

Yale CANCER CENTER

answers

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Hosts

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Meet our New Co-Host: Dr. Susan Higgins

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Yale Cancer Center Answers is a weekly broadcast on **WNPR** Connecticut Public Radio Sunday Evenings at 6:00PM

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Welcome to Yale Cancer Center Answers with your hosts doctors Anees Chagpar, Susan Higgins and Steven Gore. Dr. Chagpar is Associate Professor of Surgical Oncology and Director of the Breast Center at Smilow Cancer Hospital at Yale, New Haven. Dr. Higgins is Professor of Therapeutic Radiology and of Obstetrics, Gynecology and Reproductive Sciences and Dr. Gore is Director of Hematological Malignancies at Smilow and an expert in Myelodysplastic Syndromes. Yale Cancer Center Answers features weekly conversations about the research, diagnosis and treatment of cancer and if you would like to join the conversation, you can submit questions and comments to canceranswers@yale.edu or you can leave a voicemail message at 888-234-4YCC. This week it is a conversation about radiation oncology with our new co-host Dr. Susan Higgins. Here is Dr. Steven Gore.

Gore First of all it is fantastic to have you on the show. I have to say that the couple of shows that we have recorded together, especially as a newbie, you add a great dimension to the dialogues, so thank you so much for joining us. You are a radiation oncologist, correct?

Higgins Yes, so when people hear the word radiation oncologist, they get confused because a lot of people in the public do not know exactly what radiation oncologists are, they do not even know quite a bit about radiation.

Gore Madam Curie, right?

Higgins Madam Curie yes, actually it all started there, but if you look at the three sort of pillars of cancer therapy, there are surgical oncologists, people know surgeons, they are very familiar with that; there is medical oncology, people generally understand what medical oncologists do and general systemic therapies like chemo, but we are the third part, and we treat over one-half of the people who have cancer and I tell people, we sort of have targeted therapy and that we use radiation x-rays or high energy x-rays to treat cancers and we also use radiation sources and you alluded to Madam Curie and that is where it all started. She discovered radium which was a radiation source that gives off what we call gamma x-rays which are just x-rays and some of the earliest radiation therapy was actually done with some of these sources. The European physicians discovered that when you place these sources right near a tumor like a cervical cancer, you can actually cure the tumor and the other half of that equation is the other half of what we do which is basically the high energy x-rays that were discovered by Rontgen in 1896 and he was doing experiments with electricity and figured out that these x-rays pass through tissue, so it really did all start way back with Madam Curie and Rontgen.

Gore It is interesting to me that cancer patients including some really educated ones that I talk to and friends of mine call their radiation oncologists their radiologists. Do you think of yourself that way, no right?

Higgins It is interesting because there is a history and then a practicality to it. The history goes way back, radiation oncology is a specialty that came from radiology and initially the training programs were together in the 60s but then diverged in the 70s.

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Gore That is just a few years ago?

Higgins Yeah and basically as we became our separate specialty, we went our own way. For many, many years we have been separate from radiologists but the part of it that is still part of our practical day- to-day life is that we as radiation oncologists, because we do therapy that is focused on specific organs, specific parts of your anatomy, we still know and do a lot of work with our imaging colleagues, the radiologists, so every day we look at an MRI, PET scan, mammograms, all those things come into our practice, so most of us are very well versed. When we have to see a patient, we are there, looking at their images pretty much all the time.

Gore Is it not true that some of your machines that direct the radiation actually are based on CAT scans or MRIs, or am I making that up?

Higgins The current trend now is to use a lot of imaging to guide our therapy and even to use that imaging real time when we are doing the therapy, so we have people that come in for treatment and we have a treatment plan and we have exact measurements of their anatomy, where their tumor is, and we can use some of the imaging while they are on the table being treated to guide therapy which makes it even more precise and effective.

Gore To watch these things, just how the gantries move around, it is pretty cool to watch as an outsider and a lay person in this, I am pretty impressed with the technology and you get very precise targeting for some of these things, right?

Higgins Right, again, incorporating the imaging allows us to see sort of a 3D model of the patient and we can then use that for planning and what is a really fun part of my job is the technical part where we can basically get a CAT scan, take a patient who has let us say a breast malignancy, I treat a lot of breast cancer, they come in, we do a CAT scan, we then have all the measurements and we can take our treatment planning system which is a very sophisticated software system and decide which beams we use, what angles they come from, what strength the beam is and really give that person a very specific plan for their specific tumor in their body, so it is all about imaging and planning that make radiation so precise.

Gore You have to work with physicists or somebody who really understands the physics of all this stuff, or is that part of your training as well?

Higgins It is one of the other parts of our job that is very gratifying. There is a team behind radiation therapy, when you look at the discipline or the day-to-day practice, we have the physician who is doing work in the clinic but then behind the scenes, we are doing the planning with dosimetrists who are very highly trained and they work with us in a very close team setting to get all of that

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planning done and we know some of the software, they know some of the doctor part but it has to come together as a team to make it all happen.

Gore In your training, do you have to do a lot of class work, book learning about the various kinds of physical properties and energy and all that in addition to the usual clinical training that you would think of in many residency programs?

Higgins Part of this planning is knowing the physics of radiation and so I tell people we are sort of the geeks and we have a lot of math. We have a lot of training in math and physics and our written boards especially are very heavy on that because that is the fundamental science that is underneath all of what we do.

Gore That is amazing, you have got these different kinds of radiation sources and machines, how do you select the modality that is appropriate for a particular kind of tumor, does that depend on where it is or what the intent is, if it is curative or not?

Higgins I guess the paradigm we use is, respect what we call normal tissue tolerance, meaning each organ in the body can only tolerate so much radiation to a certain percentage of that organ while trying to treat the cancer, so what we are always doing in our minds as clinicians, we are coming up with a plan of what type of radiation we are going to use, how we are going to direct it to the target, meaning the tumor, and choosing the planning system, how to mold or shape the beam so that we avoid the normal organs.

Gore In the old days, you used to make a lot of molds to shield things, is that still part of the deal?

Higgins I think indirectly, you mentioned something about the gantry. There is a thing called a linear accelerator. It is a very large fancy machine that allows us to deliver the beam of radiation,

again a high energy x-ray, at various angles and the shaping which used to be laid with lead blocks is now done within the treatment machine, so with that machine you can basically deliver the beam from various angles and you can modify the strength of the beam and again the actual shape of the beam coming out of the machine in so many different ways, it allows us now to do things that we could not do 10 or 15 years ago.

Gore How do you know that the machine is doing it right?

Higgins We have multiple levels of quality control and I think that we are one of the most sort of self-conscious subspecialties.

Gore I bet, there is not much room for error, right?

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Higgins That is right and I had a colleague who had a saying, radiation once given can never be taken back.

Gore Right.

Higgins So before we go ahead with even the first treatment, there is a very complex set of processes that we call quality assurance that have to happen, so in the planning there are checks and second checks and third checks and for certain things we do, we actually even use a thing called a phantom and you may have heard of this. It basically irradiates something that is a tissue equivalent. In other words, it is like putting a virtual person on the table and you actually measure the dose that goes into that phantom and that is essential for a process we call IMRT which is a very nice sophisticated way of giving radiation to multiple areas in the body with multiple beams but the only way to really know that it is being done the right way is to do that study with the phantom before you ever start treatment, so you are treating a virtual patient before you ever start treatment.

Gore Is it like the crash test dummies?

Higgins Right, it is our version of the crash dummy but it is very essential because with IMRT that is really the only way to know exactly what dose is going to be delivered.

Gore That is fascinating. I was wondering, in medical school it seems to me that not many students, maybe I am wrong about this, but that it is not part of the regular curriculum to be exposed to radiation oncology and neither is it necessarily usual to be exposed to medical oncology but of course people are making a decision at the time of residency when they are graduating medical school to become an oncologist, they might think they are interested in being a medical oncologist, but they have got three years of internal medicine training ahead of them, whereas for you guys it is pretty much decided out of med school for many people anyway, how does that work?

Higgins That is an interesting story, because people who trained in the year that I trained in...

Gore Not so very long ago.

Higgins Not very long ago. More recent every day, and we used to think that and it was true at that time when I trained, radiation oncology was a well-kept secret and what we meant by that is it is a very gratifying profession that we all love and a lot of people did not know about it because again, most things then were word of mouth. Now with the advent of the internet and social media and the kinds of connections that medical students have, we now have and I know this because I am basically a Co-director of our residency program.

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Gore You are getting a lot of likes, is that what you are telling me?

Higgins Well, let me put it this way, it has gotten to the point that people are coming to me as first year medical students, this was almost unheard of in the past. For different reasons. Because they hear about it, their colleagues are blogging and tweeting and they are on sites like webMD or I think it is called doctorMD or something where they all communicate and people now have found out about radiation and we are now the most competitive subspecialty of all the medical subspecialties.

Gore It is really crazy.

Higgins It is really crazy and we usually have 2 to 3 residency spots each year and we get over 200 applications for 2 or 3 spots.

Gore Wow, I know it is very hard to get into, so do you find the medical students, do they come and do a rotation with you or are they able to do that, to try in on for size, or is it hope for the best.

Higgins It is interesting because they have sort of guided each other along this path but usually they will pick their top 2 or 3 programs and they take their elective time to spend with us in part because they want to learn about the specialty but again it is so competitive, the face time in interacting with the people that they are going to be seeing in the future is really important.

Gore And that is not unique in your subspecialty, that is just the nature of it, if you have to be competitive you have to get your face out there. It is a very fascinating area and one that I deeply respect and we have got a lot more to talk about but it is already time to take a short break for a medical minute, so let us do that and I hope the audience will please stay tuned to learn more information about radiation oncology with my co-host Dr. Susan Higgins.

*Medical
Minute*

The American Cancer Society estimates that there will be 75,000 new cases of melanoma in the US this year with over 1000 of these patients living in Connecticut. While melanoma accounts for only about 4% of skin cancer cases, it causes the most skin cancer deaths. Early detection is the key and when detected early, melanoma is easily treated and highly curable. Clinical trials are currently underway at federally designated comprehensive cancer centers, such as, Yale Cancer Center and at Smilow Cancer Hospital at Yale-New Haven to test innovative new treatments for melanoma. The goal of the specialized programs of research excellence SPORE in skin cancer grant is to better understand the biology of skin cancer with a focus on discovering targets that will lead to improve the diagnosis and treatment. This has been a medical minute brought to you as a public service by Yale Cancer Center and Smilow Cancer Hospital at Yale-New Haven. More information is available at yalecancercenter.org. You are listening to WNPR, Connecticut's Public Media Source for news and ideas.

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Gore Welcome back to Yale Cancer Center Answers. This is Dr. Steven Gore and I have here with me my new co-host and guest tonight Dr. Susan Higgins. We are talking about radiation oncology. Susan, I think one of the things that I hear a lot from patients when I tell them they are going to have the radiation doctors come and give an opinion about whether radiation might be an important part or helpful part of their therapy, people seem to worry a

lot about side effects and I do not know if it is from the bad old days but can you speak to that? Is radiation very toxic to patients?

Higgins I am glad you brought up that point about the bad old days, we were just talking about some of the innovations and techniques that we are using now to spare normal tissue and people think about the experiences that their fathers or grandfathers had with radiation and it really is not apples or oranges, things are so much more sophisticated in terms of the delivery of radiation, shielding or sparing of the normal tissue that the side effect profile for many people now is different than it was even a few years ago and for each different type of tumor, each different site in the body, the side effect profile varies and I know sometimes people talk to friends before they see me or uncles or aunts who have had different but similar cancers but no one is exactly the same.

Gore So stay off the internet, or if you are going to, read what you read on the internet with a grain of salt and realize that you are an unique person and talk to you doctor.

Higgins Exactly, what we spend a lot of time doing in our consultation, and I think as a radiation oncologist many of us enjoy it, is educating the patient because it takes away a lot of the fear and myths that surround the word radiation. People are very fearful of that word and what it implies, so we can use that time during our consultation to basically discuss the treatment plan but then also discuss side effects and the support measures. There are always side effects but again our team of nurses, nutritionists, we are all here to take care of those side effects and just like in medical oncology, we have a lot more things to manage side effects with chemo, same thing with radiation.

Gore And you have got particular staff who are familiar with radiation patients, your nurses and technologists?

Higgins Even the therapists who work at the machine.

Gore I am sure they have got a lot of experience. I guess they see the patients as they are being treated, day after day, right?

Higgins And that again is a great part of the team concept, as my patients are going through treatment, we have our therapists, many of whom have 20 years of doing radiation therapy.

Gore They are way older than you.

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- Higgins That is exactly right. They basically see or can anticipate some of the things that are going to happen because we are very familiar with the side effects, they are very predictable and their first line of defense, they may call me and say, Mrs. Smith, her skin is looking a little red, and then we immediately address those things, the nurses are the next level and then I also see my patients like every radiation oncologist, at least once a week, and it is an interesting thing because many people that come into our treatment center and are with us for five weeks really enjoy that support system that they have, the therapist, the nurses, the nutritionists, the physicians, they are seeing us very frequently, so there is a very nice support system for them.
- Gore That is great. Are there certain cancers in which radiation is particularly useful?
- Higgins If you look at any radiation oncology center, the most common cancers that play a big role are breast, prostate, lung cancer and then there is the smattering of patients with head and neck cancer and other less common cancers, but I treat breast cancer patients and patients with gynecologic malignancies and radiation plays a very large role in both of those diseases, so we can discuss that a little bit. We wanted to discuss breast cancer a little bit and I think that that is an area where we are making a lot of improvements and great strides towards actually reducing the number of people who get radiation.
- Gore Is that right?
- Higgins Because we are finding that certain subsets of patients including women over 70 may do fine with some hormonal therapy and a lumpectomy and not even need the next step, so I think in terms of breast cancer we are actually refining who needs, who does not need and also how much they need.
- Gore I understand that for certain gynecological malignancies there are different ways you can give radiation as well and sometimes I think they do intravaginal radiation versus external beam.
- Higgins Right, radiation plays a large role in the management of gynecologic cancers especially cervical cancer and this is something that has about a 50-year history, radiation given as external beam radiation over several weeks, again the x-ray type plus the internal treatments which are like the radium seeds that Madam Curie discovered many years ago, this similar process is still used. We are putting radiation seeds right near the cancer and with radiation you can cure a large majority of the patients with cervical cancer.

Gore Of course, we hope that all the young kids are getting the vaccine against human papilloma virus so that we will have less and less cervical cancer.

Higgins Yes that is right and I think that wave of people who have the vaccine and the incidence of cervical cancer being reduced by that process is coming, but it is not quite here yet.

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Gore So we are still dealing with people who grew up in the wild 60s and got around a little bit.

Higgins That is right and in head and neck cancer and GYN cancer, we are seeing a lot of HPV related cancers and some of them are not found early because people in certain regions of the country do not have access to healthcare.

Gore That is changing.

Higgins That is changing with Obamacare and we are seeing more people coming in, but it is interesting because we have been treating patients for 20 years and it is not where I would like it to be. I think we still have a lot of improvements needed in that arena which is healthcare access.

Gore Susan, let us say I am a patient with newly diagnosed cancer, how would I know that I should call you, how would I know that maybe radiation should be a part of my treatment, how do I navigate this?

Higgins When you get a diagnosis, you are usually introduced to a medical oncologist who I tell people if we are baseball team, the medical oncologists are sort of like the manager and he is going to put together the line up, so when he needs me to give a consultation and consider radiation, I tell them it is like the pitcher coming out of the bullpen, so I come out of the bullpen and when he asks me if I am going to give treatment, we see each other for six weeks or so and again we do the consultation to determine whether you need radiation and how much of it and how many weeks, but then you actually go back to your medical oncologist after that because again he is the manager and he sends you to all the specialists that you need to see and really pulls it all together.

Gore In some tumor types, this will sometimes happen all at the same time or in a multidisciplinary kind of clinic, do you participate in those?

Higgins Yes, we feel that the state-of-the art management of most of these malignancies is in a multidisciplinary setting where we have a tumor board and for example, at a breast tumor board, we have our breast surgeons, our medical oncologists, the radiation oncologists and pathologists and radiologists. We again have a team where we can actually take each patients case, review it and everyone can basically come up with a game plan for that patient's care which is going to be relatively comprehensive. We will talk about the surgery they need. We will talk about whether or not they need chemotherapy and whether or not they need radiation therapy and usually our medical oncology colleagues are at those meetings and we all participate in that process.

Gore Does that get recorded and put into the patient's chart somehow, how does that work?

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Higgins Most of the time there is a point person that presents the case and then we will take that information back to the patient the next week during consultation and say, we discussed your case last week, and they will outline the management plan. For example, for someone with breast cancer, they may say, you need a lumpectomy and then you need to see a radiation oncologist and then come back to see me, meaning the medical oncologist.

Gore And as part of the multidisciplinary plan, whether you are going to use external beam or implant radiation seeds as you call them, I guess you call that brachytherapy right?

Higgins Right, we call that brachytherapy in one of the settings where again we spoke about using it for gynecologic cancers. In that situation, I am working with gynecologic oncologists whom we have at the tumor board and we will discuss all those things and when it comes down to the specifics of the treatment plan, I will be working out whether you get the implant or not but in general, my gynecologic oncology colleagues know a lot about radiation and they have a very good sense of what we will be recommending and again we are putting together the team's game plan.

Gore Do you actually have to go into the operating room to insert these things?

Higgins Yes, that procedure of inserting the seeds has been done traditionally in the operating room but now we have a brachytherapy suite or sort of a mini operating room in our department

where we can do these procedures in an outpatient basis which is much more convenient for the patient and they do not have to be in a hospital bed. Instead of staying in a hospital bed for two days, they come over the course of a week or two or three for individual treatments usually 5 or 6.

Gore Are the seeds left inside the patient or are they removed, does that depend on the actual setting?

Higgins In this case, the radiation seed is delivered by a machine and the machine will be able to treat the patient for whatever timeframe. usually 20 to 30 minutes, and then the actual applicator is removed and the seed never touches the patient. It actually goes into an applicator, so the process entails putting a device in the uterus, in the vaginal canal so that we can deliver the sources into that. I tell people it is like a sort of conduit or straw, and the radiation seed goes inside of that but never touches the patient.

Gore Things have really changed in the 25 years since I have branched off into hematologic malignancy and I am dealing a lot less obviously with people like you.

Higgins Things have gone in a good direction in the sense that we are hopefully having patients go through less in the way of hospital stays. We do not want people lying in bed. We would like them to be up and on their feet and we actually use anesthesia for these procedures for patient comfort and safety and I think patients are tolerating these types of treatments much better than the implants that we did in the hospital.

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Gore It sounds like you get to wear a few different hats and do a lot of activities to help different kinds of patients.

Higgins Radiation oncologists, most of us, especially academic doctors, have one or two or three things that we treat and focus on but even within those 3 disease sites, let us say you do lung, head and neck cancer, even within those specialties, there are sub-sub specialties. Some people know how to do the seeds, some people know how to do different types of planning, so we get to wear a lot of different hats.

Gore That is cool. You were telling me off line that you are studying some new ways to reduce toxicity from radiation, do you want to speak about that a little bit?

Higgins Again, one of challenges as a radiation oncologist is getting enough dose into the tumor to kill the tumor cells while sparing normal tissues and I have a compound that we are running a

trial with, and the compound is called KD 018 and it is actually a standardized herbal compound and so far it has proven to be non-toxic and we used this in gastrointestinal cancers and there is actually a little bit of history behind this. Our medical oncologists have used this with chemotherapy when treating different GI cancers. GI cancers are colon, rectal, stomach and what we are finding is that it protects the normal tissue meaning the lining of your bowel and that is very exciting because we do not have that many tools in our toolbox that are non-toxic and do not interfere with the cancer therapy, but allow us to treat the tumor cells effectively. We did a very nice study with my colleague, Sally Rockwell and we were able to show this in a mouse model where we irradiated the abdomen. We looked at the mice who got the KD 018 and the mice who did not, and then we were actually able to see by taking slides of their GI tract of their bowel and see how nice and healthy their cells were when you gave this agent KD 018 and how these cells in the mice who got radiation without it were not as healthy.

Gore It would be incredible if that works out and I wish you a lot of luck with that component and that is a component that was developed I believe by a chemist here at Yale.

Higgins That is right, we had a group called Phytoceutica and again this was one of those nice entrepreneurial sort of Yale spinoff groups that work very closely with us and they had some really smart chemists that helped us develop this compound.

Dr. Susan Higgins is Professor of Therapeutic Radiology and of Obstetrics Gynecology and Reproductive Sciences at Yale School of Medicine. We invite you to share your questions and comments, you can send them to canceranswers@yale.edu or you can leave a voicemail message at 888-234-4YCC and as an additional resource, archived programs are available in both audio and written format at yalecancercenter.org. I am Bruce Barber hoping you will join us again next Sunday evening at 6:00 for another edition of Yale Cancer Center Answers here on WNPR, Connecticut's Public Media Source for news and ideas.