

## Changing the Paradigm in Prostate Cancer Radiation Treatment



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### When did you start treating patients on MRIdian? What disease sites are you focused on?

We established the MRIdian at NewYork-Presbyterian/Weill Cornell Medical Center in April 2018. Our first patient was treated for prostate cancer. I personally treat hypofractionated prostate cancer and bladder cancer, but MRIdian can treat tumors from head to toe. The other physicians in our group focus on lung, pancreatic, and liver cancer, but really any cancer that MRI imaging has a potential diagnostic or therapeutic benefit qualifies for MRIdian.

### What do you feel are the important benefits of MRIdian?

MRIdian is very different—it's a paradigm shift. It's something we've always wanted but never had the ability to put into practice. Generally, radiation oncology will use MRI for treatment planning, but still requires a CT scan to fuse the images. With MRIdian, it's the MRI that you plan on and use to guide the treatment. Not only do you get a new MRI for each fraction to adapt for the anatomy of the day, you also see—for the first time—during each fraction. You see the details of the patient's anatomy, either their prostate, lung, or pancreas, and the tumor. And you can adapt the plan daily based upon the tumor and the organs at risk. Adapting the plan while the patient is on the table is one of the most critical steps in delivering precise radiation treatment to these patients. During the actual radiation treatment, MRIdian uses real-time

MR imaging to track the position of the tumor as it moves; the system automatically turns off the radiation if the tumor moves outside of the physician-defined boundary.

### You've been using MRIdian for quite some time. How does it change the way that you treat patients?

The goal of radiation oncology is to treat the right patient with the right technique at the right time and with the smallest margins possible. With MRIdian, we are able to confidently start shrinking the margins down to potentially eliminate or further decrease toxicity for patients. And with the real-time tracking and beam gating, our dream has evolved into reality.

### When you shrink the margins, how does it impact the dose?

Shrinking margins allows us to escalate dose and treat in fewer fractions, resulting in less toxicity. In prostate cancer for example, shrinking margins allows us to involve less healthy tissue—less rectum, bladder, and urethra tissues. With MRIdian, the margin of uncertainty is literally becoming millimeters at this point, versus a centimeter or a half centimeter associated with traditional radiation. Where, even with fiducial markers, we still had a larger margin of uncertainty. If we get that margin of uncertainty to a microscopic level—that's the eventual goal—we can just treat cancer and leave everything else alone.

# MRIdian physician spotlight

Himanshu Nagar, MD

For more information about MRIdian, visit [ViewRay.com](https://www.viewray.com)

## How did you decide to install your MRIdian?

Initially, it started with the decision to purchase the device after comparing it to the other technologies. The thought from our administration was that MRIdian is very different and can change the whole paradigm of treating patients. During the implementation of the system, we began to see the possibilities. We started very conservatively doing certain things just to make sure nothing was different as compared with our standard of care. And we began to realize that if [MRIdian] is tracking this tissue well, can it also track other tissue well? Then we changed the paradigm and started tracking things with more clinical benefit to the patient. Our team keeps thinking of new ways to leverage and use our MRIdian.

## How do you see MRIdian helping you personalize medicine for each patient?

It goes back to the diagnosis, the areas that need treatment, and the natural anatomy that differs for each patient. Personalized medicine is about customizing the treatment to the patient's anatomy—not everyone's bladder, rectum, or prostate are the same. Ideally, during each fraction, we want to adapt and adjust the treatment volumes in order to minimize side effects. That's very different from patient to patient. MRIdian not only allows us to treat each patient's cancer more effectively, but also minimizes side effects based upon that patient's individual anatomy. Specifically with prostate cancer, with MRIdian we're starting to investigate boosting high-risk lesions because that's where the cancer would likely recur and cause the most damage in terms of the clinical outcome.

## How have you developed your MRIdian program to coexist with your institute's established robotic surgery programs?

Patients have valid treatment options in both surgery and radiation. It's up to the patient and the physician to engage in a shared decision, weighing the outcome they're looking for and the side effects

the patient is willing to potentially risk. For patients who do elect for radical prostatectomy, the risk of recurrence for certain patients is much higher than others. Once they have detectable PSA levels after surgery, they need a form of salvage therapy and radiation is by and large the established modality for this. The MRIdian, with real-time MR imaging, allows us to actually see and track the anastomotic junction between the bladder neck and urethra created after the prostate gland is removed. I was very doubtful that we would be able to track the anastomotic junction, but with MRIdian we showed that we could visualize and track it and focus the dose on the target tissue. Our radiation team was surprised and pleased with this breakthrough.

## Now that you understand MRIdian at a deeper level, what other future clinical opportunities do you see in prostate or other areas of the body?

I think we are comfortable seeing and tracking the tumor and performing treatments in real-time without any marker guidance. We're actually not just seeing the tumor or the gland and the organs around it in real-time, we can also track their position during treatment. Remember, the goal in radiation oncology is to deliver an effective dose. In some tumor sites, we have not been able to escalate to effective doses comfortably without causing morbidity. Now, for pancreatic cancer we are able to deliver a higher effective dose to these cancers, even with organs that surround the tumor. For prostate cancer, we are able to boost certain areas that might be close to the bladder or close to the rectal interface because we can see the anatomy. On a traditional radiation treatment system, we would have to compensate for tumor motion and uncertainty by increasing treatment volumes and margins. With MRIdian, we can see the anatomy, we can shrink the margins, we can track the tumor as it moves, and we can turn the beam off if it moves too far. We know in real-time that we're delivering the right dose to the right place at the right time.

