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Welcome to Yale Cancer Answers with your host, Doctor Anees Chagpar.

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's a conversation about radiation oncology with Doctor Krishan Jethwa.

Doctor Jethwa is an assistant professor of therapeutic radiology at the Yale University School of Medicine, where Doctor Chagpar is a professor of surgical oncology.

So maybe you can start off by telling us what exactly is a radiation oncologist? Often I find people confuse a radiation oncologist with a radiologist. So can you tell us the difference? Radiation oncologists are cancer specialists who care for adult and pediatric patients. We use radiation therapy with the goal of curing cancer or to help improve the quality of life for patients with cancer, and often that’s part of the multidisciplinary care which
includes many other specialists. 

The other question that I often get is the difference between radiation and chemotherapy.

So when people are talking about using various modalities to help manage cancer or cure cancer, people often get these mixed up and also mix up the side effects.

So can you tell us a little bit about the differences between the two?

Medical oncologists are cancer specialists who use medications or drugs to treat the entire body, some of which do include chemotherapy and those specific medications they use can target the cancer and help with cancer control.

Radiation therapy is different in that we use typically high energy radiation beams targeting the cancer for a more local treatment effect, as opposed to a whole body treatment effect.

Often we work together to help with the goals of care, whether it be curative or supportive or symptom directed.

And so tell us a little bit about the side effects of each.

Very often people are worried...
0:02:19.787 → 0:02:22.448 about will my hair fall out?
0:02:22.45 → 0:02:25.57 Will I get really sick?
0:02:25.57 → 0:02:28.01 And so can you talk a little bit
0:02:28.01 → 0:02:30.207 about the differences between the
0:02:30.207 → 0:02:32.717 side effects of radiation therapy
0:02:32.717 → 0:02:35.18 versus more whole body systemic therapies?
0:02:35.18 → 0:02:37.952 The side effects are really
0:02:37.952 → 0:02:40.338 dependent upon which medication is
0:02:40.338 → 0:02:42.19 chosen for systemic therapies.
0:02:42.19 → 0:02:44.326 And for radiation therapy
0:02:44.33 → 0:02:45.94 it’s very much dependent upon
0:02:45.94 → 0:02:48.409 which area of the body is treated
0:02:48.409 → 0:02:50.399 with radiation therapy in general.
0:02:50.4 → 0:02:52.542 Some common side effects of radiation
0:02:52.542 → 0:02:53.97 therapy would include fatigue,
0:02:53.97 → 0:02:55.514 people may feel tired.
0:02:55.514 → 0:02:58.218 And there can be some reaction of
0:02:58.218 → 0:03:00.666 the skin similar to that of a very
0:03:00.666 → 0:03:02.948 mild sunburn in most instances.
0:03:02.95 → 0:03:04.966 That is not always the case,
0:03:04.97 → 0:03:07.376 but it can be depending upon
0:03:07.376 → 0:03:08.579 what’s treated.
0:03:08.58 → 0:03:10.722 Apart from those more general side
0:03:10.722 → 0:03:12.903 effects it is very much dependent upon
0:03:12.903 → 0:03:15.311 which area of the body is focused
0:03:15.311 → 0:03:16.992 with radiation therapy and part
0:03:16.992 → 0:03:19.622 of the art and care of a radiation
0:03:19.622 → 0:03:21.427 oncologist is guiding and supporting
0:03:21.427 → 0:03:23.185 a specific patient through those
0:03:23.185 → 0:03:25.027 side effects and supporting them
0:03:25.027 → 0:03:27.158 as they recover from the treatment.
Similarly, with chemotherapy it’s very much dependent upon the medication, but there can be the more global general side effects of fatigue that come along with it, but many of the other side effects are dependent on the medication. I think that when people think about radiation, they have seen movies where people lose their hair and so on and so forth that frequently is a side effect of chemotherapy and not so frequently a side effect of radiation therapy. Is that right?

That’s true when we’re treating around the brain or head region there can be hair loss from radiation therapy, but apart from that circumstance and hair loss would not be expected from radiation therapy. The other question that I get a lot is if I take one or the other, can I avoid the other? So in other words, if I take radiation, can I avoid chemotherapy?
Or if I take chemotherapy, can I avoid radiation? More often than not we combine both systemic treatments like chemotherapy and radiation therapy together because both have different effects on the cancer control. Radiation therapy specifically helps decrease the risk or control the cancer at the site that it originally grew from. Whereas systemic treatments target the rest of the body to help control any microscopic cancer that may be progressing elsewhere. So typically it’s not an either or, but usually and often a combination of both to improve outcomes. Which brings me to the question of surgery and radiation, so surgery, similar to radiation, is a local treatment. Are there instances where you choose between surgery versus radiation, or are there circumstances in which the two are combined? And if so, can you explain why? Again, a very great question. Often we’re working with our surgical colleagues to help improve the outcomes.
In some instances, radiation therapy can be a very appropriate alternative to surgery. For instance, for treatment of many head and neck cancers. Radiation therapy or surgery are very suitable options and similarly with prostate cancers, radiation therapy or surgery, often very suitable options with the goal of cure. Although there are many other circumstances where a radiation therapy is either given before a surgical operation or afterwards to help improve the outcomes, a great example of that is breast cancer where often we do surgery first, follow it with the radiation to decrease the risk of the cancer coming back. And in terms of radiation therapy, can you talk a little bit about the different kinds of radiation? I know people have heard about things like photons and electrons, and now protons. How does one know what kind of radiation therapy
one should be getting?

What are the differences?

There are a tremendous amount of differences between each of those techniques and in general, radiation therapy comes in many forms. A way of differentiating the major forms would be external beam radiation therapy, which is somewhat similar to standard X rays, where the radiation beams are coming from the outside from a large machine and directed to the tumor. An alternative form to that would be internal radiation. And that could include procedures such as what we call brachytherapy, which involves inserting the radiation therapy device actually into or directly next to the tumor. Or there are some circumstances where we use radiotherapy releasing isotopes into the bloodstream that can be targeted to the tumor. Part of the art and skill of a radiation oncologist is determining the most ideal technique and plan to help design and target the cancer while minimizing radiation exposure to normal organs, and so it’s challenging to say
you know what questions might a patient ask to help direct which specific technique is used, but I do think it’s a fair question to simply ask your radiation oncologist, what type of cancer treatment or radiation treatment am I receiving. And so you know, there are now newer therapies or newer therapeutic modalities that are being considered in radiation for various tumors and so when patients want to get more information for example, breast cancer patients who are often treated with photons but who are now being offered proton therapy and are wondering should I be getting proton therapy? Is that the right thing for me? Where do you suggest that they get more information? Or can you shed a bit of light on in what circumstances different modalities might be better? I love this question because it’s one of my real areas of passion. How can we use advanced radiation therapy technologies to improve the outcomes and reduce the side effects of patients as they go through therapy? Standard radiation therapy
uses high energy radiation beams and those often are called photons or X rays to be focused on the cancer. A downside of X rays is that they enter the body and they actually pass through the entire body deposit, depositing radiation therapy through their path, and this can include normal organs in many circumstances. Now, unfortunately we have developed many methods to reduce the exposure of normal organs and therefore the side effects. And honestly the technological advances in radiation therapy over the decades have been so immense and very exciting and this has resulted in dramatically better outcomes for patients. Proton therapy, for example, is a real major advancement, and similarly to X rays, proton beams do enter the body and deliver some radiation exposure initially, however, that’s where the key advantages is that they can be designed to actually stop shortly after the targeting tumor. So in brief, there is little to no radiation that continues to pass beyond the tumor or through the rest of the patient’s body, and this theoretically may
substantially improve and benefit some patients. Not all patients, but some patients. That sounds really exciting and certainly we know that there are various proton facilities that have popped up all over the country. If patients are not near a proton facility, should they be looking to go to a facility that offers proton therapy? Or is that something that is pretty specialized and still on clinical trial? Or does it really depend on the tumor type? It’s highly dependent upon the tumor type and the individual patient. I would encourage patients to ask their radiation oncologists just the question of what do you think about proton therapy and do you think it would benefit me? And even if they don’t live close to a proton therapy center, I do think that an individual radiation oncologist would provide their opinion or thoughts on that technique. I get asked that question actually quite regularly and in many circumstances standard radiation therapy would be equivalent to proton therapy.
and I do think that we can deliver exceptional care with standard radiation treatment. As I mentioned, tremendous advancements have been made even with standard X rays or photons. But in some circumstances I must say that I have recommended patients to receive a second opinion at a proton therapy center. Can you talk a little bit about some of the other techniques that have been developed using standard radiation therapy that might minimize the dosage to normal organs. Many patients are always worried about, for example, if they’re getting radiation therapy after a breast cancer, let’s say to their chest. They’re worried about the radiation affecting their heart or their lungs. What advancements have been made to protect those organs and should patients be worried about the extra radiation hitting those normal tissues? As a radiation oncologist, these are the things that are on my mind each and every day. How do I design a radiation treatment plan that can minimize effectively
the dose of radiation therapy to normal organs and with standard radiation therapy for breast cancer we’ve come up with very nice ways to displace or move the heart or lungs away from the targeted breast tissue and for other cancers we’ve developed highly sophisticated X ray techniques such as intensity modulated radiation therapy, which, in simplified terms, involves advanced computer technology and sophisticated radiation beam design to better focus the high doses of radiation therapy to the tumor and spare the normal tissues so we do have very effective alternatives to proton therapy that can effectively and very well treat patients. That’s really great to hear, so we’re going to pick up this conversation right after we take a short break for a medical minute. Please stay tuned to learn more about radiation oncology with my guest Doctor Krishnan Jethwa. Support for Yale Cancer Answers comes from AstraZeneca, working to eliminate cancer as a cause of death. Learn more at astrazeneca-us.com. This is a medical minute about survivorship.
Completing treatment for cancer is a very exciting milestone, but cancer and its treatment can be a life changing experience for cancer survivors. The return to normal activities and relationships can be difficult and some survivors face long term side effects resulting from their treatment, including heart problems, osteoporosis, fertility issues, and an increased risk of second cancers. Resources are available to help keep cancer survivors well and focused on healthy living. More information is available at yalecancercenter.org.

You’re listening to Connecticut public radio. Welcome back to Yale Cancer Answers. This is doctor Anees Chagpar and I’m joined tonight by my guest Doctor Krishan Jethwa. We’re discussing radiation therapy in the treatment of cancers and right before the break we were talking about some advanced techniques that have been developed that can really help in minimizing the side effects of radiation. Before I dive into some specific cancers, one question that we’re always asked about is secondary malignancies.
In other words, people often say, well, radiation therapy, it’s kind of like radiation similar to the sun, but we know that with radiation, whether it’s from sunlight or whether it’s from nuclear explosions, can cause cancers. So is there a risk of developing a cancer from your radiation therapy which is designed to help you get rid of the cancer? That’s a really, really good question, one which I get asked from most patients. And you’re exactly right. With radiation therapy, while we focus it directly on to the tumor, and we do a very nice job at doing so, there is theoretically a risk that radiation therapy can increase the risk of developing a new cancer within or adjacent to the radiation therapy field. Thankfully, that risk is not very high. In fact, it’s far less than 1%, and if it is to happen, it often takes many, many years to develop and I mean 5-10, 30-40 years to develop. So there is a relatively low risk of it occurring and it’s a more significant risk in patients who are younger,
particularly our pediatric patients, but as a radiation oncologist it is always something on my mind when I’m caring for those young patients. And that is one of the benefits of advanced radiation therapy technologies. For instance, proton therapy, that can theoretically decrease the risk of what we call a secondary malignancy.

So during the break you were telling me that your particular focus is on GI cancers. Can you tell us a little bit more about the use of radiation therapy in those cancers? Radiation therapies are used in the vast majority of GI cancer spanning head to toe. It has a role in either the curative intent treatment or in many it would be the symptom directed treatment. So that could be for esophagus cancers, stomach cancers, liver, pancreas, colon, rectal or even anal cancers. And we have a very nice role in doing so, often in combination with our colleagues from medical oncology and surgical oncology to help improve the outcomes for patients.

So let’s go through each of those in a bit more detail so that you can give us a little bit of color of what radiation
0:17:19.423 –> 0:17:21.933 therapy is like for each of those.
0:17:21.933 –> 0:17:24.318 I’d imagine that it’s different, for example,
0:17:24.318 –> 0:17:26.691 in the esophagus versus in liver versus
0:17:26.691 –> 0:17:29.44 in the pancreas versus in the anal canal.
0:17:29.44 –> 0:17:32.16 How does radiation vary based on the site?
0:17:32.81 –> 0:17:35.246 So of course it is a different
0:17:35.246 –> 0:17:36.999 anatomical site of the body,
0:17:37 –> 0:17:38.8 and in many of those different
0:17:38.8 –> 0:17:40 circumstances we use different
0:17:40.056 –> 0:17:41.886 radiation technologies, which we
0:17:41.886 –> 0:17:44.322 think are best for the specific site.
0:17:44.33 –> 0:17:45.626 So for instance,
0:17:45.626 –> 0:17:48.218 when we treat an esophagus cancer,
0:17:48.22 –> 0:17:49.948 what’s always on our mind is
0:17:49.948 –> 0:17:52.635 how do we treat the tumor while
0:17:52.635 –> 0:17:54.105 minimizing radiation therapy
0:17:54.11 –> 0:17:56.318 dose to organs like the heart,
0:17:56.32 –> 0:17:58.84 lungs, liver or even kidneys?
0:17:58.84 –> 0:18:01.556 Whereas when we’re down in the pelvis
0:18:01.556 –> 0:18:04.56 treating a rectal cancer or an anal cancer,
0:18:04.56 –> 0:18:06.75 we worry about the radiation effects
0:18:06.75 –> 0:18:08.673 on the bowel, bladder, genitalia
0:18:08.673 –> 0:18:10.648 and bones like the femur
0:18:10.65 –> 0:18:13.698 which can be at risk of weakening or
0:18:13.698 –> 0:18:15.508 developing fractures as patients get
0:18:15.508 –> 0:18:18.29 older and there’s a lot of nuance and
0:18:18.29 –> 0:18:20.395 art in how a radiation oncologist
0:18:20.395 –> 0:18:23.043 designs those fields and is in part
0:18:23.043 –> 0:18:25.29 why it’s nice to have a specialty
0:18:25.365 –> 0:18:28.209 team involved in the care because
0:18:28.209 –> 0:18:30.105 there’s such tremendous nuance
in radiation therapy design and the technical specifics of the treatment, somewhat analogous to the expertise you may have from a surgical team as they design a complex surgical operation. And timing is the other issue too, right? So sometimes radiation is given before surgery, and sometimes it’s given after surgery. How do you decide which way that works? For most of the gastrointestinal cancers we’ve through much research learned that delivering radiation therapy prior to a surgery is beneficial. And often that also includes delivery of the systemic treatment, the chemotherapy before the operation, and we’ve learned that we improve the cancer control. And in many instances, the survival of patients by delivering both of those treatment techniques before the operation. And that includes esophagus cancer, stomach cancers, pancreas, and rectal cancers, each of which we treat with therapy prior to the operation in many circumstances, and
one can imagine that doing so might reduce the tumor burden. But how does that affect scaring for the surgeons? There’s many beneficial effects of delivering the radiation therapy or chemotherapy beforehand, one of which is that we can actually see the tumor, rather than treating an area where the tumor has been removed. When we can see the tumor, we can focus the radiation beams more specifically, and often the area that we have to treat is considerably smaller when delivered in the pre-surgical setting. That allows us to reduce the side effects that a patient may experience. Additionally, by shrinking down the tumor, it is often easier or more effective for the surgeon to remove all of the tumor with negative margins after the operation. And after doing this for decades and having clinical trials look at this for decades, there doesn’t seem to be a dramatic difference in complications from the operation when it’s done effectively as part of a multi-disciplinary team. And yet in some cancers, radiation is frequently given after the surgery. So you had mentioned, for example,
in breast cancer we generally give radiation therapy after the surgery is completed. So why is that? There’s a number of reasons for that, and I think in the breast cancer community, now acknowledging I’m not a breast cancer specialist, but the typical paradigm has been to do surgery first, in part for concern of wound complications that may develop along the skin. And in part because it’s nice to have an opportunity to look at the cancer under the microscope and see the extent of spread so that we can better design our radiation therapy fields. So it sounds like there’s good reasons in GI cancer to do it before good reasons in breast cancer to do it afterwards. So it seems to be really dependent on the tumor itself. And individual patients and again this emphasizes why being seen and cared for amongst a multidisciplinary specialty team, such as that we have at Yale is really so critical in the care of our patients. And you mentioned clinical trials
adding to the evidence that we have in terms of what we know works versus doesn’t work in terms of radiation therapy. Are there ongoing clinical trials that you’re particularly excited about? There’s so many. My interests are in using multiple methods of patient and cancer response assessment to guide the care of patients, and can include advanced imaging. It can involve tumor genetics or genomics. It can include specific targets on a cancer cell that may be targeted by medications. Or it can be specific blood tests that guide the prognosis for patients. Potential therapies for patients can also involve immunotherapy, and specifically in GI cancers we’ve been utilizing each of those techniques to help risk stratify and guide patients for subsequent therapies. And it’s so exciting because many of these developments are relatively recent in the past five to 10 years, and we’re really seeing some of the fruits of these clinical trials now. Our major cancer conference is ASCO and it’s exciting seeing some of the new clinical trial developments that
really improve the survival, but also the quality of life for our patients as they go through therapy. Do you think that these novel markers, the genomic markers, the biomarkers that we’re using to tailor chemotherapy and systemic therapy, for example, might actually play a role in terms of deciding, whether radiation therapy should be used or not or what kind of radiation therapy I completely do. I think we’re learning so much more about the prognosis of patients and the pathways of cancer spread, which does seem to be influenced by each of these factors, and we’re learning how to select patients who may derive more benefit from radiation therapy. And on the contrary, we’re learning patients who may derive less benefit, and that in itself is rewarding because that provides an opportunity for a radiation oncologist to help treat patients, but know that if they do have a side effect, it was a side effect that developed in a patient that really needed the treatment. Those who derive less benefit can be spared many of those side
effects of therapy.

And what about figuring out which tumors are more radiosensitive versus those that are radioresistant?

Are there techniques that we can use that will help us to deliver radiation therapy to tumors that might not be as sensitive to it?

Yeah, this is another very interesting area of research which I think we've really just hit the tip of the iceberg on.

We're learning that genomics or tumor genetics has an impact. We're learning that the tissue surrounding a tumor has an impact, and I do think that with more time we'll learn how to combine new medications with radiation therapy to improve cancer control and will learn that there may be differences in radiation therapy dose. Or areas that we need to treat to derive more benefit.

But like I said, it's really the tip of the iceberg in regards to that area of research, which is really exciting. And so as we think about radiation therapy, I mean thus far we've really been talking about using radiation as part of a

22
0:25:35.76 –> 0:25:37.425 treatment paradigm for curative intent. 
0:25:37.43 –> 0:25:39.726 But you had mentioned early on at the 
0:25:39.726 –> 0:25:41.624 beginning of the show that radiation 
0:25:41.624 –> 0:25:43.98 can also be used for palliative intent. 
0:25:43.98 –> 0:25:45.751 Can you tell us a little bit 
0:25:45.751 –> 0:25:47.35 more about how radiation therapy 
0:25:47.35 –> 0:25:49.285 is used for symptom control? 
0:25:50.04 –> 0:25:51.688 Radiation therapy is very 
0:25:51.688 –> 0:25:53.336 effective at symptom control, 
0:25:53.34 –> 0:25:56.292 and I tend to quote that about 2/3 or 
0:25:56.292 –> 0:25:59.086 more of patients will derive a benefit. 
0:25:59.086 –> 0:26:02.4 In regards to the specific indications, 
0:26:02.4 –> 0:26:05.48 often it’s for pain control when cancer 
0:26:05.48 –> 0:26:07.758 has spread elsewhere in the body, 
0:26:07.76 –> 0:26:10.035 or if it’s causing pain in its 
0:26:10.035 –> 0:26:11.894 original site of development or 
0:26:11.894 –> 0:26:14.33 radiation therapy can be used to 
0:26:14.33 –> 0:26:16.788 help prevent organ dysfunction or 
0:26:18.88 –> 0:26:19.7 What do 
0:26:19.7 –> 0:26:21.76 you mean by organ dysfunction? 
0:26:21.93 –> 0:26:24.602 So a common situation that we end up 
0:26:24.602 –> 0:26:27.688 seeing is if cancer has spread to a bone 
0:26:27.688 –> 0:26:30.587 like the spinal column or vertebral body, 
0:26:30.59 –> 0:26:33.425 that cancer can actually grow into the 
0:26:33.425 –> 0:26:35.871 spinal canal and start applying pressure 
0:26:35.871 –> 0:26:39.15 to the spinal cord or to the nerves. 
0:26:39.15 –> 0:26:39.926 And unfortunately, 
0:26:39.926 –> 0:26:43.03 one of the consequences of that is that 
0:26:43.102 –> 0:26:45.268 patients can develop weakness in their 
0:26:45.268 –> 0:26:47.604 legs or in some circumstances even
the inability to walk because of it. Radiation therapy can slow down and shrink the cancer in those bones and really help relieve the pressure on the spinal canal or those nerves. And sometimes that’s done in combination with surgery and sometimes it’s not. We use radiation therapy alone and it’s quite effective. One of the things that’s so interesting you had mentioned earlier that when you’re giving radiation in the pelvis, one of the things you worry about is the side effects on the bone. That radiation could weaken the bone. And yet, at the same time, when we see patients who have, for example, bone metastases, we frequently will use radiation therapy not only to help with pain, but sometimes even to help with patients who might have an impending fracture. Tell me about how that works. That seems to be a dichotomy. Yeah, that’s a good question. When I see patients with bone metastases, the common questions I ask myself are, is this metastasis in a bone that is involved in weight bearing like the femurs for example?
Or how much of the bone seems to be destroyed because of the cancer?

If I do think of patients at very high risk of developing a fracture, I do ask my colleagues in orthopedic surgery or neurosurgery to see the patients as well.

Because I do think that surgery can sometimes be warranted.

In others where it’s not a weight bearing joint or an area that’s involved in a lot of mechanical strain then radiation therapy is very effective at shrinking the cancer and getting control of pain.

Doctor Krishan Jethwa is an assistant professor of therapeutic radiology 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’ll join us next week to learn more about the fight against cancer here on Connecticut Public Radio. Support for Yale Cancer Answers comes from Smilow Cancer Hospital and AstraZeneca.