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00:08.800 --> 00:45.100 Welcome to Yale Cancer Answers with doctors Anees Chagpar and Steven Gore. Yale Cancer Answers features the latest information on cancer care by welcoming oncologists and specialists who are on the forefront of the battle to fight cancer. This week, it is a conversation about MRI imaging for prostate cancer with Dr. Jeffrey Weinreb. Dr. Weinreb is Professor of Radiology and Biomedical Imaging at the Yale School of Medicine. Dr. Gore is a Professor of Internal Medicine and Hematology at Yale and Director of Hematologic Malignancies at Yale Cancer Center.

00:45.100 --> 00:54.800 <vGore>People are afraid of MRIs I find. You know, the MRI machine, so many people are afraid of it, it seems. Is that wrong?

00:54.800 --> 01:19.800 <vWeinreb>Certainly, it can be intimidating because it is a long tunnel that people have to go into. And some people are claustrophobic or just not comfortable in the environment, but I would say the vast majority of patients tolerate it very, very well and they are happy to have it because it is a very useful diagnostic test, there is no radiation and gives some answers.

01:19.800 --> 01:21.400 <vGore> And it makes a lot of noise I hear.

01:21.400 --> 01:24.200 <vWeinreb>It does make a lot of noise, yeah.

01:24.200 --> 01:25.100 <vGore>But so what right?

01:25.100 --> 01:33.000 <vWeinreb>Well, we give everybody earplugs so that the noise does not affect their hearing and generally it is not a problem.

01:33.000 --> 01:43.600 <vGore>So, people should not have to turn off their radio because they are afraid of MRIs right, to listen to our talk. That is why I started off that way.

01:43.600 --> 01:49.500 <vWeinreb>Well, you know, you cannot bring a radio into the MRI scanning room because it will cause it to malfunction and may break.

01:49.500 --> 01:53.500 <vGore>Gotcha. And what about people who have like metal in their bodies or stuff, that used to be an issue I think.

01:53.500 --> 02:38.000 <vWeinreb>Well, it is an issue but most of the metal put in the body turns out to be perfectly fine, it is not going to move, it is not going to heat up, it is not a problem. There are some types of metal that we have to be careful about and there are also a lot of patients nowadays who have various electromagnetic devices in their body, things like pacemakers and infusion pumps, and some of those are not safe to be scanned in an MR scanner, but as we have gotten more and more experienced, we are finding that even in those patients if we use the appropriate conditions and we monitor properly and

we have a lot of experience in doing this, we are scanning lots of patients now with pacemakers, so it is becoming routine.

02:38.000 --> 03:15.700 <vGore>And that is cool. You know, I finished my residency at University of Chicago in 1987. At that time, UOC did not have an MRI scanner. They were new I think. No, 1984. And I remember when it was really complicated, in those days it was just for brain imaging I think, at least there. If we had somebody who really needed an MRI of the brain, they had to be put in an ambulance and brought over, that is how it was.

03:15.700 --> 04:15.600 <vWeinreb>Right. Well, yeah MRI scanners for diagnostic purposes, for medical use was developed in the 1970s and became available in the early 1980s. So, the timeframe you are talking about, when I got into it, there were only about 5 MRI scanners in the United States, in the early 1980s. Today, there are 35,000 actually more than that worldwide and just here at Yale, we are reading studies from about 17 clinical scanners. We have separate research scanners. We have a scanner that is in our pediatric hospital, just for pediatrics, we have a scanner that is just for breast MRI, we have a scanner in an operating room environment to help the neurosurgeon during surgery in the brain. So, there are scanners all over the place in hospitals and in clinics around the country.

04:15.600 --> 04:18.500 <vGore>30 years is a long time and I am just old. Is that what you are telling me?

04:18.500 --> 04:21.100 <vWeinreb>Join the club, in good company.

04:21.100 --> 04:38.900 <vGore> My wife in those days was a strategic planner at Children's Memorial Hospital, which is now Lurie Children's Hospital, Northwestern, different building and they were putting in a certificate of need for an MRI scanner to be the second in the city and that was a big deal.

04:38.900 --> 04:56.400 <vWeinreb>Yeah, it was a very big deal and in Connecticut, we still have a certificate of need requirement which to some extent limits the number of MR scanners, but every hospital, every radiology practice has one, it has just become essential. It is used for everything.

04:56.400--> 05:05.300 <vGore>Has your practice been MRI limited from the get-go, from when you were 1980s.

05:05.300 --> 05:44.200 <vWeinreb> Well, I am radiologist, so I was trained in all diagnostic modalities, but when I started working in MRI, I was doing everything in MRI. As you mentioned, the first clinical applications were in the brain and the spine and then the bones and joints. That is what I did for some time, but over time, I helped develop the field of body MRI, so meaning MRI in the other parts of the body - the abdomen, the pelvis, the vascular system, and nowadays, clinically, I deal only with CT scanning and with MRI. That is where I specialize.

05:44.200 --> 05:52.300 <vGore> Gotcha. So, you do both. And prostate, did

that go along with being a gentleman of a certain age?

05:52.300 --> 06:01.000 <vWeinreb> I would say, my interest has not diminished. I got involved in prostate MRI in the 1980s.

06:01.000 --> 06:02.300 <vGore> Okay, when you were still pretty young.

06:02.300 --> 07:47.700 <vWeinreb> I was a pup, yeah. And, at that time, we were using MRI for staging. What I mean by that is a patient was proven to have prostate cancer based on a biopsy and then in some cases, they would undergo MRI to see if the cancer had spread out of the prostate and that is what we used prostate MRI for, for the first decade or two. Over time, as we developed more and more techniques and refined techniques and got more experience, we realized that we could actually find the cancers in the prostate, the killer cancers, the so-called clinically significant cancers in the prostate and so we started using MRI for diagnosing prostate cancer or for finding areas to biopsy. So, we would know where to put the needle to get tissue to prove whether or not there was a prostate cancer there. So, I have had a long-term interest in prostate cancer MRI, I have been doing this now for almost 3 decades. On a personal level, my father had prostate cancer when he was quite elderly, most of us are going to get prostate cancer. He had a type of prostate cancer that we now know generally does not kill people and today, probably he would not be treated for it. At that time, he was treated and he developed complications from it and made his life fairly miserable. And so, that probably subliminally spurred my interest in this field.

07:47.700 --> 08:04.200 <vGore> Right. When you say that most of us will get prostate cancer, what you are referring to is the fact that left long enough, the formation of some cancer focus in men's prostates is inevitable but may certainly not ever be clinically problematic right?

08:04.200 --> 09:09.400 <vWeinreb> Right. This is a really important issue with prostate cancers, prostate cancer is the second most common cancer in men in the United States. So, after skin cancers, it is the most common cancer in the United States. There are around 140,000 new cases diagnosed each year. The vast majority of patients diagnosed with the prostate cancer are not going to die from it. But nevertheless, it is a major killer of men in the United States. I think it is the second most common cancer cause of death for men in the United States after lung cancer. But this is a very important point. Most people who will get prostate cancer, are not going to die from it. And the problem we have had is distinguishing between those patients who have the killer cancers, the clinically significant cancers and those who have the indolent cancers - the ones that most of us are going to get and are going to live with and it is never going to affect us.

09:09.400 --> 09:19.500 <vGore> Right. I do not want our listeners to run out to their docs and say "oh! Weinreb says that I have got prostate cancer because we all do, you know." We do not want to start a panic in New Haven.

09:19.500 --> 10:20.800 <vWeinreb>No, no. So, obviously, we do not want to start doing MRIs or treating everybody, it would be business but we do not need any help in business, we are quite busy. So, the point is that, prostate cancer is just really, really common, most people are just not going to die from it. Currently, the way we determine who might be a candidate for MRI is patients get a blood test called PSA, prostate-specific antigen. If it is elevated or they have other risk factors for prostate cancers, maybe there is a very strong family history for example, then they might undergo an MRI to help determine if there is a focus or a location in the prostate that should be biopsied because it is suspicious for clinically significant cancer, and it turns out MRI is quite good at that. It is able to find most of the clinically significant cancers.

10:20.800 --> 10:54.900 <vGore>I guess the question of using this PSA blood test for screening has been controversial and for a while was sort of discouraged, and now I think it is being encouraged with the right counseling and so on, but I think the take away message is that men, certainly over 50 depending on the family history, at least prostate health should be addressed by their primary physicians and something that should be attended to one way or the other right. Everyone should be aware that they should be thinking about whether prostate cancer could be a possibility for them right?

10:54.900 --> 11:47.100 <vWeinreb>Well, again, I think given the prevalence of prostate cancer, how common it is and the implications as a cause of death this is really important. So, many men treated for prostate cancer have been in the past treated for the types of cancers that are not going to kill them and had complications from the treatment: Urinary incontinence, meaning they cannot control their urinary function, sexual impotence and it is sort of not great, you are treating a disease which was not going to kill or even hurt them and in some cases the complications are worse than the disease. So, hopefully using MRI, we can minimize that kind of thing from happening.

11:47.100 --> 12:10.400 <vGore>Okay, let's say I am working with my doctor who is a very fine internist if you are listening and he does the appropriate screening and just determines either my level is high, more likely the velocity of my increase is worrisome or something like that and he probably is going to refer me to a urologist right?

12:10.400 --> 12:12.800 <vWeinreb>Correct, right. Most of the time you will be referred to a urologist.

12:12.800 --> 12:24.400 <vGore>A urologist is going to do a rectal exam, which is not very helpful a lot of the time, sometimes it is right. But they feel like they have to do it.

12:24.400 --> 12:27.100 <vWeinreb>It is a standard part of the exam, yes.

12:27.100 --> 12:36.800 <vGore>So, how is that urologist going to decide to send me for an MRI or not. Or what is your opinion about what they should do?

12:36.800 --> 13:45.800 <vWeinreb>So, again, I think that the urologist will look holistically at the patient and take into account everything, not just the PSA level and the digital rectal exam but how rapidly the PSA is increasing, family history and maybe other blood markers or biomedical indicators that suggest that the patient is at an elevated risk for prostate cancer. In the past, those patients would go directly to an ultrasound-guided biopsy where the needle under ultrasound is placed in typically 12 parts of the prostate without targeting a spot, just sort of not quite randomly but sort of randomly in the prostate in the hopes that this little needle which is sampling maybe half a percent of the prostate gland is going to find the prostate cancer, that has been the standard of care for years.

13:45.800 --> 14:01.100 <vGore> Okay, hold it right there because you are making me uncomfortable. But really because we have to take a break for a medical minute. Please stay tuned to learn more about this horrible ultrasound thing and more about MRI imaging for prostate cancer with Dr. Jeffrey Weinreb.

14:01.100 --> 14:15.400 Medical Minute Support for Yale Cancer Answers comes from AstraZeneca, dedicated to providing innovative treatment options for people living with cancer. Learn more at astrazeneca-us.com.

14:15.400 --> 14:51.800 This is a medical minute about colorectal cancer. When detected early, colorectal cancer is easily treated and highly curable. And as a result, it is recommended that men and women over the age 50 have regular colonoscopies to screen for the disease. Tumor gene analysis has helped improve management of colorectal cancer by identifying the patients most likely to benefit from chemotherapy and newer targeted agents resulting in more patient-specific treatments. More information is available at YaleCancerCenter.org. You are listening to Connecticut Public Radio.

14:51.800 --> 15:29.000 <vGore>Welcome back to Yale Cancer Answers. This is Dr. Steven Gore. I am joined tonight by my guest Dr. Jeffrey Weinreb and we are discussing MRI imaging for prostate cancer detection. Jeff, you know, jokingly before the break, I stopped you from describing what, to a lay person does sound pretty awful, I assume this ultrasound probe is in the rectum, is that how you see the prostate? So, I am picturing some big ultrasound probe in my rectum and somebody coming at me with needles, it is a not an appealing picture, that is all I could tell you.

15:29.000 --> 15:36.400 <vWeinreb>Well, that is exactly how what happens, but it is not as bad as it sounds. I do not think anybody loves it but it is tolerated.

15:36.400 --> 15:44.100 <vGore> And I am sure that people are under some kind of anesthesia or light anesthesia or something right? But you are saying that maybe that was not the most effective way to approach it?

15:44.100 --> 16:31.000 <vWeinreb>Well, so what happens with that approach is that you are again just sampling a small part of the prostate and it is almost

a matter of luck if there is cancer present that you are actually going to find it. And even if you find it, when this goes to the pathologist, they may underdiagnose it, so that it may be a more advanced cancer but they cannot tell from the small sample they get or it may be misdiagnosed as to whether it is one of those killer cancers or not. So, in other parts of the body if you think about it, when we do a biopsy, we are sticking a needle looking for cancer into something that we think is cancer based on imaging.

16:31.000 --> 16:36.000 <vGore>Sure, a mammogram or a lung CT scan, like that right?

16:36.000 --> 16:46.300 <vWeinreb>Absolutely. So, the prostate was unique in this regard in that just random biopsies were done and hope you hit it. And the reason was that you cannot find these cancers reliably using ultrasound.

16:46.300 --> 16:49.500 <vGore> I see. So, it is not a good technique?

16:49.500 --> 17:19.400 <vWeinreb>For finding the cancers, it is a good technique for guiding biopsies. So, with MRI where we can find most of these cancers, the new approach is to do the MRI prior to the biopsy, use the MRI to decide whether or not, with the patient whether or not they want to undergo a biopsy and then if they do undergo a biopsy, use the MRI as a guide to where to stick some of the needles to increase the probability that you are going to find the clinically significant cancers.

17:19.400--> 17:24.000 <vGore>But are they using the MRI during the biopsy or they just have the pictures there.

17:24.000 --> 17:55.100 <vWeinreb>Biopsy can be done using the MRI as a guide, one way of doing it is called a cognitive biopsy and that is where generally a urologist looks at the MRI scan and then under ultrasound just looks back and forth between the MRI and tries to match and put the needle in the right place. That seems to work okay, but it is probably got limitations for small cancers.

17:55.100 --> 18:01.700 <vGore>Seems like it, and especially if you are spatially challenged like me, but then I would not be doing that.

18:01.700 --> 19:18.900 <vWeinreb>But people are doing that and it seems to work reasonably well. Another approach is to do this in the MRI scanner itself. And so, we just started doing these at Yale. This has been done at many other places and that has got some advantages, but it does use the MRI scanner for an hour or so or more, and we would like to use that MRI scanner for diagnostic purposes, we do not have availability in many places of MRI scanners to do these under direct visualization in the MRI scanner. So, the technique that has been developed now over the last decade or so, is MR ultrasound fusion guided biopsies, and the idea here is you do the MRI first, then you get this digital data and you electronically merge it with the ultrasound data and use the ultrasound with the MRI guidance to target the biopsy. It is a very interesting technology, there are a lot of different approaches to doing this, but this is what has really

taken off. This is the most common way of doing the biopsies. The MR-targeted biopsies now is with ultrasound MR fusion.

19:18.900 --> 19:21.500 <vGore>And not in the MRI machine at that point?

19:21.500 --> 19:52.800 <vWeinreb>No, so the MRI scan is done typically on one day, the radiologist assesses the MRI scan, using the MRI data, creates a 3-dimensional model of the prostate, shows exactly where the suspicious areas are and then this is merged with the ultrasound data and then under real-time ultrasound is done on another day in another room, the needles are put into the appropriate place.

19:52.800 --> 19:57.900 <vGore>And does the ultrasound machine, is it smart enough to know if the needle is in the right place or not?

19:57.900 --> 20:06.500 <vWeinreb>That is the urologist's job at current. But, you know, in the future, probably the machine will do this for us.

20:06.500 --> 20:23.500 <vGore> Yeah. I mean it makes sense, but it is just fascinating. And I do not know how many of our listeners know the prostate is in such a tough spot right there, sort of beneath the bladder and against the wall of the pelvis and it is a small thing.

20:23.500 --> 20:54.200 <vWeinreb>You know, a normal prostate is about the size of a walnut and we are looking for things that are just a few millimeters or a centimeter in size many cases. So, it is challenging and it is, as you said, it is hard to reach, it is located between the rectum and it is very deep there in the pelvis, but we can get needles in there either through the rectum or actually through the perineum which is the space between the scrotum and the rectum.

20:54.200 --> 21:08.700 <vGore> Yeah, amazing. Can the MRI be used at all to see, wow this looks like it is really going to be a cancer or maybe not. I mean does the MRI or anything about the image give you any information?

21:08.700 --> 22:31.200 <vWeinreb>Today when we do our MRI, we call it MP MRI, multi-parametric MRI. So, it uses a bunch of different techniques and we integrate all the information and use various criteria to decide what the probability of an abnormality is to be a clinically significant cancer. And the standard care now worldwide is actually something that I helped develop, I actually led the development of this, something called PIRADS, Prostate Imaging Reporting and Data System. What it does is, it uses features on the MRI scan and based on that we give it a score of 1-5. So, a 1 would indicate that there is very little chance that this is a clinically significant cancer. At the other end of the extreme, a 5 would be a finding that based on the MRI criteria, based on PIRADS criteria has a very high probability of being a clinically significant cancer. Generally, in practice today, anything that is graded as a 3, 4 or 5 will undergo a targeted biopsy.

22:31.200 --> 22:36.700 <vGore> But a 1 or 2 will not.

22:36.700 --> 23:05.400 <vWeinreb>A 1 will not, a 2 in most cases will not, but if a patient, let us say for example a patient has a very high PSA or has very high risk factors for clinically significant cancer and the only thing we see is a 2, then that might be targeted because there is nothing else that is suspicious for a cancer and a 2 does not mean it is not prostate cancer, it just means it is a very unlikely to be clinically significant prostate cancer.

23:05.400 --> 23:07.400 <vGore>Gotcha. And are there ever any prostate cancers that do not show on the MRI at all?

23:07.400 --> 23:46.100 <vWeinreb>Yes. Most of the cancers that do not show up on the MRI are the indolent ones. The slow growing ones, the ones that are not going to kill the patient, but MRI is not perfect by any stretch of the imagination and depending on the study, the chances of missing a clinically significant bad prostate cancer are probably in the range of 15-5%, most studies showing results more on the low level.

23:46.100 --> 24:41.700 <vGore> So, I knew somebody in my family or I know somebody in my family who is still fine, who underwent an evaluation for suspected prostate cancer and in fact his PSA was within the normal range, but he is kind of an anal person and he was watching his velocity and he does a lot of research and he thought that his velocity was too high and he convinced the urologist to do biopsy, which the urologist did not really want to and seems to me that he had an ultrasound-directed biopsy which was surprisingly positive and surprisingly worrisome for a higher grade cancer, and then if they had not done an MRI, so then the question was how to assess whether the cancer was within the prostate gland or was it extending beyond the prostate gland and he had to wait like 6 weeks to get an MRI, that seemed real like super-unfortunate. Does that sound like a real story or?

24:41.700 --> 26:30.100 <vWeinreb>Yeah. I think this is common, what has happened is that as I mentioned, prostate MRI was first used for staging, but as we have gotten more experience with it and as the data has accrued, we are using prostate MRI for more and more, not just for diagnosis, it was used in patients who are at risk for having prostate cancer based on their PSA or other factors had negative biopsies but they still thought that the patient had prostate cancer. We know that the traditional transrectal ultrasound guided biopsies miss a lot of prostate cancers. So, biopsy-negative patients would get an MRI to find the target. Now, we are using it before the biopsy in many cases where it is available, this is certainly not true everywhere because these biopsy capabilities are not available everywhere and radiologists everywhere are not expert yet in this, but we are also using MRI now for surveillance. So, a patient has a biopsy and say low-grade cancer for example or for whatever reason they do not want to treat it, the patient does not want treatment, we can use the MRI along with the PSA to follow these patients year to year to year and see if anything changes. And if nothing changes, then you do not treat it. If something pops up that is new, you know exactly where to put the needle to try to make a diagnosis and treat it if necessary. So, the applications

of prostate MRI have grown enormously, a lot of this is still in evolution and under investigation, but it seems to be developing a bigger and bigger role in the care pathways for prostate cancer.

26:30.100 --> 26:49.800 <vGore>So, it seems reasonable at least from what I am hearing; if you are a gentleman who is working with a urologist who is recommending a biopsy, to at least ask about whether an MRI should be done first.

26:49.800 --> 27:27.800 <vWeinreb>What I would say is, I would and I think more and more patients as they are learning about this are, some of them are learning that from the internet or from radio, but more and more, the urologists are getting on board. So, there was resistance to this approach and it was pretty widespread, and it is understandable. There was one way of doing things and this was a new thing which was unproven. But as the data is accumulating, showing that this is a good approach and as it becomes more and more available, more and more urologists are letting their patients know that this is an option or even recommending it.

27:27.800 --> 27:33.400 <vGore> Right. But if your urologist does not bring it up, it is at least reasonable to ask.

27:33.400 --> 27:34.700 <vWeinreb>Absolutely.

27:34.700--> 27:39.700 <vGore>Yeah. I was trying to make a joke about a tough walnut to crack I guess, well maybe there I just did, I am sorry about that.

27:39.700 --> 27:44.500 <vWeinreb>I thought it was a good joke.

27:44.500 --> 27:52.700 <vGore>Yeah, that often surprises me. Now, some MRIs I know for some indications, people have to get some intravenous material, some kind of contrast medium, is that used in the prostate?

27:52.700 --> 29:39.200 <vWeinreb>Yeah. We use MRI now for all parts of the body right. You mentioned we used it to the brain, spine and the bones and joints, but now we use it in the breast, we use it for looking at the blood vessels, MR angiography, MRA, about 40% of the exams are done with an injection of a contrast agent, which is commonly known as a gadolinium chelate or gadolinium-based contrast agent. So, you inject this into a vein in the arm and this in many cases outside of the prostate is extremely useful. Now, how useful it is in the prostate is an open question. As we are getting more and more experience and as we are developing and refining other techniques, the need for this contrast injection seems to be diminishing. So, there is now quite a few studies which seem to indicate that the incremental value of this contrast injection for detection of prostate cancer is small to nonexistent as long as the other techniques are optimized. The challenge currently is to optimize those other techniques to obviate the need for the contrast and right now, we still have a fair number of cases where those other techniques are not perfect, so the contrast may actually help. So, we are still giving the contrast for these exams.

I suspect over time though that the use of contrast, intravenous contrast, for prostate MRI will diminish a lot.

29:39.200 --> 30:00.500 <vGore> Okay great. Well, this has been a fascinating discussion about really an area that I had not much thought about except for my relative, and I am sure that gentleman of a particular age in the audience will have learned a lot as well about the use of MRI imaging for prostate cancer detection.

30:00.500 --> 30:09.100 <vWeinreb>You know, the men are interested, but I think their spouses are even more interested that the men get care.

30:09.100 --> 30:09.700 <vGore>Because men do not like doctors.

30:09.700 --> 30:14.800 <vWeinreb>Because men do not like to think about this stuff.

30:14.800 --> 30:37.800 Dr. Jeffrey Weinreb is Professor of Radiology and Biomedical Imaging at the Yale School of Medicine. If you have questions, the address is canceranswers@yale.edu and past editions of the program are available in audio and written form at YaleCancerCenter.org. We hope you will join us next week to learn more about the fight against cancer here on Connecticut Public Radio.