

JAMIE VAN GOMPLE: On patients with epilepsy, if we can find their focus-- so where their epilepsy's emanating from-- we're able to treat that focus effectively with some form of therapy.

GREGORY WORRELL: Two decades ago, we might not have been able to identify a lesion-- an abnormality in the brain-- that is the source, the cause of someone's epilepsy. Whereas today, with sophisticated imaging techniques that not only use higher magnet strengths, but also make use of computational tools to analyze those images, we can identify to within a millimeter of where the seizures are originating.

JAMIE VAN GOMPLE: If we find that spot, we're able to treat it effectively, either with taking that focus out, if it's in a spot that doesn't control something important, like their arm or their leg or their speech.

But if it does control one of those areas, we have other options now available that a lot of other centers don't have-- electrical stimulation options and restorative therapies that really weren't present, maybe four or five years ago.

GREGORY WORRELL: Many patients, evaluated decades ago, can benefit from re-evaluation because of the new technologies that have become available. We have new medications. We have new surgical techniques. We have new devices that can have a huge impact on their lives.

We know that epilepsy surgery is very efficacious in carefully selected patients. But unfortunately, it's enormously underutilized. When we see patients, often they've had epilepsy for 20 years, 30 years. They're having seizures weekly, daily, monthly-- when, in the appropriate hands, these patients could potentially be cured by epilepsy surgery.

JAMIE VAN GOMPLE: About a million patients are potentially candidates for some form of epilepsy surgery in the country. A lot of those are actually surgical candidates, based on the most common form of epilepsy-- so temporal lobe epilepsy-- which we treat very well.

But some of them might have other types of epilepsies that we still have surgical therapies for.

GREGORY WORRELL: Approximately 3 million people in the US have epilepsy. And despite taking medicines twice a day, every day, a third of those-- approximately a million people in the US with epilepsy-- will continue to have their seizures.

JAMIE VAN There are other options beyond just medications. Some patients may not want to be on three,

GOMPLE: four medications to try to get good seizure control. Some may not want to have the medications really affect their sensorium, as they do.

The memory's usually deteriorating because of their medications. Or they don't feel like they can think clearly, because they're on so much medication.

**GREGORY
WORRELL:** If a physician has tried two medications at appropriate doses-- appropriate application of those medications-- and the patient is still experiencing seizures, the chance that a third medication is going to render that patient seizure free drops significantly-- certainly less than 10%. Approximately 7%.

**JAMIE VAN
GOMPLE:** It gets hard to face a life knowing that you're not going to know when the next seizure's going to happen. I think that's depressing and anxiety provoking for patients.

**GREGORY
WORRELL:** The same circuits in the brain that are responsible for mood, for behavior-- these are the same circuits that in patients with epilepsy, are generating seizures.

**JAMIE VAN
GOMPLE:** 80% seizure freedom is something that we typically reserve for patients that we see a spot that might be causing their epilepsy on the MRI or, alternatively, patients that have seizures that start from the inside part of their temporal lobe. And that's a very reasonable expectation in those two very well-described epilepsies.

However, there's a fair number of patients that don't fall into those categories, that still have excellent treatment options available for them.

**GREGORY
WORRELL:** The goal of epilepsy surgery is to remove or destroy the tissue-generating seizures. With cortical mapping, we're able to identify which regions of the brain perform which functions. With recording from the brain, we identify where seizures come from.

**JAMIE VAN
GOMPLE:** In some select patients in which we find the seizure focus-- and we suspect that it's close to something very important like speech or arm movement-- we do extra-operative cortical mapping if they have a subdural grid in place.

This is where the leg moves or this is where the arm moves. So if they're that close, sometimes we take the patient back through their craniotomy that they've already had awake, and do stimulation in the operating room so we know exactly where that motor function is and take out the seizure focus next to it, but stop and preserve function.

GREGORY An option, currently, is cortical stimulation. So this is where electrodes are implanted on the surface of the brain or within the brain, and target that region with electrical stimulation, which doesn't destroy the normal function, but controls the seizures in that region of brain.

WORRELL:

JAMIE VAN Vagal nerve stimulators are a stimulator that's placed in the neck, on a vagus nerve, always on the left side.

GOMPLE:

It, itself, has a role in treating patients in which we can't really figure out where their focus is coming from or in patients that maybe don't have a focus, like generalized epilepsy.

And a certain portion of those patients who respond very well have a reduction in seizures.

GREGORY The goal for patients with epilepsy is always seizure freedom with no side effects. In the future, the technologies that are available-- the medications, the diagnostics, the therapeutics-- are transforming the care of these patients.

WORRELL: