

Advance Cardiology Programs

Electrophysiology

When your child's heart skips a beat or the rhythm is out of sync, there may be a problem with the electrical impulses in the heart. When this happens, the Electrophysiology Program at Cook Children's offers cutting-edge treatment for patients with heart rhythm abnormalities.

If your child has been diagnosed with, or is suspected of having, a heart rhythm disorder, seeing a pediatric electrophysiologist is an important step in his or her care. The electrophysiology (EP) program here at Cook Children offers superior technology and nationally recognized specialists, so you know that your child is in good hands.

Why Cook Children's Electrophysiology Program?

From the tiniest of babies to kids, teens and young adults, our team is second to none in diagnosing and treating even the most complex rhythm disorders. With heart rhythm certified electrophysiologists, an award-winning nursing staff and extensive support team we are among the most advanced programs in the southwest.

The highest level of expertise demands innovation at its best. Utilizing the most advanced technology available, our medical team is at the forefront of medical advancements. For our patients and their families this means not only improved outcomes, but brighter outlooks for the future.



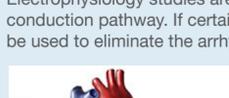
Cook Children's was the first pediatric facility in the U.S. to use EnSite 3000® computerized mapping and imaging software to help identify the source of an arrhythmia.

Because heart rhythm irregularities can often be related to other medical conditions throughout the body, care often goes beyond the walls of our program. When necessary, our EP team works with other cardiologists as well as other specialties across our system to assure that your child receives the most complete care possible. And, with our Child Life team and other support specialists, we also offer care that is centered on the entire family.

What is an electrophysiology study

The human body is filled with electrical impulses that travel throughout the body. The heart utilizes these signals to maintain a constant and regular heartbeat. Sometimes these electric signals do not function because there is a defect along the path. In the heart, this can cause irregular rhythms, called arrhythmias. In most cases, arrhythmias are not life threatening, but sometimes they are

Electrophysiology studies are conducted to determine the type and location of a specific arrhythmia along the conduction pathway. If certain types of arrhythmias are found, radiofrequency catheter ablation and cryoblation can be used to eliminate the arrhythmia. Catheter ablation is often used to correct abnormal heartbeats or arrhythmias.



The heart's job is to pump blood through the body by contracting or "beating". The pattern of heart beats is called the heart rhythm. An electrical impulse tells the heart how fast to beat. Electrical problems in the heart can cause irregular heart rhythms.

Normally, the electrical impulse begins in the sinoatrial (SA) node. It travels through the upper right chamber (right atrium) to a group of cells called the atrioventricular (AV) node. The impulse then moves to the lower chambers (ventricles) causing them to contract and pump blood.

An electrophysiology study (EPS) looks at the electrical activity in your child's heart. It is performed using cardiac catheterization combined with state-of-the-art equipment featuring computerized electrical stimulation and analysis systems. During the study, special catheters are inserted into your child's veins and the catheters are guided to the heart. The tips of each catheter have platinum electrodes that record electrical signals from inside your child's heart as well as pace the heart from different locations. This information is then sent to a computerized monitor. The monitor creates a map of the electrical activity in your child's heart. The results of the study can tell your doctor if there is an abnormal heartbeat or arrhythmia and give your doctor information such as:

- to diagnose the cause of symptoms: such as, palpitations, lightheadedness, dizziness or fainting
- to pinpoint the location of a known arrhythmia and decide the best treatment
- to see how severe an arrhythmia is and to help predict the risk of a future cardiac event, such as cardiac arrest
- to verify effectiveness of medication to control an arrhythmia
- to decide whether or not an implantable device (pacemaker or defibrillator) is needed, or a treatment procedure (catheter ablation)

An EPS provides the most accurate and detailed information about the functioning of the heart's electrical system. If we do find an abnormality, we can work closely with your doctor to determine which treatment is best for your child's diagnosis, which may include:

- Arrhythmia ablation
- Pacemaker or defibrillator implantation
- Balloon angioplasty or valvuloplasty
- Heart valve placement or replacement
- Septal closures
- Stent placement
- Vascular occlusion

Who needs an electrophysiology study?

Babies, children, teens and young adults with irregular heartbeats, or arrhythmias, may be referred for an EPS. Your doctor may also request an EP if your child has any of the following symptoms:

- Fainting episodes (syncope)
- Dizziness
- Lightheadedness
- Heart palpitations
- Unexplained chest pain
- Shortness of breath
- A family history of sudden cardiac arrest
- Other symptoms that might suggest a problem with his or her heart

Preparing for an electrophysiology study

Before your appointment

Most people are anxious about any kind of medical exam. Having your heart tested can even be scary. We will walk you through the process every step of the way so that you know what to expect, and we'll answer any questions you may have. Please don't hesitate to let us know if you have any concerns.

If your child having an EPS and is very young, or is older but still anxious, we recommend that you talk them and explain, in an age appropriate manner, why they are having the study and how it will help them. Knowing this ahead of time can help to ease their fears.

Prior to your scheduled visit, you will receive a call confirming your appointment. At that time, we will go over the procedure for your child's study based on his or her needs and the referring doctor's request. We will also go over eating and drinking instructions.

On the day of your appointment

Your child's stomach should be empty when they have the study. In most cases, your child should not eat or drink after midnight on the night before the study. (They may have sips of water with their pills if taking medication). If your child's EP study is in the afternoon, they can have a clear liquid breakfast –then nothing more. To help your child relax, a sedative will be given before the study. For your child's comfort, they will need to empty their bladder just before leaving for the study.

Please bring any medications that your child is currently taking with you to the hospital.

When you arrive for your scheduled study, please report to Patient Registration on the 1st Floor of the hospital at your appointed time. It is very important that you arrive on-time in order to complete any paperwork that may be needed. We also need time to prep your child for the study and, in some cases, additional testing may be required before the study begins.

What to expect

The electrophysiology lab contains an array of special computer equipment, monitoring and recording devices. In addition to your child's electrophysiologist, a highly trained group of nurses and technicians will be in the lab during the electrophysiology study.

Before the Study

Depending on your child's particular case, after you arrive but before beginning the actual study, your pediatric cardiologist MAY have ordered the following tests to be performed on your child:

- EKG
- Echocardiogram
- Holter monitor
- Blood work
- Exercise stress test

After any required tests are completed, the doctor and one of the Cardiology Case Managers will meet with you to obtain consent for the procedure and answer any additional questions.

After all paperwork is completed and any needed tests are done, your child will be dressed in a hospital gown. A sedative will be given prior to the test to relax your child. Most children will have a breathing tube placed for the duration of the procedure so that they will be asleep and not feel any pain. A numbing medicine will be given at the catheter insertion sites also. The procedure can last from 3-4 hours, but one of the Cardiology Case Managers will keep you informed throughout your child's procedure.

Cardiac catheterization is what is called an invasive procedure, meaning it involves going into the body through the skin. However, it is a minimally invasive procedure and is not considered "open" surgery since it's performed without making any large incisions.

The Study

An EP study is performed with a procedure called cardiac catheterization. Your child's electrophysiologist will use one or more catheters, depending on the areas of the heart that need to be tested. A catheter is a thin, insulated tube that contains tiny wires capable of sending and receiving electrical impulses.

Your child's groin, neck and/or arm may be cleaned so that one or more catheters can be inserted. The catheter insertion site may need to be shaved and will then be rubbed with an antiseptic solution. Sterile sheets will be placed over your child, leaving only a small area exposed. All of this is done to prevent infection.

The catheter will be inserted into a vein through a needle puncture. Guided by x-ray pictures, as well as a special 3 dimensional mapping system, your child's doctor will advance the catheter and position it in their heart.

Electrode catheters are able to see and record the electrical activity in different areas of the heart and measure how fast the impulses travel. Electrode catheters are also used to deliver electrical impulses to pace the heart (cause it to beat). The purpose is to see if your child's heart develops an abnormal rhythm. Inducing arrhythmias in during an EP study allow your doctor to determine the exact location of abnormal electrical pathways and also help your doctor decide which treatment may be best. Occasionally an electrical shock (defibrillation) is needed to restore normal heart rhythm.

Medication Testing

If an abnormal rhythm can be started during pacing, your child's electrophysiologist may want to find out if a certain kind of medication will control the rhythm. Your child will be given the medicine by IV. Then part of the pacing will be repeated. If the medicine works, the doctor can prescribe it in pill form. Your child's doctor may also simulate exercise by infusing an adrenaline-like drug.

After the Study

When your child's EP study is over, the catheters will be removed. To prevent bleeding, pressure will be applied for 10 to 20 minutes on the area where the catheters were inserted. Then a Band-Aid or a small pressure dressing will be applied. Your child will not need stitches.

Your child will be taken to the recovery room on a stretcher. They will then be able to drink some liquids. Your child will need to stay in bed for four to six hours. This will help the catheter insertion sites begin to heal. During the first two or three hours, your child's nurse will frequently check their blood pressure, pulse and catheter insertion sites. Here are some tips that will speed healing of the insertion site:

- Do not allow your child to bend the arm or leg the catheter was inserted in. Bending their leg at the hip may cause the site to bleed.
- Call your child's nurse immediately if you notice bleeding or feel warmth, notice any swelling or if your child is experiencing pain at the insertion site.
- When your child coughs or sneezes, they should put their hand over the site and apply pressure.

Getting the results

In some cases, if certain types of arrhythmias are found, radiofrequency catheter ablation or cryoblation may used to correct abnormal heartbeats.

Your child's electrophysiologist will go over the test finding with your child's referring doctor. The referring doctor will contact you with the results and discuss the best treatment for your child's particular case.

Interventional catheterization

Depending on the severity and cause of your child's arrhythmia, an interventional electrophysiology procedure may be performed during your child's EPS. Those procedures might include:

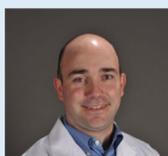
- Arrhythmia ablation –This procedure is performed to correct certain types of irregular heartbeats or arrhythmias.
- Pacemaker or defibrillator implantation – Procedure used to correct certain types of arrhythmias and prevent sudden cardiac death.

Electrophysiology team

Matthew Dzurik M.D., Christopher Case M.D. and Gregory Barker M.D. are Cook Children's cardiologists who excel in the use of RFCA for children of all ages.



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