HEALTH BASICS

Subcutaneous implantable cardioverter-defibrillator

A subcutaneous implantable cardioverter-defibrillator is a device placed under the skin to detect and shock dangerous heart rhythms.

WHAT IT IS
An under-the-skin device that detects and shocks dangerous heart rhythms

WHERE IT COMES UP
When an ICD is considered to prevent sudden cardiac death

WHY IT MATTERS
Can stop certain life-threatening heart rhythms with a shock

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
A cardiologist or cardiac device clinic

HOW IT IS CHECKED
Device interrogation, remote monitoring, and heart-rhythm review

Overview

A subcutaneous implantable cardioverter-defibrillator, or S-ICD, is a device that watches your heart rhythm and can deliver an electrical shock if it detects a life-threatening rhythm. It is not a disease or a diagnosis.

"Subcutaneous" means under the skin. The device's battery and computer, called the generator, usually sit under the skin or muscle at the side of the chest. A wire called a lead runs under the skin beside the breastbone. Unlike a traditional transvenous ICD, its lead does not pass through a vein into the heart.

An S-ICD may be considered for someone at increased risk of sudden cardiac arrest from ventricular tachycardia or ventricular fibrillation. These are dangerously fast rhythms that begin in the heart's lower chambers. The device may be recommended after a previous cardiac arrest or because a heart condition creates a high future risk.

An S-ICD is not suitable for every person who needs an ICD. It does not provide ongoing pacing for a heart rate that is too slow. It also cannot usually stop ventricular tachycardia with a series

of small pacing impulses, known as anti-tachycardia pacing. A transvenous ICD may be more appropriate when these functions are needed.

How it works

Before implantation, the cardiac team usually checks whether the S-ICD can reliably tell your normal heartbeat from dangerous rhythms. This often involves placing temporary electrodes on your chest and recording the heart's electrical pattern in several positions.

The S-ICD is inserted during a procedure using anaesthesia and pain control. The generator is placed along the side of the chest, often near the left armpit. The lead is tunnelled under the skin and positioned beside the breastbone. No lead is placed inside the heart.

The device continuously reads the heart's electrical activity. Its programming helps it separate a dangerously fast ventricular rhythm from a normal fast heartbeat, such as during exercise. If it identifies ventricular fibrillation or certain forms of ventricular tachycardia, it charges and delivers a strong shock across the chest.

A shock can be painful and may feel like a sudden kick or jolt. A person may lose consciousness from the abnormal rhythm before the shock occurs. The device can also provide brief pacing immediately after a shock if the heart rate is temporarily very slow, but this is not a replacement for a pacemaker.

The battery lasts for years, but not indefinitely. Its remaining life is checked during follow-up. When the battery becomes low, the generator can be replaced through a procedure. The lead may remain in place if it is working properly.

Why it matters for your health

Ventricular fibrillation and some forms of ventricular tachycardia can stop the heart from pumping blood effectively. An S-ICD is designed to recognise these rhythms and treat them quickly, including when no one else is present to use an external defibrillator.

Keeping the lead outside the veins and heart avoids some problems associated with transvenous leads, such as damage to blood vessels or heart structures. It can be useful when access to the veins is difficult or when avoiding a lead inside the bloodstream is especially important.

That advantage must be weighed against the lack of long-term pacing and anti-tachycardia pacing. Some people with heart failure also need cardiac resynchronisation therapy, which uses pacing leads to coordinate the heart's pumping chambers. An S-ICD cannot provide that

treatment.

An S-ICD lowers risk from specific abnormal rhythms, but it does not remove the underlying heart condition or protect against every cause of cardiac arrest. Medicines, treatment of the underlying condition, and routine cardiac follow-up may still be needed.

What can go wrong

An S-ICD is connected with conditions that can cause ventricular tachycardia or ventricular fibrillation. These include some cardiomyopathies, which are diseases of the heart muscle, and some inherited electrical disorders of the heart. It may also be used after a cardiac arrest when the cause cannot be fully reversed.

Possible problems with the implantation procedure or device include:

Inappropriate shocks can happen if the device mistakes another rhythm or electrical signal for ventricular tachycardia or ventricular fibrillation. Careful screening, programming, and follow-up help reduce this risk, but cannot remove it completely.

Call emergency services if you receive a shock and remain unwell, have chest pain, severe shortness of breath, fainting, confusion, or ongoing palpitations. Multiple shocks close together also require emergency help, even if you later feel better.

If you receive one shock and quickly feel well, follow the plan given by your device clinic. You will usually need to contact the clinic promptly so the stored rhythm and device response can be reviewed.

Contact the implanting team urgently if the wound becomes increasingly red, hot, swollen, painful, or starts draining fluid, or if you develop a fever. Mild soreness and bruising can occur after implantation, but they should generally improve rather than worsen.

Routine follow-up is different from urgent care. Scheduled checks assess the battery, lead, stored heart rhythms, and device settings. Many devices can also send information to a clinic through a home remote-monitoring unit.

- Bleeding, bruising, swelling, pain, or a collection of blood called a haematoma
- Infection around the incision, generator, or lead
- Poor wound healing or erosion of the device through the skin
- Movement, damage, or failure of the generator or lead
- An inappropriate shock when the rhythm is not actually life-threatening
- Failure to detect or stop a dangerous rhythm

- Complications related to anaesthesia

What you can do

Before implantation, ask why an S-ICD is being recommended instead of a transvenous ICD. Useful questions include whether you may need pacing now or in the future, what pre-implant screening showed, and how the device fits with your heart condition.

Keep a record of:

Carry your device identification card. Show it before surgery, medical procedures, or an MRI scan. Some S-ICD systems are MRI-conditional, meaning an MRI may be possible only with approved equipment, settings, and monitoring. The exact device model must be checked.

Ask when you can return to driving, work, exercise, and lifting after implantation. Driving restrictions may apply after an ICD procedure or shock and are affected by local law, why the device was implanted, and whether dangerous rhythms have occurred.

Keep strong magnets and powerful electrical equipment away from the device unless the manufacturer or device clinic confirms that they are safe. Ordinary household electronics are generally used normally, but industrial equipment and some medical procedures need specific advice.

There is no safe way to test or reprogram an S-ICD yourself. Attend scheduled checks, keep any remote monitor connected as instructed, and report shocks or alerts according to your personal device plan.

- Your device manufacturer, model, and implant date
- Your device clinic's contact details
- What to do after one shock or several shocks
- Your medicines and other heart treatments
- Dates of device checks and generator replacement estimates

Common questions

Is an S-ICD the same as a pacemaker?

No. A pacemaker mainly treats a heartbeat that is too slow. An S-ICD mainly treats dangerously fast rhythms with a shock. It can provide only brief pacing after a shock.

Can you feel the device?

You may be able to feel the generator and lead under the skin. The area can be sore after implantation. Persistent pain, skin breakdown, or increasing swelling needs assessment.

Can the device prevent a dangerous rhythm from starting?

Usually not. It watches for certain rhythms and treats them after they begin. Medicines or other treatments may be used to reduce how often abnormal rhythms occur.

Can you exercise with an S-ICD?

Many people can return to physical activity after the incision heals. Timing and safe intensity are based on the underlying heart condition, recent rhythm events, and the implanting team's instructions. Contact sports may damage the device or the tissue around it.

Will airport security affect it?

Security equipment may detect the metal device. Carry your identification card and tell security staff that you have an implanted defibrillator. Do not remain beside or lean against a security scanner longer than needed.

Does a shock mean the device is faulty?

Not necessarily. A shock may be appropriate treatment for a dangerous rhythm, or it may be inappropriate. The device's stored information must be reviewed to tell the difference.

Sources

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