THE UNIVERSITY OF CHICAGO MEDICAL CENTER

New Detection Tools for Lung Cancer (Video Transcript)

To view the accompanying video of this transcript and to download a PDF of the physician's slide presentation, visit:
http://www.uchospitals.edu/specialties/cancer/lung/video/index.html

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So, I'm a bronchoscopist, I'm a pulmonologist, I'm not an oncologist and so my clinical interests lie heavily in making sure that people actually never need to see Ravi (Dr. Ravi Salgia) and so we're going to talk about some strategies and some tools that are hopefully going to improve our outcomes of our patients, so I'm going to give you just some simple ideas of what is out there patient-wise, and maybe what we should offer people.

There's a 55-year-old smoker, who is worried about his risk for lung cancer. He's smoked for 28 years, 2-3 packs of cigarettes a day, and he's actually got some emphysema. So what do we tell this person about his risk for lung cancer and what tests ought to be considered because we know if we find it at a late stage, we have a lot less options?

Or this person: A 76-year-old lady, who on a CT scan had a small little nodule that was found, and then on a follow-up CT scan it got slightly bigger, up to 9 mm. Now what?

Or this person who had fluorescence bronchoscopy, who is 52-year-old former smoker, cured of lung cancer 5 years ago, undergoes a routine autofluorescence bronchoscopy and this area right here is glowing red. It's a precancerous lesion. What do you offer this person?

Here's a former smoker with COPD found to have squamous metaplasia in the lung, and he's particularly worried because his father died from lung cancer. Or this person's management absence.

There's a whole host of issues that these people bring up because it centers around the issue of early detection. Much as we've seen major advances in breast cancer from early detection and colon cancer and prostate cancer, we've lagged behind in lung cancer in making the same advances that our colleagues in other areas have. So, some of the new tools that I want to discuss--autofluorescence bronchoscopy, line needle aspiration of lymph nodes so that we're able to make diagnosis within lymph nodes without having to go to the operating room, and a new instrument called the Super Dimension System, which allows biopsy of nodules like those small ones you see,

without having to go to the operating room as well.

Specifically, who's at risk? Who should be targeted for interventions to potentially find things in early stages? You can't just take anybody and everybody who has ever smoked. Patients that are former or current smokers who actually have damage from their smoking or documented emphysema, patients who have had prior histories of cancers cured, but related to smoking, patients who have pulmonary fibrosis and patients who have been exposed to asbestos and first degree relatives of cancer patients. These are the folks that need to be targeted. These are the folks that are at increased risk for the development of lung cancer.

This is just another reiteration of that. There are some things that seem to help prevent and lower your risk for lung cancer: a diet consisting of significant amounts of fruits and vegetables and even a diet consistent with selenium. But it's these two – asbestos exposure and emphysema, and a background of smoking – that carries some of the largest risks.

In particular the reason that we were talking about autofluorescence bronchoscopy is its role in a particular type of lung cancer called squamous cell. It's the second most common form of lung cancer within North America and Japan, and it's the most common actually in Europe. Of the 174,000 cases of lung cancer that are expected in the year 2006, 49% will be squamous cell, and about roughly 50,000 cases of squamous cell lung cancer will be diagnosed in 2006.

The issue here is that squamous cell cancer had to start as something else first. One of the areas that is of interest to me is an early lesion called an inter-epithelial neoplasia, a so-called precancer if you will. If this was a colon you'd call it a polyp. Something like the metaplasia, dysplasia, the carcinomas in situs. These can be removed before they become cancerous and invaded.

It's interesting, there's an argument about finding precancerous lesions. Let me give you an interesting quote about colon cancer in the 1980s. Some people argue there's no relationship between polyps and malignancy, while others believe that polyps will progress to malignancy at a high percentage of rate unless they are removed. In other words, it was blasphemy almost 30 years ago to even remotely start looking at the colon because polyps, who cares? Needless to say, this is of course standard of care. Lung has lagged behind.

Their lesions – these early stage lesions – progress and a significant percentage, anywhere from five up to 50% and even higher in some of the studies, these premalignant lesions can progress. Detecting them with autofluorescence bronchoscopy is a form of bronchoscopy, so it is a scoping, similar to a colonoscope only into the lungs. Early stage lesions will actually fluorescence in the red spectrum as opposed to green indicating areas of abnormality, areas that need to be biopsied and potentially treated.

The reason is, of course, we want to find the so-called stage 0 lesion. Cancers, especially lung cancer, get various stages that are dependent on what you are able to see from the CT scan. Finding a prelesion puts you at stage 0 and most squamous cells have to pass through this way. So if they're going to pass through this way, why aren't we finding them there?

If I just did a regular bronchoscopy, why can't that be enough? Part of it is because by the time I can see it, it's often advanced with white light. Early stage lesions are very thin, only a few millimeters. The naked eye has a hard time discriminating that. Mucosal changes of early lesions can be subtle on normal bronchoscopy, so autofluorescence is actually an FDA-approved device

specifically for this indication. Been studied in over 3,000 patients. Its sensitivity for early stages is it basically doubles your detection rate and the addition of autofluorescence to normal bronch has a higher chance of finding these abnormal lesions. All it is, is an adapter you put onto a standard bronchoscope. A patient undergoes a standard bronchoscopy, similar to any other endoscopic procedure.

This is a movie showing what a normal bronchoscopy might look like. There's nothing really going on in here. You put them under fluorescence, you still don't see anything. This is someone who you can say – we've now screened you with this instrument, which is one of the indications for this instrument and we've not found any early lesions.

Now, here's somebody who has an abnormality in their trachea and it looks pretty small so you think – well, we'll just resect this little area here and they should be then ultimately cured of this early lesion. But when you switch them over to fluorescence, the abnormality is here, the red actually extends quite further. So if this is somebody who you just did a small resection on, you would actually be leaving a majority of their premalignant lesions. This is somebody who actually is going to need a fairly extensive surgical procedure to remove an early stage lesion, not a simple little procedure that was originally thought just from the white light.

The guidelines for all the fluorescence bronchoscopy through the American College of Chest Physicians: if you have abnormal psychology, you need one of these. If you've had a resection of a prior cancer, you need one of these. If you have an issue with secondary chemoprevention, who to target other drugs for to help prevent start of a new lesion? This is for a therapy and then ultimately primary screening in high-risk patients through surveillance. That's the issue with the early lesions.

I'm now going to branch into the situation where you now have somebody who has got enlarged lymph nodes on a CT scan or an X-ray, and traditionally what's that meant is a trip to the surgeon and that meant a cut at the base of the neck and passing a scope down into your chest.

The idea is there's all these lymph nodes outside the trachea and outside the airways, all these little red circles and yellow circles and traditionally that was the easiest way to get to them, pass a scope under the bone and slide down and take biopsies of those. It's very invasive though.

There's an abnormal lymph node, there's another abnormal lymph node. Notice how it's right next to this trachea here, there's the windpipe. A couple of more lymph nodes, going to skip through those.

What we're able to do is use an instrument that comes out of our bronchoscopy. It's an outpatient procedure. You're in the hospital and up on the sixth floor for about 40 minutes and an hour in recovery and you go home. Where it will pass a needle right through the tracheal wall, attached to a suction catheter, and we're able to core out part of that lymph node to get the diagnosis. So an outpatient, you walk in, you walk home procedure to make a diagnosis inside your lymph node without ever once having to undergo the surgeon's knife. You're able to get large pieces of tissue to be able to determine if there are cancerous lesions there or not. You can help stage, you can also help put a lot of concerns and fears to rest when you see a slightly enlarged lymph node in a prior cancer patient. Now, that's the lymph node.

Dr. MacMahon is going to discuss in regard to CT scans, but because the CT scan in general has become more commonplace and the resolution has gotten better and better, we're finding a lot more lesions in the lung by accident almost, if you will. You got a CT scan of your abdomen, and they've caught part of the lung and now there's something there. This is a real problem though because if you have a suspicious lesion in your lung and there's a concern that it's cancer, sometimes you have to watch it and get serial CT scans, but other times it needs to come out right away, but that involves surgery.

What do you do for some people that don't really want to undergo a surgery? They're not an ideal surgical candidate because of other medical problems, or to the spot, that would mean a fairly major surgery. So is there something else you can do? Well, there actually is. Traditionally, bronchoscopy had no role here because the peripheral lesion on the outer part of the lung was not able to be reached by a normal bronchoscopy. There's a unique device that's come into play here about a year ago. In the state of Illinois and actually in the Midwest, the University of Chicago is the only one with this instrument and it's an instrument that's called super dimension and what it does is it takes advantage of the fact that a lot of the lesions that are found on a CT scan are beyond my field of view, so I can't get my scope there normally.

Traditionally what we did, we just pushed our instruments out and hoped we got lucky that maybe we caught a piece of it and that left very low yield and made things not very acceptable. Or what happened was, you needed to get needles put in through your chest, which had a higher complication rate. The idea behind the super dimension is because our CT scans have gotten so good, we can actually build a virtual lung and build a 3D model of the lung and create a road map, if you will. Everybody's car has a GPS system these days – turn left here, turn right there, oops turn around. Well, we have the same thing now with our bronchoscopy device – we're able to steer our instruments directly out to these lesions, essentially telling us, "Go left, go right," steering to it. And so now, we can do a standard bronchoscopy and add this additional instrument to have increased ability to target these small lesions.

I'm going to show you a demonstration video just so you get an idea of what it involves and what we're able to provide with this. This is just simply showing that we're able to do lymph nodes.

Normally, I'm pushing the scope down through the lung and scope, because the airways get smaller, can only get out so far and so the scope would normally get to be about this far. The problem is, of course, the thing that looks like a cancer is way up here, so now we're able to push this instrument out further and steer it and because we're doing – essentially there's a GPS probe on this and we're following where it is in space on our virtual CT scan as we're diving through the tunnels through the lungs, taking a left, taking a right, going up, going down, pushing our probe out to ultimately get – see, here we took a wrong turn, we're going to back up, turn and go forward – to get ultimately to this area. That's the uniqueness of this instrument and it's unique to the state of Illinois for us to have this.

What it looks like in real world is that during the bronchoscopy we're busy measuring where you are in space. We align the CT scan to the real image so we're overlaying the virtual image with the real patient, so it truly is very space age. There's a computerized version of you sitting on top of a real version of you and we're working through both. Ultimately giving me the ability to steer towards these things and increase our accuracy.

During the bronchoscopy then, because the CT scan now comes in three different planes, I'm able to, while I'm moving my instrument, you'll see it in real time change where I'm located, so I always know where I am inside your chest, inside your lung. Even though I can't see it with the naked eye, I'm able to build it on a virtual CT scan and a virtual bronchoscopy to lead myself right towards the big green target and pass the instrument that increases the biopsy rates so therefore make things better for the patients.

Ultimately, the University of Chicago's goal has been to build the clinic that currently exists, the Center for High Risk for Aerodigestive Malignancy. It's a coordinated effort through us and pulmonary. Dr. MacMahon and Dr. Kalgeri and all the others down in radiology, obviously the entire chest oncology group, radiation oncology, thoracic surgery – it's a multi-modality approach and exists for one purpose: to have better outcomes for lung cancer and earlier detection rates.

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To learn about more lung cancer care at the University of Chicago Medical Center, visit: http://www.uchospitals.edu/specialties/cancer/lung/index.html