences from tube to tube of the exact same design,” Hafner says. “This is why the system manufacturer — in this instance GE — allows for variation of a certain percentage, published by GE as plus or minus 15 percent of the CT Dose Index. When designed identically, the Dunlee tube delivers a dose (CTDI 100) within the published GE specifications for its own GE CT scanners.”

Dunlee also measures the exposure to the patient, and has measured dose, according to GE published specifications, on Dunlee tubes in hundreds of GE systems. Hafner says that Dr. Robert Dixon, former chairman of the CT committee for the American Association of Physicists in Medicine, says the Dunlee replacement tubes for both the GE VCT scanner and the GE Lightspeed 16-slice scanners were found to deliver a radiation dose to the phantom that is indistinguishable from that of the GE tube it replaces.

Denison says GE provides in its technical reference manual and within the operating software methods for estimating the exposure to patients based on all of the imaging parameters, including the tube in use, mA, kV, filtration, collimation, and helical pitch.

“These estimates are based on the physical measurements mentioned above that allow us to calibrate the software and the methods in the technical reference manual,” Denison says. “Because we do not have access to Dunlee tubes in order to make the physical measurements needed to calibrate the methods for estimating exposure, GE is unable to know what the estimated exposure is when using these tubes. As a result, we put a simple statement of this fact into the dose reports from the system.”

Hafner says Denison’s response is a bit misleading.

“GE’s strategy is to instill fear and uncertainty to the user when they use the system with other than GE Glassware,” Hafner says. “The GE CT systems do not measure dose. They calculate dose based on empirical evidence collected using GE tubes (their statement). They could also calculate dose based on empirical evidence from Dunlee tubes, but they chose not to do so, since this would validate a competitive part. Dunlee tubes are manufactured to the highest quality standards, and certify the output from all tubes to be within GE published specifications.”

Hafner says Dunlee would provide GE access to new replacement Dunlee tubes, to be measured by an independent third party under supervision by each company, should GE choose to do so.

Meanwhile, Jakub Mochon, director of marketing and operations for Siemens, says the company’s new Vectron tube is a good example of how the tube makes a difference in dose reduction.

“Even the traditional imaging technical aspects like precision and size of the focal spot can have dramatic impact on the dose efficiency of the scanner,” Mochon says.

Low dose on the high end

The new crop of high-end scanners that have hit the market over the last year raise the bar for CT and take dose into account.

In April, the U.S. Food and Drug Administration cleared GE’s Revolution CT scanner and Siemens’ SOMATOM Force.

Denison, of GE, says the technology in the Revolution, launched at RSNA last year, allows users to lower dose by 52 to 82 percent while increasing diagnostic imaging quality. In 2008, the company introduced its first iterative reconstruction technology called ASIR.

“This combines the best pieces of both of those,” Denison says.
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The machine has a .28-second rotation speed and a 160-millimeter detector that allows technicians to capture the entire heart in one rotation. The Revolution is being marketed for patients who have high heart rates or metallic implants, as well as pediatric patients, with the potential to freeze cardiac motion in one heartbeat, reduce metal artifacts, and possibly offer sedation-free CT scanning.

“It really allows you to have the options to fit and tailor the acquisition to the particular clinical indication and patient,” Denison says. Siemens is marketing its SOMATOM Force CT System for challenging cases, specifically children, patients with renal insufficiency, and those who are unable to hold their breath. It’s a high-end system that has already been installed at the Mayo Clinic, Medical University of South Carolina and the National Institutes of Health in Washington, D.C., Mochon says.

Though most of the scanners on the market are fast, patients are still asked to hold their breath, which could be difficult for some, Mochon says. Ensuring that patients follow a technologist’s instructions takes more time than the scan.

“With the Force, we can completely change that situation,” Mochon says. “In this health care environment where every patient-focused care.”

Mochon says that because of the company’s new Vectron X-ray tube, imaging can be done at much lower kV settings.

“With the new tube, many of the adult patients can be imaged at 70 and 80 kV, which was the kV used primarily for pediatric patients,” Mochon says. Contrast can also be better visualized at a lower kV, Mochon says, meaning there is a potential to use less contrast media as well as a lower concentration of the contrast, which can reduce the risk of conditions like contrast-induced nephropathy.

This year, Toshiba launched its second generation Aquilion ONE platform, which includes a 320-slice scanner configuration, and two 640-slice scanner configurations. The Aquilion ONE VISSION Edition includes all the capabilities of the Aquilion ONE 640 along with a faster 0.275 second rotation and a more powerful 100 kW generator. Last year, it introduced the second generation Aquilion PRIME, a scalable system capable of going from 40 to 80 to 160 slices without replacing hardware. Both the Aquilion ONE and Aquilion PRIME platforms have been optimized for ease of use, patient experience and safety, according to the company.

Misra says the company’s advanced dose reduction technology, AIDR 3D, is available in all its scanners, even the entry level machines, something unique among manufacturers.

Toshiba also built in dose reduction technologies and started the upgrade process very early on, Misra says. Today, 90 percent of Toshiba’s installed base can be upgraded without having to get new equipment.

“That’s a Toshiba difference,” Misra says. “We saw this coming and we had this built into our design. We had things like automatic exposure control built into our system many years back. “It’s a far smaller challenge for Toshiba than it is for any other competing system.”

At RSNA last year, Philips debuted its iQon Spectral CT, the first spectral detector-based CT, which the company billed as a breakthrough invention that allows you to use color to identify the composition of what you see. The machine, which includes Philips IMR, or Iterative Model Reconstruction, is pending 510(k) approval.

While the big OEMs have been showcasing high-end scanners at trade shows, Hitachi, which previously manufactured CT scanners for Philips as well as for themselves, has a relatively new entry into the market as of 2013 and is focusing on value. Hitachi received FDA clearance in early 2013 for its SCENARIA 128-slice scanner, and also offers 16- and 64-slice machines.

“We’re not really dueling with Siemens and GE for who has the largest slice,” says Mark Silverman, manager of CT marketing for Hitachi. “Now we live in the land of affordable care, and in the land of affordable care, hospitals are making value-based purchasing decisions.”

Late last year, Hitachi provided all customers under warranty with a software upgrade for all 16-slice machines, which have been on the market for about five years, so the company doesn’t have to worry much, like the bigger OEMs do, about an older installed base that can’t be upgraded.

The upcoming Medicare rate cuts have been driving movement in the CT market. While there are dose-lowering solutions, Silverman thinks it will still become important for hospitals to make sure they have Smart
Dose-compliant scanners. Private insurance companies could follow Medicare’s lead, and people are becoming more educated consumers of health care.

“There’s plenty of motivation to replace old CT scanners,” Silverman says. “Everyone wants lower dose and it’s going to drive the market for a very long time.”

Neusoft, a China-based company that introduced its products to the U.S. market in 2006, also focuses on low-slice scanners, and introduced its 16-slice model in 2008. Chris McHan, president of Neusoft Medical Systems USA, says both its 16- and 64-slice scanners are compliant with the MITA Smart Dose standards.

“If it’s an older model then our competition is requiring an upgrade,” McHan says. “You don’t have to spend extra money to upgrade a Neusoft machine.”

Neusoft, which competes against some up-and-coming CT scanner manufacturers in China, is the only one from that country to market its products in the U.S.

CT in the OR
A Minnesota company called IMRIS manufactures a unique ceiling-mounted intraoperative CT solution that uses the Siemens SOMATOM Definition AS technology to produce high quality images at the lowest dose. The Smart Dose-compliant product brings the CT into the operating room on demand using ceiling mounted rails, so the CT easily moves in and out of the OR, and over the patient on the table, as needed. The product has been on the market since the summer of 2013.

IMRIS CEO Jay Miller says that if dose management is important in diagnostic CT, it’s even more important in the OR, where there are also nursing staff and anesthesiologists present.

“Everyone in the room, including the patient, will benefit from that,” Miller says.

Once the machinery is installed, staff goes through days, and sometimes even weeks, of training. Miller says the company’s competitors mainly use older devices lacking sophisticated dose management technology.

Dr. David Enterline, chief of neuroradiology and associate professor of radiology at Duke University, says the device has been used in his facility for spinal surgery. Enterline says that while you don’t need the same image quality in the OR as you would for a diagnostic CT, there’s an advantage to using a well-established and mature scanner with state of the art dose reduction techniques.

“You can dial down dosing, but it allows you to see the actual component of the bone that you’re putting a pedicle screw into,” Enterline says. “The technology of imaging has really changed and the need for imaging in the operating room is very clear.”

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Industry Sector Report: CT

DOTmed invited the leading CT scanner manufacturers to submit up to three of their current products to be featured in this guide. To learn more about these scanners and see other models not shown, please visit the DOTmed’s Virtual Trade Show, or go to: www.dotmed.com/ct

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Neurologica / BodyTom®
BodyTom® is a portable, full body, 32 slice CT Scanner that boasts an impressive 85 cm gantry and 60 cm field of view. BodyTom easily interfaces with PACS, HIS/RIS and surgical navigation systems. Its unique capabilities provide high quality CT images wherever needed including the OR, Trauma Bay, ED, ICU, Radiology Department, Radiosurgery and Interventional Suite.

Hitachi / SCENARIA
The scalable SCENARIA CT platform is available in 64 and 128-slice models offering premium capabilities and workhorse performance. Incorporating advanced dose reduction features, greater patient access (75cm aperture with Lateral Shift Table) and rapid workflow tools (up to 35 image per second reconstruction), Hitachi provides feature-rich configurations and unique support benefits that create a superior value. Over 30 years of CT development and manufacturing expertise and 12,000+ CT installations worldwide comes with Hitachi’s next generation CT – SCENARIA.

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The Neurologia CereTom® is an 8 slice CT scanner that provides rapid scan time, flexible settings and immediate image viewing. These features make it an indispensable tool to any clinician setting that has an urgent need for real-time data on critically ill patients so rapid diagnosis can be achieved.
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inSPira HD® is a portable high resolution SPECT imaging system. inSPira HD® is capable of imaging radioisotope energies between 80 to 200 keV for clinical applications such as Epilepsy, Parkinson’s, NeuroPsych, Alzheimer’s and Stroke.

Neuros / NeuViz 16

This full-featured CT scanner provides the smallest footprint with the widest detector coverage in 16-slice scanning. The NeuViz16 has reduced scan times, lower dose and is easy to site. Includes: Dynamic Focal Spot to reduce artifacts, MIP, MinIP, SSD, AIP, MPR, bone removal, Virtual Entrophy, and Vessel analysis. A 50 kW generator and 5.0 MUH tube lowers the cost of ownership.

Philips Healthcare / The Philips ICT Family

The Philips ICT Family (ICT Elite with IMR, ICT Elite and ICT SP) provides high image quality with low energy, low dose and low injected contrast. This family takes CT imaging to the next level by using a combination of hardware innovations, state-of-the-art acquisitions and iDose4 offering premium results. The ICT Elite with IMR upholds patient-centric clinical excellence, significantly improves spatial resolution with low-noise and low-dose* with IMR. The the NanoPanel Elite when combined with IMR, opens the bottlenecks for a noise-free imaging chain, from scan through reconstruction with workflow powered by iPatient. "In clinical practice, the use of IMR may reduce CT patient dose depending on the clinical task, patient size, anatomical location, and clinical practice.

Neuros / NeuViz 64

The NeuViz 64 has three platforms that provide the perfect system with or without cardiac imaging. Full-featured configurations include 3D workstation, ClearView Iterative Reconstruction, Calcium scoring, Vessel and tumor analysis, Lung density and nodule analysis, Neuro DSA, MIP, MinIP, SSD, AIP, MPR, and bone removal. With a tiny footprint of 254 sq/ft, NeuViz64 is the right fit for any location.

Philips Healthcare / Ingenuity CT

The Ingenuity Family (Ingenuity Elite with IMR, Ingenuity Elite and Ingenuity Core) transforms your care through solutions that deliver high performance with virtually no tradeoffs. Industry-leading low-contrast resolution with IMR, delivers appropriate contrast dose and consistent image quality with SyncRight, low dose and high image quality with iDose4 Premium Package, improved visualization in the presence of large metal orthopedic implants and NanoPanel Elite detector for marked image noise improvement. Majority of reference protocols reconstructed with iDose4 in less than a minute, IntelliSpace Portal preprocessing.

Neuros / NeuViz 64

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Neuros / NeuViz 16

This full-featured CT scanner provides the smallest footprint with the widest detector coverage in 16-slice scanning. The NeuViz16 has reduced scan times, lower dose and is easy to site. Includes: Dynamic Focal Spot to reduce artifacts, MIP, MinIP, SSD, AIP, MPR, bone removal, Virtual Entrophy, and Vessel analysis. A 50 kW generator and 5.0 MUH tube lowers the cost of ownership.

Neuros / NeuViz Flex

The Ingenuity Flex CT scanners (Ingenuity Flex32, Ingenuity Flex16) using Ingenuity Data Acquisition and Sampling (DAS), brings high image quality at low dose. They offer fast reconstruction, a range of automated tools to ease workflow and flexibility to achieve personalized image quality based on patients’ needs. The Ingenuity Flex 32-slice scanners produces high image quality with reduced artifacts through its standard offering of Philips’ iDose4 Premium Package, which includes iDose4 and metal artifact reduction for large orthopedic implants (O-MAR). The Ingenuity Flex 16-slice offer O-MAR and iDose4 as options.

Neuros / NeuViz 64

The NeuViz 64 has three platforms that provide the perfect system with or without cardiac imaging. Full-featured configurations include 3D workstation, ClearView Iterative Reconstruction, Calcium scoring, Vessel and tumor analysis, Lung density and nodule analysis, Neuro DSA, MIP, MinIP, SSD, AIP, MPR, and bone removal. With a tiny footprint of 254 sq/ft, NeuViz64 is the right fit for any location.

Neuros / NeuViz 16

This full-featured CT scanner provides the smallest footprint with the widest detector coverage in 16-slice scanning. The NeuViz16 has reduced scan times, lower dose and is easy to site. Includes: Dynamic Focal Spot to reduce artifacts, MIP, MinIP, SSD, AIP, MPR, bone removal, Virtual Entrophy, and Vessel analysis. A 50 kW generator and 5.0 MUH tube lowers the cost of ownership.

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Industry Sector Report: CT

Siemens Healthcare / SOMATOM Definition AS
Single-source CT system available in 20-, 40-, 64-, and 128-slice configurations. Has 78-cm bore (80-cm bore available with 20- and 64-slice configurations) and standard 500-lb. patient weight table (optional 676-lb. high capacity table). Includes FAST CARE package of features, which are designed to help make time-consuming, complex procedures simpler and more intuitive, as well as reduce dose and helping to improve image quality. Sinogram Affirmed Iterative Reconstruction (SAFIRE) software available on all slice configurations. The system is fully upgradable to the Stellar Detector for all slice configurations.

Toshiba / Aquilion PRIME
Toshiba’s Aquilion™ PRIME is a mid-tier CT solution that delivers on customers’ clinical and financial needs today, with the ability to adapt as those needs change in the future. The scalable, patient focused system is available with 80 or 160 slice configurations and makes for faster, more comfortable exams for patients while providing improved diagnoses and workflow for clinicians.

Siemens Healthcare / SOMATOM Definition Force
Dual-source CT system offers split-second scanning. The system offers rapid scanning which may be useful in cardiac studies. FAST CARE package is designed to help make complex, time-consuming procedures simple and intuitive. Stellar Detector enables the system to deliver high spatial resolution, generating ultra-thin slices and providing high levels of sharpness at low patient radiation levels.

Toshiba / Aquilion ONE Family
The Aquilion™ ONE Family systems match current clinical needs with a field-upgradable path for the future:
- Aquilion ONE 320 – 8 cm, single rotation scan at 0.35 second rotation speed allows for optimal speed and efficiency.
- Aquilion ONE 640 – Single 640-slice rotation covers 16 cm, allowing full-organ imaging in a comprehensive CT scan.
- Aquilion ONE ViSION – Combines the capabilities of the Aquilion ONE 640 with higher volume capabilities, delivering matchless functionality.

Siemens Healthcare / SOMATOM Perspective
Company’s 64- or 128-slice advanced single-source CT system designed to drive efficiency and reduce costs for budget-conscious community hospitals, critical access hospitals and outpatient centers, potentially enabling them to extend the range of available examinations at reduced radiation dose. Covers all clinical fields, including cardiac imaging with iTRIM (Iterative Temporal Resolution Improvement Method) technology that increases temporal resolution to 192 ms. Features Illumination MoodLight for a more comfortable scanning environment.

Toshiba / Aquilion Large Bore
Designed to expand the dimensions of CT, Aquilion™ Large Bore (LB) combines Toshiba’s award winning CT technologies with the advantages of a large bore platform. Aquilion LB provides a true 70cm field-of-view acquisition, covering more anatomy with greater accuracy than ever before. Aquilion LB was specifically designed to meet oncology challenges and improve patient care. Now CT simulation positioning can easily mirror radiation therapy positioning without compromise.

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THE GENERAL PROCESS IN MANUFACTURING X-RAY TUBES

1. PARTS PREPARATION
   • Out-Gassing
   • Brazing
   • Plating / Coating
   • Cleaning
   • Nitrogen Part Storage

2. ASSEMBLY
   • Clean Room Environment
   • Cathode Assembly
   • Target Assembly
   • Envelope

3. FINAL SEAL
   • Glass Final Seal
   • Welded Metal Assembly

4. PUMP
   • Removal of Gas from the Envelope and Internal Tube Components

5. TANK TESTING/HOUSING LOAD
   • X-Ray Tube is Loaded into a lead lined Housing; this provides Radiation Shielding
   • Housing is filled with dielectric oil
   • High Voltage Stand-off
   • Cooling
   • High Voltage Conditioning and High Power Seasoning

6. HOUSING TEST
   • X-Ray Output is quantified for size, position, and movement per specific Customer Specifications
   • High Voltage stability is tested

7. FINISH-OFF
   • Tube is prepared for Shipment; paint, labels, cables as required
The health care landscape is always shifting, but some things have remained fairly constant, including the high cost of X-ray tubes.

It’s no secret that these powerful, vacuum-sealed, and fragile tubes are one of the most important components of a CT scanner or X-ray system. And while most imaging professionals know how they work, the process of how these tubes are created is not common knowledge.

For its annual industry sector report, DOTmed Healthcare Business News decided to demystify the X-ray tube manufacturing process a bit, speaking with two of the major players — Varian Medical Systems, which builds tubes and private labels equipment for OEMs, and Dunlee, a division of Philips Healthcare which, in addition to supplying its parent company, also makes private label tubes for other manufacturers and CT tubes for the multivendor marketplace.

The hope is that when it again comes time to replace the tubes, you’ll have a clearer picture of where your money is going.

Materials
Before things even get going in the factory, it all starts with the materials, which are the most expensive part of the manufacturing process. The refractory metals — oxygen free high thermal conductivity copper, high grades of nickel, tungsten, silver, rhenium, and Kovar — are costly and the prices often fluctuate. The metals are mined and sourced from several different countries including China, Russia, Australia, Peru, and Canada.

Parts are also sourced from a few suppliers. For example, targets, big metal pieces made out of refractory metals, generally tungsten, that produce X-rays when struck by electrons, are only made by a few big companies, such as GE Healthcare and Plansee. Both Dunlee and Varian purchase targets from these outside companies, because the level of investment it would take to produce them would be high, according to Mark Jonaitis, general manager of X-ray tube products at Varian.

1. Parts preparation
Preparing the expensive materials also requires a major capital investment. Inside large furnaces that cost a few million dollars and range in size from 10
Industry Sector Report: X-ray Tubes

X-ray Tube Insert Final Seal
Photo courtesy of Varian

square feet to 50 square feet, all gases and other materials are removed from the metal components to ensure there’s a solid vacuum environment — kind of like water being wrung out from a sponge. Varian uses a variety of furnaces manufactured by Thermal Technology, Vacuum Industries, and Astro, to name a few. Dunlee also uses furnaces manufactured by Thermal Technology along with a variety of others including T-M Vacuum Products.

Depending on the type of part being outgassed and/or brazed, temperatures can range from 475 to 1,800 degrees Celsius. This outgassing and brazing, or high-temperature soldering, which on average takes about six hours, creates a complete and airtight envelope for X-rays to be produced.

Next comes the plasma coating to create surfaces that either absorb or reflect the incredible amount of heat that builds up in the tubes — a target can get as hot as a 2,700 degrees centigrade. The tube produces 99 percent heat and 1 percent X-rays, Jonaitis says. Much of the technology and design of the tubes is for heat management.

Cleaning, while it sounds simple, is an important step, and requires an investment in ultrasonic water- and solvent-based cleaning systems, which can be as tall as 15 feet. Cleaning helps to prevent arcing, which occurs when there is a short-circuit within the tube, usually caused by residual gas or an improper electrical path, and stops the X-ray output — not something you want to happen mid-scan. Warming up your tube before use can also prevent arcing.

After degassing and cleaning, the parts, which can absorb gases from the atmosphere, must be stored in cabinets filled with nitrogen which boils away from liquid air at a lower temperature than oxygen, to prevent reabsorption. Varian partnered with their supplier to build a 100-foot by 100-foot on-site nitrogen plant, Dunlee buys large quantities of liquid nitrogen, and then lets it evaporate and collects the gas, creating ultra-pure nitrogen used during many of the operation steps.

2. Assembly
The two major parts of the X-ray tube — the negatively charged cathode, which contains the filament wire, usually made of tungsten, that generates the electrons used to produce X-rays, and the positively charged anode, which contains the target that the electrons collide into — are assembled in a clean, HEPA-filtered space similar to a sterile operating room, where workers don gowns, gloves, and
headcovers. There must be a strong connection between the target and its stem, otherwise the anode assembly can become unbalanced and the tube will not function correctly.

3. Final seal
This is the most visual part of the process, and for anyone who has toured an X-ray tube factory, it can be as interesting as a visit to the Simon Pearce glassblowing facility in Vermont (though without the gourmet food). The assembled cathodes and anodes are placed depending on the product, into metal or glass inserts (also called envelopes).

“Forming the glass envelope is fascinating and requires a high level of glass technology as some glass doesn’t seal to the metal parts and requires ‘transition’ glass to be used,” says Tom Spees, director of sales, North America for Dunlee, the GTC division of Philips Healthcare. “The welding of the tube parts into the metal frame construction of high-end CT tubes is equally as fascinating, although perhaps not as visually stimulating, as watching the glass blowing,” he says.

4. Pump
At this stage, the anode and cathode are heated and cooled repeatedly to remove unwanted gasses. The length of the pumping process varies by the size of the tube and the application, and can range from eight hours to three days, using equipment that’s about the size of a large closet. Because tubes are run actively and produce X-rays during the process, the equipment housing the tubes during the process is lead lined for the safety of the operators. The vacuum is very strong to create a stable high voltage environment. According to Dunlee, the vacuum levels achieved in their processing is better than those which surround the International Space Station. At this point, it is sealed off from the atmosphere.

5. Tank testing/housing load
Once the final seal is in place, all of the gas has been removed and the insets are placed in their lead housings, which have small windows that allow X-rays to exit. Dielectric oil, nonconductive oil that acts as a cooling agent, is added, and the oil is specially processed so X-rays don’t break it down. The fully assembled tubes are then put into test tanks and are exposed to the type of voltage they will run on, on a gantry system similar to one used in the field, preparing the tube for its role in a medical
application. Varian always exposes the tubes to 50 percent more voltage, so if the tube will run on 140 kV then it’s exposed to 210 kV. Dunlee also exceeds the high voltage rating.

6. Housing test
This part of the process gets to the heart of what a tube manufacturer’s customers care about — the focal spot of the radiation source that they’re buying. This process, which is where the rubber meets the road for X-ray tubes, quantifies levels of output.

The focal spot sizes are measured to make certain they are within the industry tolerances and the final assembly is checked for any stray radiation leakage to assure X-ray output is only from the desired window.

“We test our products on actual customer generators and scanners to ensure optimal performance in the field,” says Laura Hafner, senior director of global sales and marketing for Dunlee.

7. Finish-off
This part may seem to be only cosmetic, and on some level it is. Tubes are painted to match the shade of the OEM machines. But tubes also have to be labeled as part of regulatory compliance, with different countries having different requirements.

For Dunlee, the entire process, from degassing and cleaning to being able to ship, generally takes four to five days to many weeks, depending on the tube type.

Jonaitis, of Varian, notes that part preparation can take one month, while the rest of the process takes about two weeks.

For both companies, materials and parts make up the majority of the cost of the tube, followed by overhead and then labor, even though at Dunlee, 90 percent of the manufacturing is done by hand, while the remaining 10 percent is robotic, with robots mainly used during the Housing Test step.

For Varian, probably 70 percent of the original labor content has been replaced by automation. Jonaitis says this keeps the company competitive on cost and allows them to “tune a process to an optimum point and reproduce that point consistently.”
Fast facts:

**Varian**
Varian first started building X-ray tubes in 1970, but the plant has been there since the 1940s, producing vacuum tubes under a different company name (EIMAC).

**Headcount:** 959  
**Number of tubes manufactured per year:** 22,000 to 25,000  
**How many different models of tubes are manufactured:** 400+  
**Square footage of the Salt Lake City plant:** 340,000 square feet  
**Location of manufacturing facilities:** Salt Lake City, Charleston, South Carolina; Las Vegas, Nevada, Syracuse, New York; Dusseldorf, Germany; Beijing

**Dunlee**
Dunlee was founded in 1946 by two former GE tube engineers and began building X-ray tubes in Chicago. Following a move to Bellwood, a Chicago suburb, the company built a new factory in Aurora, Illinois and moved into its present 140,000-square-foot facility in 1994.

**Headcount:** 600+  
**Number of tubes manufactured per year:** More than 10,000  
**How many different models of tubes are manufactured:** 100+  
**Combined square footage of the plants:** More than 350,000 square feet  
**Location of manufacturing facilities:** Aurora, Illinois and Hamburg, Germany

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- SERVICE / MAINTENANCE ALSO AVAILABLE
Industry Sector Report: X-ray Tubes

DOTmed NEW EQUIPMENT GUIDE X-RAY TUBES

Dunlee / Reevo 240G CT Replacement Tube

The Reevo 240G™ is a 8.0 MHU CT tube designed as a replacement for use in GE LightSpeed® VCT, LightSpeed® VCT Select, LightSpeed® RT16, LightSpeed® Xtra, LightSpeed® Pro 16, and Discovery VCT systems.

Dunlee / DA 200 CT Replacement Tube

The DA 200 is a 6.3 MHU CT tube is designed as a replacement for use in GE LightSpeed® 16, LightSpeed® Ultra, LightSpeed® Plus, LightSpeed® QXi, LightSpeed® RT, Discovery LS/ST/STE/RX, Discovery CT600, CT670, HiSpeed® QXi, HiSpeed CTi, HiSpeed NX/i Pro, HiSpeed ZX/i, and LightSpeed® QXi systems.

Dunlee / S 532 B/Q

This 5.3 MHU CT tube is designed as a replacement for use in Siemens SOMATOM Volume Zoom®, Volume Access, Sensation 4, Sensation Cardiac, Sensation 10, and the Sensation 16 systems.

*All products listed may be trademarked by the referenced OEM

Philips Healthcare / Philips iMRC

- X-ray tube anode: iMRC with segmented anode
- Heat storage, MHU: 30 effective
- Heat dissipation rate, kHU/mm: 1,608
- Tube cooling: Direct
- Tube focal spots, mm:
  - Large: 1.1 x 1.2
  - Small: 0.6 x 0.7
- Maximum generator power: 120kW
- Max mA for small focal spot @ fastest rotation: 800
- Max scan time at max mA, sec: 4

Philips Healthcare / Philips iMRC Ice

- X-ray tube anode: iMRC Ice with segmented anode
- Heat storage, MHU: 30 effective
- Heat dissipation rate, kHU/mm: 1,608
- Tube cooling: Direct
- Tube focal spots, mm:
  - Large: 1.0 x 1.0
  - Small: 0.5 x 1.0
- Maximum generator power: 80kW
- Max mA for small focal spot @ fastest rotation: 667
- Max scan time at max mA, sec: 4

Varian Medical Systems / MCT 8064

Replacement X-ray Tube for Hercules®

- Replacement tube for GE Lightspeed VCT scanner family
- Installs and calibrates like the original
- Over 30,000 anode end grounded (AEG) tubes sold
- Designed with Varian’s 20+ years of experience building AEG tubes

Varian Medical Systems / GS-1096

Varian’s GS-1096: 840 kHU anode with 0.6 x 1.0mm focal spots on a 12” target. Replacement for the Siemens Optitop 150/40/80HC. Available in original Siemens Optitop housing for service replacement or in Varian’s B-199 housing as original equipment for OEMs. Specifications and Calibration like the original. Replaces Siemens part numbers: 33 45 209 x1953 – Optitop 150/40/80HC-100 3 phase stator.

Varian Medical Systems / MCS 8064

Replacement X-ray Tube for Hercules®

- Replacement tube for GE Lightspeed VCT scanner family
- Installs and calibrates like the original
- Over 30,000 anode end grounded (AEG) tubes sold
- Designed with Varian’s 20+ years of experience building AEG tubes

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DOTmed Registered X-ray Tubes Sales & Service Companies

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MEVION medical systems
Proton therapy: progress with a price tag

By Gus Iversen

As early as the 1950s, physicians in nuclear research facilities had been using particle accelerators to explore the practical application of protons against disease, but over the last decade the treatment has become a central — and sometimes polarizing — topic in the conversation about curing cancer. Using protons (instead of photons, such as X-rays) to eliminate tumors that have solid borders has proven to be a superior method for treating certain cancers. Proton therapy is preferable to standard radiation because it conforms to the shape and depth of a tumor to achieve optimal dose distribution and effectively spares nearby tissue and organs of residual toxicity, which may reduce susceptibility to side effects and post-treatment complications.

Although the price of proton beam technology has gone down in recent years, the cost continues to dwarf traditional radiation. Since the true value of proton therapy is still being defined, some experts fear the health industry is running headlong into a costly treatment option with too little clinical data to responsibly recommend it. Work is currently being done to assess benefits as they pertain to specific cancer sites and how those benefits compare with traditional radiation, but with so few proton therapy centers in existence that work takes time.

Currently, there are 14 proton therapy centers operating in the U.S. and 12 more in development. They are also emerging on a worldwide scale, with centers popping up in China, Europe, Japan, Russia, and Korea. With more facilities being built, more patients receiving the treatment, more companies investing in the technology, and more studies being published, proton therapy appears to be at a major tipping point. For insurance providers, this influx of interest paired with relatively few completed studies presents a costly paradox.

Leonard Arzt, the executive director of the National Association for Proton Therapy, spoke to DOTmed HealthCare Business News about a few insurance providers, such as Aetna and Blue Shield of California, who have stopped covering the treatment. “It’s an evolving situation that is rapidly changing while ongoing clinical trials are being conducted providing more evidence of the value of proton therapy,” says Arzt. “Cancer
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patients should be fully informed of all treatment options and should have access to the best choice when it comes to their quality of life.”

Success with head and neck

At the MD Anderson Proton Therapy Center in Houston, Texas, patients have been receiving proton therapy since 2006. DOTmed spoke with their medical director, Dr. Steven J. Frank. “We’re seeing, before our eyes, a rapid evolution of the most advanced form of radiation therapy delivery,” says Frank. “It’s a very exciting time because we’re able to treat cancer with high curative intent and minimize patient side effects.” Frank was referring specifically to the latest advancement in proton therapy, a new form called Intensity Modulated Proton Therapy (IMPT) which has been used to successfully treat complicated head and neck tumors, and is believed to cause fewer side effects than cases where the alternative — Intensity Modulated Radiation Therapy (IMRT) — is used.

The American Cancer Society estimates that 36,000 people in the U.S. were diagnosed with cancer of the oral cavity and oropharynx last year, (representing a 20 percent increase since 2010). Those cancers primarily affected men in their 40s and 50s and were typically triggered by an infection with human papilloma virus or HPV. “The thing about HPV cancer in the head and neck, specifically the throat, is that it’s highly curable,” says Frank, who described the number of diagnoses as a national epidemic. “Being highly curable means that not only will they survive, but they will have to live with the side effects of the treatment for potentially 40 or 50 years.” With IMPT, Frank says the frequency of those side effects (such as loss of taste and inability to swallow) are being cut in half.

“IMPT uses small spots of radiation that are deposited in a pencil beam fashion. They are stacked in layers on top of the tumor where you can intensify the radiation and the treatment where the tumors are and minimize it where it’s not,” says Frank. With the alternative IMRT treatment, there is the problem of surplus radiation, like the exit dose that continues beyond the tumor and through healthy organs and tissue. Frank described his first IMPT patient as a 33-year-old woman who had a tumor growing around her brain stem. Traditional IMRT physicians refused to treat the tumor for fear the procedure would be fatal. With IMPT however, the cancer was completely eradicated and the patient experienced a full recovery.

Too much of a good thing?

At the 2013 annual meeting of the American Society of Clinical Oncology (ASCO), Dr. Frank H. Saran, from the Royal Marsden NHS Foundation Trust in the United Kingdom, advocated a more economically conservative approach to PBT technology. He acknowledged the treatment’s benefits for pediatric patients with tumors in the central nervous system, (who are at an exceptionally great risk for side effects) but says those patients amount to only about 1,400 patients per year in the United States; about enough to fill the volume of one facility.

The Center for American Progress recently published an article deriding the use of proton therapy on prostate cancer stating, “There is currently zero evidence that proton radiation therapy is more effective for treating prostate cancer than the alternative standard treatment.” Neither Saran, nor the CAP article object to proton therapy itself, just the excessive application of such a costly treatment when there are more economical alternatives for eradicating a tumor.

Determining the value of proton therapy as it applies to different cancer sites is an essential part of utilizing the technology responsibly.

Meeting consumer demands

Just as a cellphone once cost thousands of dollars, advocates for PBT anticipate costs will go down as the technology is implemented on a larger scale. Meanwhile, new modalities are expected to become more compact. DOTmed spoke to Joseph K. Jachinowski, chief executive officer of Mevion Medical Systems, about their smaller-scale, single gantry proton therapy system, the MEVION S250. “Mevion is the only manufacturer of single room proton therapy solutions,” says Jachinowski. “All the other single gantry solutions actually require a multi-room installation, and that leads to facilities that range from twice, to four times, as large as a Mevion facility.” Jachinowski believes the reduction in square footage alone translates to millions of dollars in construction cost savings in comparison to traditional centers.

Jachinowski also emphasized how easy the MEVION S250 is to operate, saying it is the only proton therapy system on the market today that does not require a dedicated team of engineers or physicists to operate
it. “The therapist sets the patient up directly using built-in CT quality image guidance, they walk out of the room, and they press the ‘beam on’ button just like they would with a linear accelerator.” Jachinowski says the value of a single-room modality lies partially in the limited consequences of technical problems. “With conventional proton systems the accelerator, or parts of the complex beam transport system, will fail. When that happens you lose the entire facility at one time. Just as X-ray therapy machines don’t share an accelerator, we think proton therapy will inevitably go that way because of inherent benefits.

Another new proton therapy system from Ion Beam Applications (IBA) called ProteusONE is also being marketed as a small-scale alternative in proton therapy. With a price tag of around $25 million, the ProteusONE costs roughly the same as the MEVION S250. In July, IBA announced it had received Marketing Authorization from the U.S. Food and Drug Administration for its Compact Gantry Beam Line, a regulatory green-light they believe will bolster international interest in the ProteusONE.

Today, small-scale systems like the MEVION S250 and IBA’s ProteusONE make up only about 7 percent of proton therapy rooms. In the future, Chris Pericak, a consultant for Research and Insights at the Advisory Board Company, predicts that figure will grow to 30 percent. Pericak says, “We’ve seen that the cost of investing in protons is actually decreasing in some respects. Historically, you’d have to [spend] $200 million for a four-room center that takes up the size of a football field. Now, hospitals can buy a single-room system for about $30 million in their current space.”

“Compact proton machines have many cost saving advantages for medical centers seeking the latest radiation oncology tool and the capability to provide a mix of treatment options,” says Arzt, “but the larger multi-room centers, although more costly, provide substantially more access and treatment opportunities for cancer patients. There’s room for both in the proton therapy landscape.”

Jachinowski sees a future when proton therapy becomes implemented on a larger scale. “Maybe in 20 years protons will become a majority treatment, but I think within the next 10 years we will get to a point

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**PROTON THERAPY EXPERIENCE**

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BR+A Consulting Engineers are the Global Engineering Leader in the design of Proton Therapy Facilities. Our success stems from a talented Core Team of Engineers who have been working together on proton projects for the past 15 years. Our familiarity with how to deliver these highly complex facilities, combined with an in-depth knowledge of the technical requirements of the proton operating system, uniquely positions our firm as Engineering Leaders in the design and delivery of these extremely specialized facilities.

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Industry Sector Report: Proton Therapy

where, say, 15 percent of treatments are done with protons.” He also says that the MEVION S250 is the first and only proton therapy system to have been purchased by a private physician, a facility called First Coast Oncology in Jacksonville, Florida.

Market activity seems to indicate the health care industry is optimistic about the potential for proton therapy. Varian has been a leader in the industry with its ProBeam modality, which was recently installed at the Scripps Proton Center near San Diego as well as the King Fahad Medical Center in Saudi Arabia. Varian has also been selected to provide equipment for new proton therapy centers at the University of Maryland and in Mestre, Italy. Besides IBA, Mevion, and Varian, companies like Sumitomo, Mitsubishi, Hitachi, P-Cure, ProTom International, and Panacea, have all committed themselves to manufacturing their own modalities.

This September, at the 56th annual meeting of The American Society for Radiation Oncology (ASTRO), at least a dozen companies intend to showcase products and services they’re offering in relation to proton therapy. Among them are Logos Systems International, which has introduced a proton beam inspection system called XRV-100, Architection; the oncology design and construction company responsible for building the proton beam at MedStar Georgetown University Hospital in Washington D.C., the imaging specialists at

ASTRO recently issued a Policy Model for proton therapy which details the cancer diagnoses they believe should be covered by private insurers and Medicare. They emphasize cases where proton therapy has shown proven benefits, like pediatric cancers, as well as certain adult cancers such as ocular melanoma.

Waiting on results

At the 2014 NAPT annual conference, Dr. Bhadrasain Vikram, chief of the clinical radiation oncology branch at the National Cancer Institute, said eight randomized trials will soon be getting off the ground comparing the results of proton treatment versus photon treatment. The outcome of those trials, and others like them, will be vital in gauging the significance of proton therapy’s advantages as they pertain to various cancer sites.

The Affordable Care Act has played a role in shifting health care cost emphasis away from services rendered and towards patient outcomes. “[At MD Anderson] we just treated our 5,000th patient. We have generated 100 publications in our first eight years. More than any publications of any other center treating with proton therapy ever,” says Frank. “Our aim is to put out another 100 publications in the next four years.” As more studies are performed, more literature may define the value of proton therapy as it applies to different treatments and success ratios.

ASTRO recently issued a Policy Model for proton therapy which details the cancer diagnoses they believe should be covered by private insurers and Medicare. They emphasize cases where proton therapy has shown proven benefits, like pediatric cancers, as well as certain adult cancers such as ocular melanoma. In the interest of medical research they also encourage coverage for cancer sites where ongoing trials are being performed and benefits are suspected, such as the breast, prostate, and lung.

Reducing fatalities, improving patient post-treatment quality of life, and diminishing the frequency of side effects, are all breakthroughs that would justify the expense of proton therapy, and the continued advancements promoting affordability and accessibility. Defining those benefits is an intrinsic part of the scientific process, and an essential step in the responsible adoption of the treatment. With every completed study and every randomized trial, physicians and patients alike become better equipped to weigh the benefits of proton therapy against the cost.

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Industry Sector Report: Proton Therapy

DOTmed asked the leading proton therapy manufacturers to submit their leading products to be featured in this new equipment guide.

To learn more about these systems and see other models not shown, please visit the Equipment Guide in DOTmed’s Virtual Trade Show, or go to www.dotmed.com/proton. We also invite you to rate these products online.

**PROTON THERAPY**

**Hitachi / PROBEAT**
The Hitachi PROBEAT™ System is a proven, industry leading Proton Therapy System, first in FDA cleared IMPT Spot Scanning. IGRT choices include CT-on-Rails, C-Arm CBCT, and Gantry-mounted CBCT. Hitachi’s commitment to Proton Therapy continues with essential innovations, such as Real-time Target Tracking and Gating. Prestigious medical centers have chosen Hitachi PROBEAT™ due to high reliability and efficient work flow supporting features, such as fully automated beam switching between treatment rooms and beam matching, in multi-room centers.

**IBA / Proteus®PLUS**
ProteusPLUS is inspired by clinical excellence. Its versatility powers your institution to rise to the challenges of treating complex cancer conditions. You can configure its cutting-edge features into a tailored solution that meets the specificities of your practice. Clinically, you will leverage its IMPT and IGPT capabilities while expanding your research potential to advance cancer care. Its optimized workflow will allow you to maximize the use of the system to treat proton therapy to the largest number of patients possible. With ProteusPLUS, you can add proton therapy to your cancer program to create a center of excellence in radiation therapy and enhance your cancer patients’ lives.

**IBA / Proteus®ONE**
ProteusONE is the compact intensity modulated proton therapy (IMPT) solution from IBA. It benefits from the latest technologies developed with renowned clinical institutions. ProteusONE is smaller, more affordable, easier to install and to operate. It is ultimately easier to finance. ProteusONE makes the most advanced radiation therapy modality available to your institution and your patients. With ProteusONE, Proton Therapy is made easy.**

**Mevion / MEVION S250**
Mevion’s flagship product, the MEVION S250 Proton Therapy System, is designed to preserve all of the treatment benefits of traditional proton therapy systems while removing the obstacles of size, cost, and complexity. Realizing this vision, Mevion has forever changed the economics and accessibility of proton therapy worldwide.

**Optivus Proton Therapy / Conforma 3000**
Designed with more than two decades of experience in realworld therapeutic treatments, the FDA-cleared Conforma 3000 offers sixth-generation technology. The Conforma 3000 features an electronically variable energy synchrotron accelerator, intensity modulated proton therapy (IMPT), image guided proton therapy (IGPT), modular architecture and flexible configuration options with a focus on throughput, reliability and safety.

**ProTom / Radiance 330°**
DScanning proton beam with 3mm diameter at 250MeV in air at isocenter. 16° diameter synchrotron with advanced beam control produces energies of 70-250MeV for therapy, and up to 330MeV for proton imaging. Economically viable project due to lower construction cost and lower operating cost; system requires up to 40% less radiation shielding and operates with up to 55% greater power efficiency. 200° gantry and fixed beam treatment rooms available.

**Sumitomo Heavy Industries / 230MeV Proton Therapy System**
SSumitomo Heavy Industries, Ltd. provides a 230MeV cyclotronbase proton therapy system. Its gantry has a compact design with 360 degree rotation. Both broad beam and pencil beam are available. Robotic bed and imaging system enables precise patient positioning. CT (in-room CT and/or CBCT) and on-line PET system are optional.

**Varian / ProBeam Proton Therapy System**
ProBeam™ proton therapy combines imaging, treatment planning, and state-of-the art proton delivery in a fully integrated solution. A ProBeam system incorporates pencil-beam scanning technology that enables intensity-modulated proton therapy (IMPT), which optimizes the dose applied to every point within the area being treated, making it especially applicable for treating complex tumor shapes or tumors wrapped around critical structures like the spinal cord or brain stem.

**PROTON THERAPY CENTER DESIGN AND CONSTRUCTION**

**Haskell Architects**
Headquarters: Melbourne, Australia
From feasibility studies to patient treatment, Haskell is the only experienced company that can deliver a complete solution for your proton therapy facilities need. With in-house real estate, architecture design, engineering, and construction management staff, we integrate our innovative and thoughtful expertise to craft the optimal solution for your project. Our proton projects include design and construction of Scripps Proton Therapy Center in San Diego and Maryland Proton Treatment Center in Baltimore.

**TsoiKobus & Associates**
Headquarters: Cambridge, MA
Now in its 31st year, Cambridge-based TsoiKobus & Associates is one of the nation’s leading architecture, planning, and interior design firms for proton therapy facilities. TKA is known for creating environments that advance the discovery of new knowledge, producing award-winning designs that combine technology with compassion and creativity. TKA has designed seven operational facilities, with five more in development.

**VOA**
Headquarters: Chicago, IL
VOA is a global architecture, planning, and interior design firm, and one of the largest designing for the health care industry. VOA is one of only two architectural firms to design an operational proton therapy center in the United States within the past ten years. Having recently completed the Hampton University Proton Therapy Institute in Hampton, Virginia, VOA is nearing completion on several additional proton centers in New York, Georgia, Tennessee, Texas, Ohio, and the Middle East.

**BR+A**
Headquarters: Boston, MA
BR+A is a global leader in the design of proton therapy facilities. Our ability is centered around a talented core of experienced engineers who have been designing and building proton projects for more than 15 years. Our familiarity in delivering these complex facilities, combined with an in-depth knowledge of the technical requirements of the proton operating system, makes us a leader in the design and delivery of these extremely specialized projects.
### The economics of radiation oncology

**By Gus Iversen**

Nearly a decade ago, the *Journal of the National Cancer Institute* published a study concluding that hypofractionated radiation therapy for palliation of bone metastases is just as effective as the more drawn out, more expensive standard treatment. Despite those findings, a study published in the *Journal of the American Medical Association* found that between 2006 and 2010, only 4 percent of Medicare covered bone metastases cases utilized hypofractionated, (also known as intensity modulated) radiation. Since then, similar studies have emerged recommending hypofractionation for whole breast irradiation and prostate therapy.

Reluctance to embrace new technologies is nothing new in health care. The slow adoption of electronic health records (EHRs), regardless of their numerous benefits over handwritten records, is a well-documented example. In the case of treatment modalities, part of the reason better systems are not implemented is related to the industry’s reimbursement structure. DOTmed HealthCare Business News spoke with Dr. Leslie Botnick, chief medical officer of Vantage Oncology and board certified radiation oncologist, about the adoption of new equipment at Vantage, where they provide a wide variety of linear accelerator (linac) hypofractionated services. “If you’re a free standing facility, you’ve got to be very careful how you spend your capital,” says Botnick. “Over the last generation, the Centers for Medicare and Medicaid Services have cut reimbursement in the freestanding centers close to 20 or 25 percent, while hospital reimbursement has gone up.”

**Keeping up with CMS**

Dr. Brian Kavanagh, Department of Radiation Oncology at the University of Colorado School of Medicine’s Anschutz Medical Campus and chair of the Health Policy Council for the American Society for Therapeutic Radiation and Oncology (ASTRO), spoke to DOTmed about a three-part plan to improve CMS reimbursement models. The first part is for ASTRO to draft their own accreditation program to provide practitioners with guidelines for what they consider high-quality service.

“‘The second part is to work with CMS to update some of our treatment delivery codes,’ Kavanagh says. “We understand it has been a little hard for CMS to keep up with some of the things that have changed about how radiation oncology is practiced in a modern context,” he says. “So we’re working closely to ensure reimbursement is fair and based on justifiable and realistic costs.”

The third and final part of ASTRO’s plan, according to Kavanagh, is to determine the total cost of care in the interest of better coordinated treatment plans and smarter spending. “We want to design alternative
payment models that depart from the traditional fee-for-service system,” he says.

In 2013, CMS cut reimbursement for Gamma Knife brain tumor treatment by more than half while leaving linac coverage unchanged. Decisions like that directly impact patients, and the treatment plans their physicians prescribe. DOTmed spoke to Dr. Constantine Mantz, a board certified radiation oncologist and chief medical officer at 21st Century Oncology about the medical implications of Gamma Knife versus linac for treating brain tumors. He believes either option is suitable in most cases although, “in cases of unusually complex or small tumor anatomy, Gamma Knife holds a technical advantage, given its large number of radioactive sources available for field design.” On the other hand, if the patient cannot tolerate a stereotactic frame attached to their head, Mantz recommends a linac platform. It’s worth mentioning that Gamma Knife is usually a one-time treatment procedure whereas linac brain tumor treatment requires multiple visits.

Dean Rosen, a partner with the government relations group, Mehlan Castagnetti Rosen Bingel & Thomas, and a presenter at the upcoming ASTRO conference, spoke to DOTmed about radiation oncology’s relationship with CMS. “Radiation oncology has been very forward leaning and engaged in making sure reimbursement codes are appropriately valued,” says Rosen. “We’ve often had to step in and push back on the administration, and ASTRO has been very successful in working with Congress to prevent a lot of those cuts.”

Rosen also emphasizes that reimbursement is about managing money correctly, not trying to get the most possible. He cites a loophole in the physician self-referral law, Section 1877 of the Social Security Act (42 U.S.C. 1395nn), that provides an exception of improved efficiency. Whether or not that will be sufficient to curb the shortage, overall demand for oncologist services is projected to grow 40 percent by 2025, whereas supply may grow only 25 percent. Those projections would indicate a demand for radiation oncologists exceeding the number of qualified practitioners around 2020 and climbing 10 percent higher by 2025. The study concludes that unless oncologist productivity can be enhanced, the anticipated shortage will strain the ability to provide quality cancer care.

Kavanagh is optimistic that productivity can be—and indeed has been—advanced in a way that will mitigate those trends. He cites more active surveillance for low-risk prostate cancer and shorter treatments for certain breast cancer cases as two examples of improved efficiency. Whether or not that will be sufficient to curb the shortage, Kavanagh says, is anybody’s guess.

For aspiring physicians, getting accredited for radiation therapy can be a lengthy process. “For the oncologist who prescribes treatment with [stereotactic] equipment, four years of specialty residency training is required following an internship year,” says 21st Century Oncology’s Mantz, “Some training programs may also offer an additional year of stereotactic radiotherapy training for interested candidates.” In addition to the prescribing oncologist, Mantz says a medical physicist, medical dosimetrist, and radiation therapy technologist are all required to help design and facilitate a treatment plan. Each of those specialists requires post-graduate training to be licensed for their work.

In January, the Toronto Star reported that a shortage of qualified physicians had resulted in more than 5,700 cancer patients in Ontario going without radiation therapy. “We feel the real gap is likely in patients who, toward the end of life, might benefit from radiation treatment to control pain or other issues. However, there are other treatments they can have,” said Dr. Padraig Warde, interim vice president of clinical programs at Cancer Care Ontario. Those other treatments are typically pain medications, which can be disorienting and keep patients from their normal routines. In 2013, 72,000 new patients were diagnosed with cancer in Ontario. At the time of the article, there were only 185 radiation oncologists in the entire province.

Dr. Arkadi Stolpner, president of the Diagnostic Treatment Center of the International Institute of Biological Systems, told DOTmed about the state of radiation oncology in Russia. He says that 400,000 Russians are diagnosed with cancer every year. He estimates that Russia needs 600 linear accelerators to adequately treat candidates for radiation therapy, but currently only has between 130 and 140 systems. “Many of those radiation oncology systems are old-fashioned cobalt machines,” says Stolpner.
The products available for modern radiation therapy treatments necessarily provide vast mechanical improvements, as well as a greater emphasis on patient comfort.

“and even then, less than 40 percent of patients receive the treatment.”

The need for better access to treatment is no clearer than in India, where a recent article in Nagpur Today describes an epidemic of 25 million people currently battling cancer. The article states that there are only 2,000 radiation oncologists in the entire country to treat those patients. India’s highest concentration of cancer cases resides in the region of Vidarbha, where there are currently zero linear accelerators. India has one of the highest cancer rates in the world, and according to the International Agency for Research on Cancer, the number of annual diagnoses may double within the next twenty years. Bringing treatment to those patients is a complex and troubling issue.

Meeting demands through refurbished equipment

The availability of refurbished modalities doesn’t resolve the physician shortage, but it does provide affordable alternatives to end users. DOTmed spoke with three professionals working in the refurbished radiation oncology equipment sector.

Although John Vano, president of Radiation Oncology Solutions, says not all radiation oncology modalities are prominent on the refurbished market, linear accelerators are readily available. He acknowledges the recession as a factor in what he perceives to be diminished modality replacement rates, but believes the trend goes beyond a recovery economy or reimbursement issues.

“The newer, more sophisticated technologies allow more efficient targeting of cancer cells,” says Vano. “It’s not uncommon to see four old linear accelerators replaced by two newer systems that can treat the same number of patients just as effectively.” Vano cites the same advantages with hypofractionation, which, by decreasing the number of treatments a patient needs, frees up not only radiation therapists, but high-demand modalities too.

Meanwhile, Jose Rodriguez, president of OncoAmerica Oncology Centers, believes the refurbished industry is growing, but has work to do in gaining consumer trust. “There are a few very good companies servicing parts. In the refurbishing side there is still a long way to go,” he says. “Better service is needed, more knowledgeable companies and more conscientious sellers are needed to better understand the needs of foreign buyers.”

Tony Richardson, vice president of sales and marketing at Acceletronics, mentions India as a country where refurbished modalities could make a significant impact, but importation laws make purchasing them difficult. “There are a number of countries where there is demand, but there are political barriers to pre-owned equipment,” says Richardson.

With regards to a statement indicating that India needs 12,000 more radiation oncology centers, Vano says, “In truth, it probably needs closer to 8,000 to be comparable to the U.S. but in any case, that is 20 times more than exists there today.” Meanwhile, as cancer patients go largely untreated, “the local distributors, local manufacturers, and government officials are the ones that benefit,” he says.

On the domestic end, Vano believes the widespread circulation of refurbished radiation oncology equipment could bring rural communities greater access to advanced cancer therapies. “In reducing reimbursement rates for smaller, freestanding radiation oncology facilities, CMS seems to have forgotten about the toll it takes on some patients and their families to commute long distances for treatment,” he says.

Richardson gives a little back-story on the CMS situation saying, “There was a substantial increase [in reimbursement] when IMRT and IGRT modalities were introduced, but in the last three or four years reimbursement has been coming down.” He says as a consequence, there are fewer new facilities being built, and that trend informs replacement rates. Regardless of that, Richardson expects the number of used IGRT modalities in the refurbished market to go up significantly within the next two years as early buyers start shopping for replacements of their own.

Position precision

Modern radiation treatment places an unprecedented emphasis on dose distribution and patient positioning. “The major thrust of research into the area of treatment delivery technologies over the last few decades has been a concerted effort to target tumors accurately and as tightly as possible while sparing surrounding tissue,” says ASTRO’s Health Policy Council chair, Kavanagh. “Proper patient immobilization is an essential component of the overall process of care.”

With advancements delivering a higher level of accuracy, radiation oncologists are able to more safely utilize higher dose, and by extension, treat over a shorter span of time than in the past.

The positioning products available for stereotactic therapy necessarily provide vast mechanical improvements over their predecessors, as well as a greater emphasis on patient comfort. Some of these products rely on complex chemical reactions to achieve positioning goals, like the MoldCare Head Cushion from Bionix. The cushion is a soft fabric bag containing resin coated polystyrene beads that are coated in a moisture-cured polyurethane resin. When sprayed with room temperature water it becomes malleable and can be formed to the patient’s head and neck. After five to 10 minutes, the cushion hardens to form a rigid, custom-support which can be used to reproduce stereotactic treatment positioning. The CIVCO Vac-Lok uses a vacuum system to remove air from a cushion filled with Styrofoam balls while the patient rests upon it.

Alpha Cradle products require physicians to combine two bottles of chemicals and shake the mixture for 10 seconds. This mix-
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Industry Sector Report: Radiation Oncology

ing triggers an exothermic reaction, which produces a foamy substance that expands up to 40 times the original volume. This process takes place within a bag on which the patient rests his weight for 15 minutes. Patients may experience a comfortably warm feeling as the foam expands and hardens beneath them, producing a closed-cell polyurethane cast.

DOTmed spoke to Jeffrey Kostich Sr., the President of Smithers Medical Products, the company that manufactures Alpha Cradle products. “As equipment becomes more precise, defining smaller margins, it’s not positioning that’s important, it’s repositioning,” says Kostich, “being able to reproduce the set-up position each day the patient comes in for treatment.”

When Kostich entered the industry in 1984, “some hospitals were using sand bags and foam wedges to put the patient in place, while others would physically tape the patient down.” Some hospitals would experiment with plaster of paris molds for Medulloblastoma patients. “Children had to be anesthetized while making these forms and while lying in them.” Kostich says thermoplastics were introduced shortly thereafter, and continue to yield good results for head and neck patients.

Alpha Cradle technology originated in Europe and was introduced to the American market at a 1981 ASTRO exhibit. Over the years, Kostich has reformulated the foam to make it more comfortable for the patient. “How many owners of medical companies have strapped themselves into their own pieces of equipment?,” asks Kostich. “It’s important to remember this is all about treating and caring for patients who have been struck with cancer.”

Many positioning devices are designed specifically to immobilize the patient, such as arm holding wing boards and breast boards. QFix manufactures a number of products to that end, such as the Tilt-Pro Tilting Base, which allows precise angling of the head and neck. For brain tumors, a stereotactic head frame, like the Leksell from Elekta, may ensure that the radiation beam can reach its target from multiple angles, like a gantry, while preserving nearby tissue.

Meryl Ginsberg, director of public relations at Varian Medical Systems, spoke to DOTmed on behalf of Varian’s product management team. She discussed the company’s contributions to the positioning marketplace. “The PerfectPitch six-degrees-of-freedom robotic couch was designed for the precision and functionality required to deliver radiosurgery treatments in the brain and in the rest of the body,” says Ginsberg. They also offer a real-time tumor tracking system called Calypso.

Industry leaders see a future in image-guided therapy

Fluoroscopic, cone-beam CT, and MR imaging, have all arrived at the treatment table. That means physicians can monitor the location of a tumor in therapy more efficiently than ever. DOTmed spoke to several industry experts about the trends they are seeing in image-guided therapy, as well as their latest imaging modalities.

“The utilization of MR in radiation therapy planning has tripled over the last six years,” says Aenne Guenther, VP of marketing and sales for Siemens Radiation Oncology. “Now the market is at a tipping point to really utilize MR in a more clinical, routine way.” Guenther says MR is particularly useful to radiation therapy imaging because it uses non-ionizing radiation and therefore contributes zero dose to the treatment.

“You want to make your results reproducible,” says Guenther. “Patient positioning must always be the same.” With hypofractionated procedures there is no wiggle room for missing the cross hairs, so image guidance is an invaluable ally. The MAGNETOM RT Pro Edition from Siemens integrates MR soft tissue differentiation and functional MR imaging into radiation therapy. Guenther says the package, which operates in conjunction with either the MAGNETOM Aera or MAGNETOM Skyra, is different from what a diagnostic radiologist might expect from a typical MR system. “There was always distortion in MR images, but radiology wasn’t concerned because you only needed to know if there was a tumor,” says Guenther, but the MAGNETOM RT Pro Edition features a built-in automatic quality assurance program to correct any geometric distortions.

Accuray utilizes MR treatment imaging with CyberKnife, a linear
accelerator that operates with advanced robotic technology instead of a traditional gantry. DOTmed spoke to Terry Chang, director of CyberKnife marketing at Accuray, who says, “CyberKnife is the most sophisticated way to handle motion. It’s a closed feedback loop where the patient is always imaged to verify the tumor is where it should be.” He says that the robot moves in accordance with that motion and no user intervention is required, nor are any immobilization accessories.

“It’s all about precision,” says Chang. “You might be fast, you might be powerful, but if you aren’t delivering radiation directly to the tumor you might as well go back to chemotherapy or surgery.”

To explain the significant amount of movement a tumor may experience if the treatment table is adjusted, he compares a patient’s body to a bag of water. “You might say I moved the table that way, but what about the actual patient? The laws of physics say if you move the table one way the patient moves the other way. That variability is an enemy of precision.”

In 1993 Brainlab began developing its own linear accelerator technology. Stefan Seifert, director of the radiotherapy product line for the company, described their ExacTrac software to DOTmed as, “an in-room based monitoring system that detects intra-fractional motion during treatment delivery.” The system can be implemented as part of a Novalis configured linear accelerator or independently on any gantry-based accelerator.

Varian’s TrueBeam and Edge linacs are compatible with their On-Board Imager, a tool which offers high resolution digital imaging in the treatment room. Those linacs may also utilize gated RapidArc radiation so, “imaging can take place throughout the course of a treatment,” says Ginsberg. “RapidArc ensures that targeting is as accurate as possible for treating thoracic and other tumors that move.”

The On-Board Imager allows for all imaging modalities, (cone-beam CT, radiographic, and fluoroscopic) at the time of treatment.

Like the CyberKnife, GE’s Deviceless 4D eliminates the need for immobilization when creating motion-compensated 4D CT scans. Although not part of radiation therapy itself, Deviceless 4D is a movement tracing technology that informs treatment planning. Paul Anderson, general manager of Oncology for GE Healthcare, told DOTmed that Deviceless 4D utilizes time-stamped anatomical readings of the patient. “We’re using internal anatomy to determine the respiratory wave form,” says Anderson, “it’s a method much more forgiving [than immobilization], and accounts for the partial compression that might be in there.”

Similarly, an offering from Elekta, called Symmetry, provides 4D imaging of where a lung tumor resides throughout the breathing cycle. Elekta has also gotten into patient immobilization through extension of their radiotherapy modalities. Using radio-frequency identification system technology and optical markers, they’ve created a program called Identify. Dee Mathieson, senior vice president, oncology business line management for Elekta, and Kevin Brown, Elekta’s global vice president of scientific research, told DOTmed about the system.

“The significance of brachytherapy
Unlike external beam treatments, brachytherapy involves placing a radioactive material inside or next to the tumor being treated.

“Identify can guide and monitor the exact position of treatment accessories. Working in the background, it is fully integrated with MOSAIQ (Elekta’s patient information management system) and only intervenes when needed.” Elekta has also teamed with Royal Philips to install an MR guided radiation therapy system in the Netherlands. Mathieson says, “The higher the quality of the images, the more confident the clinical operator can be when positioning the radiation beam, thereby increasing the dose to the tumor cells and further reducing the unwanted dose and thus the side effects of the treatment.”

Although CT is still the gold standard for radiation therapy planning because you need to measure electron density of the tissue, MR provides added value when it comes to areas like the head, neck, or pelvis. “Treatments are becoming more and more effective, more and more curative,” says Siemens’ Guenther, “but the more cancer patients survive, the more important it is to take better care of normal tissue toxicity.”
This method of radiation delivery allows for higher doses to be administered because there is no beam potentially damaging healthy tissue with its exit dose. Candidacy for brachytherapy depends on the cancer, (early stage prostate and breast cancer, among them) as well as considerations of practicality and affordability to the patient. “Some patients live too far away from a radiation therapy center and cannot commit to a schedule of daily radiotherapy over a period of several weeks,” says 21st Century Oncology’s Mantz. Those circumstances may recommend brachytherapy over external beam therapy.

According to Radiation Oncology Solutions’ Vano, HDR (High Dose Rate) brachytherapy is one of the most economical types of radiation therapy available, and is in particularly high demand in developing countries. “However,” says Vano, “HDR systems rely on radioactive sources and, until recently, the availability of such sources was controlled by the manufacturers of the devices, which for obvious reasons don’t like refurbished equipment.” A study called EM- BRACE illustrates a 90 percent increase in successfully controlling tumors when utilizing MR to guide brachytherapy treatment for locally advanced cervical cancer.

**The software situation**

In describing the network of specialists he and his colleagues draw from on a daily basis, Dr. Leslie Botnick at Vantage Oncology emphasizes the importance of interconnectivity. “We use a medical review process, initially by different groupings based on disease expertise. How to best treat breast, prostate, pancreas, head and neck, and detail what you should contour, what normal tissue to protect, what doses you can give normal tissue.” They start with a small group and move on to larger groups throughout the network; as cases are discussed, it becomes an educational process for those involved. Botnick contrasts this approach to medicine with what he calls “line medicine,” where individual specialists offer diagnoses without communicating with one another.

The Carl Zeiss Group applies that philosophy of inclusion to its TARGIT (targeted intraoperative radiation therapy) Academy, an intensive and hands-on training resource for users of their INTRABEAM modality. The company describes the academy as offering, “A multidisciplinary faculty with extensive experience with INTRABEAM.” These experts are available to INTRABEAM users and will, “share their knowledge about the TARGIT technique based on clinical evidence, experience, and research.”

“A linear accelerator— even the most sophisticated linear accelerator— is a tool,” says Ginsberg, “and only as good as the skills...
and talents of the professionals who use them.” She says one of Varian’s core objectives is the aggregation of images, treatment plans, patient records, and professional expertise. The company aims to unite physicians and unlock the vast amounts of clinical data that is currently housed in disparate places around the world.

The need for shared expertise echoes the health industry’s push for EHRs; demand for accessibility and uniformity is of particular importance to radiation oncologists using unfamiliar and groundbreaking technology. As the modalities for cancer treatment improve, the software they utilize often represents an opportunity to bring physicians together. Citing better outcomes and longer lives in general, Ginsberg says, “Having access to the right treatment information at the right time, in order to understand each patient’s entire treatment history, has never been more essential.”

Gregor Thörmer, global segment manager for MR in radiation therapy at Siemens, describes the software utility that operates with their MAGNETOM RT Pro Edition, called Dot (Day optimizing throughput). With the Dot system, “it’s possible to exchange imaging protocol sets with other experts and import them on another system.” Siemens also joined up with Varian to design ARIA; a comprehensive image and information management solution designed with an emphasis on meaningful user experience. The fullAccess communications platform from Radiologica is another offering that prioritizes usability.

Elekta created the MOSAIQ Radiation Oncology Information System in the interest of centralizing radiation oncology and particle therapy patient data into an open system interface that can be accessed by multi-disciplinary teams across multiple locations. “We are developing software that can optimize patient and department workflows,” says Mathieson. “Coupled with the ability to aggregate data and learn from it, this will permit more personalized care.”

Brainlab’s Elements system is yet another example of manufacturers prioritizing integrated and customizable radiotherapy solutions. Seifert says, “Elements bridges departments and offers working, scalable connections between clinical subspecialties like neurosurgery, spine surgery, orthopedics, and radiation oncology.” The system can be used online or offline, and from certain tablets and smartphones. Brainlab also offers membership to a clinical forum called the Novalis Circle network, “where doctors and programs worldwide can connect to collaborate, develop and share new ideas, enabling a rapid exchange of joint scientific research.”

Chang describes the software in Accuray’s CyberKnife as “holistic,” meaning that everything—software, accelerator, interface—are all built and designed in-house to ensure developments in one area inform developments in another. Chang says that by not involving other companies in the software design process, Accuray is able to assemble modalities that are fully integrated. “There are other vendors who allow third party planning software, but we think there’s value in a tightly integrated approach,” says Chang. “There’s a lot of nuances and idiosyncrasies that a delivery system has and for any vendor to try to adapt software to those is quite challenging,” says Chang.

**Cutting the surgery out of cancer**

During the conversation with GE’s Anderson, he referenced the aging population of baby boomers and the impact that generation has had, and will continue to have, on the demand for faster, better, and more affordable cancer therapy. That theme of increasing demand is not something that will be going away any time soon, and although recent breakthroughs have made significant impact, there is always more that needs to be done.

Mantz at 21st Century Oncology sees adaptive therapy on the horizon, which he describes as, “the use of repeat volumetric imaging of the radiotherapy patient during a course of care and then the application of sophisticated volume rendering and rapid treatment planning algorithms to that imaging in order to create a customized treatment plan on a per-fraction basis.” In effect, this therapy would allow delivery to be continuously modified during, and throughout, treatment. Mantz says an initiative is already underway with several research groups, (including his own) but requires significant software development before it can become viable.

Vantage Oncology’s Botnick feels that physicians have only scratched the surface with curative non-surgical therapy at sites like the lung, where removal of the tumor may not always be necessary. “Distinguishing what we should and shouldn’t do will take an increasing role,” says Botnick, “and the challenge is diminishing side effects while keeping up local control rates and cure rates to go along with hopeful improvement and systemic treatment.”

“As we move toward even better imaging with MR, our consortium partners are convinced that we will be able to treat more indications,” say Elekta’s Mathieson, particularly in the abdomen, where soft tissue imaging will be significantly improved, and that radiation therapy will be a viable alternative to other modalities, such as surgery.”

For patients, cancer treatment is not unlike enlisting in a civil war with one’s own body. Positive outcomes hinge on a paradox where one part of the body is destroyed, but all other parts are preserved. Incidentally, the origins of chemotherapy are tied to the mustard gas exposure soldiers experienced during the two world wars. When those soldiers were observed to have low white blood cell counts, researchers saw a link to lymphoma treatment.

As science and technology evolve, physicians are learning to eradicate the enemy with more efficiency, with fewer casualties, and with fewer injuries in the line of duty. It is a matter of economics, not only financial but with regards to toxicity. Balancing those factors in the name of better patient outcomes is a central topic in the health care industry and the dissemination of the latest radiation treatments.

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DOTmed asked the leading radiation therapy manufacturers to submit their leading products to be featured in this new equipment guide.

To learn more about these systems and see other models not shown, please visit the Equipment Guide in DOTmed’s Virtual Trade Show, or go to www.dotmed.com/radiation. We also invite you to rate these products online.

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Flexitron is the newest afterloader. With its 40 channels, it enables implants up to 40 catheters without the need for reconnection during treatment. The design includes absolute source drive, as well as many improvements based on ICRP publication 27. Flexitron’s third drive enables future advanced brachytherapy techniques such as using two sources simultaneously for patient treatment to increase patient comfort and free up valuable caregiver time.

**Elekta / microSelectron Digital**

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### Varian / Eclipse Treatment Planning System
Eclipse™ is a market-leading comprehensive treatment planning system that simplifies radiation therapy planning for all kinds of treatment, including 3D conformal, intensity-modulated radiation therapy (IMRT), electron, proton, and brachytherapy. It incorporates many tools that substantially speed up the process of planning complex radiotherapy treatments, including planning protocols and easy-to-use optimization tools.

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**Eclipse® treatment planning system**

**Eclipse** is a treatment planning system featuring a new workflow and system architecture designed to improve processing speed and enhance planning productivity. The latest version of Eclipse now supports the full spectrum of radiotherapy techniques, including VMAT, IMRT and 3D conformal radiation therapy. Eclipse 5 is especially well-equipped for sophisticated stereotactic therapies, such as SRS and SRT, with added planning support for specialized beam shaping solutions.

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**Brainlab**

**Brainlab / ExacTrac**

ExacTrac® is a clinically proven IGRT system which uses high-resolution stereoscopic X-ray images, acquired before or during treatment delivery or between fields, to instantly detect and visualize internal structures and their displacement. The system provides a proprietary 6D—xy/z along with angular—fusion and robotic alignment in an automated, two-minute process. Unlike linac-based systems, the fundamental architecture of ExacTrac allows for instantaneous imaging of internal structures anytime during beam-on, without moving any detectors or imaging units into position and even at variable table and gantry angles.

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**Brainlab / BrainMets**

Brainlab / BrainMets combines the combination of the revolutionary Automatic Brain Metastases Planning® software with the well-established ExacTrac IGRT system enabling a precise and efficient treatment of multiple brain metastases. The new tool rapidly creates consistent treatment plans, minimizing dose to normal tissue, and offering new treatment possibilities for larger volumes and higher numbers of metastases. *FDA clearance pending*

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**Eclipse**

**Eclipse® treatment planning system**

Eclipse** is a treatment planning system featuring a new workflow and system architecture designed to improve processing speed and enhance planning productivity. The latest version of Eclipse now supports the full spectrum of radiotherapy techniques, including VMAT, IMRT and 3D conformal radiation therapy. Eclipse 5 is especially well-equipped for sophisticated stereotactic therapies, such as SRS and SRT, with added planning support for specialized beam shaping solutions.

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Medical Museum: Minton tile caduceus

The picture and description appear courtesy of Dr. M. Donald Blaufox, M.D., Ph.D, from his website: www.mohma.org.

Each month we visit Dr. Blaufox’s Museum of Historical Medical Artifacts to take a look back at the medical equipment that cleared the way for what patients encounter in doctors’ offices and operating rooms of today. Some equipment may be recognizable, while other inventions featured here have since become obsolete or have had their usefulness discredited.

**Category:** Art  
**Estimated Date:** 1900  
**Name:** Minton Tile Caduceus  
**Manufacturer:** Minton China Works

**Description:** This tile was made by the Minton factory and is fully marked on the reverse MINTONS CHINA WORKS STOKE ON TRENT. I am not certain of the exact date, but certainly an S was added to the name Minton in 1871. This tile probably dates from between 1890 and 1920. It is standard size six inches square and is 0.5 inches thick. There is a tiny chip on the top edge and a nibbled part along one edge. The central symbol is a caduceus or Herald’s wand such as that carried by Hermes the messenger God. It is the symbol used by the medical profession.
This Month in Medical History

The pioneer of public health nursing

Lillian Wald was only 22 years old when she arrived in Manhattan, but she quickly established herself as one of the nation’s most prominent public health advocates and social reformers. She was loved by poor immigrant families on the Lower East Side and respected by President Theodore Roosevelt at the White House.

Wald was born on March 10, 1867 in Ohio. Her father was a successful optical goods dealer, and the family’s financial security enabled her to attend the New York Hospital Training School for Nurses. She graduated in 1891, and worked at the New York Juvenile Asylum before deciding to become a doctor. While she took classes at the Women’s Medical College, she was asked to teach a class on home nursing and hygiene to immigrant women on the Lower East Side.

One day, the daughter of one of the women in Wald’s course rushed into the classroom crying — her mother was very sick. Wald accompanied the young woman back to her apartment and found her mother in a blood-soaked bed, hemorrhaging from giving birth two days earlier. Wald quickly tended to the woman and soothed the family’s worries. The family was so grateful that they kissed Wald’s hands as she left.

That encounter served as the turning point for Wald. After seeing that woman, she later wrote, “all the maladjustments of our social and economic relations seemed epitomized in this brief journey,” Wald decided that medical school had to wait. Instead, she would do what she could to bring quality health care to the impoverished residents of the Lower East Side.

Wald moved into a tenement house in the neighborhood and recruited other nurses to provide free or low-cost medical care to those who needed it. As her services grew more popular, she secured funding through donors, and was able to hire more staff. The nurses accepted referrals from charity organizations and physicians, keeping careful records of all the home visits they made. Wald’s practice became known as the Henry Street Settlement, which cared for 4,500 patients in 1905 alone. (The Visiting Nurse Service of New York was initially a part of Wald’s practice, but it became a separate entity in 1944). In addition to medical care, Wald also organized social and educational activities for the families in the neighborhood.

Wald did not only pioneer the profession of public nursing, but also coined its name. Her efforts to put the field on the map reached far beyond the Lower East Side. At her urging, the New York Board of Health established the first public school nursing program in the country. Wald also organized a series of nursing lectures, which led to the establishment of Columbia University’s School of Nursing. In 1912, she was elected to serve as the first president of the National Organization for Public Health Nursing, which she herself had founded.

Wald’s passion for social justice turned her into an influential advocate for children and civil and women’s rights. She helped to establish the National Association for the Advancement of Colored People (NAACP), offering up the Henry Street Settlement as the venue for the first organizing conference. She also helped President Roosevelt create the federal Children’s Bureau, as well as the National Child Labor Committee.

She often traveled internationally to promote the public nursing profession, an activity that became more and more difficult for Wald in the 1930s. Her heart issues and chronic anemia eventually took a toll, and she retired as the head of the Henry Street Settlement after more than four decades of service. After a long battle with an illness, she died at the age of 73 on September 1, 1940 in her home in Connecticut.

Today, the Henry Street Settlement House still occupies its three original buildings on the Lower East Side and continues to serve the neighborhood’s diverse population.

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HealthCareBusiness news I SEPTEMBER 2014
We’re witnessing a time of unprecedented leaps forward when it comes to diagnosing and treating various cancers. Dr. Hossein Jadvar, associate professor of radiology and biomedical engineering at the University of Southern California and the president elect for SNMMI talks about some of the strides we can still expect to see.

**HCBN:** What do you think will be the big strides forward for cancer imaging 10 years from now?

**HJ:** There’s a field called theranostics where you design treatment based on a particular biological target. You design an imaging agent — maybe with a radionuclide and then if that target is available — you take the same agent and label it with a different radionuclide — a therapeutic one this time, and go to the exact same place you just imaged and treat that area in a more targeted and localized manner.

One area that we’re already seeing this is neuroendocrine tumors. They’re currently being studied very intensely for the field of theranostics. The same process is being worked out for prostate cancer. This process will likely be expanded to other types of cancers.

**HCBN:** What do you believe the challenges will continue to be?

**HJ:** I think there are three major obstacles. The first is funding. You need research to do these things. A lot of research is spearheaded by major pharma with the goal to invest in things that will make money, which is fine, but we also need funding from usual sources such as the NIH and other government entities. Unfortunately, the budgets have been reduced.

These have been difficult times, especially for young investigators, to get funding. And in a few years if that doesn’t change, the U.S. will lose its prime status as top researcher. This could create a domino effect — researchers are already going to other countries in Europe and Asia to get the support for research. We need to pay attention to make sure that one of the things that has been a strength of the U.S. continues — research and all that associated with it that attracts talent from all over the world.

The second thing, the supply of radioisotopes has been difficult. It’s mindboggling that in the U.S., one of the richest countries in the world, we don’t have a domestic supply of molybdenum. And we’re dependent on countries that have old reactors in need of renovation or closing. Why don’t we have a domestic supply is beyond me.

The last thing, we need some of these tracers or agents for diagnosis and therapy to be approved faster. It has been very difficult to get things through FDA and get them available. There are a lot of face-to-face meetings and advocacy, trying to get the process streamlined so that we can get the data needed to satisfy regulatory departments to get those options onto the market for patients in need as fast as possible.

Reimbursement is the last thing. For example, we have three agents that can help to rule out Alzheimer’s, but reimbursement isn’t there, so they’re not being used. CMS needs to react faster to research showing benefits and facilitate availability to the different options to the public.

**HCBN:** If budgets weren’t a concern, what would you like to see in regard to cancer diagnosis and therapy?

**HJ:** If funding was no obstacle and we could understand the biology of the cancers, clinics of the future could not only detect, but characterize cancer for that patient in a streamlined fashion using not just imaging but blood tests possibly as well. At the end of the day, the patient comes out, you’re able to tell the patient and their physician — this is the type of cancer it is, this is the treatment it will respond to, this is what it won’t respond to. You’re able to monitor closely and if you see the biology of the cancer is changing, you can be warned, stop the treatment earlier and adjust your approach.

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