

ICD ESSENTIALS

Device summary table

Device	Intravenous leads	Discriminators available	ATP available	Pacing available
Single-chamber ICD	Right ventricle	- Onset - Stability - Morphology - Sustained rate	Ventricular	Right ventricular
Dual-chamber ICD	- Atrial - Right ventricle	- AV association - PR pattern analysis - Onset - Stability - Morphology - Sustained rate	- Atrial - Ventricular	- Atrial - Right ventricular
CRT-D	- Atrial - Right ventricle - Left ventricle	- AV association - PR pattern analysis - Onset - Stability - Morphology - Sustained rate	- Atrial - Ventricular	- Atrial - Right ventricular - Left ventricular
S-ICD	None (subcutaneous electrode only)	Specialist morphology-based discriminators	Unavailable	Unavailable

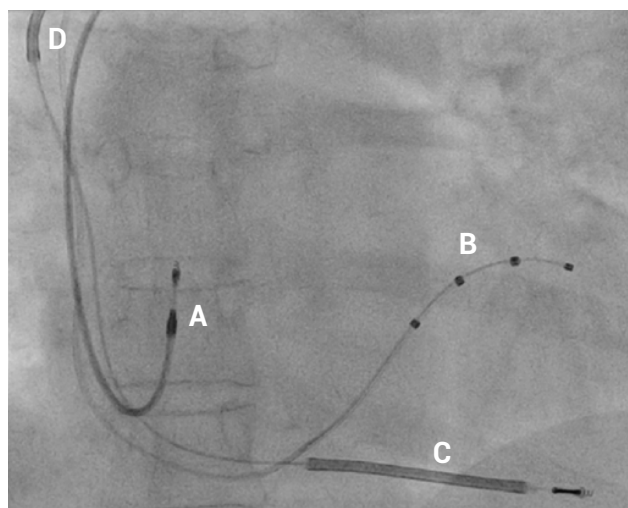
Intravenous ICD leads

A) Bipolar pacing lead (atria): Able to pace the target chamber but unable to deliver a large voltage shock.

B) LV lead: Able to pace the target chamber (left ventricle) but unable to deliver a large voltage shock.

C) RV single-coil defibrillator lead: Able to pace the target chamber and deliver a large voltage shock through the single coil positioned in the right ventricle.

D) RV dual-coil defibrillator lead: Able to pace the target chamber and deliver a large voltage shock through two coils, one positioned in the right ventricle and the other in the superior vena cava (SVC).



Programmable discriminator summary

Discriminator	Method	Device	Purpose	Limitations
Onset	How suddenly did the rhythm start?	• Single-chamber • Dual-chamber • CRT-D	Withhold inappropriate shocks for sinus tachycardias.	Can withhold therapy for VTs that occur during exercise.
Stability	Is this rhythm irregular?	• Single-chamber • Dual-chamber • CRT-D	Withhold therapy for 'fast' AF.	The faster the AF, the less likely it is to work appropriately.
QRS morphology	Does the QRS look like this person's 'normal' QRS?	• Single-chamber • Dual-chamber • CRT-D • S-ICD	To withhold therapy for SVTs.	Requires an underlying rhythm to generate the baseline QRS template. Can be 'tricked' by rate related bundle branch blocks and antidromic AVRTs.
AV association	How many atrial events are there compared to the amount of ventricular events?	• Dual-chamber • CRT-D	Withhold therapy for any rhythm where $A_s > V_s$ or $A_s = V_s$.	Can withhold therapy for VTs with retrograde conduction.
PR pattern analysis	What is the time interval between the atrial event and the ventricular event in rhythms, with 1:1 AV association?	• Dual-chamber • CRT-D	To recognize and re-instate therapy for VTs with retrograde conduction.	Dependent on 'normal' AV node physiology and behavior.
Sustained duration override	If a high rate has been sustained for a programmable period of time, the device deliver therapies irrespective of the other discriminators.	• Single-chamber • Dual-chamber • CRT-D	To deliver therapy when the duration of a rhythm suggests a discriminator may have wrongly withheld therapy.	Inappropriate shocks for sinus tachycardia and other SVTs are likely.

Antitachycardia pacing (ATP)

Types of ATP

Burst: The coupling interval remains constant between two impulses within a sequence.

Ramp: The coupling interval reduces by the programmed decrement value from one impulse to another.

Scan: The fixed coupling interval is shortened between each drive train.

Ramp scan: The coupling interval reduces by the programmed decrement value from one impulse to another and again between each drive train.

Useful links

Pacing and ICD indications

ESC guidelines on cardiac pacing and cardiac resynchronization therapy.

www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Cardiac-Pacing-and-Cardiac-Resynchronization-Therapy

Indications for ICDs in heart failure patients

ESC guidelines for the diagnosis and treatment of acute and chronic heart failure.

www.escardio.org/Guidelines/Clinical-Practice-Guidelines/Acute-and-Chronic-Heart-Failure

Driving restrictions

Consensus statement of the European Heart Rhythm Association: updated recommendations for driving by patients with implantable cardioverter defibrillators.

europace.oxfordjournals.org/content/11/8/1097

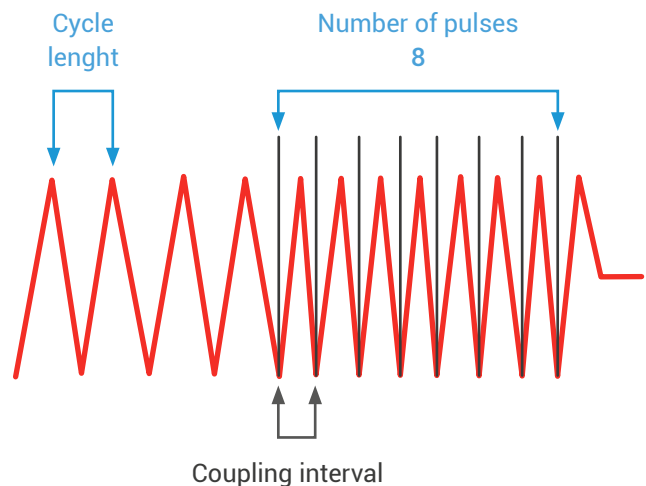
ICDs and radiotherapy

Management of cancer patients receiving radiotherapy with a cardiac implanted electronic device: A clinical guideline.

www.sor.org/learning/document-library/management-cancer-patients-receiving-radiotherapy-cardiac-implanted-electronic-device-clinical

Terminology

1 x sequence/drive train



ICDs and MRI

Guidelines for MRI in patients with cardiac pacemakers and/or implantable cardioverter-defibrillators.

www.radiology.wisc.edu/fileShelf/forReferring/MRI_Safety_Subcommittee_on_Pacemakers_Memo.pdf

ICDs and electrical devices

Answers to questions about implantable cardiac devices (ICDs): The electromagnetic compatibility guide.

http://www.medtronic.cz/wcm/groups/mdtcom_sg/@mdt/@crdm/documents/documents/electromagnetic-compatibility.pdf

ICDs and surgery

Guidelines for the perioperative management of patients with implantable pacemakers or implantable cardioverter defibrillators, where the use of surgical diathermy/electrocautery is anticipated.

heartrhythmuk.org.uk/files/file/Docs/Guidelines/MHRA%20guidelines%20surgery%20and%20ICDs.pdf

Patient information site

Ask the ICD.

<http://www.asktheicd.com>