Electromagnetic Interference (EMI) and Compatibility of an Active 131 KHz Radio Tag (RuBee, IEEE P1902.1) with Pacemakers (PM) and ICDs.


**Background:** Radiofrequency (RF) identification has safety and economic implications in healthcare. RuBee, a 131KHz protocol, has shown value of real-time visibility of implantable devices and human assets in the operating room. Our purpose was to determine if significant EMI occurred when PM and ICDs were exposed to RuBee RF signals.

**Methods:** In-vitro testing was performed in a saline bath. Underlying rhythm was simulated with a ‘slaved’ PM and leads. Two RuBee modes were tested, normal power (NP) and over power mode (OPM) (2.3 x NP). Four antennae test configurations (ATC) were used: 2.25 and 4.75 inches ( ) above and 6 to the side of the device. ICD and PM programmer interference was tested using ATC of 6” - 60” to the side. PM tested in bipolar and unipolar sensing configuration at most sensitive (S) setting and ICDs tested in bipolar at most S setting.

**Results:** 64 total tests performed on 6 total devices (1 PM and 1 ICD from 3 manufacturers). At normal power and ATC at 2.25 and 4.75 above devices, no EMI or untoward events for any bipolar PM or ICD at the most S setting were found. One event for 1 unipolar pacemaker at most S setting (0.15 mV) was found. No events occurred at commonly programmed sensitivity. In OPM EMI could be provoked in ATC 2.25 in all but 1 PM and 1 ICD but at 4.75 only 1 episode EMI noted in 1 unipolar PM at 0.15 mV sensitivity. EMI with programmer telemetry was seen from 18” to 49.5 from the device.

**Conclusions:** RuBee and the programmers operate on similar frequencies, (131KHz vs 100KHz to 147 KHz). Using worst case power levels and ATC and most S settings the risk of an untoward event in any tested PM or ICD is minimal providing normal RuBee operating parameters are used. RuBee did not modify or alter programming of a device but could interfere with telemetry signal at a definable distance. RuBee networks should be turned off or placed at a safe distance during the brief period an ICD or PM is programmed. Exposure to RuBee in NP mode appears to carry a non-significant EMI risk to PMs and ICDs tested.