

## CPR and External Defibrillation for Pacemaker and/or Defibrillator Patients

### SUMMARY

Cardiopulmonary resuscitation (CPR) and external defibrillation are emergency medical procedures used to help people survive conditions such as sudden cardiac arrest.

This article describes how CPR and external defibrillation can be used on people implanted with pacemakers, CRT-Ps, ICDs, or CRT-Ds (referred to herein as pacemakers and defibrillators). Included are techniques to help minimize potential damage to the implanted device should external defibrillation be used during cardiac life support procedures.

AHA: American Heart Association

ICD: Implantable Cardioverter Defibrillator

CRT-D: Cardiac Resynchronization Therapy Defibrillator

CRT-P: Cardiac Resynchronization Therapy Pacemaker

### CRM PRODUCTS REFERENCED\*

All ICDs, CRT-Ds, CRT-Ps and Pacing Systems

\*Products referenced herein may not be approved in all geographies. For comprehensive information on device operation, reference the appropriate product labeling.

### CRM CONTACT INFORMATION

Technical Services – U.S.  
1.800.CARDIAC (227.3422)  
[Tech.Services@bsci.com](mailto:Tech.Services@bsci.com)

Technical Services – Europe  
+32 2 416 7222  
[eurtechservice@bsci.com](mailto:eurtechservice@bsci.com)

LATITUDE Clinician Support  
1.800.CARDIAC (227.3422)  
[latitude@bsci.com](mailto:latitude@bsci.com)

Patient Services  
1.866.484.3268 – U.S. and Canada  
001.651.582.4000 – International

CPR and external defibrillation are performed routinely in hospitals as well as within the community, either by laypersons or emergency response professionals. Normal procedures to administer cardiac life support (CPR and/or external defibrillation) should be followed for all persons. If it is known that a CPR candidate has an implanted pacemaker or defibrillator, the responder may have questions or concerns pertaining to cardiac life support. The following Q&A may help to address some of these questions or concerns.

### CPR

#### Can CPR chest compressions be performed on patients implanted with pacemakers and/or defibrillators?

Yes. CPR chest compressions may be performed as usual. If resuscitation efforts are successful, the implanted device should be interrogated to assess its function.<sup>1</sup>

#### What if the implanted defibrillator delivers a shock while the responder is administering CPR?

If the implanted device delivers a shock during CPR, the responder may feel a tingling sensation on the patient's body surface. However, the shocks delivered by the implanted defibrillator will not pose a danger to the person administering CPR. The unpleasant tingling sensation can be prevented by wearing gloves during CPR.<sup>2</sup>

### External Defibrillation

#### What if the implanted defibrillator delivers a shock while the responder is in the process of operating a manual external defibrillator or an automated external defibrillator?

If the implanted device delivers a shock to the patient (i.e., the patient's muscles are contracting similar to that observed during external defibrillation), the AHA recommends that the responder allow 30 to 60 seconds for the implanted device to complete the therapy cycle before administering external defibrillation.<sup>3</sup>

#### Can the energy associated with external defibrillation damage the implanted device?

Yes. Although implantable pacemakers and defibrillators are designed to withstand external defibrillation, the implanted device can sustain damage if the external defibrillation electrode pads are placed too close to or directly over the device. Use the lowest energy output of external defibrillation equipment that is clinically acceptable.

#### How should I position the external defibrillation pads to avoid damaging an implanted pacemaker or defibrillator?

Position the external defibrillation pads in a clinically acceptable position that is as far from the pulse generator as possible. When a device is located in an area where a pad would normally be placed, the AHA recommends positioning the external defibrillation pad at least 1 inch (2.5 cm) away from the device.<sup>3</sup>

Whenever possible, external defibrillation pads should be placed in an anterior-posterior position (Figure 1). However, if the device is positioned in the left pectoral region, placement of the external defibrillation pads in the anterior-apex position is also acceptable.<sup>4</sup>

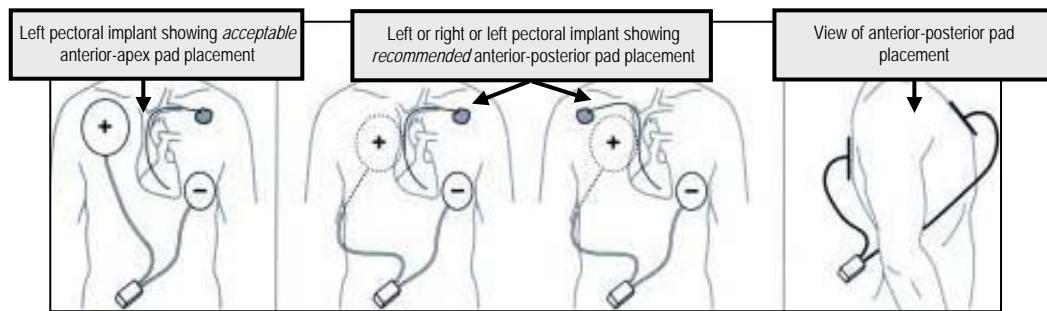


Figure 1. Placement of external defibrillation pads for pacemaker or defibrillator patients.<sup>4</sup>

### What is the best way to determine if the implanted device has been damaged by external defibrillation?

Following any episode of external defibrillation, proper function of the implanted device should be verified.

- For implanted defibrillators—Interrogate the device, perform a manual capacitor reformation, verify battery status, shock counters and pacing, and ensure that the programmable parameters did not change. Note that if external defibrillation is applied, a warning message may be displayed upon interrogation (Figure 2).

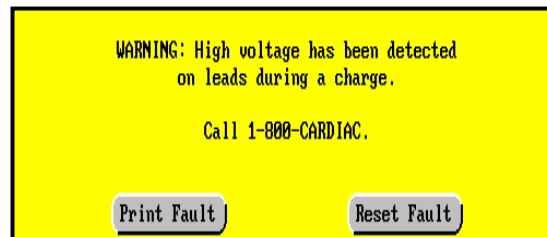


Figure 2. Warning message indicating greater than 8 volts detected on the leads during two consecutive charging cycles.

- For implanted pacemakers—External defibrillation could cause a temporary battery voltage reduction, which would cause the device to enter a reset condition. Should this occur, the programmer will display a warning message upon interrogation (Figure 3). Reprogram parameter settings as desired.



Figure 3. Pacemaker reset message.

### Where can additional information on CPR and external defibrillation be obtained?

The complete guidelines can be found by visiting the American Heart Association website at [www.americanheart.org](http://www.americanheart.org).

<sup>1</sup>Feature Articles page. Emergency Medicine Web site. Available at <http://www.emedmag.com/html/pre/fea/features/039030030.asp>. Accessed May 20, 2008.

<sup>2</sup>McMullan J, Valento, M, Attari, M, Venkat, A. Care of the pacemaker/implantable cardioverter defibrillator patient in the ED. *The American Journal of Emergency Medicine*. 2007; 25: 812-822.

<sup>3</sup>Circulation. 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. American Heart Association Web site. Available at [http://circ.ahaajournals.org/cgi/content/full/112/24\\_suppl/IV-35](http://circ.ahaajournals.org/cgi/content/full/112/24_suppl/IV-35). Accessed June 25, 2008.

<sup>4</sup>Woods S, Sivarajan Froelicher E, Underhill Motzer S, Bridges E. *Cardiac Nursing*. 5<sup>th</sup> ed. Philadelphia, PA: Lippincott Williams & Wilkins; 2004. Google Book Search Web site. Available at [http://books.google.com/books?id=vWmbeuYRN8C&pg=PA750&vq=external+defibrillation&dq=external+defibrillation+and+icds&source=gbs\\_search\\_r&cad=1\\_1&ig=qX49MamVUTqTh3siEqwe89rQX0o](http://books.google.com/books?id=vWmbeuYRN8C&pg=PA750&vq=external+defibrillation&dq=external+defibrillation+and+icds&source=gbs_search_r&cad=1_1&ig=qX49MamVUTqTh3siEqwe89rQX0o). Accessed June 25, 2008.