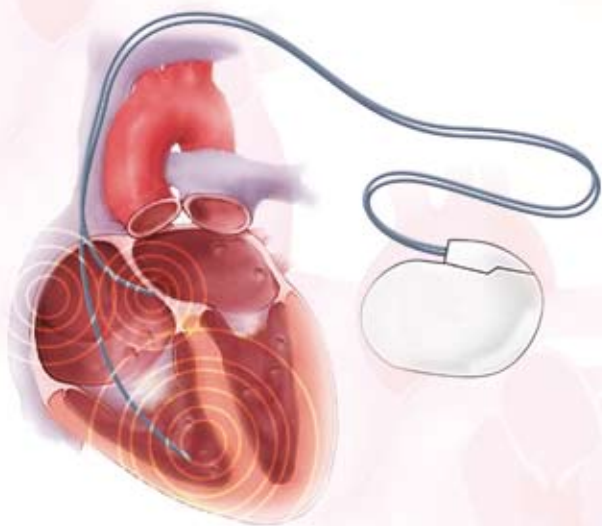


# 心臟起搏器/心臟除顫器

PACEMAKER/IMPLANTABLE  
CARDIOVERTOR DEFIBRILLATOR  
(ICD)



養和醫院  
心臟科中心

Cardiology Centre  
Hong Kong Sanatorium & Hospital

## 心臟起搏器/心臟除顫器



心臟是人體內重要的器官，負責輸送血液至全身。健康的心臟在靜態時每分鐘跳動六十至一百次。運動或情緒變化時，由於身體所需氧氣量增加，每分鐘心跳可提升至超過一百次。

## 心律不正是甚麼？



心律不正是指心臟不按常規跳動，跳得太快、太慢或不規則，都會影響心臟供血。心律不正可由遺傳、老化或疾病引起。其中最常見的心律不正是心跳過慢或緩脈，令身體未能獲得足夠氧氣而導致暈眩、虛弱和疲倦，嚴重者可致休克甚至死亡。

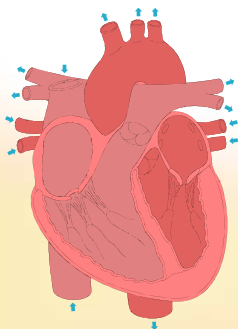
## 兩種常見的心律不正



### (一) 心搏過慢

#### 1. 病態竇房結綜合症

竇房結位於右心房的心肌區，負責產生脈衝引致心臟收縮，是人體天然的起搏器。如患上病態竇房結綜合症，竇房結無法正常運作，有部份脈衝滯留在竇房結內（竇房結傳導阻塞），或每次脈衝之間的停頓太長（竇性停止），心臟因而不能隨身體的需要而調節心跳的速度。



## 2. 心房室傳導阻塞

房室結位於右心房中隔壁的心肌區，負責把來自竇房結的脈衝傳導至心室壁，引致收縮。如患上心房室傳導阻塞，有部份或全部脈衝滯留在房室結，令心房和心室之間的傳導受阻或中斷。

以上情況引致的緩脈，都可以透過人造的心臟起搏器來改善。

## 心臟起搏器的功用



心臟起搏器的基本功用是監察心臟跳動和控制心跳。當心臟跳動不正常或不規則時，起搏器產生預先調較的脈衝，刺激心臟有規律地跳動。

心臟起搏器由兩個重要部份組成：

### 起搏器：

金屬盒子裡裝有電池和電路，負責監察心律及產生脈衝。

### 傳導電線：

一條極軟的電線，末端有電極連接至心臟內部，負責接受心律訊號，以及把起搏器產生的脈衝傳導至心臟內部。



## 心臟起搏器的類型



### 單腔型起搏器

單腔型起搏器只有一條導線連接至右心房或右心室，適用於只有竇房結或房室結出現問題之病人。

## 雙腔型起搏器

雙腔型起搏器有兩條導線，電極分別連接至右心房和右心室。適用於竇房結和房室結協調出現問題的病人。

## 雙室型同步起搏器

雙室型同步起搏器有三條導線，電極分別連接至右心房、右心室和冠狀靜脈竇以刺激左心室，令左右心室能同步收縮，適用於心臟衰竭的病人。

## (二) 心搏過快

至於心搏過快的種類中，以心室心搏過速及心室纖維性顫動最為危險。因為惡性心跳過速、心律異常，若不及時受到控制，可令患者有生命危險，甚至致命。

### 1. 心室性心搏過速

當心臟的傳導系統發生故障，訊號比正常時間過早到達心室或形成「短路」，就會形成心室性心搏過速，常見於曾患心肌梗塞的病人。心室性心搏過速會降低心臟把血液泵到全身的效率，導致短時間內引致缺氧，對生命造成威脅。在此情況下，病人感到心跳加劇，頭暈目眩。如果缺乏適當治療，會有生命危險。

### 2. 心室纖維性顫動

當心室性心搏過速變得太快而速度不穩定，並且節奏異常時，就被稱為心室纖維性顫動。心跳的速度可高達每分鐘超過三百次以上。如果出現心臟纖維性顫動，心臟不能泵出血液，病人很快便開始缺氧，幾秒鐘內會失去知覺。心室纖維性顫動屬心臟病發猝死的主因之一。

## 心臟除顫器的功用



植入式心臟復律除顫器的功用，主要適用於患有心室纖維性顫動或心室過速的病人。心臟除顫器可於體內產生電擊流經心臟，阻斷異常的傳導信號，回復由竇房結發出的傳導信號，使心臟回復至正常心律。心臟除顫器經過調較後，亦可作起搏器或心室同步治療之用。

各種起搏器均有不同的效用，醫生會為你詳細解釋及作出最合適的選擇。

## 植入心臟起搏器/心臟除顫器



### 手術過程

過程約為時兩小時，其中雙室同步起搏器及除顫器手術的時間較長。兩項手術均無須作全身麻醉，病人在過程中神志清醒。

1. 在左胸或右胸鎖骨下進行局部麻醉，切開小切口，並在皮下形成小口袋
2. 把導線沿靜脈插入至心臟
3. 利用放射影像監察導線電極的位置是否正確，並測試導線運作是否正常
4. 把導線固定，並接通起搏器
5. 把起搏器放入鎖骨下的皮下小口袋，然後把傷口縫好

### 手術前準備

1. 大部份病人須於手術前一天入院作基本檢查，例如心電圖、血液檢查、胸肺X光等
2. 遵照醫生囑咐停服指定之藥物
3. 如曾對任何藥物或食物有過敏反應，必須告知醫護人員

4. 手術前禁食六至八小時
5. 簽署手術同意書
6. 手術前獲發輕度鎮靜藥物，幫助鬆弛，減少不適

## 手術後注意事項

1. 手術後初期減少活動植入起搏器側之上肢，以免影響傷口癒合
2. 如出現下列情況，請立即通知醫生：
  - 呼吸困難、暈眩或昏厥
  - 手腕和足踝呈現浮腫的現象
  - 胸痛或不停的呃逆
  - 傷口紅腫或有血水滲出

## 日常護理

病人植入起搏器後，通常可於短時間內回復日常生活。與醫生商量後，你可以重拾昔日興趣、運動或性生活。

1. 服用醫生指定的藥物
2. 定時覆診
3. 隨身攜帶證明咭
4. 如發現心臟起搏器出現異常情況，請立即聯絡醫生
5. 留意周遭環境會否干擾你的心臟起搏器，如發電機、強力電磁等
6. 若須進行醫療程序或檢查，如磁力共振、碎石術、射頻消融術、透皮神經刺激、鑽牙或電烙術，必須先與醫生商量方作決定
7. 如靠近一些電器設備時，感到頭暈、心跳或脈搏不正常，應立即遠離或關掉這些設備。如須進一步建議，請與醫生聯絡。

## Pacemaker / Implantable Cardioverter Defibrillator (ICD)



The human heart is an important organ that pumps blood throughout the body. The heart normally beats 60 to 100 times per minute at a resting rate. During exercise or emotional stress, the body requires more oxygen and the heart beats faster to over 100 times per minute.

## What is Cardiac Arrhythmia?



Arrhythmia is any disorder of your heart rate or heart rhythm, such as beating too fast, too slow, or irregularly, which affects the blood supply to the body.

Arrhythmia may be caused by hereditary factors, ageing or disease. Common arrhythmias are the heart beating too fast (tachycardia), or too slow (bradycardia). Some types of arrhythmia cause dizziness, feebleness and fatigue and may be life-threatening if not promptly treated.

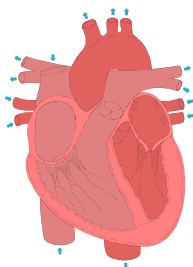
## Two Common Types of Arrhythmia



### Bradycardia

#### 1. Sick Sinus Syndrome (SSS)

Sinoatrial node (SA node) is located in the muscle area of right atrium. SA node is the natural pacemaker, which generates impulses causing the heart to contract. Patients with SSS have defective SA node such that not all impulses leave the node (sinoatrial block) or such that there are longer pauses in the generation of impulses (sinus arrest). The heart fails to beat as fast as the body requires.



#### 2. Heart Block

Atrioventricular node (AV node) is located in the muscle area between right atrium and right ventricle. AV node transmits impulses from the SA node to ventricle and the rest of the heart. Patients with Heart Block have a defective AV node such that some or all impulses do not leave the AV node and the transmission between atria and ventricles is blocked.

An artificial pacemaker provides therapy to bradycardia.

## Functions of Pacemaker



The basic functions of pacemaker are to monitor the heart rhythm and control heartbeat. When the heart beats abnormally or irregularly, the pacemaker generates pre-determined impulses to stimulate the heart to beat regularly.

The pacemaker has two basic parts :

**Pacemaker:** A metal case which contains a battery and a circuit, responsible for monitoring the heartbeat and producing impulses.



**Pacing lead:** It is an extremely flexible insulated wire which makes contact with the heart through metal electrode at the lead tip. It helps monitor the heart's electrical activity and transmits electrical impulses sent to the heart from the pacemaker.

## Types of Pacemaker



### Single-Chamber Pacemaker

A single-chamber pacemaker has only one pacing lead to be placed into a chamber of the heart, either right atrium or right ventricle. It is mainly for patients with problems in sinoatrial node or atrioventricular node.

### Dual-Chamber Pacemaker

A dual-chamber pacemaker has two pacing leads to be placed in two chambers of the heart, usually the right atrium and right ventricle. It is mainly for patient with problems in both sinoatrial node and atrioventricular dissociation (lack of co-ordination).

## **Biventricular Pacemaker**

A biventricular pacemaker has three pacing leads connected to right atrium, right ventricle, and the coronary sinus, which paces the left ventricle respectively. It can also provide cardiac resynchronization therapy (CRT) for patients with heart failure.

## **Tachycardia**

Some life-threatening arrhythmia will be fatal if an episode of extremely fast and irregular ventricular arrhythmia continues without treatment.

### **1. Ventricular Tachycardia(VT)**

The heart's electrical signals come from the ventricles or re-entry circuit instead of the SA node. Ventricular tachycardia can make the heart beat very fast. As the heart beats faster, it pumps less blood. There is not enough time for the heart to fill with blood between beats. If this fast heartbeat continues, the brain and body may not receive enough blood and oxygen. The patient may feel the heart is skipping beats, lose consciousness or even die suddenly.

### **2. Ventricular Fibrillation(VF)**

VF originates from many different locations in the ventricles, each one trying to signal the heart to beat. In this case, the heart beats much faster than normal, sometimes over 300 beats a minute. The ventricles quiver instead of really contracting, and very little, if any, blood is pumped from the heart to the rest of the body. If your heart is in VF, you can become unconscious very quickly. If these irregular, fast heart rhythms continue for a length of time, the body will not get enough oxygen-carrying blood. Without oxygen, the brain and body tissues cannot function normally and die.

## **Functions of Implantable Cardioverter Defibrillator (ICD)**



ICD is a pacemaker-like device that continuously monitors the heart rhythm, and delivers life-saving shocks if a dangerous heart rhythm is detected. They can significantly improve survival in patients with ventricular fibrillation

which is the primary cause of sudden cardiac death. ICDs also have the ability to act as a pacemaker for slow heart rate and can be modified to provide resynchronization therapy. Different pacemakers serve different purposes. Your doctor will explain in details and choose the best option for you.

## Implantation of Pacemaker/ICD

### How the pacemaker/ICD is implanted?

While the procedure usually takes 2 hours, the implantation of biventricular pacemaker and ICD may take longer time. No general anaesthesia is needed; patients are conscious throughout the procedure.

1. Local anaesthesia is performed under the left or right collarbone. A small incision is made and a little “pocket” is created.
2. Insert a pacing lead through a vein and into the heart.
3. Use X-ray to monitor if the lead is in correct position and working.
4. Place the lead firmly and connect to the pacemaker.
5. Insert the pacemaker into the “pocket” and suture the wound.

### Pre-operative Preparation

1. Admit to the hospital one day before operation to undertake basic investigation, including ECG, blood test, chest X-Ray, etc.
2. Stop medication as instructed by doctor.
3. Notify doctor and all healthcare personnel about your drug or food allergies.
4. Refrain from eating or drinking 6 to 8 hours before the operation.
5. Sign the consent form.
6. A mild sedative may be prescribed before the operation to help you relax.

## Post-operative Care

1. Limit the upper limb movement on the operated side to help the wound healing.
2. Inform your doctor immediately if any of the following symptoms occurs:
  - Difficulty in breathing, dizziness or fainting.
  - Swelling over your wrist and ankle.
  - Chest pain or hiccup.
  - Redness over incision site with bloody discharge

## Going Home

Patients can resume normal life shortly after the implantation. Discuss with your doctor about resuming your hobbies, sports and / or sexual activities.

1. Take the prescribed medication as instructed.
2. Go to your follow-up appointments regularly.
3. Carry your pacemaker/ICD identification card at all times.
4. Contact your doctor if you notice anything strange with your pacemaker.
5. Be aware of your surroundings and the devices that may interfere with your pacemaker, such as power generating equipment, powerful magnet, etc.
6. Discuss with your doctor the possible risks and benefits before you undergo any medical / diagnostic procedures such as MRI, lithotripsy, radiofrequency ablation, transcutaneous electrical nerve stimulation (TENS), dental drilling or diathermy usage.
7. If you feel any symptoms, such as dizziness, irregular pulse or an increased heartbeat, while you are near electrical equipment, stay away from it and/or turn it off immediately. Consult your doctor for further advice.

## 心臟科中心

香港跑馬地山村道二號

養和醫院李樹陪院二十一樓

辦公時間：

星期一至星期五：上午九時至下午五時

星期六：上午九時至下午一時

(星期日及公眾假期休息)

如需緊急診治，請致電：

本院總機：2572 0211 門診部：2835 8600

專科診症，敬請預約

如有查詢，歡迎聯絡我們：

電話：2835 7899

傳真：2892 7545

電郵：cardiology@hksh.com

<http://www.hksh.com>

## Cardiology Centre

Hong Kong Sanatorium & Hospital

21/F, Li Shu Pui Block,

2 Village Road, Happy Valley, Hong Kong

Service Hours:

Monday to Friday : 9:00 am - 5:00 pm

Saturdays : 9:00 am - 1:00 pm

For emergency, please contact us through:

Hospital Main Exchange : 2572 0211

Outpatient Department : 2835 8600

(Closed on Sundays and Public Holidays)

For further enquiries and appointment,  
please contact us at:

Tel : 2835 7899 Fax : 2892 7545

E-mail : cardiology@hksh.com

<http://www.hksh.com>