surgery and then were taken to the operating room. At some point after the procedure, the patient, now connected to various intravenous lines and tubes, was returned to the MRI room, where the surgeon learned whether the tumor had been completely removed and whether there were any complications. Each of these steps jeopardized safety and success.

By contrast, Smilow’s integrated suite puts the MRI right in the operating room and the patient doesn’t move. “That’s an enormous safety advantage,” Dr. Piepmeier said. “We can take high resolution images during surgery and target the abnormality with high precision, and we can see that we have accomplished exactly what we wanted to do. It also gives you confidence that no other problems have occurred during the treatment.”

These advantages can be the difference between life and death, hope and hopelessness. Three months ago a patient came to Smilow with a large deep brain tumor that was also wrapped around an artery. Other cancer centers had told the patient it was too risky to operate because surgery would likely leave him paralyzed and mute. But because of the MRI suite, Dr. Piepmeier could map the specific areas of the brain that needed protection, and take pictures during the surgery to confirm that those areas stayed protected and that the tumor was removed.

“Two days after surgery,” Dr. Piepmeier said, “he walked out of the hospital. So when others say, ‘No, we can’t do it,’ come by and let us take a look at it.”

The suite, which has been open since July 2010, grew out of a year’s research by Dr. Piepmeier and several other Yale physicians. They visited other sites, evaluated the available technology, and decided they wanted a two-room operating suite with MRI and bi-plane angiography. Their ideas were given concrete form by the medical technology company IMRS.

The suite’s unique properties necessitated special training. Because the MRI is such a powerful magnet, anything metal brought into the OR can become a projectile. Every time the magnet is used, the surgical team goes through a safety checklist, similar to the checklists used by pilots. At first Dr. Piepmeier worried that opening the OR door to bring in the MRI might increase the risk of contamination and infection, but in fact the infection rate went down. “That’s because we hand-picked the best people to do this,” said Dr. Piepmeier. “We’re very safety-oriented.”

Dr. Piepmeier says the suite is revolutionizing treatment for today’s patients, but he is equally enthusiastic about the suite’s future uses. He foresees the ability in the near future to target each patient’s specific genetic mutation with a novel therapeutic treatment that, with the MRI’s help, can be delivered to precise areas of the brain while being monitored in real time.

He looks forward to taking lab research being done by Yale scientists and translating it into clinical practice. For example, he is now working with W. Mark Saltzman, Chair of Yale’s Biomedical Engineering Department, on developing biodegradable nanoparticles that can carry chemotherapy, antibodies, and gene transfers to pinpointed spots in the brain that can’t be reached safely by surgery. “We’re headed in exciting new directions,” he said.