MASSACHUSETTS GENERAL HOSPITAL

Patient ID

MGH PACEMAKER/ICD PREOP EVALUATION FORM

Device Type: (Pacemaker ICD CRT-D CRT-P SubQ ICD Leadless Pacer)

Manufacturer: (BS SJM/Abbott MDT Biotronik)

Device Location: (Left or Right)

Date of most recent interrogation_____ (see Preoperative Interrogation Guidelines below)

Alerts:

Battery life:

Indication for Insertion:

Is patient pacemaker dependent: (Yes No)

% A-paced_____

% V-paced_____

Patient's underlying rhythm?

Are any leads less than 3 months old?

Pacemaker settings: Mode_____ LRL_____ URL_____

If Rate Response Mode on, what is sensor: (Min Vent. Accelerometer CLS)

Present settings of the ICD--lowest HR for shock or ATP delivery_____

Pacemaker magnet response: Mode_____ Rate_____ Other_____

Will the ICD respond to a magnet (applies to St Jude and Bost Scient ICDs): (Yes No)

AFib mode switch settings: Mode_____ LRL_____

Does the device have a sleep/rest/night mode activated?

Does the device have MVP, VIP, RHYTHMIQ, IRS activated?

Preoperative Interrogation Guidelines

1. A recent device interrogation report should be available to the anesthesia team according to these guidelines:
   ICD or CRT device 3 months prior to procedure
   Pacemaker 6 months prior to procedure
2. Patients who experienced symptoms such as palpitations, chest pain, dyspnea, or a recent shock that could signify device malfunction should be seen prior to surgery, no matter when the last interrogation occurred
3. If a patient presents for surgery without an "up-to-date" assessment, the patient should be seen by our EP service prior to going to the OR unless there is a note in the medical record from the patient's cardiologist stating that no further preop device evaluation is required.

EP tech pager (8:00am-4:30 pm)	16939 (or PPM)	Medtronic Tech Support (Pacers)	800-505-4636
EP Fellow (after hours and w/e)	617-726-9292	Medtronic Tech Support (ICDs)	800-723-4636
Boston Scientific Tech Support	800-227-3422	Biotronik Tech Support	800-284-6689
St Jude Medical Tech Support	800-722-3774		

Pacemaker Magnet Interaction Information

Most pacers respond to a magnet by pacing asynchronously (DOO, VOO, or AOO) at a rate between 85-100. The rate depends on the Manufacturer and remaining battery life (see chart below). Rarely, pacers can be programmed to ignore a magnet (Bos Sci, St Jude, Biotronik), or to pace asynchronously for only 10 beats (Biotronik), or to ignore a magnet for 60 min. after a programming session (few Medtronic pacers). Therefore always test the magnet function on the appropriately monitored patient prior to starting the procedure if you might use a magnet.

	BOL	ERI	BOL=Beginning of Life ERI=Elective Replacement Indicator
Boston Scientific (Guidant)	100	85	Gradual decline in magnet rate to ERI rate
St Jude Medical	98.6 or 100	86.3 or 85	Gradual decline in magnet rate to ERI rate
Sorin/ELA	96	80	Gradual decline in magnet rate to ERI rate
Biotronik	90	80	Abrupt decline in magnet rate from 90 to 80 at ERI
Medtronic	85	65	Abrupt decline in magnet rate from 85 to 65 at ERI

Pacemakers do not emit a tone in response to magnet application.
Magnets will inhibit the Rate Response Mode (RRM) in any pacer programmed to respond to the magnet.
Biotronik pacers have 3 magnet modes: ASYNC—paces at 90 asynchronously; AUTO—paces at 90 for 10 beats only; SYNC—Ignores magnet
Leadless pacemakers do not respond to a magnet. A programmer is required to change the pacing mode.

For more detailed magnet related information see Heart Rhythm July 2011 p.1151-52, Appendix 5A.

ICD Magnet Interaction Information

Magnets applied to ICDs typically inhibit the ICD's anti-tachy functions, i.e., the shocking and anti-tachy pacing will be temporarily inhibited. Some ICDs (Bost Sci and St Jude) can be programmed to ignore a magnet, but this is rare. Always determine how the magnet will affect the ICD (EP consult or programmer) prior to the procedure. Removal of a magnet from a magnet-responsive ICD will reactivate the ICD's anti-tachy function. Biotronik ICDs are only inhibited by a magnet for 8 hours.

Magnet-responsive Bost Sci ICDs emit an intermittent tone (R-wave synchronous or every second in newer devices) for as long as the magnet is on the device. Boston Sci Sub Q ICDs will emit a tone for only 60 seconds, but the magnet continues to inhibit the ICD. Boston Scientific ICDs that have been exposed to an MRI will likely no longer emit a beeping tone as the MRI destroys the speaker function. Medtronic ICDs emit a temporary continuous tone for 15-20 seconds upon magnet application; a temporary beeping tone indicates there is an alert situation; a high-low tone indicates a significant warning. St Jude, Biotronik, and Sorin/Liva Nova ICDs do not emit a tone upon magnet application.

Key Concept—Although a magnet will convert most pacemakers to an asynchronous pacing mode, a magnet applied to essentially all ICDs will not affect the pacemaker component of the ICD—pacers associated with an ICD do not respond to a magnet with one exception: Sorin/ELA ICDs' pacers respond to a magnet by pacing in the base mode at 96. To change the pacing mode of an ICD, a programmer is required.

Subcutaneous ICDs (Bost Sci S-ICDs) pulse generators are positioned laterally, and the shocking lead is inserted midline above the sternum. Pacing is limited to post-shock VVI pacing only.

Device	ICD Fxn	Pacer/RRM	Tone	Removal	Can be programmed to ignore magnet
St Jude	Suspends	No effect	No	Resumes function	Yes
Biotronik	Suspends	No effect	No	Resumes function	No
Medtronic	Suspends	No effect	Yes	Resumes function	No
Bost Scient	Suspends	No effect	Yes#	Resumes function	Yes
Sorin/L. Nova	Suspends	HR 96 to 80 in base mode	No	Resumes function	No

Unless the Boston Scientific ICD has been exposed to MRI
See HRS Document in Heart Rhythm July 2011 p.1153-54, Appendix 5B for more details on the effects of a magnet on ICDs

Post Op Management Recommendations

1. Patients listed below (a-h) need to be evaluated by an EP team prior to being discharged from a monitored setting:
    a. The ICD or Pacer was reprogrammed prior to the procedure (e.g., ICD therapy turned off, pacer mode changed, etc.)
    b. The patient underwent cardiac, thoracic, open extensive vascular, neck or ipsilateral shoulder surgery
    c. The patient experienced cardiac arrest, CV or defibrillation, CPR, temporary pacing or other complex event
    d. The patient had emergency surgery with EMI above the umbilicus, and no preop device assessment was available
    e. The patient had radiofrequency ablation or therapeutic radiation near the device (thoracic or neck area)-see EP guidelines
    f. A shock was noted or the patient moved unexpectedly intraop
    g. Abnormal tones were emitted from an ICD when a magnet was placed, or apparent pacemaker dysfunction was noted
    h. A pulmonary artery catheter was inserted within 3 months of ICD or pacer lead implant

2. If cautery or lithotripsy was used, but the patient does not meet any condition a-h above, the patient's device should be interrogated within 1 month of DC by the cardiologist managing the patient's device—this can be done in an office or via remote-monitoring. If the patient states that this will not be possible, our EP team should see the patient prior to hospital discharge.

3. If no cautery or lithotripsy was used, no additional perioperative EP assessment is needed.