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Welcome to Yale Cancer Answers with doctors Howard Hochster, Anees Chagpar and Steven Gore. I am Bruce Barber. Yale Cancer Answers is our way of providing you with the most up-to-date information on cancer care by welcoming oncologists and specialists who are on the forefront of the battle to fight cancer. This week in honor of breast cancer awareness month, it is a conversation about the use of radiotherapy in the treatment of breast cancer with Dr. Meena Moran. Dr. Moran is a Professor of Therapeutic Radiology, Assistant Clinical Professor of Nursing and Director of the Yale Breast Radiotherapy Program, and Dr. Gore is a Professor of Internal Medicine and Hematology and Director of Hematologic Malignancies at Smilow Cancer Hospital.

Gore It seems to me that a lot of people find the idea of radiation super scary.

Moran They do, they do, and actually I think the vast majority of them know family members or acquaintances or friends who have had radiation and they hear horror stories.

Gore And is it most like they have heard people from the old days when they like they got cobalt taste, right?

Moran Yes, and they got burns and skin was falling off, and the technology has changed so much and advanced so much now that it is very individualized to the patient and we are able to take account of the anatomy and then really minimize side effects. It is also very site dependent. So, depending on the body, the part of the body that we are treating.

Gore Okay. So, we certainly want to get into that during our show, but we can just get right off the bat, like radiation is not like this horror story necessarily at all, right?

Moran Specifically for breast cancer, no not at all.

Gore Gotcha. So, why do we use radiation for breast cancer. I mean, I know and I think everyone knows people get lumpectomies, get mastectomy, and they get reconstructive surgery and then a lot of people are getting chemo afterwards or hormones, so why should they also be getting radiation, or who should get radiation?

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Moran So, originally, say 25 years ago, the standard of care was actually a mastectomy for any woman who had breast cancer. And since that time, in Europe and also in the United States, they started doing trials looking at mastectomy versus doing less than a mastectomy, and those trials looked at doing a lumpectomy, which is removing the primary tumor and adding radiation to it. And what they found was while there was no difference at all in the long-term

outcomes in terms of survival, there was a difference in that women who did not get the radiation had a 30-40% chance of it coming back within the breast, and what that suggests is that when the surgeon removes the tumor, that there are sometimes residual cells left behind. And what the radiation does is it sterilizes the area that we target.

Gore Just to clarify what you just said – was that comparing the lumpectomy with or without the radiation or was that comparing the lumpectomy and radiation to the mastectomy.

Moran All 3 arms. So, when you look at mastectomy, lumpectomy, and lumpectomy plus radiation, there is no difference in survival, but the patients who have the lumpectomy alone have a much, much higher chance of it coming back within the breast, locally, or in the nodes and then they have to undergo additional treatments and it has to kind of start all over again.

Gore But comparing the mastectomy to the lumpectomy with radiation...

Moran There is no difference in survival.

Gore And what about the local recurrence.

Moran The local recurrences are similar.

Gore Okay. So, it sounds to me then nowadays, correct me if I am wrong, that I were a woman with I guess this is for local breast cancer, right?

Moran Localized breast cancer, yeah.

Gore They can choose between mastectomy...

Moran Absolutely, absolutely. And actually the standard of care is really to do breast conservation if the patient wants it.

Gore That means the smaller surgery right?

Moran The smaller surgery, removing the lump and delivering radiation is really the standard of care for someone who has a small tumor that is localized, which is very different than someone who has disease that spread in various parts of the breast – in the lymph nodes, possibly up into the neck which can happen also sometimes.

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Gore But that is a different...

Moran That is a different thing exactly.

Gore So, how do women negotiate this choice, is it likely that is pretty clear to them that they are "Oh I just want to get the whole thing off, or "Gee, I would never want to lose my breast if do not have to," are the people who struggle. I can see like it is difficult right?

Moran I think some women struggle with it, but I think others come in and they already know what they want. We are actually seeing a trend where once breast conservation or doing the lumpectomy had already been established and that data was available to all the surgeons and to the radiation oncologists and to patients, for a while we were seeing 50/50: 50% of the patients were doing breast conservation and 50% of the patients were asking for mastectomies, and now we are actually seeing a trend nationally where more patients are asking for mastectomies, in fact double mastectomies because they feel that it might improve their outcomes, but in fact it does not necessarily do that. And sometimes women are just not wanting to go through the follow-up of having repeat mammograms and that kind of thing as well. So, there is a personal preference involved.

Gore So, the double mastectomy thing, I remember it was Angelina Jolie?

Moran Yes, yes. She did in a different setting though, she did it in a prophylactic setting.

Gore Because had a breast cancer gene or something right?

Moran She had a gene and she did it in order to prevent breast cancer. So, she had all of her breast tissue removed so that none of the cells would develop into cancer, which is very different than a patient who develops breast cancer and then has to choose between lumpectomy and radiation versus mastectomy as their treatment.

Gore I am just curious though when a really prominent media star, very glamorous, Angelina thing, and kind of attractive personally as well as being an attractive person, adopting all those kids and everything, was there an uptick in interest in mastectomy – “if Angelina can have a double mastectomy, what am I worried about,” right?

Moran Yeah. It was actually called the Angelina Jolie effect where the mastectomy rates just started going up, but again very different scenario which is a subtle thing but not so much in the medical world, in that one is a prophylactic – meaning you are trying to prevent something and the other one is a treatment for when you already have breast cancer, and the vast majority of women who have breast cancer actually do not carry the gene. Actually, it is just a sporadic, meaning – it happens just because of multiple unknown factors over time.

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Gore So, for those people, the average women with breast cancer with a localized breast cancer on one side, she should necessarily be thinking that I want to have both breasts removed to minimize...there is some risk right to recurrence on the other side.

Moran There is, there is, but you know it is not very different than if she never had breast cancer and it is also not very different if she had a breast

conservation procedure because the vast majority of these patients are getting systemic treatments, the vast majority of these patients are going to be ER positive or PR positive.

Gore Those are hormone receptors?

Moran The hormone receptors, the estrogen and progesterone, and so they will be taking some type of anti-hormone therapy to block those receptors. So, there is a lot of different things that are just bringing the recurrence rates really, really, really low. So, women have the option of preserving their breast if they choose to do so.

Gore And it seems like it would be a lot less surgery to do that, right?

Moran Absolutely.

Gore So, how is, I guess cosmetic effect, if you will, if somebody has had a tumor removed and then radiation, can they wear a bikini if they like that kind of a thing.

Moran Absolutely. It also depends on how much breast tissue is there to begin with. So, if you have a relatively moderate-sized breast and a small tumor, as you can imagine, it is relatively easy for the surgeon to go in and remove the tumor and you will have a small scar in that area where the lumpectomy was performed, but otherwise, there would be minimal defects. When we add the radiation, it does cause some scar tissue and that can sometimes, depending on how the person heals and responds to radiation, it might be a little bit more pronounced or not, but ultimately you are preserving the breast with the goal of having a good to excellent cosmetic outcome. With the mastectomy and with reconstruction what patients do not realize is that, first of all you lose all sensation in your chest in terms of there is no nipple-areolar complex unless that is preserved, but that is a whole another discussion, and there are a lot of reasons why the breasts will never look the same. And often patients who will undergo all that are somewhat surprised or disappointed because they think that when they are doing their reconstruction, that is going to look like before and it is not. And that becomes a lot harder. So, the vast majority of patients who get radiation in the breast conservation setting, 80-90% report good to excellent outcomes with the cosmetic outcome.

Gore I would hope that it is plastic surgeons, right, who do the reconstruction, and I would hope that they are letting the people know, so they heal as best as they can and that is what people hear and they want to hear as well right?

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Moran Yeah, I am sure. I think either way, there is a lot of information to process and I think it is really hard when you get diagnosed to actually think about 5 years – exactly, and the reconstruction process is really it should be almost after the fact, but it is not – you have to make these major decisions at

the time that you are also told that you have to go through treatment and that you have just been diagnosed, it is really difficult.

Gore It is interesting, because like in my cancers that I deal with, which are leukemias, of course everyone gets chemotherapy that is the main treatment, you know people of both genders, but more prominently women are of course concerned about the hair loss, but they kind of accept that that is going to happen and they are very reassured that their hair is grow back, almost 100% of the time, even if it is a little different, but here you are talking about something that is on face value, disfiguring, right at least so much of our culture, for better for worse, the breasts are part of this whole female conception of beauty and sexuality, I just cannot even imagine.

Moran Yeah. I think we have made so many strides in terms of the breast conservation and the surgeons with their techniques and how they are actually doing smaller lumpectomies to achieve negative margins and localizing techniques, the radiologists have been very, very helpful in localizing the tumor beforehand to help the surgeon to actually get in and remove it in its entirety. So, all of these things have made a big difference and right now, the patients that we see that are having breast conservation, they look great and there are a lot of them that have to come back after 6 months after radiation, I cannot even, I am looking to see where the scar is, and not always, because again how I develop a scar versus how you develop a scar is going to be a different thing. There is some variation with the radiation, but ultimately the cosmetic outcomes are actually very good.

Gore Hmm. And what about the loss of sensation if there is a lumpectomy and radiation. Are there any issues with sexuality and sensation?

Moran I think much less so than with mastectomy. So, you will have some... primarily the complaints that I will hear from my patients are that they have some loss of sensation or numbness around the scar, so if the scar is in the nipple or in the areolar region, then that might cause them to have some difficulties with the sexuality or some differences, but most of the time it is not. It is somewhere in the breast tissue and so it is away from nipple-areola and it is the axillary lymph node biopsy or the dissection scar that actually bothers them more because that is directly under the arm and often their arm is rubbing and they are feeling that and feels kind of funny to them, so that is the major complaint, but it does not really affect them sexually.

Gore Good. I assume you are not radiating under the arm for most of these patients.

Moran Not for most, but sometimes.

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Gore Well, good! This has been a fast 15 minutes. We do need to take a short break for a medical minute. Please stay tuned to learn much more about

radiation and breast cancer with Dr. Meena Moran.

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Gore Welcome back to Yale Cancer Answers. This is Dr. Steven Gore and I am joined tonight by my guest Dr. Meena Moran. We have been discussing the field of breast cancer and minimizing the toxicity of radiation for patients. Meena, I promise that we are going to really get to talk about radiation which is your field, but I wanted to share an anecdote that I just heard on NPR this week, which had to do with - I don't if you have heard it or not, but there is a young woman with breast cancer in her 20s and talked about her process and she went to bilateral mastectomy, I don't know whether she had a breast cancer gene or not, but she decided that was the right thing for her and at the end of the day, she was not satisfied with her cosmetic effect at least in terms of her self-image and the story was about her going to a tattoo artist and reclaiming her chest in a whole different way, and I just put it out there - I am not a tattoo fan, I am kind of old for that and not my taste, but this story and you can watch this video of her on the web, I found it very moving, do you have any experience with it at all, I thought it was so interesting...

Moran No, but I do know that I am assuming she did some kind of an extensive personal thing - art..

Gore And it's beautiful, I have to say it is beautiful.

Moran No, no actually no.

Gore It has been in my mind, something about it is very haunting to me, about the whole idea of how. How do you reclaim our self-image and/or self-concept after something that is can be so psychologically and physically devastating right? I mean it is really interesting.

Moran Absolutely.

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Gore But it sounds like you are helping people to not have to suffer that way if the results are so good.

Moran Yeah. I think in terms of the radiation, we have done a lot to minimize side effects. Years ago, when we treated patients, there was a lot of toxicity to the skin, caused a lot of scar tissue and permanent visible damage to the skin that you could actually see. There was damage to the heart and the lungs, there was an increased risk of lung cancer and cardiac toxicity that caused premature deaths. And now, with our 3-dimensional technology, we are able to really tailor the radiation beam so that we are just focusing on the area where, that's at risk and not just shooting the entire chest area.

Gore So, how do you do that? I mean it sounds like Star Wars.

Moran So, what we do is we will have the patient come in, and say for example if we have a left-sided breast cancer patient, we will have them come in, we will try to determine if they have a large breast and its pendulous or if it is a smaller sized breast. If it is a larger breast and it is pendulous and they are having just the breast treated, sometimes it is better to put them, as opposed to keeping on their back for treatment, putting them on their stomach and having the breast hang forward, there is a hole in the table what we call prone board, and that allows gravity to help us to kind of move the breast tissue away from the chest wall.

Gore Have they already had their surgery at this point?

Moran They have had their surgery. We see them after the surgery. This is to start the radiation. And we do what we call as a simulation. We bring the patient in, we tell them they are going to have a scan and that is just to do the planning of the radiation.

Gore Are they really scared?

Moran No, because we give them a lot of information in advance, and we tell them it is basically just a CAT scan and they have had that before. So, we put them depending again on their anatomy on either in a supine position on their back or prone on their stomach, and then usually their arms are above their head, so they have to get their arms up and then we take a scan and we use that scan and the borders that we have determined as positions that are going to be needed to treat to then design the radiation beams and that is all done virtually while the patient is at home.

Gore Well, how can you do that when the tumor is not there anymore? How do you see where you have to go?

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Moran So, that is a very good question actually. In fact, the vast majority of patients do have a small if not larger seroma, which is a small bubble of liquid that fills the area where the surgeon took out the lump because they have not

filled in yet within anything else. So, that is often helpful, and more and more surgeons are actually putting in clips in the area where they remove the tumor so that we can better localize it as well. They are like staples, they are radio-opaque clips that are like staples, and they go in and allow us to just really localize that area so that we can really make sure that it is covered and that is extremely beneficial, and we are really pushing to have all of the surgeons....

Gore It seems like it should be required...

Moran It should be, but it is not always done and I think the surgeons because they have so much else going on at the very end, it is just an additional thing that they have to think about and it does not really effect their practice, so it is happening, but it is not happening as often as we would like to see and we would like to see that happen more.

Gore So, you got them there, the computer or the scanner takes the pictures, hopefully they have the clips and that shows really where it is, otherwise you got this fluid collection which is a marker and then your computer...

Moran Well, then we just determine typically with whole breast radiation, we are treating the whole breast and so we are going from the mid sternum - the midportion of the chest between the two breasts, all the way to the edge of the breast tissue and a little bit beyond that, so it is under the arm. We are really treating the whole breast area. And so, we use the scan and we contour out the breast at all the different levels and then radiation beam is designed so that it is coming in to treat the breast actually with tangential fields. It is very hard for me to actually describe it towards without pictures.

Gore Dr. Moran, so you guys know is just doing a lot of gesticulating.

Moran Waving my arms all over...

Gore Maybe we should do a video.

Moran But, essentially what happens is that the patient lies on the table in the same position for the daily treatment and the beam actually treats very superficially, just skims the chest wall so that it is getting the breast and maybe a little bit of underlying tissue but it is really not penetrating through and through.

Gore So, it is not going into the chest like starting with the ribs, right above the ribs basically.

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Moran Exactly, exactly. It is kind of skimming the chest wall and it is individualized for the patient based on the amount of breast tissue they have and the contour of the breast tissue, and what that allows for is it just allows for a much more even distribution of the radiation dose as well, which we did not have years ago.



Gore Do they get any extra where the tumor was or that is not necessary?

Moran They do, they get what we call boost, the radiation boost, the last few treatments, anywhere from 4-8 treatments are where we do a more superficial beam just in the area where the tumor was and they have done studies that actually show that using this boost actually improves the outcomes even further, so we usually will do a boost in the vast majority of patients.

Gore So, in the case of the woman with a larger, more pendulous breasts as you have pointed out, that you still irradiate the whole breast?

Moran Yes, for the most part that is the standard of care right now. There are some studies now looking at and some places in the country where they are starting to do more and more of partial breast irradiation, which is just treating the lump and a small area around it, but that is not the standard of care yet and we do not have long-term outcomes with that, so that is still considered investigational for the most part.

Gore Gotcha. So, how many, in general if there is a general, how many treatments will this require.

Moran So, the standard based on all the trials that were done back 25-30 years ago was 5 full weeks of radiation to the whole breast...

Gore Five days a week..

Moran Five days a week, yeah, Monday through Friday, and if you miss a treatment, you just add it on at the end, so as long as it is in certain amount of time, you are fine, and then if you add the boost in, again additional 5 to 8 for the boost.

Gore After the 5 weeks?

Moran After 5 weeks, so it is 6-1/2, and that is the maximal. But since then, we are now looking at ways to minimize treatment — one is the partial breast and other way to minimize treatment or to reduce the radiation duration is to actually give the radiation in a shorter amount of time. So, now we are really trying to deliver the radiation in 3-4 weeks, and depending on the patient's characteristics, we may or may not be able to do that, but we can actually finish the whole radiation and the boost in under 4 weeks in some patients.

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Gore You know, it sounds a lot better. Moran Yeah, 2-1/2 weeks that you save.  
Gore So, what kind of side effects should people expect or are they side effect free?

Moran During the radiation, they will have fatigue and it is usually moderate amount of fatigue, it amounts to an extra nap which they never took before or going to bed an hour early, it is never debilitating for the most part, and they will get a skin reaction, and the skin reaction varies on the patient, their

sensitivity to the radiation and also their various anatomic differences, but that is really it.

Gore Is it like a sunburn?

Moran It is a little like a sunburn, yes it is a little delayed reaction, usually starts in the second or third week and then it kind of progressively gets worse. But it gets better approximately a month after they are done.

Gore Are there screens or anything like that?

Moran We do give them a host of different things to try and to use, and they may or may not help depending on the patient.

Gore Gotcha. So, more itchy or pain.

Moran Both. We also give hydrocortisone and Benadryl ointment to help with the itching.

Gore So, not so terrible. No nausea usually.

Moran No, not at all. Again, we are treating just the breast tissue for the most part unless we are adding in the nodes, and since we not radiating any of the organs that are related to nausea – the stomach, bowel, diaphragm, where you would not see those side effects with that.

Gore So, really it sounds to me like the average person who might elect this approach to therapy really should find it perhaps inconvenient, but not really scary and pretty manageable - that is what you are telling me?

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Moran Yeah, it is actually and that is what we were starting to talk about earlier, is that the vast majority of patients hear about radiation, they hear about older techniques and it sounds very, very scary but then they will go through in almost every patient says, “Wow, that was not what I expected at all.” ‘This is a lot easier than I thought it would be. ‘I cannot believe I am done’ and things like that. So, I think we have made a lot of strides and I think it is important that patients get that education, ask a lot of questions in advance and kind of feel reassured before they get started so that they are not anxious about it, because I think it is reasonable to want to have all those questions answered in advance so that they are not anxious as they get started.

Gore Are they able to work during radiation?

Moran Absolutely. I mean they are able to, and if they want to not work, that is okay too, it depends.

Gore But they are well enough to work?

Moran They are well enough to work, swimming, doing whatever they want to do.

Gore That's awesome. Do they follow up with radiation oncologist afterwards?

Moran We do. It varies, everyone has a little bit of a different practice in our breast team, but depending on the patient, if they are following with the medical oncologist or a surgeon, often you will have one doctor that is the primary gatekeeper who will follow them long term and then kind of refer back for any problems that are specific to radiation.

Gore Gotcha. Now, are there people for whom this approach is not appropriate.

Moran This, you mean breast conservation approach? Gore Yeah. Moran Well, so patients who choose to have a mastectomy or might need to have a mastectomy, then in that case, we have to then stratify the patient by their risk factors; meaning if they have high risk factors despite the fact all the breast tissue was removed, for example, if they have multiple nodes that are involved, their doctors might still recommend radiation for them and that is because between the tumor and the lymph nodes, there might be residual cells left behind even though all the breast tissue is removed and they have done multiple studies that show that actually giving radiation in the post-mastectomy setting for women who have had the complete breast removed and lymph nodes removed still provides a benefit if you have some high-risk features.

Gore I see. So, it really has to be tailored.

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Moran It does, and that is why a patient should never go in thinking that they are having the mastectomy because they want to avoid the radiation, because there are many a times where there are unexpected findings at the time of surgery and they still require the radiation despite having had the mastectomy.

Gore So, do the teams discuss this...

Moran Absolutely.

Gore ...in a multidisciplinary way before they make the choices.

Moran Absolutely, absolutely. There is a very multidisciplinary approach at Yale and we have a great team of surgeons, pathologists, radiologists, radiation oncologists, medical oncologists, and we all work together to make sure the care is very coordinated and that everyone is on board and knows what is going on.

Gore And I am sure that other excellent hospitals would also offer such a multidisciplinary approach, things that like people should want.

Moran Yeah, it is the standard of care. So, across the country now, there are over 500 NAPBC national accreditation for breast program centers that are accredited by the American College of Surgeons. I was involved with the original development of these standards for what a breast center should be, what it should entail and any breast center program should have a multidisciplinary tumor board and it should have various- there is a whole list of things it should

have, genetic counseling for example that is available to the patient. And that is important for the patient to look into.

Dr. Meena Moran is Professor of Therapeutic Radiology, Assistant Clinical Professor of Nursing and Director of the Yale Breast Radiotherapy Program. If you have questions, the address is [canceranswers@yale.edu](mailto:canceranswers@yale.edu) and past editions of the program are available in audio and written form at [YaleCancerCenter.org](http://YaleCancerCenter.org). I am Bruce Barber reminding you to tune in each week to learn more about the fight against cancer. You are on WNPR, Connecticut's public media source for news and ideas.