JOHN HUSTON, III: As a neuroradiologist, I want to give the surgeon as much information as possible before they do their operation. In addition to standard MRI imaging, what was invented here at Mayo by Dr. Dick Ehman, is what's called MR elastography. The fundamental problem that MR elastography is trying to address are the physical characteristics of the tumor. And that's important because tumors can look exactly the same. But some are very soft. Like toothpaste, they can almost be sucked out, versus another tumor in another patient look just the same and it's rock hard and it's very difficult to remove.

That is the problem that we addressed with MR elastography. And that is looking at the stiffness of tissues and tumors. Now in a standard MR machine, we introduce very mild vibration. And as those waves go through the brain and the tumor, we're able to do a very high resolution sequence that can map out those waves. As those waves pass through a tumor, we're able to get information about how soft or hard it is.

With additional work, we have been able to even push that technology further. And we call this slip interface imaging, where we are able to look at how the waves pass between the normal brain and the tumor. And at that interface where the tumor and brain are together, we are able to determine, are the tissues adherent and therefore going to be a very difficult surgery, or are they separate and therefore the tumor will really just roll out without damaging the adjacent brain.

The two are tied together, the MR elastography is the fundamental technology. And the slip interface imaging is something that we have been able to develop in addition, on top of the MR elastography. And that's one of the exciting things about applying it to the brain. Because we have now been able to show we can determine if a tumor is soft or hard and if it's stuck to the brain or not. It's very gratifying that we are now providing information that really was not possible to get preoperatively before. And we believe it has the opportunity to change patient care.

JAMIE VAN GOMPEL: So I'm a skull-based surgeon. That deals with a lot of very deep tumors that may or may not be attached to the brain. When they're attached to the brain, they can cause problems. The MRE and the slip interface really allows us some information which we didn't have before to understand that.

And based on that information that tells us how safe this procedure could be. So it really helps evaluate the safety of the procedure for the patient and also reduce complications long term and hopefully improve patient outcomes.

So the MRE, the soft versus hard stuff, helps us probably figure out if it's going to be a short versus a long procedure. The slip interface really kind of gauges what the risks, I think, overall the surgery are to the patient.

So why is it critical? I can tell. I can counsel the patients preoperatively what the risks are. It might be twice as risky to do a procedure. And that might push them more towards a radiation option and not even have them have the risk of losing vision, or hearing, or facial nerve function, or some other problem.

I think that will allow us to make huge real-time decisions for the patient in terms of patient safety again, the ultimate outcome of the patient, and what the patient can expect postoperatively, and how well they can expect to recover.