

Epilepsy Surgery

SPECT

AT CHILDREN'S HOSPITAL OF PITTSBURGH OF UPMC, we believe parents and guardians can contribute to the success of this procedure, and we invite you to participate. Please read the following information to learn about the procedure and how you can help.

Fast Facts About SPECT

- SPECT is a nuclear medicine test to detect changes in blood flow in your child's brain; it can help doctors pinpoint the area deep within your child's brain that is causing his or her epileptic seizures.
- This test will be done when your child is admitted to the hospital's Epilepsy Monitoring Unit (EMU) for epilepsy surgery evaluation.
- No preparation is needed before the SPECT test.
- Your child will have an intravenous (IV) line placed prior to the test. A special dye will be injected into the IV to highlight the flow of blood in the brain and a computed tomography (CT) scan will capture an image of the blood flow.
- Two SPECT scans are needed: One must be done at the onset of a seizure. For that reason, your child may have to stay for several days to as long as 2 weeks in the EMU to wait for a seizure.
- You will need to stay with your child during his or her entire stay in the EMU, as well as during the SPECT scans, to help identify seizures, since you know your child's epilepsy best.
- Because this test uses radiation, women who are pregnant or believe they may be pregnant should not be in the room when SPECT scans are done. In this case, another adult may stay with your child during the scan.
- Teenage patients who are pregnant or believe they may be pregnant should talk to their doctor before having a SPECT scan. This information will be kept confidential.

What Is SPECT?

Single photon emission computed tomography (SPECT) is a test that detects blood flow changes in the brain. During a seizure, blood flow is highest at the point in the brain where the seizure starts. The SPECT scan shows this "hotspot" in the brain. It will help the doctors plot a course for surgery that will avoid critical areas of the brain, if epilepsy surgery is an option for your child.

To capture images of the blood flow in the brain, SPECT uses a liquid known as a radiopharmaceutical (*RAY-dee-oh-far-ma-SOO-tick-ool*), a tracer or dye that shows up under a special kind of x-ray called a CT scan. The liquid has very small amounts of radioactive molecules in it, but is safe and will not hurt your child. The liquid is given through an IV that will be placed



when your child is admitted to the Epilepsy Monitoring Unit (EMU). Once it reaches the brain, it sends signals that can be read by the SPECT scanner and made into the pictures that the doctors will review.

Before your child's epilepsy surgery, two SPECT scans will be needed: One, called an ictal (*ICK-tull*) scan, will be done while your child is having a seizure, and the other, called an interictal (*IN-ter-ICK-tull*) scan, will be done when your child is not having a seizure. The images of these scans will be compared by the nuclear medicine specialist and your child's epilepsy specialist.

To get the ictal SPECT (during the seizure), your child's epilepsy medication will be lowered or stopped so that your child will have a seizure. The procedure is done in the EMU so that nurses and doctors are nearby, making it safer for your child to have a seizure. It is important that the radiopharmaceutical is given as quickly as possible after the start of the seizure; for this reason, your child's IV will be connected to an automatic injection machine. When your child is not having a seizure, sterile saline (a liquid similar to tears) will flow through the IV to keep him or her hydrated. When a seizure starts, the technician in the EMU command center will push a button to activate the automatic injector, and the radiopharmaceutical will be injected into the IV. Your child will not feel the injection because the liquid will go into the IV that is already in place. About 4 to 6 hours after the radiopharmaceutical has been injected, your child will have a SPECT. This scan will show the blood flow in the brain at the moment the radiopharmaceutical was injected.

SPECT cont'd

The SPECT scan will take about 45 minutes to complete each time the radiopharmaceutical is given. During the SPECT scan, your child must lie very still so the images are clear. Most children are able to lie still during the scan. If your child is not able to remain still, your child may be given sedation to allow him or her to sleep during the scan. Nurses in the EMU will make sure your child has not had any food or drink prior to the sedation.

The interictal SPECT (not during a seizure) may be done before or after the ictal SPECT, depending on how long your child has been in the EMU. The interictal SPECT will show the normal blood flow in your child's brain so it can be used as a baseline for comparison with the ictal SPECT scan.

Home Preparation

No specific home preparation is needed before your child's admission to the EMU at the hospital, but there are a few tips you may follow:

- Waiting for a seizure can take some time and may be boring for your child, so you may want to bring books to read, toys or quiet games to play, or a favorite DVD for your child to watch. These distractions will help the time go by faster.
- You may bring along a "comfort" item — such as a stuffed animal or "blankie" — for your child to play with or hold during his or her stay.

The SPECT Scan

Once your child has been admitted to the EMU, a nurse will start an IV.

- The nurse will put some numbing cream on the area where the IV will be placed.
- Your child will feel a small pinch as the IV is inserted, then the needle will be pulled out and the IV tube will be taped in place.
- A nurse will hook your child's IV up to the automatic injector machine, which will release a slow, steady drip of sterile saline solution through the IV during your child's entire stay in the EMU.
- Your child's epilepsy medicine will be lowered or stopped so that your child will have a seizure.
- Your child's sleep and awake cycles may be altered each day, if needed, to help make a seizure occur.
- When the seizure starts, the technician monitoring the room will press a button. The button will activate the automatic injector machine to immediately inject the radiopharmaceutical into the IV.
- After the radiopharmaceutical is injected, your child will be taken to the nuclear medicine imaging room for the ictal SPECT scan. The scan may be done right away or within several hours, depending on directions from the nuclear medicine department.
- You will be able to stay with your child throughout the time in the EMU and the SPECT scan.

- Another injection of the radiopharmaceutical will be done in the EMU when your child is between seizures to record his or her interictal SPECT images.

A Parent's/Guardian's Role

The most important role of a parent or guardian is to keep your child calm. The best way to keep your child calm is to be calm yourself. Knowing what to expect and explaining it to your child beforehand is the best way for both you and your child to be prepared for this procedure.

After the SPECT

- Your child may return to normal activities and normal eating and drinking after the test.
- The ictal and interictal images of the blood flow in your child's brain will be reviewed carefully by a nuclear medicine specialist, neurologist (brain specialist), and an epileptologist (epilepsy specialist). This review may take up to 2 weeks to complete. Your child's doctor will meet with you to discuss the results of the SPECT scans.

Special Needs

If your child has any special needs or health issues you feel the doctor needs to know about, please call the Division of Child Neurology before the procedure and ask to speak with a nurse. It is important to notify us in advance about any special needs your child might have.

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To see the list of all available patient procedures descriptions, please visit www.chp.edu/procedures.

