

Living with a pacemaker

information for patients

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Your heart rhythm is too slow or you run a huge risk of developing it and your doctor thinks you come into consideration from an implantation of a pacemaker.

Pacemakers can be life-saving, but also restore quality of life, allowing patients to return to their normal lives. You are one of the more than 10,000 people in Belgium who receive a pacemaker every year. The first successful implantations date from after 1960.

This brochure aims first and foremost at answering your questions about pacemakers and especially 'how to live with a pacemaker'. It does not replace personal contact with your doctor, but is more of a guideline for your consultation.

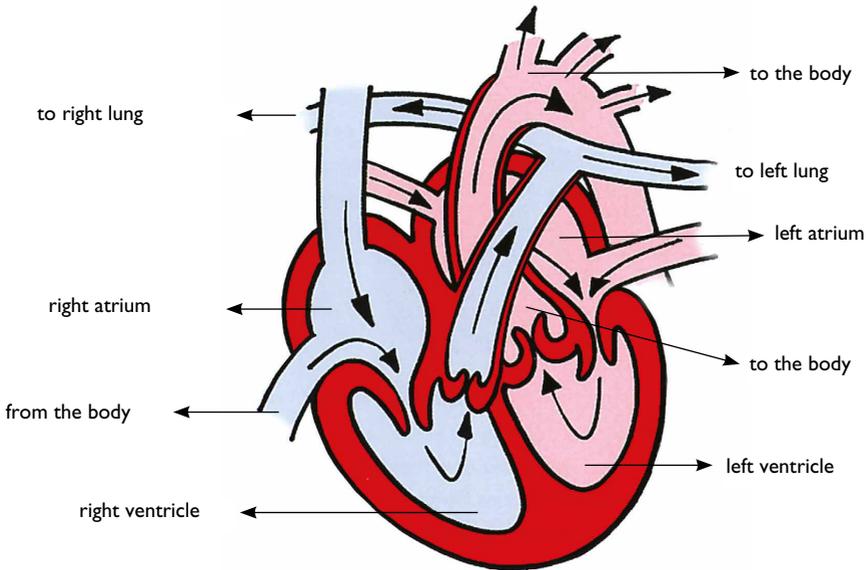
This brochure contains general information. As every person is unique, your treatment is tailored to you and may deviate slightly from the general instructions. Therefore, always follow the advice of the doctor treating you.

Be sure to ask any personal questions to your doctor and do not hesitate to speak to our staff in case of ambiguities or about your feelings and possible uncertainties. They will gladly listen to you and try to help you.

On behalf of all employees of the department of cardiovascular diseases at UZ Leuven

HOW A HEALTHY HEART WORKS

The heart is a muscle that pumps the blood through the blood vessels. It ensures the body is supplied with oxygen and nutrients at all times. Oxygen and nutrients are distributed through arteries in the body. On the way back waste products are transported from the body via the veins to the heart.



The heart is a hollow muscle, approximately the size of a clenched fist. It consists of four cavities ('chambers'). A right and left atrium at the top and a right and left ventricle at the bottom. The atriums pump the blood to the ventricles. The right ventricle pumps the blood to the lungs. The blood collects oxygen in the lungs. The left ventricle pumps the blood to the body.

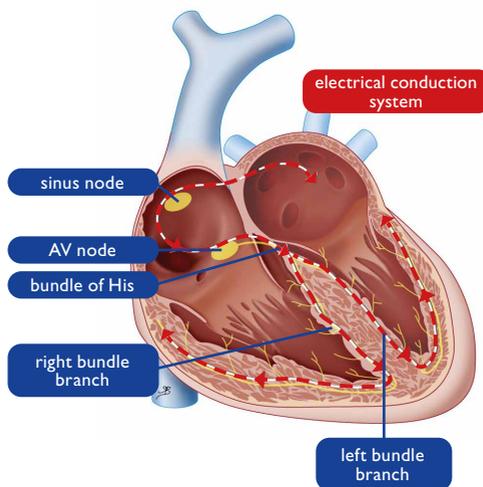
The valves between the atriums and ventricles function as doors that only open one way. The heart pumps the blood to the body about 70 times a minute, i.e. approximately 100,000 times every day.

In case of physical activity or emotional stress, the body needs more oxygen. The heart adapts to activity and stress and can raise your heartbeat to more than 100 beats per minute.

The heart has its own electrical conduction system to coordinate the speed of a pumping heart.

Every normal heartbeat starts with an electrical stimulus from the sinus node of the heart. The sinus node is located in the right atrium and is your body's natural 'pacemaker'. This electrical impulse spreads over both atriums from the sinus node and makes the atriums contract.

The electrical impulse continues over the AV node (the only electrical conduction structure between atrium and ventricle) to the chambers. In the chambers, the impulse continues through special conductive fibres. These conductive fibres ensure that each spot of the chambers is activated quickly and simultaneously.



CARDIAC ARRHYTHMIA

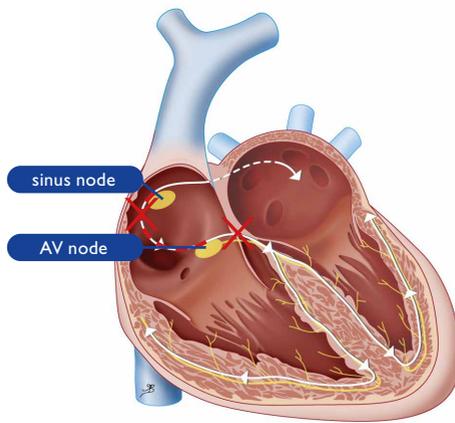
In case of cardiac arrhythmia, the heart beats either too fast or too slow. If the heartbeat is too slow (less than 60 beats per minute) we speak of bradycardia, if the heartbeat is too fast (more than 100 beats per minute) we speak of tachycardia.

BRADYCARDIA

When the heart beats too slow, various body parts receive less oxygen. This can cause fainting, fatigue, dizziness and shortness of breath and the body can no longer perform optimally. Bradycardia can have several causes.

The most common causes are:

- X Sick Sinus Syndrome:** with this disorder the sinus node (your body's 'pacemaker') is not functioning properly anymore. The sinus node emits irregular electrical impulses or emits them too slowly. Because the heart does not receive enough impulses from the sinus node, it does not contract sufficiently.
- X AV block:** with this disorder, there is a delayed or blocked conduction near the AV node (the connection between the atriums and ventricles). The conduction of electrical impulses from the sinus node via the AV node to the ventricles is partially or completely disturbed. The impulse starts from the sinus node, but is not transmitted properly to the ventricles. If the impulse from the atriums is no longer transmitted to the ventricles at all, it is referred to as a total AV block.



TACHYCARDIA

When the heart rhythm is too fast (more than 100 beats per minute), it is referred to as tachycardia. The time between heartbeats is too short to fill the ventricles with blood and causes the heart to work inefficiently. A common form of tachycardia is atrial fibrillation. This causes the atriums to start racing, while the ventricles pump quickly and irregularly. Sometimes fast atrial arrhythmia and slow heart rhythms alternate. This is referred to as tachy-brady syndrome.

BACK-UP

In case of Sick Sinus Syndrome or an AV block, an emergency rhythm ('escape rhythm') usually acts as a back-up. Lower parts of the conduction system take over the heart rhythm but they work at a lower frequency.

Cardiac arrhythmia can be treated in different ways. Your doctor will decide whether a pacemaker is necessary.

If the heart rhythms are too fast, medication or ablation can be a solution. Ablation targets and damages a small part of the heart tissue by heating or freezing to combat certain arrhythmias. Sometimes a pacemaker in combination with medication or ablation is needed. The pacemaker prevents the slow heart rhythms, while the fast arrhythmias are treated differently.

PACEMAKER SYSTEM: PACEMAKER AND LEADS

A pacemaker system consists of a pacemaker and one or more leads (also referred to as electrodes). These leads connect the pacemaker with the heart. The pacemaker itself consists of a battery and a small computer, hermetically sealed together in a metal casing about 3 by 5 cm and 0.5 cm thick.

A pacemaker takes over the task of the sinus node and/or AV node. If the heart does not give a spontaneous impulse, the pacemaker sends a small shock. This impulse causes the heart muscle to contract. In this way, the heart maintains its normal pump function and rhythm.

PACEMAKER FUNCTIONS

The pacemaker's most important functions are:

X Stimulation function

When the heart rhythm slows down too much, the pacemaker will give an electrical impulse so that the heart's pump function can proceed as normal.

X Detection function

The pacemaker 'feels' when it is needed and when it is not. Some people only need their pacemaker occasionally. The pacemaker detects itself when it needs to respond.

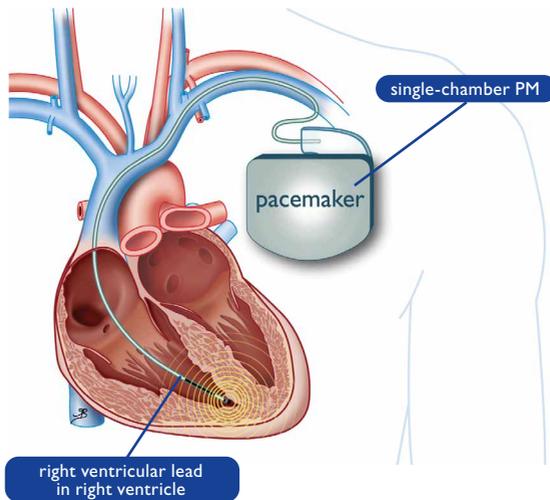
X Rate response function

Built-in technology (a movement or breathing sensor) estimates the body's activity and tries to adjust the heart rhythm accordingly. During activity, the pacemaker responds by delivering electrical impulses faster, and at rest it delivers fewer impulses.

PACEMAKER TYPES

Different types of pacemakers exist. Depending on your medical history your cardiologist will decide on a single-, dual- or triple-chamber system.

Single-chamber pacemaker



A classic single-chamber system consists of a pacemaker with one lead, which is attached in the right ventricle.

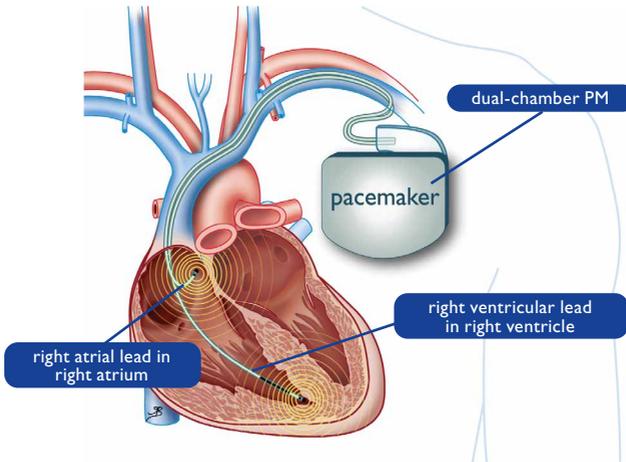
In certain circumstances a wireless pacemaker system may be implanted, whereby the device, which is very small, is implanted directly in the chamber and in other words no lead is necessary.



The pacemaker is 3 by 5 cm and 0.5 cm thick.

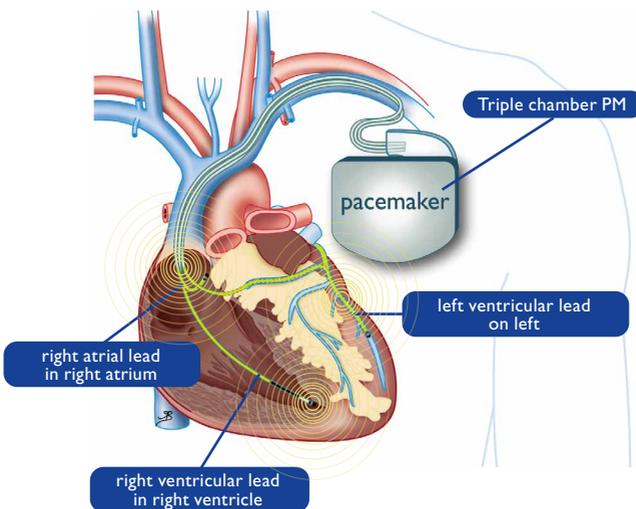
Dual-chamber pacemaker

In a dual-chamber system one lead is in the right atrium and one in the right ventricle.



Triple-chamber pacemaker

In addition to a dual-chamber system a third lead may be necessary on the left of the heart to obtain an optimum contraction of the chambers.



IMPLANTING A PACEMAKER

A pacemaker is implanted in an operating theatre under local anaesthetic (anaesthetic only where the pacemaker will be implanted, in other words no general anaesthetic).

Taking anticoagulant medication before admission

- X You may have to temporarily stop taking your anticoagulant medication before the operation. Follow your cardiologist's instructions.
- X The general rule is that you need to stop taking a non-vitamin K-antagonist (VKA) oral anticoagulant (NOAC), such as Dabigatran (Pradaxa[®]), Apixaban (Eliquis[®]), Rivaroxaban (Xarelto[®]) or Edoxaban (Lixiana[®]), at least 24 hours before the operation.
- X If you are taking a vitamin K-antagonist (VKA) such as Marcoumar[®], Sintrom[®] or Marevan[®], the treatment needs to be stopped a few days before the procedure. In joint consultation with your cardiologist you may temporarily be given subcutaneous injections with low molecular weight heparins such as Clexane[®], Fraxodi[®], Fraxiparine[®], Innohep[®] or Fragmin[®]. They are injected subcutaneously every day. The dose depends on your body weight and will be determined by your doctor. Usually the interruption of the vitamin K-antagonists is as short as possible so that injections are no longer necessary.
- X You can keep taking Asaflow[®], Cardio-aspirin[®], Plavix[®], Eflent[®] or Brillique[®].

- ✗ No food or drinks are allowed from midnight or at least six hours before the operation. Only a small sip of water is allowed to take your prescribed medication (this is the medication you were prescribed in the hospital, not your home medication).

- ✗ Before you go to the operating theatre:
 - the nurse will trim your chest and armpit. This is for hygienic reasons and to avoid infections.
 - you are given a surgical gown (you can keep your underpants, socks and pyjama bottoms on).
 - you are given an IV for medication during or after the implantation (for example antibiotics) if necessary.
 - we can, if you want, give you a sedative (a tablet). It may make you drowsy and sleepy. From this moment you remain in bed and only get out with assistance. This is why you must go to the toilet before you take this medication.

The pacemaker is usually implanted near the shoulder. The local anaesthetic you are given will start to work within five minutes. An incision of approximately 5 cm is made in the skin under the collarbone. The electrodes are guided to your heart through a vein. When the lead is in the right place against the heart muscle, the other end is connected to the pacemaker.

A pocket is made under the skin and the fatty tissue in which the pacemaker is implanted.

After making sure the pacemaker is working, the pocket is stitched up and the wound is covered with a sterile dressing.

During the procedure you will feel the doctor working on you, but you should not be in any (bad) pain. You may be given an extra local anaesthetic or a strong general painkiller if necessary.

This surgical procedure takes approximately one to two hours. After the procedure you can go straight back to your room. An hour later you are allowed to drink and eat a light meal. You should stay in bed the rest of the day. A toilet visit is possible with the help of the nurse.

Keep your arm (on the side of the pacemaker) next to your body for the first 24 hours to allow the lead to attach to the heart wall.

Sometimes the pacemaker is implanted just under the ribs and the leads on the outside of the heart. In this case the procedure is under general anaesthesia.

RISKS

Every surgical procedure involves risks. Fortunately, severe problems in case of a pacemaker implantation are small. However, complications may occur in 5 to 10 percent of patients during or after a pacemaker implantation or replacement. Life-threatening risks are rare (less than 1). The occurrence of other complications that may require new surgery depends on the type of pacemaker. Generally speaking, the risk is about 4 percent per lead placed during the implantation.

The main possible complications are:

- X Bleeding** (internally or near the wound). Internal bleeding can cause large bruises, which slowly fade away. Sometimes the wound needs to be reopened to find and treat the cause of the bleeding.
- X Pneumothorax** during the implantation. If this happens, a drain will be temporarily placed in the chest between the pulmonary pleurae to heal it.
- X Dislocation** of the leads. This will require another procedure to put the leads in the right place again.
- X Perforation of the heart wall.** This is very rare, but is possible if the tip of the electrode pierces the heart wall. There will be blood between the heart and the pericardium.
- X Thrombosis** resulting in a narrowing or occlusion of a blood vessel and swelling of the arm on the side of the implantation. Taking blood thinners for a few months usually resolves this.
- X Infections** (around the wound of the implantation or around the leads of the pacemaker). In this case the pacemaker and the leads need to be completely removed usually.
- X Defective** leads.
- X Allergic reaction** to medication used during hospitalisation. Always mention any allergies you know you have.

AFTER THE IMPLANTATION

After the implantation you remain in hospital one or two days. The day after the procedure a radiography of your lungs and heart (RX thorax) is made, followed by a check-up of the pacemaker system. This tests the function of the pacemaker system and sets the pacemaker according to the patient's individual needs.

When you are discharged from hospital, you will be given an appointment for a pacemaker check-up at UZ Leuven or you make an appointment with your own cardiologist. This is necessary approximately two months after the implantation or replacement. After that you will come for check-ups approximately every six to twelve months, depending on the life of your pacemaker and any other underlying heart problems. During this check-up you will be asked about your general health, followed by a check-up of the pacemaker battery and pacemaker function.

You need to make the appointment with your GP for the wound check-up, ten to fourteen days after the procedure, yourself.



Please let us know in good time, at least one day in advance, if you are unable to come to your hospital appointment. The telephone number can be found at the bottom of the appointment letter. You may help another patient.

Bring your medication list to each consultation, with the name of your medication, the concentration (e.g. milligram, etc.) and how much you are taking daily. This way your doctor knows which medication you are taking and he can decide if an adjustment is necessary.

WHAT YOU NEED TO KNOW ON LEAVING THE HOSPITAL

Wound and possible wound problems:

- Keep your wound and sterile dressing clean and dry to minimise the risk of infection. The sterile dressing should remain in place for 10 to 14 days.
- Once the wound has healed properly, there is no need for a dressing and you may shower or bathe again.
- It is important you check your wound yourself.



Contact your GP in case of:

- signs of infection: redness, swelling, pain, fever (more than 38°C).
- sudden discharge or blood coming from the wound.
- the edges of the wound opening.
- enlargement or swelling of the contusion around the wound.
- doubts about good wound healing.
- eruption of the pacemaker or the leads through the skin.
- fainting, dizziness or extreme fatigue.
- chest pain.

POINTS OF ATTENTION IN THE FIRST MONTH AFTER IMPLANTATION

- X Do not wear tight clothes that may cause irritation to the wound until the wound check-up at the GP.
- X Avoid extreme movements with the elbow above the shoulder for one month and do not lift heavy weights with the arm on the side of the pacemaker. In other words, avoid stretching, pulling and lifting. However, still try to move the shoulder within the pain threshold, otherwise your shoulder joint may stiffen.
 - When getting dressed, for example, make sure you first put the arm on the side of the pacemaker into the sleeve and then the other arm. You may move your forearm.
 - During this period it is best to avoid activities involving intensive arm movements or sawing movements, such as vacuuming, mopping, painting or sawing.
 - Avoid heavy physical activities or exertion. Walking or light housework are not a problem.
- X Later you may resume your normal activities. Depending on your doctor's advice, you may resume recreational sports, but build it up gradually.
- X Contact sports are not allowed. Always try to avoid shocks, hard impacts or knocks against your pacemaker.
- X Your doctor will discuss the resumption of work with you.

PACEMAKER-IDENTIFICATION CARD

When you're at home you will receive a pacemaker card by post. This says you have a pacemaker, what type of pacemaker you have and the name of the doctor and hospital. You need this card when you go to another hospital, when you go to the dentist or when you are flying. It is best to always have this card on you.

Pacemaker	
Surname name:	
°dd/mm/yyyy	
PM:	Brand Type (serial number)
Implanted	dd/mm/yyyy
Leads:	Type leads (company)
Contact:	Prof. dr. R. Willems
	UZ Leuven – Gasthuisberg Campus
	Tel. +32-16-34 42 48 fax: +32-16-34 42 40

LIVING WITH A PACEMAKER

It is important you resume your daily life, regain confidence in your own body and learn to trust what the pacemaker does. The pacemaker will support your heart rhythm when necessary and allows you to lead a normal life again. Most people therefore consider the pacemaker as a positive thing.

You will have recovered from the procedure in no time. At first the place where the pacemaker was implanted is sensitive. You will want to touch it quite often, but after a while you get used to it and you won't even think about it anymore.

You're probably wondering what you can and can't do now. If your pacemaker is set correctly and you're in good health, you can do practically everything. The pacemaker will hardly ever affect your normal daily life.

RESUMPTION OF WORK

People with a pacemaker can do practically every job. Discuss with your cardiologist which devices may be dangerous to your pacemaker and what the safe distance is between your pacemaker and certain equipment.

AMBIENT INFLUENCES

There are many misunderstandings about the effect of electric appliances on a pacemaker. Normal use of (and posture with) household appliances and tools do not pose a threat to the pacemaker function.

The following equipment may generate a strong magnetic field. Maintain a minimum distance between the device and your pacemaker of an arm's length or at least 30 cm for safety reasons.

- **Ignition systems of motor vehicles.** Do not stand over a running electric motor such as a car alternator because they often have built-in magnets.
- **Industrial equipment** such as generators, arc welding equipment, electric welding installations and industrial motors.
- **Large broadcasting installations** of radio and television stations
- **Loudspeakers** of large stereo equipment

Avoid heavier, industrial tools such as drills and vibrating devices and don't hold magnets or products that contain magnets in front of your pacemaker.



If you feel dizzy or think you are going to faint during or after using electrical appliances, immediately stop using it and make an appointment with your cardiologist.

Do not enter areas with a 'strong magnetic field' or 'prohibited for persons with pacemakers' sign.



CAUTION
Strong magnetic
field



Prohibited
for people with
pacemakers

USE OF (MOBILE) PHONE/TABLET AND OTHER ELECTRONIC EQUIPMENT

Electronic equipment, such as mobile phones or tablets, emit electric signals. When you hold the device too close to the pacemaker, the signals may very rarely affect the efficient operation of the pacemaker.

Pacemaker patients are allowed to use telephones, mobiles and smartphones, provided they respect the following recommendations:

- ✓ Maintain a distance of at least 10 cm between the mobile phone and the pacemaker.
- ✓ Preferably hold the device to your ear on the opposite side of the implantation (for example your right ear if the pacemaker was implanted by the left shoulder).
- ✓ Do not carry the device in an inside or breast pocket on the side of the pacemaker.

SECURITY SYSTEMS

Metal detectors used at airports generally do not have any major clinical effect on the operation of the pacemaker. The pacemaker system does of course contain metal components which may trigger the alarm of the metal detector. Show the security personnel your pacemaker card before walking through the metal detector. They may decide to search you in a different way. If you are still asked to walk through the metal detector, walk through it at a normal pace and don't stand still between the gate.

Anti-theft systems (security gates in stores) can theoretically be a source of electromagnetic interference, but generally won't do any harm if you don't stand or lean against them. Walk through at a normal pace

Procedures that are **not** possible, without prior consultation with your cardiologist, include:

- X Magnetic resonance imaging (MRI-SCAN): this examination uses strong electromagnetic fields which may damage the pacemaker system, unless you have an MRI-safe system.
- X Radiation therapy when the pacemaker is in the radiation field
- X Electrocauterisation: this is used to seal off blood vessels that are bleeding during surgery.
- X Transcutaneous (through the skin) electrical nerve stimulation (TENS) at the physiotherapist

The following examinations are safe:

- X-ray examination (X-rays)
- CT scan
- ECG test
- Mammography
- Ultrasound procedures
- Dental drilling or dental cleaning equipment

DRIVING LICENCE

Belgian legislation makes a distinction between driving licences of group 1 (private use) and group 2 (professional transport).

For **group 1** (private use), the law (Royal Decree of 23/3/1998 concerning driving licences) states that the candidate with an implanted pacemaker is not fit to drive in the month following the implantation of the pacemaker or the replacement of the pacemaker electrode. If only the pacemaker is replaced, the cardiologist may immediately find the candidate fit to drive. To be fit to drive, the candidate must follow the cardiologist's treatment plan. Fitness to drive is valid for a maximum of three years.

For **group 2** (professional use), the conditions are stricter. Here the law states that a candidate with an implanted pacemaker is not fit to drive for three months following implantation of the pacemaker or replacement of the pacemaker electrode. If only the pacemaker is replaced, the candidate may be declared fit to drive at the earliest two weeks after the procedure. To be fit to drive, the candidate must follow the cardiologist's treatment plan. Fitness to drive for group 2 is valid for a maximum of three years. A report of a cardiologist is required.

Being a passenger in the car is not a problem.

Always wear your seat belt;
it will not damage the pacemaker.



LEISURE TIME - SPORTS - TRAVEL

You are allowed to:

- shower, bathe and swim
- walk, cycle and do sports
- do housework and work in the garden
- travel by car, train, boat or aircraft
- travel abroad

Walking, cycling and doing sports with a pacemaker is not a problem. Contact sports (such as handball or combat sports) are strongly discouraged. Heavy physical contacts may damage the leads.



LIFE INSURANCE

Your insurance may demand a higher premium. Having a pacemaker is considered an increased risk.

SEX AND PREGNANCY

You are probably wondering whether sex is still allowed. Fortunately, a pacemaker does not have to be an obstacle. The pacemaker does not cause any specific problems if you get pregnant either. If your heart is in good condition, the pacemaker does not stand in the way of a possible pregnancy.

Discuss your possible desire to have children with your cardiologist.

PSYCHOLOGICAL AND SOCIAL CONSEQUENCES

People with a pacemaker can do practically every job. After a couple of weeks you can go back to work. Discuss with your cardiologist which devices may be dangerous to your pacemaker and what the safe distance is between your pacemaker and certain equipment. Strong electric/magnetic fields can be a problem.

A pacemaker implant can have psychological consequences. Some people prefer to deny they have a health problem, others demand a lot of attention from their surroundings or become insecure and anxious because of it. Making room for emotions is often difficult, but liberating. Do not shut yourself off from your surroundings.

Give others the chance to make contact. It's important you can tell your story.

Apart from negative feelings you may also experience positive feelings. The realisation you can live a normal life again and that your complaints can be recognised and remedied, can give you a feeling of liberation and space.

PACEMAKER AND END OF LIFE

If you face a serious illness and you're wondering what to do with your pacemaker in a possible palliative setting, don't be afraid to discuss it with your doctor. In some circumstances, the decision may be made to switch off the pacemaker at your request. More information is available in our brochures on early care planning.

A pacemaker is always removed after death, a cremation or funeral. The undertaker is aware of this. Your relatives can notify the undertaker that you have a pacemaker.

CONCLUSION

The pacemaker causes the heart to pump at a normal rhythm again.

Implanting the pacemaker is actually a small procedure under local anaesthesia. For the implantation of a first pacemaker, you stay in the hospital a couple of days.

During periodic check-ups, the doctor examines the battery life and when it needs to be replaced. To replace a pacemaker, you will be admitted to hospital a maximum of two days.

The average life of a pacemaker battery is between six and more than ten years, depending on, among others, the functioning of the electrodes and how much the device needs to work.

Living with a pacemaker requires little adjustment. Most jobs can be resumed. Travelling abroad is not a problem. Electric appliances and machines usually do not affect the pacemaker.

Psychological and social consequences can be very different from person to person. Talking about your emotions and uncertainties is very important and can offer new perspectives.

USEFUL ADDRESSES

HARPA vzw Sports club for Heart patients

Secretariat Tervuursevest 101

3001 Heverlee

Tel. 016 62 14 12

e-mail: harpasport@harpa.be

website: www.harpa.be

Belgische cardiologische liga

Secretariat

Elyzeese Veldenstraat 63

1050 Brussels

Tel. 02 649 85 37

Fax 02 649 28 28

e-mail: info@liguecardioliga.be

website: www.liguecardioliga.be

Belgian Heart Rhythm Association

website: www.behra.eu

CONTACT DETAILS

Specialised nurses / healthcare professionals cardiac implants and telemonitoring

Tel. 016 340462

e-mail: larc-telemonitoring@uzleuven.be

Cardiologists- rhythmologists:

Secretariat cardiology

UZ Leuven – Campus Gasthuisberg

Herestraat 49

3000 Leuven

Tel. 016 34 42 48

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Comments or suggestions pertaining to this brochure can be submitted via communicatie@uzleuven.be.

Editor-in-chief
UZ Leuven
Herestraat 49
3000 Leuven
Tel. 016 33 22 11
www.uzleuven.be

 my nexuz health



Consult your medical record via
www.mynexuzhealth.be or

