

Advances in Imaging

3T MRI Technology

By Scott P. Edwards



Radiologists (left to right) Drs. John Loh, Dmitry Rakita, and Richard Hicks appreciate the high level of detail afforded by the 3 Tesla MRI device, especially for difficult situations and diagnoses.

Nearly a year ago, Baystate Medical Center raised the level of imaging in the region with a new 3 Tesla MRI device at the Baystate MRI & Imaging Center, delivering an unprecedented level of detail in its images and offering the most advanced imaging technology available in Western Massachusetts.

“The 3 Tesla technology—3T for short—is essentially a stronger magnet, which enables physicians to see and interpret scans at a level of detail we’ve never had before,” says Richard Hicks, MD, chief of MRI and Neuroradiology at Baystate. “From neurology to orthopedic imaging, we are able to detect and diagnose a range of health issues faster and more effectively than ever.”

MRI scanners typically operate at field strengths between .35T (low field strength) to 1.5T (high field strength) to 3T (ultra high field strength). In comparison, the Earth’s gravitational pull is only 0.00005T. Thus, physicists say, a 3T scanner, like the one used at Baystate, operates at 60,000 times the gravitational pull of the Earth. These more powerful MRI scanners also have a higher signal-to-noise ratio, which helps to improve the quality of the images produced.

“The key with 3T,” says Dr. Hicks, “is more signal strength in the system, which allows us to do two things. We can make higher resolution scans with thinner slices, and we can trade this high signal for scan time, meaning we can do a scan on 3T in about half the time we can using a 1.5T magnet.” He says that in most cases at Baystate, they opt for higher resolution studies in the same scan time. In special circumstances, parameters are changed for a faster scan.

In addition to image quality and time, Baystate’s 3T MRI unit has a large open bore so it can accommodate patients who, in the past, might have struggled getting MRIs, including people of size, those who are claustrophobic, and children who might have difficulty staying still for a longer scan.

While 3T MRI has a wide range of applications, Baystate is focusing on three areas: neuroradiology, musculoskeletal imaging, and abdominal imaging.

Neuroradiology

One major advantage of 3T is that it has better sensitivity for contrast enhancement, which is important for brain and spinal scans. This sensitivity is especially important in detecting new multiple sclerosis lesions and subtle changes in brain tumors.

Experts agree that MRI is the most sensitive, noninvasive way of detecting central nervous system demyelination, a hallmark of MS, making it especially beneficial in the diagnosis of the disease. “The 3T scans give

One **major advantage** of 3T is that it has *better sensitivity for contrast enhancement*, which is **important** for brain and spinal scans.

us better comparison between studies,” says Dr. Hicks, “so we can determine which lesions are old and which are new.”

Baystate is also using 3T MRI for all follow-up studies of patients with brain tumors in order to detect any subtle changes to the tumor. Pituitary and orbital imaging is frequently done at 3T for improved image quality. The use of rapid 3T MRI to replace CT in pediatric patients is also being explored.

Musculoskeletal Imaging

For diagnosing musculoskeletal injuries such as tears of the meniscus, cartilage, ligaments, and labrum, 3T MRI also offers significant benefits, providing improved diagnostic evaluation and valuable pathological detail.

“Meniscal, labral, and cartilage pathology is much easier to see on 3T,” says John Loh, MD, chief of Musculoskeletal Imaging at Baystate. “We are able to obtain thinner cuts—down to 2mm—so we can detect and characterize pathology in these structures more accurately and completely.”

Dr. Loh says the technology has taken Baystate to a “whole new level” of orthopedic care. Radiologists and orthopedic specialists are better able to determine where meniscal tears are in the knee, where labral tears are in the shoulder and hip, what type of tear is present, and how complex a tear is. Chondral injury is more completely characterized. For the patient, this means greater patient comfort, fewer arthrograms, and more accurate diagnoses.

Abdominal Imaging

Dmitry Rakita, MD, Baystate’s chief of Abdominal Imaging, says that certain abdominal or pelvic imaging has “become indispensable” with 3T, no more so

than in prostate imaging. At Baystate, 3T MRI is used to diagnose occult, clinically suspicious prostate cancer following a negative biopsy, and to determine the extent of disease.

3T MRI has
taken Baystate to a
“whole new level”
of orthopedic care.

“We use 3T for characterization of newly diagnosed high risk prostate cancer and for search missions in cases of clinically suspected occult prostate cancer,” says Dr. Rakita, calling 3T “exceedingly useful” for both indications.

In addition, 3T is used for the diagnosis and evaluation of other anal/rectal problems, including perianal fistula and complex pelvic abscesses related to Crohn’s disease, as well as rectal cancer staging.

Says Dr. Rakita, “The high-resolution magnet has allowed us to expand pelvic imaging into other realms,” including uterine and cervical cancer staging after hysterectomy and improved rectal cancer staging and prostate imaging.

Refer a Patient
Baystate MRI & Imaging Center
80 Wason Avenue
Springfield, Massachusetts
MRI: 1-800-258-4674 • PET/CT: 1-866-258-4738

3T MR enterography is also used in the pediatric population for monitoring and facilitating diagnosis of intestinal Crohn’s disease and its complications, typically done with CT scan, and thus avoiding the radiation exposure.

“In the average case,” says Dr. Hicks, “there’s not a specific advantage between 3T and 1.5T MRI. But with difficult situations and diagnoses, 3T provides improved resolution so we can make a better, more accurate diagnosis. That’s probably its biggest advantage.”

Baystate
MRI & Imaging Center
80 Wason Avenue
Springfield



New Imaging Center

Last year, Baystate MRI & Imaging moved from 3300 Main Street to its new location at 80 Wason Avenue, just off Main Street and minutes away from Baystate Medical Center and other medical offices in Springfield’s North End.

Baystate MRI is a partnership between Baystate Medical Center and Shields Health Care Group, which provides MRI services across central and southern New England. In addition to 3T MRI, the new Baystate MRI & Imaging Center includes two open-bore 1.5T MRI units and the most advanced PET/CT technology for oncology and brain imaging. For patient convenience, the center offers easy parking and access, and evening and weekend appointments.