15 APPENDIX A: DIAGNOSTIC TESTS

Blood analysis *(bloodwork)*

What is bloodwork?

Bloodwork is done to check the components in your child's blood, such as:

drug levels
whether your child is getting enough or too much of prescribed drugs

electrolytes
whether the elements in your child's blood, such as sodium and potassium, are in balance

haemoglobin
whether the blood is carrying enough oxygen to supply cells throughout the body

white blood cells
whether your child has an infection or the ability to fight an infection

kidney function
how well the kidneys are working.

What will happen during the test?

A local anaesthetic cream called EMLA is applied to the skin about an hour before the poke and is held in place with a clear bandaid. The local anaesthetic takes an hour to numb the skin so that the needle poke does not hurt. EMLA is very helpful in relieving pain, but some children may still get upset.

Once the skin is numb, a needle will be inserted into your child's vein or artery and one or more blood samples will be taken. The amount of blood taken is very small compared to the amount in your child's system. The body quickly replaces the blood taken for the test.

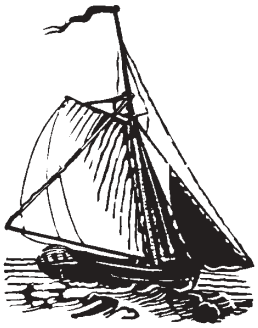
We recommend leaving bloodwork to the end of a clinic visit, because many children get upset with the needle poke even with the EMLA. EMLA is not recommended for infants less than six months old.

What can we do to prepare our child?

Parents can help by remaining calm and comforting. It is best for you to be with your child. Providing a treat and lots of praise afterwards can also help for the next time testing is needed. If your child is very upset by bloodwork, speak to the clinic nurse about some play therapy that may help your child cope.

When will the results be available?

How long bloodwork results take depends on the type of test. Some results are available within hours, while others take much longer.



HEART AND STROKE FOUNDATION

Finding answers. For life.

Chest x-ray

What is a chest x-ray?

A chest x-ray is a picture of the inside of the chest—the heart, lungs, and bones. X-rays are a form of radiation similar to light or sound waves that create an image on film of the organs and bones inside the body. Structures that are dense, such as bone, appear white, air is black, and soft tissues such as the heart appear as shades of gray.

A chest x-ray is created by sending a beam from the back to the front of the chest (called a "frontal view" or "postero-anterior view") and recording the image on an x-ray film. A side-to-side picture ("lateral view") may also be taken to provide more information and to confirm or rule out any problems seen on the frontal view. The radiologist informs your child's doctor of any concerns.

A chest x-ray provides information about:

- the size and shape of the heart,
- abnormal fluid in or around the heart or lungs,
- pneumonia or a collapsed lung.

What will happen during the test?

The chest area needs to be free from clothing and any form of jewellery or metal, so hospital gowns are provided. Babies lie flat on a special table for the x-ray; toddlers may sit in a special chair; and older children may stand. Since it is important to stay still for the x-ray, some younger children may need to be restrained for the minute or two it takes to do the test. Although the test does not hurt, some children cry because they are unable to move. Older children can help by taking a deep breath and holding it for five seconds while the x-ray is being taken.

What can we do to prepare our child?

The large equipment and darkened room used for x-rays can be frightening to some children. You can prepare your child by explaining that the machine is just like a big camera.

Many parents, older children, and teens have concerns about the harmful effects of radiation. You can explain that technicians are trained to use the least amount of radiation possible and take the fewest number of x-rays to minimize exposure to radiation. A protective lead apron will be placed over your child's pelvic area to minimize exposure of reproductive organs to radiation.

When will the results be available?

The radiologist usually looks at the x-ray soon after the test, depending on how urgent it is. If it is a routine test, the radiologist will contact your doctor with the results, who will discuss them with you at your next visit. If the x-ray is done for an urgent problem, they will discuss the results with you on the day of the test.

CT Scan

What is a CT Scan?

A C.T. Scan is a form of x-ray. A computer is used to make the picture of a part of the body we want to see. C.T. scans are different from plain x-rays because they show different types of tissue inside an organ, like bone and fat as well as fluid in the tissues.

What will happen during the test?

Your child will lie on a narrow bed, held safely by straps or bands. The table then slide into the scanner, which looks like a large donut. The camera moves around in the scanner, taking many pictures. The computer then combines the pictures to form a big image. Your child will see a moving light and hear a whirring noise, but the CT does not hurt.

It is important that your child lie very still during the test, which may take about 20 minutes. Babies and young children may need to be sedated for the test, in which case, your child will need to fast (not eat) for several hours beforehand.

Sometimes, the radiologist may inject a contrast medium or dye to highlight certain parts of the body (a CT-Angiogram highlights the heart and the vessels near it). If this is done, your child will need to have an intravenous to give the dye.

What can we do to prepare our child?

Your infant or child can expect to wear a hospital gown during the test. He or she will have to lie very still during the procedure. If your child is to be sedated or will have contrast medium (dye), he or she can expect a small prick from the needle. Children older than 5 who may not need sedating can practice lying very still.

Are there any side effects or after effects?

Not usually. Occasionally the dye gives a feeling of warmth or nausea which goes away quickly. Tell the radiologist about any allergies or other reactions to contrast in the past. If your child is sedated for the test, the staff will tell you about any after effects to expect.

When will the results be available?

The radiologist will write a report to the cardiologist, and the results may take several days.

Echocardiogram *(echo, cardiac ultrasound, or transthoracic echo)*

What is an echo?

An echo is a painless test that allows the doctor to see a very detailed picture of the heart. It uses ultrasound (harmless sound waves that cannot be heard) to create a video of the heart as it is beating. The sound waves are sent and received by a transducer, a device shaped like a small microphone that vibrates slightly. The sound waves are sent into the chest, where they bounce (echo) off the muscles and valves of the heart. The transducer picks up the echoes and sends them to the echo machine, where they produce a live image of the heart on a television screen.

A 3-lead ECG (see *Electrocardiogram*, page 15-5) is done at the same time as the echo.

The test provides the doctor with information about:

- the shape and condition of the muscles and valves of the heart,
- how well the heart muscles and valves are working,
- whether the blood is moving properly through the heart,
- whether there are any blood clots or vegetations.

What will happen during the test?

Three patches will be placed on your child's chest and attached by wires to the ECG machine (see *Electrocardiogram*, page 15-5). Gel that has been warmed to body temperature will be applied to your child's chest. The technician will hold the transducer on your child's chest and move it around to get pictures of different parts of the heart from different angles. At the same time, the technician will watch the television screen closely to make sure that all of the necessary information is collected.

To ensure that the technician is not distracted during the test, your child will need to lie fairly still during the test. The test will take from 20 to 45 minutes.

What can we do to prepare our child?

Explain to your child that the test will not hurt, but that he or she will need to lie quietly while the test is being done. Reassure your child that you will stay throughout the test. If your child seems anxious about the test, consider a play activity at home to recreate the test, using a doll or action figure and a washable, sticky substance such as finger paint or pudding.

Your child will need all clothing removed from the upper body. Gowns are provided to older children to protect their modesty. The gel is washable but sticky, so avoid dressing your child in any clothing that you do not want soiled.

Some children find that listening to music or watching a video during the procedure makes it easier to lie still. You can help your child select the entertainment before the test. If your child is a baby, you may settle him or her with a soother or feeding. Toddlers sometimes need medication to help them lie still during the test. If your child needs medication, the doctor and the clinic nurse will discuss it with you. You may stay with your child throughout the test.

When will the results be available?

The results will be available once the doctor has reviewed the video, often the same day.

Electrocardiogram *(ECG or EKG)*

What is an ECG?

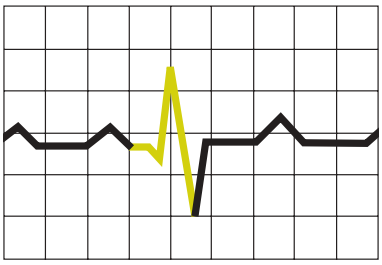
An ECG is a quick, painless test that measures the electrical activity of the heart. Every time the heart beats, it produces a tiny amount of electricity. Electrodes (sticky patches with snaps) applied to your child's body detect this electrical activity. The information is sent from the electrodes to the ECG machine through wires called leads (pronounced "leeds"). No electricity goes from the machine to your child.

The information is recorded continuously for up to several minutes and is printed out on a long strip of paper.

The recording provides information about:

- how quickly the heart is beating (heart rate),
- whether the heartbeat is regular (rhythm),
- whether the electrical activity occurs in a normal pattern,
- whether the heart muscle is a normal size.

The type of ECG depends on the number of leads used to collect the information. A larger number of leads mean that more information can be collected. The most common type of ECG for a child with a heart condition is a 12-lead ECG. There are also 3-lead and 4-lead ECGs. In addition, ECGs are used for Holter monitoring (see page 15-11) and stress testing (see page 15-7).



What will happen during the test?

An ECG technician will apply electrodes to specific places on your child's upper body and legs. If your child is a small baby or toddler, you will be asked to remove all of your child's clothing except for the diaper, panties, or shorts. If your child is older, you can help or ask your child to remove clothing. Gowns are usually provided to older children to protect their modesty.

Your child will need to lie still for a few breaths while the ECG is being done. If the child moves around too much, the ECG may need to be repeated. When the ECG is finished, the electrodes can be removed.

What can we do to prepare our child?

Reassure your child that the test will not hurt. Younger children may be worried that removing the stickers will be painful. A play activity involving *removable* stickers may reduce the child's anxiety. Let your child apply stickers and then remove them from a doll or action figure to show your child how easy it is.

When will the results be available?

Your doctor may discuss the results of the test with you before the end of your clinic visit.

Exercise echocardiogram

What is an exercise echocardiogram?

An exercise echo is similar to a regular echo (see *Echocardiogram*, page 15-4), except that it is done while your child exercises on a reclining bike. It can only be done on children who are old enough to ride an exercise bike.

This test provides your child's doctor with information about:

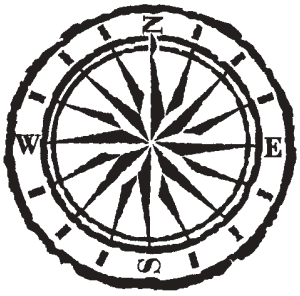
- whether the heart rhythm and electrical activity change with exercise,
- whether the heart gets enough oxygen at rest and during exercise,
- whether the heart muscle is in good condition,
- how hard the heart can work before symptoms develop,
- whether your child experiences symptoms such as tiredness or chest pain during exercise,
- how quickly the heart recovers after exercise.

The test takes about an hour to complete.

What will happen during the test?

Your child's ECG, blood pressure, and echo will be recorded at rest and while your child pedals a stationary bicycle.

The doctor and ECG technician will be in the room with the child as the test is performed. Your child will be carefully monitored and his or her responses closely watched. The test will be stopped if your child becomes too tired or has any symptoms such as chest pain.



What can we do to prepare our child?

You will usually be given advance notice of this test, as your child will need to wear the right clothing and shoes for exercising. Your child should not eat a large meal within two hours before the test. Ask the doctor or clinic staff whether your child should be given his or her regular medications before the test.

Your child's chest area should be free from any lotion, oil, or powder.

Encourage your child to participate in the test by following instructions and by telling the doctor or technician if there are any problems during the test.

When will the results be available?

The full results of this test may not be available on the same day but the doctor will discuss any events or concerns with you when the test is done.

Exercise test *(stress test)*

What is an exercise test?

An exercise test is similar to an ECG (see *Electrocardiogram*, page 15-5) but it is performed while the child walks on a treadmill. It shows what happens to the heart's rate and rhythm when the heart is stressed by exercise. As the body works harder during the test, it requires more oxygen, so the heart has to pump more blood. Exercise tests can be done only on those children who are able to walk well on their own.

The test can show:

- whether the blood supply is reduced in the arteries that supply the heart,
- what type and level of exercise is okay for your child.

The test may take up to 20 minutes to complete, and an ECG is recorded continuously throughout the test.

What will happen during the test?

Electrodes will be applied to your child's chest. An ECG will be performed and your child's blood pressure will be measured before the exercise test. Your child will start by walking slowly on a treadmill set at a flat angle. The speed and angle of the treadmill will be increased slowly until your child is at his or her maximum exercise effort, walking uphill as fast as is comfortable for your child. The doctor and ECG technician will be in the room with your child as the test is done. Your child will be carefully monitored and his or her responses closely watched. The test can be stopped at any time if your child becomes too tired or has any symptoms such as chest pain or shortness of breath.

What can we do to prepare our child?

You will usually be given advance notice of this test, as your child will need to wear the right clothing and shoes for running. Your child should not eat a large meal within two hours before the test.

When will the results be available?

The full results of this test may not be available on the same day, but the doctor will discuss any concerns with you when the test is over.

Heart catheterization

What is a heart catheterization?

Heart catheterization is a test in which a catheter (a flexible tube containing special sensors) is inserted into the heart through one of the large blood vessels.

The test gives the cardiologist detailed information about:

- the pressure in the chambers of the heart and its large blood vessels,
- the amount of oxygen the blood carries to and from the heart,
- the amount of blood pumped into the body with each beat.

The test is done under sedation or a general anaesthetic, and takes two to three hours to complete.

What will happen during the test?

Most children having heart catheterization are admitted to the hospital for the day. Your child will go into the hospital the morning of the test and may be allowed to leave that evening, or may need to stay overnight in the hospital so his or her condition can be monitored.

Your child will not be allowed to have anything to eat or drink for several hours before the test. The number of hours depends on your child's age. Keeping your child's stomach completely empty helps prevent vomiting during or after the procedure. It is important not to give your child a drink or snack, as even a small amount of food or drink vomited can enter the lungs and cause pneumonia.

If your child is on any medications, check with your doctor or hospital staff about whether to give the medication on the morning of the test. If the medication is to be given, it should be taken at least 3 hours before the test. If your child has any allergies to medications, be sure to tell the hospital staff.

If your child is taking any medication to prevent blood clots, such as Aspirin™ (ASA) or warfarin, your child must stop taking the medication before the procedure. The cardiology clinic nurse will tell you when to stop these medications. If this is not part of the instructions you were given, call the clinic nurse for specific information.

The catheterization will be done in a small operating room, usually in the x-ray department. An IV line will be put into a vein in your child's hand or foot. An anaesthetist will give your child a sedative or anaesthetic through the IV. This will help your child relax or sleep during the procedure. The anaesthetist will talk to you about what type of sedation or anaesthetic will be used for your child's anaesthetic.

When your child is sedated, the site where the catheter is inserted will be cleaned and a local anaesthetic will be injected to numb the area. The groin (the crease at the top of the leg) is the usual site, although other sites are sometimes used.

When the area is numb, the cardiologist will insert a needle into a large artery or vein. A guide wire will be threaded through the needle and then the needle will be removed, leaving the guide wire in place. A catheter (flexible tube) will then be placed over the guide wire. The cardiologist will carefully guide the catheter through an artery/vein into position in the heart. The movement of the catheter is monitored on an x-ray screen.

Once the catheter is in place, the cardiologist will do specific tests and measurements to learn how the heart and blood vessels are working. After the tests, the catheter will be removed. The small wound will be covered with a bandaid. Stitches are usually not needed.

Your child's heart will work normally during the test. Blood pressure, ECG, and oxygen saturation will be monitored continuously during and after the test.

With the help of an anaesthetic or sedative, most children sleep comfortably through the procedure and do not feel anything. Some children may feel a "sting" when the freezing is injected. Your child may feel pressure as the catheter goes in, but will not feel the catheter moving in the blood vessel. Some children feel a warm flush for a few seconds if contrast solution is injected.

HEART CATHETERIZATION - CONTINUED

Your child will go to the recovery room for about an hour before returning to the daycare or ambulatory unit. Once awake, babies can have clear fluids such as sugar water, and older children can have a Popsicle™ or apple juice. As long as clear fluids do not cause an upset stomach, your child can then eat a light meal.

After at least four to six hours in the recovery room, most children can go home. Your child will probably feel sleepy after the test and will need to lie quietly in bed for the rest of the day. Most children can follow the normal routines the next day.

What can we do to prepare our child?

Tell the staff about any allergies or reactions that your child has to food or other substances.

Babies and toddlers may be more relaxed if they have a special stuffed animal, blanket, toy, or pacifier with them for the test. If your child is older and is going to be sedated (sleepy) rather than having a general anaesthetic, he or she may want to listen to some favourite music during and after the test.

When to tell your child about the test depends on his or her age. You can tell your toddler the night before or the morning of the test. Older children can be told further in advance of the test so that they can ask questions, which you should answer honestly.

Let your child know that you will not be able to be in the room during the test, but that he or she will be sleepy or asleep during this time. Reassure your child that you will be there when the test is finished.

What happens after the test?

Wait 24 hours before giving your child a tub bath. You can sponge bath your child (wash him or her using a damp sponge or cloth) as soon as you wish.

You may remove the bandaid 24 hours after the test. The groin may have a bruise and feel sore for a day or two.

If you are from out of town, plan to stay in the area the night after the heart catheterization.

Are there any risks or complications?

A heart catheterization is done by skilled professionals who handle the child and equipment with great care. Damage to the heart during a catheterization is rare. However, there are risks with this test. You, as the parent or guardian, must sign an informed consent. This legal document states that the cardiologist has explained the reasons for doing the test, and that you understand the risks and benefits. Ask questions and discuss your concerns with your cardiologist.

The possible risks of a heart catheterization include:

1. An allergic reaction to the contrast solution or sedation during the test.
2. Irregularities in heart rhythm during the test.
3. Blood clots may form during or after the test (if the leg where the catheter was inserted swells, looks paler feels cooler than the other, this may mean that a clot has formed).
4. A small amount of bleeding from the catheter insertion site in the groin. If this happens:
   - place a piece of gauze or cotton over the site and press down firmly for 10 minutes,
   - when the bleeding stops, cover with a bandied,
   - if the bleeding continues, press firmly for another 10 minutes,
   - keep pressing until the bleeding stops,
   - remove the bandied 24 hours after the bleeding has stopped.
5. Swelling or redness at the insertion site, and fever, which indicate that there is an infection.

Call your cardiologist or clinic nurse if you have any concerns.

Special procedures during heart catheterization

Your cardiologist will talk to you briefly in the daycare or ambulatory unit when the procedure is over to tell you how your child is doing. After the cardiologists and surgeons have studied the test results, your doctor will contact you to discuss findings and possible treatments.

SPECIAL PROCEDURES DURING HEART CATHETERIZATION

Other procedures are sometimes done during a heart catheterization. Your cardiologist will discuss any special procedures with you first.

Procedure	Description
An **angiogram**	the injection of a special liquid called a contrast medium through the catheter into the heart. The blood vessels, major arteries, chambers, and valves of the heart will then show up on x-ray pictures. The contrast solution passes out of the body in the urine within 24 hours. For more information about angiograms, ask the clinic nurse.
Balloon dilatation	(also called angioplasty or valvuloplasty) is done if the heart's valves or blood vessels need to be enlarged to allow more blood to pass through them. A special catheter with an inflatable balloon at the end is passed to the part of the heart that needs to be enlarged. The balloon is inflated to stretch the tissue. After these procedures, children may need to stay in hospital overnight so they can be watched carefully.
An **atrial septostomy**	done to enlarge the opening between the atria (two top chambers of the heart). The catheter is passed from the right atrium, through an opening, into the left atrium. The catheter has a small balloon, which increases the opening while the catheter is pulled back between the two atria.
A **stent**	inserted if a blood vessel is too narrow to allow enough blood into the heart and lungs. A small tube called a stent is placed into the narrow part of the vessel by the catheter as it moves through the narrowed area. The stent holds the blood vessel open so that blood can flow through the area more freely.
A **coil**	inserted if too much blood is flowing in one direction, usually because of extra blood vessels in a particular area. A coil is inserted in the same way as a stent, but instead of opening the blood vessel, it blocks the blood flow.
Atrial septal closure device	an atrial septal defect can sometimes be closed by a device during a heart catheterization procedure instead of during an operation.
A **biopsy**	can be done to take a small sample of tissue of the heart or blood vessel. The tissue is then examined under a microscope to see if there is damage to the heart muscle cells or small blood vessels in the heart.

Holter monitoring

What is Holter monitoring?

Holter monitoring is using a portable ECG about the size of a pager (see *Electrocardiogram*, page 15-5) that provides information on how the heart works over a 24-hour period. A 5-lead ECG recorder called a Holter monitor is worn for a whole day of normal activity. The purpose of the test is to provide your doctor with information about whether the heart rate and rhythm changes naturally (with nothing to trigger the change) or in response to different activities such as eating, playing, exercising, sleeping, or in stressful situations.

Holter monitoring is sometimes referred to as 24-hour continuous ECG monitoring, ambulatory electrocardiography, ambulatory ECG, or ambulatory EKG. Many types of recording devices besides the Holter monitor are now available for this test. Some devices record continuously for 24 to 48 hours, and some make brief, intermittent recordings over weeks or even months.

What will happen during the test?

ECG electrodes with leads will be securely attached to your child's chest. The recorder, which is about the size of a pager, is worn either in a backpack or on a special belt around the waist. The recorder must not get wet, so your child will not be able to bathe or swim during the test.

Your child should be as active as usual while wearing the Holter. You will be asked to keep a record of activities and symptoms in a diary to help link any changes in rate or rhythm with different events during the day.

The Holter may be removed easily after the test period by peeling the stickers from your child's chest. The monitor and diary must be returned to the clinic as soon as possible after the 24-hour test period.

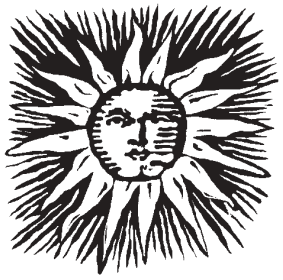
What can we do to prepare our child?

Older children may be reluctant to go to school or participate in regular activities while wearing the monitor. You can encourage your child by describing the monitor as "similar to a pager", reassuring him or her that loose clothing will hide both the wires and the monitor, and encouraging your child to keep the diary in a pocket.

Some children who have infrequent arrhythmias (irregular heartbeats) may be given an event recorder. This small device can record heart rate and rhythm during an event at home. You or your child will be shown how to use the event recorder before being sent home with it.

When will the results be available?

The results of this test may take several days.



Lung Scan

What is a lung scan?

A lung scan is a nuclear medicine scan, which is a little like an x-ray. It creates a picture of the size, shape and position of the lungs to see how well they are working. It also checks on the supply of blood and oxygen to the lungs. A nuclear medicine scan shows more than an x-ray, because the picture on the screen shows the lungs moving and helps to see how well they are working.

The radioactive material gives off rays as it travels in the blood. A special camera records the rays as they move through the body and a computer creates a picture.

What will happen during the test?

The test is done by a technologist in the Nuclear Medicine Department. Your child will be put on a special table, and will be held safely by Velcro straps. It is important for your child to hold still during the test. The test is just like having a picture taken and does not hurt.

There are two parts to this test.

Part 1: Your child breathes a small amount of radioactive material through a mask, like an oxygen mask. Some children find it a little difficult to draw a breath through the air mask, so oxygen is available to help them. Your child can either sit up or lie down for this scan; it takes about 5-10 minutes.

Part 2: Your child will have an intravenous injection of a small amount of radioactive material. The technologist then positions the special gamma camera over or under your child. This part takes about 30 minutes.

What can we do to prepare our child?

No special preparation is needed. Come ready to stay and help your child lie still. A good plan is to keep babies and toddlers awake before the scan so that they are tired. Bring a bottle of juice, milk or formula to help your child relax into sleep. Some children like to hold a special toy or blanket, or listen to music or a story.

Most children manage the test well if they know what to expect. Please explain to your child what will happen, and describe what he or she will feel.

What are the side effects?

The small amount of radioactive material given to your child should not cause any concerns. Just to be doubly safe, we recommend that the 6-24 hours after the test you (and anyone else caring for your child) take the following steps:

- wear disposable, waterproof gloves when handling your child's urine (includes diaper changes),
- use disposable, waterproof gloves to change sheets or clothing which have urine on them and then put clothing into the regular laundry,
- flush the toilet immediately after your child uses it,
- if you are pregnant, ask someone else to do most of the childcare for the next 6-24 hours,
- at home, place diapers in the outside garbage; in the hospital, ask your nurse or caregiver where to dispose of diapers,
- if you have any questions, please ask your child's nurse or the nuclear medicine technologist.

When will the results be available?

The nuclear medicine doctor will read the pictures and write a report to your child's cardiologist. The results may take several days.

Magnetic resonance imaging *(MRI)*

What is an MRI?

An MRI of the heart provides very detailed images of the anatomy and function of the heart and blood vessels. It is so detailed that it can show the different tissues that make up the heart, including the heart muscle (myocardium), the tissue covering the heart (the pericardium), and the blood inside the heart.

An MRI uses a combination of magnetic and radio waves to produce signals that a computer forms into images. There are no known side effects.

What will happen during the test?

The MRI machine is large and shaped like a tunnel. Your child will lie on a narrow table that slides in and out of the tunnel. For safety, your child will likely be strapped to the table. The image can be blurred if the child moves around too much, so very young children may be sedated or given a general anaesthetic.

Children who need sedation or a general anaesthetic are not allowed any food or drink for several hours before the test. If the stomach is completely empty, this helps prevent your child from vomiting during or after the procedure. It is important not to give your child a drink or snack, as even a small amount of food or drink if vomited can enter the lungs and cause pneumonia.

If your child is on any medications, check with your doctor or hospital staff about whether to give the medication on the morning of the test. If the medication is to be given, it should be taken at least 3 hours before the test. If your child has any allergies to medications, be sure to inform the hospital staff.

Sleeping medicine will usually be given through an intravenous (IV) line. A local anaesthetic called EMLA will be placed on the skin on the back of your child's hand to numb the skin. The IV will be inserted through the numbed skin. Your child will recover from the anaesthetic in a few hours, and will have to stay in the hospital or clinic until he or she is fully awake. Your child may have a sore throat for a day or two.

An IV may also be necessary for injecting a "contrast medium". A contrast medium is a material that moves through the blood to a part of the body, highlighting it on the image that is created.

Your child will not feel the magnetic waves. The machine is very noisy, making frequent knocking and humming noises. Children who are not sedated are given earplugs, and may be able to listen to music.

A single test takes 45-90 minutes, depending on the type of machine.

Once awake, babies can have clear fluids such as sugar water, and older children can have a Popsicle™ or apple juice. As long as clear fluids do not cause an upset stomach, your child can then eat a light meal.

What can we do to prepare our child?

Your child may wear regular clothing with no metal fasteners or decorations, or a hospital gown. All metal jewellery must be removed. Let the technicians know if your child has implanted devices such as a pacemaker or stents.

The machine looks frightening to some children. You can prepare your child by reassuring him or her that the test will not hurt—that the machine is a big camera that makes a lot of noise, and that you will be in the room the whole time.

Your child may bring a toy, blanket, or other soothing item for the test as long as it does not have any metal pieces.

When will the results be available?

The radiologist will write a report to the cardiologist, and the results may take several days.

Oxygen saturation test *("sats" or oximetry)*

What is an oxygen saturation test?

The oxygen saturation test is a painless test that checks the amount of oxygen in your child's blood. A probe shines a special type of red light through a small body part such as a finger, toe, or ear lobe. The probe senses any changes in the light and uses this information to calculate the amount of oxygen in the blood.

What will happen during the test?

A small sensor will be wrapped around either a toe or a finger and held in place by special non-sticky tape. The sensor will be attached to a small hand-held machine called a pulse oximeter. The test is very quick but your child needs to be still for an accurate reading. This can take a few minutes with younger children and babies.

This test may also be done to check the oxygen saturation level while your child is exercising, or to monitor oxygen saturation continuously while your child is in hospital.

The probe generates heat, so the probe site will be changed regularly when used for long periods.

When will the results be ready?

The results are available immediately.

Sestamibi *(mibi)*

What is a mibi scan?

A mibi (pronounced "mib-ee") is a special type of scan used to produce images of the heart. A small dose of radioactive material is injected into a vein, and this material moves through the blood to the heart. A special camera takes readings and a computer forms them into moving pictures of the heart while it is working.

What will happen during the test?

A local anaesthetic cream called EMLA will be applied to the skin about an hour before the test and the EMLA will be held in place with a clear bandaid. The local anaesthetic takes an hour to numb the skin. EMLA is very helpful in relieving pain but some children may still get upset. Once the skin is numb, an intravenous (IV) line will be inserted in the back of your child's hand.

A scan will be performed while your child is resting. This takes about 15 minutes. Your child will then have an exercise test on a treadmill (see *Exercise Test*, page 15-7). During the exercise test, a small amount of radioactive material will be injected into the IV, and a scan will be done. The scan will be repeated several times, and each scan takes about 15 minutes. The test, which is done by an experienced nuclear medicine technologist, takes several hours to complete.

What can we do to prepare our child?

Your child should have nothing to eat for a few hours before the test. You may stay with your child during the whole procedure and you may read a story or play a special tape. After the exercise test, your child may eat. Several more scans may be done after the exercise test. The whole test may be repeated without the exercise portion. This is termed a "resting mibi scan".

When will the results be available?

The radiologist will write a report to the cardiologist. It may take several days before the cardiologist can give you the results.

Tilt table test

What is the tilt table test?

The tilt table test may be performed if your child has fainting attacks called syncope (pronounced "sin-cope-ee"). There are many reasons why your child may have syncope. This test will help determine the specific cause of these spells and how best to manage them.

The tilt table test checks to see whether your child's syncope is a relatively harmless response to a change in position, such as standing up suddenly after lying down. In this condition, the child's blood pressure drops when he or she changes position, and the brain does not get enough oxygen for a very short period. As soon as the child lies down, blood pressure returns to normal, the brain gets enough oxygen, and the child wakes up. If the tilt test is positive, there are medications available to help prevent the syncope attacks.

What will happen during the test

Your child will not be allowed to eat a large meal in the two hours before the test. He or she will lie on a padded tilt table and relax for about 20 minutes. Safety straps will be placed across the chest and legs to hold your child in place. During this time, your child's blood pressure and ECG will be recorded.

The technician will slowly move the tilt table to the upright position. Your child will be asked not to move around or tense leg muscles during this time. The cardiologist and ECG technician will monitor your child for any changes in blood pressure or ECG. The table will then be returned to the horizontal position and your child will be allowed to rest.

The entire test may take up to an hour. If your child faints or experiences any symptoms of fainting, the test is considered "positive".

What can we do to prepare our child?

Reassure your child that the test will not hurt, and that you will be there throughout the test. If your child seems very anxious about the test, you can demonstrate the movement of the tilt table using a doll or action figure and a book or small board.

When will the results be available?

The results may be available shortly after completion of the test.

Trans-esophageal echocardiogram *(TEE)*

What is a trans-esophageal cardiogram (TEE)?

TEE uses the same technology as an echo to provide very clear images of the heart from behind the heart (see *Echocardiogram*, page 15-4). Instead of collecting the images by moving a transducer over the child's chest, a special tube-shaped transducer is inserted into the esophagus. The esophagus is the tube that lies right behind the heart and connects the mouth to the stomach. The cardiologist will use the transducer to record images of the heart on a videocassette.

A TEE helps determine whether the following are happening:

- there are any abnormalities in the heart muscle, valves, or major blood vessels to and from the heart,
- the heart muscle and valves are working properly,
- there are any blood clots or infection in the heart,

A TEE also provides greater detail than a trans-thoracic echo on vegetations within the heart such as seen in bacterial endocarditis. This test may also be used during surgery when it is not possible to do a trans-thoracic echo (see *Echocardiogram*, page 15-4).

For this test, your child will be given a general anaesthetic. To avoid giving your child anaesthetics too often, a TEE may be done at the same time as another planned procedure that uses a general anaesthetic.

What will happen during the test?

Your child will not be allowed anything to eat or drink for several hours before the procedure. Keeping your child's stomach completely empty helps prevent your child from vomiting during or after the procedure. It is important not to give your child a drink or snack, as even a small amount of food or drink if vomited can enter your child's lungs and cause pneumonia.

If your child is on any medications, check with your doctor or hospital staff about whether to give the medication on the morning of the test. If the medication is to be given, it should be given at least 3 hours before the test. If your child has any allergies to medications, be sure to tell the hospital staff.

An intravenous (IV) line will be inserted for the general anaesthetic. A local anaesthetic called EMLA will be placed on the skin on the back of your child's hand to numb the skin, and the IV will be inserted through the numbed skin.

Once your child is under general anaesthetic, the cardiologist, with help from the echo technician, will pass a small tube-shaped transducer into your child's esophagus and record images of the heart. Your child will recover from the anaesthetic in a few hours, and will have to stay in the hospital or clinic until fully awake. Once awake, babies can have fluids such as sugar water, and older children can have a Popsicle™ or apple juice. As long as clear fluids do not cause an upset stomach, your child can then eat a light meal.

Your child may have a sore throat for a day or two.

What can we do to prepare our child?

Reassure your child that he or she will be asleep during the procedure and will not feel anything. Your child may bring a toy, blanket, or other soothing item for the test.

When will the results be available?

The results of the test will be discussed with you once the doctor has reviewed the video.

NOTES

NOTES