# Dr. Gerard Silvestri

## Lung Cancer Workup and Staging: A Pulmonologist's Perspective

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Intro GRACE, the Global Resource for Advancing Cancer Education, is pleased to provide the following presentation on Diagnosis and Staging of Lung Cancer by Dr. Gerard Silvestri, Pulmonologist and Professor of Medicine at the Medical University of South Carolina in Charleston. Dr. Silvestri spoke at the GRACE Non-Small Cell Lung Cancer Patient Forum in Seattle in September of 2009, a program supported by OSI Pharmaceuticals and Swedish Cancer Institute.

Dr. Silvestri: Thank you, Jack. It's really a pleasure to be here. I think all of the docs that are from out of town, we get the chance every once in a while to meet with lay-audiences and cancer survivors and it's an honor, it's an honor and treat because we just don't get to do this much. We spend a little bit of time with each of you individually in our office, but to get a group here so interested in learning, it's a great thing. Trying to make sure he gets the message out to patients and families is a terrific way to go.

You know, yesterday I was talking to a group of oncologists, you know, so I had to dummy-down my lecture, but now that I have a sophisticated audience I'm going to go with good science here today. And by the way, I don't want to hear any hair jokes, you guys. So I'm a pulmonologist, that's a lung doc. I don't know how many of you actually some people may have bypassed their pulmonologist. I see between five and eight new lung cancers a week in the cancer center in Charleston, South Carolina. It's all I do. It's all my research, it's all my patient care; it's everything I do within my university is about lung cancer and so oftentimes I also see patients who've had treatment for their lung cancer that have respiratory problems because of their treatment. So, that's one thing that I think a pulmonologist can be extremely helpful in. And what I do in my clinic is I see patients, I diagnose and stage them and then I deliver them to the appropriate service whether it be a surgeon or a chemotherapy doctor or an oncologist, or a radiation doctor; sometimes all three of them. So its really important to have that initial part of the evaluation. I'm going to skip the case, but this is a patient that has this mass in the upper left lung and it's sort of a large mass and when I see that, my first inclination is, is it cancer? If its cancer, what kind of cancer? And then the really critical part, where has it gone; has it gone anywhere else, because I'm going to show you in a moment, but stage really dictates treatment.

This is that CAT scan as opposed to the chest x-ray. You guys, you know, I actually take patients and show them their CAT scans all the time and, sometimes the picture is worth a thousand words and just so you know if you can imagine what a CAT does is slice you like a loaf of bread. So, if their head was behind their screen and their feet were out here we're just taking slices and that's the top of the chest up here and you can see the breast bone in the middle, these are ribs coming around, this is the left side of the person's lungs and this is the right side of their chest and that's the wing bone in the back and

there's the vertebral column. So, if the person's laying down we just looked at one individual slice of that loaf of bread and found this mass.

The next thing I look for is lymph glands and I think probably at some point in many of your discussions you've talked about lymph nodes or lymph glands. They're critically important and this patient actually had a few lymph glands that were right at the border of line of normal size. Why are lymph glands so important? They're the absolute place where we would stop and say, okay, you're eligible for this treatment or not for this treatment. And that's critically important because the treatments vary so much and I'll show you that in a second.

This is that PET scan. So this scan is different and you probably have all been through a PET scan; if not, you know, there might be good reason for not having one. PET scans are a bit unusual, right? So the CAT scan tells us is it there, is it not and it gives us anatomic details. Is it close to something? But it doesn't tell us whether what's there is active. And sometimes if you do CAT scans, if you did a CAT scan on a thousand peoples' chests, at least 20% of the people over age 50 would have some kind of something else there; wear and tear. We've all been through that and it wouldn't be cancer. So, one of the reasons we use this PET scan is to find out if what's there is metabolically active and you can see that in this patient that whole white bright spot and that's an old, old PET scan, but, it is metabolically active. The really good thing about PET scans, it can look for metabolic activity in other parts of the body; the bones, the abdomen, okay. So, we use the PET scans to not only look in the primary tumor spot and in the lymph glands, but also in other parts of the body.

One caution I would give the audience here is sometimes these PET scans can be wrong. If you have an infection or inflammation from for example radiation or if you have a pneumonia, you can have metabolic activity that's not cancer. And so it behooves you and your physicians to make sure, hey doc, you sure that PET scan really is the cancer that I have, either come back or in a different spot and if its important because it might really sway how we treat our patients.

So, the way we use this staging system and I'm not going to go into it in great detail is there's this TNM staging system. I promise you if you go on the internet this is what you'll find when you look up your sort of stage of disease. Docs might say stage III and the way we get to that is the tumor, what size and location it is, the node – is there lymph node involvement and where and not how many, but where and metastasis, has it spread outside the chest? And we give numbers to these three systems.

But the real important reason for you and why accurate staging is critical is because the treatment options are stage-dependent. The prognosis is as a group, not as you as an individual, but as a group is based on stage; the lower the stage the better the prognosis. We use this to enroll people in clinical trials. So, the way we open new trials with new drugs is to say okay we have a trial for Stage I cancer or Stage II cancer, etc. It provides a common language so I can call up Jack and say, hey, Jack, you know what? I've got this difficult patient with a Stage IV. He'll say what's the TNM and I'll say, T1 N2, M1 and

he'll go, "okay." Now we know what we're talking about, so it provides a common language and it allows for studies of really large cohorts of patients, so we can say how's cancer doing in the United States or worldwide based on this staging system.

And I said before, it dictates treatment. You can have for stage I -- and this is just a general guideline, we often make exceptions within Stage -- but, stage I, that's just the small lesion in the chest with nothing else, no lymph glands, no spread outside the chest, is usually operated on alone with nothing else. And then you can see stage II as it gets more advanced, we might add chemotherapy. And stage III we might, you know, add chemotherapy after surgery. And then there's another type of Stage III where we just give chemotherapy and radiation.

So I think what you're seeing is that its really important for me to get it right for your cancer doctors to get it right to know exactly what your stage is throughout the course of your disease, so we can get you the right treatment and then, in Stage IV, dependent on how healthy the patient is, they can receive chemotherapy or supportive care.

So we were looking at case and there's a whole bunch of ways that we can make a diagnosis of cancer. Sometimes if the patient is coughing up a little bit of blood, we can actually spread that out on a microscope and look at it and say that they have cancer just by doing that without any invasive tests. A bronchoscopy -- if you break that down "bronchus" just means airway, "scope" means scope, right? -- bronchoscopy is what I do a lot, and that's a scope smaller than my pinky and very flexible and hooked up to a TV And what we do is numb patients' throats, give them intravenous medicine to make them sleepy, but they're not always completely asleep and I can take that scope and look down into your lung and take biopsies of different areas. So that's bronchoscopy.

Sometimes surgeons actually make a small incision in the chest, mediastinoscopy, and look in the middle -- "media" meaning middle of the chest for lymph glands. So that's done in the operating room. Transthoracic needle biopsy -- "trans" meaning across, "thoracic" means chest -- numbing up the skin on the chest and putting a needle directly into the chest so that we can take a biopsy. Video-assisted thoracoscopic surgery -- "video" meaning video, "assisted" means the video gives you assistance, "thoracoscopic" meaning chest, and "surgery" meaning the surgeon, that's that sort of small surgery -- we're doing it a lot in the abdomen to take out gallbladders, but now they do it in the chest as well.

I'm going to switch gears and remember now you guys are experts in reading CAT scans and this is the front of the patient, their breastbone, this is the back. Now there's one of these little tiny lesions that we talked about. Well, my scope can't really get out to that thing. That's just too far away. But this is the kind of patient where if we numb the skin on their back, we can put a needle right through there, and that'll take care of doing the biopsy.

However, if we have somebody, and this is the center, this is where the lungs break in two, see that, the left lung airway and the right lung airway. If you have a tumor right here, well that's a perfect case for us to look down with a scope and be able to take a biopsy.

This patient has one of these lymph glands right in the middle of the chest. In the old days, what we'd have to do is to have a surgeon make an incision here and go after that lymph gland in the operating room. And now, this is a bronchoscope, that has an ultrasound tip on it. That's the same way we look at hearts with echocardiogram or babies, you know, the baby ultrasound. We can look at structures inside the body. They miniaturized this tip and we can look into folks' lungs and actually outside the lungs. We don't have any pain receptors in the airways so it doesn't hurt at all.

Five years ago, I tell you this technology wasn't available, and what that's allowed us to do in an incredibly minimally invasive way, so this patient will go home an hour and a half after that procedure is done. And in this patient I didn't know what that was. I suspected it might be cancer and we were able to diagnose and stage that patient's cancer at the same sitting. So pretty cool new technology that your lung doc can do.

One of the things I wanted to bring up is we do this PET scan to help us find if cancer is outside the chest; is it anywhere else? There was a trial in Europe that looked at either just doing a regular CAT scan and a regular examination in one group, that's a randomized trial. Those are those trials where they assign you to either randomly get one or the other. You don't even know which one you're going to be assigned to when you sign the permission slip because we didn't know would it be helpful to get that. And what we did find, it was incredibly helpful to get that. And what we found was that if the PET findings would really preclude surgical treatment needed to be verified so we needed to make sure that a positive was truly positive, but, the addition of PET to the conventional workup prevented unnecessary surgery in one in five patients. Imagine that! Some patients who would have gone to a big huge operation unknowingly already had disease elsewhere in the body, but by getting that PET scan and eliminated the need for an unnecessary large surgery. So this has been a huge addition.

I do want to caution you though, please, and I want you guys to be involved with your doctor in these things, sometimes those PET scans are wrong. In fact, 20% of the time if it lights up, it's really not cancer. So it's really good when it's negative; sometimes when it's positive we have to confirm that positive really means positive.

I just wanted to spend one last moment on breathing tests. This patient got some breathing tests, and those breathing tests help us to know whether you would tolerate surgery or not. You can't just take out the tumor. You have to take out a whole big piece of lung with it, and sadly a lot of our people were smokers, and smoking causes emphysema as well. So a lot of times our patients have both emphysema and lung cancer.

And the way we look at these is about 40 years ago they took a thousand people in each subgroup -- a thousand people same size, weight, sex, race, everything -- and they did those breathing tests. So they average that value of thousand patients to get what's called a predictive value. What should you be able to do, a guy your size who'd never smoked, who never had breathing problems and then when you have your breathing tests, we compare it. So what you're doctor should be able to tell you is how you stack up against someone like you.

And here are the ways these look and in this patient there are a couple of values that are really important. But I just want to point out one which is in this patient, first of all I look at the height, 60 inches, a little under five feet, right, a little under five feet, and their breathing tests -- we do these in liters -- predictive value for this test is 1.29 liters. So, that's not that much. Most taller people have about one and a half liter or 2-liter in each lung. But this was a short person, and their breathing tests were only .89 liters, but that was only 70% of normal. So that person could tolerate getting some things taken out. We use 40% as our cutoff.

This fellow here was a bit taller, 74 inches, their actual test was 1.26, right? But their predictive should have been 3 liters, and they're already down at below 40%. That person has absolute more lung function, but when predicted against someone else this person would not be able to tolerate an operation.

If you came in after your lung surgery with a lot of breathing problems, we'd get this test. We'd follow it for different types of complications of the lungs to make sure that we're not missing something that we could improve with medications.

When patients are going for an operation and they have marginal breathing tests, sometimes we find out how much blood is flowing through the area that we're going to take out. So then we can calculate by subtracting out how much blood is flowing through there, that's how much they're going to lose after the operation, and then we can calculate well what are their breathing tests going to look like after the operation by using this test.

Okay, so I wanted to go back to our patient that we just presented and the bronchial ultrasound was negative. Their lung function studies were adequate. The patient was discussed at length in our Tumor Board. We do this now as a team, and the patient had cancer surgery and they ended up being Stage II, and you can see their final TNM status. They received some chemotherapy after their operation because that's what we do for that level of disease.

You know I could actually put in a bunch of other circles in here. But I just want to let you know, you might only being seeing your oncologist. But if your oncologist is worth anything, they're talking to the rest of the team either in a formal setting or in an informal setting and we have all these folks here. What else did I not put in? Well, there's the nurse clinical coordinator; there's the social worker; there's palliative care programs; there's clinical trials operations.

Thank you for your attention.