

Treating Pancreas Cancer with Ablative Doses on MRIdian



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When did Miami Cancer Institute (MCI) begin treating patients with MRIdian? What conditions are you treating?

We began MRIdian therapy in April 2018—becoming the second clinically operational MRIdian linac site in the US. Today, we use the system to treat a wide variety of tumors, with higher volumes of patients with pancreas cancer, followed by liver cancer, and cancers of the abdominal and pelvic lymph nodes.

What compelled you to start treating patients on MRIdian?

MCI is a unique center with a truly comprehensive range of leading-edge radiotherapy technologies to provide personalized treatment. So, it made sense to offer MRIdian. We have a number of stereotactic body radiation therapy (SBRT) systems and we triage patients to offer the treatment we feel will be most effective. Our MRIdian patients generally have tumors that move significantly during treatment, especially in the upper abdomen, notably pancreas and lower lung.

How do patients with pancreatic cancer benefit from MRIdian SBRT treatments?

For patients with unresectable disease, MRIdian allows us to deliver an ablative dose. That's our predominant treatment for these patients. We've treated a significant volume of patients over the last year and a half, and our experience has been remarkable. Early results show the ability to safely deliver the highest dose possible is a key factor in improving outcomes in pancreatic cancer. This is based on retrospective and growing prospective data, which demonstrates an improvement in

local control and, potentially, overall survival. With MRIdian's real-time tissue tracking and automated beam gating, we have the confidence to deliver higher, ablative doses that go beyond conventional.

What outcomes have you seen with these ablative techniques?

They're early outcomes, but promising results. We're treating patients on MRIdian with ablative doses, and they are tolerating treatment well. We're eager to see the long-term outcomes, both here at MCI and other institutions participating in the ongoing stereotactic MR-guided adaptive radiation therapy (SMART) study, a prospective study for locally advanced pancreatic cancer. We have seen almost no significant side effects—I'd say at least half of the patients we've treated have had no reported side effects, which is hard to believe. And we're starting to see some early efficacy outcomes. For example, we've had many patients who had unresectable disease now undergo surgery with negative margins in the tumor bed.

How do the side effects compare to treatments performed on a standard linear accelerator?

Historical grade 3 acute or late toxicity rates from low-dose SBRT is in the 10% range. And while our series is a single institution series, our outcomes are at least on par with that, if not potentially more favorable. Ironically, our toxicity outcomes could be lower than low-dose SBRT. This makes sense because, with MRIdian, we're able to account for the position of the bowel in real-time. With traditional cone-beam, CT-based SBRT, in some cases it is likely that more of the duodenum, stomach, and small

MRIdian physician spotlight

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bowel receive potentially prescription dose than we recognize. Being able to see and control where the dose is going—that's an exciting part of MRIdian treatment.

How do you describe MRIdian treatment to your patients?

When I explain why MRIdian is so unique and beneficial, I explain that MRIdian has the ability to:

1. Continuously monitor where their tumor is at any given time, which is not possible on other radiation systems.
2. Immediately react to changes in the tumor position. MRIdian tracks the tumor in real-time and automatically gates the beam when it moves outside the boundary I have established.
3. Deliver an ablative dose using an on-table adaptive re-planning strategy designed to account for any changes in both the tumor and normal tissue anatomy on a day-to-day basis.

Does MRIdian offer other benefits to patients?

Another critical benefit to patients is the ability to start treatment sooner. Because MRIdian provides a high-quality MRI, I can see the tumor without fiducial markers or oral or IV contrast agents (CT requires them). Patients come to MCI from all over the globe, and now I can offer same-day consult and simulation. This has a tremendous impact. It helps reduce patient anxiety stemming from the desire to start treatment as soon as possible. And it limits the opportunity for further tumor growth while patients wait for treatment. For context, many patients are referred to MCI with tumors that have grown even while receiving chemotherapy. MRIdian helps condense a process that can take at least four weeks—from the time of consult to first fraction if delivering traditional SBRT with a CBCT-based system—to potentially one week.

Has MRIdian impacted your referral patterns?

In our first 18 months of clinical operation, we've treated roughly 200 patients; we're on track to treat more than 200 this year. About 20% of our patients come from outside of the Miami area. This includes patients from other parts of Florida, but

we also have an increasing volume of patients from across the country. This is a testament to how we're using MRIdian to push the boundaries and achieve extraordinary outcomes.

What do you see as the future clinical opportunity for MRIdian?

At MCI, there are two areas where MRIdian is allowing us to think differently about treating patients with radiation therapy. First, we are exploring the potential to shorten treatment planning and treatment time. For example, why does it take only a few minutes to create an on-table, adaptive fraction each day, but it takes a week or more to create the original plan? Also, could we perform same-day simulation and treatment? Starting patient treatments more quickly is one exciting idea we're exploring. Second, why are we delivering SBRT in five fractions? Is it just because it is the standard convention? We're exploring the potential to reduce the number of fractions safely. There's literature that supports single-fraction SBRT on cone-beam CT. Wouldn't that be better using an MRI-guided system like MRIdian? We're investigating this.

Has MRIdian changed the way you treat patients at MCI?

When I treat patients on other systems, it's like taking a step back in time. We're looking at cone beam CT and X-rays pretreatment and not being able to see what we're treating during treatments. This reminds me of how sophisticated the MRIdian system is and how many benefits we're providing patients—being able to treat them in the most precise, accurate way and being able to achieve otherwise impossible outcomes.

MRIdian represents a giant leap forward in radiation therapy and a paradigm shift in patient treatment. MRIdian allows us to go beyond what we could do with any other radiation platform for patients who need high, ablative doses. Our early results show that with many of these patients, high doses matter—especially for patients who have disease refractory to chemotherapy and are told they have a very short time to live. With MRIdian, we have been able to treat these patients with high doses safely, and they have tremendous responses.

Editor's note: Learn more about the SMART study at <https://clinicaltrials.gov/ct2/show/NCT03621644>



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