May 2015 Issue | Pankaj Vashi, MD and Glynis Vashi, MD

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Welcome to May 2015 Functional Medicine Update, and this is the first of what I believe is going to be a very remarkably insightful and information-packed series on functional oncology and this whole remarkable transition/revolution that we're undergoing right now as it relates to what some people call precision cancer therapy, or genomic-based cancer therapy, or targeted therapy, or personalized medicine approaches to cancer therapy. I think you're going to learn a tremendous amount through the voices and expertise of our three clinicians/researchers of the month over the next three issues.

Dr. Bland Begins a Series on Functional Oncology

This particular issue, however, is going to focus on kind of an overview as to what does the landscape look like as it pertains specifically to the cancer environment/cancer therapy diagnosis in the year 2015. And then we will start moving from there as to where does it look like the future will take us in the subsequent issues? We're very privileged to have, this month, two experts in cancer therapy that bring—as a husband and wife team—in the specialty of oncology, tremendous breadth and depth of knowledge in this area. I think it couldn't be better to have kind of this clinical approach first to really talk through some of the challenges and some of the victories that are occurring in the area of oncology from a functional perspective. So let's move into our discussion with the Vashis, who will tell us a little bit about what is the real state as it relates to today's treatment of cancer.

INTERVIEW TRANSCRIPT

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We're so excited this next three months to be producing a focused course on the progress that's being made in cancer therapy and I think there is probably no area within functional medicine that could be

more concerning and more on the minds of people than what's being done in this critically important area for which there are decades of efforts and it seems like now things are starting to really change in the whole cancer therapeutic area—aspects of integrated, functional, personalized, and precision cancer therapy are starting to emerge. The genomic revolution is upon us. And we're learning something about the fundamental nature of cancer that we didn't know before as it pertains to the immune system and the interrelationship of immune vigilance and how that relates to the body's own natural management of transformed cells. We're so pleased that we're starting this series right at what I would call the top of the ladder. We have two extraordinary clinical experts in the area of the emergence of the 21st century cancer therapy: Dr. Pankaj Vashi and his physician colleague and his wife, Dr. Glynis Vashi, who are working together collaboratively. And I think it is very interesting from an interpersonal relationship perspective as to how two professionals, one—Glynis—in the internal medicine area and Pankaj in the gastroenterology area, can work together collaboratively to create, really, a successful program in integrated, precision cancer management. I think this is certainly the first time that we've had husband and wife on Functional Medicine Update, and the first time that we've really had a dual perspective for a clinical target. I want to thank both Dr. Vashis for being present for this discussion because we consider this an epic tip-off for this mini-course that we're going to be doing over this next several months in 21st century cancer therapy, so welcome to Functional Medicine Update.

GV & PV: Thank you.

JB: How did each of you come into this field? You know, there is always this interesting path that takes us into where we end up, and we may not have planned to be there from the very beginning, but by a series of events we end up being experts in a field that maybe we weren't initially intending. How did both of your paths lead you to this place at Cancer Treatment Centers of America and the positions of authority that you're in?

GV: I started my practice as an internist in 1992 in the Chicagoland area, and I worked for Midwestern Regional Medical Center, which is now known as Cancer Treatment Centers of America. So I always had an interest in oncology, especially when I was doing my residency and training. And when I started practice and began to grow the practice and began to diagnose cancer in my patients that I had already developed a relationship with, I became more and more interested in cancer and its treatment and management. The hospital then kind of phased out its medical/surgical program and became exclusively a cancer treatment center, and at that point in time I was already onboard as an internist, so I was offered a position to work with cancer patients at the hospital. And since I had already had an interest in oncology, I took up that position about 11 or 12 years ago. What I do now is see all the new patients that come with the diagnosis of cancer and work them up and get them ready to see the oncologists, so that's how I became interested in cancer care.

Patient-Positive Cancer Care Begins with the First Appointment

JB: What I have learned, Glynis, from your work and that in collaboration with Pankaj, is the incredible patient-positive reputation that you have developed. Your presence almost precedes you with the patients that I had the opportunity to talk with when I was visiting the facility. It's quite amazing what you have done, both in terms of treatment and setting a tone and a mood. We're going to get back into that because I think there is a whole social matrix that interrelates to cancer care and cancer treatment that you seem to have really done something uniquely positive in setting the right environment.

So Pankaj, how about you? What led you—as a gastroenterologist—into this area?

Cancer Patients Have Complex Metabolic, Nutritional, and Emotional Needs

PV: My training in gastroenterology was at the University of Michigan, and during that time—this was in the 80s—nutrition was a pretty strong portion of our training, and the University of Michigan initial work on metabolic support was actually published out of the University of Michigan, so I always had that natural interest in nutrition besides being a gastroenterologist, and so Glynis and I, we both came out here in ’92. I also started my practice as a gastroenterologist in the community. People don’t recognize it, but CTCA was at that point a very small, little hospital with about 20 beds and also the med/surg hospital. So I started working there and obviously you know our chairman very well. I met with him with Glynis and I saw his vision and was excited about working more and more with cancer patients, and so over the last 20 years I phased into taking care of mostly all of GI malignancies. Unfortunately our patient population is mostly complex and advanced patients, so their needs (metabolic needs, nutritional needs, emotional needs) are very different and [more] challenging than dealing with a healthy population. We learned very quickly how to manage those patients and we developed a very robust integrative cancer program incorporating all of the things that you and I believe in. And then I got more and more interested in nutrition and started studying more on the role of metabolic support, nutritional interventions, and quality of life, and we’ve got some good publications coming out within the next couple of weeks showing some of the outcomes from intervention. I think with that and GI as my background, everything goes with the gut. It’s been a fascinating ride for both of us.

JB: Well I think it’s been an important ride for the whole field of advancing cancer therapeutics. What you’ve done, and the way you’ve described it—and I would have to say you’ve very politely understated what you’ve accomplished over the years—is taking a conception of an idea of how to evolve cancer care and cancer treatment, and you have just continued to evolve it over those 20 years to really be, I think, a model for what is going to be seen as the premier way of approaching this complex nature of the disease that we call cancer and the psychology that is interrelated to it—the sociology as well as the medical and physiological effects. I want to get into that a little bit more because I think what you’ve done is nothing short of remarkable in evolving the program over those years. As you’ve watched this field advance—and it certainly has made some extraordinary advances over those two decades; in fact, I was just absolutely enthralled by this wonderful public television series that is co-sponsored by CTCA, The Emperor of All Maladies, which is Siddhartha Mukherjee’s wonderful book, which to me is one of the great pieces of medical literature that has ever been written in English. I think what it really lays out is a history of cancer therapy in the United States, and it also opens our minds to how remarkable the evolution of your program has been as kind of a leadership. What kind of training do you feel is important to keep abreast of the extraordinary changes that are occurring in this personalized, integrative cancer therapy area? Because it seems like it is ever changing.

GV: I kind of believe that the training should begin in medical school and residency programs, because as far back as I can remember, there was not enough emphasis placed during our medical school training as well as residency training on personalized medicine. We always were taught how to diagnose disease and then treat it, but the pre-disease state (the wellness state) was never emphasized: lifestyle changes/modifications, dietary modifications, all of that I feel is not emphasized in school, so I believe if we ever want to make that much of a difference we should really bring it out in medical school training and in residency training as well, and functional medicine and personalized medicine training should start

there.

PV: I totally agree with Glynis. That's one thing that we are now more aware of—the impact of obesity, for instance, or hyperlipidemia, or eating habits (plant-based versus meat-based and the impact of red meat)—all those things we are seeing now because we are seeing the consequences of that, I wish we had looked at it years ago, and it's never too late. We are still facing this tremendous problem with kids now—obesity in kids and the eating habits in kids—so I think proactive intervention. The thing is most of the healthcare costs and pharmaceutical companies are so much involved in building drugs that will take care of diseases that they don't feel there is any need for us to look into why they even get it. I think that is where the whole healthcare system needs to recognize the importance and give value to that is what we both feel strongly about.

How Has the Treatment of Gastrointestinal Cancers Changed Over Two Decades?

JB: Well, thank you. I know that there are many of our listeners of Functional Medicine Update who are strong students and believers and even practitioners who believe that the immune system of the intestinal tract (the so-called gastrointestinal-associated lymphoid tissue) is extraordinarily important in communicating the messages from the outside world, like diet and the microbiome, to the inside world of our body, and clearly as a gastroenterologist you're right at the cutting edge of that particular association. How have you seen changes over the last 20 years in the whole field of how we view cancer and the specifics of the gastrointestinal system as it relates to malignancy?

PV: I think the biggest change I see—not even [over] 20 years but more so in the last decade or last six or seven years—is how much more we have learned about the gut microbiota. I mean we used to always know that bacterial growth—that the symbionts in the GI tract—really had a role to play, but not until recently when we started getting a lot of genomic identification and sequences that we are getting more and more aware of the actual role of gut microbiota, and I was at the clinical nutrition week, which is a large nutrition meeting up in California and one of the presenters blew my mind and said, you know, the gut GI surface is 200 meters square in surface and the skin is only about 1.5 meters square and yet millions and millions of dollars are spent in identifying skin-related problems because you can see it. And so knowing that there are almost trillions of bacteria in the GI tract, I think it's very fascinating and now we are seeing more and more studies coming out about the immune system (how it plays a role). For instance, the role of inflammation in the GI tract treated by bacterial-producing inflammatory mediators like interleukin-1, TNF-alpha, interleukin-8, prostaglandins, and how does inflammation play a role in not only cancer but in other conditions.

Autism has been now shown to have some relation to the gut microbiota. We have incredible data now coming out in the GI literature about the role of gut microbiota in inflammatory bowel disease. You know, the great example is H. pylori, a bacteria that has been known to cause stomach ulcer but there is a strong relationship between H. pylori and inflammation it produces and lymphoma. For instance, the mild lymphoma can be cured sometimes just by treating the bacteria.[1] So this kind of strong relationship between the gut bacteria (the so-called good bacteria, the probiotics) and the role they play in chronic inflammation and modifying the immune system by producing all the mediators, and so we are getting more and more aware of the roles. I think that's the most fascinating part—the gut microbiota. I think the next few years is going to be even more exciting the more we look at the studies showing the impact of that on different disease processes, including cancer.

JB: So Glynis, when you are speaking with patients, do you have a difficult time with them understanding this diet/gastrointestinal function connection to the immune system as you're helping them through being advocates for their own health? Is this an abstract concept for most people, or do they kind of at some level understand the importance?

GV: Actually the patients that do come to us, they do a lot of research. I guess they go on the Internet and get some information. Well, yes and no, because sometimes there are patients who are very interested, and then there are others who really don't have a clue. We try our best to give them a little education and talk about it. It all depends on their interest as well.

Integrating Genomics into Cancer Care

JB: You know, we're kind of in this age of genomics right now in which we're all being educated as members of our 21st century society about what genes do and don't do and how they are unique among different people in the way they are expressed. This obviously is having an application to cancer therapy and personalized medicine. How is this being interwoven to the programs you are doing and your discussion with patients?

PV: I think at CTCA we have really gone far beyond what the norm is recommended as far as genomic testing is done. CTCA has invested a significant amount of resources and finances in continuing to help develop the specific tests to define genome. You're very right, each patient's gene expression is different, so lung cancer in one patient will not respond the same way in another patient and we're already finding out there are so many targeted therapies that are available. So many of our patients, by the time they come to us, if they have already gone through some first-line treatments and obviously they failed, we are doing genomic testing predominantly on most of those patients. We get some tissue and we do genomic sequences and identifying different targets from them, and then, because of the barrier between cancer types we treat those patients depending upon what targets they identified with. And Glynis is really involved a lot because she is the first person to see them. I'm sure she can speak more on that.

GV: Ideally when a patient comes in to us it could be either a very newly diagnosed patient or someone who has been through several cycles of chemotherapy, so for both of the types there is a great interest in doing genomic testing on them. Right from the get go we talk to them about it, and some patients do know. I mean, they do have some knowledge of what genomic testing is all about and they are very, very interested because for everyone, they want to beat the cancer and to do well, so they are very, very receptive and all I have to do is talk to them about it and say we are going to send some of your tissue for genomic testing and based on those results we will be able to have a better understanding of what is causing your cancer and what are the genetic mutations, and if there are any and we can find some targeted therapies to help you, we'll go for it. And we find a lot of receptive patients. They really are keen on doing that.

JB: So this discussion we are having right now is what I would call the high technology part of therapy. It's the front-edge of the evolving science in cancer therapy. And one of the things that I've been very amazed to see that you've been able to do is to couple that high technology, leading edge development with what is called high touch. And you know there's this old concept—John Naisbitt—high touch and high tech have to go together to be successful. How have you been successful in integrating this concept of

high touch—this personalized approach that is not just through technology but it's through counseling, and relationship-building, and nutrition and lifestyle advice. How does that actually work within your facility?

The Cancer Treatment Centers of America Care Model

GV: Thanks to our chairman, Mr. Stephenson, who had this vision of what cancer care should be, primarily because he felt his mother did not receive it when she needed it, CTCA has been the pioneer in terms of offering integrative cancer care and personalized medicine to patients. And so we have a very robust department: nutrition, naturopathic doctors, mind/body medicine, Reiki therapy, massage therapy, chiropractors. Whatever it is that we can do to improve patients' well-being overall is offered to them right from day one when they come in. Typically when a new patient comes in I see them, literally as the face of the hospital, because I am able to tell them what they can expect to have from us. So it is always all about doing the traditional therapies, but staying at the cutting edge with the genomic medicine testing, and also offering them everything that can make them feel that they are having treatment in a nurtured environment. I do tell them this is going to be very different from what you've already experienced at home. Even when they meet with me they already know that there is a difference in the hospital.

PV: I think that I can stress also that in the nutrition department—because that's the department I head—you can imagine we have one dietitian per physician in oncology. I mean, that's unheard of. We have 16 dietitians; that, basically, would be what you would see in a thousand-bed hospital. We have less than 40 beds and we have 16 dietitians, so that tells the commitment we have. These are nutritionists who are well-trained not only in metabolic support, but in understanding metabolism. They are all certified (metabolic support certification and oncology certification). So each patient is assigned a dietitian and a naturopath from day one and they basically see them on every visit, they follow them while they are at home, they get their emails, their phone numbers. Unfortunately we have two extremes of patients. We have patients that come significantly malnourished. We have totally different needs for that group of patients where we get very aggressive with enteral feeding, PPN, IV nutrition. And then we have another spectrum of patients who are prostate cancer patients, breast cancer patients, who are early-stage and more so having issues with obesity and poor lifestyle prior to coming to us. So we have different personalized treatment. For people with metabolic syndromes, for instance, we work with them. As you say, anybody can do a genomic test and give a targeted therapy, but what is so unique about CTCA is that while we do that we also have incredible supportive care that we give to our patients.

JB: You know, I was very impressed with the research that you've been able to do while you're heavily and primarily engaged in clinical services and clinical support. Your number of publications that you've been actively involved in over the years is quite impressive. What nutrients and what areas have you found through these explorations that stand out as problem areas that are found in many of your patients?

PV: I started getting interested in vitamin D about 2007/2008, when the initial data started coming out, more of the epidemiological data. There is some relationship between low vitamin D and certain cancer types, mostly the GI colon cancer was the initial one, prostate, lung. That's when we actually started almost checking everybody for vitamin D levels. We did an initial interesting little study that was a research master's study for one of my dietitians on just picking 50 of our female employees at Midwestern and 50 patients with breast cancer and just check randomly their vitamin D level. It was shocking that—well, because are in Chicago maybe, we don't get much sunshine—but 70 percent of our employees…close to 70 percent were deficient and in the patients it was close to 80 percent, so there was

not much difference. That's when I started getting more interested and then we started looking at vitamin D.

We actually do vitamin D levels on every patient that comes to us. It is part of the initial nutritional panel that we do that includes vitamin D. We start correcting vitamin D. Initially we have shown the impact of vitamin D in colon cancer, and then we started noticing that just because we supplement vitamin D in these people doesn't mean that they normalize equally, so we published that on different cancer types and how they respond to supplementation.[2] This most recent article that we presented—this one published March 16 in PLoS One—is mostly on vitamin D in advanced cancer. What I was trying to show is that, yes it is important (vitamin D), but it is not that if you get diagnosed with stage 3/stage 4 cancer, if your vitamin D level is low, the damage is done.[3] That's why functional medicine and personalized medicine is so important. It's a lifestyle thing: make sure your vitamin D is good when you are in your 30s and continue to maintain that high vitamin D level and prevent the development of certain cancers. I think that is one of the ingredients that I've found that I've studied enough to show in colon cancer, lung cancer, and prostate cancer—these are the three main cancer types I have looked into.

Another very interesting thing that Gynis should actually get credit for is she started doing vitamin B12 levels in a lot of the patients because of concern of neuropathy from induced chemotherapy. She called me one day and said, "You know, I don't understand why all of those patients have vitamin B12 levels that are so high." And it's not that those people are taking vitamin B12 supplements—not that they are taking it but still they end up finding it high. There are studies that show that many times solid tumors secrete vitamin B12, which impacts B12 levels and you may get false positive normal B12.[4] So we studied nucleations. Methylmalonic acid, in particular, is a very sensitive indicator for B12 deficiency and we found that higher levels of methylmalonic acid was there in patients with normal B12, so not going into the details of the study but that's another thing that we found out—a nutrient that is low in about 16 to 18 percent of the patients having even normal B12 levels. Those are the two things that I have had interest in, and obviously we brought in calorie malnutrition and cancer cachexia and sarcopenia—those are the other things that we are looking at.

JB: Yes, and I think you touched upon a very important connector there: states of inflammation, which are—as you mentioned—associated with malignancy, induce, then, alterations in the myocyte (the muscle cell) to lead to apoptosis and lead to loss of muscle mass, so you get this sarcopenic situation, and also it is clearly tied with appetite suppression and nausea, so it's like a dog chasing its tail; it tends to break that loop where it just gets worse and worse. And I know that you have—with your dietetic and nutrition intervention groups—you've got a lot of attention that you pay around that problem, because as an individual loses muscle mass their overall vitality and their immune system function is adversely affected as well.

PV: That's correct.

The Unique Needs of Female Cancer Patients

GV: Glynis, I know that—having been to the center there in Illinois and being very impressed with both the staff and the advocacy of the patients there—you have a lot of female patients. What are the unique features—if any, do you feel—as it relates to cancer treatment in women? Are there certain things that differentiate male and female patients in the way that you approach either? Well, obviously women might

have breast cancer and men would have prostate cancer—that's obvious—but are there differences in the way that you approach the discussion or the intervention with women versus men in the center?

GV: I think that for women who come for cancer treatment there are a lot of specific issues and I think they are very related to either their socioeconomic status or just cultural issues. For example, we would see breast cancer patients who have been in some kind of a denial. They felt a lump possibly three years ago, or two years ago, and have done nothing absolutely about it. And even when it fungates and breaks through the skin, or if the breast is literally falling off—I mean, we've seen all those kinds of patients—and you always sit back and wonder how can these women go through life and know that something so terrible is happening but don't do anything about it? I don't know what to say. I think maybe men are more dominant in some ways than females…I think it is possibly cultural or socioeconomic. I think they do not seek treatment or…I don't know if they are treated differently when they come in, but not at our institution. We have always wondered why women are so late in seeking treatment. I think that is one of the biggest issues that I see that is really specific to women.

JB: That's a very interesting observation. Again I want to commend what you all at CTCA are doing, because I've noticed recently a very direct public information program that is being sponsored by CTCA to heighten and increase the relative understanding and sensitivity people have to these problems so they can get on top of it early versus late. I think that advocacy has huge benefits in terms of the potential of arresting cancer and putting a person back into good health.

Let me ask you—this is a difficult question and I think all of us in our chosen professions should ask this question of ourselves periodically—and that is: what do you consider the biggest obstacles or challenges that you face in the implementation of the personalized program that you're advocating? It's such a forward-thinking and leadership-related program, but undoubtedly it meets all sorts of levels of resistance that you have to overcome at different points. What do you consider the biggest pitch points and concerns that prevent it from really taking off and being what you think it can be in terms of general treatment of choice?

GV: I think that at this point in time we really would be getting some pushback from insurance companies on genomic testing—I think if it ever has any negative connotation to it, it will always be because the healthcare dollar is shrinking and I think that would be the major factor that would be a reason for not doing the test in some, or if we found targeted therapies as a result of doing genomic testing, then we're not allowed to use it simply because the use is off-label, for example, or the insurance companies wouldn't pay for it. So I think that is the biggest deterring factor in us moving ahead and doing wonderful things with our results from genomic testing.

PV: I think I will say that I think the other component of that is people in the field of mainstream medicine recognizing the importance of other components of treatment—the role of lifestyle changes and emphasis on supplements and emphasis on probiotics and nutrients and emphasis on metabolic syndromes and other things…mind/body…all those components of treatment. Unfortunately not enough resources have been put into those fields. We have been fortunate enough to be able to support some of those fields by us knowing that many of the services we provide are not reimbursable. The biggest hurdle and obstacle I see is lack of recognition by mainstream medicine people to understand the importance of other modalities of treatments besides just chemotherapy and surgery and radiation therapy in oncology in particular. I think the burden is on us, for us to show to the world the impact of that, and that's why we

are trying to do a lot of clinical trials to show that these therapies do make a difference. I think that's another big obstacle.

JB: Yes, I really want to commend what you're doing there because I've noted that recently you're really starting to participate in some of these national oncology meetings and reporting outcomes. As you mentioned earlier, you often get the sicker-than-sick patients that have already failed phase 1 types of traditional therapies so they come there already having been a failure of some kind of intervention with chemotherapy or whatever. And I think it is really meritorious that you're now presenting data that relates to your outcome because I think numbers often speak for themselves and when people start seeing the results that come out of your integrated precision approach I think it will stand up and speak for itself. It will be a real strong determinant for other people.

GV: I think our patients, too, are our best advocates. They come to the hospital, they see the difference, and they see the difference in how it makes them feel. And just knowing that they have all the nutrition support and back-up, if you see them for the second visit and you see that they have really renewed vitality and their fatigue is better, so a lot of the quality of life issues are made better, and I think they go out and are able to tell the world. Because very often I hear patients say, "I asked my doctor about what should I eat and they said cruel things—like, 'Eat whatever you want, it doesn't really matter at this point.'" I mean, physicians have told patients this. And this is hearsay, but I hear it all the time. And then when they are able to sit down with a nutritionist, who will go over the whole nutritional screen that we do and tell them that they need to take vitamin D, or we have to replace some iron, and when they feel better within a few weeks, they are our best mouthpiece. They just go out and tell everybody in their neighborhood and so it goes on.

JB: Yes, I think that's wonderful. There's nothing like the proof in the results, particularly with cancer as such a dominant concern. Once people start seeing a benefit, your reputation is spreading rapidly. Let me finish up with one question which asks you to look a little forward, which I think you can do in your perspective because you're at the leading edge in the evolution of cancer therapy and cancer care. What are your views about where the field is going? If you were to look out, say, five years—that's about as far as we can look forward, maybe, five to ten years—where do you see things going based upon the trajectory of change and how you see things evolving?

Personalized Medicine Will Revolutionize Cancer Care

PV: I think that the biggest change we will see in the next five years is exactly what we discussed already: personalized medicine. I think a time is going to come in our kids' generation where they will be laughing at us and say that you guys used to give the same chemo to everybody. I think the genomic testing and identifying specific targets will be done. Now we are doing it in patients who have failed the first line. I think that may become the mainstream. We're already doing that for a lot of cancers. We are doing testing for colon cancer, for mutation up front, to see if they could benefit from certain chemotherapy, so I think that is to me the biggest feature. I think incorporating that, people are going to get more and more recognized as there are more publications of the impact of personalized medicine in terms of nutrition and supplements and lifestyle changes. I think a combination of those two would really be the forefront future over the next five to ten years.

GV: I think genomic medicine and personalized medicine has already revolutionized cancer care, and I

think we are all moving in the right direction.

JB: Well, Pankaj and Glynis, I want to thank you both. I think this has just been a remarkable snapshot. I know there is so much more that we could talk about from the breadth of experiences that you've had, but I think you've painted a really optimistic picture and one in which there is patient involvement, there is a broader spectrum of management of the patient than just managing their tumor alone. You've given us a sense of what the landscape is of the evolving cancer care in the 21st century. I want to thank you both. I know it's a difficult job. I think that people who are engaged in cancer therapy are warriors in a very, very complicated area of intervention and I think the way that you bring yourselves to your jobs and the way you're respected by your patients is a demonstration of not only your ability to manage a very challenging environment but the grace in which you do it. I think you both for being available to talk this through. Pankaj and Glynis, thank you very, very much for being part of Functional Medicine Update.

GV: Thank you for allowing us to share our thoughts and we really appreciate it.

PV: And, Jeff, I have to say that we had an amazing time at your conference. I think that was an eye-opener for both of us because we settled outside our comfort zone, so to speak, but the amount of things that are happening out there and that was a very well-organized conference, so kudos to you and your team.

JB: Well, thank you, and we look forward, hopefully, to having your participation in our Personalized Cancer Therapy 2015 version that's going to be in Chicago in late October. We're looking forward to your voice and contributions to that meeting as well. Thank you.

GV: We're looking forward to that, too.

JB: I wish both of you the best and thank you for being with us.

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