Standard Letter
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ELECTROMAGNETIC COMPATIBILITY (EMC)

ELECTROMAGNETIC INTERFERENCE (EMI)

IPG – IMPLANTABLE PULSE GENERATOR (PACEMAKER)

ICD – IMPLANTABLE CARDIOVERTER DEFIBRILLATOR

ILR – IMPLANTABLE LOOP RECORDER

Medtronic pacemakers, defibrillators, and loop recorders have been designed and tested to operate normally during a patient's exposure to the electromagnetic fields commonly encountered in the work and home environments. The patient, physician and employer together need to consider the ability of the patient to resume work after receiving a device.

The following are three principal types of interference

- **Conducted interference** occurs when the patient is in direct contact with the electrical source. The most risk and actual accounts have occurred from poorly maintained electrical equipment. Conducted currents should be avoided.
- **Radiated fields** are those signals which propagate through the air and may potentially induce current that can be detected by the implanted device. Common sources of these fields include high-voltage power lines, radio transmission towers, or two-way wireless communication equipment.
- **Static magnetic fields** are those produced by a permanent or direct current (DC) electro-magnet.

Typical Response by each type of device (effects are typically temporary):

Source	IPG	ICD	ILR
Conducted Interference *-OR-* Radiated Electric/Magnetic Fields	Inhibition, Reversion or high rate pacing	Inhibition, Shock or high rate pacing	False Episode Activation
Static Magnetic Fields (DC)	Asynchronous pacing	Suspend Detection (pacing unaffected)	No effect

Interference to a device from electromagnetic fields is unlikely, but has been known to occur in some instances.

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ELECTROMAGNETIC FIELDS – THRESHOLDS

The following are field intensity limits for Medtronic IPGs and ICDs. The following limits are stated relative to where the patient's torso may be located:

EMI Source	Field Intensity Limit
Power Frequency (50/60 Hz)	6,000 volts per meter
High Frequency (150 KHz & up)	100 volts per meter
Static Magnetic Fields (DC)	5 Gauss
Modulated Magnetic Fields	80 Amps/meter (1 Gauss) up to 10 KHz and 1 Amp/meter for greater than 10 KHz

Although Medtronic does not provide on-site environmental testing, technical assistance can be provided to the environmental consultant or employer in interpreting test results. Medtronic Technical Services can answer questions regarding EMC and possible device interactions.

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