MASSACHUSETTS GENERAL HOSPITAL

Patient ID

MGH PACEMAKER/ICD PREOP EVALUATION FORM

Surgeon's Office - Please complete **Section 1** and fax to patient's cardiologist/ electrophysiologist when surgery booked.

PATA Clinic - If patient is followed at MGH please complete section 1 and fax to 617-724-7534, Attn: Pacemaker RN or ICD RN. If patient is followed elsewhere, please complete **Section 1** and FAX to the patient's cardiologist.

Cardiology Office—please complete **Section 2** and FAX to **PATA**: 617-726-4489

SECTION I: (to be completed by surgeon's office and/or PATA Clinic)

Date of surgery:

Type of surgery (include side):

SECTION II: (to be completed by cardiology/EP office or MGH EP service)

Device Type (Pacemaker, ICD, CRT-D, CRT-P):

Device Location (Left or Right):

Manufacturer:

Model #:

Date of most recent interrogation:
- Any abnormal findings?
- Battery life >6 months?

Indication for Insertion:
- Pacer:
- ICD:

Is the patient pacemaker dependent?

What is the patient's underlying rhythm?

Are any leads less than 3 months old?

Present settings of the pacemaker (mode and lower rate/upper rate limit):

Present settings of the ICD (lowest HR for shock and lowest rate for ATP delivery):

How will the Pacemaker respond to a magnet (mode and rate)?

Will the ICD respond to a magnet (applies to St Jude and Bost Scient ICDs)?

If there is a Rate Response Mode active, what is the sensor (min vent. or accelerometer or CLS)?

If there a mode switch for A Fib/A Flutter, what will the pacer mode and rate change to?

Does the device have a Sleep/Rest/Night Mode activated? If yes, what are the parameters?

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

Is the device MRI safe?

Name and number of patient's Cardiologist/EP Attending?

Is there anything else the perioperative team should know (e.g., any lead recalls or capture threshold issues)?

Main OR Fax Number	617-726-1643	Medtronic Tech Support (Pacers)	800-505-4636
Boston Scientific Tech Support	800-227-3422	Medtronic Tech Support (ICDs)	800-723-4636
St Jude Medical Tech Support	800-722-3774	Biotronik Tech Support	800-284-66

Preoperative Device Interrogation Guidelines

1. The last device interrogation reported in the pt's medical record should be within 3 months of the surgery if the patient:
    a. Has an ICD
    b. Has a pacemaker or ICD with cardiac resynchronization therapy (CRT)
2. The last device interrogation reported in the pt's medical record should be within 6 months of the surgery if the patient:
    a. Has a pacemaker without CRT
3. Patients with new symptoms such as palpitations, chest pain, dyspnea or any other sign or symptom that could be related to pacer malfunction or who have had an unexpected shock should be seen prior to surgery no matter when the last interrogation occurred.
4. 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.

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, Biotron), 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. You should 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. 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/ELA 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 mode of a pacer associated with an ICD, one needs to use a programmer.

Subcutaneous ICDs (Bost Sci S-ICDs) respond to a magnet as other ICDs. The anti-tachy function will be temporarily inhibited. The pulse generator is 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/ELA	Suspends	HR 96 to 80 in base mode	No	Resumes function	No

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)
    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 were 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, the patient should be seen by our EP team prior to discharge from the hospital.
3. If no cautery or lithotripsy were used, no additional EP assessment is needed.