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DOW WILSON, PRESIDENT & CEO, VARIAN MEDICAL SYSTEMS, INC.: I would like to welcome you to our ASTRO investor conference. We are grateful to have you all here. Sorry for the kind of long, skinny room. We are glad to have you here. We have got some great speakers for you today and I think it will be a very enjoyable and productive morning.

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Before we get started I would like to introduce a few people. We've got a few members of our **Board** here and I would just like to introduce them to you. Tim, if you can do stand out for a second, Tim Guertin is our Vice Chairman of the **Board** with us this morning. Mark Laret is here, Mark is our governance committee chair. And Sue Bostrom is here who is our comp committee chair of our **Board**. So we are grateful to have three members of our **Board** here today.

Just want to remind everybody, forward-looking statements. We are in the -- toward the end of our quarter and in the middle of our quite period. Of course it would be -- I think as a result of that we are going to spend the day really talking about the clinical advances, what is happening in radiation oncology. I think this will be a lot of fun for you today, give you a really good sense of what is happening in the industry at a clinical level.

So I will turn the time over in just a second to Kolleen. She will give you a brief overview of the oncology **business** and a booth tour. By the way, we are at the booth. We are not doing a formal tour today, but Spencer and Neil and I will be on the booth from starting at 10 o'clock. For anybody who wants to come by the booth we would certainly welcome you there.

And then we have Dr. Dee Khuntia, he is our Vice President of Oncology Systems Medical Affairs, and Dee will be taking you through clinical advances in radiation medicine. Dr. John Fiveash from the University of Alabama Birmingham and Corey Zankowski, our Vice President of Product Development, will take you through some of the advances in stereotactic radiosurgery. Really some exciting work that is going on there with one of our great clinical partners.

Lots of things happening in the software space and we have got Mr. Andre Dekker, a medical physicist from Maastricht here to talk to you about that along with Sukhveer Singh, our Vice President of Oncology Continuum Solutions. And they will be talking about Big Data and kind of the future of radiation medicine and how these software tools all come to play to drive better quality and better efficiency in radiation therapy.

And then we will finish up with a presentation on the road ahead in proton therapy. I will talk a little bit about **business** and markets and then we are excited to have Dr. Carl Rossi and Dr. Lei Dong, our clinicians down at Scripps' proton center, talk to us about what is happening there and give you a little overview of the clinical aspects of proton therapy.

And then if there is any time left we will have time for one question. So we tried to kind of pack it in here this morning, but with a little luck we will have 15 or 20 minutes left for questions. And with that I will turn it over to Kolleen.

KOLLEEN KENNEDY, SVP & PRESIDENT OF ONCOLOGY SYSTEMS, VARIAN MEDICAL SYSTEMS, INC.: Thank you, Dow, good morning, everyone. I'**m** very excited to talk to you today to kind of provide just a brief overview on Varian Oncology Systems and, as Dow said, we will turn it over to the really interesting clinical application and technology innovation discussion from there.

Just a reminder, summary overview of Oncology Systems. We are in fact the global leader in radiotherapy. We do see a continuing need and long-term increasing demand for radiotherapy systems and services on a global basis.

We watch very closely the healthcare megatrends that drive and inform our portfolio decisions and how we manage our **business** around the world. And we also expect these healthcare megatrends to inform us in terms of market expansion and what we're doing to address that particular opportunity.

Finally, I am going to talk to you a little bit today about an evolution in our organizational structure to position us better for future growth, especially to look at emerging and frontier markets.

A reminder of who we are in Oncology Systems. We have a little over 4,800 employees today around the world. We're about 50% domestic and about 50% outside the US. And as we see our **business** grow, which right now is about 57% outside the US, we will expect to see that number -- that ratio changing to support that **business** growth outside of North America.

In FY13 we did a little bit of -- a little over $2.5 **billion** in orders and about $2.3 **billion** in revenues in Oncology Systems. We have about 60% of the global installed base of medical linear accelerators with approximately 7,400 systems installed around the world. We have approximately 3,700 software systems installed and that is a combination of Eclipse, our treatment planning system; ARIA, our oncology information system; and Velocity, our recent **acquisition** image management system.

We have about six education centers; we have numerous sites where we have education centers with our customers where we are really looking at clinical technologies, new treatment protocol adoptions and how we can expedite bringing these new capabilities to a clinical site around the globe. But we have six formal education centers for Varian.

We do see the global cancer burden continuing to rise. The forecast is that there will be 21.4 **million** new cases of cancer by 2030. Unfortunately along with that increasing burden comes a mortality rate of about 63%. We believe that by continuing to partner with the oncology community around the world we'll be able to address that very high burden of mortality.

Clearly that change is based on where you are in the world because of technology adoption and also based on disease site. But we -- again, we think that building on our strong legacy of co-innovation over the years with the global community we'll be able to address those numbers in a positive way.

I wanted to take a minute today and really focus in on emerging and frontier markets and what the access to radiation therapy looks like. So what you are seeing here is a chart of Linac density versus total health care spending across emerging and frontier markets. On the Y axis is the Linacs per **million** population. Let me put this into a frame of reference for you.

In developed markets we average somewhere between 6 and 10 linear accelerators per **million** population. You will see that this goes to a total of two. So as we are looking at emerging and frontier markets the need for additional radiation therapy equipment is quite significant. Across the X axis is healthcare spending per capita. So let's just take a look at BRIC for example starting with Brazil, which is on the right-hand side, your right-hand side of the chart.

Brazil spends about $143 **billion** annually on total healthcare spends for each individual, that is a little bit less than $800 of total healthcare spend. And they have about 1.4 linear accelerators per **million** population. Clearly even with the large MOH tender win we had last year, an additional 80 linear accelerators going in is nowhere near going to address their needs in Brazil for radiation therapy.

Moving to the left we look at Russia where they have $68 **billion** total healthcare spend annually. It's a very small number actually. When you look at their population, they're spending about $500 annually on healthcare for their population. And they have about 0.8 linear accelerators per **million** people.

We look at **China**, the largest overall total healthcare spend, which is what you would expect based on population alone. About $255 **billion** and yet they only have 0.8 linear accelerators per **million** population. Truly reflecting the 16% RT treatment for their cancer patients in **China**. Lots of runway there in terms of driving radiation therapy growth.

And then India, almost at the 0.0 point, less than $100 spent per individual in India on an annual basis for healthcare, 0.2 linear accelerators per **million** population.

So if we take a step back and look at emerging and frontier markets, the access to care is very, very low, the need is very high and we want to continue to position ourselves appropriately to go after this opportunity successfully.

There was a terrific paper that was published just recently in June, the International Journal of Radiation Oncology, a retrospective analysis done by some Swiss institutions looking at the global can data. And what they determined was that today in the emerging markets only there are about 4,100 linear accelerators installed, and of course with all the associated software and services that go along with those systems.

Just based on today's demographics, they need -- they felt the need was for 10,735. If you project that out to 2020 based on increasing cancer incidence changing demographics on a global basis the number is 13,307. So to address the known and forecasted cancer burden an additional 9,100 machines are needed.

Now you have heard us talk over the last few years an additional 10,000 machines are needed. So let me just be really clear, this number is for emerging markets only. So the 10,000 number we've been talking to you about has actually been a little bit of an underestimate of the need to address the need -- global cancer burden as being projected.

So as we look at our portfolio we want to make sure that we have the right systems and services on a global basis to address this value segment. Making sure that we have the right price points and yet delivering products that operate at the same level of quality that we have for all of our Varian systems with a high level of reliability in environments that are very challenging to get the right level of electricity, for example, the right temperature to run the systems effectively.

So we are looking for quality, reliability and performance that Varian is known for at the right price point on a software and services perspective.

Turning to our organizational change. Effective October 1 we will be implementing a geo-based structure to enable a more nimble customer response. We're going to be building and market development team to expedite emerging and frontier market growth.

We're going to be integrating our regional sales and service teams to align across a total cost of ownership program to expedite our profitability and to enhance our profitability. And we're going to be consolidating our global **operations** to really ensure that we can drive overall productivity in the organization.

So what does this really mean? It means starting October 1 we will have three major geo leads that will have sales, service, applications training and marketing in each of their regions reporting directly to them.

So if we look at the Americas for example, Chris Toth will now be our leader in the Americas. Each of those functions, those customer facing functions will report directly to him. The objective here is to allow us to be more responsive and more nimble in addressing customer concerns and issues in their time zone of their location.

In EMEA, which for us is Europe, Middle East, India and Africa, Roger Leibundgut will be the new leader in that region. And then in Asia Pac we are bringing on a strong leader from outside who has tremendous experience and depth of knowledge in the Asia-Pacific region. He will be starting shortly and will continue to grow that bench strength as we look at the Asia Pac market being very important to us moving forward. Each of these new leaders will report directly to me.

Turning to ASTRO. As Dow said, we've had a very exciting show here the last few days. I was thrilled to see we had over 1,000 attendees at our users meeting on Saturday. And to put that into context for you, it was a beautiful day in San Francisco, one of the most exciting cities in the world. And we had over 1,000 people who came in at 8 AM and they stayed with us all day long through some amazing breakout sessions.

We also had a really exciting panel -- healthcare reform panel where we had some clinical practitioners, **operations** managers talking about what they are seeing around the globe in terms of health care reform and what are the issues of most importance to them and making sure that as a partnership vendor we were doing everything we could to position them for success.

The concept and the theme behind the year's ASTRO is linking minds. And for us we want to continue to build on our 66-year-long legacy of co-innovation with the global oncology community. We're continuously asking ourselves what if.

What if Varian could build a knowledge learning system that would connect and link practitioners on a global basis so that they could adopt best practices and disseminate those best practices globally, especially as we are seeing radiation therapy be adopted into those emerging and frontier markets where they may in fact not have the skilled resources that we do in developed markets to implement the technology as quickly as we would like? We want to address that global cancer burden successfully and have those tools.

What if we could implement and onco informatics system that allowed us to be able to extract the data that has been in our information system for all these years, be able to analyze that data, liberate it in a way and turn it back into actionable information to really improve clinical practice management and **operations**.

And this is some of the really exciting items and new launches that we've got in our booth. I encourage you all to go over there. As Dow said, we will have people there to answer your questions. But I would like to direct you especially in addition to looking of course at the Edge and our TrueBeam system, over to our knowledge network pavilion.

We will be having demonstrations there about RapidPlan, our lunch last year. We're getting tremendous adoption of that out in the field as people are seeing the value that it brings to them clinically in terms of expediting, the efficiencies of treatment planning which historically has always been the bottleneck in the treatment delivery process. And making sure that the quality of that standard of care continues to improve.

Velocity Imaging Informatics, this is an **acquisition** that we did earlier this year and it rounds out our portfolio of information solutions. Imaging is so important to oncology, whether it is in the diagnosis, the treatment planning, motion management, looking at tumor response and assessment and then follow up.

We saw a gap in our portfolio, we went out and acquired the best organization out there to help us determine and put in place the solution around onco imaging informatics moving forward. We have a new solution around reporting with ARIA, we are calling it AURA.

Tremendous feedback from our customers because it gives them a really interactive opportunity to customize their reports in ways that they never had before and to make them sticky. So even as we upgrade their systems their reports stay in place and give them the analytical information they need to move forward.

Now I cannot probably emphasize enough the excitement in the booth around our new launch of onco informatics, an analytics tool called InSightive. We actually have people knee deep waiting to get a demo on this. It is very exciting.

We encourage you to go take a look at it because it is a tool -- and Sukhveer will be talking about this more as well as Andre -- it is a tool that is really positioning us to enable our customers to access their data real-time, create dashboards that are customized that help them to run their businesses more optimally, more productively, and to advance their care. Because they're able to look at their outcomes for example around breast cancer and determine how in fact they're performing relative to their peers, relative to their own internal programs.

And finally, Qumulate Cloud QA, lots of interest from our physics community there. It is a QA tool for linear accelerators up in the cloud so that we can help them track the performance of their systems both within their own hospitals and across the global community.

So lots of excitement in our knowledge network pavilion, encourage you all to go over there and take a look. And just a reminder once again, what is driving our **business**, it's healthcare megatrends, it is looking at emerging and frontier markets for growth, driving our productivity and profitability over time and making sure that we have the right organizational structure to position ourselves for future success.

So thank you, everyone, and with that I'**m** going to turn it over to Dee Khuntia, our VP of Medical Affairs.

DEE KHUNTIA, VP OF ONCOLOGY SYSTEMS MEDICAL AFFAIRS, VARIAN MEDICAL SYSTEMS, INC.: Thanks, Kolleen, and thanks, everyone, for joining us this morning. I really look forward to the opportunities to talk to this audience. I get to really show excitement about some of the things that are happening whereas in many of the other talks I have to tone it down a little bit.

But this is my third time I've been able to speak with you and probably the time I have been most excited to do so. This is my -- I was telling our team of about 300 employees on Friday that this is my 14th consecutive ASTRO and I have never been more excited. Not just because of the products and technology that Varian has been debuting at this particular meeting, but also from what the medical community is bringing to the meeting itself.

We have almost 3,000 papers that are being presented over the next day or two as well as yesterday and Sunday. And some of these are practice changing, meaning I'**m** going to be in clinic this Friday, I still practice medicine, and I'**m** going to do things differently because of some work that happened yesterday, for example. And that is exciting to me, whenever I can go to a meeting and actually change the way I practice that is wonderful.

Well, one of the most exciting papers to come out at ASTRO was presented at our plenary session yesterday. And this involves an idea called the abscopal effect. We've known about the abscopal effect for

a while. But this is where if we are to offer radiotherapy to a primary site such as a lung cancer, but that lung cancer has spread elsewhere, we can actually cause the other lesions to disappear.

So a study was done in the mouse model with breast cancer and melanoma patients. And, for example, how this would work is we've identified multiple lesions. And we end up giving targeted high-dose radiotherapy, stereotactic treatment in a single fraction or a few fractions. And that causes the body's immune system to basically supercharge itself. That original lesion disappears and the body's immune system is primed and the immune system gets rid of the other tumors.

This can be revolutionary. This disease entity, metastases, affects almost 500,000 people a year. When you think about the number of patients that have cancer every year, about 1 **million**. So many people are living with metastases. This is a big deal, you're going to see a lot more of this happening over the next few years.

Let's talk about another landmark study that was presented by Dr. Slotman from VUMC and it involves small cell lung cancer. Small cell lung cancer affects between 10% and 20% of all patients with lung cancer. That may not seem like a lot, but when you're talking about 200,000 Americans a year with lung cancer that percentage is pretty high.

Now small cell lung cancer is notorious for being one that is metastatic at presentation. About 80% of patients have disease outside of the chest when they're diagnosed with small cell lung cancer. And the standard of care is to treat with chemotherapy. What Dr. Slotman showed is that he can offer radiotherapy after the chemotherapy and increase survival by about 10%.

Dow has challenged us to work very hard and diligent to use radiotherapy to increase survival in lung cancer. We've only been successful at about a rate of 1% per decade. This study alone will probably give us almost 1% if we do the math. So it is exciting, radiotherapy is going to increase survival in this disease entity and a new standard of care is established.

Let's talk about another disease that is being presented here, this is a little less common, it involves sarcomas. Sarcomas are tumors of the muscle and soft tissue. And these tumors are potentially curable even if they have spread to the lungs, not too often that you see that. And the way we would treat these would be with something called a metastasectomy.

A metastasectomy involves oftentimes a thoracotomy which is a fairly invasive procedure. You get the chest spreaders out and you end up essentially carving out the lesion. What this study showed is that instead of going through that invasive procedure you can offer stereotactic treatments.

You can eradicate the disease and have equivalent outcomes in terms of efficacy using SBRT as opposed to a surgical resection. Just the quality of life benefits from something like this in itself is a major advance. And so we are starting to see more and more signs that metastatic disease can be addressed in a more noninvasive fashion.

What about pancreatic cancer. This is a disease that traditionally for patients that had localized pancreatic cancer we would operate, but in many cases we are not able to get all of the tumor out. We would then offer radiotherapy to a large field within the upper abdomen, similar to what is depicted in this cartoon.

Well, data has been presented showing that we can actually offer SBRT to patients where the surgeon wasn't able to get it all out or the margins were very tight and we have improvements in local control of the disease with fewer side effects. Again, an example of how SBRT is making its way into prime time in diseases outside of the brain.

Here is another paper that was presented from some folks from Stanford and British Columbia. This is really exciting. And what they have done is they have come up with a new radiation technique called 4Pi; it was actually pioneered by some physicists at UCLA. And they were able to uncover a methodology that would allow us to get substantially improved conformity to our target.

So if we look at a more traditional type of treatment of the breast we have a fairly wide spreading of dose. With this 4Pi technique they were able to bring the dose lines in considerably. This technique, however, can only be made possible using a TrueBeam. And I'**m** going to show you a quick video here of what's actually happening.

And in this technique we have multiple things moving at the same time. We have the gantry of the machine here moving. We have collimators moving. We have the MLCs in the head of the machine. We have the couch moving. We are able to come up with many, many non-coplanar beams where no one beam is actually carrying much radiation. But when they all add together you get a very high dose in the middle with very little in the surrounding tissues.

We still have some work to validate some of these dosimetric plans, but if this is truly the case, which we are expecting, this can be as disruptive as DMAT was to the field of radiation oncology. And we are very excited to see more and more work done in this.

UCLA presented a paper on 4Pi as well and in this case they used brain as the model. GBM, which is the most common brain tumor, affects about 7,000 or 8,000 Americans a year. And typically we give 60 Gray over six weeks as a standard treatment. They were able to use a 4Pi technique to get all the way up to 100 Gray with the same dose to the normal structures that they would get was 60 Gray.

So essentially you're getting almost a doubling of dose for free. This could make a big difference in a disease that we don't do very well in. And hopefully we can translate this to other diseases. Or maybe we can start reducing the dose to the normal structures and keep the mean dose of the tumors the same. So we are going to impact either quality-of-life or efficacy when this becomes a more standard procedure.

Let's talk about RapidPlan. So last year we were pleased to announce the technology of RapidPlan to the world and we now have some early user experience. This is some work that was presented last week in Australia at their version of ASTRO. It actually was a combined scientific meeting of their radiology society and their radiation oncology society, they do it once every four years roughly.

And what they found is that when they use RapidPlan in their model and they compared it to what the doctor did without RapidPlan, not a single one of these plans did the doctor do better than RapidPlan. And in 20 of the 30 the software actually did better than the physician. So this is proof of concept that RapidPlan does make a difference and it can impact the way a physician practices.

You know, I often argue if this truly is the case would it be wrong not to use a product like this? So that is just food for thought. That is what goes through my mind when I see data that is compelling.

Here is some more work using MLC tracking. This work initially started at Stanford by a physicist at the University of Sydney named Paul Keall who was doing a sabbatical there. Paul has since gone back to Sydney and has the first human experience using MLC tracking. He is doing this on a study of approximately 30 patients with prostate cancer.

And what he showed is that normally the prostate will move and we just treat a margin around it. These metal lines are actually the leafs, but he can have the leafs now move at the same time as the prostate is moving and basically track almost like a guided missile. And what ends up happening is that you end up, in his situation, reducing the amount of radiation that the normal structures have had and getting all of the dose in the prostate.

He actually modeled what the dose would have been had he not used the tracking and he would've under dosed the prostate. So this under dosing is what may be happening routinely in practice right now. MLC tracking allows us an opportunity to potentially reduce that under dosing.

So, at this point I would like to conclude my section and I would like to introduce to you, Dr. John Fiveash. Dr. John Fiveash is a radiation oncologist at the University of Alabama.

The University of Alabama is a very unique environment. They are a multi-vendor platform in terms of their radiosurgery capabilities. But more and more they have been showing substantially increased value with our Varian TrueBeam line. And we're going to have John share us a little bit about what he has been doing in the radiosurgery world. So, John, thank you very much.

JOHN FIVEASH, RADIATION ONCOLOGIST, UNIVERSITY OF ALABAMA: Thank you, Dee, I'm excited to be here today to share some of the work of our team at University of Alabama in Birmingham. I'm going to focus on some of the developments that we've done pre-clinically over time and then move those into the clinic and give you a little bit of a background about how these have been implemented in general. To do that I need to give you some context of who we are at UAB and then look forward in the future to where we plan to be.

If you haven't been to Birmingham, the University dominates the economy and the landscape. The picture I show you here is a view from Red Mountain. And the bottom two-thirds of this picture are the University -- is the University. And this is all biomedical research facilities. So all hospital research and the rest of this is undergraduate.

So what you are looking at is the largest employer in the state of Alabama and the largest entity in that city is the University. It is a biomedical research area that is unrivaled in the region.

We think of ourselves as a large academic medical center associated with a 1,200 bed hospital. We also think of ourselves as one of the first comprehensive cancer centers in the United States, we were one of the first seven and have held that grant for more than 40 years. That means we are not just doing good

radiation oncology but we are doing discovery of new treatments for cancer, the biology and we have to fit all of this together.

In the future we're going to be thinking about ourselves not just as a big academic medical center but as a health system that is serving a diverse patient population not just in the types of patients that we treat, the problems that we face, but also the region that we serve.

One example of this is the proposed regional care organizations. And associated with our partners it is currently proposed that we're going to be caring for almost 500,000 Medicaid patients on a capitated rate. To do this and to do it right we have to provide value. So how are we going to define value?

Value is going to be high-quality care for a low-cost. But as an academic medical center it is our role to society to disseminate knowledge. And so we're going to work with our partners like Varian to create knowledge but also move that into the community. And some of the things you are going to hear about like the knowledge-based planning are going to be the tools that we use for that.

One example of how we have explored the biology of cancer radiation enhancement is the cetuximab monoclonal antibody. And UAB was the epicenter of the early phase clinical trials for this for head and neck cancer. We did the Phase 1 trial at UAB combining radiation for head and neck cancer with this antibody. This is the Martha Stewart antibody in ImClone if you're not familiar with it.

Dr. Bonner later led the Phase 3 trial and this was the first FDA approved biologic agent to be used in combination with radiation. This is a big deal. You heard Dee talk earlier about the anti-PD1 antibodies in the plenary session enhancing immune response. That is the same type of theme. So all these things have to be put in context of how we're going to implement them in the clinic.

Throughout my career, I have been at UAB for 16 years, I have seen many technologies. And the things that you see here are the cornerstones of how we are implementing radiosurgery in the clinic and how we are moving from a dedicated, GammaKnife device more towards Edge and TrueBeam systems for our patients. And I will show you some of the examples of the quality and efficiency that we're achieving now.

But UAB was an early adopter of IMRT, CT-based image guidance. We were one of the first centers in the world to do RapidArc. And our expansion on our TrueBeam in the high-intensity mode has been very favorable. We've treated over 600 patients with high-intensity mode now. And we are one of the first centers in the world to do triggered imaging on the TrueBeam. 2014 we hope to implement the Calypso, an optical surface monitoring, to extend our radiosurgery program.

The technology that is enabled on the Varian platform has been further enhanced with co-development of other technologies. So here you see a triggered image, the fiducial has been placed in the patient and we are tracking it every time the patient breathes to know that the treatment is being accurately administered. We don't have to stop the procedure, we continue with treatment and continuously monitor the position of the tumor.

The placement of these markers used to result in 20% to 30% of patients developing a pneumothorax, an unacceptable complication. Now we have navigation bronchoscopy that allows to safely place these markers out in the periphery of the lung.

This is basically a virtual bronchoscopy, basically computer imaging three-dimensional construction of the airways enable you to navigate the lung even though you don't have a camera to see where you are going, you are doing it all virtually. So this is basically a videogame in the bronchoscopy suite.

We have over six or seven years of preclinical development in radiosurgery planning with RapidArc. This has resulted in quality of treatment that rivals any other platform, but efficiency that absolutely blows anything else away.

The best example of this is the multiple target single isocenter radiosurgery for the treatment of multiple brain metastasis. Increasingly clear that getting all patients whole brain radiotherapy probably is not the best choice for patients and that we need to individually treat a larger number of tumors. Using nested control structures and multiple arcs we're able to do this efficiently, safely and high patient satisfaction.

There's one example a very recent publication and it is online accepted in May, it is creating quite a buzz. We get almost a phone call every week of somebody asking us about this publication. It is not even fully in the written neurosurgery journal yet.

Evan Thomas, who is an MD PhD student worked with our physics **group** and myself on this project where we took 28 GammaKnife clinical plans with multiple metastases and asked the question, can we implement single isocenter radiosurgery for these patients? Can we get a plan that is as good as what we treated? That was our goal.

And we were able to do a plan that was more conformal and had the same mean brain does, but we could implement it in a fraction of the amount of time. To treat these patients with multiple brain mets on a GammaKnife clinically took us about 2.5 hours. So that is this graph on the right here. The actual beam time was about an hour going in and out of the room making adjustments.

The RapidArc plans are so efficient you almost can't even read it on this graph. So, so quick, just a few minutes, 2 to 3 minutes depending on the number of arcs that are selected. Overall treatment time fits in a conventional time slot. So this enables the patient to be more comfortable and perhaps get a frameless treatment more often. Neurosurgeons really like this, by the way.

As we have implemented these technologies in our clinic our comfort of treating very small targets has increased. If you look at the first three years of our program on the TrueBeam, we had about a third of our patients with tumors that are less than 2 centimeters, now we're up at about two-thirds of our patients have tumors treated that are less than 2 centimeters. So smaller targets, as small as you can see on an MRI we can treat with this technique.

Other preclinical development has really impacted our lung SBRT program. This is just one example where the RapidArc has really enabled things to move quickly and efficiently. It has really been in combination with the high-intensity mode.

This is a preclinical study looking at the absolute time savings based on combinations of different beam energies where the flattening filter [pre] has been removed and where the RapidArc has been utilized compared to other technologies. Significant time-saving in the clinic has enabled these procedures to be done. We typically schedule these in a 20- to 30-minute time slot and it is easily obtained in that time.

What are we looking for in the future? Here we have our physician team, Dr. Bonner, Dr. Jacob and Dr. [Dubay], one of our liver surgeons. We have a liver surgeon doing liver radiosurgery with us. And here is our patient getting ready to be treated.

The patient wants to be comfortable when he comes and. And we don't want to have to have invasive setups that hold the patient in position. Perhaps they're not comfortable for some patients who may be in pain. Shorter treatment is going to be better. We've seen that in our radiosurgery program in the brain and they want to come to clinic fewer times.

The therapist wants a simple setup. They don't want to have some complex thing they have to do in the room. They want to be able to find the right place to treat and then monitor the patient during treatment. We want to know where the patient is in the room, where the linear accelerator is and that will enable us to do automation so you don't have to go in the room as many times. All these things are going to benefit the therapist.

The physician wants to see improvement in plan quality over time. We've done incremental improvement. You've heard about the RapidPlan, we're excited to implement that in our clinic. Use more intelligent planning tools. We will tell you is your plan good or is a better one possible, you need to continue to work.

And we want the best tools for motion management to manage where the patient is in real-time and know that we don't have to interrupt treatment to ask the question are we still doing what we thought we were?

So in the future we're going to have lots of people on our team that are helping to implement these technologies. And we are going to have Corey come up next to tell us a little bit more about where Varian is on these things.

COREY ZANKOWSKI, VP OF ONCOLOGY SYSTEMS PRODUCT DEVELOPMENT, VARIAN MEDICAL SYSTEMS, INC.: Thank you very much, Dr. Fiveash. I want to start just by acknowledging the fact that the University of Alabama in Birmingham is truly a pioneer in the field of radiotherapy and radiosurgery.

And it is a privilege for Varian to work with institutions like yours who constantly push our technology to the edge and really push us to innovate and expand and develop our technology to support your pioneering activities. And it is with collaborations like we have with the University of Alabama that have encouraged us to release the Edge radiosurgery system in 2012.

Now the Edge is Varian's very first all Varian fully integrated treatment device completely dedicated to radiosurgery. And it is -- it incorporates a variety of different elements from treatment planning all the way through to treatment delivery and patient monitoring to ensure that we deliver the highest amount of precision possible to give our clinical partners the confidence to use this device for the most challenging cases.

And again, we design it for full efficiency so that we can help our partners treat more patients with this life-saving technology. And I think the Edge is a great example of what can happen when we collaborate closely with our clinical partners and build something that they are demanding.

And you can see from the numbers with over $135 **million** in Edge and related radiosurgery product orders since its launch in 2012, as of the fiscal year Q2 in 2014 that this product has been very successful and well received in the marketplace. And it is very important for us to be successful in this market because the radiosurgery market is growing at a phenomenal rate.

A recent study by a **group** called Sg2 predicts that the number of patients treated with radiosurgery techniques in the brain and in the body is expected to double over the next decade. And so, for Varian this is an important growth trajectory and we are committed to continuing to collaborate with our partners to continue to evolve our solutions so that more patients can benefit from our technology for years to come.

Now how do you do this? I think the hypothesis we had when we designed TrueBeam was to make sure that it has the level of precision necessary to -- as I said, to give confidence to our clinical partners so that they would treat more patients with it. For us we were able to design mechanical accuracy of well within a millimeter of tolerance.

But you want to deliver treatments that are truly accurate to within a millimeter, you have to look at the entire treatment process from treatment planning all the way through to treatment delivery.

And so, the Edge is integrated with state-of-the-art advanced treatment planning systems with very, very highly accurate dose calculation algorithms all the way through to cone beam CT for positioning the patient accurately every day. As well as patient monitoring solutions such as the Calypso system that will ensure that the patient remains in place throughout the duration of the treatment and that, if they do move, that the beam can be gated off and the patient can be repositioned to within that submillimeter accuracy.

And so, it is this level of detail and focus on all of the detail, sorry, in the overall process that has enabled us to achieve extremely high degrees of accuracy and precision with the Edge. And we know from prior experience that is sufficient but not enough to drive true practice change. And as Dee mentioned, if we really want to change people's practices we have to deliver on multiple dimensions of a solution.

And so treatment efficiency has always been at the top of mind for Varian. And as Dr. Fiveash presented, one of our collaborators at UAB has done a study using Linac based radiosurgery to compare, plan and treat -- plan quality and treatment efficiency against the **gold** standard, GammaKnife and found that Linac based radiosurgery can deliver equivalent dosimetric results as the GammaKnife in 3 to 15 times faster timeslots than the **gold** standard.

This is particularly impactful from the perspective of the patient. Many patients cannot tolerate, simply cannot tolerate being on a couch immobilized for two hours to receive their treatment. But many of those same patients can tolerate a treatment that lasts only 20 minutes. So they become accessible for such kinds of treatments.

So we are very excited to work in this area to bring our technologies to a broader patient population. And when we designed the Edge we did think that by achieving the high degrees of precision, and also increasing efficiency with the device, we would see our clinical partners treat a higher volume of challenging cases.

And so we collected data, we have been collecting all of the treatment data for patients treated on the Edge. And the evidence does show, in fact, a higher concentration of clinical cases in the area of lung, liver, pancreas, places that are very challenging to treat typically. These are areas where people are using the Edge to treat patients.

So if you compare this with just demographic data, incidence data from around the world you can see that there is a prevalence or a higher concentration, 20% versus 13% on lung in 12% of patients treated with Edge versus 8% of incidents for liver and pancreatic -- pancreas cancer. And obviously you see very fewer breast patients treated on Edge because those machines -- those patients may be treated on other Varian devices.

And you can see from the quote from Dr. Carlo -- or Professor Carlo Greco that with the Edge we're able to treat even the most difficult cases and treat them efficiently.

And so it is that Varian formed the Edge Advisory **Board** to help us to navigate through this new world of radiosurgery treatments and help us to formulate our long-term strategy of where we need to take our radiosurgery platform and where we'd have the greatest opportunities.

The Edge Advisory **Board** consists of surgeons from neurosurgery, from thoracic surgery and their radiation oncology partners. We challenged the Advisory **Board** to reimagine radiosurgery altogether and to help us find new applications for radiosurgery so we can expand this market further and bring our solutions to an even broader patient population.

And I can tell you that just having these people, these high-powered people in the same room has really gone a long way in expanding the base of our clinical knowledge with respect to radiosurgery, surgery both in the head and in the body. And we think that by continuing to work with these partners we will continue to drive and expand this knowledge and we will generate advocates for radiosurgery that will carry the torch even further.

But we are not resting there. At Varian we have opened up the TrueBeam and Edge platforms with something called Developer Mode, and that allows clinicians, clinical researchers to write special scripts and develop new techniques for image guidance and treatment in a safe, nonclinical manner and perfect these techniques to help us then quickly translate those new techniques into clinical practice.

And so we are essentially using our own network of clinical collaborators to create a community that will drive innovation in radiotherapy and radiosurgery and it's already starting to pay dividends. And I am proud to say that UAB is a among our clinical collaborators in this space.

And they have been working with us to develop advanced treatment planning techniques through our Eclipse API, developing techniques that you saw from Dr. Thomas, very, very sophisticated, complex trajectory treatments. And they are working with us to enable these complex treatments to allow us to select safe beam angles that will reduce the amount of doses delivered to organs at risk without putting patients at additional risk for collisions in the room, for instance.

And Dr. Thomas and the University of Alabama staff are also working with us to take that wonderful technique that they have built over there and to build RapidPlan models that will allow this technique to be successful in clinics around the world.

And also to answer Dr. Fiveash's question about is this plan good enough for someone who is not quite as experienced as the University of Alabama? They will have an answer, they will be able to compare their results against what you were able to accomplish, and give themselves the confidence to treat patients with that technology.

And so, with all of this and our strong network of collaborators I believe that Varian is well-positioned to explore new indications for use for the Edge radiosurgery device and to continue to grow our market and our leadership position in this area.

With that I would like to transfer over and introduce Andre Dekker, a PhD Physicist from Maastricht University Medical Center. He has been involved in very, very groundbreaking informatics research that is changing practice and we are happy to have -- include Dr. Andre Dekker as part of our network of collaborators.

ANDRE DEKKER, MEDICAL PHYSICIST, MAASTRICHT UNIVERSITY MEDICAL CENTER: So this is quite exciting for me as well, I have never had one of these investor relations meetings. And probably the best thing is that the Varian staff is much more nervous than usually and it's great to see. So I will talk about something we started at MAASTRO about eight years ago and in research and hopefully show you some results and why it is now ready to go big. It will be about Big Data.

We did this very simple study at that time. We gave our physicians 3D charts of lung cancer patients and we said to them, can you please put these in order of survival for us, please. So they knew everything about the patients, the diagnosis, they knew what treatment was going to be given.

And they had to put a patient that they think would be dead at two years on the left-hand side and a patient that would be alive for two years on the right-hand side. And the patient that they weren't sure about in the middle. So it's called an [ordering] experiment. And if you have a perfect prediction then it would be like the top 100% accurate and the bottom flipping a coin and 0.72% is about in the middle.

Now usually in these kinds of talks I ask the audience where do you think our physicians are when we try to have them predict overall survival in lung cancer patients. And I won't do it now because I only have 10 minutes. But the answer is they are not very good at this. They are not significantly different from tossing or flipping a coin.

So if you go into MAASTRO as a lung cancer patient you ask your doctor, Doctor, will I be alive at two years? The answer you get is really bad, it is not very accurate at all. And this is a problem because we don't -- if we don't know which patient will be alive or is at risk of dying we don't know which patient needs all this technology that you heard just now. How can you decide?

The answer is you can't. And that is the issue we are working on. So how can we -- and it is a strategic choice at MAASTRO to make all our decisions data-driven and to have decisions support systems in our clinic for every single decision we take. Because humans cannot do that, even doctors.

So why is that? Well, you hear a lot about the benefits of Big Data but it is really a problem, it is not a benefit at all in the moment. Doctors see -- and this is a chart. They see exponentially amounts of facts on a patient and this is exponential skill as well as a double exponential. They don't -- they cannot process that. A person can only process five things in his mind.

If you go to an ER and you look at the wall there you will see a flowchart which has chest pain. The reason there is a flowchart on the wall is because you can't, especially in a stress situation, make a decision because there is more than five things to consider when you make that decision.

And so we are asking basically our physicians an inhumane task and they are not very good at it. They are overwhelmed. So we need to do something. And we think we can leverage some of that and I have been into -- invited to many debates now trying to make radiotherapy think differently about evidence and how we should collect that and how we should analyze that.

And we feel that the whole prospective preclinical trial thing, which is very successful in medical oncology and they get a lot of funding and a lot of approvals there, but it doesn't work for technology. So technology is really a bad set up to do these prospective trials.

We don't have a lot of evidence at all from clinical trials in relation as a whole, so the doctors can't even read -- there may be 3,000 papers in ASTRO. But to give all the decisions to every combination of an individual patient and individual technology isn't possible. So we don't have the tools for that.

And so, we're trying to shift that into a situation where we're going to use Big Data to help doctors make the decisions and patients as well obviously.

This is quite a wide accepted field now. If the Zimbabwe Star sites your work then you know you have gone a long way. And it is true, the models that we have, they are about 0.75% accurate -- 75% accurate. So they are much better than physicians, they are not perfect yet, but they are much better than physicians.

And I will try to show you at the end a real result which probably would impact survival of lung cancer patients way more than any of new technology we can figure out. So what is the problem then? Why isn't this solved? Well, the problem is if you want to build models you need a lot of data. And a lot of diverse data because you can only learn from differences.

And so you have to get thousands and thousands of patients to throw at your machine learning application of data **mining** or whatever you want to call it, AI. The problem is that the data will not come out of a hospital.

If you think about a global scale you have to learn from every single patient in the world, which is what we want, there is only one solution and it is to not share the data. To have the data inside hospitals because people don't want to share data because it might hurt them, right. If you get data from Memorial and we see that they are treating the prostate cancer badly, the whole of New York will go to New York Presbyterian and it would lose a lot of **business**, that is a real concern.

And for us we will never share lung cancer data at MAASTRO because we have 10 PhD students working on the lung cancer data and want to have first crack. There is a lot of reasons not to share data. And there is ethical of course, that is privacy. And if we think about Europe, we have quite a struggle now in the EU to get Parliament to not basically make research in Europe impossible because of privacy regulation. So there is also that to consider.

So the best way, and experts agree, is keep the data inside your hospital. But if you can't bring the data to a central location to learn you have to bring the learning application to the data. It is Mohammed and mountain thing, right. And that is what we are working on with Varian.

How can you make a system, a global system, and we have already 17 partners in such a network -- it is not a dream, it is actually happening -- where data stays inside your hospital and we can send learning applications around the world to learn from that data without a single patient leaving the hospital. That is to goal.

So a real clinical case. We went to -- in MAASTRO we learned a model from our lung cancer data. This is the model that had the area or the accuracy of 75%. But this is learned in MAASTRO, right, we are a western centered treating only white people basically with only concurrent chemo radiation, because that is our guideline (inaudible). So that is a curated set.

And the question we had is can we now take that [decision] support system to send it to Australia and can we commission that? Is it correct in Australian patients? So the answer what you see here is, yes, it does work. So you can learn in one center, send it to another center, commission it, validate it, commission it in their data and it works.

It doesn't take too much time, it doesn't take any curation of the data, we just grab whatever it is that they have and try it out and it works immediately. And what you see here in this graph is that we're able to see about three groups, a good, a medium and a poor prognosis **group**. And you see the different survivals and the colored curve is MAASTRO and the black curve is just Sydney.

This doesn't really mean anything for patients yet, it just means that the work we do actually validates and generalizes to other centers. And we are doing now the same in Rome, in Shanghai, in Philadelphia, in South Africa where patients are different and we need to show that you can generalize this.

But more importantly, Sydney does things different than Maastricht. In Sydney they treat about half of their nonmetastatic patients or half of their stage one to three (inaudible) lung cancer they treat with palliative radiation. We are not allowed to do that in Holland because we have a [guideline] and everyone should get high-dose concurrent chemo radiation, so we don't have those patients. But they do.

In half the doctor decides I'**m** going to give palliative radiotherapy. So what does that mean? It means those patients, especially patients in the good prognosis **group**, they have a survival of 18% in Australia. Whereas if they would have been treated with [curative] care their survival would probably be 65% at two years.

So the doctors in Australia looked at this and said, hmmm, we have to make some changes here. So now when they decide to choose palliative therapy in a patient they will use the model and check this is a good prognosis patient. And if it is a good prognosis patient they will put all the resources, they will put in their RapidArc, their 40 CT pats, they will replan, they would spend hours on getting the best plan out there to get the dosing.

So they will focus their resources on these patients that really benefit from curative radiotherapy. But MAASTRO maybe learned even more because look at the bottom in the black curve is MAASTRO survival in poor prognosis patient. In Sydney they treat these patients with palliative care and we treat them with six weeks of concurrent chemo radiation. The survival benefit of concurrent chemo radiation in these poor prognosis patients is zero.

So we are suggesting at MAASTRO people to six weeks of -- well, I won't call it help, it is not going to be very pleasant -- where you probably are not seeing any survival benefit. So we learned also a lot from this kind of work. And this is the keep message, you share data, it is not about blaming if somebody does it wrong or right, you learn from each other, you learn from differences and it was valuable for both. So we can capitalize on data and we can make everyone's treatments better by learning from each other.

So why do we need Varian? Well, we have 17 partners, this is all research funding. But of course we need to go to, what was it, 7,000 (inaudible) or whatever. So it will be less centers but we need to go to the whole world because we need diversity, we need more patients, we need more outcomes, we need more data to do this properly to make better decisions.

We need to work on getting better data quality in. So that is another strategy that we are following. How do you make doctors note something correctly? How do you get that data out? And in the end we need to prove ourselves. This sounds good, but we still have to do a prospective trial on decision-support system which is up next. Thank you for your attention.

SUKHVEER SINGH, VP ONCOLOGY SYSTEMS, ONCOLOGY CONTINUUM SOLUTIONS, VARIAN MEDICAL SYSTEMS, INC.: Good morning and thank you, Andre, and that is a very impactful illustration of the power of Big Data. And I wanted to take some time to share with you how, in terms of what Dr. Dekker described, how do we leverage this power of Big Data and take it out of research setting to thousands of our customers? How do we make this power of data accessible to all customers across the globe. So that is the focus of our informatics strategy.

But before we get into the solutions that we're working on I wanted to take a few minutes to illustrate what is the problem of big data. As Dr. Andre highlighted, the problem of Big Data is that in the last 10, 15, 20 years there has been an explosion of data in healthcare community. Now you have EMR systems, you have helped IT systems.

There is tons and tons of data that is being brought to bear. The challenge lies, as we saw earlier, it is in our cognitive ability to deal with data. The more data we have the more it decreases our ability to process as data.

So as we see at any time we are presented with data, which we are not able to process as human beings within a limited time it becomes a Big Data problem. And that problem extends all the way from being able to analyze population data for trends and all the way down to a single clinic or maybe a single radiation treatment site where they are seeing hundreds of patients and they want to know are they treating those patients effectively. Are they running their **operations** efficiently?

So this is the problem we want to solve. So as a **Company** we have committed now to creating informatics solutions which will help our customers solve these problems.

Now a solution to these problems also is a continuum, it is not about one single silver bullet, the problems -- these problems will need to be solved at the level of having better reporting, being able to see what is happening in the clinic and being able to see what are the trends, what are my patient wait times? How much is it costing me to treat patients? What is the toxicities for my patients I'**m** treating?

Going from that all the way to being predictive, not only looking back but looking forward. For example, when I am treating a patient is this the best therapy for this patient? What would be the outcome? What would be the survivorship?

And as you will see actually we are really excited that already we are starting to offer solutions with solved problems across the data continuum. And as we solve these problems we do realize that we will need to increase our technological capacity. We will need to be more capable in terms of technologies and talent that we have to have within Varian to be able to solve these problems.

Of course part of it is also working with our customers collaboratively to create these solutions. So as we focus our solutions we will also focus on acquiring technologies. And Kolleen earlier gave an example of Velocity, that is a great illustration of kind of competencies we want to bring to bear to be able to bring these solutions to our customers faster.

In the next few minutes I just wanted to share with you some of the products we are showcasing at this conference that we are bringing to our customers to be able to leverage the power of Big Data.

Let's start with one of the simplest problems to solve but still it is a pretty complex problem out there, that is just being able to report on what is happening in the clinic. And EMRs have become pretty prevalent and more and more clinical information is being put into electronic systems. Unfortunately still it has been very difficult to get that information back to get insights onto what is happening in the community.

We are showcasing now a **brand**-new reporting solution which exposes all the data which is in our ARIA information system to our customers so that they are able to create reports, they are able to distribute it, they are able to see what is happening within their clinic.

I think what we are most excited about is the next product, InSightive. This takes reporting to the whole new level. Reporting is a view in the rearview and it is a static view, it tells you what happened in the clinic. InSightive takes it to the next level it allows you to -- our customers to interact with the data, be able to see not only what happened but why it happened.

For example, they might be looking at a dashboard which shows them the referent pattern from different clinics or from different referring physicians to their clinic. They will be able to see by ZIP Code, they will be able to seat by who the referring doctor is, why there has been a change in refer patterns and be able to make decisions around that.

And similarly they will be able to see what are the toxicities associated with a particular diagnostic space? Has there been a change in there? Have we changed our practice in a certain way which is leading to that? The response to this tool at the booth has been just absolutely phenomenal. It is almost like it is great to see our customers as kids in a candy store when they see this data come live in front of them and they are like, oh, was that data, that insight already in my information system?

We are really excited about this product and I think this will bring a really great benefit to our customers in terms of liberating the data, as Kolleen pointed out earlier.

Velocity, another great example of bringing disparate unconnected imaging data and converting that into knowledge which clinicians can use to make better decisions, whether it is better decisions for kind of treatment which should be chosen. It is a letter decision for what kind of treatment plan should be chosen, whether it should be radiosurgery or conventional IMRT.

And not only that to being able to track how is the treatment proceeding. Does the dose need to be changed? Do we need to replan? This is again a very powerful tool that has been out there in the community and now it is part of our portfolio. And as we look into the future we will integrate the power of image-based knowledge more and more into our products.

Now Qumulate QA, again Kolleen mentioned it earlier. This is linear accelerator performance management tool. It will allow customers to visualize the performance of their machine in a very interactive way. And I think the most important piece of Qumulate is not only would they be able to see the performance of their own machine, they would be able to compare that data to their peers in the community.

And this is a great example of kind of applications we are working on in the future -- cloud-based, extremely interactive visualization, powerful insight. And not only that, but leveraging data across the community to create knowledge and benchmarking which will **lead** to better decision support.

RapidPlan, we have been sharing with you information about RapidPlan launch and how it is impacting clinical practice. RapidPlan takes Big Data solutions to the whole new level.

RapidPlan is not only about seeing what is happening in the clinic and being able to work with the data, but it is actually about really about [quantifying] some of the expert knowledge, some of the decision making which is done by experts in the community and being able to convert that into a tool which can be leveraged across the community to increase the standard of care overall.

It is an extremely powerful tool. As Dee highlighted, it can have real impact in terms of clinical outcomes in terms of making sure that our users are able to pick the best plan that has been validated by experts across the community. So it's really bringing that collective knowledge of the community into a tool which can be used across the globe.

As I mentioned, in addition to the exciting tools we also want to make sure that we build our capabilities to build many more of these tools. Part of those capabilities is also for example working with Dr. Dekker and many users like that, one of the leading edge of Big Data solutions.

At the same time we're also looking to bring some of the technologies in-house. For example, we have licensed the underlying machine learning technology which powers some of the work which is done by -- being done by Dr. Dekker and his team.

We mentioned InSightive, InSightive is a result of the technology we licensed from a leading data visualization **Company** called Tableau. Tableau is one of the exciting new companies, they have been around for some time but they are the masters in terms of being able to take the data, visualize it interactively and allow our customers to create very powerful insight.

Yesterday we did a press release about our partnership with Infor. Infor is a market leader in healthcare data exchange. And that is extremely critical to the strategy we are following. It is not only about liberating the data which lies in our own information system, but it is also about bringing the data which doesn't lie in our information system to point of care.

For example, genomics data. For example, data from hospital information systems, labs, pathology so that we can allow our customers to make decisions based on their comprehensive knowledge about the patient.

So where do we go from here? I think this is the most exciting part. While it is -- sometimes there are many tools out there which can create knowledge and insights, but the power lies in being able to bring those tools to the point of care. The example I would give in in the audience I see many of you are wearing these activity tracker bands.

Imagine if your tracker band, only thing it did was at the end of the month it showed you how you did during the previous month. That is insightful but that is not [actually valuable] insight. I imagining some of these bands, actually they do that every 30 minutes if you have been sitting without doing any activity they alert you. They ask you to take an action.

So that is really sort of a simplified analogy of how we want to approach these tools. It is not only about creating dashboards, it is not only about creating these insights, but we want to bring those insights back to when a decision is being made so that a better decision can be made at that point.

So we like you to come to the booth and see some of these exciting tools like InSightive, RapidPlan, Qumulate. And we look forward to being able to share with you many new innovations in this area. Thank you for your time. Now we will have the proton team come up.

DOW WILSON: Thanks, Sukhveer. We will go from software to the biggest hardware we make, how is that for transition? Just wanted to give you a little update on what we're seeing in the market and then I will turn it over to Dr.'s Rossi and Dong.

We do see the proton market accelerating. It was about $300 **million** in 2010. We think it's going to be about $700 **million** this year. Our share is growing rapidly, I will show you some details on that in a minute.

Our North American market share, the last 24 months we have won 18 rooms and we think we are outdistancing the competition.

We do have all five rooms in clinical operation in Scripps and you will get an update on that from the Scripps team in just a minute. And a growing market preference for our proton technology with the scan beam capability that we have with our technology and the ability to do intensity modulated proton therapy gives us very much a competitive advantage in the proton **business**.

We do have 10 sites and our backlog. So you can see the sights here, Scripps Proton Centers of course up and going; King Fahd in Riyadh; St. Petersburg, Russia; Cincinnati Children's; Paul Scherrer Institute -- they have a cyclotron from us, they just ordered a gantry to complement the existing clinical capability that they have to expand their center; University of Maryland in Baltimore; Georgia Proton Center at Emory; UT Southwest in Dallas; also with our partner APT; National Taiwan University Hospital in Taipei as well as the installation that already exists, the Rinecker Proton Center in Munich.

you can see how our share has changed. We are the dark blue slice right here. So we had 10 proton rooms operational between 1995 and 2014, you can see rooms **sold**, how it has changed. And we are very satisfied that we are growing our market position and reputation in the proton space, especially since the clinical demonstration of what we can do in San Diego.

We are launching here at ASTRO our ProBeam Contact system, fits in a space a little smaller than a tennis court, clearly optimized for cost. Beam line is much shorter. Cyclotron and gantry are modular with what we have today and the benefit for our customers as they don't have to make any trade offs in the clinical quality of their proton therapy, something that others have had to do as they bring their compact products to market.

So it is fully capable IMPT and we are very pleased to be launching that here at ASTRO. With that I will get out of the way and turn it over to Dr.' Rossi and Dong to tell you about their experience in San Diego.

CARL ROSSI, MEDICAL DIRECTOR, SCRIPPS PROTON THERAPY CENTER: Thanks, Dow, and thanks for the opportunity to talk about what we are doing down there now. And it is a lot of fun being able to treat patients that started in February.

Give you a little view of the facility there which I happen to like because it is actually above ground having spent 20 plus years working two stories underground with different technology. Having a window is a luxury that a lot of radiation oncologists just don't get. I'**m** not in any hurry to give mine up. Anyway.

The usual disclosures. I am very happy that we have a research agreement, certainly with Varian because there are a lot of things that we're going to be able to do in the future that we are just watching the surface of.

But the first iteration of IMPT, I can tell you based on my 20 plus years experience with passive scatter proton therapy, it is a huge difference. But it is just the beginning. There are many, many, many more things that can be done with this and will be done with this technology in the years to come.

So to give you a little bit of a briefing on where we are right now. We treated our first two patients on February 12 of this year, I started out with a grand total of two. We are now treating approximately 50 patients a day, we have been above that now, a little bit below that, but that is purely steady load.

And it is not just one tumor site, now it always -- because I have spent a lot of time treating prostate cancer. Needless to say it pains me when people -- when we have what I think are non-sensible debates at ASTRO about it. But I want to make the point that even though I am going to be showing you some cases here in a second that are of relatively unique situations, that is just one of the things that we can do.

I picked those cases because I think they are very illustrative of the differences between protons and x-rays. But certainly one of my goals is to make sure that protons are moved into the mainstream as they have been. A lot of that has been technology Limited when you could only treat like I could only treat a 17 centimeter field in the past, you're limited to what you could actually radiate.

That isn't the case anymore. Effectively I can treat with this equipment the same field sizes as a Linac. So if you look at the case mix that we have already experienced at Scripps it is pretty eclectic for -- and I will submit that for a facility that has been open for six months and change we have ramped up faster and got into a greater variety of cases than any other proton center has when they have come online.

So, yes, lung, breast, lymphoma, head and neck. We just completed our first pediatric anesthesia case -- a pediatric cranial spinal that we did with one of our clinical partners, Reedy Children's Hospital. So we are moving into a lot of areas very quickly in part because with the IMPT system you can treat larger areas to take advantage of the fact that you are using a beam that actually stops.

Now just to be clear what the differences are, the original proton systems and the majority, the vast majority of existing systems use what we call passive scatter proton technology, which was invented in the early 1950s. So it has the same vintage really as cobalt. And you start out this nice little pencil beam of protons and then you start modifying it with physical devices to make it do what you want to do.

So you have to spread the beam out, you have to shape it in X and Y and you have to shape it in Z to get it to do what you want it to do. And obviously that works but there are compromises involved. You have taken a very clean beam and you are putting material in it to where you get some neutrons produced.

You're also having to manufacture for each patient physical devices that specifically shape the beam for that patient. So your -- believe me after a while your treatment rooms look like machine shops. You have these blocks, it's not just one set of blocks per patient, it's one set per beam.

So you have stacks and stacks, literally stacks of [cerebin], [brass], tissue equivalent wax, whatever, all over the place to get the beam to stop at the distal edge of your target. And that is what you are really limited to, you can set it to stop at one point, you always pick the distal edge.

Now with an IMPT system of course you start with the same nice little pencil beam, in our case it is a little over 4 millimeters in size. And instead of using physical devices to modulate that beam to get it to do what you want it to do you primarily use electromagnets to shape it.

Now this picture is a bit deceptive, it looks like I am taking a shotgun and blowing a bunch of pallets into a target. I am not doing that. We are taking this little spot and we are using it to deposit dose within the target with exquisite precision. So for any one thing that I treat I'**m** actually breaking that into hundreds if not thousands of sub targets and specifying the appropriate **energy** for that dose or that layer.

One of the tricks you can do with this besides now being able to treat very large tumors is you don't have to limit your dose to the distal edge. You can do what we do in the modern x-ray therapy world, differential dosing, simultaneous integrative boost, we do all that. The physical analogy is that IMPT is like a 3D printer, you build the dose layer by layer by layer.

Another point is that you do not have to manufacture devices for each patient. If you need to replan somebody, which we often do, because tumors shrink, anatomy changes, you can do that very quickly because you're generating a new data file and not a new set of blocks that have to make the beam do what you want it to do.

Give you an example of the difference in normal tissue dose between these two types of proton treatment. On the left we see PSPT, that is passive scatter, the right of courses IMPT. what you are looking at is a lung cancer patient. The tumor is this box shaped area down in the corner. It is somewhat irregular shape actually the green line around it.

With passive scatter protons, yes, you can cover it and you do a fairly good job of being relatively conformal to it. But you are still treating a lot of normal tissue, less than in other situations. But you are still treating lung that you would otherwise not want to treat.

If you look on the right you can just eyeball that and say, gosh, that is much more conformal dose, I am treating significantly less normal tissue which is always the name of the game in radiation therapy, especially when these patients as many are now receiving combined modality treatment. And we are able to do this because of the unique properties of the intensity modulated proton beam.

Many of you have probably seen this video which I am going to hopefully get to run here in a second if I know how to do it. But I'**m** not sure if I can actually get it to run. If anybody knows how, I mean, Spencer, if you could give me a hand with that, that would be great. Thank you.

So this is a pretty darn good representation of our treatment room. The gantry room. So you have the patient on the robotic couch. The first thing of course we have to do is check position and that requires we now use (inaudible) x-rays with cone beam of course in development. You **acquire** your image relatively quickly, you then use this information to move the patient at necessary. Again, this is identical in concept if not in practice to what you do an x-ray therapy.

Retract the image, capture screens and then in a second here will be the magic of animation, you are going to see the proton beam coming on. And again, think of this as painting dose like you are building a solid object with a 3D printer.

So it will come on, we have got our target. It is irregular shape, tumors are never -- are rarely perfectly spherical. They don't read the textbook, they don't do what they are supposed to do. But you can see the dose being deposited here literally layer by layer by layer. You can be very creative, you can be very

specific. You don't have to radiate tissue proximal to the target that we have to do in passive scatter protons.

And you can really cover large complex irregular shapes without a lot of difficulty, which are things that I could not do in the past. And that is a huge advantage clinically in opening the number of sites that I can potentially address.

And I am not going to make you look at every single layer, I think you get the point. But it is a very effective way of delivering precision treatment. Now let me give you some brief examples of cases that I have already treated, one of which is under treatment at Scripps.

Again, these are unique. But remember, we use this with the routine stuff, the **bread**-and-**butter** as well as the unique. This first is a woman in her early 60s, she has a history of Crohn's disease which has an absolute contraindication to abdominal radiation because you are going to affect the Crohn's in a bad way.

She started having some abdominal pain in the last year, she got a CT scan for that. They couldn't figure out why she was having abdominal pain, it was probably her Crohn's flaring up. But they found a mass in her left kidney, biopsied it and found that that is what we call a diffuse large **B** cell lymphoma, a very rare bird, a non-Hodgkin lymphoma of the kidney of all things. The rest of her metastatic workup absolutely negative.

The standard of care for this type of situation is multi-agent chemotherapy followed by consolidative radiation because you want to be short you kill the bulk disease. The trouble here is the Crohn's. She was able to get three of the planned six cycles of chemotherapy but even by the time she had the third cycle, because she was not in the best of shape, she was having trouble tolerating the chemo.

The medical oncologist at Scripps said I really can't give you any more without having to reduce the dose which just reduces your punch on the cancer. You need radiation but there was no way to deliver it safely with x-rays because there was no way to treat her with x-rays -- any technology without having a beam going through the small bowel and contralateral kidney.

Well, we were able to with a very simple straightforward single field intensely modulated proton plan successfully irradiate her. We brought in the beam posteriorly and we contorted around this residual disease. She did very well. She had absolutely zero gastrointestinal issues during her treatment. She is four months out now, she has not had any issues post treatment. And her first pet scan post-radiotherapy shows that there is no longer any activity in that area.

So obviously a series of one, too soon to know the ultimate outcome, but the fact that she was able to get through a course of treatment after being really beat up by the chemo with zero side effect from our treatment is certainly telling and compelling because you are not having to hit that normal tissue.

The second case was a young man who actually lived up here in the Bay Area. He was born with a congenital bladder problem which eventually led to him losing his kidneys in his teens, so he has a renal transplant courtesy of his father. Despite that he's finished college down at the University of San Diego.

But last year about September he noticed a mass in his left testicle, was worked up, found it was testicular cancer, had surgery. We often do adjuvant therapy, either radiotherapy or chemo after surgery in these cases because we know in about 20% of the cases they will recur. Because of the immunosuppression they didn't want to do this up at Stanford, they said let's go up [and observe you] and they did. That is also appropriate.

Several months later, May of 2014, they find he has a recurrence in the abdomen, they biopsy, they prove it is recurrent. Now what do you do? His medical oncologist says well, we could give you lots of chemo because now that is what you have -- that is one option, we are going to give you multi agent chemo.

But you are already immunosuppressed, you already are at risk for infection because your bladder, he still has a bladder, it is colonized with bacteria because he has to self cath every day. And it is not a good situation. Plus he is athletic, he didn't want to receive one of the chemo drugs which could **lead** to a decrease in pulmonary function.

So he went and saw Steven Hancock who is a radiation oncologist at Stanford. And Steve said, maybe protons would be a good idea and we don't have them here but let me call US San Diego which is one of our clinical partners and see what they think. He spoke with Dr. [Munt], Dr. Munt spoke with me and we got the gentleman in.

So this is his scan before he had treatment, that little black dot here is the recurrence in the upper abdomen, you can see it on the transverse scan. And what we did was again a very simple two field proton

plan where we were able to bring the beam in from the back, and just off of midline at an angle and stop the beam immediately beyond the target.

Another issue in seminoma, we cure most of these patients, we worry about second cancers, they typically are gastric cancers, stomach cancers. So I wanted to keep the stomach and small bowel dose down to zero.

If you look on the transverse slice, you can see that that dose is stopping before it hits the small intestine, before it hits the stomach. And it was very nicely carved out around his transplanted kidney. That is another -- would've been another issue it would have been difficult to manage with x-ray therapy.

Lastly, we tend to get a lot of other challenging cases like retreatment, a gentleman who had had prior radiation for nasopharynx cancer, he has now recurred, what do you do? There are no good chemotherapy options, there are no good surgical options. [Re-irradiation] which there are published data on protons as a rule here. The problem is trying to spare normal tissue.

You've got to worry about brainstem, optic nerve, etc. He is currently under treatment at Scripps. We are using a multi-field technique to cover this area of recurrence here in the nasopharynx and right pharyngeal space. And if you look on the (inaudible) you can see that we are able to spare the optic nerves, the chiasm which is sitting here and we are able to get a very, very low dose of radiation to his brainstem.

So we are giving him a fighting chance in effect because we are not having -- we have more room to be cavalier with our treatment because we are not as worried about dosed normal tissue.

So I feel that IMPT is emerging as what I think will be the standard in proton therapy. I see no reason to go back. And I think it is analogous to we've had Cobalt, we had 3D conformal, we have IMRT. The IMPT is to protons as IMRT was to 3D conformal even Cobalt. So that is good.

We need to collect more data, we always need to collect more data. We're in the process of doing that. We have all of our patients are now being offered participation in a multi-institution registry and we have other clinical trials coming down the line.

I would like to turn this over now to Dr. Lei Dong who is our Chief of Medical Physics and another gentleman who is -- besides being an absolute delight to work with, has vast experience in the fields of proton therapy. Thanks.

LEI DONG, CHIEF PHYSICIST, SCRIPPS PROTON THERAPY CENTER: Thank you, Carl, and I want to continue with what Carl said regarding the proton therapy versus the traditional radiation therapy. As you know, an MRT especially provides an extremely high conformal dose to the target. What we usually talk about is the high dose [conformality].

And the proton is actually quite unique, it provides a low dose [conformality]. Typically we don't usually lower down the dose line. We don't look at it at zero grade line. I saw it at some of the previous slides in the (inaudible) and for proton therapy we always add scale that goes down to zero dose, you know like a (inaudible) shot.

So it looks like we are not at conforming, but in fact the low dose part, it was quite significant. This is an illustration, I don't have a small, maybe I have one, the lower part is a proton therapy compared with the traditional x-ray therapy. If you lower the dose level you can see there are lots of low dose penetration caused by aggregate.

So that is one of the advantages. For a younger patient for example, you really don't want a dose anywhere outside of the targeted region. For some of their retreatment like Dr. Rossi mentioned, clinical dose may be already exceeded. So you want to use the advantage of the proton therapy. I don't see the proton therapy as a competitor for photon therapy, it is really complementary because not every patient will need to have a spare in the low dose.

This is another example for proton therapy for prostate cancer. And if you calculate the body dose using the photon therapy compared with the proton therapy, about twice more dose is given in the x-ray. So with a pencil beam intensity modulation with the proton therapy you actually get at the high-dose region very conformal. That is one of the reasons the proton therapy is really, really emerging as a newer technology that can handle very complicated cases.

Another thing we are experimenting a lot of the new treatment techniques. For example, breast cancer in this (inaudible) there is a precedent symposium on the breast cancer. One of the things that were mentioned was the cardiac effect by radiation therapy. It was such a big problem especially for young women living long, long time, cardiac toxicity is really a concern.

For proton therapy this is really a very unique situation. You know the target is very superficial. The (inaudible) uncertainty is less. So you will be able to use (inaudible) beam instead of a tangential beam and create a dose that is not only more uniform than the traditional x-ray therapy, but also give a near no dose to the heart. It depends on where the target is located relative to the heart. So is really taking advantage of some of the characteristics of the proton therapy.

I am very excited, you know Varian has this proven system integrated as part of the family, because I have been working with other vendors, the proton system was a third-party. There are lots of pieces of technology was not integrated. So we found -- we still need to have lots of information system, treatment planning system, the treatment plan has to be able to download it to the machine. So this integrated system makes workflow much easier.

Yes, I just want to summarize some of the key themes for intensely modulated proton therapy. I think Dr. Rossi mentioned there are a few neutrons because really there is no (inaudible) of the beam. So there is no neutron generated. There is no physical compensator, the workflow is much easier because it can start patient very quickly.

And also, there is an added advantage because a scan beam you actually can treat a larger field. Many situations, especially for radiation therapy, the large tumors is actually more difficult to treat not only because the area is larger, the toxicity is also higher because of the penetration of x-ray. So this larger field creates lots of unique advantage, you don't need to worry about where is your isocenter relative to that volume, the setup is easier.

Another thing Varian has a unique advantage which I color out is the dose delivery. Varian has the most efficient dose delivery system for the proton beam. If you look at low **energy** usually the beam efficiency generated by the accelerator will be lower. But Varian still maintain that high-dose rate at the low **energy**, superficial target, which is advantage of the super conducting cyclotron.

Another thing I want to mention is that in addition to new hardware, Varian beam can match -- we have demonstrated in (inaudible) we make the dosing metric in the machine at a different treatment the beam is perfectly matched. Which means if a patient comes in, they don't need to be selective to one of the treatment rooms, they just go into the next available slot.

Or in case we have a machine problem as you imagine when we first come up there are always some issues with the machine. You can actually channel the patient to a next treatment room. So effectively downtime is much lower for the patient. That is an advantage. I believe Varian is exploring the technique so that the beam can be matched at the different facilities, that will really speed up the commissioning.

And commissioning is another advantage because the pencil beam commission you don't require a lot of hardware to -- for beam management. You really can speed up. We literally only spend less than six weeks for doing the commissioning. I think that next facility when they are familiar with the system, they can be even shorter.

So that is a huge advantage and is a big investment. You want to start treating the patient as soon as possible. There is some other advantage for proton therapy, I really think we are at the very beginning to explore how we can best use this new technology. Thank you very much.

DOW WILSON: Thank you. Maybe before we open it up just a couple things in conclusion. First of all, how about a round of applause for our guests, really terrific. I would like to thank Dr. Fiveash, Dr. Rossi and Dr. Dong for their presentations.

Also a reminder that the presentations and the entire webcast will be available on our webpage. So I saw some of you taking pictures, if you want higher quality you can go to our webpage and get them there.

Just in conclusion I think four takeaways, number one is the field remains a very robust. As you heard from our team today, radiation therapy remains a terrific therapy for cancer, has great impact and is highly efficient and is growing in its applications. That would be number one.

Number two, stereotactic radiosurgery, stereotactic radiation body -- SBRT, stereotactic body radiation therapy, is growing in importance in the field and our position couldn't be better. We really feel very strongly that our position in SRS and SBRT is outstanding. And growing in the marketplace and getting that kind of the recognition as you saw in particular from Dr. Fiveash's presentation.

Third, Big Data. Big Data, big schmata, we all see the Big Data things in the newspapers. What I like is that we have got five products that are doing Big Data kinds of things, Sukhveer talked about them as well as Dee Khuntia.

First of all RapidPlan, which we launched last year. The reception of RapidPlan remains outstanding, starting to see some of the clinical evidence of the impact it can have and the way it can help people not only be more efficient but actually deliver better care. And that is very, very exciting.

I think we are just in the first few minutes of that game. We have got a long way to go as we develop techniques for each disease site. It is moving very, very fast, our collaboration partners are very excited to be part of RapidPlan. And that remains very exciting.

Sukhveer told you about InSightive, new technique for really **mining** the data that is in the center. We knew that this was going to be exciting. Frankly we have been here at the show really pleased with the customer response on these tools. And again, how do you take information and turn it into something actionable not just after-the-fact but as part of the therapy processes.

Velocity is doing the same things with imaging. Imaging data exists in very disparate places in the hospital, often in a radiology PACs system. Our customers want to use that data to monitor, diagnosis and progress during therapy more and to be able to pull those -- that information and to make it much more part of the clinical process is a great demonstration of the ability to pull things out of distant databases and make them part of the clinical flow.

Qumulate is kind of an operational thing, but a cloud-based capability for monitoring QA, quality assurance in the clinic to make sure that our products are working as they are always supposed to work and delivering the safest radiation therapy possible.

And last of all, full-scale product, which is virtualizing and taking to the cloud on a hosted basis for our customers their clinic continues to grow in importance and scale in the market. So kind of very excited about our initiatives here in the IT space and what it will mean for our **business**.

And then last of all, proton. As you know, this has been a daunting investment for us. We thought that it would make an impact. But as you can see from Dr.'s Rossi and Lei Dong's presentation, we are really proving out the clinical impact that protons can have and are very excited about its future. And think more than ever that it is going to have a really significant place in radiation therapy and that it will be a growing part of how we treat cancer with radiation.

And with that I think what I will do is I will kind of monitor the questions and dish them out to the panel as it goes.

Questions and Answers

DOW WILSON: Please.

JEFF JOHNSON, ANALYST, ROBERT W. BAIRD: Jeff Johnson, Robert W Baird. Just a couple questions here on the software stuff. Obviously we look at this, it is really cool stuff. But how do you monetize it, number one? Can you put maybe some ASP ranges around some of these products at all?

Do you expect hospitals-- some of your hospitals to **buy** one or two of these products, four or five of these products? And then as we think about the recurring revenue stream as part of your oncology **business** today, I think it is around a 40% or so of your oncology revenue. Does this help get that to 45%, 50% over the next three to five years, just how to think about that.

DOW WILSON: Yes, I would say in general terms the software **business** is about a $300 **million business** today for us. We think that will double over the next three years, that is probably the best way to characterize it. Price points really are a function of what they **buy**, how big their department is. I mean it is difficult to get into each of the price points here on how it is deployed because each one is so different. Kolleen, you want to fix any of that?

KOLLEEN KENNEDY: (Inaudible) software support agreements -- with our software support agreements we do in fact offer the opportunity to roll some of the new licenses into their services contract so that they can access the technology sooner rather than having to wait for our CapEx purchasing cycle. And that seems to be a nice way that our customers are looking to bring on **board** new capabilities sooner rather than later.

DOW WILSON: And some of these still have a license component. But, for example, Qumulate is entirely a SaaS model and paid over time by the customer on a cloud-based implementation as well.

JEFF JOHNSON: Understood.

KOLLEEN KENNEDY: (Inaudible - microphone inaccessible).

DOW WILSON: Yes, and I think it is going to help us grow share as well in our oncology information system **business**.

JEFF JOHNSON: And just one quick follow-up there. Is there any ability to tie in -- your old machines won't work on some of the software, the software won't work on some of your old machines, so it almost forces an upgrade. Is there anything that works there? Thanks.

KOLLEEN KENNEDY: Yes, no. Great question. And on the Qumulate QA, actually that was designed with both our Clinac family as well as our TrueBeam family in mind. So I think that that particular quality assurance tool operates on all of our systems. And on the InSightive Analytics, that really is through our ARIA system, so it just accesses everything that is in the database already.

DOW WILSON: Jason.

JASON WITTES, ANALYST, BREAN CAPITAL: Hi, thanks. Just one quick follow up on software then a second question. In terms of the rollout, should we assume that all of the cloud-based programs in the Big Data are ready to go now or there is sort of an evolution over the next year?

DOW WILSON: All of these are going to grow, but RapidPlan is available today, InSightive is available today, Velocity is available today, Qumulate is available today, FullScale is available today. Did I miss any of that?

JASON WITTES: That is perfectly clear, thank you.

DOW WILSON: In the catalog and selling. All these are going to grow significantly. RapidPlan, let's see, Corey, last year which models did we have? Prostate -- yes last year we just had prostate on RapidPlan, now we have --.

COREY ZANKOWSKI: We are about to roll out prostate, prostate with nodes, head and neck and lung.

DOW WILSON: So each of these are going to grow a lot in capability over time.

JASON WITTES: Great, fair enough. And then second on proton for the single room center. Just an idea of what the price point is there. And also if you look at the market it does appear from your slides it has improved this year. What type of configuration do you think customers are looking for and if you could compare and contrast the US with outside the US, it would be helpful.

DOW WILSON: Yes, sure. I think our -- price point first. I would say $30 **million** to $35 **million**. So still a little bit higher than maybe some of the other guys. But again, no compromise in quality or throughput of the machine. So one of the things that we have looked at is we think that price point is equal to some of the lesser capability. You would actually have to **buy** two rooms to get the kind of throughput that we could get with one.

And then the second part of the question was kind of market and how we see it segmenting. Most of our market has been larger centers, we have not taken a -- we just introduced the Compact we haven't taken a Compact order yet. I would say the average is around three with a trend. I would say our first few orders were four and five room systems and we are seeing a trend more towards two and three.

RAJ DENHOY, ANALYST, JEFFERIES & **COMPANY**: Raj Denhoy, Jefferies. Maybe I will start with proton maybe for the gentleman from Scripps. They talked about having five rooms up and running, but 50 patients a day I guess. And I am curious if that is an appropriate throughput, that you can increase that, what is gating your throughput at this point?

DOW WILSON: Carl?

CARL ROSSI: It is primarily -- I think the throughput for our current operation is fine. We are just starting to use the two fixed two beam rooms. So we have been treating 50 patients a day on our three gantries and that is in an eight hour day.

And you saw from the clinical mix that it is a big mix. It is a lot of stuff which is **bread**-and-**butter**, but a lot of stuff which is complex. And to be able to get that case mix through on three machines from 8:00 to 4:30 is pretty good.

Certainly want to expand that. And there are a lot of pieces that are moving toward that goal. We are getting -- starting to see more patients referred from our clinical partners, from UC San Diego and from Reedy Children's Hospital. That is going to bring that up somewhat.

We are beginning to do more marketing to try to get a greater patient catch mitt. So it is a good start. Again, I think that I don't think anybody has reached that milestone that quickly. But it is not where I want to be. It is good for now, I want to get up higher than that.

RAJ DENHOY: But do you have a sense of where you can take that with the technology you have? I mean if it is three gantries you can do 50, what do you think you can do with three if everything is running properly?

CARL ROSSI: Well, with three gantries in two fixed beam rooms and if you're operating in a 16-hour day, which is what has become the standard in most proton centers, you could very easily be up well over 100 patients per day, very easily.

RAJ DENHOY: Okay, and then, Dow, just one follow-up in terms of some of the other questions. The US market we have all been expecting this upgrade in the replacement cycle at some point to kick in. You even put the slide up on the aging of the Linac installed base. But orders have been remarkably kind of tough to track.

And I'**m** curious if any of what you are launching now or anything you can perceive over the next couple years in terms of data will finally open up that big replacement and upgrade cycle we are expecting.

DOW WILSON: I mean I think we are pushing very, very hard. I will say if you had told me at the beginning of the year we would do 5%, which year to date we are 5% in the US, I would have taken it. I think that is really pretty good in the US.

Our challenge this year has been our international growth is not that good. We have had -- we are down about a third in Japan, we had a slow first half in **China**, Q3 in **China** we saw it come back, we had a huge order in the UK last year, it is given us a bit of a comparable year-over-year issue. But frankly our growth issue on the year has not been about the US market, it has been about OUS market.

So I think as we look long-term that is going to come back, that is going to come back. Now where is US market going to be and can we get a little extra juice, clearly all these products are global products and they are going to benefit our most experienced customers and our newest customers. So we are pushing the US market very, very hard.

I think one of the questions that is embedded in there, why don't we just take right now, is where do we think reimbursement is going to go? We've got Andy Whitman here who is our Vice President of Government Affairs in Washington. I'**m** going to give the mic to Andy. And Andy, why don't you just update everybody on kind of what we see in reimbursement.

ANDY WHITMAN, VP OF GOVERNMENT AFFAIRS, VARIAN MEDICAL SYSTEMS, INC.: Sure, thanks, Dow. So in terms of, as we know, the proposed rule came out in the US. There were some cuts to the freestanding centers proposed related to the bulk being considered by CMS as an indirect expense where it has normally been treated as a direct expense.

I think that there has been a big push in the community to turn that back. And there has been a lot of activity on Capitol Hill as well. In terms of as we know that there are some new codes that are being introduced and that will affect freestanding hospital setting.

I think what is important to note is that in a hospital setting that reimbursement, because it is a cost per report based system that reimbursement will probably stay the same I mean as the proposed rule went up 2.2%, probably stay the same for another few years. So we are really unsure what the final code values will be.

Same thing for the freestanding we are unsure of what the code values will be until the final rule and there is even some possibility that there may be a delay on that. So there is a little bit of uncertainty there, those proposals were done back in late August and so there is not a clarity around that.

But that is kind of what we are seeing both in the freestanding and the hospital. I think the hospital is fairly stable and we won't be seeing any movement, even though the codes will be there, because it is a cost per report system. You won't see any movement in the hospital setting at least for a few years until it catches up.

DOW WILSON: Any other questions on US reimbursement before we move on? Why don't we take that one real quick?

RAJ DENHOY: Just a quick question on SRS reimbursement in the hospital setting. I would like to mention that they are seeing record orders for GammaKnives and that is being spurred along by the shift in the

technical component in the hospital setting for SRS surgery. Are you seeing the same benefit with Edge? Thanks.

DOW WILSON: I think our short version is we are very satisfied that reimbursement for the two products is the same now, that was our objective all along. Our Edge product remains very, very good. I think Elekta's made some good moves with perfection and now their cone beam CT offering on the GammaKnife.

However, having said that, just at the risk of repeating it, what we are seeing is for new systems people are very interested in Edge because of what Dr. Fiveash talked about. And that is, if I can find it here, I guess it was way back at the beginning.

What is interesting is cone beam CT is going to help them go frameless. Now just pinch yourself, that is what we have been talking about for years is going about frameless. And so that is what they are trying to do on the GammaKnife is get to frameless. So it validates Linac based radiosurgery on one hand. So we are thrilled about that.

But this -- here we go, getting close here. This time difference that Dr. Fiveash talked about is not about cone beam CT. It is about the source. And so to really do fast SRS you need an Edge. Cone beam CT is going to eliminate the frame, that is great. But you are still going to have the efficiency problem of delivering high dose, high doses very, very quickly.

And so, the clinical benefit of that is huge and so as we look at new sites customers are more and more interested in the Edge product because of its overall efficiency in getting high dose in in a very highly precise way, very, very quickly. And that doesn't change with that product.

So from an upgrade point of view it is a pretty smart play, by Elekta, I think it gives them offerings to sell to their installed base. But at least what we are seeing for new sites, we've got a very good competitive advantage with more and more clinical demonstration of those advantages in the literature and we are starting to win some share here. Steve.

STEVE BEUCHAW, ANALYST, MORGAN STANLEY: Steve Beuchaw, Morgan Stanley. I will start with a clinical question specifically on the 4Pi functionality and on the motion adaptive MLC, Dow, it would be great to hear from you and maybe from Deepak.

It seems like these might position you a bit better for treatment specifically on cranial and on the lung. These are areas where a couple of your competitors have historically had a nice position. Can you talk about the timelines for rolling those out more aggressively on the commercial side and whether or not this is a part of an effort to make more of a push into those areas again commercially?

DOW WILSON: Kolleen or Dee?

DEE KHUNTIA: So in terms of the clinical piece, we are now just getting dosimetric information. We are not actually able to treat patients with the 4Pi modality. However, on the DMLC tracking, the MLC tracking program, currently there is only one trial that is being done under a research protocol at the University of Sydney, they have treated 18 of 30 patients for that trial as of last week.

It is exciting, but it is not in a commercial ready mode yet. It is still being done under research. And maybe I can pass it to Corey Zankowski who manages all of our products and he can talk a little bit about the development strategy.

COREY ZANKOWSKI: Sure, thanks for the question, it's a good question. We have been on a trajectory for developing MLC tracking type technology for several years now. We've talked about it for several years. But the piece that we were lacking for so long was something that accurately followed the tumor motions so that we can respond to that.

And with the **acquisition** of Calypso a few years ago we brought that technology in-house and are able to study how well we kid actually monitor the tumor motion and respond to it. And I think your question you asked about the timelines for commercialization of the technology, the TrueBeam already has the capacity to do DMLC tracking in the developer mode which is that nonclinical side of it.

We do have a lot of sponsored research exercising this capability. So it is part of our long-term development strategy. We did -- I would say we did a little bit of a pause when we started to look at the data that we were collecting on Calypso and realized that perhaps some simpler approaches were needed to guarantee geometric that we missed -- that we didn't achieve a geometric miss because some of the CTVs, the expansions around the tumor that are meant to account for human motion, some of the data was suggesting that those typical expansions might not be adequate in some clinics.

So we're looking at that problem before we start pushing the technology too hard. But we are constantly doing the research and development in this area. So I don't want to -- I'm going to be purposefully a little hazy on the timeline there.

In terms of the 4Pi question, as Deepak alluded to, we do have a significant amount of research and collaborations in exploring new avenues of how to select the appropriate beam angles to achieve better dose distributions. So we are working right now in the dosimetry space.

But simultaneously we are working with collaborators like UAD to develop collision avoidance, collision detection systems so that when we do go non-coplanar we can increase our confidence in doing that safely and effectively. Again, I'm being purposefully vague on timelines, but we are working aggressively with our collaborators to bring this kind of treatment technology to the market.

STEVE BEUCHAW: Thanks for that. And then one on the distribution strategy change. Well I suppose, two. First, is there a cost savings for Varian as a function of this restructuring? And second, what is your customer going to see that is different? Is it a different pricing strategy, is it a different group of personnel, does it give you a different opportunity to bundle, different contract terms? Can you help us understand what it means out in the field? Thanks.

DOW WILSON: Kolleen?

KOLLEEN KENNEDY: No, it is a great question. What I would say that this organizational transformation, I would not call it a restructuring. It is actually an investment by Varian because what we're doing is putting leadership in the regions in a more embedded way so that we can respond to our customers in a more nimble and flexible way.

We had some voice of the customer work going on, lots of feedback in that regard. That being said, by having customer facing teams more fully aligned, reporting into a single leader in each of the geo's we believe that there have been opportunities that we haven't been successfully capitalizing on as a result of some of our slowness of response that will help drive future business growth for us.

DOW WILSON: Yes, the idea is nothing has to go to Palo Alto. Make the decisions in the field then get closer to the customer. So we are thrilled about this new structure.

PATRICK DONNELLY, ANALYST, JPMORGAN SECURITIES: Patrick Donnelly, JPMorgan. Just another one on reimbursement, sorry about getting it in late. Can you just maybe give thoughts on kind of this bundling initiative ASTRO spoke about on Sunday? Also kind of the cut cost for simpler cases including prostate and breast and how that could impact you guys next year and what chances that goes through?

DOW WILSON: Go ahead, Andy.

ANDY WHITMAN: Yes, I mean I think -- I think that that the bundling initiative by ASTRO -- that is really a restructuring of the codes. So I don't know that it is a true -- when you are hearing policymakers talk about bundled payments for a single payment for an episode of care I don't think that is necessarily what they were talking about per se.

As it relates to the new code structure, again, the rates aren't set yet, we don't know what the rates are going to be. I mean as I mentioned previously, they went through a process, they submitted the data to CMS, we may or may not see this in the final rule, we expect to see it in the final rule.

The immediate impact will probably be on the freestanding setting. But as I said before, it is not on a hospital setting for at least several years. So that is kind of what we expect to see, we don't know what the values are yet. But we'll say probably we're not seeing in a few months.

UNIDENTIFIED AUDIENCE MEMBER: Maybe just a question for Dr. Khuntia and Dr. Fiveash on immunotherapies. The pharmaceutical world has been making a lot of noise on PD-1 agents. There has been an approval recently in melanoma. Here at ASTRO you have spoken about the abscopal effect.

Can you give us a sense over the next three to five years where immunotherapy will settle in cancer care? And is it -- does that displace radiotherapy or does it advance radiotherapy as it relates to a conjunction therapy effort that we could see over time? Thanks.

DEE KHUNTIA: So I know Dr. Fiveash has some comments on this too, I will give you my perspective first. So this is a -- I want to just go over the mechanism of how we think this works first of all. So what basically is happening and it tends to only happen, at least in the way that we are seeing this data, when you use very high dose radiation therapy. So not the standard radiation that we are used to thinking about. So this would be SBRT SRS, okay.

And what ends up happening is when you treat that tumor with a very high dose it triggers the immune system to be hyperactive. And that immune system then goes in -- it attacks basically that primary tumor site but then you now have basically these T cells that will go after the rest of the body's tumor that it can now recognize.

The drug, the immunotherapy component of it is to -- it's sort of like a steroid for the immune system, supercharge them so they can be more effective killers. So we look at this as something that is going to increase the use of radiotherapy and specifically radiosurgery.

And I will point out that all the data that we showed in terms of trends of the doubling over the next decade of radiosurgery that did not include this whole concept of immunotherapy and radiosurgery together. And it also did not include data from, for example, the lung screening information that we are hearing about.

So these are really underestimating what the use of radiosurgery will be. And so this is part of the reason why we actually have a -- sort of an incubator called GTC within Varian that looks at how biology is going to be integrating with our radiotherapy. And so I look at it from my perspective as something that is going to dramatically enhance the use of SBRT.

JOHN FIVEASH: I think you said the same thing that I've seen in my practice. I was going to give you an example of Yervoy which is the most common immunotherapy for melanoma right now.

And our practice changed where patients were just getting Yervoy, the New England Journal of Medicine article came out one patient showing the abscopal effect and we started getting referrals for body radiosurgery at different sites for patients that were failing Yervoy, can we extend how long Yervoy is going to work by just radiating and using very short courses of radiation.

The anti-PD-1 antibodies are going to be more active than Yervoy in this. So I think you're actually going to see more radiosurgery in hyper fractionated treatments.

DOW WILSON: Good, I think with that we have reached 10 o'clock. Please feel free to join us out on the show floor and thank you very much for joining us today.

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