Advance Neuroscience Technology

Robotic Arm Technology

Rocket science meets brain surgery. Originally designed to explore outer space, robotic medical assistance technology is changing the way we explore the inner spaces of the brain. The first free-standing children's hospital in the U.S. to offer this technology, Cook Children's is making childhood, and even young adulthood, simpler for many patients with difficult to treat epilepsy.

For children, teens and young adults with severe forms of epilepsy, our robotic surgical arm is one of the greatest things to come along. Often, these patients don't respond to medications or other therapies. For some of them, surgery, such as laser ablation, may provide relief. But before surgery can be performed, a lot has to be learned about the type of seizures they're having and where those seizures are originating in the brain. One of the most effective ways to do this is to implant electrodes into the brain so the doctors can gather the information necessary to determine if surgery is an option.

In the past, placing electrodes in the brain was invasive and took many hours to complete. But here at Cook Children's, this procedure can be done quickly, very precisely, and it's minimally invasive, making this surgery less stressful for your child. That's all thanks to our robotic arm technology.

What is the robotic arm used for?

Using the very latest in smart technology, the robotic arm is a brilliant tool that takes electrode placement to a whole new level. And while it doesn't actually perform surgery, it does assist the neurosurgeon before and during surgery to ensure that electrodes are placed with never-before-seen accuracy.

Before surgery

In any kind of brain surgery, accuracy is always important. To find where epileptic seizures are happening in the brain requires extensive planning and brain mapping to ensure that each electrode is precisely placed. Prior to the surgery, the medical team will take an MRI, and a CT scan. The scans are merged and loaded into the robot's own on-board laptop computer. The computer has a very large screen so the surgical team can plan each trajectory– from where to enter the skull to where to place the electrode lead in the brain.

During surgery

When it's time for surgery, the robot remembers each trajectory so when we go to place our first lead, we tell it which trajectory we want it to go to, and the robot moves into place.

Using its own laser scanner the robot scans areas of the patient's face and then lines it up with the MRI images that have been loaded onto the robot and matches it to the trajectory. It then triangulates itself and tells the doctor exactly where to place the lead.

To place the electrodes, the neurosurgeon drills a small hole about the size of a pencil lead. A special bolt is screwed into that hole. The hair-thin lead then goes through the bolt and the bolt is tightened down to the lead so it stays where it's supposed to.

How seizures are monitored

Once all the leads are placed, your child is moved to our epilepsy monitoring unit (EMU) and we monitor them by hooking up the leads to our EEG monitoring technology which will gather data on each seizure. Our neurologists process the data and then determine if there's something surgical that can be done to alleviate the seizures.

Benefits of robotic arm technology

Epilepsy patients who don't respond to medications or other therapies, may be candidates for certain types of brain surgery. When we combine brain mapping technology with the advanced robotic arm, we are able to more accurately diagnose which children will benefit from brain surgery. Because of the improved data gathered from this testing, we can also identify other potential treatments for children who are not candidates.

This technology further advances our nationally and internationally recognized epilepsy program, allowing us to better treat kids with complicated epilepsy by gathering better information through a less invasive procedure.
Benefits include:

- Reduces risk since there's no need for a craniotomy or laying electrodes on the surface of the brain
- Precision placement of hair-thin electrodes enables neurosurgeons to access deeper locations in the brain
- Neurology team can gather accurate seizure data for hard-to-treat seizures
- Highly targeted data helps to identify treatment protocols
- Minimally invasive surgery
- Faster placement of electrodes reduces stress on patients
- Little or no pain during recovery

Need help referring a patient?
Please call the International Patient Services department at +1-682-885-4685,
send faxes to +1-682-885-2557, or email international@cookchildrens.org