

Let's Talk About...

Electrophysiology Study and Cardiac Ablation for You or Your Child

What are these procedures, and why are they used?

An **electrophysiology (EP) study** is a test that measures how electrical signals move through your child's heart.

Cardiac ablation is a procedure used to treat some types of heart rhythm problems.

Heart rhythm problems

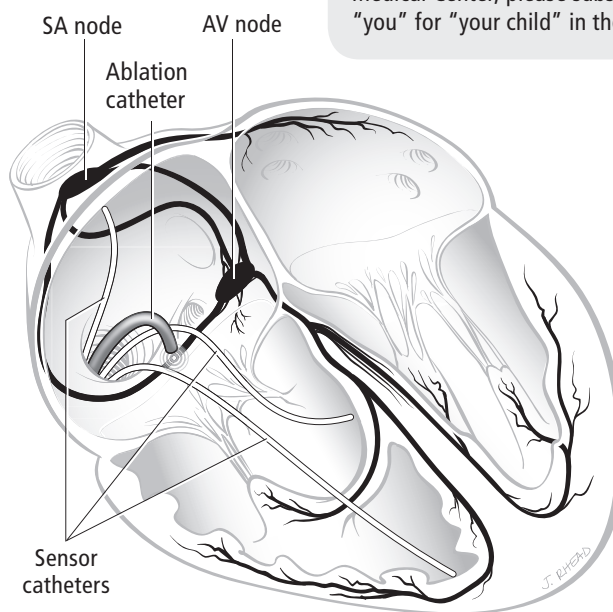
Normally, the heart beats in a regular, even pattern. Electrical pulses travel on a pathway through the heart, causing muscle contractions along the way. Problems in the electrical pathway can cause an unstable heart rhythm. Symptoms can include a pounding or rapid heartbeat, a heart "flutter," feeling dizzy or faint, or difficulty breathing.

Causes of an unstable heart rhythm include:

- **Extra electrical pathways** that make the impulses move in a circle or re-enter areas they already went through.
- **Extra electrical signals in the atria** (the heart's upper chambers) that may make them contract rapidly or in an irregular way.
- **Extra electrical signals in the ventricles** (the heart's lower chambers) that may make them contract rapidly before the chambers are filled completely.

These problems often come from heart cells that are sending electrical pulses when they shouldn't be.

Note: if you are an adult having this procedure at Primary Children's Medical Center, please substitute "you" for "your child" in the text.



EP study: Catching your child's heart in the act

Heart rhythm problems often come and go in an unpredictable way. Sometimes it is difficult for doctors to catch an abnormal heart rhythm "event," even using sensitive tests such as an ECG (electrocardiogram), cardiac echo test, or Holter monitor.

An EP study uses one or more **catheters** (flexible tubes) threaded through a vein into your child's heart. The catheters are fitted with tiny sensors that measure the precise flow of electric signals through the heart.

During an EP study, a doctor can also use a catheter to provoke the unstable heart rhythm. Measurements recorded while the heart is in an unstable rhythm can help doctors determine its cause, where it starts, and even what medications control it best.

Cardiac ablation: Treating an unstable heart rhythm

Medication is a common treatment for an unstable heart rhythm, but it isn't always effective and is never a cure. Another alternative is cardiac ablation. With cardiac ablation, a catheter is placed next to the heart cells that are creating abnormal electrical signals. A device on the catheter then uses radiofrequency energy or liquid nitrogen to destroy abnormal cells in a small area. This can restore your child's heart to a normal rhythm. In most cases, an ablation procedure can be completed at the same time as an EP study. Your child's doctor will tell you if your child is scheduled for an EP study, an ablation procedure, or potentially both.

How to prepare

Regardless of whether your child will be having an EP study or a cardiac ablation procedure, here are some things you can do to make things go more smoothly:

- **Follow the doctor's directions about medications.** Your child **may** need to stop taking blood thinners and other medications for several days before. **Always check with your child's doctor before stopping any medications.**
- **Arrange for a ride.** Give your child a ride to and from the hospital, or arrange for someone else to do this.
- **Have your child fast (no food or drink) for 6 to 8 hours before the procedure.** If the procedure is in the morning, your child should not eat or drink anything after midnight the night before.
- **Tell the doctor if your child is ill the day of the procedure** with a cold, the flu, or anything else.
- **Bring a list of all your child's current medications.** List everything, including over-the-counter medications, herbal supplements, and vitamins.
- **Tell the doctor if your child has allergies** to any medications or dyes.

What happens before?

Here's what happens before the procedure:

- You will fill out some paperwork, including a consent form.
- Your child will change into a hospital gown, and a nurse may draw blood for lab work.
- An IV (intravenous) line may be placed in your child's arm or hand to give her fluids. She may also be given medicine by mouth or through a mask before the IV is placed.
- Your child will be moved to the EP lab. The room may feel cool, but she will be covered with sterile draping and a blanket for the procedure.

What happens during?

Typically, an EP study takes 1 to 2 hours, and a cardiac ablation procedure takes 1 to 2 hours. A combined procedure (EP and ablation) may take 3 to 4 hours or longer. Your child will sleep through the procedure.

The first step in either procedure is inserting one or more catheters.

- **Anesthesia:** First, medication will be given so your child goes to sleep, and sleeps through the procedure.
- **Preparation:** A nurse will prepare each patch of skin where a catheter will be inserted.
- **Monitoring:** Your child will have monitoring devices attached to check her heart rate, breathing, and other information.
- **Inserting catheters:** Your child's doctor will first insert a sheath (a short plastic tube) into a blood vessel. Each catheter will be put into the sheath and threaded through the blood vessel to the heart. Guidance is provided by x-ray imaging techniques.

EP study

Here's what generally happens in an EP study.

- **Recording the heart's electrical signals:** The healthcare team uses sensors in the catheters to gather information about how electrical signals travel through your child's heart. It's like an ECG (echocardiogram, or "heart ultrasound") measured directly from the heart muscle, rather than from the surface of your child's chest.

- **Pacing the heart:** Next, the doctor uses a catheter to stimulate the heart. The goal is to reproduce your child's heart rhythm problem. This way, doctors can measure the electrical signals while the problem happens. The measurements can show the cause of the problem and help doctors find the tissue that is operating abnormally.
- **Evaluating medications:** Your child might be given medications through the IV to see whether they are effective in reducing the problem.

Cardiac ablation procedure

Here's what generally happens in an ablation procedure.

- **Finding the abnormal heart tissue:** An EP study confirms the location of the tissue that is causing the rhythm problem.
- **Placing the ablation catheter:** An ablation catheter connected to a specialized device is placed next to the abnormal tissue.
- **Ablation of the abnormal cells:** Precisely focused radiofrequency energy or liquid nitrogen is sent from the catheter to the abnormal tissue cells. This **ablates** the cells, or in other words, creates a tiny scar. This prevents the abnormal cells from interfering with the heart's normal electrical pathway.

Finishing the procedure

At the end of either procedure, the doctor will remove the catheter(s) and seal the catheter site.

- **Removing the catheter(s):** Numbing medication will be applied to the catheter sites. Each catheter will be threaded back through the vein and removed. Then the sheath will be removed.
- **Sealing the catheter site:** A doctor or nurse will apply pressure to the site to prevent bleeding, and a band-aid or pressure bandage will be placed on the site.

What happens after?

After the procedure, your child will be monitored as she wakes up, and until she is ready to go home.

- **Monitoring:** Your child will be moved to a recovery unit. She will be connected to a **telemetry monitor** that shows her heart rate and rhythm.

- **Recovery:** Your child will need to lie flat for 4 to 12 hours. She can watch movies, and you may want to bring a favorite toy or book.
- **Going home:** Some patients can go home at the end of the day, while other patients will need to stay overnight. Your child's doctor will decide when she is ready to leave the hospital.

What happens when we go home?

- **The first 48 hours:** You'll need to take some specific steps to take care of your child, and you will need to watch for symptoms.
 - **What your child will feel:** She might feel sore from several hours of lying flat — this will go away in a day or so. The catheter site will be bruised, but this should go away in a week or so. Your child's heartbeat might feel strange to her at times as the heart muscle adjusts to the healthier heartbeat.
 - **What to watch for:** Watch for swelling or bleeding at the catheter site, difficulty breathing, or swallowing problems. Also, tell your child's doctor if she feels fatigue or chest discomfort that is severe or that continues beyond the first few days. See the end of this fact sheet for more information on when to call the doctor.
 - **Cautions and steps to take:** Make sure your child does not bend or squat. Keep your child from doing intense activity such as climbing stairs, running, or lifting objects that are heavy for her. Have your child take short walks of 5 to 10 minutes, several times a day. Give your child an appropriate stool softener, if necessary, to relieve constipation.
- **Caring for the catheter site:** Avoid hot baths, hot tubs, or swimming pools for the first 5 days or until the wound is closed. Showers are okay after 48 hours.
- **Returning to work or school:** When your child can go back to work or school depends on his physical condition and his work/school activities. Many patients can go back to work or school within a week. Check with your child's doctor.
- **Ongoing medication, monitoring, or both:** If your child's doctor prescribes medication on the basis of an EP study, have her take it as prescribed, even after she feels better. Keep follow-up appointments so your child's heart can be monitored.

Watching for problems and reporting them

Call the doctor if your child experience any of these:

- A fever over 101°F.
- Redness, swelling, drainage, bleeding, or severe pain near the catheter site
- Coldness or numbness in the arm or leg
- Severe tiredness, or tiredness that continues
- Difficulty swallowing or eating
- Fainting, lightheadedness, or dizziness
- Very fast or slow heartbeat
- Difficulty getting enough breath
- Swelling in the hands or ankles

Call 911 if your child has chest discomfort that is severe or is not relieved by medication for chest pain.

Talking with your doctor before this procedure

The table below lists the most common potential benefits, risks, and alternatives for EP studies and cardiac ablation procedures. Other benefits and risks may apply in your child’s unique medical situation. Talking with your child’s healthcare provider is the most important part of learning about these risks and benefits. If you have questions as you talk with your child’s healthcare provider, be sure to ask.

Potential benefits	Risks and potential complications	Alternatives
<p>EP study</p> <ul style="list-style-type: none"> • Compared with other tests, it provides better information about the electrical system of your child’s heart • It can help your child’s doctor accurately diagnose the cause of a heart rhythm problem, find its source, and test medications to treat it <p>Cardiac ablation procedure</p> <ul style="list-style-type: none"> • Can lessen or eliminate the heart rhythm problem • Can allow your child to decrease or stop long-term medication for a heart rhythm problem 	<p>Both procedures</p> <ul style="list-style-type: none"> • Bleeding or infection where the catheter was inserted (rare, and we use precautions and antibiotics to prevent this) • Allergic reaction to x-ray contrast media (dye), (very rare) • Damage to the artery or heart (extremely rare) • Heart attack or stroke (extremely rare, and not typically caused by the procedure itself) • The need to use an electric shock to restore a normal heartbeat during the procedure (rare) • Low blood pressure, or buildup of fluid in the sac that contains the heart (rare) • Clots developing at the tip of the catheter (rare) <p>Cardiac ablation procedure</p> <ul style="list-style-type: none"> • Damage to the heart’s electrical system (rare). If this happens, a permanent pacemaker may need to be inserted. • Your child’s doctor may need to use a catheter to treat your heart rhythm problem that is not yet approved by the FDA for this specific purpose. 	<p>EP study</p> <p>Alternatives to an EP study include other heart tests, such as:</p> <ul style="list-style-type: none"> • ECG (electrocardiogram) • Echocardiogram • Heart rate recorders such as a Holter monitor • Tilt table test <p>Cardiac ablation procedure</p> <p>Alternatives include other treatments such as:</p> <ul style="list-style-type: none"> • Medication • Implantable cardiac defibrillator (ICD)