

**Interview with Dr. Kristin Manning, Seattle Radiology**  
**Part 1: Screening, Initial Evaluation, & Follow-Up of Lung Cancer**  
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Dr. West: I'm Jack West, and I'm a medical oncologist at Swedish Cancer Institute in Seattle, Washington; I'm also the President and CEO of GRACE, the Global Resource for Advancing Cancer Education. I'm here today with Dr. Kristin Manning, who is a radiologist at Seattle Radiology and she's actually a perennial winner of our Best Doctors in Seattle in her field. She has a particular expertise in body imaging and is one of my favorite go-to people for lung cancer imaging. So, she's kindly come in to agree to cover some questions on the management of imaging issues in oncology. Thanks for joining us.

Dr. Manning: Thank you.

Dr. West: Let's start with the question of screening, always a controversial one. You've been involved in some of the work on the national lung cancer screening trials. What have you found to be the key take-home issues in that field these days?

Dr. Manning: Well, the key message is whether lung cancer screening actually works and will help prevent more lung cancer deaths if people are screened versus not screened. The answer to that question has not been answered yet, and there are ongoing trials regarding that. But there's been a lot of information that has been gathered about lung cancer screening and chest imaging and looking at lung nodules in general. Probably one of the most interesting things that's been discovered is that lung nodules can be followed for a period of time before anything needs to necessarily be done on them in the overwhelming majority number of people. And in an overwhelming majority number of people, lung nodules are benign and never need anything done to them.

Dr. West: What kind of interval do we routinely recommend for following a nodule that's ambiguous, say less than a centimeter, but certainly can cause anxiety in people when they hear about it?

Dr. Manning: You know it really just depends upon what the patient's risk factors are for developing a malignancy in the lung. And also what the patient is able to frankly tolerate if they're anxiety is too high. But, in general, most lung nodules can actually be followed at just a one-year interval if they're small enough, and then there are other lung nodules that are just an intermediate size and which we'll probably look at them a little bit closer. But the goal really is not to keep taking pictures of the same thing over and over again. You want to give it enough time to make a change so that you can actually take action if you need to.

If someone has developed a new lung nodule and we have a prior study on them, then we'll do a shorter interval because we know it's new. It's more likely that it's infectious or inflammatory and not a cancer and so we may just do a one-month follow up on them. In general, we try to go out six months and then a year.

Dr. West: What are the features of a nodule that give you a sense of to be more or less suspicious that its cancer versus a benign cause because there are parts of the country where there are many, many people with nodules and we don't want to scare all of them. We don't want to do any more procedures like biopsies than we need to. So, how do you assess risk for a nodule?

Dr. Manning: Well, one of the things I've learned over the years is that actually I'm sometimes surprised at what does turn into a lung cancer when I look at a nodule. But in general, patients who have lots of little nodules, some of which maybe calcified; the overwhelming majority of those are from an old infection, probably due to where they lived in the country and those are very reassuring. In somebody who has evidence of a lot of damage from smoking, or having had some sort of exposure to something that damaged their lungs, then you start to get more nervous about even small nodules that perhaps that you would not be quite so nervous in someone who looked like they had healthy lungs.

Dr. West: Anything about the shape that leads to a greater concern?

Dr. Manning: Certainly, when a nodule starts to get larger and has very irregular margins around it, then we start to get nervous. Also lung nodules that develop in areas in which the lung is actually damaged itself also make us nervous.

Dr. West: Sometimes we'll read reports that lymph nodes are prominent even if they're not technically enlarged. What goes into the process of you being more concerned about lymph nodes whether they're larger than expected or not?

Dr. Manning: Well, a radiologist can be fooled by lymph nodes because you can have lymph nodes that are simply reactive -- meaning that they have no cancer cells in them that appear abnormally enlarged to a radiologist. But in general, we take the viewpoint that if a lymph node is less than a centimeter in size, and if it has a certain shape that we've come to be comfortable with as being a feature of non-cancer, then we, we go ahead and look at those lymph nodes and don't necessarily call them abnormal. Whereas other lymph nodes if they are greater than a centimeter in size and are more round appearing, that makes us more concerned that there could be tumor or cancer within those lymph nodes. But there are patients that have been exposed to a lot of different inhalational abnormalities or diseases in their lives, they could have really abnormal looking lymph nodes on their imaging that turnout to not contain cancer cells. Certainly if there's a change, that's a huge warning sign.

Dr. West: We sometimes order CT scans with contrast and sometimes without. What are the features that you can get more from when you give IV or oral contrast and how do you recommend when we should do CT scans with contrast?

Dr. Manning: So, contrast is exactly what its name implies. It helps make things stand out more and it helps differentiate certain tissues from other tissues. So, in general, the theory is that contrast is more helpful on studies because it helps differentiate the tissues and this helps the radiologist see things better. But there are certainly people who can't tolerate contrast and we can get a pretty good study without it particularly when we're talking about chest CT because with chest CTs we're lucky in that a lot of the emphasis is on the lung and the lung doesn't need

contrast to be optimally evaluated. We will be limited somewhat in the middle part of the chest without contrast, but even then we can still get a pretty good look. So, in general the theory is that things are better with contrast, but we can still get a pretty good look without it.

Dr. West: The liver is often easier to evaluate with contrast?

Dr. Manning: Well, once you're talking about below the chest, so the abdomen or the pelvis, then contrast is tremendously helpful in interpreting the study. And you're really quite limited without it and there's very limited tumors that you could actually see better without the contrast than you could see with it. So you would get a better study with contrast on an abdomen or pelvis.

Dr. West: One of the GRACE members has noted that on his reports he'll see different amounts of radiolabel injected for a PET scan. How constant and comparable are PET scans either done at the same center or at different ones?

Dr. Manning: So, PET scans are it's almost like an in general kind of look at the tissue. You're looking at the abnormal tissue relative to what the background tissue is doing. So, even if you haven't injected necessarily the exact same amount, relatively there should be a similar appearance if things have not changed. And if things have drastically changed, you should then see a relative difference that you wouldn't have seen before. So, you don't necessarily need to inject the exact same amount; more importantly is that you have a similar person interpreting the images. And that I think is more helpful.

Dr. West: So, again, it's kind of the normalizing for the amount of background there is?

Dr. Manning: Correct. Because normal tissue will take up the radioisotope that is injected; but abnormal tissue the hope is will take it up more. And so you, even though it doesn't necessarily, it's not imperative that it be the same amount injected each time because you're looking for a relative change.

Dr. West: What about the interpreter and the equipment, how often do you find yourself differing in the interpretation based on the report that you've gotten?

Dr. Manning: I think in our community where we practice medicine the overall interpretations are excellent and it's helpful if your doctor has a radiologist that they work closely with so that they're on the same page and that there's a trust level. And I think that's very important: I think it's better to have a relationship.

Dr. West: Do you find yourself frequently having different interpretations from what the report says on another study?

Dr. Manning: I would say not frequently, but it does happen that I will disagree with a report that it would be of significance to the patient. But, with the understanding that I'm certain there are doctors who read my reports that don't personally know me who probably send these in to someone else to check up on. And again, I think it's the relationship between the referring clinician and radiologist that's most important.

Dr. West: One of the settings where there's some controversy about the best kind of scan to order is in the follow-up of someone with locally advanced lung cancer is chemo and radiation. What's your feeling and experience about doing CTs versus PET scans in that setting?

Dr. Manning: Well, they're both difficult to interpret once someone has been treated for lung cancer because if they've had any radiation or chemotherapy, then there's going to be some damage to the lung. And that's what the desire is because that's the whole point of treating the tumor. Differentiating then tumor recurrence from damaged surrounding tissues that are still normal and don't actually have tumor is difficult. There are going to be false positives with both studies and I think that it's more important that the radiologist interpreting the study be familiar with what a posttreatment exam will look like and the possible false positives that are present or that can occur because PET/CT imaging after someone's been treated for lung cancer can be very difficult.

Dr. West: Is there an interval of time when you feel more comfortable about interpreting it?

Dr. Manning: Well, certainly the longer it has been since their treatment the easier it is to interpret it mainly because you probably will have some interval studies that if there's a change you can just feel more comfortable about it or if things have stabilized over several months, then you can also feel more comfortable that you're looking at post-treatment change. And certainly, anything that's done immediately after therapy is going to look grossly abnormal on both studies. And it's something that you usually just have to follow over time and not jump the gun.

Dr. West: Is there any interval before which you would not recommend a PET/CT because you just think it's too fraught with difficulty in interpreting?

Dr. Manning: Well, as long as the interpreting radiologist knows the time frame in which the patient the patient has been treated and understands that a tumor can look markedly abnormal on a PET/CT after treatment and then they could resect that tumor and find that there's no actual live cancer cells in there and everything that the radiologist is seeing is post-treatment effect, then you could potentially get the CT at that time to, but I'm not sure how helpful then that CT is going to be for your PET/CT is going to be for you anyway. So I'm not sure that that would be useful information anyway.

Dr. West: What about following metastatic disease? There's a lot of open questions and some oncologists routinely do PET scans in addition to CTs to follow metastatic disease and others think that if it's not readily visible on the CT, there isn't much clinically relevant difference. Do you feel that you can detect significant differences on a PET scan that are going to be invisible on CT?

Dr. Manning: I think that PET scans are helpful in detecting small amounts of tumor that you might have just accidentally skipped over on the CT otherwise. So I think then that the PET scan could detect tumor progression earlier but I don't know if that necessarily is going to change how the patient is treated or the outcome.