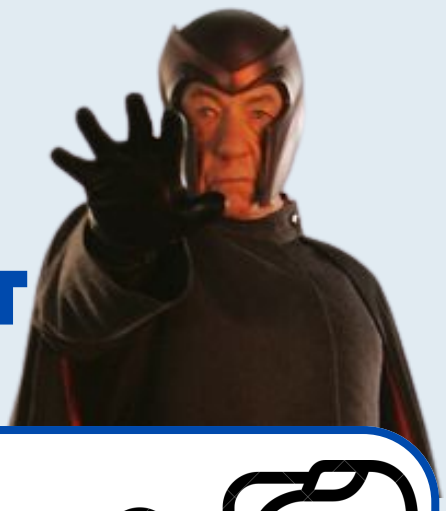
@SMURBMPM



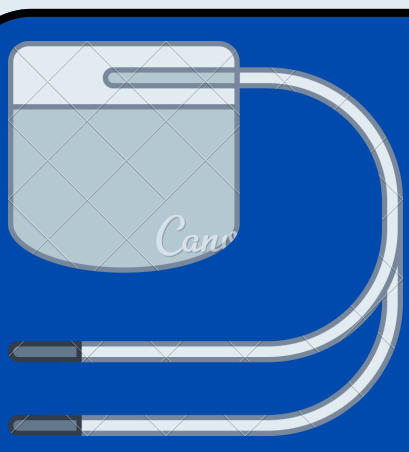
THE POWER OF THE MAGNET

Why and when to use it

NORMAL ICD'S FUNCTION

A defibrillator continuously analyzes the rhythm of the heart (frequency, morphology, regularity of QRS, etc.); in the event of tachycardia, if it considers its ventricular origin, it will respond either by defibrillating, or by stimulating even faster to "break" the arrhythmia ("anti-tachycardia pacing = ATP"). In the event of bradycardia, the defibrillator can also stimulate the heart like a pacemaker (most often in VVI 40/min).

NORMAL PM'S FUNCTION



The PM stimulates the heart when its rhythm is too slow (lower than a programmed rate).
Sensing, and pacing, can take place at the level of the atrium (A), the ventricle (V) or both (D).
In case of detection of a spontaneous rhythm, the PMK will be able to either inhibit (I) or trigger (T), or both (dual = D) or nothing (O). It can consist of several probes (chambers) and therefore stimulate several places.

Some examples...

The setting will therefore be expressed by a combination of 3 letters. (PSA: Pacing/Sensing/Action)
- 1st letter = place of pacing
- 2nd letter = place of sensing (detection)
- 3rd letter = type of response (action)

AAI : senses and paces the atrium, inhibits if detects a P wave, stimulates if no wave detected below the programmed frequency.

VVI : Same as AAI but with ventricular pacing and ventricular sensing.

DDD : Same as AAI but with ventricular pacing and ventricular sensing.

Picture from : https://thoracickey.com/cardiac-pacing-modes-and-terminology/

MAGNET'S EFFECT

PM

The PM will not stop; it will just go "deaf and blind" (asynchronous). It will therefore continue to stimulate, whatever the underlying rhythm, at a fixed rate, which is the "magnet rate".

This corresponds to an "A00" or "V00" or "D00" mode depending on the number of probes implanted.

The default rate of the PMK depends on the manufacturer, and can also provide information on the battery on certain models (ex: freq. set at 100, but reduced to 85bpm by default if the battery is out.
(ERI = Replacement / EOL = End of Life)

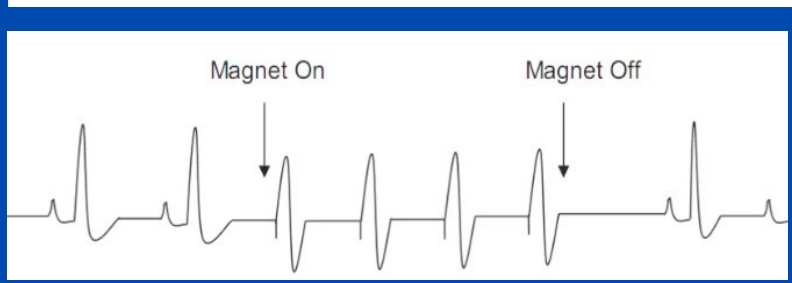
A summary sorted by manufacturer is available here

ICD

On an ICD, the magnet will disable tachycardia therapies (ATP, defibrillation), but for the most cases maintain anti-bradycardia pacing if needed.

A "beep" may be heard when the magnet is placed (inactivation)

A summary sorted by manufacturer is available here



Picture from : Dr Sajjad Safi (https://www.slideshare.net/SajjadSafi4/pacemaker-ecg)

WHEN TO USE IT ?

PM

- If in doubt about a malfunction of the device (absence of spikes, blocked P waves, spikes without wave behind).
- If necessary to accelerate the patient's heart rate (torsade de pointes, shock, etc.).
- If there is a risk of electromagnetic interference (EMI) (eg use of an electric scalpel = EB) which may inhibit stimulation.
- Tachycardia by electronic re-entry

ICD

- If multiple electric shocks, while patient is concious = either it is an error of the ICD (fracture of probe), or it is a rhythmic storm which does not respond to tachy therapies: in both cases, it is necessary to take over the ICD by the patches (external electric shock possible if VT/VF)
- In case of palliative care
- If risk of EMI (BE...)

WARNING: this document concerns the majority of PM/ICD, but not all of them. Exceptions are possible.
To learn more, click here

Infographic by Dr BALAZ, proofreading Drs WILKIN, BARRAUD et KHALIL