



Considerations and Challenges in Treating Elderly Patients with Lung Cancer, by Dr. Rogerio Lilenbaum

Dr. West:

Hello, and welcome. My name is Dr. Jack West, and I'm a medical oncologist in Seattle Washington and the Founder and CEO of GRACE, The Global Resource for Advancing Cancer Education. Together, we're partnering with the LUNGeivity Foundation to bring you today's program.

I'm very happy to welcome Dr. Rogerio Lilenbaum, who is a medical oncologist and long time friend for more than a decade now. He is currently the Chairman of the Cancer Institute of the Cleveland Clinic in Weston, Florida and he's been in South Florida for a long time now. He leads multiple national trials and really has been a leader in the field of lung cancer, and specifically one of the topics that he has led several trials in and speaks everywhere about is on the management of elderly and poor risk, more fragile patients.

The fact is that these are patients who we see a great deal of in clinical practice but are relatively underrepresented in clinical trials so it's certainly something that all of us, patients and caregivers and oncologists alike, need to know about.

With that I'm going to turn it over to Dr. Lilenbaum and he will lead us through a tour of some of the key issues that we need to think about for managing older patients with lung cancer. Thanks Rogerio for joining us.

Dr. Lilenbaum:

Thank you very much Jack for the very nice introduction. It's my pleasure to be with you and your guests tonight and talk a little bit about elderly patients with lung cancer. This is an exciting opportunity and again I appreciate the invitation.

So, what is an older person and what does it mean to be 80 years old for example? This is a picture that illustrates two patients who have the same chronological age, 80, and yet as you can see have vastly different functional capabilities, which is pretty much one of the main points that I would like to make tonight, that chronological age is not the same as functional age. So, as we oncologists face elderly patients with lung cancer we tend to focus more on the functional age and not so much on the chronological age.

Now, this is not an uncommon issue for us medical oncologists. In fact more than 50% of the patients with lung cancer in the United States will be over the age of 70 which is the cutoff that we typically use for elderly patients. A while back it used to be 65, some people believe that it should be 75. I think most clinical trials and publications as of now agree on an age of 70 or older to classify elderly patients. So, 50% or more of our patients will fall into this category.

Now, despite this, the representation of elderly patients on clinical trials falls way below 50%. It's getting better as you can see by this slide, it goes from 15% in trials that were conducted mainly in the late 80s and 90s to 26% in trials that were conducted perhaps within the past five or seven

years as ECOG 4599. So we've made some progress, but we're still far from getting a fair representation of elderly patients on clinical trials.

This is one of the main problems we have when we try to interpret the data, because even when we have a substantial number of elderly patients, these are likely to be carefully selected patients and not necessarily the patients that we see in our clinical practice. Why is that the case? Why do these patients get frequently excluded from clinical trials?

Well, there are some misconceptions that we need to address, and I'm sure there will be some questions about this at the end. One is that elderly patients have less aggressive disease and that is not documented anywhere, so we have no documentation that that's the case.

Two, that elderly patients do not want to be treated aggressively, and again there is no documentation in the little data that is available to us today about patients' wishes that that's indeed the case. In fact our personal experience and the few publications on the subject have shown that elderly patients want to be treated at least according to standard guidelines.

Elderly cannot tolerate aggressive therapy. Well, I think that depends. It depends on the patient that we're talking about and depending on the therapy that we're talking about, but we shouldn't automatically assume -- and again that's an assumption that has permeated the field of oncology, both on the physicians' side and on the patient's side for a long time -- that elderly patients cannot and should not receive aggressive treatment.

Then lastly that elderly have different wishes with respect to prolongation of life and that famous saying, "Oh doctor I've lived my life and I don't want to deal with this and I don't want to be bothered with chemo or radiation or other issues." And it's possible that on occasion we will face patients who have legitimate wishes and do not want to subject themselves to treatment. That's actually true for younger patients as well so age is not the major problem here.

I have not met a 74 or 76 year-old patient who wants to live any less than a 64 or 66 year-old patient. So this is, again, a misconception that we need to address in clinical practice.

Now, there is a recent publication by Davidoff and colleagues in the JCO, and this is last year, looking at patients aged 65 and more, Medicare patients on the SEER database that participated between 1997 and 2002. And as you can tell from the indices, it's a somewhat complicated picture, but basically what it says is that 75% of these patients did not receive chemotherapy and these were patients that by and large were eligible to receive treatment. So, only 26% of these patients received adequate treatment if you consider that a standard management for these patients, and then the breakdown as far as what they received is on the smaller circle.

So, this is the first line setting, B is in the second line setting and the exact types of chemotherapy that they received. So, a number that is vastly inferior to what you would expect in the younger population or the general population for that purpose.

So, when we're looking at this from our side, there are two important principles. One is we don't want to harm our patients so it is true that we need to be attentive and careful to how our elderly patients function and therefore make a decision about whether or not a certain type of treatment is adequate for that patient because we don't want to cause excessive toxicity. That's important and that's what's almost always in the mind of an oncologist facing an elderly patient.

On the other hand, and this doesn't seem to be as prominently featured as it should, is by automatically assuming that that patient cannot tolerate standard treatment. The oncologist may end up denying that patient the benefits of a more aggressive therapy and therefore a superior outcome. So it's important to balance these two major principles and the way we do this in practice is we look at something called performance status. We look at comorbidities and we'll talk about comorbidities in just a moment, overall frailty which is hard to quantify, and obviously we discuss patients' wishes and expectations.

So, there is something called Activities of Daily Living. They are basic self care skills; dressing, bathing, toileting, transfer, cognizance and eating. So, based on this scale you have a fairly good assessment of a patient's capability as far as functional status, and as you will see in subsequent slides it does correlate with their ability to be treated.

Then there is a higher function, order function in that way to maintain independence in the community and they are called Instrumental Activities of Daily Living. They include shopping, housekeeping, transportation, able to make laundry, telephone, finances and medication. So handle all of these issues alone or somewhat independently.

So, there's an interesting publication that was done by the Italian group and published in the JCO in 2005 in which clearly they show that patients who had difficulty with the instrumental activities of daily living had a worse outcome when treated with chemotherapy. So, not so much performance status which was actually quite uniform in this trial, comorbidities was a separate analysis but just the activity of daily living was able to separate patients into a better and a worse prognosis category when treated for lung cancer in the advanced setting.

So, this is what it shows here, intermediate and then worse, so a clear separation between the worse category and the other two categories in terms of their score. This is important information. Again it is an instrument that's known to most physicians and yet we don't typically use this instrument in clinical practice and it's important that we bring this up for discussion and sometimes our nurses can help us with this assessment.

Comorbidity is a different aspect of functionality. The definition of a comorbid condition is an independent concurrent health condition which may be a predictor of survival and also of resource requirements. So again when we face someone with very severe heart disease or very severe lung disease in the setting of cancer, we're going to ask is this patient going to die from cancer or another medical problem.

Now, that's a question that applies mostly to patients who have early stage cancer, so as I said before somebody with very advanced heart disease or lung disease who is diagnosed with a small lung nodule or somebody who let's say moving from one cancer to another, small breast cancer, does it make sense to treat that cancer or the prognosis of this patient and life expectancy of this patient will be determined primarily by the other conditions, the comorbid conditions.

But for us what's more frequently an issue again in our assessment is the second question. Is that will these other medical problems limit our ability or their ability, the patient's ability to tolerate chemo or our ability to deliver that treatment.

So, we all know that comorbidities will increase with age so you see this very clearly in terms of number of comorbidities on the left and the age ranges.

More importantly, and this is an important piece of information again from an Italian group, showing that high comorbidity scores will correlate with this continuation of treatment and if you have a Charlson score which is a valid and reproducible score that quantifies comorbidities of greater than two, then the likelihood of discontinuation of cancer treatment is almost 80% to 90%. That is an astounding number so it's important to keep that in mind when we again decide what to do with our patients.

Then lastly, it's not just about tolerating treatment, it's also about overall prognosis and patients who have worse comorbidities will have worse prognosis and an inferior life expectancy. This looks very well illustrated.

This is probably the most recent publication looking at this. It comes from a Canadian trial; NCI-C stands for the National Cancer Institute of Canada in which they looked at over 1200 patients. 774 of them had advanced disease, about a third of the patients were 65 years of age or older, and then 31 of the patients had a Charlson score index over zero.

Only a few percent of the patients had performance status two which is another scale that we use to define functional status primarily however based on cancer symptoms. So, the finding was that age alone, just like we said at the very beginning, age; chronological age was not prognostic for overall survival. Comorbidity was, so it's not again the age it's what the age causes in terms of different diseases and different conditions that will interfere with the patient's ability to be treated.

So, let's try to apply some of these concepts to some of the settings in which we see patients with lung cancer, and the first one is adjuvant chemotherapy. So, most people on the call may know that sometimes patients who undergo surgery for early stage lung cancer will subsequently receive chemotherapy in an attempt to decrease the likelihood of a relapse and therefore improve the cure rate. It's important, however, to understand that the trials that we have, and this is a slide that I borrowed from Dr. West, is the trials that have been done for adjuvant chemo showing an improvement in survival included patients that don't necessarily or don't often reflect the patients that we see again in our clinical practice. So not everybody is able to receive those treatments.

There is one trial that looked specifically at elderly patients. This is was a Canadian trial, one of the landmark trials in adjuvant chemo and there was a subset analysis of elderly patients. They used 65 in this case as a designated cutoff and 32% of the patients were 65 years of age or older and these are the demographics. They were pretty similar in terms of older versus younger except for the histological type and so it was different. Older patients had more squamous cell carcinoma as opposed to younger patients and the performance status tended to be worse in older patients. I wonder, just asking a question, if this is really performance status or comorbidity or functional status as we define by activity of daily living.

So, these analyses show the following: that overall regardless of treatment the younger patients actually did better. There was a trend in favor of better survival in the younger population. Now, when you look at the older population and then specifically at those over the age of 75, which most of us would really classify as the elderly subset, then the survival was significantly worse and I think that's an important observation.

When we start looking at elderly trials that include patients from age 65, we're going to see a lot of signals that actually overlap with younger patients because 65 year old patients are younger patients, and so are patients that are in their early 70s provided that they don't have major comorbidities and they are capable of performing their activities of daily living including the instrumental activities.

So again it's really the older, older category that we are very concerned about and as I said in one of our slides at the beginning, more than 50% of our patients will be over the age of 70 and probably around 35 or so, and we don't have a specific number in that respect, but the most recent statistics are 35% or more of those patients will be 75 or older.

Now when those patients were treated the benefit seen for chemotherapy in the elderly was pretty much the same as it was seen in the younger population so it mirrored the same benefit that was seen in the overall population and this what you see here on the survival cusp. So, on the left you see the younger patients, on the right you see the older patients, so the magnitude was even a little bit more significant. In the elderly populations the numbers obviously are much smaller.

Based on this observation and others, I think it's important that we go back to one of those principles that we discussed previously, just a few minutes ago. It's important for the oncologist to make an accurate assessment of a patient's ability to tolerate treatment without a doubt, but on the other hand it's important also to understand that a patient should not be automatically denied treatment that can lead to a superior outcome just because of age. And I think that the trial by Papi and others illustrates this principle.

The second setting is patients with locally advanced disease and RTOG9410 was a very large trial that used three different – compared, in fact, three different ways to approach these patients. One was, and it's the bottom of the slide, sequential chemo followed by radiation, concurrent chemo and radiation to a certain dose given once a day, and then concurrent chemo and radiation given twice a day. So, what Dr. Langer did is he went back into this very large trial and looked at the elderly populations again with a cut off this time of 70 years of age.

So, 104 only were classified as elderly patients so you can see it's less than 20% of the patients. There as more toxicity in the elderly patients as one would expect and this is by the way a very common finding among trials that focus on elderly patients. This is true not just for blood counts issue but also esophagitis and as we will see later also some degree of pneumonitis. However, the elderly patients, and we will see this in terms of the overall survival, had comparable benefit from the treatment that gave concurrent chemo and radiation with once a day schedule as the younger patients.

In other words, this trial showed that in the general population the patients treated in the concurrent arm with once a day radiation, the green line; did better than the others and that was true also for the elderly patients. That's an important – again the same observation that was made for the adjuvant trial showing that in patients with locally advanced disease elderly patients if selected appropriately will do just as well.

So, here are the conclusions from Dr. Langer; elderly patients who have similar survival rates they do appear to benefit from more aggressive regimens, there is more myelosuppression, which is basically issues with blood counts, which sometimes can lead to clinical complications and other toxicities or side effects related to inflammation in the lungs and inflammation of the esophagus.

Now, the third setting is patients with advanced disease so the majority of our patients unfortunately that come to us in clinical practice will have advanced disease. So I just want to run some basic concepts of how we approach elderly patients with advanced disease. Again we looked at adjuvant patients, early stage disease and we looked at the Canadian subset analysis. Then we moved on to patients with stage three disease or locally advanced disease and talked

about chemo and radiation. Now we're going to spend a little bit more time and be more specific in terms of advanced disease or metastatic disease.

So, again when look at patients that are between 70 and 70 years of age, so the low range of the elderly population, if they have a good performance status and no major comorbidities, these patients do just as well as younger patients. They should not be treated any differently and that usually or most often implies a combination of drugs, and in this country we favor a carboplatin-based combination.

So, this is again a representation of several trials that looked into this issue. The MILES trial was a comparison of gemcitabine versus vinorelbine or the combination. The Swedish trial was gemcitabine versus carboplatin/gemcitabine. and then the CALGB was paclitaxel versus carboplatin/paclitaxel. These were, however, prospective subset analysis except for the MILES trial that was done exclusively in elderly patients.

And the MILES trial for one did not show an advantage for the combination, however it did not use a platinum based regiment. The Swedish trial and the CALGB trial used a carboplatin-doublet, and in both there was a pretty significant trend in terms of a median survival time in favor of the combination in the elderly population.

One issue that we have had to deal with both in terms of clinical practice, but also in terms of clinical research and design of clinical trials, is the fact that most elderly patients are often combined with patients with a low performance status or fail patients sometimes just because of age alone in what's then labeled as a special population - in other words, patients who traditionally were not included in previous trials of aggressive chemotherapy.

And I think it's become clear -- and if there's one contribution that clinical research has made to clinical practice in the past decade in this particular topic is exactly to show that these are not the same patient. An elderly patient is not automatically a patient with a low performance status.

So, this is one trial we conducted, in which patients that were both elderly and performance status two were eligible, and then when we separated those, so PS0 to 1 based on age alone, you see the median survival of 7.9 months, and then when we look at PS2, regardless of age, the median survival was 2.9.

In addition to this, there was another similar trial by Dr. Hesketh and his colleagues in SWOG that found exactly the same difference between age and PS. So in the blue line you see those patients that are elderly but still maintain a good performance status, median survival 9 months. Performance status 2 patients however, again of any age, median survival 5 months, so these patients should not be combined.

An elderly patient has issues that are different than performance status, so they go beyond performance status. If, however, an elderly patient has a performance status of two, then that usually trumps the age issue, and that's how that patient should be approached.

We have had in the past decade several new agents that have come into our armamentarium for the treatment of this disease and many of these agents are so called biological agents. We don't have a lot of data for the use of these drugs in the elderly cohort so one very important trial, the trial that actually led to the approval of bevacizumab, or Avastin, in this disease (ECOG) 4599 actually had a fair percentage. We saw in the beginning, I don't know if you all recall, but there was about 26% of the patients that were elderly patients even though the median age of the

elderly population was only 74. So, we're not talking about 78 or 82, just 74 and they were elderly patients compared to non-elderly patients.

What we see here was that in terms of efficacy there was a trend in favor of medium – of the Avastin term in terms of progression free survival. Because of the small number, however, this was not statistically significant and there was no clear difference in median survival as opposed to the survival difference that was seen in younger patients. I personally don't believe that it is accurate to say that Avastin is not active or efficacious or much less should not be used in elderly patients based on efficacy alone or based on this analysis alone.

My concern is that there was an obvious difference in several toxicities or complications when Avastin was used in elderly patients compared to younger patients. So, including, as you see at the bottom of the slide, TRDs stands for treatment-related deaths, and this is 6.3% versus 2.6% in the younger population which is a very high number for both patients and physicians when dealing with a disease like advanced non-small cell lung cancer.

So, again I think we ought to be very careful, very conscientious when we discuss the use of Avastin in elderly patients, but it's also very important, and I'm going to repeat this several times during this presentation, it's also very important not to deny these patients access to Avastin just because they happen to be 72 years of age, or 74 for that matter if they have no other major contraindications.

In terms of what we call tyrosine kinase inhibitors or EGFR inhibitors, this is a trial done at the Dana-Farber by Dr. Jackman, this was published a few years back. In elderly patients there were not selected by molecular criteria so these patients had a median age of 75, ranged from 70 all the way to 91. 50% of these patients were female. As you can tell again most of them had excellent performance status. 94% of these patients were either never or former smokers.

You can see here the response rate was 10% and then 41% disease control. Their time to progression 3.5 and the median survival 10.9; these are reasonable numbers. We don't have the breakdown based on molecular criteria. The number of EGFR mutated patients in this particular trial was actually not that high despite the smoking criteria, but clearly those who had mutated tumors did much better.

The other trial was the so called INVITE Trial. This was an Italian trial, and this was a phase two randomized trial. I actually like this trial better because it has a control arm of Vinorelbine. The other, the EGFR-TKI in this case is not Erlotinib or Tarceva, but actually Gefitinib or IRESSA which is no longer available in the United States. These are the number of patients. You get a higher percentage of performance status than we saw in the Boston trial. Still, however, not that high so the vast majority had a good performance status.

This is disease control rate; these are the toxicities at the end. As you can see toxicities will be very different when you compare a standard chemotherapy agent to an EGFR TKI. What's important to the bottom line is in the middle of the slide, there was really no difference between these two treatment strategies. So even for patients that were not selected by molecular criteria there was no difference between vinorelbine and gefitinib.

I have to admit that I find these results somewhat puzzling. I think since these studies were published there has been a stronger trend in the oncology community to select at least in the first line setting patients for Tarceva or Erlotinib who really have the mutation. Otherwise these patients tend to be, whenever possible, treated with standard chemotherapy.

Now, if we talk about the fact that we don't have a lot of data for elderly patients classified as anybody over the age of 70, we have almost no data for what we call octogenarians or patients over the age of 80. And the clinical practice out there is really very heterogeneous and it ranges from no treatment at all to sometimes single agent chemotherapy, or sometimes, as you just saw, Tarceva regardless of molecular selection.

So, there was a retrospective combination of two trials, the SWOG that we saw before. So, the two trials that we showed slides on in terms of the elderly versus performance status two, so we combined these two trials and selected a number of patients over the age of 80. So we had 49 patients or 21.5% were over the age of 80 in those two studies.

Then the median age was 82, all the way from 80 to 87. You can see just from the outset they were treated the same way as their younger patients although they were younger than 80 but still older than 70. So, I apologize if the slide is confusing, but the difference in response rate was significant. It doubled actually or it was half in the over 80 population, and again even for patients with good performance status the median survival was 11 months in those between the age of 70 and 80 and seven months in those over the age of 80.

So, I've been telling everybody since the beginning of this presentation that age is not a chronological factor and that we shouldn't look at a number, we should look at the functional status and the patient's capabilities and that's true. It's just important to realize that when you get to 80, over the age of 80, we are likely to see a more significant decrease in the patient's ability to tolerate treatment. We're going to see more comorbidities; we're going to see less ability to perform activities of daily living.

So, age in this case is not to be completely ignored or to be taken as face value as far as the number, but it is a surrogate for complications associated with treatment and to some extent a prognostic marker when you get to these extreme ages.

Now, just to get almost to the end in terms of advanced disease, this is a trial that we all believe has changed the standard of care. It was published just recently. I have the ASCO presentations, but it was published in the Lancet just a few weeks ago, and this is a French trial that was designed to definitively answer this question of a combination of drugs versus just one drug in elderly patients. As you can see here a range age from 70 all the way to 89, and the choice of chemo could be in the single agent arm either vinorelbine or gemcitabine. The combination was set, it was carboplatin paclitaxel and then patients who progressed went on to receive Erlotinib.

This is the response data. I think it's important that you look at this. The response data in the doublet was 29%, almost 30% versus 11% in the single agent. So a very, very, very significant difference in terms of response rate in favor of the doublet. Then in terms of progression free survival and this is an intention to treat analysis, the progression free survival doubled in the combination arm. It was 6.1 versus three months and the overall survival was also significantly improved with the use of a combination regimen; 6.2 in the single agent versus 10.3 in the doublet.

So, very robust, very unequivocal results in favor of the combination arm even in a population that was older than the average population that we see in clinical practice. Now, looking at the different subsets, the difference or the benefits seen for combination chemotherapy seem to apply to all of the subsets regardless of performance status lesser or greater than 80, histology,

smoking status, ADL or mini-mental status. So, these are findings that can be applied to a wide variety of patients that are seen in clinical practice.

Let's not forget, though that this has a cost and obviously every time we see positive results we have a tendency to forget or not pay too much attention to the toxicities and here you see that in terms of toxic death it went from a little less than 2% to over 6%. So it tripled in the combination arm and this is where it becomes tricky for the oncologist because this is what I was saying before. You want to provide your patient, regardless of age, with a more efficacious regimen, one that will probably lead to better survival and prolongation of life and without necessarily causing and detracting quality of life.

Now, when you face then a complication like this and there's death involved in the treatment it can be devastating, and I would say, I will go on the limbo here because this is not data driven, but I think it's exactly this type of data that curbs the use of combination chemotherapy in elderly patients because oncologists don't want to lose their patients to toxicity issues.

So, up until this study was published the ASCO recommendation was to use single agent. The authors of that study, the French trial, rightly questioned this recommendation and I hope and expect that the ASCO guidelines will reflect the findings of this trial in their next guidelines.

Now, the truth is we need to understand that despite significant improvements in outcomes, we still lose a lot of patients to this disease, and this process can be enhanced in many ways for the patient and for the family. So this trial is I think one of the most significant trials published in lung cancer recently. It actually was published in the New England Journal of Medicine and what doctors in Boston at Massachusetts General did was the following.

They took 150 patients with advanced disease and they randomized these patients to two groups; one called Standard Oncology Care. So, these patients would have an expert oncologist. These are very good doctors, Dr. West and I know most of them, and they provide the best possible care that a lung cancer patient could hope to receive. So, that's standard care and then these patients would only meet with a palliative care specialist upon request.

The other group was that a palliative care specialist would be integrated in that patient's care from the outset, from the beginning. They would meet every three weeks, at least monthly etcetera, addressing different issues that are not typically addressed by the medical oncologist.

What they measured was quality of life and clearly there was an improvement in quality of life for those patients assigned to the palliative care group. So, this was evident by any of the measures here, and this is at 12 weeks or three months into the trial.

Now, what was absolutely surprising, almost shocking, and this may just be a statistical fluke; we don't know, was that these patients in addition to having better quality of life, in addition to being able to address end of life issues in a more systematic matter, they also had a better survival. So, this is the very first time that this observation is actually made or at least this issue is raised. Can palliative, not chemotherapy, palliative care; management of pain, management of depression, management of weight loss and these other issues, when that's done in a systematic manner by a team of specialists in addition to the medical oncologist, can that lead to an improvement in survival? This trial suggests that it's possible. Survival was not a primary end point of this study so it's hard to be definitive about this but it's a pretty provocative observation.

So I want to finish with these treatment principles. I think by now the first bullet point is pretty obvious, I must have said this five or six times throughout the presentation; age alone should be a criterion for selection of treatment in advanced disease or adjuvant disease or locally advanced disease.

I don't think that we as clinical researchers should waste our time doing chemotherapy trials in patients aged 70 to 75 that have a good performance status and do not have major comorbidities or other issues with their functional variables. On the other hand, I think we should put a lot of resources in studying patients over the age of 80. This population will quadruple in the United States between now and 2030, and these patients will get sick, will have lung cancer and as of now we don't know exactly how to approach these individuals.

Optimal use of targeted agents, and I know we only approached two, the Tarceva, gefitinib -- the EGFR inhibitors -- and also the Avastin, or bevacizumab. I think we can't be definitive about this in terms of how to apply these agents to elderly patients. I believe that the recommendation here is the same recommendation that we make to younger patients. You ought to choose your patients carefully, make sure that the risks and benefits are very carefully weighed and then apply those principles to elderly patients as well recognizing that the toxicity is likely to be higher in patients over a certain age.

I think what is really missing from all this is that this entire conversation is based at the end of the day on what we call clinical judgment.

So when Dr. West and I see elderly patients in our practice, we use our experience, we use our knowledge and we try to understand the patient's wishes as well and we come up with an assessment. We come up with a recommendation, but we don't have really a metric that we can use in our clinics, in our visits that will basically tell us well, if you have X Y and Z or A B and C, then this is likely to happen when you're exposed to this type of treatment. Or if you don't have these then I feel more comfortable using perhaps these types of treatments.

So, this is where this field is going. There are going to be instruments that are validated, reproducible that will allow the clinician to use not just their judgment, not just their experience but actually a number, a score that we can then base our recommendation on. So, I think that's where we're going to be pretty soon from now. Thank you very much.

Dr. West:

We'll end the program here, with special thanks to the LUNGeivity Foundation for partnering with GRACE to make this program possible.

The question and answer session for this live program is included in a separate podcast. We hope this activity was helpful. Thanks for listening.