For more information

Our epilepsy surgery nurse specialist will be the best person to talk to about SEEGs. They are contactable by text message and by phone, and their mobile phone details will be provided soon after SPECT scans are discussed as an option for your child.

If the epilepsy surgery nurse specialist is not available, a message can be left, and you will be contacted as soon as possible.

Scottish Paediatric Epilepsy Surgery Service

Brain SPECT (single-photon emission computed tomography) scan investigation

Information for patients and families

Department of Paediatric Neurosciences · Royal Hospital for Children and Young People · 50 Little France Crescent · Edinburgh Bioquarter · Edinburgh EH16 4TJ

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SPECT scans help doctors learn about where seizures start in the brain. This helps the epilepsy surgery team find out if epilepsy surgery is a suitable treatment option for your child.

What is a SPECT (single-photon emission computed tomography) scan investigation?

A SPECT scan is a type of nuclear imaging investigation that uses a tracer (a very small amount of a radioactive liquid) injection and a special camera to create a 3D scan that shows blood flow within the brain. There are no side effects to the injection.

There are two types of SPECT scans, called ictal and interictal scans. Children will have both of these scans. We do all SPECT scans at the Royal Hospital for Children and Young People in Edinburgh, and our expert epilepsy surgery nurse specialist does the tracer injection.

An ictal scan looks at brain activity during seizures. When your child has a seizure, blood flow increases to the area responsible for causing the seizure. We inject a radioactive tracer into your child's veins at the start of a seizure so the tracer is carried in the blood to the area of the brain where the seizure is occurring or affecting. The tracer will then show these areas on the scan. Video telemetry is done at the same time.

The interictal scan looks at brain activity in between seizures when the blood flow to the brain is normal. The tracer injection and scan is done on a day your child has not had a seizure (there must be two hours since their last seizure at the time of the scan).

We aim to do the scan 1-2 hours after the injection. Each scan requires children to lie very still for about 45 minutes. If the child moves the scan must start again, so some children will need a general anaesthetic.

The ictal and interictal scans are later compared to see if the pattern of blood flow changes during a seizure. Doctors also compare this to the information from the video telemetry to see if they all suggest that seizures start in the same area of the brain.

After the scans

Please note your child is a source of radioactivity after the tracer injection. This will have been discussed with you by the nursing team and you will receive an information leaflet prior to going home.

If your child's medication has been reduced, they will stay on Borthwick Ward for monitoring until they have been back on their usual dose of anti-epileptic medicine for 24 hours and the frequency of their seizures is back to normal.

What happens next

A team of specialists will compare both scans and make a report describing the results of this investigation. This can take some time. The results are then presented at the next national epilepsy surgery multi-disciplinary team meeting to help decide if epilepsy surgery is a suitable option for your child and any next steps.

The doctors will tell you the outcome of these discussions at your next outpatient appointment.

The interictal SPECT scan

This scan will be booked for a different day than the ictal SPECT scan.

The amount of the tracer and the time between the injection and the scan will be the same as for the ictal scan. The only difference this time is that your child will **not** have had a seizure for at least 2 hours.

If your child needs an anaesthetic

Your child will most likely arrive to hospital on the same day as the interictal scan as a day case admission. They may be admitted to Borthwick, Crichton or Dirleton wards.

The doctor doing your child's admission will put in the cannula, make sure all the paperwork is completed and ensure your child has fasted correctly.

A radiographer will inject the isotope into the cannula.

They will have their general anaesthetic. You can stay with your child until they go to sleep.

After the scan, your child will return to the ward for observation.

If they are eating and drinking and the team is happy, you may be discharged within four hours.

If your child does not need an anaesthetic

If they do not require an anaesthetic, they will attend the SPECT scanning suite as an appointment.

A radiographer will inject the isotope.

After the scan, your child can go home from the SPECT scanning suite.

Are there any risks with this investigation?

Sometimes your child's anti-epileptic medicine will need to be reduced or stopped 1-2 days before the ictal scan takes place to increase the likelihood of your child having a seizure for the scan. The epilepsy surgery nurse specialist will fully discuss this with you before your child arrives at hospital. We will ask you to sign a consent form that says you have understood these conversations and consent to the medication reduction.

Medication reduction can increase the risk of longer seizures that could be bigger than your child's usual seizures. Your child will be closely observed throughout the investigation, and there will be a plan in place and emergency medication prescribed should this happen. If your child has a prolonged seizure, they may be admitted to the paediatric intensive care unit.

Your child will have to stay in hospital for the duration of medication reduction and at least 24 hours after medication has been increased back up to the normal dose.

Getting ready for SPECT scans

The epilepsy surgery nurse specialist will phone you to discuss the scan and to learn about your child's seizure frequency, seizure description and medication doses. They will also talk about potential dates for the SPECT scan to take place. The scans usually take place on a Wednesday or Friday. If your child might manage without anaesthetic, practice in the scanner may be arranged.

The ictal SPECT scan

Before the ictal SPECT scan

Your child will arrive to Borthwick Ward on the day before the scan for an overnight stay. If your child will be having their anti-epileptic medication reduced for the scan you will be asked to come in to hospital earlier, but this will be discussed with you.

A doctor will admit your child to Borthwick Ward, discuss any worries you may have and obtain consent for the scan if your child will be having a general anaesthetic.

If your child will be having a general anaesthetic, you will also be seen by the anaesthetic doctor who will discuss your child's general health with you and explain to you what the general anaesthetic will involve, including risks. They will inform you of fasting times.

A cannula (a small plastic tube) will be inserted into a vein in your child's hand or arm. This is used to inject the radioactive tracer quickly and easily. An hour before, the nurses can apply some pain relief cream where the cannula will go in to numb the skin so it doesn't hurt so much. The play specialists on the ward will support the doctors or nurses to do this if your child is scared or apprehensive.

Either the night before the scan or on the morning of, the neurophysiology team will put EEG leads (wires) on your child which will be connected to video telemetry for monitoring. These leads stay in place until the seizure is over and will be removed when your child goes for the scan.

If your child has any medical problems, like allergies, please tell the doctors or nurses about these.

If your child has had any previous reactions or problems with general anaesthetics, please tell the doctors about this.

If your child has had or had contact with any infectious diseases like chicken pox or head lice, please tell the doctors or nurses.

On the day of the ictal SPECT scan

On the day of the scan your child will have been fasting since 6am if your child will be having a general anaesthetic.

The epilepsy surgery nurse specialist and radiographer (a doctor specialising in scans) will bring the tracer injection and do some final checks. The nurse will stay in the room with your child to wait for the start of a seizure. A member of the neurophysiology team may also be in the room watching the information from the EEG leads on a screen to help see when a seizure starts but this is not always required.

At the start of the seizure, the nurse will give the injection as quickly as possible. These are the points that are important to remember when a seizure occurs:

- Tell the nurse if this is a typical (usual) seizure for your child
- Do not stand in front of the recording cameras
- Remove all bed linen and covers so the camera has a good view
- Press the seizure button
- Help the nurse steady the arm or hand that has the cannula so the tracer can be injected quickly.

When the seizure is finished, the nurse will contact the teams involved with the next steps in the scan. The neurophysiology team will remove the EEG leads and your child will be taken to the Nuclear Medicine department for the SPECT scan.

If your child is having a general anaesthetic, you can stay with your child until they go to sleep.

The scan should take about 45 minutes.

The scanner is usually available for about 5 hours. If your child does not have a seizure within this time, the test may be rearranged for another day.