



# Bradycardia (slow heart rhythm)



Working together to improve the diagnosis, treatment  
and quality of life for all those affected by arrhythmias

[www.hearrhythmalliance.org](http://www.hearrhythmalliance.org)

Registered Non-Profit 501(c)(3)

# Glossary

**Arrhythmia** Irregular or abnormal heart beat which may be excessively fast or slow

**Atria** Top chambers of the heart

**Asystole** Cessation of heart beat

**Bradycardia** Slow heart rate less than 60 beats per minute (bpm)

**Event Monitor** monitor to record the heart beat and rhythm

**Heart Block** Electrical impulses are slowed or blocked as they travel from the top to the bottom chambers of the heart

**Implantable Loop Recorder (ILR)** Can also be known as **Insertable Cardiac Monitor (ICM)**  
Monitor implanted for a period of time to record your heart activity

**Syncope** certain arrhythmias can also cause Syncope

**Ventricles** Bottom chambers of the heart

## Important information

This booklet is intended for use by people who wish to understand more about bradycardia. The information within this booklet comes from research and previous patients experiences. Additional information can be sourced from the website [www.heartrhythmalliance.org](http://www.heartrhythmalliance.org)

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# The normal electrical system of the heart

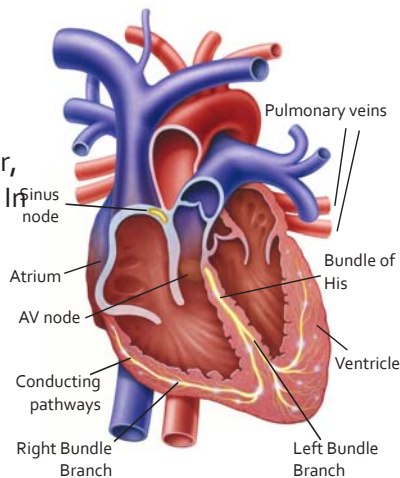
The normal heart comprises of four muscular chambers that contract to pump blood. These include two upper chambers or atria that receive blood from the body. Each atrium then pumps blood to two bottom chambers, the ventricles, which in turn pump blood to the rest of the body. In order to work in a coordinated manner, the heart has its own electrical conduction system. In its simplest form, this is made up of two specialized structures or nodes and conduction pathways or bundles, all of which contain conduction cells that transmit electrical impulses (see diagram).

The normal heartbeat begins when an electrical impulse is created and sent from the sinus node (also called sino-atrial or SA node), in the right atrium. The sinus node is responsible for setting the rate and rhythm of the heart and is therefore referred to as the heart's natural 'pacemaker'.

The electrical impulse fired from the SA node spreads throughout the atria, causing them to contract and squeeze blood into the ventricles. The electrical impulse then reaches the atrioventricular node (AV node), which acts as a gateway, slowing and regulating the impulses travelling between the atria and the ventricles.

The impulse subsequently travels down specialized pathways or bundles into the ventricles. These bundles include the Bundle of His, which is linked with the AV node and which divides into the left and right bundle branches. When the ventricles become excited, they contract and pump blood to the lungs and around the body. The normal adult heart beats in a regular pattern 60-100 times a minute; this is called sinus rhythm. The cycle then begins all over again.

## The heart and normal conduction



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# What is an arrhythmia?

Sometimes, if the conduction pathway is damaged or blocked, or if an extra pathway exists, the heart's rhythm can change. The heart may beat too quickly (tachycardia), too slowly (bradycardia) in regular or irregular fashion which may affect the heart's ability to pump blood around the body effectively. These abnormal heartbeats are known as arrhythmias. They can occur in the atria and/or in the ventricles. In this booklet we will concentrate on bradycardia.



## Bradycardia

Bradycardia often starts in the sinus node. A slow heart rate might occur because the sinus node:

1. Discharges electrical impulses slower than is normal
2. Pauses or fails to discharge at a regular rate
3. Discharges an electrical impulse that's blocked before causing the atria to contract
4. In some people, the sinus node problems result in alternating slow and fast heart rates (bradycardia-tachycardia syndrome).

Bradycardia may also be caused by age-related degeneration of the heart's electrical conduction system, coronary heart disease or by medications prescribed to treat other arrhythmias or high blood pressure. Once these medications have been reduced or discontinued, the bradycardia will usually resolve on its own.

Another cause is conditions that can slow electrical impulses through the heart. Examples include having a low thyroid level (hypothyroidism) or an electrolyte imbalance, such as too much potassium in the blood (hyperkalaemia).

There are other numerous causes which can lead to bradycardia such as heart disorders present at birth (congenital heart disease), heart surgery, heart attacks, heart infections, blood salt (electrolyte) abnormalities, hormonal disorders (e.g. thyroid problems) and medication.

## Signs and symptoms of bradycardia

Some types of bradycardia produce no symptoms, and others may cause fatigue, dizziness, breathlessness on exertion, chest pain or fainting (syncope). However, these symptoms can be caused by other conditions and are not exclusively related to slow heart rate.

## Syncope

There are several causes of syncope, some more common than others. Most cases of syncope are due to the 'common' faint. However, other important causes include defects of the 'wiring' of the heart. Syncope can occur when the heart slows or momentarily stops (asystole). Therefore oxygenated blood is not pumped to the brain, causing light-headedness, dizziness, fading of vision, buzzing in the ears and loss of consciousness. Often patients will recognize these symptoms and be able to sit or lie down before losing consciousness. However, for many there are no symptoms, just an abrupt loss of consciousness. People of all ages experience syncope, including children (reflex anoxic seizures/reflex asystolic syncope due to unexpected stimuli such as a bump or fright).

Syncope involving bradycardia can easily be diagnosed by taking a detailed history, having an EKG (electrocardiogram), and using a special event monitor. There are various types of special event monitors based on the frequency of the symptoms.

There is a separate leaflet available explaining the various types of syncope. If you require an ILR or ICM your doctor, nurse or physiologist will discuss this with you and provide you with a separate leaflet explaining in more detail.

# What investigations are commonly involved for bradycardias?

There is a range of different investigations that can be involved and these commonly look for the causes as well as the nature of the different bradycardias. It is important to note that these will be tailored to the individual patient and are performed as part of a complete assessment done by your doctor. This assessment will include a careful review of your medical history, as well as a physical examination.



Common investigations include blood tests (especially the ones that assess the levels of your blood electrolytes), and electrocardiogram (EKG). The EKG will provide a snapshot of your rhythm at the time of recording, as well as more prolonged monitoring by means of a heart monitor. The later investigations include portable EKG devices called Holter monitors or event recorders.

In some cases, your doctor may recommend the implantation of a small device underneath the skin called an Implantable Loop Recorder (ILR). This option may be recommended if your symptoms are only occurring once or twice every few months, and it's suspected that the heart monitors may miss the arrhythmia.

Your doctor may recommend an exercise tolerance test, also known as a tilt table test, to look at the heart rate in response to physical exercise. This test involves tilting you gently on a flat table and assessing if changes in your posture lead to abnormal heart rhythms. This is commonly used in investigating syncope in more detail.

# What are the different types and mechanisms of bradycardia?

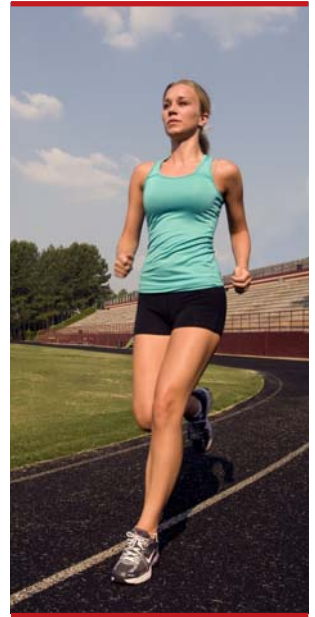
## Sinus Bradycardia and Sick Sinus syndrome

Sinus bradycardia is a slow heartbeat which can occur due to normal causes and commonly in athletes or during a state of deep relaxation. This is perfectly normal and should not cause any difficulties. Sinus bradycardia can also occur in patients with heart disease or in response to different medications, the latter being a common etiology. Once these medications have been reduced or discontinued, the bradycardia will usually resolve on its own.

Sick sinus syndrome occurs when the heart's natural pacemaker (SA node) fails, causing an abnormal heartbeat. This may be due to the SA node producing electrical impulses at a slower rate or the impulses being blocked from reaching the atrial muscle.

Patients with sick sinus syndrome may experience bradycardias, tachycardias or heartbeats that swap between the two (tachy-brady or brady-tachy syndrome). Although it is more common in elderly people it can occur in children, often after cardiac surgery.

Pacemakers are sometimes required for treating sinus bradycardia or sick sinus syndrome, especially if they are associated with significant symptoms.



## Heart block

Bradycardias can also occur as a result of a failure of the electrical impulses to be transmitted effectively through the atria and down to the ventricles. The electrical signals may be slowed down or blocked completely. The different types of heart block and the treatment options available are explained below.



In all cases of heart blocks, and sinus node disease described above, identifying and treating secondary causes (e.g. electrolyte or hormonal abnormalities), as well as discontinuing any offending medication, are important aspects of treating the arrhythmia.

### First-degree heart block

First-degree heart block occurs when the electrical impulses slow as they pass through the AV node. However, all impulses reach the ventricles. First-degree heart block rarely causes any symptoms and is often found in athletes.

No treatment is generally necessary. In patients, with first degree heart block, prescription of medication that control the heart rate such as beta blockers, requires careful supervision.

### Second degree heart block - Type I

Second degree heart block occurs when the electrical impulses are delayed to a greater extent, causing a beat to skip entirely. This cycle then repeats.

In rare cases, this may cause dizziness and other symptoms. In such cases, a pacemaker may be required.



## Second degree heart block - Type II

Occurs when some of the electrical impulses from the SA node are unable to reach the ventricles, for example every third or fourth impulse. This is because of underlying disease.

A pacemaker may be required to control and regulate the heart rhythm.

## Third-degree heart block (complete heart block)

This occurs when no electrical impulses reach the ventricles, this is usually a result of underlying disease or due to medications. In the absence of any electrical impulses from the atria, the ventricles produce impulses on their own; these are called ventricular escape rhythms and can arise from the different bundles or the ventricular muscle itself. These escape rhythms tend to be slow and the patient may feel very unwell.

This type of heart block can sometimes occur for a short time in certain types of heart attack and may require a temporary pacemaker. Sometimes patients may remain relatively well and a pacemaker can be implanted after a few days.

On other occasions, this condition needs to be treated more quickly. If a permanent pacemaker cannot be implanted immediately, the doctors will put a temporary pacemaker wire into the heart to keep the heart pumping regularly until the permanent system is implanted.

If you require a permanent pacemaker your doctor, and nurse and/or physiologist will discuss this with you and provide you with a leaflet explaining this in more detail. For further information contact Arrhythmia Alliance for our Pacemaker patient information booklet.

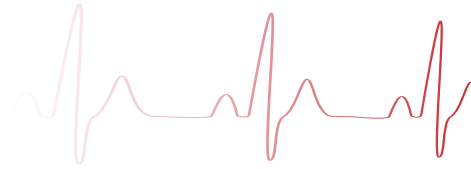
# Why do I need treatment?

The goal of treatment is to keep your heart rate at a rate high enough to allow sufficient blood flow to the body.

If severe bradycardia is left untreated, it can cause serious problems such as fainting or even death.

## What can I do to help my condition?

- Try to be active on a daily basis if possible. Your doctor will be able to advise on safe exercise for your individual circumstances.
- Eat a healthy and balanced diet.
- Try to maintain a healthy weight. Ask your doctor for help if you need to lose weight.
- If you smoke, your doctor will provide support to help you quit.
- Ensure that any other health problems such as high cholesterol or high blood pressure are well managed.



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Please remember that this publication provides general information. You should always discuss and seek advice from your healthcare professional what is most appropriate for you.

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