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## PRACTICAL DERMATOLOGY

# Electrosurgery in Patients With Implantable Electronic Cardiac Devices (Pacemakers and Defibrillators)<sup>☆</sup>

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### PALABRAS CLAVE

Electrobisturí;  
electrocirugía;  
interferencias  
electromagnéticas;  
marcapasos;  
desfibrilador

**Abstract** The electrosurgical unit is a very useful tool widely used in dermatology to treat benign and malignant skin lesions and to achieve hemostasis during surgery. However, precautions are required when this technique is used in patients with implantable electronic cardiac devices (IECD), such as pacemakers and defibrillators, because electromagnetic interference produced by the tool may cause such devices to malfunction. Before using electrosurgery in patients with IECDs, it is essential to ascertain the type of implanted device and the patient's level of dependence on it. The location of the skin lesion to be treated with respect to the device should also be assessed. Bipolar pacemakers are more resistant to interference. Appropriate monitoring and the use of bipolar forceps are recommended.

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### Electrocirugía y dispositivos electrónicos cardiacos implantables (marcapasos y desfibriladores)

**Resumen** El electrobisturí es una herramienta muy útil y ampliamente utilizada en dermatología para el tratamiento de lesiones benignas y malignas cutáneas, y para la hemostasia durante la cirugía dermatológica. Su uso en pacientes con dispositivos electrónicos cardiacos implantables (marcapasos y desfibriladores) requiere tomar ciertas precauciones ya que puede producir interferencias electromagnéticas capaces de provocar su malfuncionamiento. Ante un paciente con uno de estos dispositivos se debe conocer el tipo de dispositivo que presenta, la dependencia del paciente, y valorar la localización tanto del dispositivo como de la lesión cutánea a tratar. El marcapasos en configuración bipolar es el más resistente a la interferencia. Se aconseja la monitorización adecuada del paciente y el uso de la pinza bipolar.

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## Introduction

It is increasingly common in clinical practice to encounter patients with surgically treatable skin lesions who have a pacemaker or other implantable electronic cardiac device (IECD). The presence of such devices has classically been considered to contraindicate the use of the electro-surgical unit. However, owing to improved engineering, the resistance of these implantable devices to electromagnetic interference is constantly increasing. Some studies report a high level of safety for the use of the electro-surgical unit in dermatological surgery<sup>1,2</sup> and, with certain exceptions, the fact that a patient is carrying an IECD should not substantially alter our surgery guidelines.

The goal of this article is to discuss the interference capacity of the different waves generated by an electro-surgical unit, and to explain the basic features of the different types of IECD, with a practical focus on highlighting the precautions that should be taken in this setting.

When dealing with a patient with an IECD, we need to know the answers to a number of questions (Table 1).

We will begin by defining some important concepts and discussing the consequences of electromagnetic interference, and go on to discuss the preoperative, perioperative, and postoperative management of these patients.

## Definitions

### Electrosurgery

Electrosurgery is a procedure that uses electrical energy to destroy tissue in an effective, fast, and economical manner, with immediately visible results. The procedure is performed using an electro-surgical unit, a device that transforms standard 60 cycle current into a high-frequency current alternating at more than 200 000 Hz.<sup>3-6</sup> In dermatology, the procedure is used to achieve hemostasis during surgery and to treat and destroy benign and malignant lesions.

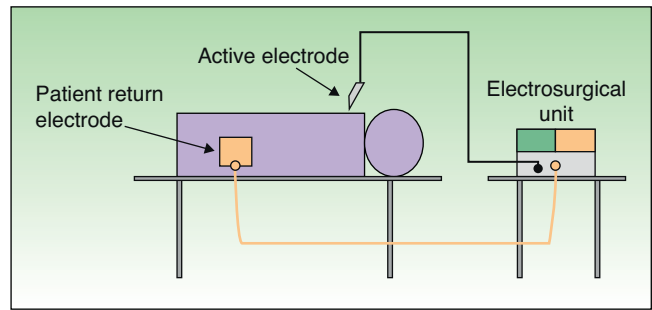
### Types of Circuit

The circuit can be bipolar or monopolar. The most common practice is to use the electro-surgical unit with a monopolar

**Table 1** Questions That Must be Answered for Patients With Implantable Electronic Cardiac Devices.

<p>Does the patient wear a pacemaker or an AICD?          When was the device last monitored?          Is the patient dependent on the pacemaker?          Is the pacemaker single-chamber, dual-chamber, or triple-chamber?          Are the leads unipolar or bipolar?          In the case of an AICD, has the defibrillator function been activated recently?          Where is the lesion located?          When was the device implanted?</p>
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Abbreviation: AICD, automatic implantable cardioverter-defibrillator.



**Figure 1** Monopolar circuit consisting of an electro-surgical unit, active electrode, and patient return electrode. The electric current flows through the patient.

circuit, in which case the patient forms part of the electrical circuit and the current passes through the patient's body (Fig. 1). In this configuration, the circuit comprises 4 elements: the generator, the active electrode, the patient, and the return electrode. The return electrode is extremely important because it completes the circuit, ensures patient safety, and prevents burns.<sup>3,6</sup>

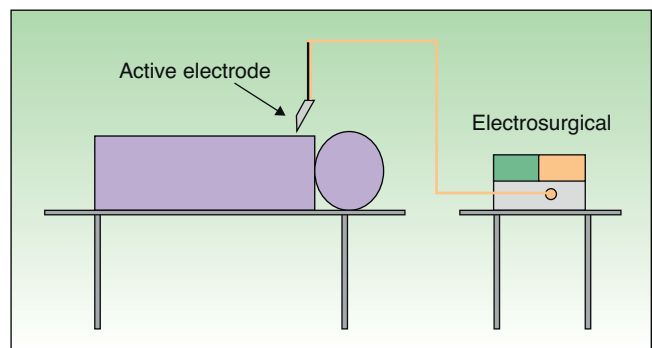
The use of bipolar electro-surgery is less common (Fig. 2). In the bipolar configuration, a special forceps is used and the current flows between the 2 tines, which serve as the active and return electrodes, allowing a complete circuit. The bipolar configuration is normally used in ophthalmology and neurosurgery and no patient return electrode is required.<sup>3-6</sup>

### Types of Waveform

The electro-surgical unit can modify the waveform and voltage of the electrical current, thereby changing its effect on tissue and the speed at which heat is produced. The 3 standard waveforms used are a cutting current, a coagulation current, and a blended current. The power can also be adjusted.<sup>3-5</sup>

### Interference Capacity

All electrical currents can interfere with the function of a pacemaker. The only technique that does not pose this



**Figure 2** Bipolar circuit. The electric current flows between the 2 tines of the forceps (active electrode) without passing through the patient.

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