Biventricular Pacemaker/ Cardio Resynchronisation Therapy (CRT) Information

Why do I need to have a CRT device?
In the “normal” heart, both the right and left ventricles pump blood out in unison in response to electrical signals from the heart. Up to half of patients with heart failure also have electrical (conduction) abnormalities in their hearts. This electrical abnormality may result in the two ventricles (lower chambers of the heart) not contracting at the same time. It can contribute to worsening heart failure symptoms such as breathlessness, oedema (swelling), dizziness and lack of energy.

What is a CRT device?
The CRT pacemaker is used to treat the delay in the heart ventricle contractions that occur in some people with heart failure. In approximately 2/3 of those who receive a CRT device benefit by feeling less breathless, have more energy and notice general improvements in their symptoms. The CRT device has 2 main components;

1. A lithium battery and electronic circuitry sealed in a metal case, implanted under your skin.
2. Special thin insulated wires (called leads) run from the metal case to the heart.

CRT Device

http://my.clevelandclinic.org/heart/services/tests/procedures/biventricular_pm.aspx
The CRT device helps the heart beat in a more coordinated way, it has 2 or 3 leads that are positioned in the heart (depending on your individual circumstances): -

- Right upper chamber (atrium)
- Right lower chamber (ventricle)
- Left lower chamber (ventricle) -via a vein on the outside

How does the CRT device work?

The CRT device works in the same way as a traditional pacemaker, it sends an electrical signal from a pulse generator through the leads to your heart, which makes the heart beat. The CRT pacemaker allows the heart to beat in a more coordinated way (left and right ventricles working together), which in turn assists the pumping function of the heart.

The CRT device continuously monitors your heart rhythm and delivers electrical signals (as programmed by your doctor) to pace your heart during a slow rhythm and coordinate your heart’s contraction (pump).

When your heart rate drops below the set rate (programmed by your doctor), the device generates (fires) small electrical impulses that pass through the leads to the heart muscle. These impulses make the lower chambers (ventricles) of the heart muscle contract, causing the right and left ventricles to pump together. The end result is improved cardiac function.

It does not replace the need to take your medications and continue to maintain a healthy lifestyle and monitor your symptoms, as before.

Risks:

Common risks and complications:

- Bruising at the CRT site
- Swelling at the CRT site
- Displacement of the CRT lead
- Significant bruising
- Infection of the CRT site
- Battery or lead failure
- Bleeding from the wound
- Damage to adjacent structures (tendons, muscles, nerves)
- Punctured lung (pneumothorax)
- Blood clot in the vein (deep vein thrombosis)
- Blood clot in the lung (pulmonary embolism)
- Heart attack
- Stroke
- Kidney failure
- Abnormal heart rhythms (arrhythmias)
- Death

This list appears very long but the risks associated with this procedure are very low. If you have any concerns please talk to your Cardiologist.
Pre Procedure

Medications: -

• If you have diabetes and take medication for this you will be advised what medications you need to stop before the procedure.
• If you are on diuretics e.g. frusemide or bumetanide you will be advised if you should omit them before this procedure.
• If you are on warfarin or any other anti-coagulants call (08) 9346 4295 for advice regarding this.
• Take all your other medications unless advised differently.

You will be sent a letter outlining where and when you should attend the hospital for your CRT insertion, if you are having this as a planned procedure. You will be invited to an appointment with a heart failure nurse approximately 1 week before the procedure. If you are unable to attend then a consultation will be offered via the telephone. You will also need blood tests and an ECG before the procedure.

Procedure

On the day of the procedure you will be seen by a doctor. They will explain the procedure to you and then they will ask you to sign a consent form. A cannula will be inserted into your arm, to allow the staff to give you medication into your vein. The CRT site may be shaved if required.

The procedure is performed in the Cardiac Electrophysiology Lab on the 4th floor of G block. It will involve local anaesthetic at the site and sedation and a strong painkiller given into your vein.

You will be lying flat for the procedure. The site will be cleaned with antiseptic solution and you will be covered in sterile drapes, to reduce the risk of infection. It is very important that you do not touch the site after that, as we want to keep it as clean as possible. Once the site is numb, a small incision in your skin will be made and then a pocket will be created under your skin for the device.

The doctor will then access a vein, through this they will insert 2 to 3 leads into the veins leading to your heart. Once they are satisfied that the leads are in a good position they will be connected to the device and it will be placed in the pocket made earlier. Stitches, underneath the skin, will close the wound. The stitches will dissolve and won’t need to be removed. The wound will either have STERI-STRIPS and a dressing placed over the wound or DERMABOND (skin glue), which does not require a dressing. The procedure will take approximately 1 – 3 hours.

It depends on your individual shape how prominent the CRT device will be, generally there will be a slight bulge.

On the very rare occasion due to unforeseen circumstances, your procedure may be cancelled. Every step is taken to try and ensure this does not happen but not all circumstances can be planned for, we apologise if this happens.
Post Procedure
Following your procedure you will be transferred to a cardiac ward. A chest x-ray and ECG will be done, once these results have been checked, you will be allowed to eat and drink. You will be put on a cardiac monitor for a minimum of 4 hours following your procedure. You will stay overnight at SCGH but after the 4 hours you may be moved to a different ward until your discharge from SCGH the next morning (if this is a planned procedure).

If you have STERI-STRIPS on the wound the dressing covering them will be taken off by your nurse on the day after your procedure then sprayed with a transparent dressing. If you have DERMABOND you will not have a dressing covering the wound.

The morning following your procedure a cardiac scientist will come and check the settings on your CRT device. If the check is satisfactory you will be given a follow up appointment in the device clinic in approximately 6 weeks from your procedure. A temporary ID card from the company detailing your device information will be provided for you to carry. A more permanent version will be sent out after a few weeks.

Wound Management
If the wound looks infected, red, warm to the touch, swollen, increased bruising or you have a temperature go to your nearest emergency department OR call your Cardiologist OR call your heart failure service (Mon – Fri 8am – 4pm) on 9346 4822. Ensure you act straight away. There is a risk that if a skin infection worsens it can extend down to the lead, which may result in the leads having to be removed.

If you have STERI-STRIPS, they should remain dry for 5 days. You need to cover the wound in the shower to avoid getting it wet; you should be given a supply of wound covers to wear in the shower. Please use a clean towel to carefully pat the area dry. These STERI-STRIPS should start to lift after 7 – 10 days, at which time you can remove them gently under the shower. If they do not lift you may remove them after 2 weeks. Do not soak in a bath until the wound is COMPLETELY healed. Do not pick, rub or apply ointment to the area. With DERMABOND you may shower without a cover on, as long as you do not soak the wound. The DERMABOND adhesive will peel off naturally in 5 – 10 days.

Movement
Avoid excessive arm movements on the side that the CRT device has been inserted e.g. lifting your arm above shoulder height or behind your body for 2 weeks. Do move your affected arm gently to prevent shoulder stiffness.

Avoid heavy lifting for 6 weeks (weights of more than 5-6kg) with the affected arm.

Driving
Driving restrictions are a legal requirement and can impact on your insurance cover. You need to discuss with the Cardiologist implanting the CRT about your driving restrictions.

If you have a commercial vehicle driver’s licence, you need to tell your Cardiologist as your heart condition may preclude you driving.
Returning to Work
This will depend on your job (manual vs. desk job). You will need to discuss this with your doctor; it is usually between 1 - 4 weeks.

MedicAlert
We advise you to consider having a MedicAlert bracelet or necklace once you have a CRT device. It allows others to be aware of your medical conditions if you are unable to advise them of this yourself. Once you have had your CRT device inserted please take the form to your GP for completion of your medical conditions.

Diaphragmatic Pacing
With a CRT device the left ventricular lead is positioned adjacent to a nerve (phrenic) which is positioned over the heart’s left ventricle. In some circumstances the pacemaker can trigger an involuntary contraction of the diaphragm causing a “hiccup” reflex. It often occurs in a certain position if this happens, move into a different position. It is very important to inform your treating Cardiologist, Heart Failure Service (9346 4822) or the Cardiology Pacing Clinic (9346 2677).

CRT check
Your CRT device will be checked the morning after it was inserted and then you will be given an appointment for a check approximately 6 weeks after that. Thereafter it will be checked 6 monthly, either in clinic or with a remote monitor.

Battery Life
Each time your CRT device is checked the cardiac scientist will assess the battery life; we get plenty of warning before the battery needs changing. How long the battery lasts varies with each individual.

Replacement of CRT
Once the battery is noted to be running low you will be given advice when it needs to be changed, it is usually a day procedure. Your Cardiologist will decide at the time of the procedure whether you will need new leads as well as a new device. Your old device will be removed and replaced with a new one, usually through the same scar as before. You will be given advice on management of the wound following this.

Precautions
Avoid rough physical contact that includes jarring or falling, particularly contact sports. Discuss with your doctor when you can re-commence swimming, golf or other sports.

Ensure you tell all personnel caring for you that you have a CRT device, including doctors, dentists and paramedics.
Electromagnetic Interference (EMI)
Tools or equipment that use electricity and magnets produce a field of electromagnetic energy around themselves. These fields are usually small and not very strong so do not affect your CRT.

EMI can stop the CRT from sensing your heart’s rhythm. This could stop the CRT from sending a pacing pulse. Most household equipment will not affect your CRT. Your device is mainly susceptible to strong electromagnetic interference.

Here is a guide for some every day issues:

**Safe:** - Radios, CD players, cordless telephones for use within the home, computers, ovens, microwave ovens, electrical blankets, washers, dryers, pagers, camcorder, remote controls for TV, garage doors, Wi-Fi, toasters, blenders, electric can openers, food processors, DVD players, video games, treadmills and vacuum cleaners.

**Maintain 6 inches (15cms) from your CRT:** - Mobile phones, devices transmitting Bluetooth, plug in shavers with an electric cord, electric toothbrushes, remote keyless entry system and magnetic wands used in bingo.

**Maintain 12 inches (30cms):** - Battery powered cordless power tools, corded drills and power tools, lawn mowers, leaf blowers, remote controls with antennas, shop tools (drills, table saws, etc), slot machines, stereo speakers, magnetic iPad casing and high powered cordless phones that can transmit 8 km.

**Maintain 24 inches (60cms):** - CB radio antenna, induction cook tops and a running motor of a vehicle (the alternator).

**Items that should not be used:** - Body fat measuring scales, jackhammers, stun guns, arc welders (discuss with your Cardiologist if this is something you need to do), chain saws, circulation booster, magnetic mattresses, chairs and pillows.

**Theft Detector Systems (found in department stores and library doorways)**
Walk through at a normal pace. Do not linger or lean on the system. If you find yourself standing between them, do not worry but just move away.

**Airport and Courthouse Security Systems**
Most people with a CRT-D travel freely unless they are restricted by their underlying medical condition. At the airport or courthouse, show your CRT-D identification card and tell them you have a device. They should either hand search you or use a handheld wand. They should not hold it over your device for more than a few seconds.

**Dental and Medical Procedures**
It is important before any medical procedure you discuss with your doctor, dentist or technician that you have a CRT because it could damage or affect your device. They may need to take precautions to make it safe for you.
Safe: - Dental procedures using drills, cleaning equipment to clean teeth and dental x-rays, diagnostic x-rays (e.g. chest x-rays), diagnostic ultrasound procedures, ECG’s, CT scans and mammograms (they need to avoid damaging it when the breast is compressed).

Precautions: - Transmitting loop for digital hearing aid, therapeutic radiation treatment for cancer (the CRT-D device will probably need to be checked pre and post treatment, depending on where the treatment is given), electrolysis and external defibrillation. The use of TENS machine will need to be assessed on an individual basis.

Not recommended: - MRI (unless you have a MRI safe CRT), diathermy or electro cautery - used during surgery, lithotripsy (break up kidney stones). Besides the MRI the doctors can organise for your device to be made inactive for the procedure and if necessary checked following this.

These are general guidelines, please discuss with your Cardiologist for your individual needs.

Where to get further information
All the companies that make CRT’s have websites, here are a few of them:

http://www.bostonscientific.com/lifebeat-online/cardiac-procedures/resynchronization-therapy.html?

http://www.medtronic.com/patients/heart-failure/device/what-is-it/

http://health.sjm.com/heart-failure-answers/treatment-options/cardiac-resynchronization-therapy/crt-p

Conclusion
Hope this leaflet has been useful. We value any feedback regarding this.

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